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# The Economic and Fiscal Consequences of Immigration

Panel on the Economic and Fiscal Consequences of Immigration

Francine D. Blau and Christopher Mackie, *Editors*

Committee on National Statistics

Division of Behavioral and Social Sciences and Education

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The panel thanks the following individuals who attended open meetings and generously gave of their time to present material to inform the panel's deliberations. Ronald Lee (University of California, Berkeley) reviewed methods for producing intergenerational population and fiscal impact projections. Gordon Hanson (University of California, San Diego) discussed the role of immigrants in innovation. Ian Preston (University College London) gave a presentation about immigration and public finances in the United Kingdom. Alan Auerbach (University of California, Berkeley) shared his deep expertise on tax and fiscal policy and on intergenerational estimates of fiscal impacts. Matthew Hall (Cornell University) described his research on interstate migration and the assimilation of U.S. immigrants. Brian Cadena (University of Colorado Boulder) described how immigrants affected the spatial allocation of labor across localized markets during the Great Recession. Audrey Singer (Brookings Institution) discussed the comparative skill and educational profiles of immigrants and the native-born in the United States, as well as policy and public responses to immigration. David Card (Uni-



versity of California, Berkeley) engaged the panel on a wide range of labor market topics, including wage impacts and employment effects across skill and other groups, and on variation in the capacity of industries to absorb immigrants. Ethan Lewis (Dartmouth College) presented on immigrant and native substitutability in the labor market and on the impact of immigration on production technology and economic growth. Ted Mouw (University of North Carolina) discussed evidence from the U.S. Census Bureau's Longitudinal Employer-Household Dynamics on worker displacement in high-immigration industries. Rob Fairlie (University of California, Santa Cruz) described findings from his research on the impact of immigrants on entrepreneurship and job creation. Magnus Lofstrom (Public Policy Institute of California) likewise discussed entrepreneurship and job creation and the role of state policies affecting these processes. Sarah Bohn (Public Policy Institute of California) discussed the role of immigrants in informal labor markets in California. Annette Bernhardt (University of California, Berkeley) presented on how unauthorized status plays out in the workplace—its correlation with higher rates of unemployment and labor law violations, and how current immigration policy shapes the bargaining between employers and undocumented workers. Laura Hill (Public Policy Institute of California), with input from Hans Johnson (Public Policy Institute of California), provided an overview of state and local policy issues affected by immigration in California, and of methods using administrative IRS data and indirect survey methods for measuring the extent of unregulated/unauthorized work. Nancy Folbre (University of Massachusetts Amherst) provided information to the panel about immigration and nonmarket and care work. Giovanni Peri (University of California, Davis) presented on labor market issues ranging from the role of immigrants in stimulating local labor markets to the impact of foreign science, technology, engineering, and mathematics workers on native wages and employment in U.S. cities. Dan Lichter (Cornell University) discussed Hispanic boomtowns and how immigration affects population change and racial diversity in rural America. Klaus Zimmermann (University of Bonn) presented evidence to the panel on the economic and fiscal impacts of circular migration. Lynn Karoly and Francisco Perez-Arce (RAND Corporation) presented a framework for benefit-cost analyses of state-specific immigration policies (e.g., in-state tuition, e-verify, driver's licensing, etc.). These presentations stimulated extensive discussion of the issues covered in this report.

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On behalf of the panel, I would like to express our deep gratitude to our study director, Christopher Mackie. He did a superb job in keeping us on track and coordinating all our myriad activities from our review of the existing literature to our original data analyses. He helped organize our meetings and develop the structure of the panel's final report, contributed to our literature review and the drafting and reworking of the report's chapters, and shepherded the report through the final review process. We all benefited enormously from his superlative organizational skills, insightful input into the report, and resourcefulness, as well as his patience and good humor. Speaking personally, it has been a great pleasure to collaborate with Chris on this important endeavor.

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Finally, and most importantly, a note of appreciation is in order for my fellow panel members. Despite their many professional commitments, every panel member donated countless hours and shared extensive expertise to make this report possible. As a result, the report reflects the collective expertise and commitment of all panel members: Michael Ben-Gad, City, University of London; George J. Borjas, Harvard University; Christian Dustmann, University College London; Barry Edmonston, University of Victoria; Isaac Ehrlich, State University of New York at Buffalo; Charles Hirschman, University of Washington, Seattle; Jennifer Hunt, Rutgers University; Dowell Myers, Sol Price School of Public Policy at the University of Southern California; Pia Orrenius, the Federal Reserve Bank of Dallas; Jeffrey S. Passel, Pew Research Center; Kim Rueben, Urban Institute; Marta Tienda, Princeton University; and Yu Xie, Princeton University. This group—deliberately chosen for their varied perspectives, diverse back-

grounds, and deep subject-matter knowledge—displayed rigor and creativity, and also patience when dealing with one another to produce this report.

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise. The purpose of this independent review is to provide candid and critical comments that assist the institution in making its reports as sound as possible, and to ensure that the reports meet institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process.

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Francine D. Blau, *Chair*

Panel on the Economic and Fiscal Consequences of Immigration

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## Summary

More than 40 million people living in the United States were born in other countries, and almost an equal number have at least one foreign-born parent. Together, the first generation (foreign-born) and second generation (children of the foreign-born) comprise almost one in four Americans. It comes as little surprise, then, that many U.S. residents view immigration as a major policy issue facing the nation. Not only does immigration affect the environment in which everyone lives, learns, and works, but it also interacts with nearly every policy area of concern, from jobs and the economy, education, and health care, to federal, state, and local government budgets.

Although this report focuses on the United States, the rise in the share of foreign-born populations is an international phenomenon among developed countries.<sup>1</sup> And, given disparities in economic opportunities and labor force demographics that persist across regions of the world, immigration is an issue that will likely endure. Recent refugee crises further highlight the complexity of immigration and add to the urgency of understanding the resultant economic and societal impacts.

One set of headline questions concerns the economy, specifically jobs and wages: To what extent do the skills brought to market by immigrants complement those of native-born workers, thereby improving their prospects; and to what extent do immigrants displace native workers in the

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<sup>1</sup>The United States is about in the middle of the range for OECD countries in terms of the percentage of its population that is foreign born.

labor market or lower their wages?<sup>2</sup> How does immigration contribute to vibrancy in construction, agriculture, high tech, and other sectors? What is the role of immigration in driving productivity gains and long-term economic growth?

Other questions arise about taxes and public spending: What are the fiscal impacts of immigration on state, local, and federal governments—do immigrants cost more than they contribute in taxes? How do impacts change when traced over the life cycle of immigrants and their children? How does their impact on public finances compare with that of the native-born population? To what extent is the sustainability of programs such as Social Security and Medicare affected by immigration and immigration policy?

The Panel on the Economic and Fiscal Consequences of Immigration was convened by the National Academies of Sciences, Engineering, and Medicine through its Committee on National Statistics to distill findings on these complex questions in a way that advances the conversation and improves understanding of these important topics.<sup>3</sup> Support for the study was provided by the John D. and Catherine T. MacArthur Foundation and the National Academies' presidents.

## IMMIGRANTS AND THEIR CHARACTERISTICS

Key developments have occurred over the two decades since the last major report on this topic from the National Research Council (1997), *The New Americans: Economic, Demographic, and Fiscal Effects of Immigration*:

- The number of immigrants living in the United States increased by more than 70 percent—from 24.5 million (about 9% of the population) in 1995 to 42.3 million (about 13% of the population) in 2014; the native-born population increased by about 20 percent during the same period.
- Annual flows of lawful permanent residents have increased. During the 1980s, just under 600,000 immigrants were admitted legally (received green cards) each year; after the 1990 Immigration Act took effect, legal admissions increased to just under 800,000 per

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<sup>2</sup>This report uses the term “immigrant” synonymously with the term “foreign-born.” This follows common practice of referring to the foreign-born population counted in a census or estimated by a survey as “immigrants,” even though technically this population often includes foreign students, temporary workers on H-1B and other visas, and migrants who entered the country surreptitiously or overstayed legal visas.

<sup>3</sup>The full text of the panel’s charge is reproduced in Chapter 1.

year; since 2001, legal admissions have averaged just over 1 million per year.

- Estimates of the number of unauthorized immigrants in the United States roughly doubled from about 5.7 million in 1995 to about 11.1 million in 2014. Gross inflows, which had reached more than 800,000 annually by the first 5 years of the 21st century, decreased dramatically after 2007; partly as a result, the unauthorized immigrant population shrank by about 1 million over the next 2 years. Since 2009, the unauthorized immigrant population has remained essentially constant, with 300,000-400,000 new unauthorized immigrants arriving each year and about the same number leaving.
- The foreign-born population has changed from being relatively old to being relatively young. In 1970, the peak concentration of immigrants was in their 60s; in 2012, the peak was in their 40s.
- Educational attainment has increased steadily over recent decades for both recent immigrants and natives, although the former still have about 0.8 years less of schooling on average than do the latter. Such averages, however, obscure that the foreign-born are overrepresented both among those with less than a high school education and among those with more than a 4-year college education, particularly among computer, science, and engineering workers with advanced degrees. The foreign- and native-born populations have roughly the same share of college graduates.
- As time spent in the United States lengthens, immigrants' wages increase relative to those of natives and the initial wage gap narrows. However, this process of economic integration appears to have slowed somewhat in recent decades; the rate of relative wage growth and English-language acquisition among the foreign-born is now slightly slower than it was for earlier immigrant waves. The children of immigrants continue to pick up English-language skills very quickly.
- Geographic settlement patterns have changed since the 1990s, with immigrants increasingly moving to states and communities that historically had few immigrants. Nonetheless, the majority of the foreign-born population continues to reside in large metropolitan centers in traditional gateway states.

Macroeconomic conditions have also changed:

- *The New Americans* was released during a prolonged period of economic expansion; annual real gross domestic product (GDP) growth was between 2.7 and 4.8 percent in 1992-2000. Since then, the nation has experienced a dot-com bust recession, followed by a

largely jobless recovery, a housing boom, the Great Recession, and another long, slow recovery.

- The nation's total public debt, which, in addition to federal government debt, includes state and local debt, was about 63 percent of GDP in 1997. After declining to about 54 percent in 2001, it increased to 100 percent by the end of 2012. In 2016, total public debt remains over 100 percent of GDP. The increases of the past decade have occurred largely as a result of, and in response to, the Great Recession.
- Civilian labor force growth has slowed, from around 1.2 percent annually in the 1990s, to 0.7 percent in the 2000s, to a projected 0.5 percent this decade, reflecting current demographics such as aging Baby Boomers and more young people going to college.
- The portion of the labor force that is foreign born has risen from about 11 percent to just over 16 percent in the past 20 years. Immigrants and their children will account for the vast majority of current and future net workforce growth—which, at less than 1 percent annually, is slow by historical standards.

## LABOR MARKET AND OTHER ECONOMIC IMPACTS

Economic theory provides insights into the mechanisms whereby immigration may impact wages and employment in a receiving country. By increasing the supply of labor, an episode of immigration is predicted to reduce the wages of workers already in the labor market who are most similar to the new arrivals; the incomes of others may increase, either because immigrants' skills complement their own or because the returns on capital increase as a result of changes to the labor force. The mix of skills possessed by arriving immigrants—whether manual laborers, professionals, entrepreneurs, or refugees—will influence the magnitude and even the direction of wage and employment impacts.

Given the potential for multiple, differentiated, and sometimes simultaneous effects, economic theory alone is not capable of producing definitive answers about the net impacts of immigration on labor markets over specific periods or episodes. Empirical investigation is needed. But wage and employment impacts created by flows of foreign-born workers into labor markets are difficult to measure. The effects of immigration have to be isolated from many other influences that shape local and national economies and the relative wages of different groups of workers. Firms open and close, people retire, workers switch jobs, and a stream of young native-born job seekers comes of age. Changes occur in technology, global supply chains, international trade, and foreign investment. The inflow of the foreign-born

at a given time is, under normal circumstances, a relatively minor factor in the \$18 trillion U.S. economy.

The measurement task is further complicated because the impact of immigration on labor markets varies across time and place, reflecting the size of the inflow, the skill sets of natives and incoming immigrants, the local industry mix, the spatial and temporal mobility of capital and other inputs, and the overall health of the economy. Some of the processes that are set in motion take place immediately upon arrival of the foreign-born, while others unfold over many years. Aside from supplying labor, immigration (like population growth generally) adds to consumer demand and derived demand for labor in the production of goods and services, which, in turn, may affect workers' wages and incomes.

Beyond these real-world complexities, several additional measurement problems must be resolved. Primary among these is that characteristics of local economies affect where people decide to live. Evidence suggests that immigrants locate in areas with relatively high labor demand and wages for the skills they possess and that immigrants are more willing than natives to relocate in response to changes in labor market conditions. If immigrants predominantly settle in areas that experience the highest wage growth, the observed wage growth (or dampened wage decline) may be erroneously attributed to the increase in immigration. Additionally, correct identification of the wage and employment effects of immigration must account for the possible migration response of natives to the arrival of immigrants. Researchers have made great strides in addressing these issues in recent decades; even so, the degree of success in dealing with them is still debated.

Empirical research in recent decades has produced findings that by and large remain consistent with those in *The New Americans*. When measured over a period of more than 10 years, the impact of immigration on the *wages* of natives overall is very small. However, estimates for subgroups span a comparatively wider range, indicating a revised and somewhat more detailed understanding of the wage impact of immigration since the 1990s. To the extent that negative wage effects are found, *prior immigrants*—who are often the closest substitutes for new immigrants—are most likely to experience them, followed by native-born high school dropouts, who share job qualifications similar to the large share of low-skilled workers among immigrants to the United States. Empirical findings about inflows of skilled immigrants, discussed shortly, suggest the possibility of positive wage effects for some subgroups of workers, as well as at the aggregate level.

The literature on *employment* impacts finds little evidence that immigration significantly affects the overall employment levels of native-born workers. However, recent research finds that immigration reduces the number of hours worked by native teens (but not their employment rate). Moreover, as with wage impacts, there is some evidence that recent immigrants

reduce the employment rate of prior immigrants—again suggesting a higher degree of substitutability between new and prior immigrants than between new immigrants and natives.

Until recently, the impact of high-skilled immigrants on native wages and employment received less attention than that of their low-skilled counterparts. Interest in studying high-skilled groups has gained momentum as the H1-B and other visa programs have contributed to a rapid rise in the inflow of professional foreign-born workers (about 250,000 people per year during the last decade). Several studies have found a positive impact of skilled immigration on the wages and employment of both college-educated and noncollege-educated natives. Such findings are consistent with the view that skilled immigrants are often complementary to native-born workers, especially those who are skilled; that spillovers of wage-enhancing knowledge and skills occur as a result of interactions among workers; and that skilled immigrants innovate sufficiently to raise overall productivity. However, other studies examining the earnings or productivity prevailing in narrowly defined fields find that high-skilled immigration can have adverse effects on the wages or productivity of natives working in those fields.

With so much focus in the literature on the labor market (and much of this on the short run), other economic consequences—such as the role of immigrants in contributing to aggregate demand, in affecting prices faced by consumers, or as catalysts of long-run economic growth—are sometimes overlooked by researchers and in policy debates. By construction, labor market analyses often net out a host of complex effects, many of which are positive, in order to identify direct wage and employment impacts.

The contributions of immigrants to the labor force reduce the prices of some goods and services, which benefits consumers in a range of sectors including child care, food preparation, house cleaning and repair, and construction. Moreover, new arrivals and their descendants are a source of demand in key sectors such as housing, which benefits residential real estate markets. To the extent that immigrants flow disproportionately to where wages are rising and local labor demand is strongest, they help equalize wage growth geographically, making labor markets more efficient and reducing slack.

Importantly, immigration is integral to the nation's economic growth. Immigration supplies workers who have helped the United States to avoid the problems facing stagnant economies created by unfavorable demographics—in particular, an aging (and, in the case of Japan, a shrinking) workforce. Moreover, the infusion by high-skilled immigration of human capital has boosted the nation's capacity for innovation, entrepreneurship, and technological change. The literature on immigrants and innovation suggests that immigrants raise patenting per capita, which ultimately contributes to productivity growth. The prospects for long-run economic

growth in the United States would be considerably dimmed without the contributions of high-skilled immigrants.

### FISCAL IMPACTS

Beyond wage and employment considerations, policy makers and the general public are interested in the impact that an expanding population, and immigration in particular, has on public finances and the sustainability of government programs. All population subgroups contribute to government finances by paying taxes and add to expenditures by consuming public services—but the levels differ. On average, individuals in the first generation are more costly to governments, mainly at the state and local levels, than are the native-born generations; however, immigrants' children—the second generation—are among the strongest economic and fiscal contributors in the population. Estimates of the long-run fiscal impact of immigrants and their descendants would likely be more positive if their role in sustaining labor force growth and contributing to innovation and entrepreneurial activity were taken into account.

Two basic accounting approaches, each with advantages and disadvantages, can be used to estimate the fiscal impact of immigration. Static models may be used to analyze a specific time frame, often a tax year. If data are available, cross-sectional static models can be repeated over multiple years to calculate fiscal impacts for a historical period. By contrast, dynamic projection models can be used to compute the net present value of tax contributions and government expenditures attributable to immigrants and, in some analyses, their descendants projected over their life cycles. Such analyses involve modeling the impact of an additional immigrant on future public budgets.

Regardless of the modeling approach, assumptions play a central role in analyses of the fiscal impacts of immigration. An important example is how the children of immigrants are treated in the analysis. In forward-looking projections, the logic for including second generation effects is straightforward: Even when the children of immigrants are native-born citizens, the costs and benefits they generate to public finances would not have accrued in the receiving country had their parents not immigrated in the first place. In cross-sectional analyses, life-cycle effects are captured only to the extent that data are detailed enough to reveal earnings levels of the children of immigrants once they become adults. Even then, the current fiscal contribution of today's adults provides only an imperfect estimate of the future contribution of today's children.

Analysts must also make assumptions about immigrants' use of public services. For services such as education and health care, where the total cost of provision is roughly proportional to the number of recipients, expendi-



tures should be assigned on a per capita, average cost basis. In other cases, the marginal cost of provision may differ greatly from the average cost. For pure public goods (such as national defense, government administration, or interest on the national debt),<sup>4</sup> the marginal cost of an additional immigrant is, at least in the short run, zero or close to it; thus, for answering some questions, it may be reasonable to allocate the costs of pure public goods only to the native-born or to the pre-existing population consisting of natives and earlier immigrants. For analyses estimating the fiscal impact of other kinds of immigration scenarios—for example, for large numbers of arrivals taking place over a multiyear period—the zero marginal cost assumption becomes less tenable. Because public goods such as national defense represent a large part of the federal budget, decisions about how to allocate these expenditures have a very large impact on fiscal estimates. For forward-looking intergenerational accounting models, additional assumptions must be made about government budgets, the tax burden across generations, and the interest rate, all of which can affect results dramatically.

While cross-sectional estimates of fiscal impacts are limited in a number of ways, 20 years of Current Population Survey (CPS) data on the first and second generations analyzed by the panel reveal numerous insights about the fiscal impacts of immigrants at the national level:

- Immigrant and native-born populations have historically been and remain very different in terms of their age structure. For the 1994–2013 analysis period, the first generation was heavily concentrated in working ages. Meanwhile, during the early years of this period, the second generation had higher shares of elderly and young people relative to the first and third-plus generations;<sup>5</sup> however, by 2012, the second generation had become more heavily concentrated at younger ages, including younger adults.
- Cross-sectional data from 1994–2013 reveal that, *at any given age*, the net fiscal contribution of adults in the first generation (and not including costs or benefits generated by their dependents) was on average consistently less favorable than that of the second and third-plus generations. Relative to the native-born, the foreign-born contributed less in taxes during working ages because they earned less. However, this pattern reverses at around age 60, beyond which the third-plus generation has consistently been more

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<sup>4</sup>A pure public good has the characteristic that its consumption by one individual does not reduce the amount available to be consumed by others, and it is not possible to exclude any individuals from consuming the good.

<sup>5</sup>Throughout the report, “third-plus generation” is used as shorthand to refer to any American who is in the third or higher generation after immigration (generally, those with two U.S.-born parents).

expensive to government on a per capita basis than either the first or second generation; this is attributable to the third-plus generation's greater use of Social Security benefits.

- The same cross-sectional analysis for 1994-2013 reveals that second generation adults had on average a more favorable net fiscal impact for all government levels combined than either first or third-plus generation adults. Reflecting their slightly higher educational achievement, as well as their higher wages and salaries (at a given age), the second generation contributed more in taxes on a per capita basis during working ages than did either of the other generational groups.
- Examining the per capita fiscal impact in an alternative way that reflects the age structure of each generational group as it actually existed in each year during the 1994-2013 analysis period produces a different perspective on the data. For this analysis, the panel included net fiscal costs of dependent children as part of the calculations for their parent's generation. Under the conservative assumption that the per capita fiscal cost of public goods such as national defense should be assigned on an average cost basis, the first generation group (including dependent children) again had a more negative fiscal impact than either of the other generation groups. This outcome is primarily driven by two factors: First, the lower average education level of the first generation translated into lower incomes and, in turn, lower tax payments; second, higher per capita costs (notably those for public education) were generated at the state and local levels because the first generation had, on average, more dependent children than other adults in the population (due in part to the age structure of first generation adults). A partially offsetting positive fiscal impact was created by the fact that, during the analysis period, first generation adults were disproportionately of working ages and paying taxes.
- Under the same assumptions as above, and using the same data, the fiscal impact of the second generation group (including their dependent children) was only modestly less negative than for the first generation over the period as a whole and considerably more negative than that of the third-plus generation. This result may appear at odds with the *age-specific* data indicating that the second generation typically outperforms all other generations along a number of dimensions, including years of education, per capita wage and salary income, and per capita taxes paid. This apparent incongruity is due mainly to changing age profiles. At the beginning of the 1994-2013 period, the second generation was concentrated in the (fiscally expensive) retirement ages. By 2013, comparatively

more second generation individuals were in younger age groups, while more third-plus generation individuals were in older age groups. As a result of this demographic shift, the second generation group's fiscal impact became only slightly more negative than that of later generations. The larger negative effect for the second generation group during the analysis period was due entirely to their age distribution.

- Figures for the 1994-2013 analysis period translate into large fiscal shortfalls overall for *all three* groups (although the federal and total fiscal picture became more favorable for the first and second generation groups over the period, while it generally became less favorable for the third-plus generation group). These shortfalls are consistent with deficit figures in the National Income and Product Accounts for the federal-, state-, and local-level budgets combined. For 2013, the total fiscal shortfall (i.e., the excess of government expenditures over taxes) was \$279 billion for the first generation group, \$109 billion for the second generation group, and \$856 billion for the third-plus generation group.<sup>6</sup> Under this scenario, the first generation group accounted for 17.6 percent of the population and 22.4 percent of the total deficit, while the second generation accounted for a slightly higher share of the total deficit (8.7%) than their share in the population (7.4%). While the fiscal shortfall for the average member of the first generation group was larger than it was for an average member in either native-born group, the shortfall for the latter groups would have been larger without the presence of the first generation group because federal expenditures on public goods such as national defense (assigned to members of all three groups on an average cost basis here) would have to be divided among a smaller population.
- Because government expenditures on public goods are large, accounting for almost one-third of total federal spending, the average versus marginal cost assumption is an important driver of fiscal impact estimates. When a marginal cost allocation of public goods is assumed instead of the average cost allocation used in the fiscal impact numbers reported above, the total net fiscal impact of the first generation group accounts for less than 4 percent of the total deficit, while still accounting for 17.6 percent of the sample population.

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<sup>6</sup>Again, in this analysis, dependent children are included in the generational group of the parent to which they are assigned.

Models that project the fiscal impact of immigrants and their descendants—that is, models that add up the future tax payments and benefit receipts each year from the time of entry into the United States—provide an alternative to the static historical analyses described above. Although the assumptions involved—about the government budget, choice of interest rate, or who pays for public goods—strongly influence the results, additional important insights about the impact of immigration on fiscal balances can be derived as follows:

- Viewed over a long time horizon (75 years in our estimates), the fiscal impacts of immigrants are generally positive at the federal level and negative at the state and local levels. State and local governments bear the burden of providing education benefits to young immigrants and to the children of immigrants, but their methods of taxation recoup relatively little of the later contributions from the resulting educated taxpayers. Federal benefits, in contrast, are largely provided to the elderly, so the relative youthfulness of arriving immigrants means that they tend to be beneficial to federal finances in the short term. In addition, federal taxes are more strongly progressive, drawing more contributions from the most highly educated. The panel's historical analysis indicates that inequality between levels of government in the fiscal gains or losses associated with immigration appears to have widened since 1994. The fact that states bear much of the fiscal burden of immigration may incentivize state-level policies to exclude immigrants and raises questions of equity between the federal government and states.
- Today's immigrants have more education than earlier immigrants and, as a result, are more positive contributors to government finances. If today's immigrants had the same lower educational distribution as immigrants two decades ago, their fiscal impact, expressed as taxes paid minus expenditures on benefits received, would be much less positive or much more negative (depending on the scenario). Whether this education trend will continue remains uncertain, but the historical record suggests that the total net fiscal impact of immigrants across all levels of government has become more positive over time.
- An immigrant and a native-born person with similar characteristics will likely have about the same fiscal impact. Persons with higher levels of education contribute more positively to government finances regardless of their generational status. Furthermore, within age and education categories, immigrants generally have a more salutary effect on budgets because they are disqualified from some benefit programs and because their children tend to have

higher levels of education, earnings, and tax paying than the children of similar third-plus generation adults.

In addition to the net fiscal effects of immigration for the nation as a whole, the effects on revenues and expenditures for state and local governments are also of concern to policy makers and the public. The panel's analysis of subnational data indicates that the net burden of immigration to fiscal balance sheets varies tremendously across state governments. Consistent with findings in the national-level analyses (and for the same reasons), first generation adults plus their dependents tend to be more costly to state and local governments on a per capita basis than adults (plus their dependents) in the second or third-plus generations, and, in general, second generation adults contribute the most to the bottom line of state balance sheets.

For the 2011-2013 period, the net cost to state and local budgets of first generation adults (including those generated by their dependent children) is, on average, about \$1,600 each. In contrast, second and third-plus generation adults (again, with the costs of their dependents rolled in) create a net positive of about \$1,700 and \$1,300 each, respectively, to state and local budgets. These estimates imply that the total annual fiscal impact of first generation adults and their dependents, averaged across 2011-2013, is a cost of \$57.4 billion, while second and third-plus generation adults create a benefit of \$30.5 billion and \$223.8 billion, respectively. By the second generation, descendants of immigrants are a net positive for the states as a whole, in large part because they have fewer children on average than do first generation adults and contribute more in tax revenues than they cost in terms of program expenditures.

In jurisdictions with higher spending on schools (kindergarten through 12th grade), the relative cost of first generation immigrants with more dependents is typically higher compared with low-spending jurisdictions. However, this investment could drive higher wages in the future.

### DATA RECOMMENDATIONS

The theoretical and empirical advances of recent decades have allowed researchers to address questions about the economic and fiscal impacts of immigration with greater confidence; nonetheless, some questions remain difficult to answer fully. Therefore, this report concludes by identifying data needs for pushing the knowledge frontier forward so that a report published 20 years from now will present an even more comprehensive portrayal of how immigration affects the economy and those engaged in economic activities. A key requirement is building into the nation's statistical infrastructure the capacity to monitor the net contributions of the native-born children of immigrants who help to shape the nation's economic and demographic

future over the course of their entire lives. The ability to identify second generation respondents is extremely desirable for empirical analyses of both the labor market and fiscal impacts of the children of immigrants, who may on average attain different education and skill levels (often higher), achieve different occupational outcomes, and generate at least slightly different fiscal impacts compared with the general population. Perhaps the most important of the data recommendations for advancing research on immigration identified in this report—and also recommended in our sister panel’s report (National Academies of Sciences, Engineering, and Medicine, 2015) *The Integration of Immigrants into American Society*—is for the U.S. Census Bureau to add a question on the birthplace of parents to the American Community Survey (ACS). This addition would permit more accurate monitoring of local populations and labor forces than is possible with the current source of such information, the CPS, which while highly valuable has a considerably smaller sample size than the ACS.



# PART I

## BACKGROUND AND CONTEXT





# 1

## Introduction

### 1.1 CONTEXT AND MOTIVATION

Immigration is not a new phenomenon. The United States has been a nation of immigrants<sup>1</sup> throughout its history. Nonetheless, the issue of immigration has often risen to the fore, and today many Americans view immigration as one of the top policy issues facing the nation.<sup>2</sup> Perhaps this should come as no surprise given that the percentage of foreign-born in the U.S. population has been steadily growing, increasing from 4.7 percent in 1970 (the lowest ever measured for the United States) to 11.1 percent in 2000, and further rising to 13.3 percent in 2014 (approaching the historical highs attained 100 years ago). An even higher percentage of households have at least one family member who is foreign born. According to the

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<sup>1</sup>In general in this report, the term “immigrant” is used synonymously with the term “foreign-born.” In doing this, the panel follows common statistical practice for referring to the foreign-born population counted in a census or estimated by a survey as “immigrants,” even though the category includes foreign students, temporary workers on H-1B and other visas, and migrants who entered the country surreptitiously or overstayed legal visas. Further, in portions of the report, such as in the fiscal analyses in Chapters 8 and 9, we distinguish between immigrant generations: the first generation (who are foreign-born), the second generation (those born in the United States to at least one foreign-born parent), and the third-and-higher generations (those born in the United States to native-born parents). For brevity, the report uses “third-plus generation” to refer to the latter group. In Chapter 2, Section 2.10 (Counting Immigrants) addresses these and other definitional issues.

<sup>2</sup>In the 2015 edition of the Pew Research Center’s annual policy priorities survey, 52 percent of Americans rated immigration a “top priority for the president and Congress.” (Pew Research Center, 2015b).

Census Bureau, more than 20 percent of married couples in the United States include a spouse born in another country. And nearly one-quarter of the U.S. population is either foreign born themselves or has at least one foreign-born parent (Pew Research Center, 2015a, p. 120). Moreover, the largest increases in the percentage of foreign-born in recent years have taken place in states—many of them in the South—unaccustomed to immigration.<sup>3</sup> Hence, immigration is undeniably a key factor shaping many communities and households. In workplaces, classrooms, and neighborhoods across many parts of the country, daily interaction among the native-born, earlier immigrants, and new arrivals is the norm, and these interactions raise awareness of immigration across the population more broadly.

Immigration is also constantly in our purview because it is an ongoing process. And, given divergences in demographic trends and economic opportunities that persist across regions of the world, it is one that is likely to continue. The stream of arrivals—at times a relative trickle and at times rapid—not only affects the environment in which we live, learn, and work, but also interacts with nearly every policy area of concern, from jobs and the economy, education, and health care to the federal budget deficit. Thus, immigration factors into a nearly endless list of social and economic questions whose answers will shape the nation's future.

This study assesses the impact of dynamic immigration processes on economic and fiscal outcomes for the United States, a major destination of world population movements. Related topics, such as the occupational, educational, and other assimilation issues faced by immigrants themselves, necessarily enter the discussion along the way.<sup>4</sup> The report is organized into three major sections: Part I (Chapters 1-3) provides background and context by placing immigration to the United States in historical perspective and statistically describing the economic assimilation of immigrants in recent history. Part II (Chapters 4-6) assesses economic impacts of immigration, focusing on wages, employment, and labor markets generally, as well as on broader economic activity and long-run growth. Part III (Chapters 7-10) estimates fiscal impacts over recent past periods for federal and state governments and presents illustrative future immigration scenarios for the federal level.

<sup>3</sup>The states where the proportion of foreign-born has risen by one-third or more since 2000 are Alabama, Arkansas, Indiana, Iowa, Kentucky, Louisiana, Maryland, Mississippi, Nebraska, North Dakota, Oklahoma, Pennsylvania, South Carolina, South Dakota, Tennessee, and Wyoming. This calculation is based on Decennial Census and American Community Survey data presented in Grieco et al. (2012).

<sup>4</sup>The integration of immigrants into American society—specifically, their outcomes in terms of educational attainment, occupational distribution, income, residential integration, language ability, and poverty—is the focus of a companion report, *The Integration of Immigrants into American Society* (National Academies of Sciences, Engineering, and Medicine, 2015).

The last major report from the National Academies of Sciences, Engineering, and Medicine to take on these topics comprehensively was *The New Americans: Economic, Demographic, and Fiscal Effects of Immigration*, released in 1997 (National Research Council, 1997). One conclusion of that report was that immigration flows were unlikely to have a very large effect on the earnings of the native-born or on per capita gross domestic product (GDP). However, the report recognized that immigration can have sizable effects on segments of the workforce and on specific geographic areas with high concentrations of immigrants. Similarly, fiscal impacts overall were found to be modest but highly variable at the margin, mainly due to the great variety in age, education, and experience brought by new arrivals. One reason for revisiting these topics is to reconsider how findings about economic and fiscal impacts may have changed in the past 20 years, given the very different political, economic, and demographic context of the present relative to the 1990s. A key underlying question is: “How is what is known now about the consequences of immigration different from what was thought before, either because of expanded and improving research or because of changed circumstances?”

The following short “then and now” list summarizes how the context has shifted and why a reassessment is warranted.

1. Between the mid-1990s and 2014, the total number of immigrants living in the United States increased by more than 70 percent, from 24.5 million in 1995 to 42.3 million in 2014 (based on published data from the 1995 Current Population Survey and the 2014 American Community Survey). Over the same period, the number of unauthorized immigrants estimated to be in the United States roughly doubled from about 5.7 million in 1995 to about 11.1 million (Passel and Cohn, 2016).
2. Regarding inflows, legal immigration has increased somewhat. During the 1980s, just under 600,000 (577,000 annual average over 1980-1989) immigrants were admitted legally each year (received green cards); after the Immigration Act of 1990 took effect, legal admissions increased to just under 800,000 per year.<sup>5</sup> Then, from

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<sup>5</sup>Approximately 785,000 green cards, granting lawful permanent residency, were issued per year over the 1992-2000 period. The vast majority of these went to foreign-born individuals qualifying as family of a U.S. citizen or lawful permanent resident, admitted through employer sponsorship, granted protection as refugees or asylum seekers, or originating from countries with low immigration rates to the United States (also known as diversity immigrants or green-card lottery immigrants). A small percentage of individuals and their dependents during this period also benefited from the Immigration Reform and Control Act of 1986, which legalized certain seasonal agricultural workers as well as unauthorized individuals who entered the United States before January 1, 1982, and met a set of standard naturalization conditions.

2001 on, legal admissions averaged more than 1 million per year (1,043,000 for 2001-2014).<sup>6</sup> Another major change, beginning in the 1990s, has been the increased entrance of immigrants via temporary foreign worker visas—including through the H-1B program, which allows U.S. companies to temporarily employ foreign workers in high-skilled, specialty occupations. Since the category was created in 1990, the number of H-1B visas made available each year has been limited to an annual statutory cap of 65,000; however, higher caps (115,000 or 195,000) were put in place from 1999-2003 and, since 2006, 20,000 additional visas have been available for foreign professionals who graduate with a master's degree or doctorate from a U.S. university.

3. Growth of the unauthorized immigrant population averaged about 500,000 per year between 1990 and 2007 as a result of large inflows of new unauthorized immigrants offset by smaller outflows of those already here. In the early 1990s, inflows were averaging 400,000-500,000 per year. By the first 5 years of the 21st century, average annual inflows of new unauthorized immigrants reached more than 800,000 every year. After 2007, the pattern changed dramatically; the unauthorized immigrant population decreased by about 1 million over the next 2 years as outflows increased substantially and inflows of new unauthorized immigrants dropped from the high levels of the early 2000s. Since 2009, the unauthorized immigrant population has remained essentially constant as inflows and outflows have reached a rough balance. During this period, 300,000-400,000 new unauthorized immigrants have arrived each year and about the same number have left the United States.
4. With respect to overall economic conditions, *The New Americans* (National Research Council, 1997) was released in the midst of a period of prolonged real GDP growth, with annual rates ranging from 2.7 to 4.0 percent between 1992 and 1996 and from 4.1 to 4.8 percent between 1997 and 2000. Since 2000, the United States has experienced a major 2-year slowdown and a rebound, followed by the Great Recession (which reached its nadir with a -2.8 percent GDP decline in 2009) and a long slow recovery.

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<sup>6</sup>There is no strong trend after 2001. There was a drop in 2003 due to increased security checks and start-up delays for the U.S. Department of Homeland Security, but these delays were offset by increases in 2005-2006.

5. The nation's federal public debt, expressed as a percentage of GDP, was in the 4446 percent range in 1997 and by 2001 had declined to 31 percent of GDP. The debt has been increasing since 2001 and has remained at more than 70 percent of GDP since the end of 2012. Indeed, total public debt, adding in state and local debt held by the public, is now greater than 100 percent of GDP. The increases of the past decade have occurred largely as a result of and in response to the Great Recession.<sup>7</sup>
6. Growth in the size of the civilian labor force has slowed from around 1.2 percent annually in the 1990s to 0.7 percent in the 2000s and to a projected 0.5 percent annual growth for this decade. This trend reflects current demographics (mainly an aging Baby Boom cohort reaching retirement age), more young people going to college, and a decline in labor force participation rates of working-age adults (including a leveling off of the decades-long trend of rising labor force participation by women). Workforce size and participation carries implications for fiscal balances and the sustainability of government retirement and health care programs because benefits are largely funded by taxes paid by current workers. Likewise, the number of workforce exits (mainly retirements)—which has increased from 18.8 million in the 1990s to 23.4 million in the 2000s and to a projected 27.3 million in the 2010s—has a major impact on the fiscal health of these programs.
7. The portion of the labor force that is foreign born has grown from about 11 percent to just over 16 percent in the past 20 years. The vast majority of current and future net workforce growth—which, at less than 1 percent annually, is very slow by historical standards—will be accounted for by immigrants and their U.S.-born descendants (Myers et al., 2013).
8. Population aging figures more prominently on today's political agendas than it did 20 years ago, driven by a number of factors including rising health care costs (since the mid-1990s, the nation's total expenditures on health care, as a share of GDP, have increased from roughly 13% to 18%) and concerns about the long-term viability of Social Security insurance as Baby Boomers retire. What an aging population portends for future workforce trends is highly uncertain. Much depends on incentives for seniors to remain in the labor force; on educational investments in youth, including the children of immigrants; and on the skill composition of future immigrants.

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<sup>7</sup>Federal Reserve Bank of St. Louis. *Total Public Debt as Percent of Gross Domestic Product*. Available: <https://research.stlouisfed.org/fred2/series/GFDEGDQ1885> [November 2016].

9. Geographic patterns of immigrant settlement have changed in the past two decades, with immigrant families increasingly settling in “nontraditional” receiving states and communities. None of the traditional gateway states (California, Florida, New Jersey, and New York), where immigrants make up roughly 20 percent or more of the population, were among the top seven states with the highest growth rates over 1990-2010. Over that 20-year period, Arkansas, Georgia, Kentucky, Nevada, North Carolina, South Carolina, and Tennessee, each experienced growth rates over 300 percent—albeit from low initial immigrant populations at the beginning—in their immigrant populations.

Intertwined with many of the trends identified above was the Great Recession, extending officially from December 2007 to mid-2009, which had devastating consequences for middle- and low-income households, particularly those whose members were among the 8 million workers who lost their jobs and whose wealth was based on inflated housing prices (Economic Policy Institute, 2012). Although the recession officially ended in June 2009, the labor market response has been sluggish, unlike trade and industrial growth, which has direct implications for economic opportunity. As in the “jobless recovery” after the 2001 recession (Bernstein, 2003), employment growth has been slow and highly uneven by skill level, industry sector, and occupation (Carnevalle et al., 2015). Even with unemployment falling from its recession peak of 10.0 percent (October 2009) to its current rate of around 5 percent during the slow recovery, the addition of 6.8 million nonfarm payroll jobs in the 42 months since February 2010 when payrolls bottomed out is below the number lost during the market contraction.<sup>8</sup> However, the job growth picture is mixed: Median earnings for full-time, full-year workers have at least returned to and possibly now exceed pre-recession levels; growth in low-wage jobs also has restored recession losses; and the gap between the earnings of young and experienced workers has widened. Some of these trends have potentially exacerbated wage gaps by skill level.

In addition, rising immigration is far from being just a U.S. trend. The rise in the share of foreign-born populations is an international phenom-

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<sup>8</sup>These figures come from Pew Research Center analysis of Bureau of Labor Statistics data. Available: <http://www.pewresearch.org/fact-tank/2013/09/25/at-42-months-and-counting-current-job-recovery-is-slowest-since-truman-was-president> [November 2016].

enon among the developed countries,<sup>9</sup> although the experiences of each nation are sufficiently disparate that claims about the consequences of immigration are unlikely to hold across all places at all times.

The drivers behind migration patterns to the top destination countries are also diverse. Geographic proximity is a factor in most but not all cases. For example, there are close to 12 million Mexican-born individuals living in the United States, but there are also 3 million U.S. residents born in India and 1.9 million born in the Philippines. And 4.7 million UK-born individuals are living in Australia. Differences in the restrictiveness embedded in a nation's policy objectives affect the size and composition of immigrant inflows. The primary entry-purpose designations are "economic," "family reunification," "asylum and humanitarian," and "student." Family reunification is the largest avenue through which individuals qualify for admission and for lawful permanent residence in the United States, and those entering under this designation represent more than 60 percent of all legal entries. The United States is somewhat unusual in this respect, as most other countries use entry categories other than family reunification at higher rates.<sup>10</sup>

Economic incentives motivate much of the world's population movements. The Australian government (as well as others, such as the UK government) has formalized this objective—albeit from the receiving country's perspective—instituting a point-based system in 1989 designed to grant visas based on the personal attributes of applicants indicating their ability to contribute to society, defined primarily by their occupational category. An extreme example is the United Arab Emirates. As a result of massive guest worker programs, more than 80 percent of its population consists of foreign-born individuals,<sup>11</sup> the vast majority of whom are excluded from

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<sup>9</sup>The Migration Policy Institute has a comprehensive and easily understood set of interactive maps, charts, and other visuals on international migration statistics, showing trends over time and across countries. Available: <http://www.migrationpolicy.org/programs/data-hub/international-migration-statistics> [November 2016]. See also the *International Migration Outlook 2015* (OECD, 2015).

<sup>10</sup>The events surrounding the resettlement of people fleeing turmoil in Syria since the onset of the civil war there in 2011 has put pressure on the United States to increase the number of refugees it accepts above the current annual cap of 70,000. A plan by the Obama administration would increase the number of refugees (people who can prove they are escaping war or persecution) to 100,000 by 2017—still a small fraction of foreign-born admitted to the United States and a very small number compared with the millions of Syrians living in Jordan, Lebanon, and Turkey, and now Germany and other parts of Europe. (Through the first half of 2015, Germany had received nearly 100,000 Syrian refugees.) Debate about these different immigration policy paths by the candidates has played a prominent role in the run-up to the 2016 presidential election.

<sup>11</sup>Temporary workers such as these generally are not considered immigrants as defined in Chapter 2.



citizenship and access to government programs. China is a major sending country, mainly due to its enormous overall population but also because of its many students studying abroad (mainly in the United States).

Beyond these broad developments in the national and global environment, there have been changes over the past two decades in the characteristics of immigrants (and the native-born) in the United States and in the environments to which they arrive. Trends—in age, education, occupation, country of origin, and opportunities and constraints—that directly shape immigrant integration are documented in much greater detail in Chapters 2 and 3, as are historical developments in the policy environment. Together, these first three chapters set the context for the subsequent chapters, which analyze how these variables interact to affect wage, employment, and other economic and fiscal outcomes.

## 1.2 ECONOMIC IMPACTS

The consequences of immigration for individuals already established in a receiving country, particularly those involving wage and employment prospects, are a long-standing concern to a range of stakeholders. The headline questions are: Do immigrants take jobs away from natives; do they lower the wages of natives? Do immigrants complement native-born workers or are they more often substitutes? What occupational niches do immigrants fill for the benefit of the rest of the economy? What is the role of immigrants in driving productivity change and long-term economic growth? And what is their role in contributing to vibrancy in construction, agriculture, high tech, and other economic sectors?

A deep though not fully unified literature addresses these concerns. The panel's review and assessment of this literature, which deals with labor markets specified in a number of different ways (e.g., by skill group, by occupation, by geographic area), reached a number of conclusions. As explored in detail in Chapter 5, wage and employment outcomes resulting from immigration are closely tied to the extent to which new arrivals complement or substitute for workers already established in the labor market. For cases in which immigrants and natives specialize in different occupational activities—perhaps the former as construction workers or scientists and the latter as supervisors or financial analysts—wage gains and job creation become likely outcomes. When new arrivals compete with those already in the labor force—for example, if unskilled immigrants and native-born teenagers (or earlier immigrants) are applying for the same fast food restaurant jobs—wages and job opportunities for the latter may be negatively impacted, at least in the short run.

The definitiveness of the panel's conclusions is tempered by the fact that measurement of the impacts created by flows of foreign-born individuals

into labor markets is difficult. The effects of immigration have to be isolated from innumerable, simultaneously occurring influences that shape local and national economies. Beyond this measurement challenge, the relation between immigration labor inflows and market outcomes is not a constant; it varies across places and immigration episodes, reflecting the skill set of incoming immigrants and natives in destination locales, a given market's mix of industries, the spatial and temporal mobility of capital and other inputs, and the overall state of the economy. Although a labor market emphasis has created a rich economics literature on immigration, there are still a number of unresolved empirical questions, which this report explores.

Much of the wage and employment research reviewed in Chapters 4 and 5 involves essentially static marginal analyses answering the question, "if  $x$  new arrivals are added to the labor supply, what are the likely short-run market impacts?" Many fiscal analyses—for instance, the impact on state, local, or federal budgets this year or the projected life-cycle fiscal impacts for the nation—are similarly oriented toward assessing marginal effects. However, it is also important to consider the dynamics underlying an expanding economic pie, dynamics that operate over long time periods. Thus, to the labor market discussion we attempt to overlay a critical issue that is sometimes overlooked: the relationship between immigration and economic growth. Once it becomes clear that immigration contributes to long-term economic expansion in a way that accommodates a larger population, assessments of short-term adjustments and societal costs can be placed in a more complete context.

Long-run growth requires infusions of labor, various forms of capital—both physical and human—and technology. Given native fertility rates and age profiles in the United States and in many other industrialized nations, immigrants are the most likely candidates for generating net labor force growth. Likewise, they contribute to capital formation and innovation, which also shapes the way and the pace at which growth unfolds. Easterlin (1980) wrote about the impact of immigrants and family formation on cycles of growth in the American economy before the restrictive immigration regulation in the 1920s. Cutler et al. (1990) and many others have discussed the implications of population aging on secular stagnation in Japan and Europe while finding the United States less affected because of higher immigration rates. Population aging is a major policy issue in part because of slowing labor force growth and a declining ratio of workers to dependents but also because, relative to other adult age groups, older people purchase fewer houses and durable goods, which drive a significant component of economic demand. The demographic profile of immigrants factors into these trends in obvious ways: One-half of the foreign-born are between the ages of 18 and 44 (about 80% are between the ages of 18 and 64), compared with about one-third of the native-born (about 60% are between 18 and 64).

An essential piece of the long-run economic analysis investigated in Chapters 5 and 6 involves immigrants and their contributions to human capital development, scientific advancement, and innovation. For this reason, researchers are increasingly interested in documenting trends of the foreign-born among students studying and professionals working in science, technology, engineering, and mathematics (STEM) fields; their roles in business creation, patenting and other activities related to innovation, productivity, and growth are also being examined. To the extent that immigrants can add disproportionately to cutting-edge science activities occurring in universities and research labs, the U.S. economy is likely to benefit. The National Science Foundation's 2010 National Survey of College Graduates suggests that this is indeed the case. For example, 60 percent of foreign graduate students were enrolled in STEM fields, and although the foreign-born represent only 14 percent of all employed college graduates, they account for 50 percent of those with doctoral degrees working in mathematics and computer science occupations.<sup>12</sup> Immigrants are also overrepresented in Silicon Valley high-tech firms; roughly one-fourth of high tech startups during the period 1995-2005 included at least one immigrant among the firm's founders. Beyond science and technology, immigrants have historically played a key role in small-scale retailing, which can help to revitalize urban (and sometimes rural) areas, expanding nascent business sectors by lowering the cost of goods and services; examples include nail salons, ethnic restaurants, child and elder care, and lawn care and gardening. Recent studies (e.g., Fairlie, 2012) indicate that immigrants display entrepreneurial rates above those of the native-born population.<sup>13</sup>

### 1.3 FISCAL IMPACTS

Part III of this report (Chapters 7-10) assesses the impact that immigration has on fiscal trends at the federal and state levels of government. Along with wages and employment consequences, the fiscal impact is the other major factor determining the extent to which immigrants are or will

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<sup>12</sup>National Science Foundation's National Center for Science and Engineering Statistics, *Science and Engineering Indicators 2012*. Available: <http://www.nsf.gov/statistics/seind12/pdf/c02.pdf> [November 2016]. Interestingly, as pointed out by Teich (2014), whereas the H-1B visa program is often viewed as the mechanism whereby science and engineering and, in turn, innovation can be strengthened—and scientists and engineers engaged in research and development are indeed brought in or allowed to extend stays under the program—the majority of H-1B visa recipients are in computer programming and other information technology fields. Many immigrants working under H-1B visas do so for firms that outsource information technology services overseas.

<sup>13</sup>However, due to a smaller average size of new businesses started by the foreign-born, their relative contribution to job creation is less clear (Fairlie, 2012).

be net economic contributors to the nation. The headline questions here include the following: What are the fiscal impacts of immigrants for state and federal governments; do they cost more or less than they contribute in taxes? How do the fiscal impacts change when traced over the life cycle of immigrants and their children? How does their impact on public finances compare with others in the population?

In formulating immigration policy, information about public finances—specifically the added tax burden or benefit to those already in the country created by new immigrants—is of central interest.<sup>14</sup> In addition, immigration affects the growth rate of government outlays. By adding workers and beneficiaries to the economy at different rates relative to the native-born, immigration affects the long-term financial health of programs such as Social Security and medical care programs. Answering such questions about long-term implications requires calculating how fiscal impacts change when traced over the life cycle of immigrants, their children, and future generations.

Recent studies suggest an increasing recognition of the need to understand the fiscal challenges of immigrant integration in an environment characterized by a mismatch between the federal government's revenues and spending. The 2010 report *Choosing the Nation's Fiscal Future* assessed the options and possibilities for a sustainable federal budget (National Research Council and National Academy of Public Administration, 2010). That study considered a range of policy changes that could help put the budget on a sustainable path, including reforms to reduce the rate of growth in spending for Medicare and Medicaid, options to reduce the growth rate of Social Security benefits or to raise payroll taxes, and changes in many other government spending programs and tax policies. Among the policy recommendations the study considered was the option of expanding the numbers of immigrants, especially skilled workers, with the expectation that this could boost the working portion of the U.S. population, thus helping to pay for benefits to the elderly. However, the report concluded that because immigrants obviously grow old, too, any budget fix from increased immigration would be a temporary one; even if immigration doubled or tripled from current rates, only a small long-term contribution to aggregate income and to federal revenues could be expected (National Research Council and National Academy of Public Administration, 2010, p. 31). By

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<sup>14</sup>That the Congressional Budget Office produces estimates of these impacts indicates the high degree of political interest. For example, in a recent analysis of the 2013 Senate immigration reform bill by the Executive Office of the President (2013), the Congressional Budget Office estimated that the bill's enactment could reduce the federal budget deficit by nearly \$850 billion over the next 20 years, in large part due to increased work by otherwise unauthorized immigrants who would become authorized under the bill, along with greater ability to tax their earned income.

contrast, Myers (2012) used Census Bureau projections to conclude that, if immigration slows the process at a critical time, it does not have to stop population aging completely in order to be beneficial. He demonstrated that the critical fiscal problem now facing the United States is linked to the sharp increase (by roughly two-thirds) in old-age dependency on federal benefit programs that would occur between 2010 and 2030. Immigration can reduce the program deficit impact in that critical period, even though “immigrants grow old, too” in later decades.<sup>15</sup> The fiscal projections in Chapters 8 and 9 of this report illustrate how highly dependent public expenditures and tax revenues are on the population age structure.

As with estimates of employment and wage impacts, estimating the fiscal impacts of immigration is a complex calculation that depends to a significant degree on what the questions of interest are, how they are framed, and what assumptions are built into the accounting exercise. The first-order *net fiscal impact* of immigration is the difference between the various tax contributions immigrants make to public finances and the government expenditures on public benefits and services they receive. The foreign-born are a diverse population, and the way in which they affect government finances is sensitive to their demographic and skill characteristics, their role in labor and other markets, and the rules regulating accessibility and use of government-financed programs.

The potential to alter a nation’s or state’s fiscal path is greatest when the sociodemographic characteristics of arrivals differ distinctly from those of the overall population—and particularly when these characteristics are linked to employment probability and wage levels. In the United States, immigrants have historically exhibited lower skills and education and, in turn, lower income relative to the native-born. However, as described in Chapter 3, after 1965 substantial numbers of the foreign-born are now in high-skilled occupations as well. Age at arrival is another important determinant of fiscal impact: The very young and the very old typically create net costs to government programs. Immigrants arriving while of working age—who pay taxes almost immediately and for whom per capita social expenditures are the lowest—are, on average, net positive contributors. This value gradually declines with higher age at entry, as the projected number of years remaining in the workforce becomes smaller. For immigrants with lower levels of education, the net present value of expected contributions is much smaller initially and turns negative at a much earlier

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<sup>15</sup>Population projections by the Pew Research Center (2015a) indicate that post-2015 cumulative immigration is likely, by 2050, to reduce the ratio of seniors to the overall population by one-fourth relative to what it would be without immigration. Myers (2012) contended that the logical error stems from focusing only on the endpoint commonly used in Social Security population projections—85 years out—when the greatest problem is the sharp age increase from 2020 to 2030.

age. Those arriving after age 21 also typically do not add to the largest state and local cost of immigration—the cost of public education in the receiving country—although their children will. These age and life-cycle variations in fiscal impacts are only realized over the course of many years.

When considering alternative scenarios, it can be important to differentiate immigrants by country of origin and legal status, as individuals grouped by these characteristics experience different outcomes in the labor market and different take-up rates for government services. As just one example of how heterogeneity may affect fiscal impacts, Camarota (2012) found that for the top immigrant-sending countries in 2010, the share of immigrant households participating in means-tested programs (e.g., food assistance and Medicaid) was highest for households headed by immigrants from Mexico (57%), followed by Guatemala (55%) and the Dominican Republic (54%). The lowest rates were for households headed by immigrants from Canada (13%), Germany (10%), and the United Kingdom (6%). Thus, the net fiscal impact of immigration for a particular state or the nation as a whole is driven by a rich set of contextual factors.

A comprehensive accounting of fiscal impacts is further complicated by secondary effects on the native-born population. For example, because new additions to the workforce may alter the wages or employment probabilities of those already employed, the impact on taxes paid directly by immigrants is only part of the picture. Moreover, revenues generated from the native-born who have benefited from economic growth and job creation attributable to immigrant innovators or entrepreneurs would also have to be included in a comprehensive evaluation, as would indirect impacts on property, sales, and other taxes and on per capita costs of the provision of public goods.

Accounting exercises such as those presented in Chapters 8 and 9 create combined tax and benefit profiles by age and education to decompose the timing and source of fiscal effects—and they typically deal only with the direct, not the secondary, effects. Forward-looking projections build scenarios to demonstrate alternative assumptions about how public expenditures—e.g., for public education and various programs (Aid to Families with Dependent Children; Medicaid; Special Supplemental Nutrition Program for Women, Infants, and Children; Supplemental Nutrition Assistance Program; Supplemental Security Income; etc.)—and revenues change by generation and affect a baseline fiscal estimate.

Part III explores a number of methodological approaches to address different accounting objectives. For some policy questions, multigenerational costs and benefits attributable to an additional immigrant or to the inflow of a certain number of immigrants may be most relevant. For others, the budget implications for a given year associated with the current immigrant population or for recent changes in the foreign-born population residing

in a particular state or in the entire nation may be of interest—this is often the focus of state legislators, for example. Sometimes the question is about absolute net fiscal impacts; sometimes it is about the fiscal impact of an immigrant *relative* to that of an additional native-born person. Although these approaches require very different kinds of aggregations and calculations, the program (expenditure) and tax (revenue) fiscal components are largely the same.

### 1.4 CHARGE TO THE PANEL

The changing patterns of immigration and the evolving consequences for American society, institutions, and the economy continue to fuel public policy debate that plays out at the national, state, and local levels. The National Research Council has published a number of studies over the past 20 years that have been influential in these debates.<sup>16</sup> The foremost of these studies, *The New Americans: Economic, Demographic, and Fiscal Effects of Immigration* (National Research Council, 1997), was prepared in response to a request from the congressionally chartered Commission on Immigration Reform, which required a scientific foundation for policy making on immigration. *The New Americans*—parts of which are updated with more recent information by this report—focused on the effects of immigration on the future size and composition of the U.S. population, the influence of immigration on the U.S. economy, and, in particular, the fiscal impact of immigration on federal, state, and local governments.

Questions concerning immigrant integration were explored in a 2006 study focusing on the impact of the growing role of Hispanics in the United States. *Multiple Origins, Uncertain Destinies: Hispanics and the American Future* (National Research Council, 2006b) made important contributions to understanding the process of immigrant integration and its effects on families, education, the labor force, and health.

Since *The New Americans*, a growing body of research and improved sources of data—most notably, the American Community Survey, the New Immigrant Survey, and a longer series of Current Population Surveys—have made it possible to fruitfully update that report's findings. Remaining, significant data gaps notwithstanding (described in Chapter 10), it is now more possible than ever to assess the consequences of immigration for the

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<sup>16</sup>Among these reports are *The New Americans: Economic, Demographic, and Fiscal Effects of Immigration* (National Research Council, 1997); *The Immigration Debate: Studies on the Economic, Demographic, and Fiscal Effects of Immigration* (National Research Council, 1998); *America Becoming: Racial Trends and Their Consequences* (National Research Council, 2001); *Hispanics and the Future of America* (National Research Council, 2006a); and *Multiple Origins, Uncertain Destinies: Hispanics and the American Future* (National Research Council, 2006b).



### **BOX 1-1** **Statement of Task**

The National Academies' National Research Council will appoint a committee of leading economic, demographic, and fiscal experts to study the economic and fiscal impact of immigration. The expert panel will (1) summarize existing knowledge about the economic and fiscal impacts of immigration; (2) project immigration and related economic and fiscal trends to the year 2050, or present an analysis of projection scenarios representing best research on the topic; (3) discuss implications of the panel's findings for economic and fiscal policy, particularly with regard to expenditure and tax programs; and (4) identify gaps in our existing knowledge and in the data infrastructure.

The goal of the project is to lay the basis for informed and fact-based discussion of the issues surrounding current immigration into the United States among a wide range of audiences from policy makers to researchers, teachers, and the general public. In carrying out its charge, the panel will address a list of specific questions about the impacts of immigration on:

- overall living standards and the macro economy;
- wages and income of U.S. natives and immigrants;
- the labor market broadly (e.g., to what extent does immigrant labor complement and substitute for native employment);
- budgets and fiscal health at the federal, state, and local levels; and
- intergovernmental fiscal dynamics (e.g., the distribution of the budget impact across federal, state, and local entities).

At the conclusion of the study, the National Academies Press will publish a consensus report of the panel that will be available on the Web and in paperback. In addition, dissemination activities will be planned to ensure that the report has an appropriate impact.

American economy in a shifting demographic, social, and political landscape. Given this backdrop, the Panel on the Economic and Fiscal Consequences of Immigration was formed by the National Research Council and tasked with assessing the fiscal and economic impacts of immigration. The Statement of Task guiding the panel's work is reproduced in Box 1-1.

The findings and conclusions in this report are intended to help inform basic policy conversations such as the following: How many immigrants to admit? What should be the composition of those admitted? What is the economic impact of enforcement dealing with immigration that takes place within and outside authorized channels? Which individuals and government levels benefit, in the short run and in the long run, from new immigration? Priorities and policy decisions depend in part on the kinds of information



about economic and fiscal impacts contained in this report; they may also depend in part on other objectives—for example, the value (economic and noneconomic) to people of unifying families or of providing safe refuge for those fleeing oppression. How each of these objectives is weighted is a political matter, which is not addressed here. Nonetheless, an informed discussion of policy options does depend on accurate information; the panel hopes that this report provides such information for the economic and fiscal domains. The audience for the report begins with policy makers and lawmakers at the federal, state, and local levels but extends to the general public, nongovernmental organizations, the business community, educational institutions, and the research community.

## 2

## Immigration to the United States: Current Trends in Historical Perspective

### 2.1 INTRODUCTION

More than 40 million persons living in the United States were born in other countries, and almost an equal number—the second generation—have at least one parent who was born abroad. Together, the first generation (foreign-born) and second generation (U.S.-born children of the first generation) comprise almost one in four Americans (Pew Research Center, 2015a, p. 120). Political leaders and social commentators sometimes cite these large numbers as evidence that the United States is facing an unprecedented crisis that threatens the economy and the cultural fabric of U.S. society. However, current levels of immigration, though at record highs in absolute numbers, are not out of line with those experienced for most of American history when considered relative to the total U.S. population. The United States has witnessed successive waves of mass immigration that were initially seen as crises but are now celebrated as major contributions to a “nation of immigrants” (Kennedy, 2008; Martin, 2010). In the coming years, immigration will be the primary source of labor force growth in an increasingly aging population.

Placing current and future immigrant trends and patterns into historical perspective is the objective of this chapter. In addition to setting the stage for the subsequent chapters of this report, a look backward also provides context for understanding the contentious debates over immigration. Each generation of Americans, from the founding of the republic to the present day, has wrestled with questions of who should be allowed to enter the country and to become a citizen. Americans, especially natives and long-

settled immigrants, have always been suspicious of the qualities of newcomers: their character, their skills, their loyalty, and their potential to assimilate to American values and institutions (Zolberg, 2006). At many times during U.S. history, laws and policies were enacted to restrict the entry and freedoms of different groups of newcomers. But the door was never completely closed, and peoples from almost every part of the world have continued to seek refuge and opportunity on American soil that they could not find in their home countries (Daniels, 1991; King, 2000; Reimers, 1992).

The growth of the U.S. population from less than 4 million in 1790 to about 320 million in 2015 is due in no small measure to immigration. Most Americans today are the descendants of immigrants who arrived after the founding of the nation in the late 18th century (Edmonston and Passel, 1994, p. 61; Gibson, 1992). Their immigrant ancestors may not have been welcomed because their language, religion, culture, or appearance was not considered sufficiently “American.” Yet, with the passage of generations, the children, grandchildren, and great-grandchildren of the successive waves of immigrants have become part of the American tapestry. This multigenerational process, which involves integration of different peoples, religions, and cultures, has diversified and broadened what it means to be “an American” (Gleason, 1980).

Immigrants and their descendants have also been accepted, even if not fully embraced, because of their determination and enterprise. Many immigrants are willing to undertake less desirable jobs than, and to settle in locations that are shunned by, native-born workers. The children of immigrants are often distinguished by their ambition and creativity (Hirschman, 2013), helping to invigorate American society and sustain this nation’s world leadership in science and culture. In his 1958 book, *A Nation of Immigrants*, then-Senator John F. Kennedy claimed that the distinctive American culture of optimism and enterprise arises from our immigrant heritage.

In this brief survey, the panel addresses four major contemporary issues that have historical roots:

1. Are current levels of immigration higher than those experienced in the past?
2. How is immigration changing the racial and ethnic makeup of the U.S. population?
3. What will be the impact of immigrant workers on the U.S. economy as the Baby Boom generation departs the workforce?
4. How have the geographic settlement patterns of new immigrants changed in recent decades?

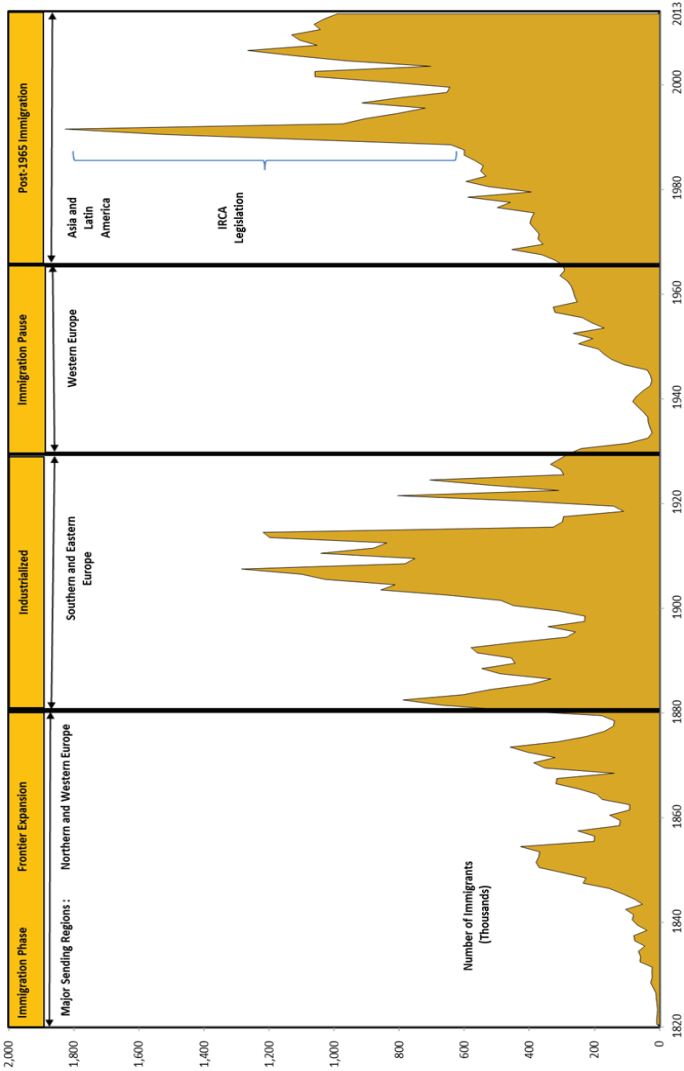
To understand the significance of these issues, the chapter begins with an overview of historical trends and patterns of immigration to the United

States. Three themes are emphasized (1) the volume of immigrant inflows and their changing origins; (2) the context of reception, often hostile but later accommodating; and (3) the successful integration of immigrants and their children.

## 2.2 IMMIGRATION TRENDS AND ORIGINS FROM 1820 TO 2015

The United States began collecting data on the numbers and origins of arrivals by ship in 1820. This statistical series, published in the annual *Yearbook of Immigration of Statistics* by the U.S. Department of Homeland Security (DHS), is widely considered to be the standard account of immigration to the United States, even though the series provides an incomplete record of immigration for much of American history. For example, overland entries from Canada and Mexico were not counted until the early 20th century. In recent decades, the DHS figures are not the number of new arrivals but of persons receiving lawful permanent resident (LPR) status, commonly called receiving a “green card.” More than 1 million persons receive LPR status each year, but the majority of these have already been in the United States, some for many years. In addition, many other new arrivals enter the United States on temporary visas to work, study, or accompany a family member who comes to work or study. In fact, LPRs and temporary students or workers are not entirely separate populations, since over half of new LPR visas each year are “status adjustments” received by persons who were already in the United States on another visa (or even without a visa). Despite these limitations, the DHS series is the most widely used source of data for measuring long-term flows of (legal) immigrants to the United States. Figure 2-1 shows the absolute number (in thousands) of arrivals/LPRs based on the DHS data series with labels for the major immigration eras identified by Philip Martin (2013) in his Population Reference Bureau publication. We note that the spike in the numbers of new immigrants from 1989 to 1991 does not represent a surge of new arrivals but rather the change in legal status for the 3 million previously undocumented immigrants who received LPR status following the passage of the Immigration Reform and Control Act of 1986 (IRCA). Table 2-1 shows more detailed data on the specific countries of origin from the published DHS Immigration and Naturalization Service data series for each of the four periods identified in Figure 2-1 (the dates of Martin’s periodization are slightly revised here to be consistent with the availability of DHS data by country of origin).

Based on the DHS data series, at least 74 million immigrants have arrived in the United States since 1820. There are only fragmentary counts of those who returned to their countries of origin or who died without leaving any descendants, but there is little doubt that almost all Americans are



**FIGURE 2-1** Legal immigration to the United States, 1820-2012.  
NOTE: IRCA adjustments refer to the amnesty provisions of the Immigration Reform and Control Act of 1986, under which 2.7 million undocumented foreign-born U.S. residents obtained lawful permanent resident status.  
SOURCE: This figure replicates Martin (2013, Fig. 2, p. 5) directly from the data series maintained by the U.S. Department of Homeland Security, 2014. These data can be downloaded from <https://www.dhs.gov/publication/yearbook-immigration-statistics-2013-lawful-permanent-residents> [November 2016].

the products of immigration, past or present. Without a common ancestry (real or imagined) to claim, American identity has been forged by common experiences rather than descent. These common experiences of Americans are created and reinforced by public schools, military service, civic organizations, Hollywood images, political campaigns, and social movements.

The four periods represented in Figure 2-1 are (1) frontier expansion before 1880, (2) industrialization and the age of the Great Atlantic Migration from 1880 to 1929, (3) the immigration pause from 1930 to 1965, and (4) the post-1965 wave of migration from Latin America and Asia. Even though millions of migrants arrived in each period, the eras of industrialization and the post-1965 wave stand out as exceptional, with 23 and 35 million documented immigrants, respectively.

The absolute numbers of arrivals or immigrants represented in Figure 2-1 (and on which the percentages in Table 2-1 are based) are not adjusted for the size of the American population at the time. For example, the 1 million or more annual arrivals in the early 20th century—in a country of less than 100 million people—represented a larger change to the population base than the arrival of 1 million annual immigrants in the early 21st century when the U.S. population numbered more than 300 million. The next section of this chapter presents estimates of the net international migration rate relative to the national population. The first conclusion from Figure 2-1 is that the annual numbers of immigrants in the current period—the “post-1965 wave”—are not exceptionally different from the numbers during much of American history. The one period that is distinctively different is the 1930 to 1965 immigration pause (Massey, 1995). This era, often remembered with nostalgia by many older Americans as representative of the American past, is actually the most different with respect to the annual numbers (and percentage of the receiving population) of arriving immigrants.

Beyond the number of immigrants, it is helpful to survey the major trends and patterns that shape and describe immigrant flows. These include the factors that motivate long-distance migration; condition the reception of immigrants by the receiving population; and shape government policies that have encouraged, discouraged, and restricted immigration at various times (Hirschman et al., 1999; Massey et al., 1998; Portes and Rumbaut, 2014). Economic factors loom large among the many causes of international migration. As a frontier New World country in the mid-19th century, a rapidly growing industrial economy in the early 20th century, and a dynamic postindustrial economy in recent decades, the United States has always attracted immigrants (Easterlin, 1980). Long-distance migrants rarely come from the ranks of the successful; more often they have been peasants pushed off their lands by the commercialization of agriculture, workers who lost their traditional livelihood because of the

**TABLE 2-1 Persons Obtaining Lawful Permanent Resident Status by Region and Selected Country of Last Residence, Fiscal 1820-2013 (percentage of total)**

Region and Country of Last Residence	Frontier Expansion					Pause	Post-1965 Era		All Periods
	Industrialization						1970-2013		
	1820-1879	1880-1929	1930-1969	1970-2013	1820-2013				
Total (%)	100.0	100.0	100.0	100.0	100.0				
Europe	90.0	82.9	47.5	13.1	47.7				
Northwestern Europe	52.2	13.8	14.3	3.0	13.8				
Britain	19.5	6.7	8.4	1.9	6.3				
Ireland	28.7	5.0	1.8	0.3	5.6				
Scandinavia	3.6	6.1	2.1	0.3	2.7				
Germany and Switzerland	31.8	7.1	14.8	1.3	8.3				
Eastern Europe	1.2	33.4	4.8	5.0	13.1				
Austria-Hungary	0.7	16.6	2.3	0.3	5.5				
Poland	0.2	1.5	1.3	1.2	1.2				
Russia	0.4	13.7	0.1	2.0	5.2				
Southern Europe	1.3	22.5	11.2	2.3	9.2				
Italy	0.7	19.0	7.2	0.9	7.0				
Greece	0.0	1.9	1.9	0.5	1.0				
Spain and Portugal	0.5	1.6	2.0	0.9	1.2				
Asia	2.3	3.4	7.5	34.0	18.0				
China, Hong Kong, Taiwan	2.3	0.4	2.0	6.6	3.7				
Japan	0.0	1.2	1.2	0.8	0.9				
Philippines	0.0	0.0	1.3	6.2	3.0				
Korea	0.0	0.0	0.4	3.0	1.4				
Vietnam	0.0	0.0	0.0	2.9	1.4				
India	0.0	0.0	0.3	4.6	2.2				
Other Asia	0.0	1.7	2.3	9.9	5.4				

Americas	6.8	13.2	43.4	45.6	30.5
Canada and Newfoundland	5.8	7.9	15.3	2.4	5.8
Mexico	0.3	3.2	11.1	19.2	11.1
Caribbean	0.7	1.5	8.4	11.7	6.9
Cuba	0.1	0.2	4.3	2.7	1.8
Dominican Republic	0.0	0.0	0.0	0.0	0.0
Haiti	0.0	0.0	0.5	1.9	0.9
Jamaica	0.0	0.0	1.0	2.2	1.1
Other Caribbean	0.5	1.3	1.3	1.5	1.3
Central America	0.0	0.2	2.3	5.3	2.8
South America and other America	0.1	0.4	6.4	7.0	4.1
Africa	0.0	0.1	0.6	4.9	2.4
Oceania	0.1	0.2	0.7	0.7	0.4
Not specified	2.1	0.2	0.2	1.7	1.1
Total persons (in thousands)	9,604	22,540	7,269	34,694	74,107

NOTE: Official recording of immigration to the United States began in 1820 after the passage of the Act of March 2, 1819. For the period 1820-1867, the data represent alien passenger arrivals at seaports. For the periods 1868-1891 and 1895-1897, the data are for all immigrant alien arrivals. For 1892-1894 and 1898-2013, the data represent immigrant aliens admitted for permanent residence. From 1892 to 1903, aliens entering by cabin class were not counted as immigrants. Land arrivals were not completely enumerated until 1908. Prior to 1906, the data are for country of origin; from 1906 to 2013, the data are for country of last residence. Because of changes in national boundaries, data for a particular country may not necessarily refer to the same geographic area over time. Only the largest countries from the source table are listed here, although the regional and subregional areas are inclusive for all new arrivals/immigrants from that area. The boundaries of most of Eastern Europe changed radically from the late 19th century through the early decades of the 20th century. Moreover, many new arrivals may have reported their national identities rather than the country or political unit from which they came. For complete details, see the 21 detailed footnotes to the source table.

SOURCE: This table is a summary of Table 2 of the *Yearbook of Immigration Statistics: 2013* (U.S. Department of Homeland Security, 2014, pp. 6-7).



collapse of industries, and minorities who were fleeing religious or political persecution (Hatton and Williamson, 2008; Massey et al., 1998). Nor are migrants selected from the bottom of the socioeconomic spectrum in sending societies; instead, most migrants come from the middle ranks of the sending society. The poorest of the poor rarely become long-distance migrants because they lack the resources to cover the costs of transportation and initial settlement (Massey, 1999; Portes and Rumbaut, 2014, Ch. 3).

### **Settling the Frontier: Immigration from Western Europe Prior to 1880**

Before 1880, 90 percent of immigrants were from Europe, mostly from the United Kingdom, Ireland, and Germany (Table 2-1). Another 6 percent originated in Canada. There were smaller numbers from Scandinavia, the periphery of Europe, and China. Compared to the present, it might seem that the United States was a homogenous society for the first century after independence. This interpretation would, however, be a serious misreading of the deep racial and ethnic divides in 18th and 19th century America.

The first census in 1790 showed that 20 percent of the early American population was of African origin—90 percent of whom were slaves (Archdeacon, 1983, p. 25; Gibson and Jung, 2005, Table A.1). For the three centuries after European arrival in the New World, many more Africans crossed the Atlantic in chains than did free or indentured Europeans (Hatton and Williamson, 2008, p. 8). In addition, it should not be overlooked that Native American populations were demographically and politically ascendant in all of North America except the eastern seaboard (Snipp, 1989), even if they were not enumerated in early censuses. The conflicts and political struggles over slavery and white settlements on Native American lands were the major political issues in early American history.

In the 18th century, Americans often expressed intolerance of European groups that spoke other languages and followed different religious faiths than the majority. Benjamin Franklin complained that the “Palatine Boors” were becoming so numerous in Pennsylvania that they might be tempted to Germanize the resident population instead of the residents Anglifying them (Archdeacon, 1983, p. 20; Jones, 1992, pp. 39-40). The major immigration wave in the 1840s and 1850s, primarily of Irish Catholics fleeing the potato famine, sparked a nativist reaction, popularly known as the “Know-Nothing” movement (Higham, 1988, Ch. 2). In 1854, 6 governors and 75 members of Congress were elected from the Know-Nothing party on a platform of ending immigration (Archdeacon, 1983, pp. 81-82). Although nativism receded in the 1860s as the Civil War dominated domestic politics, the animosity against immigrants, and Catholics in particular, was a harbinger of what was to come.

### **The American Industrial Revolution and Immigration from Southern and Eastern Europe, 1880 to 1924**

The second historical period of immigration includes the last two decades of the 19th century and the first quarter of the 20th (Table 2-1 approximates this period with data from 1880 to 1929). Although most of the immigrants during this era crossed the Atlantic, there was also an important trans-Pacific flow of migrants from China and Japan to California. The first large-scale Chinese migration began in the 1860s and 1870s, and the 200,000 Chinese workers in California in 1880 made up nearly a quarter of the state's labor force (Bonacich, 1984). Fearing wage competition with Chinese workers, white workers in California, supported by unions and politicians, unleashed a vitriolic anti-Chinese campaign that led to the first ban on immigration of a national origin group—the so-called “Chinese Exclusion Act of 1882” (Chan, 1991). When Japanese began arriving in large numbers in the late 1890s and early 1900s, they were also met with racial hostility that soon led to a ban on immigration of Japanese workers with the “Gentlemen's Agreement” of 1907 (Daniels, 1962).

In the five decades from 1880 to 1929, more than 22 million immigrants arrived in the United States—a country that only numbered 50 million in 1880. Even more controversial than the numbers were the sources of the “new immigrants,” as they were called. The earlier streams of Irish, British, and German immigrants gradually gave way to peoples from Southern and Eastern Europe, including more than 4 million Italians, 3 million people from the Russian Empire, another 4 million from the Austrian-Hungarian Empire, and millions more from other parts of Eastern Europe, Greece, Spain, Portugal, and Scandinavia. During this period, there were also sizable immigrant streams from the Americas, notably Canada, Mexico, and the Caribbean, as well as from Japan. Relative to the prior period (1820 to 1879), the age of the American industrial revolution (1880 to 1929) saw the fraction of immigrants from Northwestern European origins reduced from 52 to 14 percent, while the numbers from Eastern and Southern Europe soared from 2 to 55 percent.

Industrialization provided a propitious labor market for throngs of unskilled workers willing to accept jobs that were shunned by native-born Americans (Atack et al., 2000, p. 322; Carpenter, 1927, p. 271; Hirschman and Mogford, 2009). However, the differences in language, culture, and religion between new immigrants and the native-born population, combined with popular anxieties over the industrialization of the American economy, contributed to the formidable political backlash against Southern and Eastern European immigrants during the late 19th and early 20th centuries.

Anti-Catholic attitudes were a core feature of 19th century American culture, which sometimes seethed into mob violence (Archdeacon, 1983,

p. 81; Daniels, 1991, pp. 267-268). The rising tide of 19th century nativism morphed into a pseudo-scientific theory of Anglo-Saxon racial superiority based on Social Darwinism (Higham, 1988). Premised on assertions that immigrants from Southern and Eastern Europe could not be assimilated into American society, academic treatises and popular writings alleged that these new immigrants would undermine American political and cultural values and lower the intelligence of the population. An unusual political coalition, including the Ku Klux Klan, Midwestern Progressives, and many prominent intellectuals joined the anti-immigrant hysteria (Higham, 1988, Ch. 1; Jones, 1992, pp. 228-230). In 1910, the Dillingham Commission, appointed by Congress, issued a 42-volume report, which avowed the racial inferiority of the new immigrants from Eastern and Southern Europe (Bernard, 1980, p. 492; Handlin, 1957, Ch. 5).

The Immigration Restriction League, founded by young Harvard-educated elites in 1894, advocated a literacy test to slow the tide of immigration from Southern and Eastern Europe, which allegedly were sending an “alarming number of illiterates, paupers, criminals, and madmen who endangered American character and citizenship” (Higham, 1988, p. 103). When the literacy test failed to stem the immigration tide, the restrictionists pushed for numerical caps on new arrivals that aimed to reduce if not eliminate immigration from undesirable origins. Congress passed a law in 1921 that restricted immigration to 3 percent of each nationality already in the U.S. population, based on the 1910 census. Seeking to tighten the screws, the Immigration Act of 1924 (“Johnson-Reed Act”) lowered the quotas by restricting immigration to 2 percent of each nationality counted in the 1890 census—a date before the surge in immigration from Southern and Eastern Europe. Following vitriolic congressional debates about restricting, the act was amended in 1929 to set quotas based on the “national origins” of the white U.S. population (Bernard, 1980, pp. 492-493; Jasso and Rosenzweig, 1990; Tienda, 2002).

The anti-immigrant prejudices also triggered scapegoating of immigrants as the alleged causes of a myriad of social problems, including crime, radical politics, labor unions, and disease. The “Red Scare” (directed at socialists and communists) during 1919 and 1920 led to the mass arrests and deportations of immigrants (Higham, 1988, pp. 222-233). In early 1920, Attorney General A. Mitchell Palmer directed federal agents to round up more than 6,000 “aliens” without warrants. Although most were eventually released, many “were detained for unjustifiably long times and some suffered incredible hardships” (Cohen, 1964, p. 73). Similar scapegoating episodes occurred in the 1930s when, in the depth of the Great Depression, President Hoover authorized repatriation of Mexicans without due process in order to reduce welfare rolls and open up deportees’ jobs for American workers (Balderrama and Rodriguez, 1995). As Nazi Germany unleashed

an increasingly violent repression of its Jewish population during the 1930s, only a small number of Jewish refugees from Germany were allowed to enter the United States. Even as awareness of an approaching Holocaust of European Jewry spread, American immigration quotas, reinforced with anti-Semitism in the State Department, restricted any emergency response to accept more refugees (Breitman and Kraut, 1987; Zolberg, 2006).

### **The Immigration Pause from 1924 to 1965**

During the long hiatus in immigration, only 7 million LPRs were admitted (Table 2-1 approximates this period with data from 1930 to 1969). The Great Depression and World War II were key factors leading to the very low levels of immigration for the 1930s and 1940s. Moreover, the restrictive laws of the 1920s had dramatically lowered immigration with very small national origin quotas for Southern and Eastern European countries and quotas of zero immigrants from Asia and Africa. Consequently, almost half of the 7 million immigrants admitted during this period originated from Western Hemisphere countries, which were exempt from the national origin quotas. The largest influx was from Canada, but there were also substantial numbers from Mexico, the Caribbean, and South America. Strong social and economic ties between Mexicans granted U.S. citizenship by decree and Mexican citizens living south of the Rio Grande provided a foundation for sustained migrant flows even after the creation of the Border Patrol in 1924. In addition to those granted permanent residence, the United States authorized the entry of temporary workers from Mexico—popularly known as the Bracero program in 1942. More than 5 million Mexicans came to the United States as braceros between 1942 and 1964 (Massey et al., 2002); virtually all of the braceros returned to Mexico. There was also continued immigration from the few European countries that were given generous immigration quotas (Tienda, 2002).

The era from the 1920s to the 1960s was an important period for the integration and assimilation of Southern and Eastern European immigrants, and especially their children—the second generation—into the mainstream of American life (Alba and Nee, 2003). Against the backdrop of an often-hostile reception encountered by the new immigrants stands the remarkable social and economic progress of millions of immigrants from different cultural origins during the early and middle decades of the 20th century. Because new immigrants were considered a breed apart in the 1910s and 1920s, ethnic intermarriage rates were low and residential segregation levels were high (Lieberson, 1963; Pagnini and Morgan, 1990). Despite its many flaws, the Americanization movement did boost naturalization rates of immigrants and broaden educational opportunities for children of immigrants (King, 2000). By the 1950s, the children of early 20th century

immigrants had reached socioeconomic parity with other white Americans, residential integration was the norm in growing suburban areas, and ethnic intermarriage was unremarkable (Alba and Nee, 2003; Duncan and Duncan, 1968; Lieberman, 1980). During this period, World War II and the ensuing postwar economic boom (when all boats were rising) also played a role as an engine of integration over time. These trends continued and expanded during the second half of the 20th century to incorporate previously stigmatized immigrant and religious groups, including Catholics and Jews, into the social and economic mainstream. For much of the 20th century, the American commitment to diversity was limited to reserving one seat on the Supreme Court for a Catholic and another for a Jew—the implicit assumption was that without some sort of informal quota, minority religions would not be represented. In 2015, by comparison, all of the justices on the Supreme Court were Catholic or Jewish. This shift suggests that other factors, such as political ideology, are now more important than religion or ancestry.

### **The Post-1965 Immigration Wave from Latin America and Asia**

The 35 million legal immigrants from 1970 to 2013 represent a new chapter in American immigration history, with more than 40 percent coming from Latin America and 34 percent from Asia (Table 2-1). The count of immigrants granted LPR status over this period includes 6 million from Mexico, 4 million from the Caribbean, 1.8 million from Central America, and 2.4 million from South America. Of the 12 million Asian immigrants granted LPR status since 1970, 2 million hail from China (including Taiwan and Hong Kong), another 3 million are from the Philippines, and more than 1 million each came from Korea, Vietnam, and India. Since 1970, more than 1.7 million immigrants from Africa were granted LPR status.

Although the popular response to the post-1965 immigration wave may lack the blatant expressions of vitriol that were common in early 20th century America, there are parallels between the anti-immigrant political movements then and now. Undocumented immigrants evoke considerable antipathy from political leaders and the media, including allegations that immigrants increase crime rates; spread communicable diseases; create congestion in schools, parks, and other public facilities; and deplete scarce natural resources (Bouvier, 1992; Chavez, 2008; Federation for American Immigration Reform, 2009; Massey and Pren, 2012). Prominent intellectuals and academics sometimes legitimately claim that the newcomers from Asia and Latin America cannot be assimilated (Brimelow, 1995). Singling out Latin Americans (and Mexicans in particular), Harvard political scientist Samuel P. Huntington (2004, p. 256) warned that the continued influx would eventually “change America into a country of two languages, two cultures, and two peoples.” As in the past when anti-immigrant sentiment

mounted, Congress passed a series of punitive laws in the 1990s and 2000s, which permitted the deportation of aliens, including permanent residents, with little regard for due process. The arbitrary detention and deportation of many Muslim immigrants in the wake of 9/11 is similar to the forced repatriation of Mexicans during the 1930s and 1950s.

Beyond concerns about the impact of immigrants on the labor market and the fiscal system, some Americans believe that the large numbers of immigrants from “third world” countries are a threat to national identity and culture (National Academies of Sciences, Engineering, and Medicine, 2015, p. 50). Much of the outrage in the mass media is focused on undocumented immigrants and the problem of “broken borders,” but the antipathy against illegal immigration often spills over to all immigrants, particularly during periods of economic recession (Chavez, 2008; Portes, 2007; Sanchez, 1999). In 1994, for example, California voters approved Proposition 187, which was intended to limit access to health care and public schooling for the children of undocumented immigrants. Another response to the perceived immigrant threat was the militarization of the Mexican border (Dunn, 1996) and the spending billions of dollars for border enforcement along the nearly 2,000-mile peaceful border (Massey et al., 2016).

## 2.3 IMMIGRATION DRIVEN BY LABOR DEMAND

One of the major issues in immigration debates, past and present, has been whether migration is primarily a response to conditions in the countries of origin or to economic demand in the United States. Economic and demographic theory predict that both pushes and pulls are important, but there are other noneconomic factors influencing long-distance migration, including the social support from family and friends who have previously migrated (Massey et al., 1993), as well as immigrant admissions policies that emphasize family reunification. It is not so much a question of “either-or,” but whether the magnitude of long-distance migration flows is responsive to labor demand and therefore “self-regulating” (at least in part), or whether immigration can only be controlled by restrictive policies (Hollifield et al., 2014).

The consensus of economic historians is that international migration before the 1920s was highly responsive to the economic demand for labor (Easterlin, 1968; Hatton and Williamson, 2008; Thomas, 1973). The restrictive immigration policies of the United States from the 1920s onward (and elsewhere in the world) reduced international migration to very low levels and ended the historic link between economic demand and the Atlantic migration system.

Following the immigration reforms in the 1960s, immigration levels increased from 1970 to the late 1990s and have oscillated since then at

relatively high levels compared with the decades immediately prior to 1970. However, there have been substantial swings in the national origins and composition of immigrant arrivals during the contemporary period of mass immigration. For example, the large influx of unauthorized migrants, especially from Mexico, appears to have slowed in the early 2000s and then declined after the Great Recession (Passel et al., 2013). The major wave of Korean immigration peaked in the 1980s, while immigration from China and India increased in the 1990s and 2000s (U.S. Department of Homeland Security, 2014, Table 2.1).

Changes in immigration and refugee policies have shaped much of the fluctuations in the most recent period, including expansion of temporary immigration of high-skilled workers under the H-1B visa program and increasing numbers of international students, both undergraduate and graduate, enrolling in American universities (see Section 5.6 in this report). These policies and programs reflect, at least in part, the high demand for highly skilled labor in STEM fields (science, technology, engineering, and mathematics) by American firms in the high tech sector and in research laboratories in universities and the private sector.

There is also a high demand for temporary labor by the American agricultural sector, which has led to the creation of the H-2A visa program. The significant flows of undocumented workers to low-wage jobs in domestic child care, agriculture, and construction signify a partial response to the demand for workers by employers and for services by households in the United States (Massey et al., 2002; Muller, 1993; Portes and Rumbaut, 2014). The dramatic reduction in the levels of unauthorized migration following the collapse of the construction industry during the Great Recession in 2007-2009 suggests a powerful feedback from economic conditions (Martin, 2013; Massey, 2012). As will be shown in a following section, immigrants and their children have comprised a growing share of the working-age population. With the impending retirements among the large population of Baby Boomers, immigrants will play an even larger role in serving the labor needs of economic growth.

## 2.4 THE NET INTERNATIONAL MIGRATION RATE AND ITS CONTRIBUTION TO POPULATION GROWTH

The iconic portrait of immigration shown in Figure 2-1 represents only the inflow of LPRs to the United States. It does not include those coming on temporary visas to work or study nor those entering without authorization. Moreover, the DHS series does not include emigrants—the numbers of persons who depart from the United States each year. There has always been a substantial return migration of immigrants to their country of origin (Bandiera et al., 2013; Van Hook et al., 2006). More-



over, the absolute number of immigrants does not incorporate information on the size of the national population. The magnitude of immigration relative to the total resident population (sometimes labeled “the density of immigration”) is a better reflection of the visibility of presence of newcomers and of their potential impact on the host society. Standard demographic measures are typically expressed in rates relative to the population per unit of time. Thus, the panel’s preferred index of immigration is the “net international migration rate” (or the net immigration rate) defined as net international migrants (immigrants minus emigrants) for a time interval divided by the (average) total resident population for the same time interval.

However, the lack of direct and complete measurement of all persons who enter and leave the United States has meant that most research relies on the one-sided and partial DHS series of LPRs as the index of temporal flow of immigration to the United States. Demographers and economic historians have, however, made heroic efforts to estimate the net international migration rate based on incomplete data and indirect methods of estimation (Barde et al., 2006; Carter et al., 2006, Ch. 1, pp. 541-550).

Table 2-2 shows the best available estimate of the trend in the net international migration rate and the share of national population growth attributable to net immigration for each decade from 1790 to 2000 and annually from 2000 to 2013. The historical series from 1790 to 2000 was assembled by Michael Haines (2006) and published in the millennial edition of the *Historical Statistics of the United States* (Carter et al., 2006). Table 2-2 also includes U.S. Census Bureau estimates of the net international migration rate for each year from 2000 to 2013 (except 2009). Although the techniques of estimation used in the historical series and the Census Bureau estimates are somewhat different, they rely on a similar logic. Net international migration is measured as the residual for a specific time interval (decade or year) after subtracting natural increase (births minus deaths) from total population growth for the same time interval. This method is indirect, but components (population growth and natural increase) are better measured than are the actual numbers of immigrants and emigrants.

Despite the record numbers of immigrants admitted in recent decades (as shown in Figure 2-1), the net immigration rate in Table 2-2 shows that contemporary immigration is fairly modest when considered relative to the size of the total population. The highest rates of net immigration relative to the total population occurred neither in the early 20th century nor in the early 21st century but rather in the 1840s and 1850s. The net international migration rate was about 8 or 9 per 1,000 population during this time, falling to about 6 or 7 per 1,000 population from 1880 to 1920, and then falling further in the decades of the Great Depression, 1940s, and 1950s.



TABLE 2-2 Components of Population Growth: United States, by Decade, 1790-2000, and by Year, 2000-2013

Time Period	Mid-Period Population (thousands)	Rate of Total Increase (per 1,000)	Crude Birth Rate (per 1,000)	Crude Death Rate (per 1,000)	Rate of Natural Increase (per 1,000)	Net International Migration	
						Rate per 1,000	Percentage of Population Growth
1790-1800	4,520	30.1	—	—	26.5	3.6	11.9
1800-1810	6,132	31.0	—	—	26.9	4.2	13.5
1810-1820	8,276	28.6	—	—	24.7	3.9	13.7
1820-1830	11,031	28.9	—	—	26.8	2.1	7.1
1830-1840	14,685	28.3	—	—	23.5	4.8	16.9
1840-1850	19,686	30.7	—	—	22.4	8.3	27.0
1850-1860	26,721	30.4	—	—	20.6	9.8	32.3
1860-1870	35,156	23.6	—	—	17.4	6.3	26.5
1870-1880	44,414	23.1	41.2	23.7	17.5	5.6	24.2
1880-1890	55,853	22.7	37.0	21.3	15.7	7.0	30.9
1890-1900	68,876	19.0	32.2	19.4	12.8	6.2	32.6
1900-1910	83,822	19.4	29.8	17.3	12.6	6.9	35.3
1910-1920	100,546	14.2	26.9	15.3	11.6	2.6	18.1
1920-1930	115,829	14.5	23.2	11.6	11.5	3.0	20.5
1930-1940	127,250	7.3	19.5	11.1	8.4	-1.0	-14.0
1940-1950	139,928	13.9	23.1	10.5	12.6	1.3	9.6
1950-1960	165,931	17.1	24.8	9.5	15.3	1.8	10.4
1960-1970	194,303	12.7	20.1	9.4	10.6	2.0	16.1
1970-1980	215,973	10.3	15.4	8.9	6.5	3.8	37.0
1980-1990	238,466	9.9	15.8	8.7	7.2	2.8	27.9

1990-2000	266,557	11.1	14.9	8.5	6.4	4.8	42.9
2000	282,172	10.3	14.3	8.6	5.8	4.3	41.3
2001	285,082	9.5	14.1	8.5	5.5	3.8	39.6
2002	287,804	8.8	14.1	8.4	5.7	2.9	32.6
2003	290,326	9.4	14.2	8.4	5.7	3.4	36.3
2004	293,046	9.2	14.1	8.3	5.8	3.2	35.0
2005	295,753	9.6	14.1	8.2	6.0	3.4	35.4
2006	298,593	10.0	14.4	8.1	6.3	2.9	29.0
2007	301,580	9.3	14.2	8.1	6.1	2.9	30.9
2008	304,375	8.6	14.0	8.2	5.8	2.8	32.5
2009	Not available						
2010	309,347	7.7	12.8	8.1	4.7	3.0	38.5
2011	311,722	7.7	12.6	8.0	4.6	3.1	40.0
2012	314,112	7.6	12.6	8.2	4.4	3.2	41.9
2013	316,498	7.5	12.5	8.2	4.3	3.1	42.2

NOTES: Net International Migration Rate from 1790 to 2000 is based on Rate of Population Growth minus the Rate of Natural Increase. Net International Migration Rate from 2000 to 2013 includes the international migration of both native- and foreign-born populations. Specifically, it includes (a) the net international migration of the foreign-born, (b) the net migration between the United States and Puerto Rico, (c) the net migration of native-born U.S. citizens from and to the United States, and (d) the net movement of the Armed Forces population between the United States and overseas. Net international migration for Puerto Rico includes the migration of native- and foreign-born populations between the United States and Puerto Rico.

SOURCES: Haines (2006); U.S. Census Bureau (2015).

The net international migration rate rose from its very low levels during the middle decades of the 20th century to 2 per 1,000 in the 1960s—as the post-1965 immigration wave began. The net international migration rate then jumped to 3.8 per 1,000 in the 1970s, receded to 2.8 in the 1980s, and then increased to 4.8 per 1,000 in the 1990s. In the early 2000s, the rate fluctuated and then dropped to about 2.8 to 2.9 at the onset of the Great Recession in 2008. The rate appears to have stabilized around 3.1 to 3.2 from 2011 to 2013.

The current net international migration rate of one-third of one percent (3.3 per 1,000) per year is only half the level experienced in the prior period of mass migration, from 1880 to 1910. However, one aspect of contemporary immigration is higher than in prior periods of mass migration. During the post-1965 wave of immigration, net international migration has been a larger fraction of national population growth than it was during most earlier periods. The last column in Table 2-2 shows the ratio of net international migration to the total rate of population growth (either intercensal or annual)—which can also be expressed as the share of population growth due to net immigration. Since the 1970s, net immigration has been around 35 percent, and sometimes over 40 percent of total population growth. The ratio did drop below 30 percent during the 1980s and for a few years around the 2008 Great Recession, but immigration has been a major reason for the relatively high rate of population growth in the United States (compared to most other industrialized countries).

The explanation for the apparent anomaly of a historically moderate net international migration rate and a record-high contribution of immigration to national population growth is that other components of population growth have fallen to historically low levels. Over U.S. history, the rate of natural increase in the population (births minus deaths) has been steadily declining because the costs and benefits of large families changed for both native-born and foreign-born couples as the nation became more urbanized and industrialized. In addition, in an aging society deaths per thousand of population are also rising, which further depresses natural increase. In the past few years, the rate per 1,000 for natural increase has fallen below 5.0. As natural increase declined closer to the net international migration rate of around 3.0 per 1,000, the immigration contribution to total population growth has increased to roughly 40 percent, even though the numbers of immigrants per year was not increasing.

The post-1965 immigration wave coincided with the end of the Baby Boom, the transition to below-replacement fertility, and an aging population. Fertility in the United States has hovered around the replacement level of 2.1 births per woman for the past three decades, but fell after the 2007-2009 recession to 1.86 in 2013. With the total fertility rate of white non-Hispanic women, the largest ethnic group, consistently below

1.9, higher fertility among other groups, particularly Hispanics (roughly 2.8 prior to the recession, when it fell to 2.2), has helped to maintain the replacement level.<sup>1</sup> Overall, fertility of immigrant women is slightly higher than that of the native-born; however, the differential is small and typically narrows over time (Monte and Ellis, 2014; U.S. Census Bureau, 2014, p. 17). Even though the overall fertility rate has remained near replacement, the convergence of nativity differentials in childbearing behavior, combined with rising numbers of deaths from an aging population, portends slower future population growth even with high immigration levels.

## 2.5 PAST AND FUTURE TRENDS IN THE STOCK OF FIRST AND SECOND GENERATION IMMIGRANT POPULATIONS

Immigration effects are often viewed as due to not only the numbers of foreign-born alone (the first generation) but also their children born in the United States (the second generation). This section reviews the trends over time in the numbers of first and second generation individuals (see Box 2-1 on sources of data for these trends). The *stock* of the foreign-born in the total population at any moment in time represents the cumulative impact of prior waves of immigration, net of the deaths and the return migration of earlier immigrants. Changes in the size and composition of the stock of foreign-born across successive Decennial Censuses provide a portrait of the presence of immigrants and their children in American society.

Through the passage of generations, descendants of the foreign-born become part of the national population without any sense of being foreign or “other,” but at what point does this happen? In this chapter, as in the broader research literature, the children of immigrants—the second generation—are considered part of the immigrant community (Carpenter, 1927; Hutchinson et al., 1956; Portes and Rumbaut, 2014). For the fiscal analysis accounting in Chapters 8 and 9, the education and other costs of dependent individuals in the second generation are included on the immigrant side of the ledger. However, the decision of where to draw the line on which generations are included in the immigrant community is somewhat arbitrary.

The children of immigrants, if born in the United States as most are, are native born by definition and, under the Fourteenth Amendment, are U.S. citizens at birth. Most individuals in the second generation adopt English as their primary language, and many of them marry outside their ethnic community (Lichter et al., 2011; Qian and Lichter, 2011). Yet, many if not most of the second generation are reared and socialized within the immigrant/ethnic sociocultural environment of their parents. Their family, religious, and community ties keep them attached to the immigrant experience. This

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<sup>1</sup>Fertility data are from Martin et al. (2015).

### BOX 2-1 Sources of Data on Measuring First and Second Generation Stocks

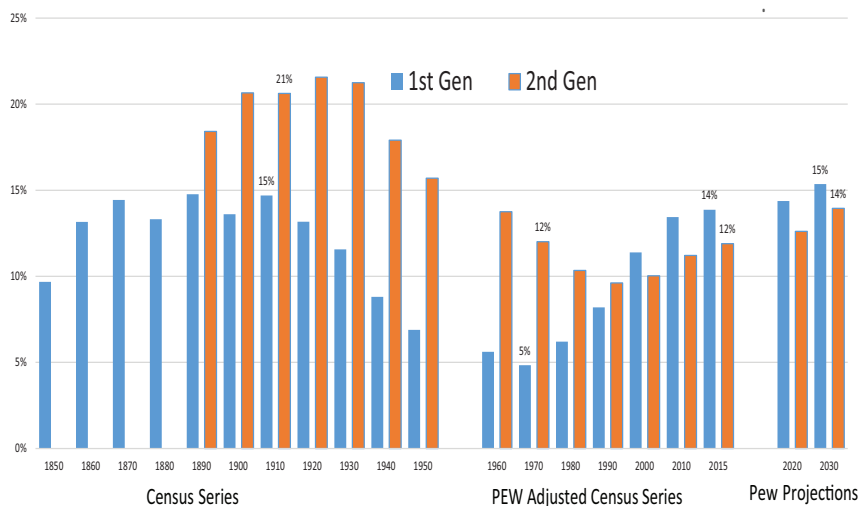
Foreign birth was first included in the Decennial Census in 1850, and a question on birthplace of parents was first added in the 1890 census. Parental birthplace of parents was dropped from the 1980 and subsequent censuses. The Current Population Survey (CPS), a major Census Bureau survey, added a question on parental birthplace in 1994, but the CPS data are not exactly comparable to the Decennial Census data or to the American Community Survey (the replacement for detailed census data after 2000). The latest Census Bureau population projections do include estimates of the future foreign-born population. Because of the inconsistencies in the census series and the lack of counts of the second generation, the data in this section use the adjusted population estimates and projections prepared by the Pew Research Center (2015a). These adjusted population series differ slightly from official census data because of methods of adjustment, estimation, and projection, but the differences are generally less than one percentage point.<sup>a</sup>

<sup>a</sup>All things being equal, one would ideally use “official” Census Bureau estimates and projections. However, the Pew estimates include first, second, and third generation<sup>b</sup> components, while the Census Bureau only includes first and second-and-higher generational data. Since the panel considers the second generation as part of the larger “immigrant population community,” this tips our decision in favor of using the Pew Research Center data.

<sup>b</sup>As noted at the beginning of Chapter 1, this report uses “third-plus generation” as shorthand for all U.S. residents whose parents are native-born U.S. citizens (sometimes called “third and higher generation”).

reality was a reason for the addition of the parental birthplace question to the Decennial Census a few decades after the question on foreign birth was adopted. In keeping with this line of reasoning, the panel considers both the first and second generations as part of the immigrant population.

Figure 2-2 shows the relative size—as a percentage of the total population—of first and second generation immigrant groups from the late 19th century to the early 21st century; these figures are based on historical Decennial Census data and Pew Research Center population estimates and projections. From 1860 to 1920, the foreign-born share of the U.S. population fluctuated between 13 and 15 percent. The second generation was larger, hovering around 20 percent of the total population. The size of the second generation population was a product of the high fertility rate of immigrants at that time, approximately twice what it is today (Morgan et al., 1994). Comprising upward of one-third of the population—one-half the population outside the South and a majority among city dwellers—in



**FIGURE 2-2** Percentage of first and second generations in the U.S. population, 1850-2030.

SOURCE: Pew Research Center (2015a).

the early decades of the 20th century, immigrants and their children were a highly visible presence in schools, workplaces, and American politics (Hirschman, 2005).

With the passage of immigration restrictions in the 1920s, followed by the Great Depression in the 1930s and World War II in the 1940s, the flow of immigrants dropped to record lows (Figure 2-1). The decline in the stock of the foreign-born population lagged the drop in flows but followed the same temporal trend, reaching a low of less than 5 percent in 1970. During the long immigration pause in the mid-20th century, the decline of the stock of second generation followed suit with a lag, reaching a low of 12 percent in 1970 and 10 percent in 1980. In the early 20th century, the center of gravity in immigrant communities was in the working-age first generation and their youthful progeny. By midcentury, the foreign-born population was diminished by the lack of new arrivals and a rising death toll among this aging population. The second generation was somewhat younger, but its ranks also began to shrink during the middle decades of the century as that population aged and the fertility of the foreign-born population fell.

The 1965 Immigration Act is typically used to date the beginning of a new era of mass immigration. But implementation of the new immigration quotas was delayed for several years, and it might be better to consider

1970, which recorded the nadir in the size of the foreign-born population, as the start of the new age of mass migration. The absolute size of the foreign-born population rose from less than 10 million in 1970 to 45 million in 2015, while the fraction of foreign-born in the total population rose steadily to reach 14 percent in 2015—slightly below the levels experienced a century earlier. The significance of the second generation is obscured in Figure 2-2 because the rising numbers of children of the post-1965 immigrants are counterbalanced by deaths among much older members of the second generation, who were the children of early 20th century immigrants. Since 2000, however, the “new” second generation has expanded rapidly from 24 million in 2000 to 38 million in 2015 (that is, from 10% to 12% of the population). At present, in 2016, one in four Americans is an immigrant or the child of an immigrant.

Before discussing the projections of the future stock of foreign-born in Figure 2-2, it is useful to review the dynamics of recent immigration since the Great Recession. In the early 2000s, immigration continued at more or less the same pace as in the immediately prior decades. Data from the American Community Survey (ACS) showed a continued rise in the foreign-born population, as did the estimates of the undocumented immigrant population, which reached a peak of 12.2 million in 2007 (Passel et al., 2013). However, there were signs that Mexican immigration was beginning to decline in the early years of the decade (Passel et al., 2013). For the last three decades of the 20th century, Mexican immigration, much of it unauthorized, had been the largest component of the post-1965 immigration wave. The slowdown in Mexican immigration has several sources. The deep-rooted cause is slower growth of the Mexican population in the young working ages due to sharp fertility declines in the 1980s and 1990s. Mexico’s total fertility rate plunged from 6.8 births per woman in 1970 to 2.2 by 2006 (Johnson and Stoskopf, 2010). When children of the high-fertility era came of age between 1980 and 2000, a very large wave of young people sought job opportunities across the border in Texas and California, later dispersing across the United States. After 2007, owing in part to Mexico’s fertility decline, relatively fewer young people pursued jobs in the United States; with an improved Mexican economy, many more were absorbed into the workforce at home.

Despite the huge increase in personnel and other costs of border enforcement, the size of the foreign-born Mexican-origin population in the United States increased from 2.2 million in 1980 to 11.7 million in 2010 (Greico et al., 2012). A little more than half the foreign-born Mexican-origin population currently in the United States may be unauthorized (Passel et al., 2013). Massey and Pren (2012) have argued that the hardening of the U.S.-Mexican border had a modest impact on the likelihood of young Mexicans crossing the border, but it raised the costs of doing so and there-

fore discouraged return migration once migrants had entered the United States. Traditionally, much of migration from Mexico to the United States had been circular, often traveling for seasonal employment and with only a minority settling permanently in the United States. With the higher costs of border crossing, however, many young Mexican workers opted to settle permanently in the United States rather than risk detection by undertaking multiple crossings. Thus the border hardening yielded the unexpected result of increasing the immigrant population of Mexican origin, and their subsequent children, who permanently resided inside the United States.

The impact of the 2007-2009 Great Recession on Mexican migration was qualitatively different from that of prior downturns. The effects of the high unemployment rate, including the especially sharp decline in construction jobs, which had often been filled by Mexican immigrants, caused the net migration rate from Mexico to fall to zero, or perhaps even to turn negative, as the numbers of returning migrants equaled or surpassed those of new arrivals (Passel et al., 2013). A recent report by the Pew Research Center claims that since 2009, more Mexicans left the United States than entered—reversing the direction of the largest single-country flow since 1970 (Gonzalez-Barrera, 2015). Contributing to this overall decline in Mexican immigration has been a drop in the absolute number of undocumented immigrants in the United States in part due to an increase in their removals and deportations (Massey and Pren, 2012).

Since 2000, even as immigration from Latin America, and Mexico in particular, was decreasing, an increasing share of immigration has come from Asia. In absolute numbers, recent arrivals over the prior 5 years from Asia rose from 323,000 in 1970 to 2.5 million in 2013 (Pew Research Center, 2015a, pp. 36-37). Since 2008, various measures have shown more Asian immigrants arriving in the United States than Hispanics). Recent data, however, show that increases in immigration from Central America have reduced the gap between Asian and Hispanic immigration (*ibid*).

To summarize, there seem to be two distinct periods of immigrant flows into the United States during the early 21st century. The first was from 2000 to 2007, when the foreign-born population continued the high pace of arrivals recorded in the 1990s. The second period began after 2008, when the recession caused a sharp slowing of immigration from Mexico and Latin America. The economic conditions that dampened the flows of unauthorized immigration have had much less impact on legal immigration based on family reunification, much of which is coming from Asia.

The Pew Research Center projections in Figure 2-2, which incorporate the recent slowdown in unauthorized migration, show only modest increases in the size of the foreign-born population from 45 million in 2015 to 48 million in 2020 and to 57 million in 2030. The share of the foreign-born as a fraction of the total population is predicted to rise slowly to 14



percent in 2020 and to 15 percent in 2030. These projections are roughly comparable to those published by the Census Bureau, but there are minor differences in methods and assumptions (Pew Research Center, 2015a, Ch. 2; U.S. Census Bureau, 2014). The second generation is predicted to rise to 13 percent in 2020 and 14 percent in 2030. Whereas the projected share of the foreign-born in the total population is comparable to the actual share a century earlier, the share of the second generation is projected to be roughly half as large as a century ago, due to the much lower fertility of immigrants today.

## 2.6 IMMIGRATION AND CHANGES IN RACE AND ETHNIC COMPOSITION

Immigration has been the major demographic driver of changes in the racial and ethnic composition of the U.S. population since the settlement of North America several centuries ago (Klein, 2004). However, for much of the country's history, the diversity of its population was not measured because of the limited scope of questions in the Decennial Census. For example, Native American populations were only enumerated after they were settled on reservations or in government-administered areas. Religion has never been included in Decennial Censuses. While the list (and definition) of racial and ethnic groups has varied considerably over the past two centuries, ethnic differentiation within the white population was not measured in Decennial Censuses from 1850 through 1970, a period when much of the concern about immigration was driven by diverse countries of origin among white European immigrants.

Table 2-3 shows the racial and ethnic origins of the resident American population in 1900, 1970, 2000, 2010, and 2014. In 1900, the United States was in the middle of the peak years of immigration from Southern and Eastern Europe, while 1970 was just before the massive contemporary wave of immigration from Latin America and Asia. The racial and ethnic classification in Table 2-3 is a blend of pre-2000 and post-2000 categories, with the following major groups: White (non-Hispanic), American Indian/Alaskan Native (non-Hispanic), African American (non-Hispanic), Latino/Hispanic/Spanish, Asians and Pacific Islanders (non-Hispanic) and "mixed race" (non-Hispanic). Data on persons with multiple race identities (two or more races) were first available in the 2000 Decennial Census and starting in 2003 in the CPS.

Almost half of Hispanics report themselves to be white, and about one-third write in a Hispanic national origin category in response to the race question. In Table 2-3, all Hispanics, regardless of their response to the race question, are classified as "Latino/Hispanic/Spanish." The 1900 and 1970 data are based on public use microdata derived from the Decennial

TABLE 2-3 Racial and Ethnic Diversity by Immigrant Generation, United States, 1900, 1970, 2000, 2010, and 2014

Race and Ethnic Identity	Percentage Distribution				
	1900	1970	2000	2010	2014
<b>White (non-Hispanic)</b>	<b>87.3</b>	<b>83.3</b>	<b>69.6</b>	<b>64.0</b>	<b>62.3</b>
3rd-plus generation	53.8	69.0	62.4	57.4	56.1
1st and 2nd generation	33.5	14.3	7.2	6.7	6.3
<b>American Indian/Alaskan Native (non-Hispanic)</b>	<b>0.3</b>	<b>0.3</b>	<b>1.0</b>	<b>0.7</b>	<b>0.8</b>
<b>African American (non-Hispanic)</b>	<b>11.7</b>	<b>10.9</b>	<b>12.9</b>	<b>12.0</b>	<b>12.1</b>
3rd-plus generation	11.7	10.7	11.4	10.4	10.1
1st and 2nd generation	0.1	0.3	1.5	1.6	1.9
<b>Latino/Hispanic/Spanish</b>	<b>0.5</b>	<b>4.6</b>	<b>11.5</b>	<b>16.4</b>	<b>17.3</b>
3rd-plus generation	0.2	2.1	3.1	4.5	5.1
1st and 2nd generation	0.3	2.5	8.5	11.9	12.2
<b>Asian American &amp; Pacific Islander (non-Hispanic)</b>	<b>0.1</b>	<b>1.2</b>	<b>4.9</b>	<b>5.1</b>	<b>5.6</b>
3rd-plus generation	0.0	0.2	0.5	0.4	0.5
1st and 2nd generation	0.1	1.0	4.5	4.7	5.1

TABLE 2-3 Continued

Race and Ethnic Identity	Percentage Distribution				
	1900	1970	2000	2010	2014
Mixed Race (non-Hispanic)	NA	NA	NA	1.8	1.9
3rd-plus generation	NA	NA	NA	1.4	1.5
1st and 2nd generation	NA	NA	NA	0.3	0.4
TOTAL	100.0	100.0	100.0	100.0	100.0
Race and Ethnic Identity	Population Count (thousands)				
	1900	1970	2000	2010	2014
White (non-Hispanic)	65,637	169,435	191,228	194,814	195,399
3rd-plus generation	40,433	140,334	171,359	174,537	175,717
1st and 2nd generation	25,204	29,101	19,869	20,277	19,682
American Indian/Alaskan Native (non-Hispanic)	196	691	2,801	2,234	2,448
African American (non-Hispanic)	8,810	22,257	35,424	36,589	37,783
3rd-plus generation	8,761	21,731	31,311	31,621	31,738
1st and 2nd generation	49	526	4,113	4,968	6,045
Latino/Hispanic/Spanish	401	9,289	31,660	49,797	54,253
3rd-plus generation	146	4,292	8,384	13,687	16,115
1st and 2nd generation	255	4,997	23,276	36,109	38,139

Asian American & Pacific Islander (non-Hispanic)	142	2,465	13,597	15,486	17,510
3rd-plus generation	31	495	1,339	1,285	1,496
1st and 2nd generation	111	1,970	12,258	14,200	16,014
Mixed Race (non-Hispanic)				5,362	6,002
3rd-plus generation				4,302	4,654
1st and 2nd generation				1,060	1,349
TOTAL POPULATION	75,186	203,302	274,709	304,282	313,395

NOTE: For this table, the categories of White, American Indian, Asian American, and Pacific Islander exclude those identified as Hispanic, to avoid double-counting. All those who identified as Hispanic are included in the category for Latino/Hispanic/Spanish. In this table as throughout the report, “3rd-plus generation” refers to all U.S. residents with two native-born parents.

SOURCES: 1900 and 1970 Decennial Census Public Use Microdata Sample file, available: <http://www.ipums.org/usa/> [November 2016], 2000 CPS from Merged 1998 to 2002 CPS Public Use Microdata Sample file, available: <https://cps.ipums.org/cps/> [November 2016]. 2010 and 2014 CPS Public Use Microdata Sample file, available: <https://cps.ipums.org/cps/> [November 2016].

Censuses for those years, while data for 2000, 2010, and 2014 are based on the CPS. Within each ethnic-origin category (except American Indian), the third-plus generation<sup>2</sup> population is distinguished from the combined first and second generation (immigrant stock) population.

One indicator of the long-resident U.S. population of European origin is the category in Table 2-3 for third-plus generation non-Hispanic white. This group's share of the total U. S. population has hardly changed from 1900 to 2014. Just over half of the American population (54%) was in this category at the turn of the 20th century, and the share was only slightly higher (56%) in 2014.

In 1900, about 12 percent of the U.S. population was of African (or part African) origin. Because most African Americans lived in the South prior to the Great Migration (from 1915 to 1960), they had only a small presence in the rest of the nation—generally only a few percentage points. Other minority groups, including Native Americans, Hispanics, and Asians combined, comprised only 1 percent of the total population in 1900.

The major source of ethnic diversity in 1900 was within the white (European-origin) population. About one in three Americans in 1900 consisted of whites who were foreign born or had at least one foreign-born parent. This fraction rose to almost half of the population outside the South and to a substantial majority of the population in the largest cities. As discussed earlier, many old stock Americans considered immigrants of Eastern and Southern European origin to be socially and racially inferior. During this period, the Daughters of the American Revolution and similar groups were organized to stress their ancestral origins and to distance themselves from the new immigrants. College fraternities and sororities, social clubs, and many professions established racial, religious, and ethnic barriers to exclude the new immigrants and their descendants (Baltzell, 1964; Lieberman, 1980).

During the middle decades of the 20th century, the second generation (and much of the first generation) population assimilated into American life. Through generational succession, immigrant communities became ethnic communities (often of mixed ancestry) that celebrated their roots through memory, cuisine, annual festivals, and embellished Hollywood stories. Through intergenerational economic mobility and broadly shared economic prosperity, most of the children and grandchildren of Italian, Irish, and Eastern European immigrants joined the American middle class. Rather than the pressurized assimilation endured by their parents during the Americanization movement of the early 20th century, economic integration and social mobility of children and grandchildren of Eastern and

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<sup>2</sup>As noted in Chapter 1, throughout this report “third-plus generation” is used as shorthand for all U.S. residents whose parents are native-born Americans.

Southern Europeans were facilitated by postwar economic growth, the GI Bill for World War II veterans, the expansion of public higher education, and suburban development (Alba and Nee, 2003; Duncan and Duncan, 1968; Katznelson, 2005; Lieberman, 1980).

With the gradual acceptance of the descendants of Southern and Eastern Europeans as part of the majority white population, the U.S. ethnoracial landscape in the post–World War II era was focused on the black-white divide. By the 1970 Decennial Census, fully 94 percent of the population self-identified as either white (83%) or African American (11%). For African Americans, who had long been denied equal opportunity on the basis of skin color, the Civil Rights Movement of the 1950s and 1960s was the struggle to redress more than two centuries of segregation and government-sanctioned discrimination. The Great Migration of African Americans to cities in the Northeast and Midwest and to some places on the West Coast made the black-white divide a national issue. Although geographically concentrated in a few major cities and states (California, New York, and Texas), by 1970 the growing Latino presence was felt as activists demanded ethnic identification and social recognition (Mora, 2014).

The 1965 amendments to the Immigration and Nationality Act replaced the infamous, restrictive immigration quotas by national origin of the Immigration Act of 1924 with a preference system based on principles favoring family reunification and certain highly skilled professions. Although Congress may have assumed that there would only be modest increases in the numbers of immigrants and their composition following the 1965 changes in immigration law, the long-term impact was to open the door to a new wave of mass immigration. Not only did annual immigration flows increase but the annual flows of legal immigrants from Asia surpassed that of legal immigrants from Latin America within a dozen years (Tienda, 2015). A less documented trend is a shift in the age composition of LPRs toward older ages, which is a predictable outcome of expanding the definition of immediate family members to include parents (Carr and Tienda, 2013). Accompanying these shifts in legal immigration was the advent of large-scale settlement of undocumented immigrants, mainly from Latin America. By the early 2000s, the numbers of new arrivals of unauthorized immigrants exceeded arrivals of legal immigrant in some years (Passel and Suro, 2005, p. 5).<sup>3</sup>

This wave of immigration from Latin America and Asia gained momentum during the last quarter of the 20th century and into the 21st cen-

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<sup>3</sup>For additional detail on changes in the unauthorized population, see Figure 1-17, which charts the number of undocumented immigrants in the United States from 1990 to 2013, and surrounding discussion in the report of our sister panel (National Academies of Sciences, Engineering, and Medicine, 2015).

tury, further diversifying the U.S. population. The number of Hispanics expanded fivefold from less than 10 million in 1970 to more than 50 million in 2014—representing about 17 percent of the total population. Asians and Pacific Islanders have had an even higher rate of growth—from 1.5 million in 1970 to 17.5 million in 2014—and currently represent over 5 percent of U.S. residents. Assuming the current mix of immigrants continues, Pew Research Center (2015a, p. 119) population projections suggest that Asians could comprise 14 percent of the U.S. population by 2065 and Hispanics 24 percent.

Immigration is driving the increase in population diversity. As shown in Table 2-3, about two-thirds of all Hispanics and 9 in 10 Asian and Pacific Islanders are either foreign born or children of immigrants. Since 1970 there has been an important but much smaller increase in the African American population of immigrants and the children of immigrants.

U.S. population diversity now commands the attention of politicians, bureaucrats, and the general public as electronic and print media report new demographic milestones, such as the rise of majority-minority states and localities. Table 2-3 shows that the percentage of the non-Hispanic white population, which was 87 percent of the total population in 1900 and still 83 percent in 1970, declined to just 62 percent by 2014. The Census Bureau projects that by 2060 non-Hispanic whites will represent 43 percent of the U.S. population (Colby and Ortman, 2015, p. 9; also see Pew Research Center, 2015a).

These projections rest on several arbitrary assumptions about the nature of race and ethnic identities, mainly that racial groups can be defined in categories that are mutually exclusive and not overlapping, and foremost for projections, that the membership in these categories remains distinct over several decades. Given the overlap that already occurs between those who identify as Hispanic and also identify with one of the “race” categories, as well as the trend toward more intermarriage across these ethnoracial boundaries, projections by race and Hispanic origin must rely on today’s categories, which are increasingly hypothetical for the future. Perhaps they are best thought of as projections of the future population based on the predominant “origins” of that population as represented in today’s categories. Predictions about the future ethnic composition of the United States certainly should not be treated as projections of the identities that will be expressed by future residents of America.

## 2.7 POPULATION AGING, THE BABY BOOM, AND THE TRANSITION TO AN IMMIGRANT WORKFORCE

The age structure of a population, the relative shares of old and young, has an important influence on economic welfare, social mobility, and the

resources available to support the elderly and children. At a given time, the age structure of a population is a reflection of the numbers of births in prior years and their survival, as well as the volume and age composition of immigrants. The most important of these factors is fertility. Societies with high fertility rates invariably have youthful populations with high fractions of children, adolescents, and young adults. Low-fertility societies have larger fractions of older persons, including the elderly.

The Baby Boom, those Americans born from the late 1940s to the mid-1960s, actually reversed the aging of the American population for several decades. The very large birth cohorts during this period rippled through the age structure of the American population over the past half-century. This trend is shown in Figure 2-3 with the fraction of the national population in three broad age categories of 0-24, 25-64, and 65 and above, from 1960 to the present and then projected to 2030 based on the Pew Research Center's population estimates and projections (Pew Research Center, 2015a).

The most distinctive feature of the population in 1960, at the peak of the Baby Boom, was the relative abundance of children and youth and the relative scarcity of the elderly. With less than 1 in 10 Americans above age 65, the costs of Social Security (and Medicare, which was implemented

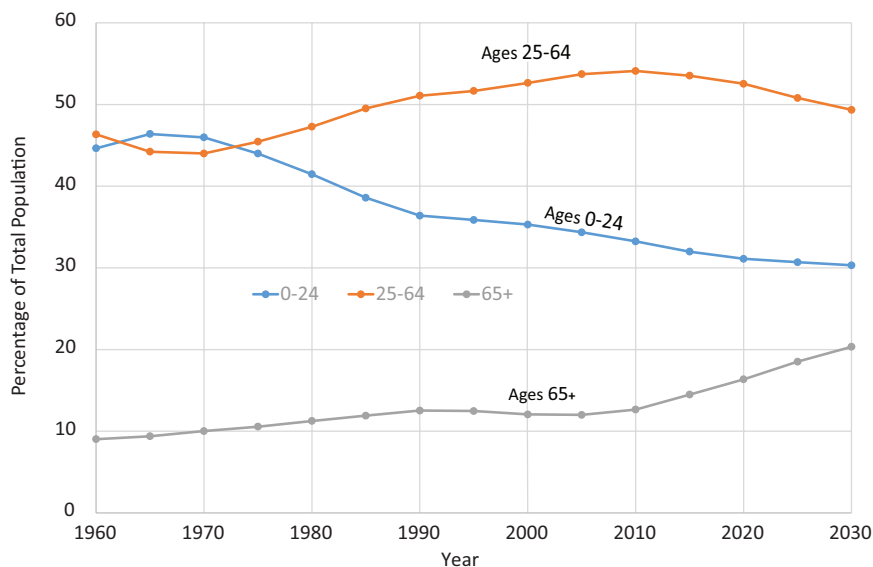


FIGURE 2-3 Change in age composition of U.S. population from 1960-2030 (projected).

SOURCE: Pew Research Center (2015a).



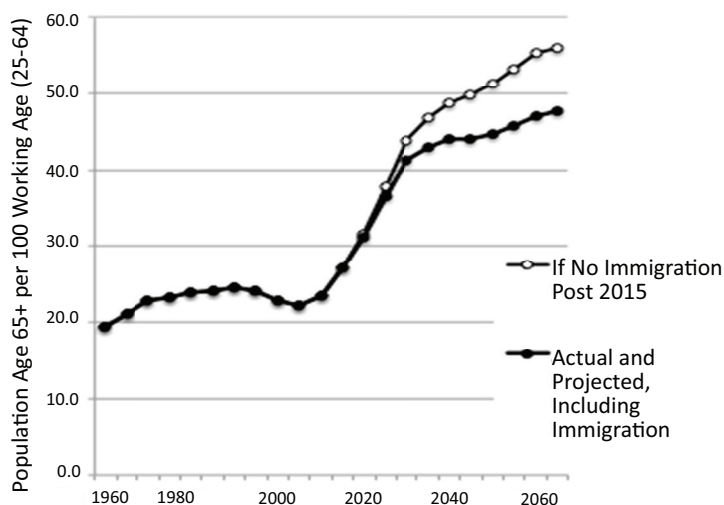
in 1965) were easily covered with modest levels of taxation. The costs of youthful dependents, for schooling in particular, were substantial, but the benefits were broadly distributed to most households with children. The costs of child care were primarily borne by families and by women in particular.

The population share of children and youth fell sharply by 10 percentage points from 1970 to 1990 and has continued to decline, but more gradually, in recent years. The share of the elderly has increased very slowly over the same period, rising from 9 percent in 1960 to 12 percent in 2005. However, the rate of change in population aging has accelerated in recent years, and the share of elderly is predicted to reach 16 percent in 2020 and 20 percent in 2030. The population share in the prime working ages, 25-64, rose for several decades after 1970 and was about 54 percent of the total population from 2005 to 2015. As the large Baby Boom cohorts—those born from 1946 to 1964—become senior citizens in the years following 2010, the population share in the prime working ages will decline, dropping below 50 percent by the late 2020s.

Changes in the age structure and the growth of the elderly population exert a fundamental constraint on public finances. In a “pay as you go” system, public funds for the elderly are a function of the generosity of the program, taxes paid by the working population, and the relative numbers of workers and beneficiaries. In essence, the support of dependent-aged populations rests on the number of working-age Americans. Figure 2-4 displays the ratio of seniors ages 65 and older to working ages 25 to 64, in a variation of demographers’ traditional old-age dependency ratio, but with working age beginning at 25. Of course, people ages 18 to 24 also can be workers, but in modern postindustrial nations more often they are of “training age,” enrolled in higher education or engaged as interns and apprentices, and so they are not yet productive enough to contribute to supporting the seniors. Similarly, people over age 65 also can be workers themselves, but retirement follows for most soon after this age, and old-age support programs have eligibility at 65 (Medicare) and 67 (Social Security’s full retirement age).

What is most striking about Figure 2-4 is that the senior ratio (sometimes called the old-age dependency ratio) remained relatively constant, with between 19 and 24 seniors per 100 working-age population, from 1960 to 2010, after which it is projected to rise sharply (based on the Pew 2015 projection data). The oldest Baby Boomers crossed the age 65 threshold in 2011, and by 2015, the ratio has already climbed to 27.1. In the next 25 years, by 2040, the ratio is projected to reach 44.0. This increase of 16.9 in the senior ratio reflects the growing weight of the entitlement programs carried by a relatively smaller working-age population.

The current level of youthful immigration to the United States is not sufficient to completely reverse population aging or to rejuvenate low-



**FIGURE 2-4** Rising senior ratio in the U.S. population, with and without projected immigration.

SOURCE: Myers (2012) and unpublished estimates by Pew Research Center (2015a).

fertility populations (Schmertmann, 1992; United Nations Population Division, 2001). As noted earlier, 1 million new immigrants per year is less than one-third of 1 percent of 300 million people that comprise the American population. But the small effect of immigration on population aging is not inconsequential (Lutz and Scherbov, 2006). To demonstrate the impact of immigration on population aging, one can compare old age ratios in projections that include or exclude immigration using the method developed by Myers (2012). If one hypothetically removes immigration after 2015, including the future descendants of those immigrants, it is possible to compare the future changes in the senior ratio over several decades. These data have already been applied in Figure 2-4, but the calculation of how large a difference immigration makes requires more detail.

As demonstrated in Table 2-4, population projections can be compared for the key ages with and without immigration. Without any immigration after 2015, the older population grows to a ratio of 55.9 seniors per 100 working-age adults in 2065, compared with 47.5 if immigration is included. Even in the first 25 years, by 2040, the ratio without immigration is projected to reach 48.8, an increase of 21.7, versus an increase of 16.9 if immigration continues as projected. In effect, already by 2040, the absence of immigration in the population projection would lead to growth of the senior ratio that is about one-quarter (28.1%) greater than if immigration

TABLE 2-4 Population Aging in Projections That Include or Exclude Immigration

	Population (thousands)			Senior Ratio (65+/25-64 × 100)			Growth in Ratio	
	2015	2040	2065	2015	2040	2065	2015- 2040	2015- 2065
Including Projected Immigration								
25-64	173,195	187,554	213,252					
65 and older	46,853	82,512	101,333	27.05	43.99	47.52	16.94	20.47
Assuming No Immigration 2015 to 2065								
25-64	173,195	164,620	158,345					
65 and older	46,853	80,278	88,469	27.05	48.77	55.87	21.71	28.82
Percentage Change in the Senior Ratio in the Absence of Immigration							28.17	40.81

SOURCE: Pew Research Center (2015a).

proceeds as projected and, after 50 years (by 2065), it would increase this indicator of aging by 40.8 percent. Clearly, immigration cannot fully stop population aging, but it can partially slow its effects. As can be seen in the table, immigrants (and descendants) add to the working-age population much more than to the elderly population. Not all grow old at once, and even after immigrants age, their children continue to pay a dividend toward old age support.

Belonging to the working-age population does not directly translate into employment—this depends on labor force behavior. In general, foreign-born men are slightly more likely to be employed than their native-born peers, especially after the first few years of adjustment following immigration (Duncan and Trejo, 2012; National Academies of Sciences, Engineering, and Medicine, 2015, Ch. 6). The gap is widest among men with a high school or less than high school education. Over a quarter of low-educated men in the third-plus generation are not employed, whereas the employment-to-population ratio of foreign-born men is very high across the education spectrum. The difference in employment ratios between foreign-born and native-born men is due mainly to differences in labor force participation and not to unemployment. Native-born men have some options—advanced education, early retirement, disability—that are not as readily available to foreign-born men, especially those who are unauthorized immigrants.

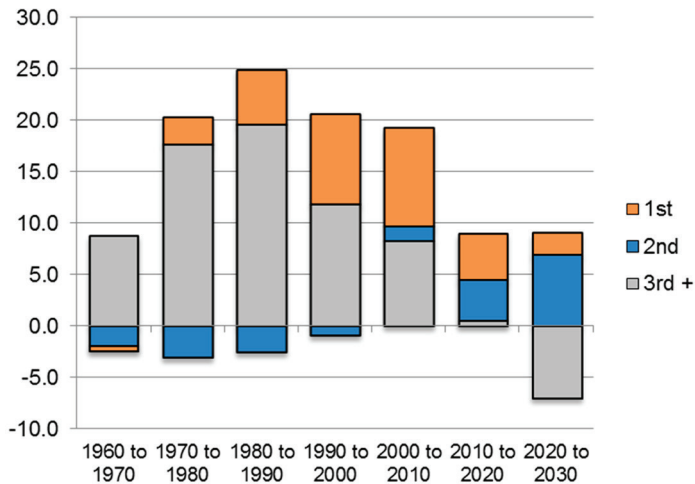
Among women, larger nativity differentials in labor force participation are common. Immigrant women are somewhat less likely (about 5 to 10 percentage points) to be employed than their third-plus generation peers in the same racial and ethnic group (the pattern is reversed for those with less than a high school education). The main differences in employment here are due to the high percentage of immigrant women staying home with young children; their labor force participation rate now resembles that of native-born females during the 1970s (which was much higher than it had been, say, in the 1950s, but still far from its peak around the year 2000). Second generation women are, however, just as likely to be working as their third-plus generation peers (National Academies of Sciences, Engineering, and Medicine, 2015, Ch. 6).

As the Baby Boom cohorts age and exit from the labor force in the coming decades, immigrants and their children will play an even larger role in the American economy. To provide an historical perspective on future trends, Table 2-5 and Figure 2-5 report the net population change (in thousands) in the working-age population, ages 25-64, by immigration generation for each decade from 1960 to 2010, with projections added for 2020 and 2030 (Pew Research Center, 2015a). The net change in the working-age population is the balance between the numbers turning age 25 (new entrants) relative to those turning age 65 (those exiting) during the decade. Among the first generation, net change is the inflow of new

**TABLE 2-5** Decadal Change in U.S. Working-age Population, Ages 25-64, by Immigrant Generation, from 1960-1970 to 2020-2030, Based on Population Estimates and Projections

Time Period	Net Change in Resident Working-age Population (thousands)			
	Total	Immigrant Generation		
		First	Second	Third-plus
1960 to 1970	6,317	-526	-1,949	8,793
1970 to 1980	17,195	2,597	-3,092	17,690
1980 to 1990	22,373	5,346	-2,564	19,591
1990 to 2000	19,637	8,703	-920	11,854
2000 to 2010	19,243	9,576	1,462	8,205
2010 to 2020	8,992	4,548	3,954	490
2020 to 2030	2,009	2,093	6,939	-7,022

SOURCE: Pew Research Center (2015a).



**FIGURE 2-5** Net change in working-age population each decade, by immigrant generation (in millions) from 1960-1970 to 2020-2030.

SOURCE: Table 2-5 data, Pew Research Center (2015a).

immigrants minus the number of retiring or departing migrants. Among the second and third-plus generations, net change is driven by the size of cohorts that were born 25 years earlier relative to those born 65 years ago (those entering and leaving the working-age population). A large wave of new immigrants and their childbearing will trigger a subsequent large wave of births of second generation children, who will become workers approximately two decades later.

From 1960 to 1970, the working-age population grew by a little more than 6 million—a slow expansion driven by the relatively small birth cohorts that occurred in the late 1930s and early 1940s. The figure of 6 million additional working-age people reflects the balance of a net increase of almost 9 million in the third-plus generation population and a net decrease of almost 2.5 million in first and second generation populations. These figures reflect the mortality experience and aging out of the workforce (attaining age 65) of immigrants and children from early in the 20th century, before the long immigration pause. In short, the foreign-born population in 1960 was composed mainly of the elderly survivors of the early 20th century immigration. The figure of 6 million persons added to the working-age population during the 1960s is dwarfed by the population changes that follow over the next few decades.

Between 1970 and 2010, the working-age population expanded by about 20 million net workers each decade. From 1970 to 1990, the growth was entirely due to Baby Boom cohorts in the third-plus generation reaching working age. Immigration added to the ranks of potential workers, but much of the increase was canceled out by aging of the second generation (i.e., children of early 20th century immigration). Subsequently, in the last decade of the 20th century, the share of the increase in working-age population due to net immigration rose, not only because the inflow of immigrants increased but also because the additions to the third-plus generation of working age slowed to only 12 million.

The 2000 to 2010 decade was a transitional period in terms of the share of growth in the working-age population contributed by immigrants. Overall growth held steady, with an increase of 17 million persons ages 25 to 64, but the increase from the third-plus generations slowed to 8 million, while the first and second generation working-age population increased by 9.5 and 1.5 million, respectively. These trends have accelerated since 2010 and are projected to continue through the 2020s. Growth of the third-plus generation is all but vanishing, with almost all of the 9 million net additions to the working-age population coming from the ranks of the first and second generations. The high relative growth of the second generation reflects the increases in immigration after 1970; the children of those immigrants are now coming of age, and new immigrants continue to make net additions to the working-age population.

The decade after 2010 marks a major turning point. The leading edge of the Baby Boom generation is aging into the retirement range (turning 65 and older), and their numbers are approximately equal to entry of younger third-plus generation persons in the working ages. Overall, the net growth of potential workers (ages 25-64) among third-plus generation cohorts will shrink to less than half a million from 2010 to 2020. At the same time, the Pew Research Center projections suggest that the net increase in the number of working-age foreign-born will also slow, falling by half between the decades 2000-2010 and 2010-2020. However, the second generation—the children of the post-1965 wave of immigrants—are projected to add almost 4 million net entrants to the working-age population, a much greater number than in earlier decades.

After 2020, the aging of the Baby Boom generation from 2020 to 2030 will begin to drain the potential workforce drawn from the ranks of the third-plus generation; a net departure from the working-age population of over 7 million is expected. From 2020 to 2030, modest growth of the population ages 25 to 64—projected as a net gain of only 2 million persons—will result because of the growth of the first and second generation population segments. Based on the projections by the Pew Research Center (2015a), the net gain of potential first generation workers will slow to 2 million in the 2020s. This number is less than half that of the 2010-2020 decade and lower than any decade since 1970, reflecting the fact that earlier immigration cohorts are reaching retirement ages.

The projected changes in size of the working-age population from 2010 to 2030 are almost entirely due to the aging of persons already born and living in the United States. Assumptions about future mortality and emigration rates create a bit of uncertainty in the projections but not much. If the American economy grows and requires more workers both to replace those who retire and to create new firms and industries, the primary source of labor will be first and second generation immigrants. This basic fact will hold at all levels, from low-skilled service jobs to professionals with postgraduate degrees. It bears repeating that the reason the third-plus generation cannot be a source of workforce growth is that so many of the older members from this population segment will be aging past 65. Many young people who are third-plus generation Americans will be joining the working-age population, but they will simply be outnumbered by the flood of departing Baby Boomers. These Baby Boom departures are expected to create employment opportunities that will benefit all ethnoracial groups. For instance, Richard Alba (2009) has argued that, similar to the World War II period, this coming period could create ideal conditions for reducing competitive frictions between groups and reducing inequality among minority groups and immigrants.

In addition to its impacts on employment and future economic growth, the volume and age composition of the immigrant population also has implications for public expenditures on education, old-age security, and health care. The working ages are also the primary ages of family formation. Foreign-born women will bear an increasing share of future births in the United States. However, as discussed above, all groups in the United States appear to be converging to replacement-level fertility (two children per woman) or below by the second generation. Currently, first and second generation immigrants comprise about one of four children in schools. Their schooling generates expenditures, but it is also an investment in their future productivity and the well-being of the rapidly growing elderly population of Baby Boomers (Myers, 2007).

The post-1965 immigrants also are beginning to retire and to become eligible for Social Security and Medicare. There is also some evidence that late-age immigration has been increasing somewhat (Batalova, 2012; Carr and Tienda, 2013; Terrazas, 2009). Carr and Tienda (2013) used administrative data to examine changes in the age composition of immigrant inflows since 1980; they found that approximately two-thirds of all LPRs admitted between 1981 and 2009 were in their prime working ages. Concurrently, immigration of persons above age 65 increased, rising from about 11 percent of new LPRs admitted between 1981 and 1985 to nearly 17 percent of new admissions between 2006 and 2009. This increase is consistent with claims by Jasso and Rosenzweig (1989), who attribute this rise in older-age immigration primarily to sponsorship of parents by naturalized immigrants and to a lesser extent to the visa backlog for numerically capped relatives of naturalized immigrants. Other studies have found that numerically capped relatives from the top four sending nations contributed to late-age immigration because their family members aged while waiting in long queues for their visa priority number to be called (Tienda, 2015; Wasem, 2012).

## **2.8 FROM TRADITIONAL GATEWAYS TO NEW DESTINATIONS: THE CHANGING GEOGRAPHY OF IMMIGRANT SETTLEMENT**

The geographical distribution of immigrants across the United States has been a function of initial patterns of settlement and subsequent patterns of internal migration. The initial pattern of settlement is sometimes affected by proximity, favoring seaports of first arrival and places near border crossings. The concentration of 19th century Irish immigrants in Boston and New York and of Cubans in south Florida in the 1960s and 1970s is illustrative of the importance of proximity. Locations of economic opportunity and of established co-ethnic communities are also important determinants of settlement patterns. In the early 20th century, high labor



demand drew immigrants to work in steel mills in Pittsburgh and Buffalo and to coal fields in Pennsylvania, as do present-day meat packing plants in small towns in North Carolina and the Midwest. Even more important than arrival proximity is the presence of families and friends who can provide temporary housing, assistance in finding jobs, and the warmth of welcome based on ties of kinship and mutual obligation. These same factors affect the secondary, internal migration of immigrants after arrival. In the 1960s and 1970s, the federal government sought to settle Cuban and Vietnamese refugees in isolated small towns throughout the country in a misguided effort to spur assimilation (Portes and Bach, 1985). Most of these families eventually moved to cities that had concentrations of their ethnicity, where they found family and relatives who could provide economic opportunity and also understand their cultural and spiritual needs.

The descendants of immigrants have less connection to the churches, institutions, and neighborhoods favored by their immigrant forebears, and they tend to move to suburban locations with more amenities and to other states and localities that offer attractive economic opportunities. Many cities and locations within cities retain an ethnic character across generations, but it usually takes a continuous flow of immigrants to maintain the social and economic vitality of an ethnic community. The deconcentration and dispersal of immigrant communities, as with the general process of assimilation, is a multigenerational process that occurs unless discrimination or other institutional factors obstruct economic and social mobility.

The initial settlement patterns of the post-1965 immigration wave follow the logic of earlier immigration flows, except that the origins of the immigrants shifted from Europe to Latin America and Asia. Most new arrivals during the 1970s and early 1980s settled in five gateway states:<sup>4</sup> New York along the eastern seaboard; California and Texas along the southern border; Illinois in the heartland; and Florida in the southeast (Hirschman and Massey, 2008; Tienda, 2002). Immigrants registered a visible presence in another five states—Maryland, Massachusetts, New Jersey, Virginia, and Washington—which, together with the traditional destination states, housed over 80 percent of the foreign-born population until 1990 (Massey and Capoferro, 2008). With the exception of Texas and California, where proximity to the Mexican border facilitated recruitment of temporary workers into agricultural jobs throughout the 20th century, most of the initial post-1965 immigrants were concentrated in large urban centers (Singer, 2004).

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<sup>4</sup>This discussion follows Massey and Capoferro's (2008) classification of states. New Jersey could certainly be considered among the major immigration destination states since in recent decades it at least matches Illinois in terms of the share of new settlers, number of foreign-born, and share of foreign-born.

Beginning in the late 1980s and with greater momentum in the 1990s and 2000s, the foreign-born population witnessed a significant geographic dispersal. Labor demand was the primary factor driving the geographic scattering of the foreign-born population, particularly in industries that demanded unskilled and/or seasonal labor (Goodwin-White, 2012; Kandel and Parrado, 2005). Buoyed by low unionization rates suppressed by state right-to-work laws (U.S. Bureau of Labor Statistics, 2015a, Table 5), Southern states with histories of limited prior immigration and recent robust growth in labor demand were major beneficiaries of the dispersal toward nontraditional destinations. In addition, housing costs, school quality, public safety, and other amenities also attracted newcomers away from the traditional gateways and toward other destinations (Lichter and Johnson, 2009; Singer, 2004, 2009; Tienda and Fuentes, 2014). Among factors that pushed both settled immigrants and new arrivals away from the traditional gateways, Massey and Capoferri (2008) identified high unemployment rates, which coincided with growth in the availability of newly legalized workers, along with rising anti-immigrant sentiment and tighter border controls authorized by IRCA and selectively implemented at ports of entry along the U.S.-Mexico border.

Despite widespread agreement in the research literature that the effects of immigration are strongest in areas where immigrants are spatially concentrated, relatively few empirical studies have examined the initial settlement patterns and subsequent internal migration of immigrants. Available empirical studies suggest that internal migration rates are higher for immigrants than for the native-born. However, internal migration rates vary according to skill levels, regional origins, and legal status (Massey, 1987). Based on public use microdata from the U.S. Census Bureau, Bartel (1989) found large regional-origin differences in remigration following initial settlement, with Asians more likely than either Europeans or Latin Americans to engage in subsequent internal migration. Furthermore, internal migration tends to accentuate the spatial concentration of the foreign-born population, albeit differentially according to immigrants' regional origins (Bartel, 1989; Edmonston, 2002). Both the propensity to migrate and spatial concentration patterns depend both on immigrants' and their families' characteristics and on their expectations regarding conditions in potential areas of settlement.

To illustrate the changing patterns of settlement of the post-1965 wave of immigrants, Table 2-6 shows the population of immigrants who arrived in the United States during six periods—1975-1980, 1985-1990, 1995-2000, 2002-2008, 2008-2010, and 2010-2014—by current state of residence in 1980, 1990, 2000, 2008, 2010, and 2014, respectively. The first three columns, for the pre-2000 periods, are taken from Massey and Capoferri's (2008) classic analysis, based on "residence 5 years earlier" data from the 1980, 1990, and 2000 Decennial Censuses. The next three (post-2000)

TABLE 2-6 New Immigrant Arrivals by State of Current Residence: 1980, 1990, 2000, 2008, 2010, and 2014

Group and State of Residence	Percentage Distribution of Immigrants Arriving in the U.S. (Census or CPS year shown in parentheses)					
	1975-1980 (1980)	1985-1990 (1990)	1995-2000 (2000)	Pre-Recession 2002-2008 (2008)	Recession 2008-2010 (2010)	Post-Recession 2010-2014 (2014)
<b>Big Five</b>						
Subtotal	63.8	67.3	54.7	47.8	50.7	44.0
California	31.1	35.4	21.1	17.0	19.9	12.3
New York	12.9	13.5	9.9	7.5	7.9	8.4
Texas	8.5	6.8	10.2	10.2	8.9	9.3
Florida	5.8	7.2	8.2	9.2	9.5	9.8
Illinois	5.5	4.5	5.3	4.0	4.5	4.2
<b>Second Tier</b>						
Subtotal	12.1	13.2	14.1	14.9	12.6	15.9
New Jersey	3.7	4.3	4.7	4.6	3.7	4.8
Virginia	1.9	2.3	2.5	3.0	2.2	3.1
Maryland	1.8	2.2	1.9	2.5	2.6	2.8
Massachusetts	2.6	2.8	2.6	2.8	2.2	2.8
Washington	2.1	1.6	2.4	2.0	1.9	2.4
<b>Third Tier</b>						
Subtotal	18.5	15.6	25.5	24.7	22.6	23.9
Georgia	0.7	1.2	3.0	3.1	3.0	2.3
Pennsylvania	1.8	1.9	1.7	1.4	1.9	2.9
Michigan	1.9	1.3	2.0	1.7	1.2	2.9
Arizona	1.1	1.5	2.0	2.6	1.9	1.1
North Carolina	0.8	0.8	2.5	1.7	0.6	1.7

Ohio	1.4	1.0	1.5	1.3	1.3	1.7
Connecticut	1.0	1.2	1.2	1.3	1.6	1.3
Minnesota	0.5	0.6	1.2	1.4	1.8	1.4
Colorado	1.3	0.8	1.8	1.4	0.9	1.2
Tennessee	0.4	0.3	0.9	1.7	2.1	1.2
Nevada	0.5	0.5	1.1	1.0	0.9	1.1
Oregon	1.0	0.9	1.2	1.2	0.7	0.9
Utah	0.4	0.4	0.9	0.8	0.7	1.4
Indiana	0.6	0.3	1.0	0.7	1.0	0.2
Hawaii	1.4	0.9	0.6	0.5	0.8	0.4
Wisconsin	0.8	0.6	0.8	1.1	0.3	0.4
Kansas	0.6	0.5	0.6	0.5	0.2	0.8
Missouri	0.7	0.4	0.8	0.6	0.4	0.4
Louisiana	1.1	0.4	0.4	0.5	0.8	0.5
Rhode Island	0.5	0.5	0.3	0.3	0.4	0.3
Other States	<u>5.6</u>	<u>3.9</u>	<u>5.7</u>	<u>12.6</u>	<u>14.0</u>	<u>16.1</u>
Total	100.0	100.0	100.0	100.0	100.0	100.0
Average Annual Number of Immigrants Arriving (thousands)	274	766	1,146	1,196	1,267	1,287
Theil's Diversity Index	70	66	77	80	78	82

NOTE: CPS = Current Population Survey.

SOURCE: Data from Flood et al. (2015) and Massey and Capoferro (2008, Table 1).

periods are selected to show the settlement patterns during the pre-recession period of 2002-2008, the years of the Great Recession (2008-2010), and the post-recession period (2010-2014). The data for these periods are based on a survey question about the year of arrival in the United States, which is included in both Decennial Censuses and the Annual Social and Economic Supplement (March round) of the CPS. The dates of arrival include the first few months of the year of interview (April for a Decennial Census and March for the CPS). The absolute number of immigrants in each data source is adjusted to annual averages (total arrivals/years since arrival).

The classic pattern of post-1965 immigrant concentration on the West Coast, East Coast, and a few other locations is evident in the column for 1980, which reflects the character of immigration in the late 1970s. During this period, 31 percent of recent immigrants were in California and 44 percent were in just two states: California and New York. There were also significant numbers of new immigrants in a few other states: Florida, Illinois, and Texas. More than 60 percent of all recent immigrants resided in these top five destination states. A closer look reveals that most of these immigrants resided in the major cities in these states: Chicago, Houston, Los Angeles, Miami, New York City, San Francisco, and a handful of other metropolitan areas. A second tier of states, including Maryland, Massachusetts, New Jersey,<sup>5</sup> Virginia, and Washington, collectively housed 12 to 13 percent of immigrants, or about 2 to 3 percent each. Another 20 states, identified as “third tier” in Table 2-6, each had about 1 percent (more or less) of all recent immigrants each, for a total of 18 percent. Although the post-1965 wave of immigration was in full swing in the late 1970s—on average, more than a quarter million immigrants arrived annually during this period—the very concentrated patterns of settlement meant that the majority of the American population, especially in medium-size cities and small towns in the Midwest and South, had little contact with new immigrants.

The pace of immigration accelerated in the late 1980s with more than 760,000 arrivals annually, almost tripling the average from 10 years earlier. The patterns of immigrant settlement were even more concentrated in 1990 than in 1980, as confirmed by the decrease in Theil’s Diversity Index from 70 to 66.<sup>6</sup> There was an increasing concentration of recent immigrant settle-

<sup>5</sup>As noted above, New Jersey could reasonably be categorized in the first group, which would become the “big six.”

<sup>6</sup>Geographical diversity of immigrants is measured with Theil’s (1972) entropy index,

$$E = \frac{-\sum_{i=1}^n p_i * \ln(p_i)}{\ln(n)} \times 100$$

where  $p_i$  is the proportion of immigrant arrivals in state  $i$  and there is a total of  $n$  states. The index varies from 0 (all immigrants in one state) to 100 (an equal number of immigrants in each state).

ment in California, New York, and Florida, and some second tier states witnessed increased settlement of recent arrivals. Although many national political leaders thought the concentration of immigrants was a sign of slow assimilation, immigration researchers explained that the gravitation of immigrants to locations with dense social and business networks was not only the historical pattern but also the path most likely to lead to upward mobility (Portes and Rumbaut, 1990).

The 1990s were a period of rapid economic growth and also increased immigration; the average annual number of arrivals in the late 1990s rose to more than 1 million per year. It was also the beginning of a dispersed immigrant settlement pattern that generated many new immigrant destinations (Massey, 2008; Singer, 2004, 2009; Tienda and Fuentes, 2014; Waters and Jimenez, 2005). Although the vast majority of the foreign-born population continued to reside in large metropolitan centers (with more than half of the foreign-born population concentrated in just 10 metropolitan areas), immigrants' spatial redistribution was particularly vigorous in states where few had previously settled, including small towns, suburban communities, and cities in Georgia, North Carolina, and several Midwestern states (Hirschman and Massey, 2008; Lichter and Johnson, 2009; Singer, 2009). As shown in Table 2-6, the Diversity Index rose from 66 to 77, indicating a very strong trend away from concentrated settlement.

Although gateway cities and states continued to receive the largest numbers of new immigrants, there were very large relative shifts of new immigrants away from California and New York. The diversion of immigrants away from California in the 1990s and continuing to recent years has been stunning. California's share of the immigrant inflow plunged from 35.4 percent of the nation's new arrivals in the latter half of the 1980s to 17.0 percent in the early 2000s (Table 2-6). The inflow corresponding to this 18 percentage point decline was distributed across many new places, each with a relatively small share of the total shift. The largest gains in foreign-born population share were 1.8 percentage points in Georgia and North Carolina. The shift has been explained by loss of job opportunities in California in the 1990s due to that state's unusually deep and prolonged recession, combined with high housing prices as an added deterrent (Myers, 2007, Ch. 5). Once migration networks discovered the plentiful jobs and low costs across the South, much of the immigrant inflow was diverted away from California, save for selected high-skilled Asian immigrants and family reunification sponsored by California's established base of more than 8 million foreign-born residents. The demographic renewal of depopulated nonmetropolitan areas brought by new immigrants has visibly altered the ethnic composition of rural America in a short period of time and has also infused new economic life into dwindling communities (Lichter and Johnson, 2009; Tienda and Fuentes, 2014). The geography of immigration

defies simple generalizations due to the enormous diversity of places and people involved.

The post-2000 patterns are even more complex, largely because of the Great Recession of 2008 to 2009, which interrupted the dispersal to new destinations. In Table 2-6, the panel examines three periods—2002 to 2008, 2008 to 2010, and 2010 to 2014—that provide pre-recession, recession, and post-recession comparisons. The first period, from 2002 to 2008, shows a continuation of immigrant flows to new destinations and away from California, New York, and Illinois. Relative growth of immigrant settlement accelerated in the Virginia and Maryland suburbs of Washington, DC, but increased most significantly in the residual grouping of “other states,” which doubled their immigrant shares from 6.1 percent in the late 1990s to 12.6 percent in the pre-recession period. The panel’s interpretation is that the attractions of economic opportunity in new destinations, plus the emergence of new immigrant communities, are eroding the pull of the traditional gateway states and cities.

The Great Recession did not stop overall immigration. The CPS data in Table 2-6 show that more than 1 million new international migrants arrived annually in the years before, during, and after the recession. Since these data count only new arrivals and not departures, they are not necessarily in conflict with the evidence that net undocumented migration into the United States slowed or even reversed during these years. The reported inflows might have been counterbalanced by outflows. Moreover, new arrivals after the recession have been mainly authorized immigrants, most of whom are on family reunification immigrant visas or were admitted on temporary work or student visas.

During the Great Recession period (2008-2010), the pull to new destinations waned and there was a slight reversion back to traditional gateways. The diversity index that had risen from 66 to 80 from the late 1980s to the early 2000s (indicating more geographic dispersion) fell slightly to 78 during the recession years. California increased its share of immigrants, as did a couple of other traditional gateway states. Many of the second- and third-tier states that had been gaining immigrants in the 1990s and early 2000s saw a decline in their share of new immigrant arrivals. One explanation, which the panel considers likely, is that many of the growth sectors that were pulling migrants to nontraditional locations, such as construction and manufacturing, had few jobs during the recession for anyone, including immigrants. In the traditional gateways, the ethnic economy, immigrant institutions, and family networks were better situated to buffer the adverse effects of the recession. The new destinations were also in states with the highest concentration of undocumented persons among their immigrant populations (Passel and Cohn, 2014). Thus, the slowdown in unauthorized immigration probably also slowed settlement in many new destinations.

The most recent period, based on 2014 CPS data, shows a return to the dispersal of new migrants away from traditional gateway areas (especially California) and gains for the second tier states and other states. In short, the Great Recession interrupted, but did not reverse, the post-1990s trend toward increasing geographic dispersal of the foreign-born population. Economic recovery rekindled the trend away from traditional gateway locations to new destinations.

The classification of states into “traditional gateways” and “new destinations” obscures more complex patterns that are evident for individual states over the entire 35-year period. Perhaps the most dramatic change is the declining primacy of California as the leading destination for new immigrants. Although California is still the leading destination, receiving 12 percent of new immigrants from 2010 to 2014, this figure is about one-third its foreign-born share in the 1970s and 1980s. Florida, by contrast, increased its share of new immigrants from 6 to almost 11 percent as other groups beyond Cubans (Latin American and Caribbean) have settled there. The increasing dispersal of immigrants around the country has made many more Americans aware that immigration is a national phenomenon.

## 2.9 CONCLUSIONS

This brief survey of historical, current, and future immigration trends supports five specific conclusions drawn by the panel:

1. In terms of the proportion of new immigrants to the national population, contemporary immigration to the United States is at moderate levels historically. Although contemporary net immigration rates are not high by historical standards, international migration is a larger component of U.S. population growth now than in the past because the share of growth due to fertility of the native-born has fallen appreciably.
2. Immigration has broadened the ethnic diversity of the American population and will continue to do so, but the increasing integration of American society may make ethnic distinctions ever less meaningful.<sup>7</sup> There has been a steady blurring of origin group categories over the last 100 years or more of our history, and with rising rates of intermarriage there is little reason to assume this trend will change in the future. A great source of American resilience as an immigrant-absorbing country is that assimilation has been a two-way street, with the mainstream society gaining exposure to

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<sup>7</sup>The sister report to this one (National Academies of Sciences, Engineering, and Medicine, 2015) fully explores topics pertaining to the integration of immigrants into American society.



- cultures and customs of many nations, as well as benefiting from immigrants' high aspirations, strong families, and strong work ethic (National Academies of Sciences, Engineering, and Medicine, 2015).
3. From 1970 to 2010, the American labor force has accommodated the growth of 80 million persons in the prime working ages (25-64), even while the ratio of female employment to the total population grew by 50 percent from 1970 to 2000. The rapid intergenerational growth of successive cohorts of the third-plus generation—that is, larger cohorts of persons ages 25-34 entering the working years and replacing cohorts who were leaving the prime working age years—ceased after 2010 and will turn negative from 2020 to 2030. Future labor force growth will therefore depend completely on immigrants and their U.S.-born descendants.
  4. Immigration helps to slow the aging of American society. The senior ratio—the number of people age 65 and older divided by the number ages 25 to 64—has begun to rise sharply, which places added weight on the smaller working-age group to support Social Security, Medicare, and other old-age programs. After decades of stability hovering between 20 and 24 seniors per 100 working-age adults, the ratio is projected to climb to 44 by 2040 (and to 48 by 2065). It would climb to 49 by 2040 (and to 56 by 2065) if no new immigrants (and their descendants) are included in projections of the population after 2015. Given continued levels of immigration in population projections, the increase in the senior ratio in the next 25 years is 28 percent less than if no immigration were projected in the population; for projections out to the next 50 years, the increase in the ratio is 40 percent less if current levels of immigration continue.
  5. The shift of immigrant settlement away from traditional gateway areas to new destinations, which began in the 1990s, was interrupted during the Great Recession of 2008-2009 but has resumed in the period since. This dispersal of immigration settlement, combined with the virtual cessation in the net inflow of undocumented immigrants, has changed the character and direction of the post-1965 wave of immigration.

The subsequent chapters of this report address economic issues of contemporary immigration with a focus on the labor market and fiscal system. Many of the controversies over these questions turn on issues of the availability of data and the precise measurement of key theoretical concepts. There is also debate over the interpretation of relatively small differences as well as the assessment of short-term versus long-term impacts, some of

which still lay in the future. The study of past demographic trends does not resolve these empirical issues or contemporary policy debates, but it does offer a valuable perspective on American society's resilience in absorbing immigrants.

For example, the initial political and social response to major waves of immigration has historically almost invariably been negative. Many Americans in the early 21st century, just like their predecessors in the mid-19th and early 20th centuries, fear that the numbers and characteristics of new immigrants will have adverse economic, demographic, and cultural impacts on the welfare of the native-born population. Although there may well be short-term costs of immigration, both for immigrants and the host society, study of the last two centuries suggests the long-term impact has been almost entirely positive. Not only did markets adjust but U.S. society and culture have created institutions that allowed the descendants of immigrants to move up the socioeconomic ladder and that broadened the definition of identity as an American far beyond the imagination of the late 18th century founding population.

## 2.10 TECHNICAL ANNEX ON COUNTING IMMIGRANTS

To understand the impacts of immigration on U.S. society and its economy, it is necessary to know how many immigrants have arrived on U.S. shores, when they arrived, and from where. Largely because of data limitations, authoritative answers to these seemingly basic questions are surprisingly difficult to obtain. In theory, immigration is measured as stocks—namely, counts of the resident foreign-born in censuses and surveys—and flows, which are the numbers of arrivals (minus departures) in a given period. Even with complete and accurate measurement, however, the stocks of the foreign-born are not simply the sum of the net flows of prior immigrants. Rather, in any given year, the foreign-born stock represents the survivors among prior migrants, those who neither emigrated nor died. International migration adds not only to the foreign-born stock but also to the numbers of native-born Americans through the fertility of the immigrants after they arrive. The U.S.-born children of immigrants—commonly referred to as the “second generation”—are native born, both literally and in law. Yet because of their proximate migration background, many organizations and service agencies consider the second generation (especially when they are children living in their parents' households) as part of the immigrant community. An ambiguity is that children may have one foreign-born and one native-born parent. By general convention, if either parent is foreign-born, the children are considered second generation.

Stock measures of the foreign-born population are affected by changes in both census enumeration methods and items in the questionnaire that

identify immigrants. Every Decennial Census from 1850 to 2000 included a question on birthplace (and a question on country of birth for the foreign-born). Comparable data on the foreign-born are available from the ACS, which replaced the long-form census schedule after 2000, and from the CPS, which is used to track labor market trends. Decennial Census, CPS, and ACS data on the foreign-born population include permanent residents, persons on temporary work and student visas, and undocumented residents who either entered without inspection or have overstayed visas.<sup>8</sup> The native-born population includes persons born in the 50 states and the U.S. territories (e.g., Puerto Rico, American Samoa, etc.) and those born aboard with U.S. citizen parent(s). Therefore, the official census definition of foreign-born—all residents who are not U.S. citizens at birth—differs somewhat from the common understanding that the foreign-born are persons born outside the 50 states.<sup>9</sup>

The major limitation of Decennial Census, ACS, and CPS data for the study of immigration is that the current visa status (and visa status at time of arrival) of foreign-born respondents is not recorded. Current citizenship and year of arrival are measured in most data sources, although with some significant variations in the wording of the question and in measurement precision in the arrival dates. In census-type surveys, therefore, it is impossible to distinguish between LPRs (“green card” holders), persons on temporary nonimmigrant visas for work or study, and persons who lack an official visa. Nonetheless, it is common statistical practice to refer to the foreign-born population counted in a census or estimated by a survey as “immigrants,” even though the category includes foreign students, temporary workers on H-1B and other visas, and migrants who entered the country surreptitiously or overstayed legal visas. There is considerable mobility across these statuses, and current visa status does not always predict who stays permanently.

Changes in the stock of immigrants over time (e.g., between rounds of a census or survey) are very imperfect measures of immigration flows. Net changes in the immigrant stock are a result not only of in-migration but also of out-migration and deaths of immigrants that have occurred between rounds of the census or survey. Although measurement can be improved by

<sup>8</sup>Although the Decennial Census and federal surveys attempt to be universal, nonresponse is a serious problem. Undocumented persons are likely to be underenumerated in all surveys and censuses.

<sup>9</sup>This number of people born abroad of American parents has increased significantly since World War II. Prior to the 1980 Decennial Census, this group was identifiable in census data through the questions on country of birth of parents. Since 1980, the Decennial Census (and the ACS and CPS) inquire about citizenship as well as country of birth. This permits data users to identify the foreign-born population as well as to distinguish U.S. citizens by birth who are “born abroad of American parent(s).”

considering shorter intervals and recent arrivals (based on year of arrival data), the growth (or decline) of the size and change in the composition of the foreign-born population are only indirect measures of the flows of immigration.

Flows of immigrants are also difficult to measure because of changes in the criteria used to record new admissions and because return flows are poorly measured. In 1820, the federal government began counting immigrants based on arrivals by ships at major seaports. However, persons crossing land borders were not counted until the early years of the 20th century. The historical fact that a considerable number of immigrants entered the United States by crossing land borders after arriving by ship at Canadian ports renders counts of immigrants for these periods incomplete.

A second major problem with flow estimates is the lack of comprehensive data on departures, or emigration. Because of poor data quality, the U.S. Immigration and Naturalization Service ceased publishing emigration counts in 1958. Historians have estimated that perhaps up to one-third of the persons who arrived between 1880 and 1924 returned to Europe (Wyman, 1993, p. 10). Even higher figures were reported in a recent study based on detailed administrative records from Ellis Island (Bandiera et al., 2013). That study found that out-migration rates may have been as high as 60 to 70 percent during the early 20th century, although they varied sharply by group, being quite low for those who faced persecution at home but comparatively high for groups dominated by labor migrants. Recent research suggests that current emigration levels are not insignificant and also vary sharply by group (Ahmed and Robinson, 1994; U.S. Census Bureau, 2014; Van Hook et al., 2006).

Another problem with official flow data is the change in definition from “arrivals” to “lawful permanent residents” (LPRs) in the 1930s. When the United States first implemented restrictions on entry by health status and other criteria (literacy was added in 1917), alien arrivals were “inspected” by authorities before being allowed to enter the United States. Steamship companies also screened potential immigrants at embarkation because they were liable for the return transportation of persons denied entry to the United States. After the passage of the 1924 legislation, prospective immigrants were required to obtain an immigrant visa from an American consular office in their origin country (Zolberg, 2006, Ch. 8). The shift in measurement to those with immigrant visas probably had little impact during the 1930s and 1940s. Not only were immigrant flows fairly modest but the numbers of nonimmigrant foreigners who were in the United States for tourism, study, or temporary work also was much smaller than the inflow of permanent immigrants. This is no longer the case. Currently, a majority of the “new” immigrants getting green cards in most years have already been in the United States (often for many years) on temporary visas.

Based on DHS administrative records, there were 61 million nonimmigrant border crossings in 2013 (Foreman and Monger, 2014).<sup>10</sup> Of these, more than 48 million were tourists; however, there were also about 3 million arrivals (and associated family members) on temporary work visas, 1.7 million students (and family members) on F1 and M1 visas, a half-million exchange visitors on J1 and J2 visas, and more than 6 million temporary visitors for business on B1 and WB visas. Very few of these nonimmigrant entrants become residents of the United States, as the vast majority are only in the country for short periods.

There is no official count of persons who are in the United States without a visa—the undocumented population—but the expert consensus is that the undocumented population peaked at approximately 12 million in 2007, then fell to about 11 million in the wake of the Great Recession (Baker and Rytina, 2013; Passel et al., 2013).

Both side-door (nonimmigrant visa entrants) and back-door (undocumented entrants) arrivals have complicated the assumption that the number of persons receiving LPR status reliably tracks new arrivals to the United States. Simply put, there are many more persons entering (and leaving) on temporary visas (or without a current visa) than the number of new LPRs. Most but not all persons on temporary work and student visas are counted as part of the foreign-born population in censuses and surveys, which inflates immigrant stock measures. However, people on temporary visas who are included in the count of the foreign-born population very likely represent less than 5 percent of the foreign-born population (National Academies of Sciences, Engineering, and Medicine, 2015, p. 119). Temporary visa holders can achieve LPR status via sponsorship by an employer or family member. In recent years, large pluralities of new LPRs are persons who adjust their temporary visa status to LPR after many years of residence with or without a visa (Kandel, 2014; U.S. Department of Homeland Security, 2013). Notwithstanding these difficulties in measuring immigration flows and statuses, about 70 percent of the foreign-born population in census and survey data are LPRs or naturalized U.S. citizens; the remainder consists largely of undocumented immigrants (Pew Research Center, 2015a, Ch. 5).

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<sup>10</sup>Technically, this is the number of I-94 admissions. The estimated number of nonimmigrant border crossings is even larger (173 million): The official estimate includes persons with border crossing cards and other frequent travelers for whom electronic I-94 forms are not automatically generated. The conversion from paper to electronic I-94 forms has increased the reported number of nonimmigrant admissions (Foreman and Monger, 2014).

## 3

## Socioeconomic Outcomes of Immigrants

## 3.1 INTRODUCTION

The skill mix of the immigrant population—and, particularly, how their education and experience levels compare to those of the native-born—is a key determinant of the impact their arrival will have on the wages and employment in receiving labor markets. These characteristics also affect immigrant assimilation and immigrants' fiscal impact. If an inflow of immigrants is composed mainly of low-skilled workers, it is reasonable to expect that the pre-existing low-skilled population (both native-born and earlier immigrant arrivals) will be most affected by the increased supply of workers. Likewise, if an immigrant inflow is composed of high-skilled workers in very specialized fields, pre-existing workers in those narrow fields are most likely to be affected.<sup>1</sup> Furthermore, the skill mix of the immigrant population is likely to influence the speed with which immigrants assimilate in their new country. Skilled immigrants may acquire new skills more quickly, including English language fluency, and may have more ready access to job information that would allow them to catch up with natives relatively quickly.

Labor market skills are also directly linked to fiscal impacts. As with the native-born, low-skilled immigrants contribute less on average than their higher skilled counterparts to the public coffers in the form of income taxes and other kinds of taxes. Based on their lower incomes, on average,

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<sup>1</sup>In-depth theoretical and empirical support for these assertions comprise the content of Chapters 4 and 5.

they have greater eligibility for some programs. However, their immigrant status, even if legal, may make them ineligible for other programs.

Immigration confers economic benefits on the native-born population as a whole but, among the native-born, there are likely to be winners and losers. While pre-existing workers most similar to immigrants may experience lower wages or a lower employment rate, pre-existing workers who are complementary to immigrants are likely to benefit, as are native-born owners of capital. Beneficial effects of skilled immigration are likely to be reinforced in the presence of capital-skill complementarity, where native-owned capital becomes more productive when combined with high-skilled labor; the panel delves into these consequences of immigration in Chapters 4 and 5. These benefits may be further augmented if there are “productivity spillovers” between high-skilled immigrants and the native-born workforce.

This chapter summarizes trends in the skill mix of the immigrant population and addresses how these trends compare with those of natives. Educational attainment is examined, as are differences in the occupations of immigrants and the native-born. The chapter also examines the extent of economic assimilation: the rate at which the economic outcomes of immigrants catch up with those of native-born Americans, focusing on employment, wage, and English-language acquisition outcomes. It also reviews some of the differences between immigrants and the native-born in terms of poverty rates and participation in social assistance programs. The descriptive statistics presented here serve to link the discussion of context and history in Chapter 2 and the analyses of wage, employment, and fiscal impacts in later chapters.

## 3.2 EDUCATION AND OCCUPATION PROFILES

### Education Profiles

Trends in the skills of immigrants relative to those of the native-born help answer questions such as whether today’s immigrants face greater or lesser barriers to full economic assimilation than in the past and whether they are likely to displace or complement native-born workers in certain segments of the labor market if they arrive in sufficiently large numbers. In this section, the panel examines changes in the distribution of educational attainment of immigrants over successive cohorts, relative to the corresponding native-born cohorts.

The education of a cohort of immigrants at a given point in time can be divided into two components: (1) the initial level of education they attained prior to their arrival in the United States, and (2) additional education attained after immigrating. Higher amounts of both are expected to lead to



more favorable earnings outcomes and fiscal impacts. Using data from the 1970-2000 Decennial Census and the 2012 3-year American Community Survey (ACS),<sup>2</sup> which covers the years 2010-2012, the panel documents how immigrants' initial education upon arrival has changed over the past few decades. We define "recent immigrants" as persons who were born outside the United States (excluding those born to U.S.-citizen parents) who arrived within the 5 years prior to each census or to the 2012 ACS. The analysis is restricted to individuals ages 25 and older. Figure 3-1 shows that **the education levels of immigrant cohorts upon arrival have been rising steadily over time**. For example, about half of recent immigrants in 1970 had less than a high school education, but by 2012 this figure had halved to 26 percent. Whereas in 1970 only 20 percent of recent immigrants had completed postsecondary education (8% with college education and 12% with advanced education), by 2012 this proportion had increased to 38 percent (22% with college education and 16% with advanced education). Average years of school completed are superimposed on the same chart to reveal the steady upward trend, from 10.2 in 1970 to 12.6 in 2012.<sup>3</sup>

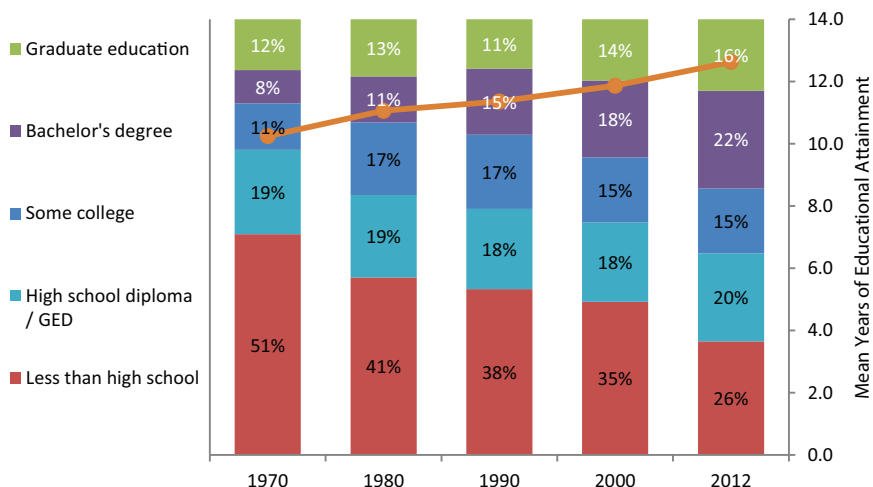
Section 3.6 of this chapter is a Technical Annex of the panel's detailed tabulations and regression analyses based on Decennial Census and survey data in the Integrated Public Use Microdata Series (IPUMS). Tables 3-16 and 3-17 in Section 3.6 break out the educational attainment levels at arrival for men and for women, respectively. These tabulations show that **increases since 1970 in immigrant education levels at arrival have been large for both men and women**.

The rise in immigrants' initial education over successive immigrant cohorts should be interpreted within a broader U.S. context, in which improvement in educational attainment has been a general phenomenon

<sup>2</sup>The ACS data were accessed through IPUMS (Ruggles et al., 2015), with all estimates weighted to be nationally representative. In tables and text throughout Chapter 3, 2012 is used as shorthand for 2010-2012.

<sup>3</sup>The continuous measure of educational attainment is calculated by first assigning each person the number of years of completed education above kindergarten as reported in the detailed educational attainment variable *educ* in the ACS data provided by IPUMS. For categories of years of education, such as "Grades 1, 2, 3, or 4," the midpoint is used (in this case, 2.5 years). For educational attainment reported by category, such as "associate's degree," or "bachelor's degree," we followed Jaeger (1997) in assigning years of educational attainment. However, for those reporting a doctoral degree, we assigned additional years of educational attainment (beyond that used by Jaeger) on the basis of data on the average time to completion of doctoral degrees in the United States from the National Science Foundation (see <http://www.nsf.gov/statistics/infbrief/nsf06312/>). In results not presented here, we used a different coding scheme for calculating continuous years of educational attainment, relying on the IPUMS *educ* variable, which presents broader educational attainment categories that are consistent across years. The average years of education resulting from this alternate coding scheme were very similar to those resulting from our original coding scheme, which is used in this report.



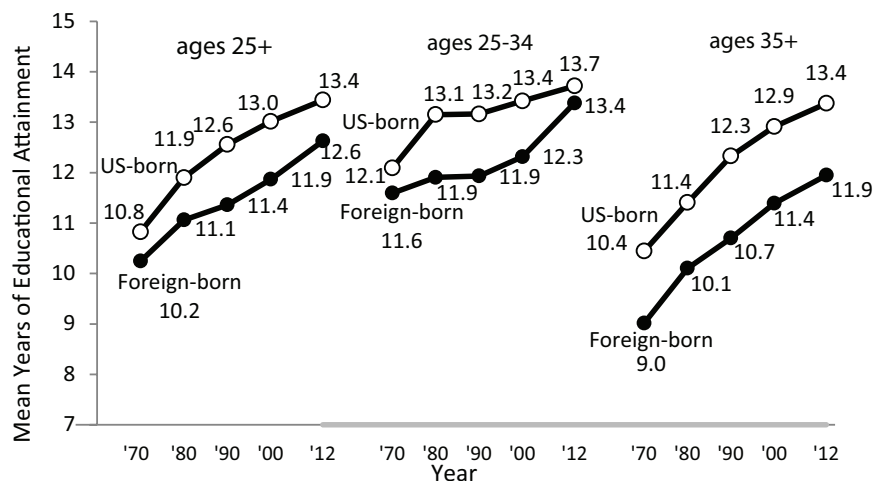


**FIGURE 3-1** Educational attainment of recent immigrants (those who entered in the 5 years prior), by Decennial Census year 1970-2000, and in 2012 (in percentages).

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

over birth cohorts in the native-born population (Fischer and Hout 2006). This comparison is important because, as noted in the introduction, the impact of immigration on wages and employment of the native-born is directly related to relative education (and experience) levels. Figure 3-2 compares trends in education (measured in mean years of schooling) for recent immigrants and for native-born persons. Given that about one-half of recent immigrants in each year fall in the 25-34 age range, compared to roughly one-quarter of native-born persons, Figure 3-2 presents the data separately for three age ranges: (1) everyone ages 25 and older, (2) those ages 25-34, and (3) those ages 35 and older.

The native-born have consistently higher educational attainment. However, for adults ages 25-35 (middle panel) there has been convergence in education between the two groups, particularly since the 1980s. In 1970, recent immigrants ages 25-34 had 0.5 years less schooling than their native-born counterparts, with mean levels of 12.1 for the native-born and 11.6 for a recently arrived immigrant. By 1980, the gap had expanded to 1.2 years, with mean education levels of 13.1 and 11.9 respectively. By 2012, the gap had narrowed to 0.3 years, with a mean of 13.7 years of education for the native-born and 13.4 for the recently arrived foreign-born. On the other hand, for the total ages 25 and older population (left-hand panel in

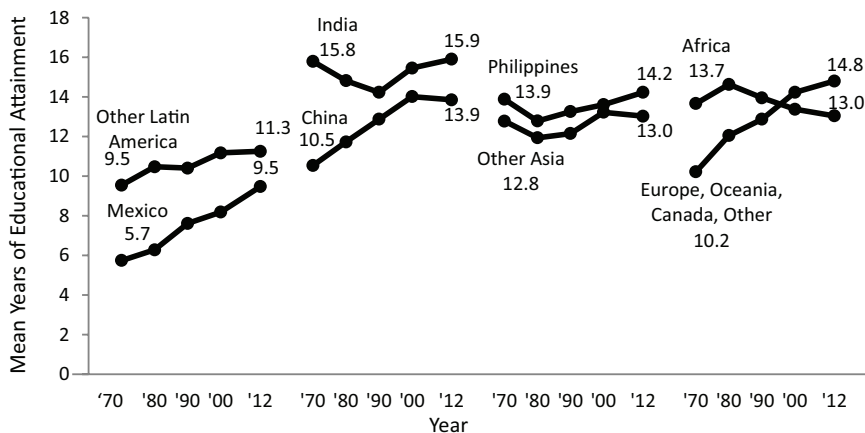


**FIGURE 3-2** Mean years of educational attainment of U.S.-born and recent immigrants (those who entered in the 5 years prior), by Decennial Census year 1970-2000, and in 2012.

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

Figure 3-2), the educational gap between immigrants and natives ended up slightly larger in 2012 than in 1970 (0.8 versus 0.6 years of education) because, even as the native-born/foreign-born education gap narrowed for those ages 25-34, the gap remained steady for adults ages 35 and older, changing from 1.4 years of schooling in 1970 to a gap of 1.5 years in 2012.

To assess trends for different groups based on national or regional origins, Figure 3-3 presents mean years of schooling among recent immigrants ages 25 or older across the largest immigrant groups identifiable in the data. The trends differ sharply by country or region of origin: **The largest increases in educational attainment have occurred among immigrants from Mexico, China, and the group combining immigrants from Europe, Oceania, and Canada.** Average Mexican immigrant education improved by 3.8 years, from a very low level of 5.7 years in 1970, to 9.5 years in 2012. Chinese immigrants started from a relatively high education level of 10.5 years and moved up to 13.9 years—an average increase of 3.4 years of schooling. For the miscellaneous group that includes immigrants from Europe, Oceania, and Canada, education levels increased over the analysis period from an average of 10.2 years of schooling to 14.8 years, for an average increase of 4.6 years. Immigrants from Latin American countries other than Mexico experienced an average increase of 1.8 years in edu-



**FIGURE 3-3** Mean years of educational attainment of recent immigrants (those who entered in the 5 years prior), by Decennial Census year 1970-2000, and in 2012, by country/region of birth.

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

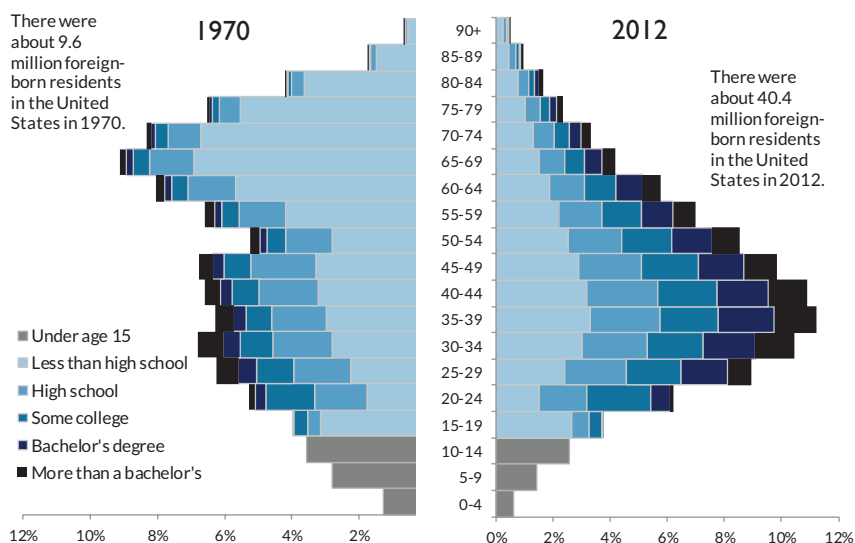
cation levels from 9.5 to 11.3 years. Three origin groups—immigrants from India, Philippines, and Asia other than China—experienced a muted U-shaped profile, with very small net gains during the period. Immigrants from Africa are the only group with an opposite trend to that of all immigrants, as the average years of education of recent admission cohorts declined from 13.7 years in 1970 to 13.0 in 2012—but this group had a very high starting level.

### Age-Education Pyramids

This subsection describes the age-education structure of the foreign-born and native-born populations in the United States. For the native-born population, the age structure is driven primarily by past fertility behavior and secondarily, in older ages, by mortality patterns. For the immigrant population, however, the age structure is determined less by fertility and mortality than by historical arrival rates and by the age composition of new immigrant inflows.

We use population pyramids to visualize the joint age-education structure of the foreign-born population relative to the native-born population from 1970 to 2002. Figure 3-4 presents an age-education pyramid for

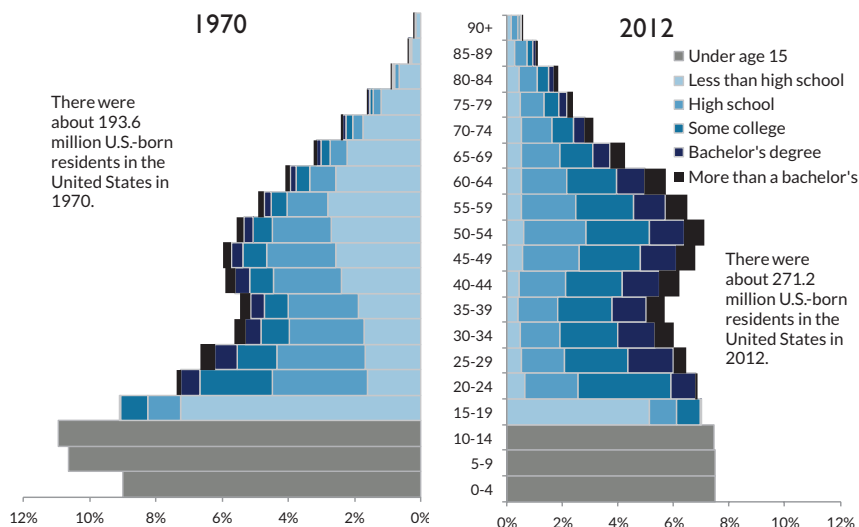
foreign-born residents in 1970 and 2012. Figure 3-5 displays comparable information for native-born residents. These pyramids, like typical age-sex pyramids, graphically display the age distribution of a population. However, they differ from typical age-sex pyramids in two important respects. First, the pyramids do not reflect the actual sizes of the two populations, as they only show within-population proportions (i.e., each pyramid sums to 100 percent for its specified population); population sizes are provided in notes accompanying the figures. Second, each horizontal bar representing the relative size of an age group is divided into education groups—from low (light colored) to high (dark colored). Five education groups are distinguished for the population age 15 and greater: (1) less than high school (or less than 12 years of education, depending on the source data), (2) high school (12 years of education), (3) some college (13-15 years of education), (4) college completion (or 16 years of education), and (5) beyond college (more than 16 years of education).



**FIGURE 3-4** Age and educational attainment of foreign-born residents, 1970 and 2012.

NOTE: The 9.6 million foreign-born U.S. residents in 1970 constituted 4.7% of the total population. The 40.4 million foreign-born U.S. residents in 2012 constituted 13% of the total population.

SOURCE: Analyses of 1970 Decennial Census data and 2012-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.



**FIGURE 3-5** Age and educational attainment of U.S.-born residents, 1970 and 2012.

NOTE: The 193.6 million native-born U.S. residents in 1970 constituted 95.3% of the total population. The 271.2 million native-born U.S. residents in the United States in 2012 constituted 87% of the total population.

SOURCE: Analyses of 1970 Decennial Census data and 2012-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

Although the size of the native-born population increased during the observation period, the relative size of the total foreign-born population expanded much more. In 1970, the ratio of the native-born to the foreign-born population was about 20, meaning that there were 20 native-born U.S. residents for each foreign-born resident. This ratio steadily declined to 15 in 1980, 12 in 1990, 8 in 2000, and 7 in 2012.

Aside from children younger than age 15, the foreign-born population evolved from being a relatively old population in 1970 to a relatively young population in 2012. This is because most immigrants arrive in their early adult years (ages 20-35). A comparison of the two pyramids reveals that the number (and share) of immigrants ages 30-39 has swollen to offset the declining numbers of the native-born population in that age range, a decline due to the late 20th century fertility bust.

It is also noteworthy that in both 1970 and 2012 the educational attainment of the foreign-born population was more concentrated at the extremes than that of the native-born population, particularly for young

adults. In 1970, for example, 41 percent of the foreign-born population ages 30-34 had not completed high school, compared to 30 percent of the native-born. In the same age group, 11 percent of the foreign-born population had attained more than a 4-year college education in 1970, compared with 6 percent for the native-born population. By 2012, the percentage of the population ages 30-34 that completed less than high school was down to 29 percent for the foreign-born and to 8 percent for the native-born. At the high end of the education distribution, 13 percent of the foreign-born population had attained more than a 4-year college education, versus 11 percent of the native-born population. In 1970, for the 30-34 age group, 7 percent for the foreign-born population had 4-year college education (and no more) while 8 percent for the native-born population had 4-year college education (and no more). By 2012, the numbers at this achievement level had grown to just over 17 percent for the foreign-born population and almost 23 percent for the native-born population.

For the broader working age population—those ages 25-64—the relative differences in educational achievement between immigrants and natives are not dissimilar from those for the younger (ages 30-34) group. In 1970, 52 and 41 percent of the foreign-born and native-born populations, respectively, had not completed high school; by 2012, these rates had dropped to 28 and 8 percent, respectively. In this broader age group, 7 percent of the foreign-born population and 5 percent of the native-born population had attained more than a 4-year college education in 1970; these rates had climbed to just over 11 percent and just under 11 percent, respectively, by 2012. The percentage of the population in this age group with a 4-year college education (and no more) was slightly lower across the board relative to the 30-34-year-old cohorts: just over 7 percent for the foreign-born population and just over 8 percent for the native-born population in 1970; by 2012, the numbers at this achievement level had grown to just over 17 percent of the foreign-born population and just under 23 percent of the native-born population.

Three conclusions stem from comparing the education-age pyramids for natives and immigrants:

1. Educational attainment of recent immigrants has improved appreciably over the past few decades.
2. For recent immigrants ages 25-34, educational attainment has risen in comparison to that of native-born Americans. Among all age groups, however, the educational attainment gap has remained relatively constant over the period.
3. Compared to the native-born, recent immigrants continue to be overrepresented among the high and low categories of educational attainment.

### Occupation Profiles

As in most social surveys and statistical reports, U.S. Decennial Censuses and the ACS collect data on workers' occupations by coding them into classification systems that delineate major differences in tasks performed and in the skills, education, or training needed across jobs.<sup>4</sup> Detailed coding systems have evolved over time in response to changes in the occupational structure of the labor market. Tracking data on occupational changes over time requires a consistent coding system which, fortunately, has been created by Xie and Killewald (2012) and Xie et al. (2016). This system, based on classification of 41 occupational categories, was created to meet two conflicting objectives by (1) reducing the number of occupational categories and (2) grouping detailed occupations only when socioeconomic status and work content are sufficiently similar across these occupations.

The Technical Annex in Section 3.7 lists the occupational titles under each category for the 2000 Decennial Census. Table 3-18 in Section 3.6 presents the percentage shares of foreign-born male workers, from 1970 to 2012, within each occupational category. Table 3-19 does the same for female workers. In the last column of these tables, the share of workers with a bachelor's degree or higher in 2012 is given as a measure of the socioeconomic status of the occupational category (Hauser and Warren, 1997).

Comparing the proportion of foreign-born workers within each occupation to the overall proportion of foreign-born workers across all occupations (top row in both Tables 3-18 and 3-19) reveals whether foreign-born workers are overrepresented or underrepresented in a given occupational category. One clear pattern that emerges for both men and women is that immigrants are concentrated in two types of occupations: (1) those requiring low levels of education, such as "cleaning service and food service workers," "textile machine operators," and "personal service workers and barbers," and (2) professional occupations requiring high levels of education such as "physical scientists," "life scientists," "physicians, dentists, and related," and "architects," and "mathematicians." Some occupations, such as "social and recreation workers," "preschool and elementary teachers," "protective service workers," "secretaries," and "bookkeepers," have always had a low percentage of foreign-born workers. Changes in the share of foreign-born workers over time are most evident (in Tables 3-18 and 3-19) for "farmers and farm laborers," "laborers, except farm," and "computer specialists," for which the share of foreign-born workers changed from underrepresentation to overrepresentation (relative to the foreign-born share of workers across all occupations). A change in the opposite

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<sup>4</sup>See [http://www.bls.gov/soc/revising\\_the\\_standard\\_occupational\\_classification\\_2018.pdf](http://www.bls.gov/soc/revising_the_standard_occupational_classification_2018.pdf) [November 2016].

direction, from overrepresented to underrepresented, occurred for foreign-born workers occupied as “writers, artists, and media workers” and as “health technicians.”

Table 3-1 shows the results for male workers when the 41 occupational categories are collapsed into 8 major occupational categories (using the Tier 2 classification in the Section 3.7 annex on occupational classification). Table 3-2 shows the same for female workers. This level of classification reveals other dimensions of the patterns described above.

First, while foreign-born workers are overrepresented in high-level professional groups that require the most education (such as scientists, engineers, and architects), they are underrepresented among other professionals, managers, and sales personnel. This pattern probably reflects the differing importance of verbal communication skills in technical occupations versus those requiring interaction with customers and subordinates, as well as occupational licensing requirements in some professions. Also noteworthy is that growth over the 1970-2012 period in the share of foreign-born workers in the first four occupational categories listed in Tables 3-1 and 3-2 has been slower than the growth in the share of foreign-born workers in the general labor force (across all occupations), resulting in a relative decline of foreign-born workers in these higher-status occupations. For the next four lower-status occupational categories, increases are generally observed in the share of foreign-born workers that outpace the share of foreign-born workers across all occupations. As in the detailed occupational tabulations in Tables 3-18 and 3-19, the increase in foreign-born workers’ presence is most pronounced among “farmers and farm laborers,” growing from 2.7 percent of all male workers in that occupational category in 1970 to 26.9 percent in 2012 and from 3.8 percent of all female workers in the category to 32.6 percent.

The disproportionate share of foreign-born workers in both the highest- and lowest-skilled occupations may contribute to occupational segregation between foreign-born workers and native-born workers. To address this question, the panel computed the segregation index (Duncan and Duncan, 1955) between the two groups of workers across the 41 occupational categories, restricting the comparison to persons ages 25 to 64 years who were employed and working at least 50 weeks a year in a nonmilitary occupation. The segregation index can be interpreted as the minimum proportion for each type of worker whose occupation would have to be reassigned in order to achieve equal representation among foreign-born workers across all occupations. In the results presented in Table 3-3, the first row indicates trends in the segregation index for all workers, male and female. The next two rows break down the trends by gender. For all workers, the segregation index increased from 0.14 to 0.23 over the past five decades. The increasing trend is more pronounced for female workers (from 0.13 to 0.26) than



TABLE 3-1 Share of Male Workers, Ages 25-64, Who Were Born Abroad, by Major Occupational Category, by Decennial Census Year 1970-2000, and in 2012

Occupation	Share of Workers in Occupation Who Are Foreign Born (%)				Share of All Workers with a Bachelor's or Higher Degree in 2012 (%)	Total Workers in Occupation in 2012 (U.S.-born and foreign-born)
	1970	1980	1990	2000	2012	
Across All Occupations	4.9	6.2	8.6	11.8	18.7	53,072,944
High-level professionals	7.6	9.2	10.9	14.4	19.3	3,684,121
Professionals	4.7	5.8	7.8	11.0	15.0	8,508,515
Managers	4.3	5.5	7.2	9.5	13.2	6,765,903
Sales workers	3.9	5.0	7.3	9.9	14.5	9,680,387
Service workers	7.4	9.5	13.2	16.5	25.2	6,025,253
Farmers and farm laborers	2.7	3.9	7.5	14.5	26.9	834,952
Skilled workers	4.7	5.8	7.7	10.8	19.3	8,114,032
Unskilled worker	5.0	6.7	9.4	13.6	24.4	9,459,781

NOTE: "Workers" is defined as those who are employed and working at least 50 weeks a year in a nonmilitary occupation. The major occupational categories are those in the Tier 2 classification in Section 3.7. Skilled workers include mechanical workers, carpenters, electricians, construction workers, and craftsmen. Unskilled workers include textile machine operators, metal working, transportation operators, operators (other than textile, metalworking, and transportation), and laborers (except farm workers).

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

TABLE 3-2 Share of Female Workers, Ages 25-64, Who Were Born Abroad, by Major Occupational Category, by Decennial Census Year 1970-2000, and in 2012

Occupation	Share of Workers in Occupation Who Are Foreign Born (%)				Share of All Workers with a Bachelor's or Higher Degree in 2012 (%)	Total Workers in Occupation in 2012 (U.S.-born and foreign-born)
	1970	1980	1990	2000	2012	
Across All Occupations	5.4	6.7	8.0	10.2	15.8	46,229,202
High-level professionals	12.1	11.3	10.8	15.1	19.4	1,957,552
Professionals	4.9	6.1	7.0	8.9	11.8	12,243,469
Managers	4.8	5.0	5.7	7.4	10.5	4,665,702
Sale workers	4.3	5.0	6.2	7.6	11.6	15,715,603
Service workers	6.1	8.8	11.9	15.8	26.9	8,559,180
Farmers and farm laborers	3.8	4.6	8.4	17.2	32.6	160,377
Skilled workers	5.5	8.7	11.3	15.0	22.7	678,948
Unskilled workers	7.9	11.3	13.5	17.9	29.0	2,248,371

NOTE: "Workers" is defined as those who are employed and working at least 50 weeks a year in a nonmilitary occupation. The major occupational categories are those in the Tier 2 classification in Section 3.7. Skilled workers include mechanical workers, carpenters, electricians, construction workers, and craftsmen. Unskilled workers include textile machine operators, metal working and transportation operators, operators, except textile, metalworking, and transportation, laborers, except farm workers.

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

**TABLE 3-3** Segregation Index of U.S.-born and Foreign-born Workers, Ages 25-64, Across 41 Occupations, by Decennial Census Year 1970-2000, and in 2012

	1970	1980	1990	2000	2012
All Workers	0.14	0.16	0.16	0.18	0.23
Male Workers	0.14	0.15	0.14	0.16	0.21
Female Workers	0.13	0.17	0.18	0.20	0.26

NOTE: “Workers” is defined as those who are employed and working at least 50 weeks a year in a nonmilitary occupation.

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

for male workers (from 0.14 to 0.21). Across all three rows, the pattern is clearly in the direction of a rise in occupational segregation between foreign-born and native-born workers, perhaps reflecting the impact of growth in immigration from Mexico (see Chapter 2) and increased participation of Mexico-born immigrants in a relatively small number of service occupations.

### 3.3 EMPLOYMENT, WAGE, AND ENGLISH-LANGUAGE ASSIMILATION PROFILES

#### Employment

Employment and other economic outcomes are key indicators of the pace and extent to which immigrants integrate into the United States. One of the most important labor market outcomes is the likelihood of working. One way to gain an understanding of employment trends is to examine the fraction of time worked or share of weeks worked over the year for different groups over time. Trends in mean fraction of time worked—calculated as the average number of weeks worked (including zeroes) divided by 52—for male immigrants relative to those of native-born men for ages 25-64 are given in Table 3-4. Table 3-5 presents parallel data for women.<sup>5</sup>

<sup>5</sup>Share of weeks worked in the year previous to the survey is an indicator of employment over the year; the variable combines the information of having worked in a particular week and being attached to the labor force over the year. Juhn and Murphy (1997) used share of weeks worked in the year previous to the survey, from the March Current Population Survey, to study trends in labor supply of married couples. Borjas (2003) investigated the impact of immigration on labor market outcomes of native-born, one of which was fraction of time worked.

Our initial calculations used the variable EMPSTAT (Employment Status) from PUMS files, which may not capture employment status of immigrants accurately for year 2000. The 2000

**TABLE 3-4** Mean Share of Weeks Worked by Foreign-born and Native-born Men, by Decennial Census Year 1970-2000, and in 2012, Ages 25-64

Nativity	1970	1980	1990	2000	2012
Native-born	88.8	83.5	82.7	82.5	75.9
Foreign-born	86.1	80.3	78.9	78.6	81.1
Africa	78.3	70.7	79.0	79.6	80.2
Europe and Other	87.5	82.7	81.0	81.6	80.5
Other Latin America	85.2	80.2	78.8	77.7	80.4
Mexico	82.7	78.7	76.3	76.2	82.4
Other Asia	82.0	71.8	76.0	78.3	78.0
China	82.4	80.3	78.2	79.4	79.4
India	81.5	86.8	86.2	85.4	87.9
Philippines	84.0	83.8	84.2	81.3	79.9
Vietnam	74.9	61.4	73.8	79.1	77.5

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

These data indicate that, historically, foreign-born men have lagged slightly behind native-born; however, by 2012, foreign-born men in the United States were more likely to be employed than native-born men. The share of weeks worked for both native-born and foreign-born men has generally declined over the 1970-2010 period, although immigrants from Africa, India and Vietnam are notable exceptions. By the share-of-weeks-worked metric, native-born men appear to have been disproportionately hit by the Great Recession, as is evident from the gap in native- and foreign-born men's share of weeks worked, with the latter 5.2 percentage points higher in 2012. However, the Great Recession also had an impact on immigrants in a way that is not captured by employment rates. A portion of immigrant unemployment was "exported" as foreign workers left the country; indeed, by some estimates, the unauthorized population alone declined by more than a million after 2007 (Passel and Cohn, 2014).

As shown in Table 3-5, both foreign-born and native-born women have dramatically increased their average number of weeks worked per year over the past 40 years. As with men, foreign-born women have had

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Decennial Census may have had problems correctly classifying the employment status of people who had a job or business in the census reference week but who did not work during that week for various reasons. There is an underestimate of employment and overestimate of people not in labor force in that Census relative to the Current Population Survey's February to May 2000 sample.

For further description of the accuracy of data on employment status from the method matching the 2000 Census and the Current Population Survey, see Palumbo and Siegel (2004).

**TABLE 3-5** Mean Share of Weeks Worked by Foreign-born and Native-born Women, by Decennial Census Year 1970-2000, and in 2012, Ages 25-64

Nativity	1970	1980	1990	2000	2012
Native-born	42.5	51.4	62.9	67.6	66.9
Foreign-born	40.9	47.8	54.1	55.0	58.7
Africa	38.5	45.1	57.2	60.2	64.4
Europe and Other	40.9	47.8	56.1	59.3	63.7
Other Latin America	49.7	54.5	59.1	59.6	64.2
Mexico	29.1	36.2	41.8	42.9	49.0
Other Asia	33.4	41.8	47.9	53.3	55.6
China	44.9	54.5	58.4	60.6	64.0
India	36.9	45.5	54.0	53.7	55.3
Philippines	51.1	64.9	73.3	73.0	74.0
Vietnam	21.1	41.8	52.7	62.4	66.1

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

lower employment prospects than U.S.-born women since 1980; in the case of women, the nativity gap in employment has generally grown over the period. These trends partly reflect the gender roles (labor force participation rates) in the immigrant countries of origin and their impact on the behavior of immigrant women in the United States. Foreign-born women have increasingly arrived from Asian and Latin American nations which, for cultural and other reasons, have lower female labor force participation rates than does the United States. Blau et al. (2011) examined women's labor supply assimilation profiles and found that foreign-born women from countries with high female labor force participation consistently work more than do immigrant women from countries with low female labor force participation, although both groups assimilate over time toward the employment patterns of native-born women.<sup>6</sup> Admission policies also play an important role in shaping employment rates of immigrant women. Many women are tied movers, arriving as spouses with visas that explicitly prohibit or severely limit their capacity to work in the United States. Nonetheless, data reported in Table 3-5 reveal that immigrant women, irrespective of the country or world region they are from, have made steady gains by the share-of-weeks-worked metric.

<sup>6</sup>Blau et al. (2013) investigated second generation women's labor supply, fertility, and education and found evidence of intergenerational transmission of gender roles, suggesting an impact of immigrant parental behavior on second generation behavior. Empirical analysis by Fernandez and Fogli (2009) arrived at similar conclusions.

Tables 3-6 and 3-7 report the same statistics as Tables 3-4 and 3-5, respectively, but for the age group 25-54 instead of 25-64. As expected, the younger age group displays higher shares of weeks worked. For men, the effect is larger for natives than immigrants in recent years because fewer immigrants are ages 55-64 and the focus on the younger groups thus narrows the immigrant employment advantage. For women, on the other hand,

**TABLE 3-6** Mean Share of Weeks Worked by Foreign-born and Native-born Men, by Decennial Census Year 1970-2000, and in 2012, Ages 25-54

Nativity	1970	1980	1990	2000	2012
Native-born	91.2	87.0	86.1	85.8	79.8
Foreign-born	88.4	81.8	80.1	80.0	83.5
Africa	78.0	70.2	79.2	80.1	81.1
Europe and Other	90.6	85.5	83.6	84.8	84.7
Other Latin America	85.9	81.0	79.4	79.0	82.4
Mexico	85.4	80.1	77.4	77.3	84.5
Other Asia	82.3	72.4	77.1	79.6	80.3
China	84.7	82.0	79.8	81.3	83.2
India	81.7	87.2	87.4	86.5	89.9
Philippines	85.8	86.3	85.8	83.0	83.0
Vietnam	71.2	62.6	75.3	80.8	80.8

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

**TABLE 3-7** Mean Share of Weeks Worked by Foreign-born and Native-born Women, by Decennial Census Year 1970-2000, and in 2012, Ages 25-54

Nativity	1970	1980	1990	2000	2012
Native-born	43.3	54.9	67.0	71.2	70.5
Foreign-born	42.4	49.7	56.4	56.8	60.3
Africa	38.1	46.1	58.2	61.7	65.9
Europe and Other	42.2	50.3	60.4	63.7	67.4
Other Latin America	51.7	55.8	60.5	61.3	66.0
Mexico	31.0	37.7	43.4	44.1	50.1
Other Asia	34.0	43.0	49.6	55.2	57.6
China	45.1	56.5	61.2	63.3	67.3
India	36.7	46.4	56.4	55.3	56.8
Philippines	52.7	68.7	75.9	75.0	76.2
Vietnam	21.1	43.2	55.0	65.3	70.8

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

the gap in employment rates between immigrant and native-born women is wider in the younger age group than in the older one. This reflects differing patterns of employment for immigrant and native-born women of the same birth cohort.

As discussed in Section 3.2, the skill composition of new immigrants has evolved over time. Furthermore, the economy faced by new immigrants has exhibited long-term changes (for example, male labor force participation has fallen) and cyclical expansions and contractions. Thus, one would expect variation in cross-cohort shares of weeks worked at various points in time after their arrival to the United States. Tables 3-8 and 3-9 show the difference in the share of weeks worked for immigrant cohorts spaced 10 years apart, relative to the comparable cohort of native-born individuals. The approach used to analyze the share of weeks worked here is similar to that used by Borjas (2014b) to analyze wages. The regression model used to produce the estimates specifies the dependent variable as the fraction of time worked or share of weeks worked. Two models are estimated, one that controls only for age (introduced as a third order polynomial) and a second that controls for age and years of education. Both model specifications include arrival cohort dummies with the native-born group as the

**TABLE 3-8** Difference in Share of Weeks Worked for Immigrant Cohorts, Relative to Native-born Cohort, by Census Period, Men, Ages 25-64

Arrival Cohort	Controlling for Age (cubic) Only Years Since Migration				
	0	10	20	30	40
1965-1969	-0.107	-0.010	0.005	0.013	0.022
1975-1979	-0.183	-0.019	-0.019	0.046	
1985-1989	-0.185	-0.033	0.042		
1995-1999	-0.160	0.057			
Arrival Cohort	Controlling for Age (cubic) and Years of Education Years Since Migration				
	0	10	20	30	40
1965-1969	-0.101	0.013	0.030	0.037	0.050
1975-1979	-0.164	0.023	0.020	0.083	
1985-1989	-0.156	0.013	0.087		
1995-1999	-0.135	0.098			

SOURCE: Regression coefficients reported in Tables 3-20 and 3-21 (see Section 3.6).

**TABLE 3-9** Difference in Share of Weeks Worked for Immigrant Cohorts, Relative to Native-born Cohort, by Census Period, Women, Ages 25-64

Arrival Cohort	Controlling for Age (cubic) Only Years Since Migration				
	0	10	20	30	40
1965-1969	-0.014	-0.001	-0.023	-0.030	-0.005
1975-1979	-0.163	-0.074	-0.063	-0.016	
1985-1989	-0.255	-0.131	-0.032		
1995-1999	-0.295	-0.097			

Arrival Cohort	Controlling for Age (cubic) and Years of Education Years Since Migration				
	0	10	20	30	40
1965-1969	0.014	0.039	0.017	-0.001	0.026
1975-1979	-0.118	-0.006	-0.015	0.027	
1985-1989	-0.199	-0.070	0.021		
1995-1999	-0.256	-0.041			

SOURCE: Regression coefficients reported in Tables 3-22 and 3-23 (see Section 3.6).

reference group. The estimated regression coefficients for cohort dummies are reported in Tables 3-8 and 3-9. These model specifications, which are estimated from five consecutive annual cross-section datasets, establish trends in the share of weeks worked for different immigrant cohorts relative to the native-born.

Looking first at the results for men in Table 3-8, one can see that shortly after arrival to the United States, and as one would expect, immigrant men—especially recent cohorts—worked fewer weeks relative to native-born men. Immigrant men who arrived before 1970 appeared to fare better in this relative comparison than cohorts that arrived from the mid-1970s onwards. Controlling for age and years of education, an immigrant male who arrived between 1965 and 1969 worked 5 weeks less than a comparatively aged native-born male, while an immigrant who arrived between 1995 and 1999 experienced a disadvantage that had grown to 7 weeks. The trends in share of weeks worked as duration of stay lengthens can also be observed for different arrival cohorts. All of the arrival cohorts experienced at least modest gains in their employment prospects with longer U.S. residence; the 1975-1979 and 1995-1999 arrival cohorts experienced especially substantial employment boosts relative to native-born men over time, even



just 10 years after immigrating. The panel concludes that, **for these cohorts of immigrant men, after an initial period of adjustment in which their share of weeks worked is lower than natives, they became slightly more likely to be employed than their native-born age-peers.**

This analysis of Decennial Census data is broadly consistent with what has been shown in the literature. Duncan and Trejo (2012) showed that the initial employment gap is widest among men with a high school education or less and that the difference in employment rates between immigrant and native-born men is due mainly to differences in labor force participation and not due to differences in unemployment.<sup>7</sup>

Immigrant women, who display a lower share of weeks worked than do immigrant men, also typically have a lower share of weeks worked than do native-born women of the same age. However, again, the Decennial Census data are consistent with the literature in showing that their probability of being employed relative to native-born women rises with length of U.S. residence (see Blau et al., 2011) despite some cyclical changes. The 1965-1969 arrival cohort appears to be an exception to the pattern of convergence, whereas the 1995-1999 cohort, which starts the furthest below its native-born age-peers, exhibits the largest observed 10-year increase in the relative share of weeks worked. This indicates that, **as immigrant women are exposed to U.S. labor market conditions and social norms, they grow increasingly likely to participate in the labor force and find employment.** Also, many immigrant women experience a change in their visa status in the first 10 years, which improves their chances of finding employment.<sup>8</sup>

### Wage Assimilation Profiles

Alongside employment prospects, tracing the wage trajectories of immigrants is crucial to understanding their economic well-being and their contribution to the receiving country's economy. Wage trajectories indicate the initial earnings and then the subsequent wage growth of workers as experience increases. While immigrants contribute to the economy by permitting greater specialization among workers, an immigrant's contribution will be greater if he or she finds a job in which his or her skills are fully utilized, and rising wages may be a sign of improving job match quality. Rising wages for skilled immigrants may also be a sign that they are reach-

<sup>7</sup>For definition of labor force participation, employment, and unemployment, see [http://www.bls.gov/bls/cps\\_fact\\_sheets/lfp\\_mock.htm](http://www.bls.gov/bls/cps_fact_sheets/lfp_mock.htm) [November 2016].

<sup>8</sup>The gender distribution of persons receiving lawful permanent resident status in fiscal year 2013 is skewed toward women under the categories of Family-Sponsored and Immediate Relatives of U.S. Citizens (54.2%), while immigrants admitted under Employment based preference are more likely to be men (51%). See Annual Flow Report 2014 by Department of Homeland Security and Table 9 in U.S. Department of Homeland Security (2014).

ing positions in which they have positive spillovers on other workers. In this section, the panel addresses this facet of the changing economic status of immigrants. The key questions are: How closely do the earnings of immigrant and native-born workers track as worker experience increases, and how has the relationship changed over time?

The earnings gap varies between men and women workers and also across immigrants' source countries. The first picture of relative wages of immigrants and natives is painted by Tables 3-10 and 3-11. These two tables use Decennial Census and ACS data to show hourly wages and annual earnings for men and women by nativity (native-born and foreign-born), with further detail by immigrant source country, but not differentiated by immigrants' length of time in the United States. The hourly wages of foreign-born men in 1970 were 3.7 percent higher than those of native-born male workers, and their annual earnings were very slightly higher. In subsequent decades, the gap reversed and widened such that, by 2012, the average hourly wage of foreign-born male workers was 10-11 percent lower than that for their native-born counterparts. For women, relative wages evolved from rough parity in 1970 to a 7 percent gap in favor of native-born women by 2012.

These averages conceal large differences among world regions and specific source countries. For foreign-born men, workers from Europe, Oceania, and Canada; India; Other Asia; and, since 1990, China perform better in terms of wages and earnings than native-born men. This is also generally true of immigrants from Africa. In contrast, immigrant workers from Latin America (including Mexico) and Vietnam earn considerably less than native-born workers, while immigrant workers from the Philippines earn about the same as, or in some years a bit less than, native-born men.

The broad outlines are similar for women, although wage and income gaps are much smaller. In general, women from Asia fare well in wage comparisons, as do women from Africa and from Europe, Oceania, and Canada, while women from Latin America, particularly Mexico, and from Vietnam tend to have lower wages than the native-born. One notable observation is that, among women, immigrants from the Philippines earn more than native-born women.

One gender difference of note involves the changing standard (that is, the native-born wages) to which immigrants' wages are being compared over time. For men, the wages of natives have been quite flat over the past few decades, and consequently the growing wage gap by nativity implies an absolute decline in the real wages and earnings of male immigrants who arrived in later decades. In contrast, the real wages of native-born women have been rising such that the widening wage gap by nativity among women is consistent with flat or rising wages of female immigrants.

A considerable literature has gone beyond the simple gap between aver-

**TABLE 3-10** Average Hourly Wages and Earnings of Employed Foreign-born and Native-born Men, by Decennial Census Year 1970-2000, and in 2012, Ages 25-64, in 2012 Dollars

Nativity	1970		1980	
	Hourly	Annual	Hourly	Annual
Native-born	\$30.25	\$62,398	\$32.50	\$61,522
Foreign-born	31.38	62,443	31.52	57,115
Africa	32.90	61,403	39.55	69,027
Europe, Oceania, Canada, and Other	34.32	69,201	34.77	66,648
Other Latin America	24.86	47,916	27.79	48,049
Mexico	20.37	38,631	22.31	35,735
Other Asia	34.41	68,115	37.73	63,138
China	27.16	55,729	29.95	57,122
India	36.82	68,616	38.95	78,138
Philippines	25.86	53,699	34.06	57,296
Vietnam	23.95	50,825	21.52	36,569

NOTE: Hourly wages are computed by dividing annual earnings from wages and self-employment income by weeks worked and average hours per week. The sample is men ages 25-64 who worked at some point in the preceding calendar year and were not enrolled in school.

age native-born and immigrant wages to examine the evolution of the gap by immigrant time spent in the United States. The literature finds that the wage gap between native-born and foreign-born workers narrows over time as the latter accumulate job experience in the U.S. labor market and invest in their skills. Chiswick (1978) pioneered this work, comparing the earnings of immigrants and native-born male workers of different ages at a point in time using data from the 1970 Decennial Census. He estimated that, at the time of arrival, immigrants earn about 17 percent less than natives and that it takes 10-15 years to close the wage gap, depending on the source country of the immigrant. Chiswick also found that immigrants often experience

1990		2000		2012	
Hourly	Annual	Hourly	Annual	Hourly	Annual
\$30.99	\$60,647	\$32.80	\$65,557	\$32.00	\$65,674
29.84	54,736	30.02	54,308	28.62	55,824
34.36	69,100	33.66	67,018	35.80	63,101
36.52	71,930	40.71	82,044	43.40	89,725
25.81	45,716	26.20	45,577	23.42	43,929
19.10	30,295	20.52	32,600	17.34	31,186
34.88	65,476	36.42	67,684	33.70	68,155
33.02	63,207	40.52	71,262	38.07	76,179
49.46	86,094	46.47	93,211	47.63	99,772
31.79	55,119	33.13	55,357	29.87	56,199
24.51	44,433	28.26	49,102	27.17	53,630

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

faster wage growth relative to the native-born, in part because they are starting from a position that allows for catching up (that is, if their initial jobs do not reflect their earnings potential). Since Chiswick's 1978 study, the economic assimilation literature has extended the analysis to take into account changes in the attributes of successive immigrant arrival cohorts, as well as the role of immigrant age at arrival (Borjas, 1985; Borjas and Tienda, 1985; Carliner, 1980; DeFreitas, 1980; Long, 1980). These studies, based on cross-sectional data, all concluded that immigrant workers experience rapid wage growth compared to native-born workers of the same generation.

**TABLE 3-11** Average Hourly Wages and Earnings of Employed Foreign-born and Native-born Women, by Decennial Census Year 1970-2000, and in 2012, Ages 25-64, in 2012 Dollars

Nativity	1970		1980	
	Hourly	Annual	Hourly	Annual
Native-born	\$19.32	\$27,793	\$20.10	\$27,100
Foreign-born	19.04	27,320	20.31	26,501
Africa	19.04	27,439	22.55	29,448
Europe, Oceania, Canada and Other	19.94	28,482	20.70	27,056
Other Latin America	16.95	25,502	18.88	25,320
Mexico	14.80	18,207	15.73	17,814
Other Asia	19.20	26,626	20.90	26,331
China	19.35	29,146	19.48	27,559
India	28.91	31,371	25.55	35,882
Philippines	20.57	31,521	27.42	36,993
Vietnam	19.18	23,709	17.29	22,686

NOTE: Hourly wages are computed by dividing annual earnings from wages and self-employment income by weeks worked and average hours per week. The sample is women ages 25-64 years who worked at some point in the preceding calendar year and were not enrolled in school.

Borjas (1985) argued that there is an inherent weakness in estimating the dynamic process of wage assimilation using a single time-point snapshot, due to the changing skill sets of successive immigrant arrival cohorts. The Chiswick approach assumes that outcomes for immigrants who in 1970 had been in the United States for 10 years represent the likely outcomes of 1970 new arrivals 10 years later, in 1980 (or conversely, that the outcomes of new arrivals in 1970 represent the outcomes established immigrants likely had in 1960). By using census data from both 1970 and 1980, Borjas was able to look at the actual outcomes in 1980 of immigrants

1990		2000		2012	
Hourly	Annual	Hourly	Annual	Hourly	Annual
\$20.68	\$31,531	\$23.80	\$37,869	\$23.85	\$40,996
20.99	30,691	22.99	34,214	22.11	36,333
27.83	37,005	25.59	40,344	22.75	39,024
22..98	33,195	26.55	41,987	29.45	48,341
18.63	27,212	20.76	29,602	18.14	25,690
13.79	17,027	16.23	19,702	12.87	17,865
22.21	32,606	24.15	36,608	22.99	37,185
21.60	35,624	27.75	44,377	27.86	49,634
28.11	43,624	31.31	53,477	33.97	60,320
26.61	42,105	29.17	46,317	27.48	49,914
19.51	30,483	\$20.0	30,189	17.51	29,575

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

who had arrived in 1970, thus separating arrival cohort<sup>9</sup> skill effects from human capital accumulation effects on earnings growth. Borjas found that within-cohort earnings growth is slower than predicted from single-census (snapshot) regression analysis. Borjas (1995a) updated these findings by including 1990 census data, concluding that the 1980 and 1990 arrival

<sup>9</sup>In this context, “arrival cohort” refers to a group of immigrants who arrived in the United States at the same time or during the same time period.

**TABLE 3-12** Weekly Wage Assimilation of Male Immigrants, by Cohort (percentage difference between native-born and foreign-born wages)

Arrival Cohort	Controlling for Age (cubic) Only Years Since Migration				
	0	10	20	30	40
1965-1969	-0.235	-0.120	-0.020	-0.014	0.176
1975-1979	-0.314	-0.185	-0.176	-0.136	
1985-1989	-0.331	-0.269	-0.252		
1995-1999	-0.273	-0.269			

Arrival Cohort	Controlling for Age (cubic) and Years of Education Years Since Migration				
	0	10	20	30	40
1965-1969	-0.172	-0.030	0.099	0.133	0.111
1975-1979	-0.211	0.011	0.039	0.069	
1985-1989	-0.176	-0.056	-0.026		
1995-1999	-0.149	-0.074			

NOTE: Regression coefficients reported in Section 3.6, Tables 3-24 and 3-25.

cohorts of immigrants are unlikely (and less likely than earlier cohorts) to catch up and match the wages of their native-born peers in their lifetimes.

Following Borjas (2016a), the panel investigated the rate of economic assimilation by calculating age-adjusted wage differentials between each immigrant cohort and its native-born cohort, using a regression estimated separately for each year—1970, 1980, 1990, 2000, and 2010-2012—from the Decennial Census and ACS IPUMS data. The dependent variable is the log of weekly earnings, and the regressors initially include age (introduced as a third-order polynomial, or cubic term) and arrival-cohort fixed effects, and then education as a third regressor.<sup>10</sup> Tables 3-12 and 3-13 show how the wages of immigrants relative to native-born workers of the same age evolve with time in the United States, computed separately for different immigrant arrival cohorts.<sup>11</sup> Male immigrants who arrived between 1965 and 1969 began with an initial wage disadvantage of 23.5 percent, but the gap narrowed to 12 percent 10 years after arrival. By 40 years after arrival, this immigrant arrival cohort earned 17.6 percent more per week than com-

<sup>10</sup>Age is introduced as a third-order polynomial to control for nonlinear effects of age on earnings.

<sup>11</sup>See Tables 3-24 through 3-27 in the Technical Annex (Section 3.6) for full regression results.

**TABLE 3-13** Weekly Wage Assimilation of Female Immigrants, by Cohort (percentage difference between native-born and foreign-born wages)

Arrival Cohort	Controlling for Age (cubic) Only Years Since Migration				
	0	10	20	30	40
1965-1969	-0.021	0.068	0.083	0.023	0.133
1975-1979	-0.082	-0.002	-0.053	-0.031	
1985-1989	-0.184	-0.138	-0.168		
1995-1999	-0.216	-0.239			

Arrival Cohort	Controlling for Age (cubic) and Years of Education Years Since Migration				
	0	10	20	30	40
1965-1969	0.111	0.173	0.202	0.133	0.073
1975-1979	0.038	0.201	0.135	0.142	
1985-1989	-0.009	0.060	0.027		
1995-1999	-0.075	-0.056			

NOTE: Regression coefficients reported in Section 3.6, Tables 3-26 and 3-27.

parable native-born males. Later-arriving cohorts began with a larger wage disadvantage: 31.4 percent lower than native-born males for those admitted between 1975 and 1979, 33.1 percent lower for those admitted between 1985 and 1989, and 27.3 percent lower for those admitted between 1995 and 1999. Moreover, the wage disadvantage does not disappear for these arrival cohorts, and the rate at which it narrows has slowed. For example, the 1965 cohort made up 21.5 percentage points of the gap in their first 20 years, whereas the 1975 cohort made up only 13.8 percentage points and the 1985 cohort only 7.9 percentage points.

When the panel additionally controlled for education, which allows for comparison of the degree to which immigrants catch up with their native-born peers with similar skills, the sizes of the immigrant-to-native-born wage gaps are much reduced. Moreover, it is only the two most recent arrival cohorts that have not yet closed the gap with their native-born peers with the same education. Of these two cohorts, 1985-1989 arrivals have nearly closed the gap after 20 years in the United States, earning only 2.6 percent less than natives with the same education.



Since immigrants are disproportionately low-skilled, it is also likely that growing wage inequality in the economy generally, which is associated with a widening wage gap between high- and low-skilled workers, has adversely affected immigrant entry wages and impeded their capacity to catch up to natives. Putting this somewhat differently, even if immigrant skills had remained constant, their wages relative to natives would have fallen. Borjas (1995a) examined relative wages during the 1980s (a time when low-skilled immigrant workers fared particularly poorly) and found that, although the change in wage structure accounted for some (16-17%) of the decline in the relative wages of immigrants, most of it remained and was attributable to declining educational attainment relative to natives.<sup>12</sup> A larger role for wage structure was obtained by Butcher and DiNardo (1998). They analyzed the role of the changing wage structure in the native-immigrant wage gap by estimating wage distributions of male and female immigrants who were recent arrivals in 1970, simulating what would have happened had they faced the wage structure obtaining in 1990. The counterfactual analysis allowed the researchers to tease out how much of the gap in native-immigrant wage distribution could be attributed to changing immigrant skills versus change in the wage structure. Depending on where a worker was along the wage distribution, the wage structure was found to have dramatic effects. For male workers at the higher end of the distribution, the wage structure changes explained 68 percent of the increase in wage gap.

The following key conclusions can be drawn from the above analyses. As their time spent in the United States lengthened, male immigrants who arrived between 1965 and 1969 experienced rapid relative growth in their wages, which allowed them to close the gap with natives. This indication of economic integration has slowed somewhat in more recent decades; the aging profile for relative wages has flattened across arrival cohorts, indicating a slowing rate of wage convergence for immigrants admitted after 1979. These overall conclusions hold after controlling for immigrants' educational attainment, although the relative wage picture for immigrants is considerably more favorable when education is controlled for.

Compared to male immigrants of the same cohort, female immigrants start off with a less dramatic wage disadvantage, particularly if earlier cohorts are considered, but they experience slower growth in their wages relative to their native-born than do male immigrants (compare Tables 3-12

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<sup>12</sup>As discussed in Chapter 6, Card (2009) and Blau and Kahn (2015) examined the wage inequality-immigration relationship from the opposite direction by investigating the impact of immigration on wage inequality. Immigrants are concentrated in the tails of the skill-and-wage distribution and thus potentially increase inequality among the full population (immigrants and native-born combined) due to compositional effects. Both studies found, however, that immigration can account for only a very small share of the rise in overall U.S. wage inequality between 1980 and 2000 (Card, 2009) or between 1980 and 2010 (Blau and Kahn, 2015).

and 3-13). The 1995-1999 arrival cohort did not experience any relative wage growth during its first 10 years in the United States. Much of the wage disadvantage of female immigrants disappears, however, when years of education are accounted for (lower half of Table 3-13), indicating that education differences explain much of the wage difference for immigrant women compared with native-born women. Even the large wage disadvantage for the 1995-1999 cohort is mostly accounted for by that group's lesser educational attainment compared with native-born females. Recent trends in part reflect increasing rates of inflow of Mexican immigrants with low education during the 1990s (Borjas, 2014b).

Although the use of repeated cross-sections is a great improvement over use of a single cross-section, the fact that some immigrants return home means that estimated assimilation may inadvertently reflect a change in the composition of a cohort, rather than a trend toward wage parity for individuals within the cohort. The ideal dataset would be a longitudinal one following immigrants (and the corresponding native-born cohort) over time, yet retaining the large sample size of Decennial Census and ACS data. For this reason, Lubotsky's (2007) work on immigrant wage assimilation is of seminal importance because it is based on longitudinal data that link the 1994 Current Population Survey (CPS) with administrative Social Security records in order to trace individuals' earnings history back to 1951. That longitudinal analysis revealed smaller entry-level wage gaps and slower wage growth among immigrants (compared with native-born peers) relative to the estimates derived from cross-section data. Consistent with results derived by Trejo (2003) and Blau and Kahn (2007), Lubotsky also found a slower assimilation process for Latin American immigrants compared with immigrants with other regional origins. He attributed part of the faster wage growth found in cross-section data to the uncaptured effect of return migration of low-earning immigrants. Immigrants who stay in the United States earn more than those who decide to leave; therefore, estimates of the rate of wage convergence derived from a census or sample of immigrants who remain in the United States are biased upward.<sup>13</sup>

Dustmann and Görlach (2014), using estimates of out-migration rates from various cross-country empirical studies, confirmed that out-migration is not random. Emigration rates (from the receiving country) differ by source country, age at arrival in the receiving country, continuing source country ties, legal status, and economic conditions in the source country that vary over time and across place. All these factors make generaliza-

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<sup>13</sup>The opposite situation will take place when high-wage earning immigrants leave, the path of wage convergence calculated from cross-section data will be biased downward. State et al., (2014) found evidence of out-migration of high-skilled workers from the United States in years following the "dot-com" crash of 2000-2002.

tions about behavior and motivation of immigrants difficult. Immigrants from developed countries are more likely to emigrate (from their receiving country) compared with immigrants from less-developed countries. Moreover, immigrants coming from poor nations are more likely to stay even if they fare poorly in the host country's labor market. There is some evidence that immigrants closer to retirement age are more likely to leave their host country, particularly if they have immediate relatives in the source country. However, hailing from economically prosperous regions of a source country improves the likelihood of staying in the host country because remittance income has superior investment opportunities. Also, refugees are less likely to leave than economic immigrants (Dustmann and Görlach, 2014).

### English-Language Proficiency and Assimilation

We suggested above that if immigrants acquire country-specific skills more rapidly than native-born workers with similar attributes, wage convergence will take place. Language skills may be particularly important. Funkhouser and Trejo (1995) found that the changing composition of immigrants accounted in part for the reduction in entry wages described above. Trejo (2003) noted that the falling average skills among U.S. immigrants relative to their native-born peers reflects the rising share from Latin America who tend not to be fluent in English upon arrival (one of the skills rewarded in the U.S. labor market). Bleakley and Chin (2004) showed a positive impact of English-language skills on earnings for individuals who immigrated to the United States as children. Analyses by Dustmann and Fabbri (2003) on immigrants to the United Kingdom and by Berman and colleagues (2000) on Soviet immigrants to Israel found that proficiency in the host country's language was positively associated with wages. Lewis (2012) used data from the 2000 Decennial Census and the 2007-2009 ACS to estimate the impact of English-language skills on relative wages of immigrants when new immigrants enter the labor market. Immigrants with advanced English-language skills suffered less negative wage impact than did immigrants with poor English-language skills. Comparing the wage gap between black immigrants and native-born blacks, Hamilton (2014) found that black immigrants from English-speaking countries eventually achieved wage parity with native-born blacks, but their counterparts from non-English-speaking countries did not.

Following Borjas (2014b), Figures 3-6 and 3-7 show the assimilation profile for English-language proficiency of male and female wage-earning immigrants by arrival cohort. The age-adjusted probability of "speaking English very well" is calculated from a linear probability model estimated separately for datasets from the Decennial Census Public Use Microdata Series for 1970-2000 and the ACS Public Use Microdata Series for 2010-

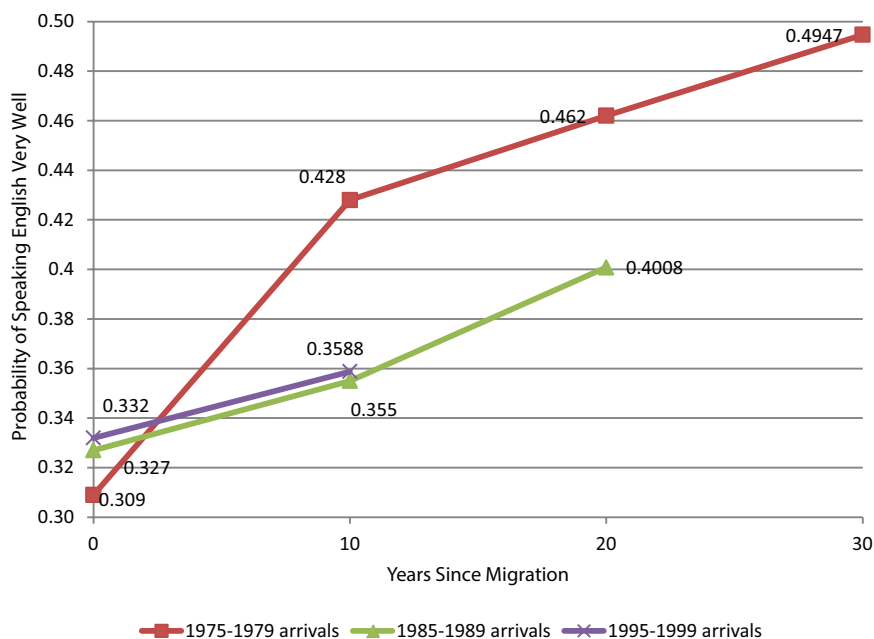


FIGURE 3-6 Aging profile for high English-language proficiency of male immigrants (wage earners), by arrival cohort.

NOTE: Regression coefficients reported in Table 3-28 (see Section 3.6).

2012, restricting the sample to immigrants originating in countries outside the British sphere of influence.<sup>14</sup> The dependent variable is a dummy that is set to unity if the immigrant speaks only English or speaks English very well and is set to zero otherwise. The regressors include the worker's age (introduced as a cubic polynomial). This regression analysis gives the following results:<sup>15</sup>

<sup>14</sup>The intent here was to limit the sample to immigrants who had the chance to learn English over time, after arriving in the United States. The countries in the British sphere of influence are where English is widely spoken, which implies that immigrants from those source countries would be fluent in English at the time of entry into the United States. These countries are Antigua-Barbuda, Australia, Bahamas, Barbados, Belize-British Honduras, Bermuda, Canada, Dominican Republic, Grenada, Guyana/British Guiana, Ireland, Jamaica, Liberia, New Zealand, Northern Ireland, South Africa, St. Kitts-Nevis, St. Vincent, Trinidad and Tobago, and the United Kingdom.

<sup>15</sup>For detailed results, see Tables 3-20 through 3-23 in the Technical Annex, Section 3.6.

- Male immigrants who arrived between 1975 and 1979 experienced a 12 percentage point increase in their fraction with English proficiency by 1990 and a 19 percentage point increase by 2012.
- The age-language proficiency profile for this arrival cohort is steeper than that of the 1985-1989 and 1995-1999 arrival cohorts.
- In the case of female immigrants, all arrival cohorts have a steeper age-language proficiency profile than male immigrants, although the general result holds that immigrants who arrived during the late 1980s and 1990s are slower in accumulating language skills than those who arrived in the late 1970s.

Figures 3-8 and 3-9 repeat the age-adjusted probability calculations but for a lower threshold of language proficiency: the probability of speaking English well (or better). These trends generally corroborate the finding discussed above that earlier cohorts of immigrants experienced more rapid language assimilation than recent cohorts. The relative slowdown of language assimilation may again be partly explained by high rates of immigra-

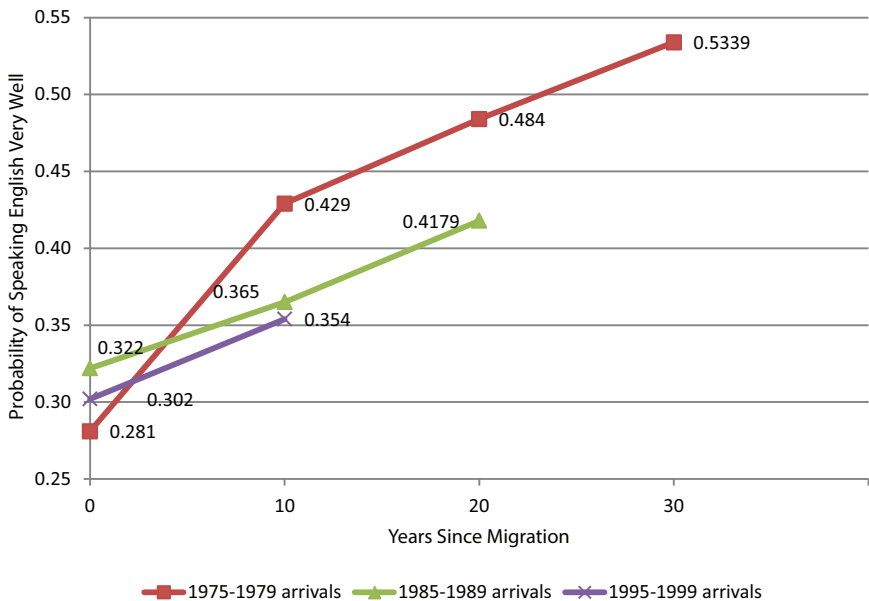


FIGURE 3-7 Aging profile for high English-language proficiency of female immigrants (wage earners), by arrival cohort.

NOTE: Regression coefficients reported in Table 3-29 (see Section 3.6).

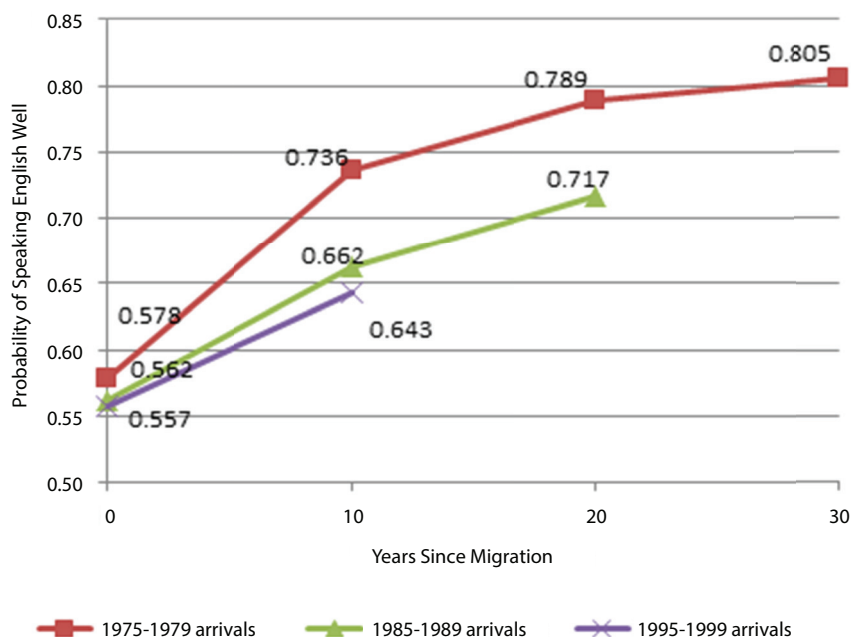


FIGURE 3-8 Aging profile for moderate English-language proficiency of male immigrants (wage earners), by arrival cohort.

NOTE: Regression coefficients reported in Table 3-30 (see Section 3.6).

tion from Mexico during the 1990s. Lazear (2007) found that Mexicans start below immigrants from other countries in terms of English-language fluency and never catch up; in general, non-Hispanics were more fluent than Hispanics at all times after arrival in the United States. One possible explanation, articulated by Borjas (2014b, p. 35), is “immigrants who enter the country and find a large welcoming ethnic enclave have much less incentive to engage in these types of investments since they will find a large market for their pre-existing skills.”

Immigration policy also plays a role in patterns of wage convergence. Specifically, immigrants who enter the United States on work visas have different assimilation profiles than those on nonwork visas. Borjas and Friedberg (2009) examined the uptick in relative entry wages of immigrants who arrived between 1995 and 2000 and conjectured that expansion of the H1-B visa program was partly responsible. Chen (2011) found that work-visa holders with science and engineering degrees earned abroad experienced a higher rate of wage growth than nonwork-visa holders with

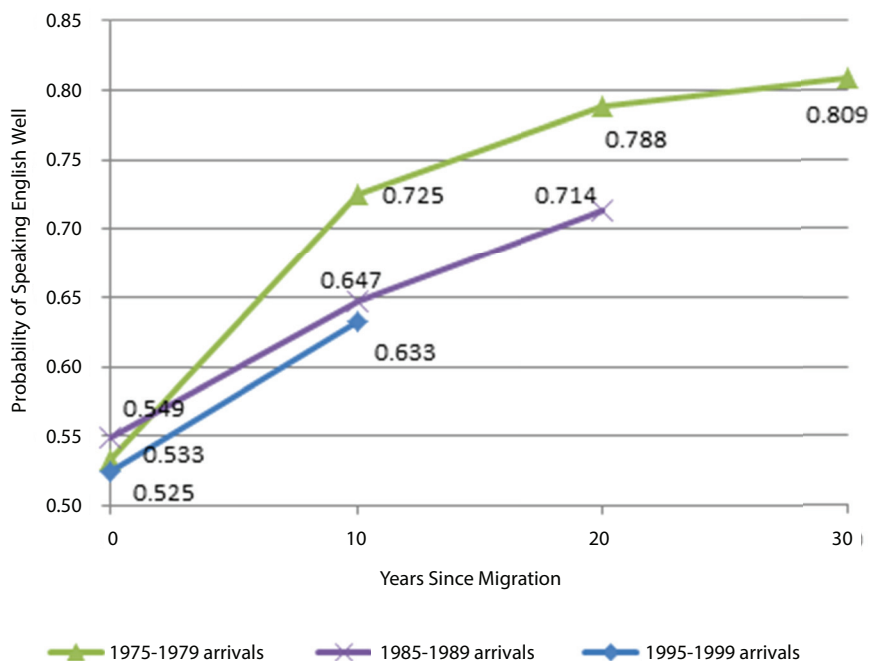


FIGURE 3-9 Aging profile for moderate English-language proficiency of female immigrants (wage earners), by arrival cohort.

NOTE: Regression coefficients reported in Table 3-31 (see Section 3.6).

these degrees, but they did not reach economic parity with work-visa holders who had science and engineering degrees earned from U.S. institutions. The wage disadvantage was greater for nonwork-visa holders because they tended to concentrate in fields other than science and engineering, where there is less standardized, technical knowledge that is invariant and transferable across national boundaries. Chen also found that immigrant workers who possessed work visas upon first entry to the United States did not suffer from an earnings penalty, providing support for the notion that assimilation in these fields can be achieved without host-country-specific human capital. Chen attributed this finding to the universalism of science and engineering training and degrees (Chen, 2011). Orrenius and Zavodny (2014) investigated earnings of immigrants under Temporary Protected Status, a status typically granted if dangerous conditions are present in the immigrants' home country due to war or a natural disaster. Using ACS data from 2005-2006, the authors compared labor market outcomes of men

and women immigrants from El Salvador, Mexico, and Guatemala. Their results suggested that being given legal status, even on a temporary basis, leads to better employment prospects for women and higher earnings for men relative to other immigrants with similar skills who were not granted Temporary Protected Status.

Evidence also exists indicating that place of education and source country characteristics influence labor market outcomes of U.S. immigrants. Zeng and Xie (2004) used data from the 1990 Decennial Census and the 1993 National Survey of College Graduates to compare earnings among native-born whites, native-born Asian-Americans, Asian immigrants educated in the United States, and Asian immigrants who completed education in their home country. Earnings differences between native-born groups and U.S.-educated Asian immigrants were small to negligible; however, Asian immigrants educated abroad earned 16 percent less than their counterparts who received U.S. degrees. Blau et al. (2011) investigated the impact of source country characteristics on the participation of married immigrant women in the U.S. labor force. They found that women immigrants from countries with high female labor force participation rates not only worked a greater number of annual hours than female immigrants from countries with low female labor force participation rates, they closed the gap with native-born women in 6 to 10 years. Borjas (2016a) revisited cohort effects and found that, in addition to average educational attainment at time of entry, gross domestic product (GDP) of source country affected economic assimilation of an immigrant cohort in its first 10 years. One explanation advanced by Borjas for the positive correlation between GDP of source country and economic assimilation is that skills of immigrants from high-income industrialized economies are more easily transferable to U.S. labor markets.

### 3.4 POVERTY AND WELFARE UTILIZATION

Comparative information about income status and welfare program use by different populations is essential to understanding the balance of fiscal benefits and the burdens that immigrants and their families bring to U.S. society.<sup>16</sup> Examining trends related to native and immigrant poverty rates and program use over time also provides a perspective on assimilation different from but related to the trends associated with wages and employment. Because welfare programs comprise significant shares of federal, state, and local budgets, usage patterns by immigrants that differ from usage patterns of the native-born would imply that immigrants impose different fiscal burdens on these welfare programs.

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<sup>16</sup>The terms “safety net” and “welfare” are used interchangeably in this section.



By design, low-income households are more likely to access public benefits programs than are high-income households. As shown in Table 3-14 and Figure 3-10, immigrants experience higher poverty rates compared to the native-born; although, as the table indicates, this is not the case for

**TABLE 3-14** Percentage of Immigrants and Their Children in Poverty and Near Poverty, by Source Country and World Region of Birth, 2011

	In Poverty		In or Near Poverty	
	Immigrants	Immigrants and Their U.S.-born Children	Immigrants	Immigrants and Their U.S.-born Children
<b>Country of Birth</b>				
Mexico	30.1	34.8	62.9	67.8
Honduras	32.7	34.0	66.4	66.3
Guatemala	28.5	31.4	63.2	66.9
Dominican Republic	21.2	25.7	49.0	54.8
Haiti	23.7	25.2	49.5	49.5
Cuba	22.9	24.3	48.7	49.4
Ecuador	19.2	22.6	43.0	46.7
El Salvador	20.3	22.0	53.2	56.7
Laos	13.8	18.0	32.7	44.0
Vietnam	17.4	17.6	37.6	38.3
Colombia	14.9	16.0	31.0	33.6
Jamaica	12.2	16.0	33.5	37.1
Iran	16.2	15.2	32.7	32.8
USSR/Russia	12.5	12.9	12.8	30.7
China	14.0	13.6	33.4	30.8
Peru	10.1	13.6	32.4	36.4
Pakistan	11.0	11.9	30.6	32.9
Korea	9.7	11.1	23.8	24.8
Japan	12.1	10.1	26.2	25.0
Canada	9.1	8.0	19.4	18.1
Poland	7.2	7.5	32.1	30.5
United Kingdom	5.6	7.2	16.9	21.4
Germany	6.7	6.8	23.7	22.4
India	6.7	6.2	15.4	15.5
Philippines	6.3	5.5	19.4	20.1
<b>Region of Birth</b>				
Middle East	27.6	28.2	45.1	47.9

TABLE 3-14 Continued

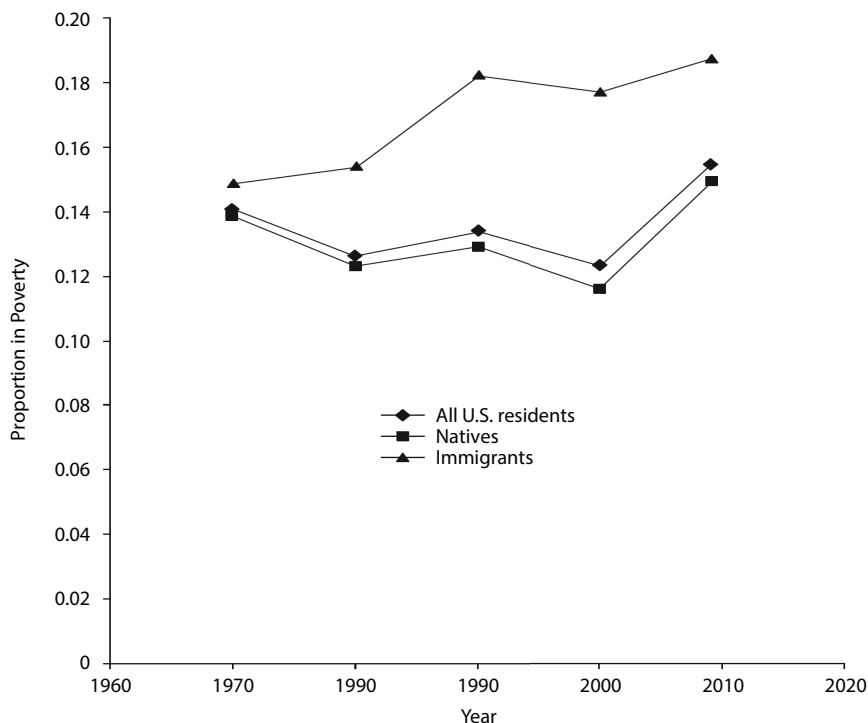
	In Poverty		In or Near Poverty	
	Immigrants	Immigrants and Their U.S.-born Children	Immigrants	Immigrants and Their U.S.-born Children
Central America (excludes Mexico)	25.2	26.8	56.8	59.1
Sub-Saharan Africa	22.9	24.6	42.9	46.2
Caribbean	19.4	22.0	43.4	46.2
South America	14.5	16.0	34.6	37.1
East Asia	12.4	12.8	30.0	30.6
Europe	9.5	10.1	27.6	27.8
South Asia	8.9	8.9	20.2	21.1
<b>All Immigrants</b>	<b>19.9</b>	<b>23.0</b>	<b>43.6</b>	<b>47.6</b>
<b>All Natives</b>	<b>13.5</b>		<b>31.1</b>	
<b>Children of Immigrants (&lt;18)</b>	<b>32.1</b>		<b>59.2</b>	
<b>Children of Natives (&lt;18)</b>	<b>19.2</b>		<b>39.3</b>	

NOTE: The poverty and near-poverty percentages shown for “all natives” exclude U.S.-born children under age 18 of foreign-born fathers. “Immigrants and Their U.S.-born Children” includes U.S.-born children under age 18 of foreign-born fathers. “Near poverty” is defined as less than 200 percent of the federal poverty threshold.

SOURCE: Data from Camarota (2011, Table 10), based on the March 2011 Current Population Survey public use file.

immigrants from a subset of source countries (those toward the bottom of the list). In 2011, 19.9 percent of immigrants and 32.1 percent of children of immigrants<sup>17</sup> (under 18) lived in poverty, compared to 13.5 percent of native-born persons and 19.2 percent of children of native-born. Suro et al. (2011) found that, for the period 2000 to 2009, immigrants living in suburbs experienced higher rates of poverty relative to the native-born living in suburbs; but their contribution to the growth of poor populations living in these areas (“the suburbanization of poverty”) was lower relative to that of the native-born.

<sup>17</sup>Immigrants are defined here as the foreign-born as identified by the nativity variable in the CPS; the category thus includes naturalized citizens, lawful permanent residents, nonimmigrant visa holders, refugees, asylees, and unauthorized immigrants.



**FIGURE 3-10** Poverty rates for all U.S. residents, natives, and immigrants, 1970-2010.

SOURCE: Reproduced from Card and Raphael (2013, Fig. 1.1, p. 5).

The primary reasons that immigrants experience higher levels of poverty than the native-born are that (as shown earlier in Tables 3-4, 3-5, 3-10, and 3-11) they are relatively less likely to be employed and they earn lower wages on average. And, as the analysis on fraction of time worked and wage assimilation in Section 3.3 shows, it takes some time for newly arrived immigrants to move up the job ladder and for the poor among them to lift themselves and their children out of poverty.

Another reason for the higher immigrant poverty rates stems from the shift in source countries away from Europe toward poorer countries in Asia and Latin America. Table 3-14, which shows the percentage of immigrants and their children in poverty and near poverty, reveals the wide variation in poverty experienced by immigrants from different countries. Poverty rates are higher for groups that form a larger proportion of the total immigrant population relative to those that comprise a smaller proportion (Table 2-1).

For example, 34.8 percent of Mexican immigrants and their U.S.-born children live in poverty, which is more than five times the corresponding statistic for immigrants and their U.S.-born children from countries such as India and the Philippines.

Additionally, there has been a change in the sectoral structure of the economy which affects the economic opportunities of low-skilled workers, including a large share of newly arriving immigrants. The United States has shifted from an industrial-based economy to a service-based economy that predominantly generates jobs with limited opportunities for economic mobility (Chen, 2011). The modern structure of the U.S. economy, with many jobs in the service sectors and high-skilled occupations but a shrinking number in between—in combination with less than full transferability of education and experience acquired abroad—has made it difficult for low-skilled immigrants to work their way out of poverty.

Comparatively high levels of poverty among immigrant groups relative to the native-born translates into greater participation in safety net programs. Although safety net programs are aimed at low-income families, children, and the elderly, not all immigrants have access due to restrictions imposed by law. Unauthorized immigrants and individuals on nonimmigrant visas are not eligible for the Supplemental Nutrition Assistance Program (SNAP), nonemergency Medicaid, Supplemental Security Income (SSI), and Temporary Assistance for Needy Families (TANF). The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA) and the Illegal Immigration Reform and Immigrant Responsibility Act of 1996 (IIRIRA) introduced additional restrictions. The former made lawful permanent residents (LPRs) and certain other lawfully residing immigrants ineligible for federal means-tested public benefit programs (such as Medicaid) for the first 5 years after receiving the relevant status. The latter also included a provision intended to prevent states from extending in-state tuition benefits to unauthorized immigrants.<sup>18</sup> LPRs who were previously eligible for assistance (before the enactment of these laws) became ineligible to receive assistance under the major federal benefits programs for a period of 5 years or longer. U.S.-born children of immigrants remained eligible for all programs, as they are citizens. Refugees and asylees also remained eligible for all programs.<sup>19</sup> Subsequent amendments to the 1996 legislation restored benefits to legal immigrants for certain programs; for example, in 2002 SNAP eligibility was extended to qualified immigrant children without a waiting period.

<sup>18</sup>There is a difference between being eligible for a welfare program and accepting benefits (taking up welfare). Participation rate is a combination of being eligible and taking up welfare.

<sup>19</sup>Capps et al. (2009) used CPS data to track welfare usage by refugee and asylees families between 1994 and 2004. There were sharp declines in TANF use, Medicaid and State Children's Health Insurance Program coverage, and SNAP and SSI participation rates during that period.

One feature of PRWORA and IIRIRA is that states were allowed the option of providing fully state-funded safety net programs to legal immigrants not covered by federal programs. For example, several states or counties provide health coverage to children and/or pregnant women without a waiting period, regardless of their immigration status (Broder and Blazer, 2011). A report by the Pew Charitable Trusts (2014b) documented that 40 states and the District of Columbia either “supplement federal benefits programs with programs funded only by the states, or take the Unborn Child or CHIPRA [Children’s Health Insurance Program Reauthorization Act of 2009] options that expand the federal programs with state and federal matching funds . . . [while] only 10 states have neither provided their own programs for immigrants nor taken up one of the federal-state options to expand eligibility.”

While not carrying implications of the same magnitude as factors such as education and health, use of welfare programs certainly factors into the fiscal impact of immigration. Table 3-15, updating Camarota (2011), reports welfare usage by state for immigrant households with children and households led by native-born persons with children. Overall, these data show that the immigrant households use several programs, most notably food assistance and Medicaid, at higher rates than do households led by the native-born. The states with the highest usage rates for immigrant-headed households are Louisiana (77.8%), South Dakota (73.8%), New Mexico (72.5%) and Kansas (70.6%), while for native-headed households the highest-usage states are Arkansas (59.4%), Mississippi (55.2%), New Mexico (53.3%) and Louisiana (53.0%). The gap between immigrant and native-born welfare use is largest in Colorado, Minnesota, South Dakota, and Wisconsin. In these four states, immigrant households with children have a usage rate for any welfare that is an average 33 percentage points higher than the usage rate for native-born counterparts.

This higher use of welfare programs by immigrants is attributable to their lower average incomes and larger families. Bitler and Hoynes (2013) used 1995-2010 CPS data on TANF, food stamps (SNAP), Medicaid, State Children’s Health Insurance Program (SCHIP), SSI, school lunch, Low-Income Home Energy Assistance Program, and housing benefits to compare household-level participation in welfare programs between immigrant and native households with incomes less than 200 percent of the federal poverty level.<sup>20</sup> The authors found that, among these lower-income households with children, those led by immigrants participated in some safety net programs at lower rates than did native-led households. This was evident for the 1995-2010 period for cash welfare, food stamps, and SSI. The authors

<sup>20</sup>For the Bitler and Hoynes (2013) study, immigrant or native-born status was determined by the nativity of the household head.

went on to report that “children who are themselves immigrants are less likely to participate in Medicaid/SCHIP across the entire time period as well, and native children of immigrant parents about as likely as children of native parents to participate” (Bitler and Hoynes, 2013, p. 16). The main exception, they noted, was in the school lunch program, where low-income immigrant households with children consistently participated at higher rates than did native-born households. Figure 3-11 summarizes results from Bitler and Hoynes (2013). Graph (a), showing any safety net participation, is higher for low-income immigrant households than for corresponding native-born households primarily because of immigrant families’ higher participation in the school lunch program.<sup>21</sup>

Borjas (2011) also examined poverty and program participation among immigrant children<sup>22</sup> using 1994-2009 CPS data on cash assistance, SNAP benefits, and Medicaid received by households. The children in that study were divided into four groups: (a) U.S.-born children who have one immigrant parent (mixed parentage), (b) U.S.-born children who have two immigrant parents, (c) foreign-born children who have two immigrant parents, and (d) U.S.-born children with U.S.-born parents. The analysis revealed that, even though poverty rates<sup>23</sup> decreased for children (whether U.S.-born or foreign-born) with two immigrant parents between 1996 and 2000, they have increased since 2007. As shown in Figure 3-12, they have also gone up for children of the native-born but not as quickly. Also, among the four groups of children, the poverty rate was highest for foreign-born children with two immigrant parents. Children of mixed parentage had a group poverty rate not significantly different from children of two native-born parents. A similar conclusion can be drawn from the Borjas (2011) analysis of program participation rates (see Figure 3-13). U.S.-born children with two immigrant parents have the highest program participation rates among the four groups. This is not a surprising outcome, as their parents are likely to have the lowest income and, since they are U.S. born, the children are eligible for various safety net programs.

<sup>21</sup>Chapter 8 examines means-tested benefits by first, second, and third-plus generation immigrants (see Figure 8-15). The analysis there, based on 2011-2013 March CPS data, reveals that, between ages 20 and 60, the third-plus generation receives more means-tested antipoverty program benefits than either the first or second generations. Among the underlying factors are that recent arrivals do not qualify for many of these programs initially, and the second generation has a slightly more favorable socioeconomic status than does the third-plus generation. For a description of underreporting of means-tested transfer programs in the CPS and the Survey of Income and Program Participation, see Wheaton (2007).

<sup>22</sup>Borjas (2011) defined immigrant children as those who are foreign born and migrate to the United States with their foreign-born parents and those who are U.S. born to one or two immigrant (foreign-born) parents.

<sup>23</sup>The poverty rate is defined as the fraction of children in a particular group that is being raised in households where family income is below the poverty threshold.

**TABLE 3-15** Welfare Use of Households with Children, by State, Current Population Survey 2011-2013 (in percentage)

State	Any Welfare		Cash Assistance	
	Immigrant	Native	Immigrant	Native
Alabama	52.4	49.5	1.1	8.4
Alaska	49.2	38.5	5.4	4.6
Arizona	55.1	42.6	3.0	5.5
Arkansas	69.1	59.4	5.0	7.3
California	61.5	40.7	9.5	9.4
Colorado	62.0	31.4	3.5	4.6
Connecticut	45.8	32.4	3.8	4.1
Delaware	58.2	41.0	3.2	7.2
District of Columbia	63.4	50.5	3.6	21.1
Florida	57.3	42.8	3.4	4.7
Georgia	51.2	45.0	2.0	4.5
Hawaii	55.3	45.9	8.1	6.9
Idaho	64.4	41.0	1.6	3.7
Illinois	59.1	41.6	2.0	4.3
Indiana	57.6	44.4	1.0	5.4
Iowa	50.5	40.3	3.2	4.9
Kansas	70.6	40.8	2.9	5.5
Kentucky	60.1	49.6	2.7	9.1
Louisiana	77.8	53.0	5.1	6.9
Maine	50.8	45.7	5.6	9.3
Maryland	42.3	31.7	1.1	4.0
Massachusetts	48.6	34.7	8.1	9.1
Michigan	48.3	43.6	6.1	7.4
Minnesota	66.9	29.1	11.4	4.4
Mississippi	45.9	55.2	4.5	7.9
Missouri	54.7	40.1	1.1	7.3
Montana	29.4	45.5	0.0	6.4
Nebraska	66.0	33.0	5.0	4.2
Nevada	49.5	36.6	4.4	4.1
New Hampshire	30.3	26.5	2.8	3.6
New Jersey	46.4	28.9	4.1	5.4
New Mexico	72.5	53.3	8.8	6.6
New York	64.2	42.2	7.8	7.4
North Carolina	58.6	44.3	2.3	5.8

## SOCIOECONOMIC OUTCOMES OF IMMIGRANTS

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Food Assistance		Housing		Medicaid	
Immigrant	Native	Immigrant	Native	Immigrant	Native
42.8	38.2	5.1	4.3	39.5	41.6
31.8	24.1	5.2	4.7	41.7	30.0
48.9	30.4	0.9	2.9	39.4	34.5
57.5	45.4	5.3	4.9	59.9	51.3
48.0	28.2	4.2	4.9	49.2	32.0
49.3	20.8	9.1	3.8	46.4	25.1
28.3	20.6	3.4	6.6	39.6	27.6
37.9	28.7	5.6	8.1	45.0	34.8
46.7	40.0	8.6	24.0	53.7	46.0
43.5	30.4	1.8	3.3	43.5	33.6
40.3	34.4	0.5	4.7	37.2	34.0
38.5	29.2	13.8	8.7	41.4	39.3
56.7	33.1	2.1	4.2	42.7	32.1
43.0	29.7	0.8	5.1	49.7	35.2
46.6	33.1	4.0	8.9	37.8	37.4
37.8	28.9	0.8	1.8	37.9	34.0
61.7	31.9	6.6	6.6	51.3	30.7
51.1	39.4	7.1	5.1	50.1	40.8
55.8	39.5	3.0	6.5	59.5	46.5
37.5	33.3	28.0	5.3	47.0	40.9
32.7	20.1	1.9	4.3	31.2	25.2
32.4	22.5	13.0	7.5	44.5	31.2
34.9	33.1	2.3	4.4	43.4	36.6
54.3	19.3	12.2	3.5	54.2	23.5
38.1	46.1	0.0	7.9	26.4	43.5
37.6	29.5	6.5	5.2	47.8	30.9
23.6	32.9	7.5	7.6	19.5	35.9
58.0	24.9	13.6	4.3	38.9	23.5
42.1	28.5	2.9	5.6	25.3	22.8
18.7	13.6	2.0	2.3	21.5	23.3
30.3	18.1	4.3	5.1	37.5	24.1
57.4	35.9	9.3	5.6	62.3	44.6
44.0	27.9	8.5	9.2	55.3	34.5
50.0	35.0	4.0	5.0	49.4	37.1

*continued*



TABLE 3-15 Continued

State	Any Welfare		Cash Assistance	
	Immigrant	Native	Immigrant	Native
North Dakota	30.7	34.9	0.0	3.9
Ohio	66.5	44.2	4.6	7.8
Oklahoma	57.4	52.3	2.2	6.7
Oregon	51.9	44.3	4.9	6.7
Pennsylvania	46.2	42.2	3.8	6.5
Rhode Island	64.1	38.7	4.6	8.6
South Carolina	56.1	46.5	1.2	6.0
South Dakota	73.8	41.8	7.4	5.9
Tennessee	58.1	46.8	4.9	7.8
Texas	63.7	44.2	2.8	5.3
Utah	57.0	32.1	2.2	3.5
Vermont	57.5	52.5	8.9	7.7
Virginia	34.3	28.5	2.2	4.7
Washington	63.5	41.7	7.1	4.3
West Virginia	27.1	49.9	20.3	8.5
Wisconsin	67.9	36.9	5.7	4.8
Wyoming	56.9	35.8	0.0	4.3
TOTAL	58.2	41.8	5.5	6.3

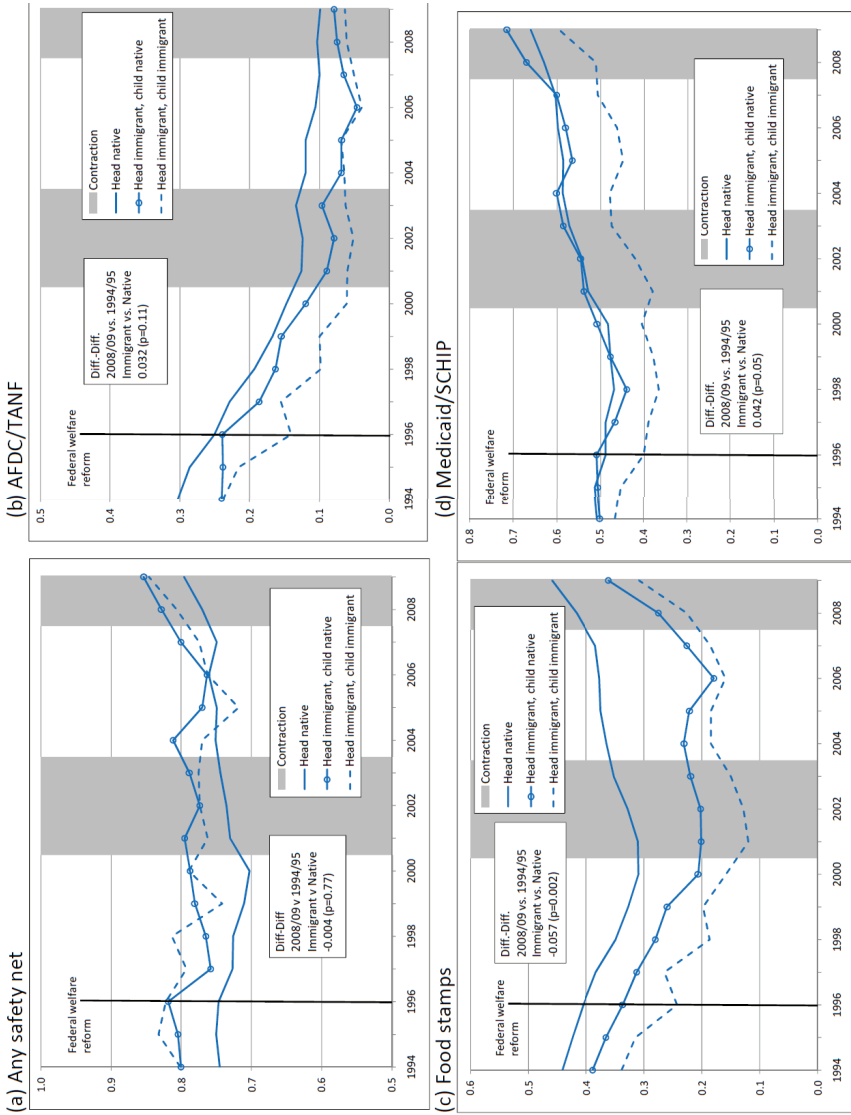
NOTES: Current Population Survey data for 2011, 2012, and 2013, restricted to households with at least one child under the age of 18. Immigrant households are based on the head of household's immigrant status (where the head of household is considered immigrant if they are not a citizen or are a naturalized citizen). "Any welfare" encompasses cash assistance (SSI and

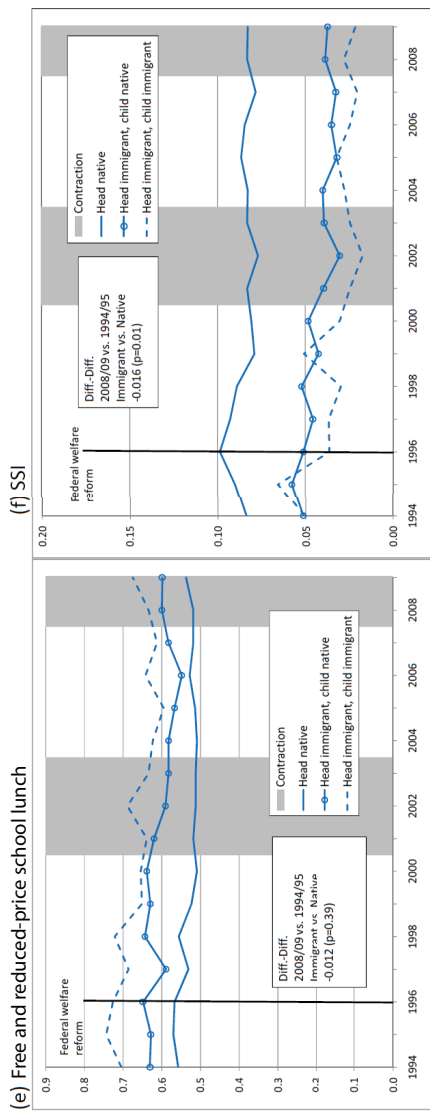
Food Assistance		Housing		Medicaid	
Immigrant	Native	Immigrant	Native	Immigrant	Native
21.5	23.9	2.3	6.6	21.5	25.2
55.9	34.9	3.3	5.5	55.8	35.1
43.8	39.3	0.0	4.8	48.8	41.4
44.4	33.6	3.1	3.9	39.6	36.2
33.2	28.3	2.0	5.4	34.6	36.2
51.3	27.7	10.8	9.6	50.2	33.4
44.0	37.9	2.0	5.0	35.7	35.2
56.6	33.0	15.8	8.4	61.1	33.9
43.2	35.5	7.8	4.1	45.1	39.4
55.2	34.6	1.8	5.8	45.6	33.9
47.7	24.6	5.4	3.4	33.9	20.1
33.1	31.0	21.2	4.6	47.7	47.9
24.1	21.1	1.4	5.3	27.0	21.8
52.8	30.4	8.7	3.8	55.2	33.2
10.3	37.6	6.4	4.3	27.1	40.5
59.2	25.8	1.7	3.2	50.4	32.4
46.3	24.4	4.0	5.1	48.5	29.0
45.3	30.6	4.2	5.3	45.7	33.8

TANF), food assistance (WIC, free or reduced-price school lunch, and food stamps), housing assistance (public housing and rent subsidies), and Medicaid.

SSI = Supplemental Security Income; TANF = Temporary Assistance for Needy Families; WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.

SOURCE: Panel's calculations from Current Population Survey 2011-2013 data.





**FIGURE 3-11** Safety net participation as fraction of households (Y axis) with incomes less than 200 percent of the federal poverty level.

NOTE: Calculations are from the 1995–2010 Annual Social and Economic Supplement data of the Current Population Survey. Sample included children under 18 with household income below 200% of poverty level. Program participation was measured at the household level. Any safety net program participation means someone in the household (1) participated in public assistance, food stamps (SNAP), Medicaid, free or reduced-price school lunch, Supplemental Security Income, or public housing or (2) received a rental subsidy from the government or energy assistance. Figures are weighted. Shaded areas refer to annual periods of labor market contraction. See source text for explanation of the weighting applied to the data shown in the graphs and further details of the analytical methodology.

SOURCE: Bitler and Hoynes (2013, Figs. 11.3–11.8, pp. 333–338).

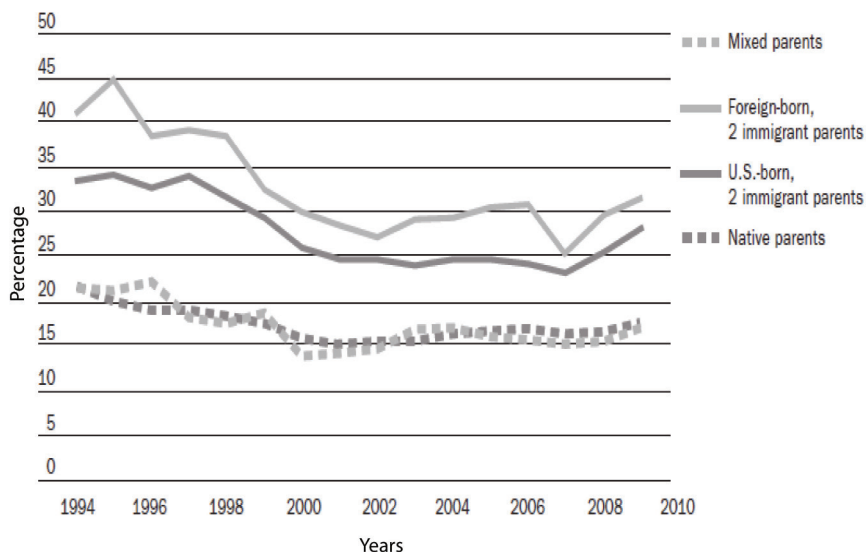


FIGURE 3-12 Trends in poverty rate of children, 1994-2009.

SOURCE: Borjas (2011, Fig. 2, p. 251). The author's calculations are based on data from the 1994-2009 March Current Population Survey administrations. The poverty rate is the percentage of households with incomes below the poverty threshold.

### 3.5 CONCLUSIONS

This chapter examined how trends in the skills of immigrants—particularly their education and experience—compare to those of the native-born population. The relative skill compositions of the two populations are an important determinant of the economic consequences of immigration, along with the magnitude of immigrant inflows and the share of immigrants likely to increase the productivity of other workers. The chapter also described how employment rates and wages of immigrants have compared with those of the native-born population.

Although the native-born population increased during the period of analysis, the total foreign-born population size expanded much more, resulting in an increase in the share of the foreign-born in the total population. And, aside from children younger than age 15, the foreign-born population changed from being a relatively old population in 1970 to being a relatively young population, with a peak concentration of persons ages 25-34 in 2012.

Education levels of immigrant arrival cohorts have been steadily rising over time, a trend observed for both men and women. That said, as explored

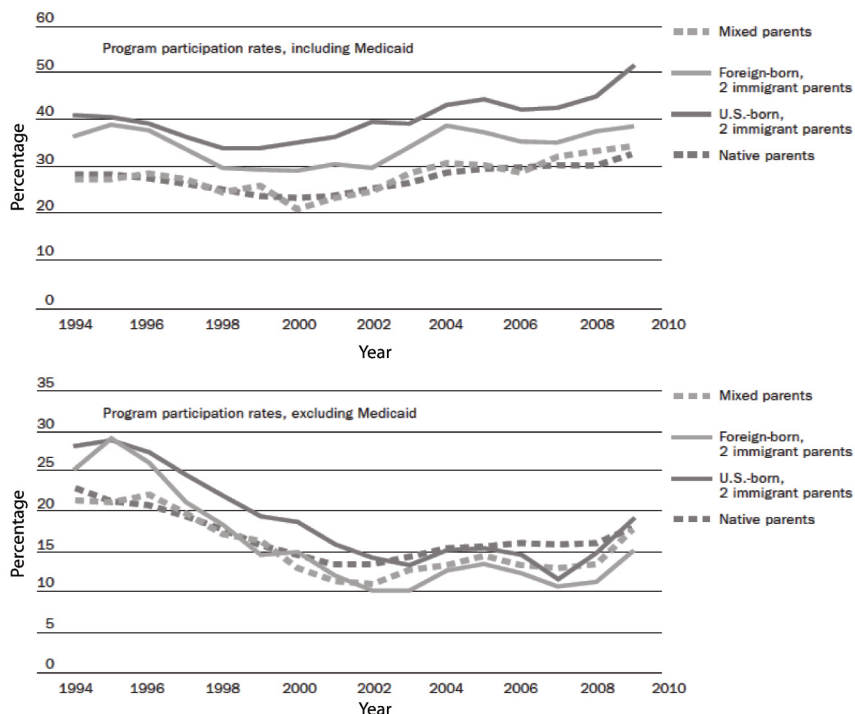


FIGURE 3-13 Trends in program participation of children, 1994-2009.

SOURCE: Borjas (2011, Fig. 3, p. 253). Author's calculations are based on data from 1994-2009 March CPS administrations. The program participation rate gives the fraction of children living in households that received cash assistance, Supplemental Nutrition Assistance Program (SNAP) benefits, or Medicaid (in the top panel), or cash assistance and SNAP benefits (in the bottom panel).

in Chapter 5, the impact of immigration on the wages and employment of the native-born population is most directly related to *relative* education levels. While there is a consistent gap in educational attainment between the native-born and the foreign-born, with the former enjoying the advantage, there is a trend toward convergence between the two groups in the average education levels for adults ages 25-34—a category in which about half of recent immigrants in each year fall. In 1970, the mean education for persons ages 25-34 was 12.1 (years of education) for the native-born and 11.6 for a recently arrived immigrant; by 1980, the gap had expanded from 0.5 years to 1.8 years, with mean years of education of 13.1 and 11.9, respectively. By 2012, the gap narrowed substantially to 0.3 years,

with a mean of 13.7 years of education for the native-born and 13.4 for the recently arrived foreign-born. Across all age groups combined, however, no such convergence in educational attainment is observed.

Over this period, the educational attainment of the foreign-born population has consistently been more varied than that of the native-born population. This contrast is particularly pronounced for young adults. In 1970, 41 percent of the foreign-born ages 30-34 had not completed high school, compared to 30 percent of the native-born. In the same age group, also in 1970, the foreign-born population had 11 percent with more than college education, compared to the native-born at 6 percent. In 2012, again restricting to individuals ages 30-34, 29 percent of the foreign-born had less than high school education, compared to 8 percent of the native-born. At the high end, 13 percent of the foreign-born, versus 11 percent of the native-born, had more than college education.

Occupational sorting has also changed in recent decades. While foreign-born workers are overrepresented in high-level professional groups that require the most education (such as scientists, engineers, and architects), they are underrepresented among other professionals, managers, and sales personnel. It is interesting to note that growth in the share of foreign-born workers in these occupations has been slower than growth in the share of foreign-born workers in the general labor force, resulting in a relative decline of foreign-born workers in these relatively high-status occupations.

Employment outcomes provide one indication of the pace and extent to which immigrants integrate into the United States. Shortly after arrival in the United States, immigrant men—especially recent cohorts—experience a disadvantage relative to native-born men in terms of the probability of being employed. However, for cohorts of immigrants arriving since the 1970s, after this initial period of adjustment in which their probability of employment is lower, they became slightly more likely to be employed than their native-born peers. The higher employment rate among immigrant men is mainly represented in the population with education of a high school degree or less, and the difference in employment ratios between immigrant and native-born men is due mainly to differences in labor force participation and not to unemployment. Immigrant women display lower employment rates than immigrant men and, typically, lower rates than native-born women. However, their probability of being employed relative to native-born women also rises appreciably after 10 years of U.S. residence, as immigrant women are exposed to U.S. labor market conditions and social norms and as some experience changes in their visa status, which improves their chances of finding employment.

On the wage front, as their time spent in the U.S. workforce extends, immigrants tend to catch up with their native-born peers. Male immigrants who arrived between 1965 and 1969 experienced rapid growth in their

relative wages, which allowed them to close the gap with native-born peers. This indication of economic integration has shown signs of slowing in more recent decades. The relative wage profile has flattened somewhat across recent arrival cohorts, indicating a slowing rate of wage convergence. This overall conclusion holds after controlling for immigrants' educational attainment, although the relative wage picture for immigrants is considerably more favorable when education is controlled for. Compared to male immigrants, female immigrants start off with a less dramatic wage disadvantage, but they experience slower growth in their wages relevant to native-born peers than do male immigrants.

Regarding poverty and program participation, a key change since *The New Americans* report (National Research Council, 1997) was welfare reform that restricted program access to some immigrants. One implication of that legislation for immigrants has been a lowering of participation rates in means-tested programs, which impacts their capacity to navigate through challenging economic times. The Great Recession of 2007-2009 and subsequent slow recovery, combined with the changing sectoral composition of the economy, has created difficult economic conditions for immigrants and the native-born alike, especially those at the low-skilled end of the labor spectrum.



### 3.6 TECHNICAL ANNEX OF TABULATIONS AND REGRESSION RESULTS

**TABLE 3-16** Educational Attainment of Male Immigrants, Ages 25 and Older, by Decennial Census Year 1970-2000, and in 2012

	Immigrants in 1970 (%)	Immigrants in 1980 (%)	Immigrants in 1990 (%)	Immigrants in 2000 (%)	Immigrants in 2012 (%)
Less than High School	47	37	37	36	27
High School Diploma / GED	15	16	17	17	20
Some College	11	18	17	14	14
Bachelor's Degree	9	12	15	17	21
Graduate Education	19	18	15	16	18
N (all attainment levels)	426,700	787,420	1,258,276	2,022,420	1,853,249

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

**TABLE 3-17** Educational Attainment of Female Immigrants, Ages 25 and Older, by Decennial Census Year 1970-2000, and in 2012

	Immigrants in 1970 (%)	Immigrants in 1980 (%)	Immigrants in 1990 (%)	Immigrants in 2000 (%)	Immigrants in 2012 (%)
Less than High School	54	44	40	35	25
High School Diploma / GED	23	22	20	19	20
Some College	10	16	17	16	16
Bachelor's Degree	7	10	15	18	24
Graduate Education	6	9	8	12	15
N (all attainment levels)	506,333	812,320	1,267,141	1,972,390	2,057,872

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

TABLE 3-18 Share of Foreign-born Male Workers (percentage), Ages 25-64, by Occupational Category, by Decennial Census Year 1970-2000, and in 2012

Occupation	Share of Male Workers in Occupation Who are Foreign Born					Share of All Male Workers with a Bachelor's or Higher Degree in 2012
	1970	1980	1990	2000	2012	
Across All Occupations	4.8	6.2	8.6	11.8	18.7	34.6
Lawyers and judges	2.5	2.2	2.8	3.6	5.2	99.1
Physicians, dentists, and related	11.5	14.2	14.5	18.3	22.6	98.4
Mathematicians	6.7	8.6	9.4	16.5	21.4	96.5
Postsecondary teachers	11.0	11.4	15.9	17.8	26.2	95.6
Preschool and elementary teachers	3.0	2.9	4.0	5.5	6.4	95.5
Physical scientists	10.0	10.5	12.1	21.8	28.7	95.0
Life scientists	9.5	7.2	10.4	19.5	28.9	93.5
Architects	7.5	9.4	11.2	11.5	18.3	89.1
Social and recreation workers	4.0	4.3	5.6	8.2	10.4	88.5
Librarians, archivists, and curators	6.5	8.2	7.5	8.0	8.4	86.6
Accountants and financial analysts	4.1	5.9	7.8	9.4	12.7	81.0
Engineers	6.8	9.4	11.7	15.2	19.5	79.8
Secondary, vocational, and adult ed. Teachers	2.8	3.5	5.3	5.8	8.2	75.7
Religious workers	5.3	4.9	5.8	8.1	11.9	75.2
Administrators and public officers	2.2	3.0	4.1	6.3	7.8	72.9
Nurses, dieticians, therapists	4.5	6.1	8.0	12.3	18.7	68.0

*continued*

TABLE 3-18 Continued

	Share of Male Workers in Occupation Who are Foreign Born					Share of All Male Workers with a Bachelor's or Higher Degree in 2012
	1970	1980	1990	2000	2012	
Social scientists	6.6	7.3	7.2	10.4	13.9	67.2
Computer specialists	4.4	6.6	10.0	17.2	23.5	66.5
Writers, artists, and media workers	7.0	7.2	8.0	9.8	12.4	60.9
Managers and proprietors	4.6	5.8	7.6	9.7	13.7	54.3
Sales workers, retail	5.2	5.3	8.8	11.4	17.1	50.2
Secretaries	5.5	7.1	8.3	9.8	14.5	37.8
All other technicians	4.7	5.5	7.8	8.0	10.8	35.1
Bookkeepers	6.0	9.1	12.3	14.0	16.6	33.5
Health service workers	4.1	8.5	11.9	16.7	24.0	32.6
Sales workers	3.4	4.5	6.6	7.7	10.9	32.3
Clerical workers	3.7	5.1	7.6	10.4	14.9	26.9
Protective service workers	1.7	2.6	3.3	4.9	7.1	25.7
Health technicians	8.6	11.8	12.5	12.4	16.3	19.0
Personal service workers and barbers	10.5	12.7	15.7	19.0	28.9	17.6
Farmers and farm laborers, incl. forestry and fishing	2.7	3.9	7.5	14.5	26.9	13.4
Cleaning service and food service workers	10.5	14.2	20.2	25.2	35.5	9.1
Craftsmen	5.1	6.7	9.2	13.0	20.4	8.9
Electricians	3.6	3.8	5.3	7.0	12.0	7.9
Construction workers	4.6	5.6	8.4	12.0	25.5	7.2

Operators, except textile, metalworking, and transportation	5.6	7.1	9.3	12.4	19.6	7.2
Mechanical workers	4.0	5.1	6.6	9.0	14.5	7.1
Textile machine operators	13.3	18.1	23.6	32.0	49.0	6.8
Carpenters	7.3	7.5	8.6	12.6	28.1	6.3
Metalworking and transportation operators	3.3	4.6	7.0	10.6	20.1	5.9
Laborers, except farm	5.0	7.8	11.8	18.6	32.8	5.7

NOTE: “Workers” is defined as those who are employed and work at least 50 weeks a year in a nonmilitary occupation. Occupational categories are the Tier 1 categories in Section 3.7, Technical Annex on Occupational Categories.  
SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

**TABLE 3-19** Share of Foreign-born Female Workers (percentage), Ages 25-64, by Occupational Category, by Decennial Census Year 1970-2000, and in 2012

	Share of Female Workers in Occupation Who Are Foreign Born					Share of All Female Workers with a Bachelor's or Higher Degree in 2012
	1970	1980	1990	2000	2012	
Across all occupations	5.4	6.7	8.0	10.2	15.8	36.5
Occupations						
Lawyers and judges	5.0	3.3	4.2	5.5	8.2	97.5
Physical scientists	18.0	16.2	16.6	27.9	30.8	97.2
Life scientists	9.4	13.4	12.7	24.1	32.2	96.8
Architects	21.1	14.0	15.6	18.0	21.4	94.9
Postsecondary teachers	8.8	8.2	10.8	11.8	18.9	94.3
Physicians, dentists, and related	29.4	28.4	20.3	22.5	23.1	92.6
Social and recreation workers	4.1	3.8	4.6	6.5	8.6	88.1
Mathematicians	6.6	7.4	11.8	15.4	23.3	87.7
Preschool and elementary teachers	2.1	3.1	4.1	5.4	7.2	87.6
Librarians, archivists, and curators	6.1	5.7	6.2	6.6	6.7	86.9
Engineers	6.5	9.1	10.6	18.1	25.3	85.4
Secondary, vocational, and adult ed teachers	3.6	4.0	4.7	5.7	8.5	81.2
Administrators and public officers	2.7	3.2	4.1	5.4	7.8	72.0
Social scientists	5.3	6.8	6.2	9.2	10.9	70.6
Writers, artists, and media workers	7.0	6.4	6.4	8.2	11.1	68.2
Religious workers	5.2	4.7	5.4	6.2	8.3	66.1
Computer specialists	4.7	7.0	9.9	14.5	21.8	64.7
Nurses, dieticians, therapists	5.5	7.3	8.0	10.1	13.2	60.5
Accountants and financial analysts	4.8	6.8	7.7	10.3	14.7	59.9

Managers and proprietors	5.0	5.3	5.9	7.7	11.0	52.3
Sales workers, retail	5.3	6.3	8.8	10.8	16.8	41.4
All other technicians	4.7	6.6	7.4	8.6	12.5	38.6
Health service workers	5.1	6.7	9.4	12.7	19.1	27.2
Protective service workers	3.5	3.9	3.7	5.3	7.1	27.2
Sales workers	4.6	6.0	6.8	8.4	12.0	22.8
Clerical workers	4.1	5.2	6.1	7.3	10.9	20.1
Secretaries	4.1	4.2	4.8	5.5	7.5	18.6
Construction workers	5.2	5.7	7.2	9.3	16.0	18.1
Mechanical workers	3.7	4.7	5.9	7.9	13.3	17.7
Farmers and farm laborers, including forestry and fishing	3.8	4.6	8.4	17.2	32.6	16.4
Bookkeepers	4.3	4.6	5.9	7.0	9.7	15.3
Electricians	3.1	5.9	7.9	10.5	11.7	13.8
Personal service workers and barbers	6.5	9.9	13.8	14.6	26.5	12.0
Craftsmen	5.9	9.7	13.1	17.7	27.0	11.0
Carpenters	6.9	7.2	8.7	11.5	20.3	10.8
Health technicians	8.8	7.8	6.9	8.0	10.8	7.9
Laborers, except farm	5.0	8.9	9.7	16.1	28.7	7.5
Cleaning service and food service workers	6.3	10.0	13.6	20.4	35.6	7.4
Operators, except textile, metalworking, and transportation	6.7	10.3	13.4	17.7	30.7	7.1
Metalworking and transportation operators	5.6	5.9	5.7	6.3	11.7	6.2
Textile machine operators	11.0	16.3	20.4	30.5	50.5	6.1

NOTE: "Workers" is defined as those who are employed and work at least 50 weeks a year in a nonmilitary occupation. Occupational categories are the Tier 1 categories in Section 3.7, Technical Annex on Occupational Categories.

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

TABLE 3-20 Difference in Share of Weeks Worked for Immigrant Cohorts, by Decennial Census Year 1970-2000, and in 2012, Men, Ages 25-64, Controlling for Age (cubic) Only

Variables	Census						ACS				
	1970		1980		1990		2000		2012		
	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE	
2010-2012									-0.158	0.001	
2005-2009									0.011	0.001	
2000-2004									0.056	0.001	
1995-1999								-0.160	0.001	0.057	0.001
1990-1994								-0.047	0.001	0.044	0.000
1985-1989					-0.185	0.001		-0.033	0.001	0.042	0.000
1980-1984					-0.048	0.001		-0.032	0.000	0.042	0.000
1975-1979			-0.183	0.001	-0.019	0.001		-0.019	0.000	0.046	0.000
1970-1974			-0.025	0.001	-0.016	0.000		-0.011	0.000	0.034	0.001
1965-1969	-0.107	0.001	-0.010	0.000	0.005	0.000		0.012	0.001	0.022	0.001
1960-1964	0.000	0.001	0.005	0.000	0.021	0.000		0.018	0.002	0.033	0.001
1950-1959	0.014	0.000	0.019	0.000	0.034	0.001		0.024	0.002	0.038	0.002

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

TABLE 3-21 Difference in Share of Weeks Worked for Immigrant Cohorts, by Decennial Census Year 1970-2000, and in 2012, Men, Ages 25-64, Controlling for Age (cubic) and Years of Education

Variables	Census				ACS			
	1970		1980		1990		2000	
	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE
2010-2012							-0.158	0.001
2005-2009							0.040	0.008
2000-2004							0.098	0.012
1995-1999							0.098	0.012
1990-1994							0.086	0.012
1985-1989					-0.156	0.003	0.013	0.008
1980-1984					-0.008	0.005	0.012	0.008
1975-1979			-0.164	0.001	0.023	0.006	0.019	0.007
1970-1974			0.004	0.002	0.026	0.006	0.027	0.008
1965-1969	-0.101	0.000	0.013	0.002	0.030	0.004	0.037	0.006
1960-1964	0.008	0.000	0.017	0.001	0.035	0.002	0.030	0.004
1950-1959	0.023	0.000	0.026	0.001	0.043	0.003	0.030	0.004

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.



**TABLE 3-22** Difference in Share of Weeks Worked for Immigrant Cohorts, by Decennial Census Year 1970-2000, and in 2012, Women, Ages 25-64, Controlling for Age (cubic) Only

Variables	Census						ACS			
	1970		1980		1990		2000		2012	
	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE
2010-2012									-0.369	0.002
2005-2009									-0.208	0.002
2000-2004									-0.131	0.001
1995-1999							-0.295	0.002	-0.097	0.001
1990-1994							-0.173	0.001	-0.063	0.000
1985-1989					-0.255	0.001	-0.131	0.001	-0.031	0.000
1980-1984					-0.111	0.001	-0.086	0.000	-0.010	0.001
1975-1979			-0.163	0.001	-0.074	0.000	-0.063	0.000	-0.016	0.002
1970-1974			-0.033	0.001	-0.053	0.000	-0.049	0.001	-0.022	0.002
1965-1969	-0.014	0.000	-0.001	0.000	-0.023	0.000	-0.030	0.001	-0.005	0.002
1960-1964	0.004	0.000	-0.009	0.000	-0.014	0.000	-0.025	0.002	-0.002	0.002
1950-1959	-0.011	0.000	-0.011	0.000	-0.016	0.001	-0.016	0.002	0.015	0.002

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

TABLE 3-23 Difference in Share of Weeks Worked for Immigrant Cohorts, by Decennial Census Year 1970-2000, and in 2012, Women, Ages 25-64, Controlling for Age (cubic) and Years of Education

Variables	Census				ACS			
	1970		1980		1990		2000	
	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE
2010-2012							-0.353	0.001
2005-2009							-0.170	0.003
2000-2004							-0.075	0.006
1995-1999							-0.256	0.002
1990-1994							-0.117	0.004
1985-1989					-0.200	0.005	-0.070	0.005
1980-1984					-0.042	0.007	-0.030	0.006
1975-1979			-0.118	0.002	-0.006	0.007	-0.015	0.005
1970-1974			0.017	0.003	0.007	0.007	-0.005	0.006
1965-1969	0.014	0.000	0.039	0.003	0.017	0.005	-0.001	0.005
1960-1964	0.027	0.000	0.017	0.002	0.011	0.004	-0.006	0.005
1950-1959	0.009	0.001	0.007	0.002	0.003	0.004	-0.004	0.005

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

TABLE 3-24 Age-adjusted Relative Weekly Earnings of Immigrant Cohorts, by Decennial Census Year 1970-2000, and in 2012, Men, Ages 25-64, Controlling for Age (cubic) Only

Variables	Census						ACS	
	1970		1980		1990		2000	
	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE
2010-2012							-.1971	.0041
2005-2009							-.3106	.0044
2000-2004							-.3388	.0027
1995-1999							-.2692	.0010
1990-1994							-.2662	.0035
1985-1989					-.0331	0.001	-.269	0.002
1980-1984					-.0285	0.001	-.236	0.002
1975-1979			-.0314	0.001	-.0185	0.001	-.176	0.005
1970-1974			-.0223	0.001	-.0124	0.002	-.128	0.006
1965-1969	-.0235	0.001	-.0122	0.001	-.002	0.003	-.014	0.005
1960-1964	-.0058	0.001	-.0041	0.001	0.046	0.004	0.074	0.004
1950-1959	0.037	0.001	0.032	0.001	0.1	0.003	0.147	0.01

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

TABLE 3-25 Age- and Education-adjusted Relative Weekly Earnings of Immigrant Cohorts, by Decennial Census Year 1970-2000, and in 2012, Men, Ages 25-64, Controlling for Age (cubic) and Years of Education

Variables	Census						ACS				
	1970		1980		1990		2000		2012		
	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE	
2010-2012									-.064	.017	
2005-2009									-.136	.028	
2000-2004									-.130	.029	
1995-1999								-.149	.021	-.074	.023
1990-1994								-.099	.025	-.075	.018
1985-1989								-.056	.025	-.026	.019
1980-1984								-.039	.020	-.003	.014
1975-1979											
1970-1974											
1965-1969											
1960-1964											
1950-1959											

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

TABLE 3-26 Age-adjusted Relative Weekly Earnings of Immigrant Cohorts, by Decennial Census Year 1970-2000, and in 2012, Women, Ages 25-64, Controlling for Age (cubic) Only

Variables	Census						ACS			
	1970		1980		1990		2000		2012	
	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE
2010-2012									-.2782	.0033
2005-2009									-.3143	.0031
2000-2004									-.2989	.0021
1995-1999							-0.216	0.002	-.2395	.0010
1990-1994							-0.165	0.002	-.2027	.0027
1985-1989					-0.184	0.001	-0.138	0.001	-.1684	.0048
1980-1984					-0.093	0.000	-0.100	0.002	-.0975	.0054
1975-1979			-0.082	0.000	-0.002	0.000	-0.053	0.004	-.0312	.0040
1970-1974			0.026	0.001	0.042	0.001	-0.026	0.005	.0615	.0041
1965-1969	-0.021	0.001	0.068	0.001	0.083	0.002	0.023	0.004	.1329	.0104
1960-1964	0.037	0.001	0.036	0.000	0.061	0.002	0.043	0.003	.1706	.0189
1950-1959	0.051	0.000	0.025	0.001	0.013	0.002	0.173	0.008		

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

**TABLE 3-27** Age- and Education-adjusted Relative Weekly Earnings of Immigrant Cohorts, by Decennial Census Year 1970-2000, and in 2012, Women, Ages 25-64, Controlling for Age (cubic) and Years of Education

Variables	Census						ACS	
	1970			1980			2012	
	Coeff	Robust SE		Coeff	Robust SE		Coeff	Robust SE
2010-2012							-.230	.009
2005-2009							-.154	.019
2000-2004							-.114	.020
1995-1999						-.075	-.056	.018
1990-1994						.002	-.010	.016
1985-1989				-.009	.020	.060	.027	.014
1980-1984				.120	.024	.0091	.078	.010
1975-1979			.038	.201	.023	.135	.142	.010
1970-1974			.162	.224	.020	.131	.160	.004
1965-1969	.111	.007		.202	.012	.133	.073	.010
1960-1964	.142	.006		.143	.008	.111	-.017	.019
1950-1959	.144	.005	.080	.101	.008	.123		

SOURCE: Analyses of 1970-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

**TABLE 3-28** Age-adjusted Probabilities of Speaking English Very Well, Immigrant Cohorts, by Decennial Census Year 1980-2000, and in 2012, Men, Ages 25-64, Controlling for Age (cubic) Only

Variables	Census				ACS	
	1980		1990		2012	
	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE
2010-2012 Arrivals					.3676	.0202
2005-2009 Arrivals					.3098	.0211
2000-2004 Arrivals					.3144	.0163
1995-1999 Arrivals				0.015	.3588	.0098
1990-1994 Arrivals				0.013	.3756	.0048
1985-1989 Arrivals			0.327	0.005	.4008	.0062
1980-1984 Arrivals			0.369	0.005	.4489	.0110
1975-1979 Arrivals	0.309	0.005	0.428	0.003	.4947	.0164
1970-1974 Arrivals	0.364	0.004	0.480	0.003	.5999	.0279
1965-1969 Arrivals	0.432	0.004	0.561	0.005	.7173	.0439
1960-1964 Arrivals	0.532	0.008	0.654	0.007	.8257	.0625
1950-1959 Arrivals	0.672	0.017	0.754	0.013		

SOURCE: Analyses of 1980-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

**TABLE 3-29** Age-adjusted Probabilities of Speaking English Very Well, Immigrant Cohorts, by Decennial Census Year 1980-2000, and in 2012, Women, Ages 25-64, Controlling for Age (cubic) Only

Variables	Census				ACS	
	1980		1990		2012	
	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE
2010-2012 Arrivals					.3300	.0154
2005-2009 Arrivals					.2907	.0143
2000-2004 Arrivals					.3080	.0101
1995-1999 Arrivals					.3540	.0060
1990-1994 Arrivals					.3733	.0038
1985-1989 Arrivals			0.322	0.008	.4179	.0061
1980-1984 Arrivals			0.360	0.007	.4895	.0108
1975-1979 Arrivals	0.281	0.009	0.429	0.004	.5339	.0151
1970-1974 Arrivals	0.341	0.007	0.508	0.004	.6084	.0219
1965-1969 Arrivals	0.424	0.006	0.596	0.006	.7335	.0315
1960-1964 Arrivals	0.543	0.009	0.714	0.010	.7948	.0435
1950-1959 Arrivals	0.716	0.019	0.829	0.020		

SOURCE: Analyses of 1980-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.



**TABLE 3-30** Age-adjusted Probabilities of Speaking English Well, Immigrant Cohorts, by Decennial Census Year 1980-2000, and in 2012, Men, Ages 25-64, Controlling for Age (cubic) Only

Variables	Census				ACS	
	1980		1990		2012	
	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE
2010-2012 Arrivals					0.604	0.018
2005-2009 Arrivals					0.533	0.019
2000-2004 Arrivals					0.572	0.015
1995-1999 Arrivals				0.557	0.643	0.009
1990-1994 Arrivals				0.632	0.69	0.003
1985-1989 Arrivals			0.562	0.006	0.662	0.005
1980-1984 Arrivals			0.663	0.005	0.725	0.003
1975-1979 Arrivals	0.578	0.009	0.736	0.003	0.789	0.005
1970-1974 Arrivals	0.666	0.008	0.779	0.002	0.827	0.008
1965-1969 Arrivals	0.747	0.003	0.866	0.006	0.889	0.012
1960-1964 Arrivals	0.854	0.006	0.944	0.008	0.937	0.016
1950-1959 Arrivals	0.993	0.013	0.986	0.01	0.954	0.023

SOURCE: Analyses of 1980-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

**TABLE 3-31** Age-adjusted Probabilities of Speaking English Well, Immigrant Cohorts, by Decennial Census Year 1980-2000, and in 2012, Women, Ages 25-64, Controlling for Age (cubic) Only

Variables	Census				ACS	
	1980		1990		2012	
	Coeff	Robust SE	Coeff	Robust SE	Coeff	Robust SE
2010-2012 Arrivals					0.573	0.02
2005-2009 Arrivals					0.529	0.019
2000-2004 Arrivals					0.572	0.013
1995-1999 Arrivals				0.015	0.633	0.006
1990-1994 Arrivals				0.012	0.664	0.004
1985-1989 Arrivals			0.549	0.01	0.647	0.008
1980-1984 Arrivals			0.633	0.008	0.717	0.012
1975-1979 Arrivals	0.533	0.011	0.725	0.004	0.788	0.016
1970-1974 Arrivals	0.613	0.009	0.794	0.002	0.859	0.02
1965-1969 Arrivals	0.707	0.006	0.879	0.004	0.919	0.027
1960-1964 Arrivals	0.845	0.007	0.972	0.008	0.962	0.035
1950-1959 Arrivals	1	0.014	1	0.01	0.984	0.021

SOURCE: Analyses of 1980-2000 Decennial Census data and 2010-2012 American Community Survey data, accessed through the Integrated Public Use Microdata Series.

### 3.7 TECHNICAL ANNEX ON OCCUPATIONAL CATEGORIES

The occupational analysis in Chapter 3 tracks changes in concentration of native-born and foreign-born individuals in different occupational categories. Because the occupational structure of a labor market changes over time, an occupational coding system that takes into account such changes is required. Xie and Killewald (2012) and Xie et al. (2016) created such a coding system, which is useful for tracking occupational changes over time. This system, based on classification of 41 occupational categories—and reproduced below—was created to meet two conflicting objectives to the extent possible: (1) reduce the number of occupational categories, and (2) group detailed occupations only when socioeconomic status and work content are sufficiently similar across these occupations. With the second purpose in mind, the second-tier occupational categories are 8 major occupational categories that are generated by collapsing the 41 occupational categories. This two-tier occupational coding system is the basis for Tables 3-18 and 3-19.

#### *First-Tier Occupational Categories*

**Lawyers and judges:** Lawyers; Judges, magistrates, and other judicial workers

**Physicians, dentists, and related practitioners:** Chiropractors; Dentists; Optometrists; Physicians and surgeons; Podiatrists; Audiologists; Veterinarians; Health diagnosing and treating practitioners, all other

**Mathematicians:** Actuaries; Mathematicians; Statisticians; Miscellaneous mathematical science occupations; Professors and postsecondary instructors, mathematical (imputed in 2000 and 2007)

**Postsecondary teachers:** Postsecondary teachers

**Preschool and elementary teachers:** Preschool and kindergarten teachers; Elementary and middle school teachers

**Physical scientists:** Astronomers and physicists; Atmospheric and space scientists; Chemists and materials scientists; Environmental scientists and geoscientists; Physical scientists, all other; Professors and postsecondary instructors, physical sciences (imputed in 2000 and 2007)

**Life scientists:** Agriculture and food scientists; Biological scientists; Conservation scientists and foresters; Medical scientists; Professors and postsecondary instructors, life sciences (imputed in 2000 and 2007)

**Architects:** Architects, except naval

**Social and recreation workers:** Counselors; Social workers; Miscellaneous community and social service specialists; Recreation and fitness workers; Residential advisors

**Librarians, archivists, and curators:** Archivists, curators, and museum technicians; Librarians

**Accountants and financial analysts:** Financial managers; Cost estimators; Accountants and auditors; Budget analysts; Credit analysts; Financial analysts; Personal financial advisors; Insurance underwriters; Financial examiners; Loan counselors and officers; Tax examiners, collectors, and revenue agents; Tax preparers; Financial specialists, all other

**Engineers:** Aerospace engineers; Agricultural engineers; Biomedical engineers; Chemical engineers; Civil engineers; Computer hardware engineers; Electrical and electronics engineers; Environmental engineers; Industry engineers, including health and safety; Materials engineers; Mechanical engineers; Mining and geological engineers, including mining safety engineers; Nuclear engineers; Petroleum engineers; Engineers, all other; Sales engineers; Professors and postsecondary instructors, engineering (imputed in 2000 and 2007)

**Secondary, vocational, and adult education teachers:** Secondary school teachers; Special education teachers; Other teachers and instructors; Other education, training, and library workers

**Religious workers:** Clergy; Directors, religious activities and education; Religious workers, all other

**Administrators and public officers:** Legislators; Administrative services managers; Education administrators; Natural sciences managers; Postmasters and mail superintendents; Social and community service managers; Compliance officers, except agriculture, construction, health and safety, and transportation

**Nurses, dietitians, therapists:** Dietitians and nutritionists; Pharmacists; Physician assistants; Registered nurses; Occupational therapists; Physical therapists; Radiation therapists; Recreational therapists; Respiratory therapists; Speech-language therapists; Therapists, all other; Massage therapists

**Social scientists:** Economists; Market and survey researchers; Psychologists; Sociologists; Urban and regional planners; Miscellaneous social scientists and related workers

**Computer specialists:** Computer scientists and systems analysts; Computer programmers; Computer software engineers; Computer support specialists; Database administrators; Network and computer systems administrators; Network systems and data communications analysts; Operations research analysts; Computer

control programmers and operators; Professors and postsecondary instructors, computer science (imputed in 2000 and 2007)

**Writers, artists and media workers:** Artists and related workers; Designers; Actors; Producers and directors; Athletes, coaches, umpires, and related workers; Dancers and choreographers; Musicians, singers, and related workers; Entertainers and performers, sports and related workers, all other; Announcers; News analysts, reporters and correspondents; Public relations specialists; Editors; Technical writers; Writers and authors; Photographers

**Managers and proprietors:** Chief executives; General and operations managers; Advertising and promotions managers; Marketing and sales managers; Public relations managers; Computer and information systems managers; Human resources managers; Industrial production managers; Purchasing managers; Transportation, storage, and distribution managers; Farm, ranch, and other agricultural managers; Construction managers; Engineering managers; Food service managers; Funeral directors; Gaming managers; Lodging managers; Medical and health services managers; Property, real estate, and community association managers; Managers, all other; Purchasing agents and buyers, farm products; Wholesale and retail buyers, except farm products; Purchasing agents, except wholesale, retail and farm products; Human resources, training, and labor relations specialists; Management analysts; Other business operations specialists

**Sales workers, retail:** First-line supervisors/managers of retail sales workers; Cashiers; Counter and rental clerks; Parts salespersons; Retail salespersons; Door-to-door sales workers, news and street vendors, and related workers

**Secretaries:** Secretaries and administrative assistants

**All other technicians:** Appraisers and assessors of real estate; Surveyors, cartographers, and photogrammetrists; Marine engineers and naval architects; Drafters; Engineering technicians, except drafters; Surveying and mapping technicians; Agricultural and food science technicians; Biological technicians; Chemical technicians; Geological and petroleum technicians; Nuclear technicians; Other life, physical, and social science technicians; Paralegals and legal assistants; Miscellaneous legal support workers; Library technicians; Miscellaneous media and communication workers; Broadcast and sound engineering technicians and radio operators; Television, video, and motion picture camera operators and editors; Media and communication equipment workers, all other; Animal trainers; Aircraft pilots and flight engineers; Air traffic controllers and airfield operations specialists; Locomotive engineers and operators; Railroad

brake, signal, and switch operators; Railroad conductors and yardmasters; Subway, streetcar, and other rail transportation workers; Ship and boat captains and operators; Ship engineers; Bridge and lock tenders; Transportation inspectors

**Bookkeepers:** Bookkeeping, accounting, and auditing clerks

**Health service workers:** Licensed practical and licensed vocational nurses; Nursing, psychiatric, and home health aides; Occupational therapist assistants and aides; Physical therapist assistants and aides; Dental assistants; Medical assistant and other health care support occupations

**Sales workers:** Agents and business managers of artists, performers, and athletes; First-line supervisors/managers of nonretail sales workers; Advertising sales agents; Insurance sales agents; Securities, commodities, and financial service sales agents; Travel agents; Sales representatives, services, all other; Sales representatives, wholesale and manufacturing; Models, demonstrators, and product promoters; Real estate brokers and sales agents; Telemarketers; Sales and related workers, all other; Reservation and transportation ticket agents and travel clerks

**Clerical workers:** Claims adjusters, appraisers, examiners, and investigators; Logisticians; Meeting and convention planners; Teacher assistants; First-line supervisors/managers of gaming workers; Gaming service workers; First-line supervisors/managers of office and administrative support workers; Switchboard operators, including answering service; Telephone operators; Communications equipment operators, all other; Bill and account collectors; Billing and posting clerks and machine operators; Gaming cage workers; Payroll and timekeeping clerks; Procurement clerks; Tellers; Brokerage clerks; Correspondence clerks; Court, municipal, and license clerks; Credit authorizers, checkers, and clerks; Customer service representatives; Eligibility interviewers, government programs; File clerks; Hotel, motel, and resort desk clerks; Interviewers, except eligibility and loan; Library assistants, clerical; Loan interviewers and clerks; New accounts clerks; Order clerks; Human resources assistants, except payroll and timekeeping; Receptionists and information clerks; Information and record clerks, all other; Cargo and freight agents; Couriers and messengers; Dispatchers; Meter readers, utilities; Postal service clerks; Postal service mail carriers; Postal service mail sorters, processors, and processing machine operators; Production, planning, and expediting clerks; Shipping, receiving, and traffic clerks; Stock clerks and order fillers; Weighers, measurers, checkers, and samplers, recordkeeping; Computer operators; Data entry keyers; Word processors and typists; Desktop publishers; Insurance claims and

policy processing clerks; Mail clerks and mail machine operators, except postal service; Office clerks, general; Office machine operators, except computer; Proofreaders and copy markers; Statistical assistants; Office and administrative support workers, all other

**Protective service workers:** First-line supervisors/managers of correctional officers; First-line supervisors/managers of police and detectives; First-line supervisors/managers of fire fighting and prevention workers; Supervisors, protective service workers, all other; Firefighters; Fire inspectors; Bailiffs, correctional officers, and jailers; Detectives and criminal investigators; Parking enforcement workers; Police and sheriff's patrol officers; Transit and railroad police; Animal control workers; Private detectives and investigators; Security guards and gaming surveillance officers; Crossing guards; Lifeguards and other protective service workers

**Health technicians:** Clinical laboratory technologists and technicians; Dental hygienists; Diagnostic related technologists and technicians; Emergency medical technicians and paramedics; Health diagnosing and treating practitioner support technicians; Medical records and health information technicians; Opticians, dispensing; Miscellaneous health technologists and technicians; Other health care practitioners and technical occupations; Medical, dental, and ophthalmic laboratory technicians

**Personal service workers and barbers:** First-line supervisors/managers of personal service workers; Ushers, lobby attendants, and ticket takers; Miscellaneous entertainment attendants and related workers; Funeral service workers; Barbers; Hairdressers, hairstylists, and cosmetologists; Miscellaneous personal appearance workers; Baggage porters, bellhops, and concierges; Tour and travel guides; Transportation attendants; Child care workers; Personal and home care aides; Personal care and service workers, all other; Parking lot attendants

**Farmers and farm laborers, including forestry and fishing:** Farmers and ranchers; Fish and game wardens; First-line supervisors/managers of farming, fishing, and forestry workers; Agricultural inspectors; Animal breeders; Graders and sorters, agricultural products; Miscellaneous agricultural workers; Fishers and related fishing workers; Hunters and trappers; Forest and conservation workers; Logging workers

**Cleaning service and food service workers:** Chefs and head cooks; First-line supervisors/managers of food preparation and serving workers; Cooks; Food preparation workers; Bartenders; Combined food preparation and serving workers, including fast food; Counter attendants, cafeteria, food concession, and coffee shop; Waiters

and waitresses; Food servers, nonrestaurant; Dining room and cafeteria attendants and bartender helpers; Dishwashers; Hosts and hostesses, restaurant, lounge, and coffee shop; Food preparation and serving related workers, all other; First-line supervisors/managers of housekeeping and janitorial workers; First-line supervisors/managers of landscaping, lawn service, and groundskeeping workers; Janitors and building cleaners; Maids and housekeeping cleaners; Pest control workers

**Craftsmen:** Boilermakers; Millwrights; First-line supervisors/managers of production and operating workers; Aircraft structure, surfaces, rigging, and systems assemblers; Electrical, electronics, and electromechanical assemblers; Structural metal fabricators and fitters; Bakers; Food batchmakers; Model makers and patternmakers, metal and plastic; Molders and molding machine setters, operators, and tenders, metal and plastic; Tool and die makers; Welding, soldering, and brazing workers; Lay-out workers, metal and plastic; Tool grinders, filers, and sharpeners; Metalworkers and plastic workers, all other; Bookbinders and bindery workers; Fabric and apparel patternmakers; Upholsterers; Furniture finishers; Jewelers and precious stone and metal workers; Photographic process workers and processing machine operators; Semiconductor processors; Etchers and engravers; Molders, shapers, and casters, except metal and plastic; Tire builders

**Electricians:** Electricians; Electrical power-line installers and repairers; Precision instrument and equipment repairers

**Construction workers:** First-line supervisors/managers of construction trades and extraction workers; Brickmasons, blockmasons, and stonemasons; Carpet, floor, and tile installers and finishers; Cement masons, concrete finishers, and terrazzo workers; Paving, surfacing, and tamping equipment operators; Pile-driver operators; Drywall installers, ceiling tile installers, and tapers; Glaziers; Insulation workers; Painters, construction and maintenance; Paperhangers; Pipelayers, plumbers, pipefitters, and steamfitters; Plasterers and stucco masons; Reinforcing iron and rebar workers; Roofers; Sheet metal workers; Structural iron and steel workers; Construction and building inspectors; Fence erectors; Hazardous materials removal workers; Septic tank services and sewer pipe cleaners; Miscellaneous construction and related workers; Manufactured building and mobile home installers

**Operators, except textile, metalworking and transportation:** Motion picture projectionists; Operating engineers and other construction equipment operators; Derrick, rotary drill, and service unit operators, oil, gas, and mining; Earth drillers, except oil and gas;



Explosives workers, ordinance handling experts, and blasters; Mining machine operators; Roof bolters, mining; Other extraction workers; Miscellaneous assemblers and fabricators; Butchers and other meat, poultry, and fish processing workers; Food and tobacco roasting, baking, and drying machine operators and tenders; Food cooking machine operators and tenders; Job printers; Prepress technicians and workers; Printing machine operators; Extruding and forming machine setters, operators, and tenders, synthetic and glass fibers; Sawing machine setters, operators, and tenders, wood; Power plant operators, distributors, and dispatchers; Stationary engineers and boiler operators; Water and liquid waste treatment plant and system operators; Miscellaneous plant and system operators; Chemical processing machine setters, operators, and tenders; Crushing, grinding, polishing, mixing, and blending workers; Cutting workers; Furnace, kiln, oven, drier, and kettle operators and tenders; Inspectors, testers, sorters, samplers, and weighers; Packaging and filling machine operators and tenders; Painting workers; Cementing and gluing machine operators and tenders; Cooling and freezing equipment operators and tenders; Paper goods machine setters, operators, and tenders; Production workers, all others; Conveyor operators and tenders; Crane and tower operators; Dredge, excavating, and loading machine operators; Hoist and winch operators

**Mechanical workers:** Elevator installers and repairers; First-line supervisors/managers of mechanics, installers, and repairers; Computer, automated teller, and office machine repairers; Radio and telecommunications equipment installers and repairers; Avionics technicians; Electric motor, power tool, and related repairers; Electrical and electronics installers and repairers, transportation equipment; Electrical and electronics repairers, industrial and utility; Electronic equipment installers and repairers, motor vehicles; Electronic home entertainment equipment installers and repairers; Security and fire alarm systems installers; Aircraft mechanics and service technicians; Automotive body and related repairers; Automotive glass installers and repairers; Automotive service technicians and mechanics; Bus and truck mechanics and diesel engine specialists; Heavy vehicle and mobile equipment service technicians and mechanics; Small engine mechanics; Miscellaneous vehicle and mobile equipment mechanics, installers, and repairers; Control and valve installers and repairers; Heating, air conditioning, and refrigeration mechanics and installers; Home appliance repairers; Industrial and refractory machinery mechanics; Maintenance and repair workers, general; Maintenance workers, machinery;

Telecommunications line installers and repairers; Coin, vending, and amusement machine services and repairers; Locksmiths and safe repairers; Riggers; Signal and track switch repairers; Engine and other machine assemblers

**Textile machine operators:** Laundry and dry-cleaning workers; Pressers, textile, garment, and related materials; Sewing machine operators; Shoe and leather workers and repairers; Shoe machine operators and tenders; Tailors, dressmakers, and sewers; Textile bleaching and dyeing machine operators and tenders; Textile cutting machine setters, operators, and tenders; Textile knitting and weaving machine setters, operators, and tenders; Textile winding, twisting, and drawing out machine setters, operators, and tenders; Textile, apparel, and furnishings workers, all other

**Carpenters:** Carpenters; Cabinetmakers and bench carpenters; Model makers and patternmakers, wood; Woodworking machine setters, operators, and tenders, except sawing; Woodworkers, all other

**Metalworking and transportation operators:** Highway maintenance workers; Rail-track laying and maintenance equipment operators; Commercial drivers; Extruding and drawing machine setters, operators, and tenders, metal and plastic; Forging machine setters, operators, and tenders, metal and plastic; Rolling machine setters, operators, and tenders, metal and plastic; Cutting, punching, and press machine setters, operators, and tenders, metal and plastic; Drilling and boring machine tool setters, operators, and tenders, metal and plastic; Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic; Lathe and turning machine tool setters, operators, and tenders, metal and plastic; Milling and planing machine setters, operators, and tenders, metal and plastic; Machinists; Metal furnace and kiln operators and tenders; Multiple machine tool setters, operators, and tenders, metal and plastic; Heat treating equipment setters, operators, and tenders, metal and plastic; Plating and coating machine setters, operators, and tenders, metal and plastic; Extruding, forming, pressing, and compacting machine setters, operators, and tenders; Cleaning, washing, and metal pickling equipment operators and tenders; Supervisors, transportation and material moving workers; Ambulance drivers and attendants, except emergency medical technicians; Bus drivers; Driver/sales workers and truck drivers; Taxi drivers and chauffeurs; Motor vehicle operators, all other; Sailors and marine oilers; Other transportation workers; Industrial truck and tractor operators; Shuttle car operators; Tank car, truck, and ship loaders; Material moving workers, all other

**Laborers, except farm:** Grounds maintenance workers; Nonfarm animal caretakers; Construction laborers; Helpers, construction trades; Roustabouts, oil and grease; Helpers-extraction workers; Helpers-installation, maintenance, and repair workers; Other installation, maintenance, and repair workers; Helpers-production workers; Service station attendants; Cleaners of vehicle and equipment; Laborers and freight, stock, and material movers, hand; Machine feeders and offbearers; Packers and packagers, hand; Pumping station operators; Refuse and recyclable material collectors

### *Second-Tier Categories*

These eight categories are combinations of the first-tier categories defined above. The second-tier categories are used in Tables 3-1 and 3-2.

**High-level professionals:** Life scientists; Physical scientists; Social scientists; Mathematicians; Engineers; Architects; Physicians, dentists, and related; Postsecondary teachers; Lawyers and judges

**Professionals:** Nurses, dietitians, therapists; Preschool and elementary teachers; Secondary, vocational, and adult education teachers; Health technicians; All other technicians; Computer specialists; Writers, artists, and media workers; Librarians, archivists, and curators; Social and recreation workers; Religious workers; Accountants and financial analysts

**Managers and Administrators:** Administrators and public officers; Managers and proprietors

**Sale workers and clerks:** Sales workers, retail; Sales workers; Clerical workers; Bookkeepers; Secretaries

**Skilled workers:** Mechanical workers; Carpenters; Electricians; Construction workers; Craftsmen

**Unskilled workers:** Textile machine operators; Metal working and transportation operators; Operators, except textile, metalworking, and transportation; Laborers, except farm

**Farmers and farm laborers:** Farmers and farm laborers, including forestry and fishing

**Service workers:** Cleaning service workers and food service workers; Health service workers; Personal service workers and barbers; Protective service workers

## PART II

# ECONOMIC IMPACTS



## 4

## Employment and Wage Impacts of Immigration: Theory

### 4.1 INTRODUCTION

This chapter demonstrates how economic theory can be used to analyze the economic impact of immigration. The discussion starts with the simplest case and progresses to more complex specifications in order to illustrate the various channels through which immigration affects labor markets and how the economy's adjustments mitigate those effects over time. Because adjustments take time, particularly when immigration is unexpected, the initial and longer run impacts of immigration differ. The impact of immigration will also depend on the size of the inflow, the skill composition of immigrants compared to that of the native-born population, and characteristics of the destination country economy such as the ease with which firms can adopt or develop new technologies and the speed at which capital can accumulate or move between industries, as well as the economic links between that country's regions and its degree of integration with the world economy.

Theory predicts that immigration initially confers net economic benefits on the destination country economy while creating winners and losers among the native-born via changes in the wage structure and the return to capital. Resulting changes in factor prices increase the production of goods and services that use the type of labor that immigrants provide most intensively. With time, the capital stock adjusts and eventually technology may respond as well, pushing up the demand for labor and hence wages toward their original levels. It bears noting that, if firms anticipate immigration and there is no lag in the response of capital and technology, the length of time elapsing between an immigration inflow and the "long-run" adjust-

ment of the labor market could be very short. Either way, if the economy simply returns to a larger version of its pre-immigration state, with the same capital-labor ratio, there are no winners and losers among the native-born, but equally, no net benefit to them from immigration.

This chapter provides a simple, largely graphical description of the often mathematically complex theoretical models that economists use to analyze the impact of immigration (or other labor supply shocks). The analysis relies heavily on the shifting of supply and demand curves, since these are most familiar to a general audience. It should be emphasized that these graphics only partly reflect the dynamic and general equilibrium characteristics of the models described here.

Most of the analysis is qualitative, designed to identify the mechanisms through which an influx of new immigrants is likely to affect wages and returns to capital as well as the overall level of income enjoyed by the native-born population that absorbs them. The concept of an *immigration surplus* as developed by Borjas (1995b) is introduced to quantify how, abstracting from fiscal effects, the arrival of immigrants affects the welfare of the native-born population on net. The panel quantifies these effects by inserting aggregate measures from national accounts or parameter estimates from empirical research. The emphasis here is on providing plausible orders of magnitude for the changes we model and should not be confused with the statistical estimation that is at the heart of Chapter 5.

## 4.2 A SIMPLE MODEL WITH A SINGLE TYPE OF LABOR

To understand the impact of immigration as seen through the prism of economic theory, it is easiest to begin by analyzing the simplest possible model, one constrained by highly unrealistic assumptions, and then consider the implications of more complicated models that arise as at least some of these assumptions are removed. We begin by assuming that the economy is inhabited by a large number of identical individuals and firms and that all economic activity is devoted to the production of a single consumption good. Firms produce this good by combining two highly aggregated inputs: work effort or labor, for which the individuals in this economy receive a wage ( $w$ ) paid by the firm, and the physical capital (the tools, equipment, machinery, and buildings) each firm owns. We assume that all individuals devote a fixed amount of time to work activities (the quantity of labor supply is perfectly inelastic—it does not respond to wage changes) and that the stock of physical capital is initially fixed. For the moment, we also assume that ownership of firms is equally distributed across the population, whose wage income is supplemented by dividends paid by these firms. For simplicity of expression, we use the term “native” to refer to the native-born population.

### Initial Labor Market Effects of Immigration

The diagram in Figure 4-1 describes the labor market in this simple model of the economy. For firms, the demand for labor is a decreasing function of wages represented initially by  $L_1^D$ , and the labor supplied by the native workers is fixed at  $N$ . The initial equilibrium (denoted by the number 1) is the point where labor supply  $L_1^S$  and labor demand  $L_1^D$  cross, and this point determines the wage  $w_1$ . In this economy, total income is equivalent to the amount produced of the single good and is represented by the area underneath the demand curve: the triangle A and the two rectangles B and C, or  $A + B + C$ . The area of the two rectangles B + C represents the income the people in this economy receive from firms as labor earnings ( $N \times w_1$ ). The triangle A represents the accounting profits received by firms from the sale of goods after the cost of labor has been paid; these profits are assumed to be remitted to the population as dividends.

Now consider what happens when there is a sudden unanticipated increase in the population due to an influx of new immigrants. These new immigrants increase the total labor supply from  $N$  to  $N + M$ , and the labor supply curve shifts from  $L_1^S$  to  $L_2^S$ . Crucially, we assume these new immigrants arrive without capital and that they do not receive a share of the

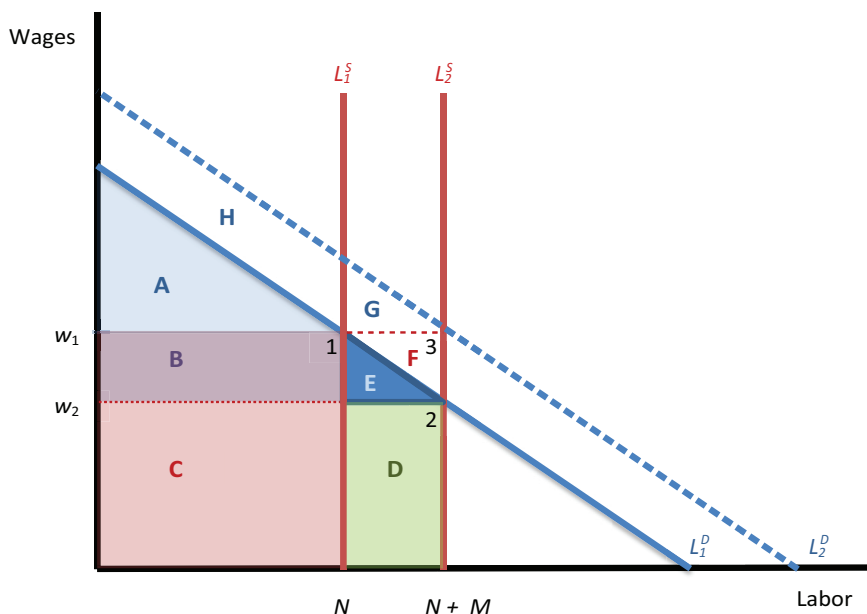


FIGURE 4-1 Labor market (with inelastic labor supply) response to an influx of immigrant workers.



existing capital, which remains wholly owned by the native-born population. At the new equilibrium (marked with the number 2), wages are  $w_2$  ( $w_2 < w_1$ ), so the immediate effect of the influx of new immigrants is to drive down the wage. Now firms pay wage income to workers ( $N \times w_2$ ), corresponding to rectangle C, to the native population, and  $w_2 \times M$ , corresponding to rectangle D, to immigrants; the value of the total amount of goods produced increases to  $A + B + C + D + E$ . The profits earned by the firms increase from the area represented by triangle A to  $A + B + E$ . Rectangle B represents the amount firms once paid as wages to natives but which now is paid to them as dividends instead. Triangle E represents the part of the overall increase in income ( $D + E$ ) not captured by the immigrants themselves; this is commonly called the “immigration surplus.” The immigration surplus represents the benefit that accrues to the native population from an inflow of new immigrants.

Although immigrants are consumers as well as workers, the demand curve for labor does not shift outward in this simple model until capital adjusts. The reason for this is that the demand curve is determined by the economy’s productive capacity, and the addition to aggregate consumption created by the immigration-driven population growth is represented as a movement along the demand curve. Although the extra labor causes the aggregate amount of output to rise, *per-capita output*—output divided by the new, higher number of people in the economy—initially declines. **To summarize, in this simple theoretical model of the labor market, the influx of immigrants initially drives down wages but native incomes still rise in the aggregate due to the immigration surplus.**

### Initial Capital Market Effects of Immigration

There are two input factors in this model economy, capital and labor, and it is important to also consider how immigration affects the market for capital. The diagram in Figure 4-2, which describes the capital market in this economy, is sufficient to illustrate most of the changes that occur following an influx of additional workers. The cost of capital for firms can be either the interest rate at which they borrow or, if funded from retained earnings, the rate of return available on an alternative investment. In this simple framework, the two are identical. Meanwhile, the economy-wide cost of capital for households is the rate of return on their asset holdings. The demand curve for capital slopes downward since firms choose to acquire less new capital and hold less existing capital at higher rates of return (or cost of capital for the firm).<sup>1</sup> The amount of capital available is initially fixed at  $K_1$  and the initial equilibrium (denoted by the number 1) determines the initial rate of return  $r_1$ .

<sup>1</sup>We use the term *rate of return* rather than *cost of capital* because our focus is on the two sources of income for households, namely wages and the return on assets.

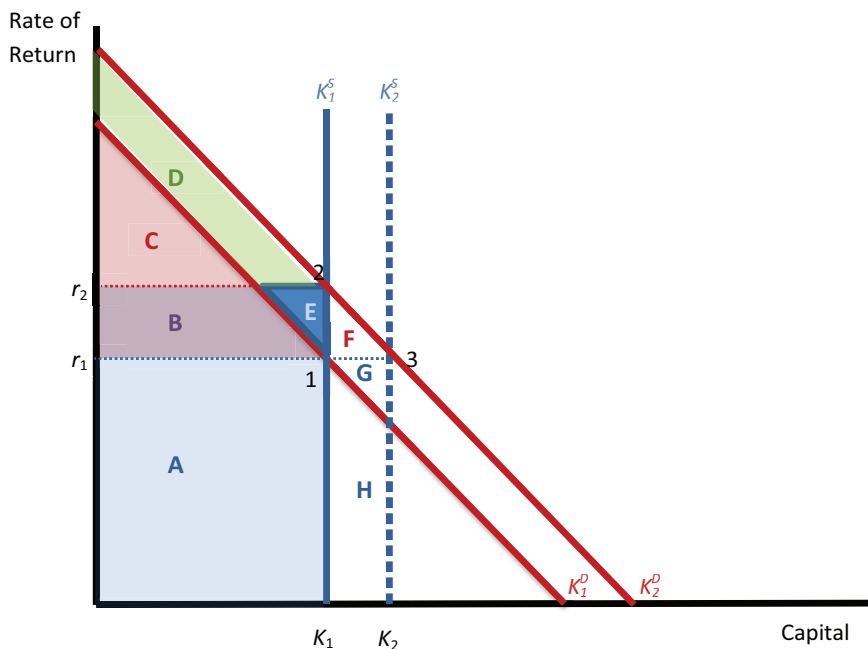


FIGURE 4-2 Capital market (with inelastic labor supply) response to an influx of immigrant workers.

The area underneath the demand curve once again equals the amount of the single good produced as well as total income. The area of the rectangle A in Figure 4-2 is the amount  $r_1 \times K_1$  paid by firms as dividends and corresponds exactly to the area of the triangle A in Figure 4-1. Likewise, the areas of the triangle C and the right trapezoid B in Figure 4-2 correspond to the areas of the rectangles B and C respectively in Figure 4-1. This once more is the amount the firm initially pays in wages.

An influx of new immigrants (an increase in labor relative to capital) makes each unit of the pre-existing capital stock more productive. The rightward shift in the demand curve for capital from  $K_1^D$  to  $K_2^D$  in Figure 4-2 captures this rise in the rate of return to capital. If one assumes that the production technology has an attribute economists call constant returns to scale—which specifies that output quantity increases by the same proportion as the quantity of all inputs—the horizontal distance between  $K_1^D$  and  $K_2^D$ , measured in percentage terms, is equal to  $M/N$  (the ratio of immigrant to native labor).<sup>2</sup> The right trapezoid B is the amount of income once paid

<sup>2</sup>Constant returns to scale means that if all the inputs increase by  $x$  percent, the output they produce increases by the same  $x$  percent.

as wages but now paid as dividends, and the wages paid to the natives are reduced to the triangle C. The area in trapezoid D represents the wages paid to immigrants, and triangle E once again represents the immigrant surplus. Modeling the impact of immigration in terms of its impact on the market for capital is admittedly less intuitive than modeling it in terms of its impact on the labor market. However, the rise in the rate of return to capital from  $r_1$  to  $r_2$  in Figure 4-2 underlines an important insight: the immigration surplus arises because the labor supplied by new immigrants makes native-owned capital more productive. Restating, **immigration raises the return to capital, making capital more productive and increasing income to owners of capital.**

### How Big Is the Immigration Surplus?

How can one quantify the size of the immigration surplus? A simple approximation for the area  $E$  in Figure 4-1 yields  $\frac{1}{2}(w_2 - w_1)M$  or, restated as a fraction of total output  $Y$ ,  $E$  equals  $\frac{1}{2}\left(\frac{M}{N}\right)^2 \frac{w_2 N}{Y} E_{LL}$ , where  $E_{LL}$  is the elasticity of the own-factor price for labor (that is, the percentage change in wages divided by the percentage change in labor between point 1 and point 2),  $\frac{w_1 N}{Y}$  represents the share of income initially paid to natives, and  $\frac{M}{N}$  is the size of the immigration surge relative to the native workforce.<sup>3</sup> In the United States, 65 percent of total national income is paid as employee compensation; it is therefore reasonable to assume that the elasticity of the own factor price for labor is  $-0.35$  and the elasticity of the rate of return with respect to labor is  $0.65$ .<sup>4</sup> The area represented by triangle  $E$  grows quadratically with the increase in the proportion of new immigrants so, unless the increase in the workforce generated by an influx of new immigrants is very large, the overall increase in income will be relatively small. A 1 percent increase in the workforce caused by an influx of immigrants

<sup>3</sup>From Borjas (2014), we define the factor price elasticity  $E_{LL} = \left(\frac{w_2 - w_1}{w_1}\right) / \left(\frac{M}{N}\right)$  which is the inverse of the elasticity of labor demand. Therefore  $\frac{w_2 - w_1}{Y} = E_{LL} \frac{M}{N} \frac{w_1}{Y}$  and  $\frac{1}{2} \frac{(w_2 - w_1)M}{Y} = \frac{1}{2} \left(\frac{M}{N}\right)^2 \frac{w_1 N}{Y} E_{LL}$ .

<sup>4</sup>For a simple Cobb-Douglas production function, these elasticity values follow directly from the share of national income paid as employee compensation (equal to 0.65) and the approximation  $E_{LL} = \frac{w_1 N}{Y} - 1$ . In this case the immigration surplus is  $-\frac{1}{2} \left(\frac{M}{N}\right)^2 (1 + E_{LL}) E_{LL}$ .

lowers wages by 0.35 percent, raises the rate of return to capital by just under eight basis points (or 0.08%) and generates an immigration surplus of \$199 million for the native population in an economy with an annual gross domestic product (GDP) of \$17.5 trillion.<sup>5</sup> An increase in the workforce twice as large, equivalent to 2 percent of the U.S. workforce, generates a decline in wages of 0.75 percent and an immigration surplus four times larger, equivalent to \$796 million.<sup>6</sup> Rather than focus on an incremental inflow of workers, the model can also generate estimates of the wage impact and immigration surplus of the entire immigrant population. Immigrant labor accounts for 16.5 percent of the total number of hours worked<sup>7</sup> in the United States, which, using this methodology, implies that the current stock of immigrants lowered wages by 5.2 percent and generated an immigration surplus of \$54.2 billion, representing a 0.31 percent overall increase in income that accrues to the native population. However, it bears noting that it is problematic to apply the same static methodology used for small temporary inflows to measuring the impact of the entire population of immigrants, which has grown over the course of decades. Over such a long period of time, capital has had plenty of time to adjust, and so these estimates can at best be described as upper limits that exaggerate the real impact of immigration on native wages and overall incomes.<sup>8</sup>

**In summary, natives' incomes rise in aggregate as a result of immigration; the size of the increase depends on the number of immigrants relative to natives, natives' share of income, and the size of the wage effect of immigration.**

<sup>5</sup>The cross-factor elasticity that measures the increase in gross returns in response to the increase in the labor force is defined as  $E_{KL} = \left( \frac{r_2 - r_1}{r_1 + \delta} \right) / \left( \frac{M}{N} \right)$ . For a simple Cobb-Douglas production function,  $E_{KL} = \frac{w_1 N}{Y}$ . If one assumes a capital output ratio of 3 and a rate of depreciation of 0.05, the initial net real rate of return to capital is 6.67 percent.

<sup>6</sup>An immigration influx 10 times larger than the 1 percent example—one that increases the labor force by 10 percent—will have an impact on both wages and the return to capital that is also about 10 times larger. Wages drop by 3.5 percent and the rate of return to capital rises by about 75 basis points. However, because of the squared term in the formula for the immigration surplus, the surplus increases 100-fold, to \$19.9 billion. Hence the ratio between the benefit that accrues to natives as a group (total income = wages + dividends) from immigration, compared to the amount of redistribution between different sources of income (wages versus dividends), rises rapidly with the immigration influx.

<sup>7</sup>U.S. Census Bureau, Current Population Survey (CPS), unweighted average across years 2013, 2014, and 2015.

<sup>8</sup>Ben-Gad (2004) demonstrated that dynamic calculations of the surplus are considerably lower than those obtained using Borjas' (1995b) static approach.

### Who Gets the Immigration Surplus?

Consider the factors that affect the decrease in the wage bill paid to natives, represented by the area of rectangle B in Figure 4-1. A decline in wages of 0.35 percent in this simple model economy, assuming a GDP of \$17.5 trillion, implies that as much as \$39.6 billion that was once paid as wages is now paid as returns to capital (for the 1% immigration-induced workforce increase scenario). Of course this is immaterial if our initial (unrealistic) assumption holds that all the natives are identical and own equal shares of the nation's capital stock. Indeed, even if people have radically different levels of income, as long as everyone shares the same proportion of income derived from wage earnings and capital income, the shift between the two generated by immigration has no impact on the distribution of income. But what if the proportions are not equal? If, to take an extreme example, the population is divided between those who derive all their income from work and others who derive all their income from capital, the shift in resources described in this example is potentially substantial. Even for the case of a 1 percent increase in the number of workers, the shift from wages to income from capital outweighs the immigration surplus by a factor of nearly 200.

In practice, most people derive at least some of their lifetime income from capital, if not directly through capital gains, dividends, rents, or interest payments, then indirectly through the ownership of their own residence and through pension savings. Still, the composition of income varies significantly across the income distribution, with those at the very top receiving larger shares of their income from capital than those at the bottom.<sup>9</sup> This means that not only does a disproportionate share of the immigration surplus accrue to people who enjoy higher incomes but the shift in overall income composition in response to immigration can at least initially exacerbate income inequality and could leave some people absolutely worse off.

**In summary, the immigration surplus stems from the increase in the return to capital that results from the increased supply of labor and the subsequent fall in wages. Natives who own more capital will receive more income from the immigration surplus than natives who own less capital, who can consequently be adversely affected.**

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<sup>9</sup>The Gini coefficient for earnings is 0.489 but 0.898 for interest, 0.789 for dividends and 0.753 for rents, royalties, estates or trusts (U.S. Census Bureau, 2014). Zero on the Gini scale indicates perfect equality in distribution (of earnings, or income, or whatever is being measured), and a score of 1.0 indicates total inequality. Salaries, wages, and pension income account for 91.17 percent of income for people in the top 10 to 5 percent of the income distribution, 83.35 percent for people in the top 5 to 1 percent, 72.34 percent for people in the top 1 to 0.5 percent, 60.46 percent for the top 0.5 to 0.1 percent, 46.65 percent for the top 0.1 to 0.01 percent, and 33.47 percent for the top 0.01 percent (Alvaredo et al., 2013).

### The Effects of Capital Adjustment: What If Immigrants Bring Capital with Them?

All the changes in wages and the distribution of income analyzed above are predicated on the assumption that the aggregate stock of capital remains fixed even as the income each unit generates increases. More likely one should expect that, as the influx of immigration raises the rate of return to capital from  $r_1$  to  $r_2$  in Figure 4-2, an incentive is created for more of it to be produced or to flow from abroad. The accumulation of additional capital has a number of effects: wages are restored to their original level, the return to capital falls, and the immigration surplus dissipates. As noted below, this is typically referred to as the long-run impact of immigration because capital responds with a lag when immigration is unanticipated.

One can also illustrate the impact of capital's response to immigration with the following thought experiment: What would happen if each immigrant not only supplied additional labor, but arrived in the country with an amount of capital that matched the capital holdings of the natives? Once again the supply curve for labor shifts from  $L_1^S$  to  $L_2^S$ , but now this is accompanied by a shift in the demand curve from  $L_1^D$  to  $L_2^D$  as the additional capital the immigrants bring raises the marginal product of labor. If one further assumes a constant returns to scale production technology, the economy reaches equilibrium points marked by the number 3 in both Figures 4-1 and 4-2, where neither the wage nor the rate of return to capital changes, there is no immigration surplus or change in the composition of income, and the initial ratios between capital and output and labor and output are restored. The economy is larger, of course, but all the benefits of immigration, whether in terms of wage earnings, represented by the areas D, E, and F, or the income generated by the capital imported by the new immigrants, represented by areas G and H, accrue to the new immigrants. This implies that programs designed to facilitate the immigration of people who agree to invest in the domestic economy will indeed ameliorate or even reverse the impact of immigration on wages and the distribution of income; but, perhaps counterintuitively, such programs will also reduce or eliminate the immigration surplus that otherwise would accrue to natives.

Assuming constant returns to scale, if immigrants bring enough capital with them such that the capital-labor ratio does not change, then the economy simply grows larger. There is no negative wage impact nor is there an immigration surplus.<sup>10</sup>

<sup>10</sup>If production is characterized by increasing returns to scale, where a particular fractional increase in all inputs yields more than the same fractional increase in output, an influx of immigrants together with capital may generate a rise in wages and a positive immigration surplus.

### How Else Can Capital Adjust?

Of course immigrants need not arrive with capital for immigration to prompt an adjustment to the stock of capital. Instead, the upward pressure on the rate of return to capital generated by the arrival of new workers provides an incentive for capital to either flow from abroad or to accumulate domestically. Here it is important to emphasize the unique attributes of the U.S. economy compared with smaller counterparts. Often it is appropriate to analyze the behavior of an economy using a small open-economy model. This is particularly appropriate if a large fraction of the economy's output is devoted to exports, if it is very open to inflows of capital from abroad, and if it represents such a small share of world output that changes in economic conditions originating in that country are unlikely to have meaningful effects on the global economy. In the context of a small open economy, an influx of immigrant workers is likely to be accompanied by an inflow of capital from abroad. Those who own the newly invested capital also own a claim to the income it generates, represented by the area of  $G + H$  in Figure 4-2. Once again, if capital flows into the economy along with the additional new immigrants, there is no change to native welfare or to the distribution of income between capital and labor.

Yet, even if capital flows freely into a small open economy and all the additional capital is readily purchased and easily transportable, there can still be substantial delays between the arrival of new immigrants and the time when new capital is ultimately installed. If the unexpected influx of new immigrants is relatively small, the resulting increase in the rate of return to capital will not be very large and will probably be very short-lived because the additional capital can be easily procured and installed at a low cost. Alternatively, if the influx of new immigrants is relatively large, the inflow of capital required to lower the rate of return to its long-run value will necessarily be large as well. Any effort to expedite the process of procuring and installing large amounts of additional capital, particularly as the immigrant influx was unforeseen, carries additional costs.<sup>11</sup> Meanwhile, during the period of adjustment, immigration exerts downward pressure on wages.

Of course the United States economy is not small and, as a consequence, transactions with the rest of the world account for a smaller share of its economic activity than for any other industrialized country. This means that much of the new capital added to the economy following an influx of new immigrants is likely to be produced locally. Higher rates of

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<sup>11</sup>Small open economy models typically include convex capital adjustment costs to ensure that investment is not more volatile than what one typically observes in the data. See, for example, Hansen et al. (2015). Klein and Ventura (2009) analyzed the impact of enlarging the European Union and creating a common labor market in North America in a model where capital flows freely across borders.

return induce higher savings rates and some shifting of production from consumer goods to capital. Yet, because people generally dislike sharp fluctuations in the amount they consume, this capital adjustment process may occur gradually, even in the absence of capital adjustment costs. Of course, if immigration is anticipated, then capital may adjust much faster. In fact, if the immigration episode is fully anticipated, capital can be increased in advance, reducing or eliminating the adjustment period.

Ben-Gad (2004) used a general equilibrium optimal growth model—the standard macroeconomic model where savings and investment are endogenously determined—to investigate the behavior of wages, returns to capital, and the size of the immigration surplus following an unanticipated change in immigration policy. To understand the overall effect of immigration flows, the change considered is a radical one—the permanent suspension of all future immigration to the United States. The result is a gradual increase in wages until they are 0.8 percent above their previous trend, and the rate of return to capital falls by 6 basis points, the equivalent of a decrease in interest rates from 4.06 to 4.00 percent.<sup>12</sup> Pursuing such a policy would mean relinquishing the immigration surplus. Yet, since capital gradually adjusts following the suspension of immigration, the loss measured in terms of the size of the U.S. economy in 2014 would amount to only about \$4 billion.

**Summarizing, even if immigrants arrive without capital, domestic savings and investment will rise as a result of the higher return to capital. Once the capital-labor ratio is restored, the adverse wage effect of immigration and the immigration surplus disappear.**

### 4.3 EMPLOYMENT EFFECTS OF IMMIGRATION WITH ELASTIC LABOR SUPPLY

In exploring these simple models of the economy so far, we have assumed that the amount of labor each worker supplies is fixed rather than a function of wages or other income. Suppose instead that for each percentage increase in wages, workers, whether native or immigrant, increase the amount of labor  $l$  they supply to the market by  $\nu$  percent. The initial labor supply curve in Figure 4-3,  $L_1^S$ , is no longer vertical but slopes upwards and the total amount of labor supplied in equilibrium is  $N \times l_1$ . The arrival of  $M$  additional immigrants shifts the labor supply curve by the horizontal distance  $M$  to  $L_2^S$ , which exerts downward pressure on wages. Lower wages mean the equilibrium amount of labor supplied by each worker drops from

<sup>12</sup>Unlike the static analysis, here the change in immigration represents a change in long-run flows. The flow of immigrant workers dilutes the capital stock, hence any change in the flows has permanent (albeit small) effects on wages and the rate of return to capital.



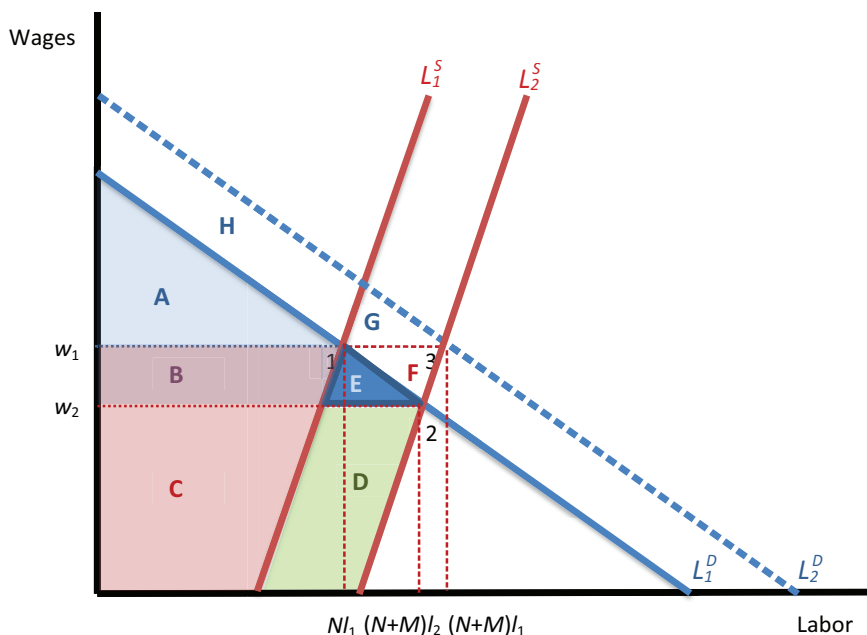


FIGURE 4-3 Labor market (with elastic labor supply) response to an influx of immigrant workers.

$l_1$  to  $l_2$  while the aggregate amount of labor increases to  $(M + N)l_2$ . Qualitatively, the results from the previous section do not change: the unanticipated arrival of immigrants increases the amount of labor in the economy and initially lowers wages. The difference is quantitative: the higher the value of the own-wage supply elasticity,  $\nu$ , the more the per capita amount of labor rather than the wage adjusts with the arrival of the immigrants.

If the factor price elasticity of labor demand is  $E_{LL} < 0$ , the change in wages from  $w_1$  to  $w_2$  in Figure 4-3 following an immigration influx of size  $M$  is  $\frac{E_{LL}}{1 - \nu E_{LL}} \frac{M}{N} w_1$  or  $\frac{E_{LL}}{1 - \nu E_{LL}} \frac{M}{N}$  when measured in percentage

terms. The increase in the rate of return on capital is also mitigated by the adjustment of labor supply in response to lower wages; the demand curve for capital in Figure 4-4 initially shifts only part of the way outward and only shifts further as the supply of capital adjusts. The smaller the decline in wages the immigrants create, the smaller the immigration surplus they generate.

The area of triangle E in Figure 4-3 corresponds to the immigration sur-

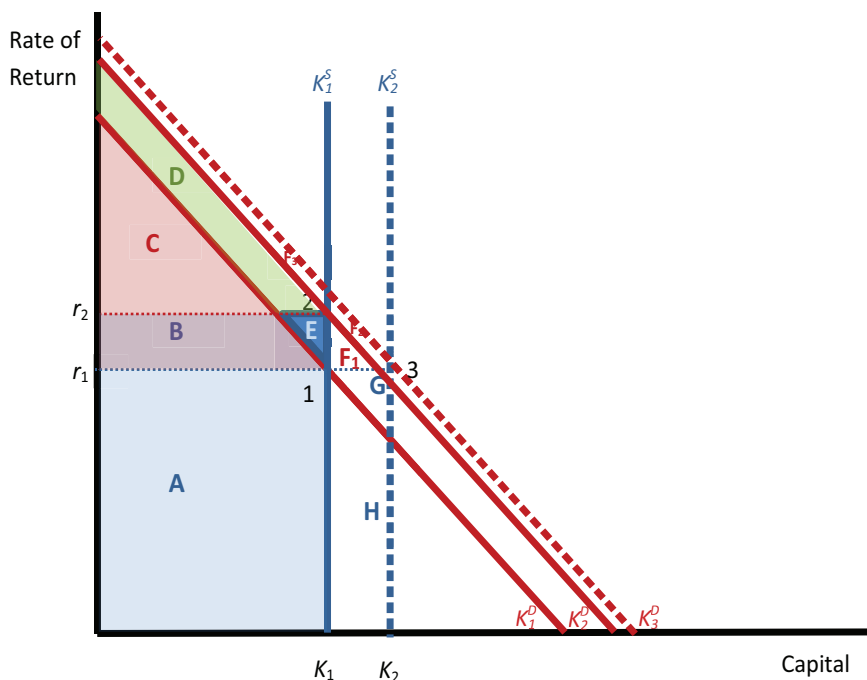


FIGURE 4-4 Capital market (with elastic labor supply) response to an influx of immigrant workers.

plus. When measured as a fraction of output, it is  $-\frac{1}{2}\left(\frac{M}{N}\right)^2 \frac{w_1 N}{Y} \frac{E_{LL}}{1 - \nu E_{LL}}$

and it also declines as the value of  $\nu$  increases. How large a value of  $\nu$  could one reasonably assume? Few econometric studies estimate a single elasticity of labor supply for the entire population. At minimum, labor econometricians divide the population by gender and marital status and estimate elasticities for each subpopulation. The highest value for  $\nu$  found by Blau and Kahn (2007) is 0.4 (for married women). If one treats  $\nu = 0.4$  as an upper bound, and assuming once again that compensation of employees accounts for 65 percent of national income, the immigration influx that raises labor supply by 1 percent now yields an immigration surplus of only \$175 million, an influx of 2 percent yields \$698 million, and the entire stock of current immigrants, who contribute 16.5 percent of total hours worked, yields \$47.5 billion.<sup>13</sup>

<sup>13</sup>By contrast, in Ben-Gad's (2004) dynamic model with endogenous capital, if the elasticity of labor supply is 0.75, the loss to natives of abolishing future immigration flows is only \$3 billion.

In summary, if some natives exit the labor force in response to immigration, then there is an employment effect of immigration in addition to a wage effect. The wage effect is smaller, however, than in the case where native labor supply is fixed.

#### 4.4 MULTIPLE TYPES OF LABOR

##### Complementarities Between Worker Types

The simple models presented thus far have assumed there is a single labor market in the economy where all workers supply the same amount of labor and where this labor is qualitatively identical. In reality, workers differ in their levels of skill, experience, and education and in their occupations. Thus, in a modern economy there is not one uniform labor market but many.

To keep the analysis simple, we now assume that there are only two types of workers. One type supplies high-skilled labor and the other supplies low-skilled labor. The distinction between the two types of workers is sometimes made on the basis of what type of jobs they perform, but more often it is imputed on the basis of how many years of schooling or educational qualifications they have accumulated. In the model explored here, firms employ both types of workers along with capital to produce final goods. For simplicity, we once again assume that each worker supplies a fixed amount of his or her type of labor in the market.

Immigrant worker type will be crucial in determining how their arrival will affect wages and the returns to capital. In Figures 4-5, 4-6, and 4-7, the panel considers the case in which all immigrants fall into the low-skilled category—this is of course a gross simplification. In Figure 4-5, the arrival of  $M_u$  low-skilled immigrant workers, augmenting the population of low-skilled native workers  $N_u$ , means that, just as in Figure 4-1, the supply curve in the market for low-skilled labor  $L_{u,1}^S$  shifts to  $L_{u,2}^S$ . Wages for low-skilled workers decline from their initial value of  $w_{u,1}$  to  $w_{u,2}$ . In the economy with undifferentiated labor, the influx of immigrant workers in Figure 4-1 raised the productivity of the second factor of production, capital, as shown in Figure 4-2. Likewise, here, the influx of low-skilled workers complements the other two factors of production, capital and high-skilled labor, and raises their productivity. This change in the market for high-skilled labor is captured in Figure 4-6 by the shift in the demand curve  $L_{s,1}^D$  to  $L_{s,2}^D$  and the rise in wages for high-skilled workers from  $w_{s,1}$  to  $w_{s,2}$ . As before, the increase in the supply of one factor of production, in this case low-skilled labor, increases the value of the remaining factors, both high-skilled labor in Figure 4-6 and capital in Figure 4-7, where the influx of new immigrants once more causes the outward shift in the demand curve from  $K_1^D$  to  $K_2^D$  and raises the rate of return from  $r_1$  to  $r_2$ .

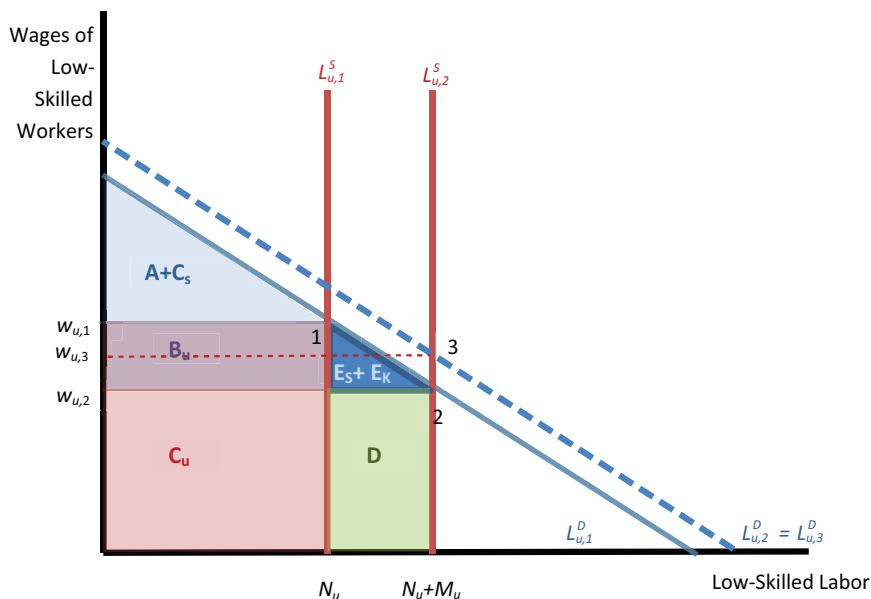


FIGURE 4-5 Low-skilled labor market response to an influx of low-skilled immigrant workers.

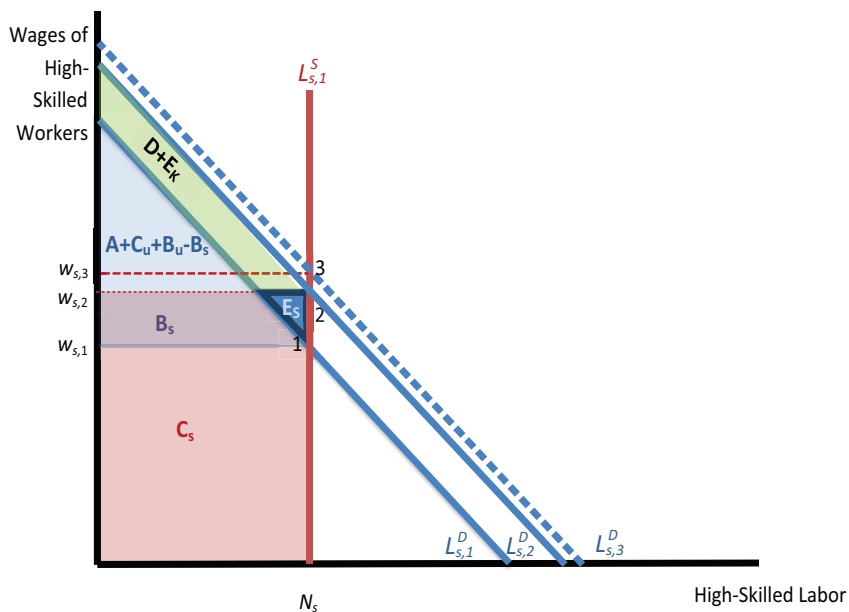


FIGURE 4-6 High-skilled labor market response to an influx of low-skilled immigrant workers.

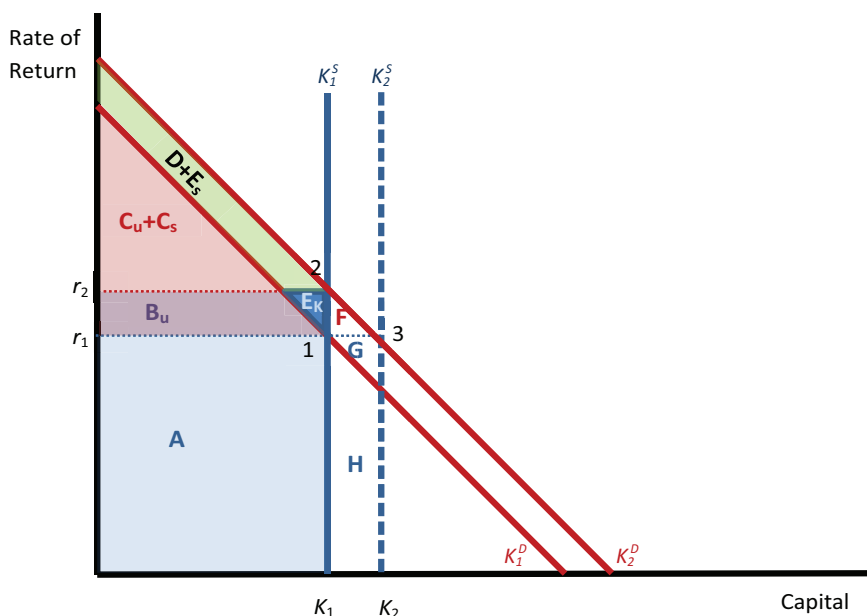


FIGURE 4-7 Capital market response to an influx of low-skilled immigrant workers.

How large are the initial changes in the two wages and the returns to capital likely to be? Start with the low-skilled natives who now face direct competition from immigrants in their labor market. Generally, the smaller the share of workers in a given category, the greater in absolute value the corresponding value of the factor price elasticity will be.<sup>14</sup> Take the example in which the labor force is equally divided between high-skilled and low-skilled workers. In this case, a 1 percent increase in the overall number of workers will not depress overall wages as much as the wages of low-skilled workers would fall when the influx is only half as large but completely confined to the ranks of the low-skilled. When comparing the effects of an influx of equal absolute size, this contrast becomes yet more pronounced.

Moreover, the way the model distinguishes between different types of workers crucially affects how the wage rate will respond to influxes of new immigrants. The more the labor force is disaggregated, the larger the own-wage response will be to an increase in immigration if all the immigrants are

<sup>14</sup>For Cobb-Douglas production functions, this is precisely true. The factor price elasticity of workers in category  $i$  is equal to  $E_{LL} = \frac{w_i N_i l_i}{Y} - 1$ .

confined to one particular category of labor. Even if the analysis is restricted to just two types of labor, the more broadly the category of high-skilled workers is defined, the more narrow the category of low-skilled workers will be and, in all likelihood, the larger (in absolute value) the corresponding elasticity of the own-factor price for low-skilled labor  $E_{UU}$ . What this means is that the slope of the low-skilled labor demand curve  $L_{u,1}^D$  in Figure 4-5 is likely to be steeper than the slope of the aggregate labor demand curve  $L_1^D$  in Figure 4-1.

The effect of low-skilled immigration on the other two factors of production largely depends on the value of elasticities  $E_{SU}$  and  $E_{KU}$ , which represent the percentage change in high-skilled wages and returns to capital, respectively, divided by the percentage change in the number of low-skilled workers. Most evidence suggests that these elasticities are positive but not very large. In other words, there is a relatively low degree of complementarity and comparatively high degree of substitutability between low-skilled labor and both high-skilled labor and capital. This means that the shifts in the demand curves  $L_{s,1}^D$  to  $L_{s,2}^D$  and  $K_1^D$  to  $K_2^D$  are not likely to be very large, and consequently the initial increase in wages from  $w_{s,1}$  to  $w_{s,2}$ , and the increase in returns to capital  $r_1$  to  $r_2$  are unlikely to be very large either.

The bottom line here is that immigration is predicted to raise native wages in the case where immigrant and native workers are complements, meaning their productivity rises from working together. Native workers who are substitutes for immigrants, however, will experience negative wage effects.

### The Immigration Surplus with Immigrant–Native Complementarity

In the model above, the two elasticities  $E_{SU}$  and  $E_{KU}$  determine the size of the short-term immigration surplus, which now comprises two elements: the surplus that accrues to native high-skilled workers, represented by the triangle  $E_S$  in Figure 4-6, and the surplus that accrues to whichever natives own capital, represented by the triangle  $E_K$  in Figure 4-7.<sup>15</sup> The size of each triangle is determined by the magnitude of the shift in the demand curve which is, in turn, determined by the elasticities  $E_{SU}$  and  $E_{KU}$ . The sum of the two surpluses represented by  $E_S$  and  $E_K$  is equal to the area of the triangle marked  $E_S + E_K$  in Figure 4-5. Indeed, as long as the influx of immigrants is confined to one skill category, it is sufficient to know the elasticity of

<sup>15</sup>If one assumes the constant returns aggregate production function  $F(x)$  applies, there is a close relationship between all the factor price elasticities:  $\sum_i E_{ij} = 0$  and  $\sum_i \alpha_i E_{ij} = 0$ , where

$E_{ij} = \alpha_i c_{ij}$ . The elasticity of complementarity between factors  $i$  and  $j$  is  $c_{ij} = \frac{F(x)E_{ij}}{F_i F_j}$ .

demand for that type of labor to determine the size of the immigration surplus, which can then be calculated as it was in the case of undifferentiated

labor, using the formula  $-\frac{1}{2}\left(\frac{M_u}{N_u}\right)^2 \frac{w_{1,u}N_u}{Y} E_{UU}$ .

Suppose again that the population is equally divided between high- and low-skilled workers and that the former receive a wage twice as high as the latter. The share of income paid for low-skilled work is now one-third of 0.65 (the overall share of earnings in total national income), or approximately 0.22, against 0.43 (the remaining portion) for high-skilled work. Finally, assume the value of  $E_{UU} = -0.6$ . Together these values imply that an influx of low-skilled immigrants that increases the overall labor force by 1 percent but raises the size of the low-skilled workforce by 2 percent lowers low-skilled wages by 1.2 percent. The influx generates an immigration surplus of just under \$462 million for the \$17.5 trillion U.S. economy, which is substantially larger than the immigration surplus in the model above that assumed only one type of labor. If one now assumes that  $E_{KU} > 0$ , the value of  $E_{SU}$  can be at most no higher than 0.31, which means wages for high-skilled workers increase by no more than 0.62 percent in response to the influx of low-skilled immigrants. Borjas (2014a) cited  $E_{SU} = 0.05$  as a more empirically plausible number, which implies a rise in wages of 0.1 percent. Furthermore, if  $E_{UU} = -0.6$  and  $E_{SU} = 0.05$ , the income shares imply  $E_{KU} = 0.32$ , so the losses experienced by low-skilled workers represent for the most part gains to owners of capital rather than to high-skilled wage earners.

**Summarizing, the immigration surplus is larger when immigrant workers are complementary to natives. Income from the surplus accrues to both owners of capital and high-skilled workers when immigrants are low-skilled.**

### Capital Accumulation in a Model with Immigrant-Native Complementarities

As in the one-labor-category model (Section 4.2), the rise in the rate of return to capital in the two-category model induces capital inflows or capital accumulation. This process raises the wages of both types of workers. Wages of high-skilled workers rise still further as the stock of capital grows, and the wages of low-skilled workers partially recover as well. Yet with more than one type of labor, neither the process of capital accumulation nor even the free flow of capital from abroad is sufficient to guarantee that wages return to their previous levels for *both* groups following an unexpected immigration episode, even in the long run, unless it also affects native occupational choice and investment in education. And even then this adjustment is a very long-run phenomenon. What this means is that

the shift in low-skilled wages from  $w_{u,2}$  to  $w_{u,3}$  only partially mitigates the initial decline from  $w_{u,1}$ .<sup>16</sup>

Restating this, once the capital-labor ratio is restored, average wages are also restored, as in the model with just one type of labor. However, in a framework with two types of labor and regardless of any complementarities, *relative* wages may not return to pre-immigration levels. If immigrants are low-skilled, the deterioration of the relative wages of low-skilled workers may persist in the long run.

### The Role of Capital-Skill Complementarity in the Immigration Surplus

There is one more aspect to the dynamic impact of capital accumulation in this context. Empirical work on U.S. manufacturing, dating back to work by Zvi Griliches (1969) and confirmed by subsequent research, suggests there is evidence of what economists call “capital-skill complementarity.”<sup>17</sup> Indeed, consistent with this evidence, in representing the demand curves in Figures 4-5 and 4-6, we assumed that the factor price elasticity of the demand curve for high-skilled workers is higher in absolute value than that corresponding demand curve for low-skilled workers—that is, that the demand curve for high-skilled workers is more steeply sloped than the demand curve for low-skilled workers. The result is that additional increments of capital raise the productivity and hence the wage of high-skilled workers more than they raise the wage of low-skilled workers. Though wages for both may rise, the additional capital also partly substitutes for low-skilled labor to a degree it does not substitute for high-skilled labor.

Capital-skill complementarity has another implication: The immigration surplus generated by an increase in the number of high-skilled workers is potentially much larger than for a similar-sized influx of low-skilled workers. To see this, consider what happens in the market for high-skilled labor when the population of high-skilled native workers  $N_s$  is augmented by  $M_s$  high-skilled immigrant workers. The labor supply curve shifts from  $L_{s,1}^S$  to  $L_{s,2}^S$  in Figure 4-8 and wages decrease from  $w_{s,1}$  to  $w_{s,2}$ . The immediate impacts of

<sup>16</sup>This is the pattern found by Ben-Gad (2008), who simulated the dynamic behavior of wages and returns to capital following a temporary surge in either low-skilled or high-skilled immigration in a model with a nested constant elasticity of substitution (nested CES) production function that incorporates capital-skill complementarities. In Table 5-1 in Chapter 5, the panel considers a different configuration of the nested CES production function in which the elasticities of substitution between different types of labor vary but the elasticities of substitution between capital and the different types of labor are identical.

<sup>17</sup>Studies by Fallon and Layard (1975) and Krusell and colleagues (2000) for the United States and by Duffy et al. (2004) using international data all confirm this finding. Goldin and Katz (1998) suggested that capital-skill complementarity emerged during the early 20th century with the transition from artisanal to mass production.



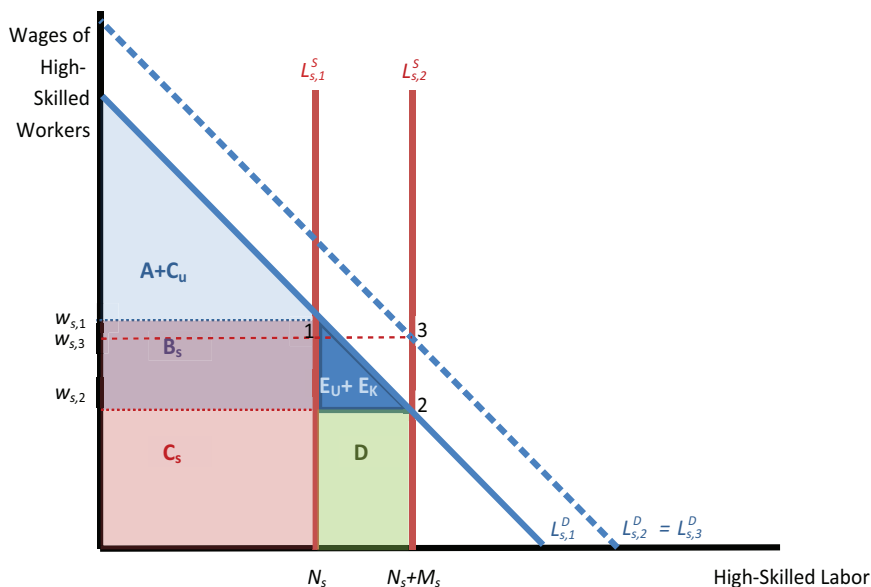


FIGURE 4-8 High-skilled labor market response to an influx of high-skilled immigrant workers.

an influx of each category of immigrant labor skill on the demand for the second category in Figures 4-6 and 4-9 are qualitatively identical, as is the impact on the demand for capital in Figures 4-7 and 4-10.

What is different is that because of capital-skill complementarities, the outward shift in the demand curve from  $K_1^D$  to  $K_2^D$  in Figure 4-10 is assumed to be substantially larger than the shift in Figure 4-7. This means the rise in the rate of return is larger and the value of the capital-related component of the short-term immigration surplus  $E_K$  is larger as well. Indeed, if one assumes that the share of national income captured by high-skilled immigrants is larger than the share captured by low-skilled immigrants and that the elasticity  $E_{US}$  is greater than  $E_{SU}$ , then the demand curve in Figure 4-9 shifts outward more than in Figure 4-6. Hence, a percentage increase in the number of high-skilled workers raises the wages of low-skilled workers by more than the same percentage increase in low-skilled workers raises the wages of the high skilled.

Assume once again that the initial population is divided equally between high- and low-skilled workers, and that high-skilled workers receive a wage twice that of the low skilled. Assume further that the demand for high-skilled workers is more elastic than for low skilled, such that  $E_{SS} = -0.9$ .

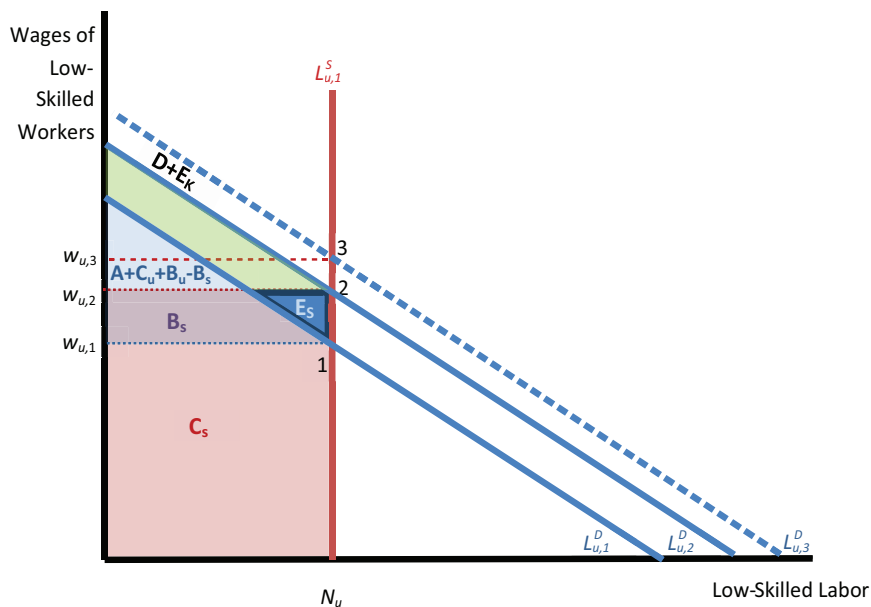


FIGURE 4-9 Low-skilled labor market response to an influx of high-skilled immigrant workers.

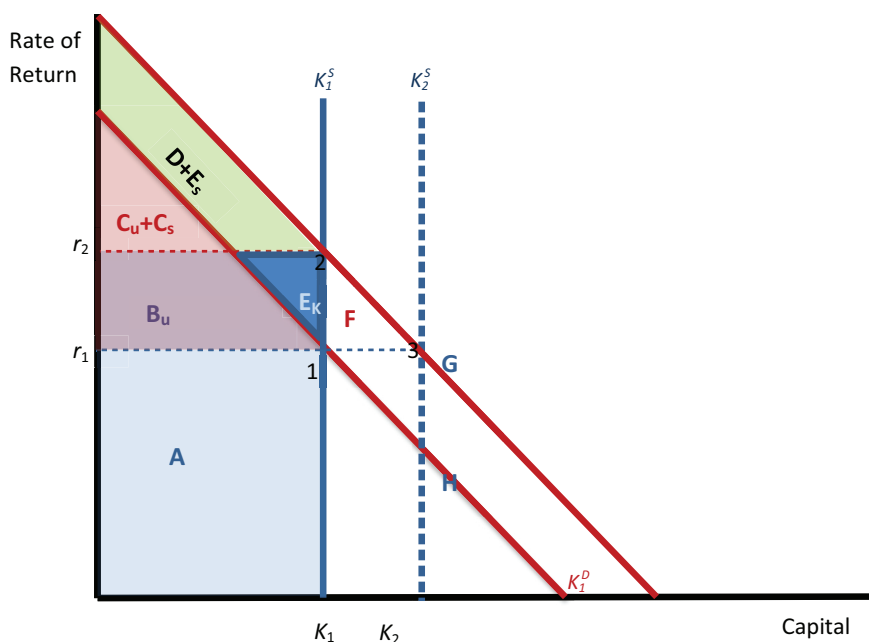


FIGURE 4-10 Capital market response to an influx of high-skilled immigrant workers.

The immigration surplus generated by high-skilled immigrants, here equal to  $-\frac{1}{2}\left(\frac{M_s}{N_s}\right)^2 \frac{w_{1,s}N_s}{Y}E_{ss}$ , of a 1 percent increase in the number of workers, all now high-skilled immigrants, is equal to just over \$1.35 billion in a \$17.5 trillion economy.

Furthermore, because the rise in the rate of return is higher when high-skilled rather than low-skilled immigrants are added to the economy, the inflow or accumulation of capital will be larger as well. This means that the further increase in low-skilled wages from  $w_{u,2}$  to  $w_{u,3}$  will be somewhat higher and that, in particular, a more significant portion of the loss in high-skilled wages will be corrected in the long term as the demand curve in Figure 4-8 shifts from  $L_{s,1}^D$  to  $L_{s,2}^D$ . This means that even after the long-run accumulation of capital is accounted for, here the immigration surplus does not completely disappear. Simulations by Ben-Gad (2008) found that even if university-educated workers are only 2.7 times more productive than workers without degrees, university-educated immigrants generate a surplus for natives 10 times larger than the surplus generated by other immigrants.

Immigration generates a surplus that accrues to both immigrants and natives, but the latter capture a larger share of the surplus when immigrants are skilled. **Capital is likely more complementary to high-skilled than low-skilled labor, which has implications for the immigration surplus.**

### Immigration Surplus in the Long Run

It might seem odd that the influx of the same number of immigrants who are exclusively either high-skilled or low-skilled can each generate a surplus larger than the influx generated by immigrants in the model with undifferentiated labor. The reason for this result is that by altering the skill distribution in the economy, immigrant labor creates shifts in wages that represent opportunities for native-born workers. In other words, the arrival of new workers from abroad disrupts the relative supply of different factors of production, and it is this disruption that generates the immigration surplus. The more disruptive the influx—here not only the number of workers but the mix of different skill types is altered—the greater the magnitude of the surplus.

This last point is emphasized by Borjas (2014a), who examined the immigration surplus for varying proportions of high- and low-skilled immigration.<sup>18</sup> In his model, the high-skilled group consists of workers with more than a high school education. Applying this criterion to data from the 2000 Decennial Census, 61.4 percent of natives can be categorized as

<sup>18</sup>See Chapter 6.

high skilled, but only 48.9 percent of immigrants classify as such. Given that immigrants comprise approximately 15 percent of the U.S. workforce, the theoretically derived calculation of the short-run immigration surplus (where capital remains fixed) yields an estimate of between 0.24 percent and 0.5 percent of GDP, but the long-run surplus (after the stock of capital has adjusted) reduces to between 0.02 and 0.03 percent of GDP. Immigrants fail to generate a substantial surplus because they are too similar to the population absorbing them. By contrast, if all the immigrants were low skilled, the short-run surplus would be between 0.45 and 0.9 percent and the long-run surplus between 0.42 and 0.77 percent. If all the immigrants were high skilled, the corresponding numbers are 0.75 and 1.35 percent in the short run, and 0.16 and 0.31 percent in the long run. In the short run, natives benefit most from the arrival of high-skilled immigrants because of capital-skill complementarities, but in the long run, low-skilled immigrants generate the larger surplus because they are more dissimilar to natives. In all cases, **once capital adjusts, capital-skill complementarity is less important to the immigration surplus.** The extent to which the immigrant skill set differs from that of natives has, in theory, comparatively more effect on the magnitude of the immigration surplus in the long run.

## 4.5 MULTIPLE TECHNOLOGIES AND MULTIPLE GOODS

### Immigration and Output Mix

So far, this discussion has assumed that people in this model economy produce and consume some aggregate good (or, similarly, that there are many goods but they are produced using the same production technology). It is instructive to consider the impact of immigration under a set of alternative assumptions about the nature of markets, including in the context of a model designed to analyze the impact of international trade.

Assume once again that the economy being modeled produces the goods it consumes by combining two factors, capital and labor, but instead of one type of good it now produces two distinct goods, designated A and B in the Lerner diagram in Figure 4-11.<sup>19</sup> The technology represented has the familiar characteristic of constant returns to scale, but allows for different combinations of capital and labor in the production of different goods. More specifically, to produce each unit of good A requires relatively large amounts of capital and less labor, while the production of good B employs relatively more workers and uses less capital. Assume further that all goods are freely traded internationally. This assumption simplifies the analysis because it implies that the prices of each good are set in global markets.

<sup>19</sup>The diagram was developed by Lerner (1952).

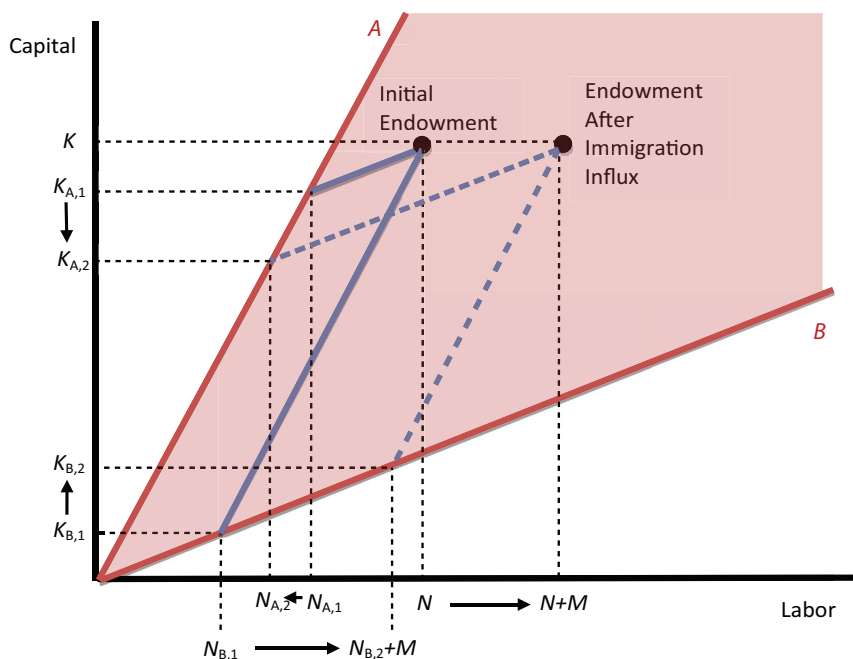


FIGURE 4-11 The allocations of capital and labor in a two-good economy, before and after immigration.

The rays from the origin labeled A and B each represent the combination of capital and labor that is required to produce one of the final goods. The shaded area between the two rays is referred to as the cone of diversification. This means that, if the economy's total initial endowment of productive inputs—its stock of capital  $K$  and available labor  $N$ —falls within this area, one expects this economy to produce both goods. The alternatives are that the economy exclusively produces good A if the initial endowment is to the left of the shaded area or exclusively produces good B if the initial endowment is to the right of the shaded area.

In the case assumed in Figure 4-11, initially—before the arrival of new immigrants—the production of good A employs most of the labor  $N_{A,1}$  and capital  $K_{A,1}$ , leaving only a comparatively small amounts  $N_{B,1}$  and  $K_{B,1}$  employed in the production of good B. All this changes when the initial work force  $N$  is supplemented by the arrival of  $M$  new immigrants, causing the initial endowment to shift horizontally to the right. Still, as long as the shift is not large enough to carry the new endowment point outside the cone of diversification, the economy continues to produce both types of goods.

Since both goods are traded on world markets, and at fixed world prices, the amount of each good consumed does not change. What does change is the pattern of this economy's trade with the rest of the world.

Suppose that before the arrival of the immigrants, the economy exported A and imported B. After the arrival of the immigrants, the volume of trade would decline and, if the effect is sufficiently large, one expects a switch toward importing A and exporting B. Alternatively, if initially this economy imported A and exported B, the volume of this trade would increase. To provide a concrete example, suppose the garment industry in this economy is relatively labor intensive. Its domestic garment industry produces less than the total amount of garments consumed and the remainder is imported. The arrival of more labor will reduce the volume of these imports and increase the amount produced domestically.

Of course none of these rather extreme assumptions is particularly representative of the condition of the U.S. economy as it absorbs new workers from abroad. Neither the prices of different goods nor the wages or returns to capital are fixed in global markets, and this simple example abstracts from the way trade can shift production within sectors between different firms. Yet even if the assumptions are mostly unrealistic, the analysis is useful because it captures in a relatively extreme fashion an additional dimension through which immigration alters the U.S. economy: reallocating output between the production of different goods. Adjustment through changes in the mix of goods produced, along with the subsequent changes in both the volume and pattern of international trade, implies less adjustment through factor prices and so will dampen, to some degree, the downward pressure immigration might otherwise exert on wages in the short run.

Of course final goods are not the only things traded—factor inputs including capital are imported and exported. Indeed the very process of international migration represents a flow of the factor input labor between countries and can serve as a substitute for trade in final goods. Workers can produce a good in a foreign country and export it to the United States, driving down both the price of the good paid by U.S. consumers and the wages of their American counterparts. Alternatively they can migrate to the United States and expand domestic production. Qualitatively the effect would be similar. Hence, there is some degree of substitution between international migration and international trade.

Summarizing, firms that use relatively labor-intensive technology benefit more from immigration and respond by increasing production and, hence, their demand for labor. The subsequent change in the economy's output mix is larger the closer the trade ties are between the receiving economy and the rest of the world, and this change further reduces any adverse impact of immigration on wages.

### Immigration and Technology

Thus far, the models discussed in this chapter have assumed that the technology for any given firm or industry is fixed and exogenously determined. In reality, technology progresses. Recognition that firms may have a choice of technologies, that the evolution of technology is likely to be influenced by changes in the composition of labor, and that immigrants themselves may hasten the process of technological change leads to an appreciation of additional links between immigration and wages.

Consider the possibility that a good may be produced with either of two technologies. Instead of assuming two different goods as above, Figure 4-11 now models an economy such that A and B represent different technologies.<sup>20</sup> Method A is more capital intensive than method B, but if one assumes that wages and the rate of return to capital are determined on world markets, the analysis illustrated by Figure 4-11 does not change. An influx of new immigrants now causes the amount produced using technology B to increase and the amount produced using technology A to decline.

The aggregate amount of capital remains constant as long as its rate of return is determined on global markets, but the amount used by type A firms declines from  $K_{A,1}$  to  $K_{A,2}$ , and the amount used by type B firms increases from  $K_{B,1}$  to  $K_{B,2}$ . The shift in the allocation of capital reinforces the shifts in the allocation of labor, so that even though the total amount of labor in the economy grows, the amount employed by type A firms always declines from  $N_{A,1}$  to  $N_{A,2}$ . Since this case assumes that the labor supplied by natives and by immigrants is identical, one can assume furthermore that all  $M$  new immigrants join type B firms. Even so, the number of native workers employed at type B firms increases as well, from  $N_{B,1}$  to  $N_{B,2}$ . Hence, if one assumes the economy is completely open and all the relevant prices, including wages and rates of return are determined on global markets, the economy can still absorb large numbers of immigrant workers by reallocating both capital and labor between the different types of technologies available.

As with the introduction of multiple goods, the introduction of different modes of production for the same good provides an additional channel through which immigration may alter the economy and absorb some of the impact that might otherwise force down wages. In the case analyzed by Lewis (2013), this result extends beyond the two-factor example with only one type of labor to models with multiple types of labor. Namely, an influx of immigrants who supply a particular type of labor once again causes a portion of output to shift toward those firms that employ that labor most intensively. Adding more types of technology increases the range of possible responses of industry to an influx of new immigrants.

<sup>20</sup>See Trefler's (1998) analysis of the Heckscher-Ohlin model of international trade.

Of course, it is unlikely that the transition between different modes of production is instantaneous. Beaudry and Green (2005) modeled an economy that is gradually transitioning between older and newer, more advanced technologies that rely more heavily on both capital and high-skilled workers. They found that the pace at which the older technology is replaced is determined by the pace at which both physical and human capital accumulate. (Chapter 6 examines the role of human capital in more detail.) An influx of new immigrants alters not only the supply of overall labor relative to capital but also the relative supply of different types of labor, potentially changing the pace of the transition. Another implication of the Beaudry and Green model is that an increase in the number of high-skilled workers may not only lower the wages these workers can command in the market but, in contrast to the analysis in Section 4.4, may also lower the wage of low-skilled workers as well, since capital shifts away from the traditional sector.

It is useful to go a step further, and ask how these different technologies arise. The shifting availability of workers with different levels or types of skill alters the incentives for the development of different types of technology. Hence, an influx of high-skilled workers would spur the development of new technologies that complement the type of labor they supply. Acemoglu (1998, 2002b) raised the possibility that while the arrival of a particular type of worker may lower wages in the short term, the new technologies that develop in response raise these workers' productivity and ameliorate the decline in wages over time.

Indeed under certain conditions, particularly if there is a high degree of substitutability between the different workers in the economy, the long-run labor demand curve will slope upward.<sup>21</sup> Consider once more an influx of high-skilled immigrants  $M_S$  in Figure 4-12 that shifts the supply of labor from  $L_{s,1}^S$  to  $L_{s,2}^S$ . In the initial phase, the wage drops from  $w_{s,1}$  to  $w_{s,2}$  along the short-run labor demand curve  $L_{s,1}^D$ . Over time, as new technologies are developed to take advantage of the now more plentiful supply of high-skilled labor, the demand curve shifts out to  $L_{s,2}^D$  and wages increase from  $w_{s,2}$  to  $w_{s,3}$ . The long-run demand curve for high-skilled labor is upward sloping.

It is further possible that immigration could speed technological progress for any given skill group if skilled immigrants are themselves innovative or provide entrepreneurial skills complementary to native innovators. This would reinforce the endogenous technological change just described. The theoretical link between immigrants and innovation is considered further in the context of immigration and economic growth in Chapter 6.

Once again, even for relatively small countries most of the assumptions made in the models discussed in this chapter are unrealistic. Even in small

<sup>21</sup>Acemoglu (2002a) used this mechanism to explain why the relative wage of college-educated workers increased even as the supply of these workers grew.



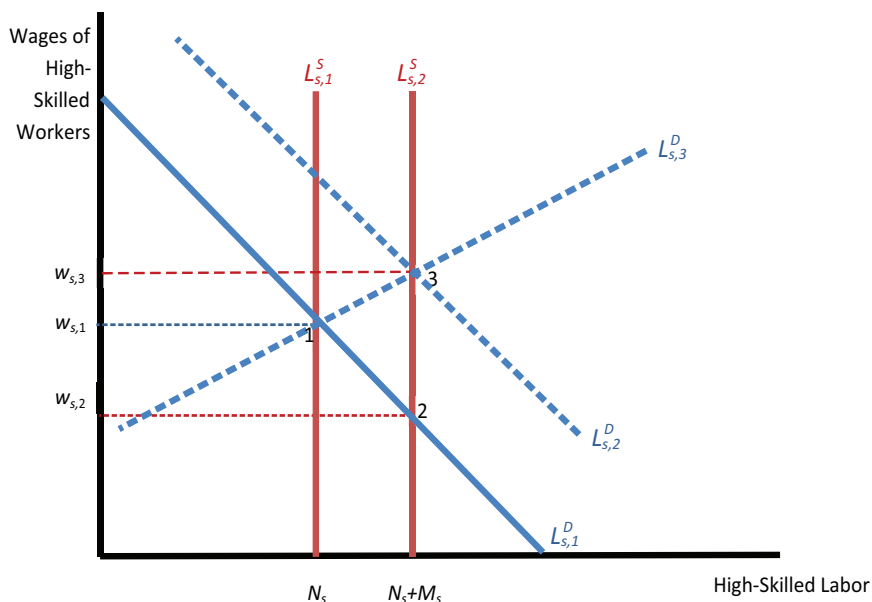


FIGURE 4-12 High-skilled labor market response to an influx of high-skilled immigrant workers (with long-run technological change).

countries, wages and prices are not solely determined on international markets, and to a degree neither is the return to capital. Furthermore, not all goods are tradeable across different countries or even different regions. For a country as large as the United States, with its enormous and relatively autarkic internal market, these assumptions are even less realistic. However, it is important to emphasize that the assumptions for these models have been made to simplify the analysis and to isolate effects that are still likely to exist to some degree, even if none of the assumptions are strictly true in a real economy. What this means is that many of the wage effects described in earlier sections are likely to be diluted by the response of firms (for example, altering the mix of goods and services they produce, shifting between modes of production, or developing new technologies) as the labor supplied by new immigrants is made available in the market.

Summarizing, firms can also respond to immigration by implementing technologies that are complementary to the type of labor immigrants' supply; this is another adjustment mechanism that mitigates adverse wage effects.

#### 4.6 RESPONSES BY NATIVES

Finally, we briefly note that there are other margins of adjustment to immigration that are not related to technology or even firms but also serve to reduce the wage impact of immigration. Of particular importance is that responses by natives may mitigate the wage effects of immigration. Individuals who compete with immigrants may choose to better exploit their comparative advantage in language or to upgrade their human capital. For example, if immigrants are not native speakers of English, immigration changes the comparative advantage of the native-born toward tasks that are more language and communication intensive and encourages them to shift into occupations utilizing these skills. This response mitigates negative wage impacts of immigration (Peri and Sparber, 2009). Furthermore, incentives to increase education are influenced by the wage structure, which is in turn affected by the entry of immigrant workers (Chiswick, 1989; Chiswick et al., 1992). If immigration causes increased wage inequality, younger natives may increase their education in response, mitigating negative wage impacts on the unskilled in the long run. Evidence of these effects is examined in the next chapter.

#### 4.7 THE LINK BETWEEN IMMIGRATION AND FRICTIONAL UNEMPLOYMENT

How does immigration affect the rates of employment or unemployment of native workers? For the case of an elastic labor supply, the influx of immigrant workers in Figure 4-3 initially lowers the wage from  $w_1$  to  $w_2$ , and the amount of work supplied by an average native declines from  $l_1$  to  $l_2$ . Yet this decline in the amount of work performed by natives does not correspond to an increase in the rate of unemployment as economists usually define this term. By the conventional definition, people are considered unemployed if they are willing to work at the prevailing wage but cannot find a firm willing to hire them.

In modern economies there are nearly always some people who are unemployed and, at the same time, some number of firms with vacancies they wish to fill. Over time, as the unemployed fill existing vacancies, others lose or quit their jobs and new people enter the labor market. Similarly, even as some firms die or shrink in size, causing workers to become unemployed, other firms expand or are established, creating new vacancies. Diamond (1982) and Mortensen and Pissarides (1994) constructed models in which this type of frictional unemployment emerges from the behavior of the unemployed searching for new jobs and firms searching for new employees. In these models, an unemployed individual must decide in each period whether to accept a job offer rather than remaining unemployed for

another period, in which case he or she remains available to accept some better job that might be offered in the future.

To date, there are only a few published papers that simulate and analyze the impact of immigration within this search and matching framework. Ortega (2000) analyzed immigration between two countries in a stylized model with only one type of labor. Liu (2010) analyzed the impact of unauthorized low-skilled immigration between 1970 and 2005 on unemployment in the United States. Chassamboulli and Palivos (2014) generalized these two papers and analyzed the impact of immigration between 2000 and 2009 on the U.S. labor market. Finally, Chassamboulli and Peri (2015) analyzed the impact of curtailing illegal immigration from Mexico. What these studies share is the seemingly paradoxical result that although larger immigration flows may generate higher rates of unemployment in some sectors, overall, the rate of unemployment for native workers declines.

In the baseline version of the Chassamboulli and Palivos (2014) model, immigration increased the size of the overall labor force by 6.1 percent over the course of a decade. A slightly larger share of the immigrants had college degrees compared to natives, 28.8 percent versus 27.4 percent. The influx caused a decline of 0.31 percent in the wages of high-skilled native workers and a rise of 0.24 percent in the wages of low-skilled native workers. These results mimic the patterns of change in wages implied by the analysis in Figures 4-8 and 4-9. At the same time, the long-run rate of unemployment simulated by the model dropped as a result of immigration from 6.10 percent to 5.46 percent for low-skilled natives and from 2.40 percent to 2.02 percent for high-skilled natives. Why do both unemployment rates decline?

The explanation is that in all of these search and matching models, searching for new workers is costly for firms. The entry of new workers through migration increases the likelihood of filling a vacant position quickly and thus reduces the net cost of posting new offers. The fact that immigrants in each skill category earn less than natives reinforces this effect. Though immigrants compete with natives for these additional jobs, the overall number of new positions employers choose to create is larger than the number of additional entrants to the labor market. The effect is to lower the unemployment rate and to strengthen the bargaining position of workers. Hence, aggregating across the two skill types, wages for all natives increase by 0.07 percent.

According to the simulations performed by Chassamboulli and Palivos (2014), the new immigrants who arrived between 2000 and 2009 had a particularly large and positive impact on the wages paid to the pre-existing stock of immigrants, whether high or low skilled. This result contradicts much of the empirical literature on wage effects, which generally finds that new immigrants are close substitutes for previous waves of immigrants.

In the simulations performed by Chassamboulli and Peri (2015), a drop of 50 percent in the stock of unauthorized immigrants from Mexico, accomplished by either stricter border enforcement or more deportations, will raise the wages of low-skilled workers by 0.56 percent and lower wages for high-skilled workers by 0.35 percent. At the same time, the removal of these unauthorized immigrants lowers the rate of employment for high-skilled workers from a baseline rate of 87.00 percent to 86.94 percent. The now smaller number of unauthorized immigrants, all assumed to be low skilled, impedes firms' overall incentive to search for these types of workers, causing the employment rate for low-skilled workers to drop from 73.0 percent to 72.4 percent.

What one learns from the papers investigating the effect of immigration on unemployment using search and matching models is that whatever the short-term impact of immigration on unemployment found in empirical studies, it would be wrong to automatically assume that an increase in the flow of new immigrants must necessarily push up the rate of unemployment in the long run. **In short, immigration can lower native unemployment by reducing search costs for employers.**

#### 4.8 CONCLUSIONS

The theoretical models point to many ways in which economic responses by individuals and firms are expected to mitigate the initial impact of immigration on the labor markets of receiving countries. Once immigration changes the relative prices of labor and capital, factor inputs are reallocated across sectors and firms may adjust their technology and output mix to make more intensive use of workers. The existing labor force may also respond by investing in certain skills and upgrading their human capital (as discussed further in Chapter 6). However, theoretical models are at best partial representations of the real-world objects they seek to analyze. For models to be tractable, assumptions are made to ignore certain phenomena or to fix the values of some key economic variables. For example, aggregating across different types of workers and across different types of immigrants and natives necessarily means a loss of detail. Still, a few important insights into the impact of immigration on the receiving economy emerge.

First, the arrival of an unanticipated inflow of immigrants initially affects the economy by changing the wage structure—reducing the wages of those natives most similar to immigrants but possibly raising the wages of other natives—and by increasing the return to capital. Second, the responses of capital and technology mean many, though not all, of these initial changes may be transitory in nature. In the long run, changes in the economy's output mix and the adoption of technology that favors

immigrant labor provide potentially important adjustment mechanisms to mitigate adverse wage effects of immigration. Decisions of natives to move into occupations where they have a comparative advantage or to invest in their human capital may also reduce adverse wage effects.

Third, the arrival of immigrants raises the overall income of the native population that absorbs them: the immigration surplus. This surplus is directly related to the degree to which immigration changes wages and returns to capital. In the simplest models, the more wages decline, the larger the surplus. Moreover, the size of the surplus is likely to be small—far smaller than the effect immigration has on the distribution of income. Immigration enlarges the economy while leaving the native population slightly better off on average, but the greatest beneficiaries of immigration are the immigrants themselves as they avail themselves of opportunities not available to them in their home countries.

## 5

## Employment and Wage Impacts of Immigration: Empirical Evidence

### 5.1 INTRODUCTION

The primary impact of immigrant inflows to a country is an expansion in the size of its economy, including the labor force. Per capita effects are less predictable: An injection of additional workers into the labor market could negatively impact some people in the pre-existing workforce, native- and foreign-born, while positively impacting others. The wages and employment prospects of many will be unaffected. The direction, magnitude, and distribution of wage and employment effects are determined by the size and speed of the inflow, the comparative skills of foreign-born versus native-born workers and of new arrivals versus earlier immigrant cohorts, and the way other factors of production such as capital adjust to changes in labor supply. Growth in consumer demand (immigrants also buy goods and services), the industry mix and health of the economy, and the nation's labor laws and enforcement policies also come into play.

The primary determinant of how immigration affects wages and employment is the extent to which newly arriving workers substitute for or complement existing workers. As laid out theoretically in Chapter 4, wages may fall in the short run for workers viewed by employers as easily substitutable by immigrants, while wages may rise for individuals whose skills are complemented by new workers. For example, suppose foreign-born construction workers enter the labor market, causing a decrease in construction workers' wages. Firms will respond by hiring more construction workers. Since additional first-line supervisors may be needed to oversee and coordinate the activities of the expanded workforce, the demand

and hence the wages of these complementary workers could receive a boost. On the other hand, where immigrants compete for the same jobs, whether as construction workers or academic mathematicians (Borjas and Doran, 2012), employment opportunities or wages of natives are likely to suffer.<sup>1</sup> Further, where the availability of low-skilled immigrants at lower wages allows businesses to expand, total employment will rise. Wage and employment effects are predicted to be most pronounced in skill groups and sectors where new immigrants are most concentrated.

Given the potential for multiple, differentiated, and sometimes simultaneous effects, economic theory alone is not capable of producing decisive answers about the net impacts of immigration on labor markets over specific periods or episodes. The role and limitations of theory were assessed by Dustmann et al. (2005, p. F324):

Economic theory is well suited to help understand the possible consequences of immigration for receiving economies, and the theoretical aspects of the possible effects of immigration for the receiving economies' labour markets are well understood. That is not to say that predictions of theory are clear-cut, however. It is compatible with economic models that changes in the size or composition of the labour force resulting from immigration could harm the labour market prospects of some native workers; however, it is likewise compatible with theory that immigration even when changing the skill composition of the workforce has no effects on wages and employment of native workers, at least in the long run. Economic models predict that labour market effects of immigration depend most importantly on the structure of the receiving economy, as well as the skill mix of the immigrants, relative to the resident population.

Empirical investigation is therefore needed to estimate the magnitude of responses to immigration by employers, by native-born and earlier-immigrant workers and households, by investors, by the public sector, and in housing and consumer-goods markets (Longhi et al., 2008, p. 1). Dynamic conceptual approaches are needed to assess some of the impacts of immigration, particularly those that require long periods of time to unfold.

In the context of the U.S. experience, immigrants have historically been most heavily represented in low-skilled occupations. This has prompted an extensive body of empirical work investigating whether immigration has had a negative effect on the wages and employment of low-skilled

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<sup>1</sup>Detailed discussion of when immigrant labor complements and when it substitutes for native employment can be found in Fogel and Peri (2014) who analyzed relative employment effects using longitudinal employer-employee data for Denmark covering the period 1991-2008. Mouw et al. (2012) and Rho (2014) also examined this question using evidence from the Census Bureau's Longitudinal Employer Household Data on worker displacement in high-immigration industries.

natives and earlier immigrants. However, a substantial and growing share of immigrants is highly skilled. In part because of this change—and also because of the possibility of positive spillovers from the highly skilled to other workers and to the economy more generally—this group is receiving increased attention. The panel’s summary of the literature in this chapter reviews both these strands of research: After reviewing the pivotal influence of substitutability among different labor inputs in Section 5.2, the focus of Sections 5.3 and 5.4 is predominantly on empirical analyses of low-skilled markets. Section 5.5 reports on a cross-study comparison of the magnitude of immigrants’ impacts on wages. Section 5.6 examines some of the research findings about the highly skilled, including the impact of immigration on innovation.

Given the complexity of mechanisms through which immigration shapes the economy, it is not surprising that the empirical literature has produced a range of wage and employment impact estimates. The basic challenge to overcome in empirical work is that, while wages before and after immigration can be observed, the counterfactual—*what the wage change would have been if immigration had not occurred*—cannot. A range of techniques has been used in the construction of this counterfactual, and all require assumptions to facilitate causal inference (i.e., identifying assumptions). The different approaches can be judged in part by the plausibility of these assumptions.

The panel has organized this review of empirical studies primarily in terms of methodological approach, using three labels common in this literature. We first describe and present results from *spatial* studies, which compare worker outcomes across geographic areas. Next, we review results from analyses that use aggregate (nationwide) data, including *skill cell* studies, which compare worker outcomes across groups defined to have similar education and experience, and *structural* studies, which implement the skill cell approach with a closer connection between theory and empirical estimation. Much of the discussion in these sections is concentrated on studies of the overall labor market and the low-skilled labor market. Later in the chapter, we turn our attention to evidence about high-skilled labor markets, including the effect of skilled immigration on innovation and entrepreneurship.

Spatial studies define subnational labor markets—frequently, these are metropolitan areas—and then compare changes in wage or employment levels for those with high and those with low levels of immigrant penetration, controlling for a range of additional factors that make some destination locations more attractive than others. As immigrants are likely to settle in those metropolitan areas that have experienced positive economic shocks, econometric methods are used to identify spatial variation in immigrant penetration that can be considered “exogenous”—that is, not determined



within the system being studied—with respect to the outcome that is modeled, which is typically the wages or employment of native-born workers. To illustrate, suppose an analyst is interested in identifying the impact of immigration on wages of the native-born in local labor markets. If immigrants settle predominantly in areas that experience the highest wage growth, then this will induce spurious correlation contaminating estimates of the causal effect of immigration; wage growth (or dampened wage decline) will be erroneously attributed to the increase in labor supply. An econometric solution to this problem presents itself if immigrants choose areas not just on the basis of economic conditions but also on the basis of non-economic factors, such as proximity to others with similar backgrounds. These non-economic factors can help the analyst create variation in immigrant penetration that is independent of wage growth and that is not correlated with unobserved factors that determine wage growth. A subset of these studies has obtained identification by taking advantage of “natural experiments” created by unusual immigration events, such as the Mariel boatlift injection of more than 100,000 Cuban workers into the Miami labor market in 1980 (Borjas, 2016b; Card, 1990; Peri and Yasenov, 2015).

Another potential problem with the spatial approach, noted by Borjas (2014a), is that natives may react to an influx of immigrants by leaving affected areas, thus dissipating the labor market impacts of migration across the national economy. However, whether such responses by natives are indeed an empirical problem is controversial in the literature on immigrant inflows and native outflows (the panel considers this issue below in the review of research, e.g., Borjas, 2006; Card, 2001; Card and DiNardo, 2000; Kritz and Gurak, 2001). A more intractable problem with the spatial approach, also noted by Borjas (2014a), is that trade in goods between locales or movement of capital can also work to disperse the impacts of immigration nationally. In fact, an important insight of economic theory is that **flows across localities, whether in labor, capital, or goods, will tend to diffuse the impact of immigration across the national economy**, potentially making spatial comparisons less informative. To the extent that existing spatial studies have not been able to address all possible mechanisms through which local labor markets adjust, it is possible that they underestimate any impact of immigration on labor market outcomes at the national level. At the same time, economic theory also implies that domestic impacts of immigrant inflows are reduced to the extent that the United States trades with the rest of the world and that capital flows into and out of the United States (see Chapter 4).<sup>2</sup>

<sup>2</sup>The extent to which trade serves to reduce the effect of immigration on an individual *country* has received attention theoretically, and these insights may apply to cross-city analyses. The classic factor price equalization model (Samuelson, 1948) holds that, if a country produces

As noted previously, the second broad category of research reviewed in this chapter focuses on aggregate (national level) data and entails dividing labor markets by skill, typically defined by years of education and experience. Borjas (2003) pioneered both the skill cell and structural approaches that comprise this line of work. In the skill cell approach, estimation relies on variation, not between geographical areas as is done in spatial analyses but between skill groups. The idea is to relate differences in immigrant inflows across the range of skill cells to differences in wage outcomes of native-born workers—just as the spatial approach relates differences in immigrant inflows across places to differences in wage growth. The drawback of this approach is that it does not estimate the entire impact of immigration. While it captures the effect on native-born workers of immigrants who have similar skills, it does not capture the effect on the native-born of immigrants who have dissimilar skills. It is unknown whether omission of these cross-group effects leads to an overestimation or underestimation of the wage impact of immigrants.

The structural approach involves assuming a particular production function describing the relationship between output and inputs (the factors of production), estimating the parameters that characterize the production technology (most notably the elasticities of substitution between factors of production), and then simulating the impact of changes in labor supply on relative wages of, say, native-born workers based on the estimated parameters and the assumed functional form of the production function.<sup>3</sup> While, as noted earlier, all empirical approaches require identifying assumptions, structural models require particularly strong assumptions, and some of those assumptions build in specific numerical answers for the wage impact. Apart from the functional form assumptions for the production technology, as detailed in Section 5.3, results may be sensitive to assumptions about the feasibility and extent to which different inputs, such as more- and less-skilled workers or immigrants and native-born, may be substituted for one another. These assumptions are, however, necessary to reduce the dimensionality of these models in a way that makes them tractable.

Another issue for a structural approach is that predictions based on these models ignore general equilibrium effects, such as how different kinds

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multiple goods that are each traded internationally, changes in relative supplies of labor of varying skills within that country need not have any effect on the relative wages by skill level within that country, provided the country is small relative to the rest of the world. On the other and, shifts in labor supplies by skill, say due to immigration, may affect relative wages if there is a significant nontraded sector or if a country specializes in one traded good (Dustmann et al., 2005; Kuhn and Wooton, 1991; Samuelson, 1948). See Blau and Kahn (2015) and Borjas (2014a) for a more extended discussion.

<sup>3</sup>See Borjas (2014a, p. 106 ff.) for a thorough description of the constant elasticity of substitution (CES) structural modeling framework that is used in this literature.

of workers interact with each other and how investment, consumption, and other responses in the economy play out. Finally, this approach, like the skill cell approach, assumes that the analyst is able to assign immigrants and native-born workers to cells within which their education and potential labor market experience are equivalent (see Dustmann and Preston, 2012).

Not all studies fall neatly into the taxonomy described above. Both spatial analyses and aggregate skill cell and production function studies may divide workers into skill groups, and a spatial study by Peri et al. (2015a) uses city-specific production functions to estimate total factor productivity growth of U.S. cities attributable to the addition of foreign-born science, technology, engineering, and mathematics (STEM) workers. Borjas (2014a, p. 127) prescribes a strategy for future research that would combine the findings from spatial approaches—where average wage effects are estimated directly from the data—with the restrictions implied by factor demand theory to estimate cross-group effects. Though there may be some overlap and gray areas across approaches, the panel follows this categorical organization in the detailed discussion below of empirical results and then considers the lessons derived from the literature in the concluding discussion (Section 5.7).

## 5.2 SOME BASIC CONCEPTUAL AND EMPIRICAL ISSUES

The foregoing discussion of economists' approaches to analyzing the impact of immigration, as well as the Chapter 4 description of relevant theory, highlights the importance of some basic concepts in determining the effect immigrants may have on native-born workers. In particular, it is clear from a theoretical perspective that the expected impact of immigration is larger in the short run than in the long run, at least if the immigration is unanticipated. In addition, whether immigrants are substitutable for natives (and how closely) or complementary with them is important for determining the direction (negative or positive) as well as the magnitude of the immigrant effects. While the theoretical concepts are reasonably clear, empirically testing them is less so. Below, the panel considers some of the empirical issues that have arisen.

### The Short Run Versus the Long Run

The standard distinction between the short run and the long run in microeconomic theory is that in the short run the capital stock is fixed and cannot adjust to changes in the demand for capital. Meanwhile, in the long run, capital is completely variable and adjusts fully to changes in demand for it. With immigration, the return to capital initially rises then falls over the adjustment period, eventually returning to its original level.

Macroeconomic theory further distinguishes between a short run in which technology and education (human capital) of workers are fixed and a long run in which they adapt to changing economic circumstances. This latter conception of the long run is the focus of the panel's discussion of immigration in an endogenous growth context in Chapter 6.

These distinctions are murkier in the real world, since these concepts do not map one-to-one with time periods of specific, consistent length. One guide to the speed at which capital adjusts is a study by Gilchrist and Williams (2004) showing that in (West) Germany and Japan, both of which suffered a large loss of capital during World War II and large population inflows immediately afterwards, the return to capital fell to world levels by the 1960s. This suggests that, for U.S. immigration purposes, capital is likely to adjust fully in considerably less than 20 years and in some cases may even be built up in anticipation of immigration. In studies of the United States, Lewis (2011a) found immigration-induced changes in the adoption of manufacturing automation equipment in a 5-year span from 1988 to 1993, while Beaudry et al. (2010) found immigration-induced changes in the adoption of computers between 1990 and 2000. These studies show that there is at least some adjustment of U.S. capital and possibly technology over 5-10 years, though it is unknown whether the adjustment observed was complete. Moreover, it might be argued that the notion of complete adjustment in the face of ongoing immigration is not clearly defined, in that there is no theory and little empirical evidence on the effect of anticipated immigration on firm behavior.

Among the various approaches reviewed in this chapter, the structural approach deals most explicitly with the distinction between the short and long run. Though the structural models are static and do not model changes over time, they yield separate short- and long-run estimates of the impact of immigration based on explicit assumptions regarding the elasticity of the supply of capital. However, technology is held fixed, and the response of worker human capital is not dealt with explicitly. Results from the spatial approach and the simple skill cell approach are more difficult to characterize along a time dimension. Presumably, estimating the effects of a large, sudden, unanticipated increase in immigration—as occurred with the Mariel boatlift—in the year or two following the inflows captures the short-run effect of immigration. More generally, the estimated effect depends on the spacing of data (e.g., decennial or yearly), the exact specification of the regressions, and the timing of immigrant inflows between the observation points; certain specifications could reflect a mixture of short- and long-run effects (Baker et al., 1999). While the panel acknowledges these ambiguities, we follow an extensive literature in continuing to use the terms “short run” and “long run,” and we grapple with the distinction as it arises in our discussion of differences in magnitudes across studies in Section 5.5.

### Substitution Between Inputs and Issues in Defining Skill Groups

Economic theory points to the importance of substitutability and, conversely, complementarity between different kinds of workers in determining the impact of immigration on the wages and employment of natives.<sup>4</sup> Where immigrants and natives are substitutes, adverse wage and employment effects may result; the more closely immigrants' skills and abilities match those of natives, the more adverse these effects are expected to be. This raises the issue of how empirical researchers measure skill and identify groups that are potentially in competition, as well as how they model the extent of substitutability between them. Thus, we consider these issues before delving into the empirical findings on the impact of immigrant inflows on natives and prior immigrants.

Substitutability between two groups—say native workers (N) and immigrant workers (I)—is measured by the *elasticity of substitution*. The elasticity of substitution between natives and immigrants gives the percentage change in the ratio of immigrant workers to native workers ( $I/N$ ) employed in response to a given percentage change in the wages of natives relative to immigrants ( $w_N/w_I$ ). So, for example, an elasticity of 2 would indicate that an increase of 1 percent in the wage of natives relative to immigrants would result in an increase of 2 percent in the ratio of immigrants to native workers employed. A very high value of this elasticity implies that as the relative wage of natives rises (so natives become more expensive compared to immigrants), employers would make a more sizable switch to hiring immigrant workers—suggesting that it would be easier to make the switch. A low value of the elasticity would suggest that a similar rise in the relative wage of natives would not lead to a very large increase in the relative number of immigrants employed, suggesting that employers find it difficult to replace natives with the immigrants. If the elasticity were equal to zero, a rise in the relative wage of natives would not change the number of immigrants employed at all, suggesting that employers find it impossible to replace natives with immigrants because the two groups are not substitutable.

Substitutes may be divided into *perfect substitutes* and *imperfect substitutes*. Two groups of workers that are perfect substitutes are so nearly identical for purposes of production that an employer will be indifferent between hiring a worker from one group or the productivity equivalent number of workers from the other. One somewhat confusing aspect of this terminology is that one might be tempted to assume that perfect substitutes

<sup>4</sup>For simplicity and also due to policy concerns, the panel frequently refers to immigrant versus native-born workers. In reality, immigrant inflows may affect the wages not only of natives but of earlier immigrants as well. Some studies have looked explicitly at the impacts of new flows of immigrants on earlier immigrants, as well as on the native-born.

are equally productive—but that need not be the case. As long as the two groups' relative wages reflect any productivity difference between them, employers will be indifferent between hiring one or the other. The elasticity of substitution between perfect substitutes is infinite. In such a case, if the relative wage of one group were to rise, the employer would shift entirely to the other group. Imperfect substitutes are, as the name implies, substitutable in the eyes of employers but not perfectly so. The magnitude of the elasticity indicates how closely substitutable the two groups are.

In implementing this concept of substitutability, an issue that arises is how to define skill groups. As we have noted, the large representation of less-educated individuals among immigrant inflows into the United States has focused attention of researchers on the wage and employment consequences of this inflow for less-skilled natives. But how is skill to be measured? This question arises across all the approaches this report surveys and has been answered in various ways. No approach is free from some level of disagreement about this issue. In general, studies employing the spatial methodology have used education level as the metric of skill (e.g., Card, 2005), although in a few cases occupations have been used to distinguish skill groups (Card, 2001; Orrenius and Zavodny, 2007). Aggregate skill cell and production function studies generally define skill by taking into account both experience (using age as a proxy) and education to form experience-education cells (e.g., Borjas, 2003). Finally, a recent alternative for defining skill in a way that groups immigrants and natives who are competing in the labor market assumes that two individuals with the same percentile ranking in the wage distribution are viewed as close substitutes in the eyes of employers; Dustmann et al. (2013) applied this approach for the United Kingdom.

One issue that has arisen in spatial studies, as well as in aggregate production function analyses, is how to delineate educational categories. Often, four educational categories are created: (1) did not complete high school, (2) completed high school only, (3) some college, and (4) completed college. Sometimes (e.g., Borjas, 2003, 2014a) the “completed college” group is further divided into college graduates and postgraduates, yielding five categories. Some research has focused on a subset of categories—for example, examining how the inflow of low-skilled immigrants affects the wages of low-skilled natives. Recently, however, questions have been raised as to whether each educational category should be viewed as a separate factor (that is, as imperfect substitutes). Based both on his review of recent aggregate time series studies and his own analysis of spatial data, Card (2009) argued that evidence supports the conclusion that high school dropouts are essentially perfect substitutes for high school graduates. In a production function context, Ottaviano and Peri (2012) also combined the two groups, providing evidence from their data that the elasticity of

substitution is quite high, even infinite in some estimates. The treatment of these two educational categories can have significant implications. As Card (2009) pointed out, immigrants have a much higher share of high school dropouts than natives, but a fairly similar share of “high school equivalent” workers (dropouts and graduates combined, accounting for differences in productivity). Thus, the change in the skill distribution caused by an inflow of immigrants, and the resulting impact of immigration on relative wages, is smaller if the high school dropout and high school graduate categories are aggregated.<sup>5</sup> However, aggregating the two groups is not without controversy. Borjas et al. (2012), in particular, take issue with the justification for doing so, namely the evidence on the elasticity of substitution.

The second issue of importance is whether immigrants and natives *within* skill groups are perfect substitutes. This issue is potentially quite important in that, for cases in which natives and immigrants are imperfect substitutes, any negative wage effects resulting from immigrant inflows will be more concentrated on previous immigrants, who are usually the closest substitutes for new immigrants, lessening the adverse impact on natives.<sup>6</sup>

Various research findings lend support to the notion that immigrants are imperfect substitutes for natives with similar *measured* characteristics.<sup>7</sup> Chiswick (1978) found a lower return to experience and education among new immigrants than among natives—with this experience and education presumably primarily acquired abroad. In line with Chiswick’s findings, Blau and Kahn (2015) found, for a sample of newly legalized immigrants, that education acquired abroad had a lower return than education acquired in the United States, while Akee and Yuksel (2008) found that the gap between the return to foreign versus U.S. experience is larger than that for foreign versus U.S. education. “Downgrading”<sup>8</sup> of immigrant skills is also suggested by Akresh’s (2006) finding that, in comparing the jobs immigrants held prior to and after migrating, they typically experienced downward occupational mobility. Also relevant is Kossoudji and Cobb-Clark’s (2000) evidence of occupational upgrading of immigrants upon legalization, which suggests downgrading of unauthorized immigrants skills relative to native-born workers. Blau and Kahn (2007a) reported higher unemployment rates of Mexican immigrants (the largest single group of immigrants) relative to native-born workers with similar age and education—again suggest-

<sup>5</sup>Card (2009) advocated the formation of just two skill groups: high school equivalent and college equivalent labor. This two-group structure has frequently been used in recent aggregate time series studies.

<sup>6</sup>See Card (2009) for a discussion; he pointed out that the difference between a large but finite elasticity of substitution and perfect substitution can be quantitatively quite important.

<sup>7</sup>Most of this paragraph is drawn from Blau and Kahn (2015).

<sup>8</sup>This is the term used by Dustmann et al. (2013).



ing imperfect substitution between the two groups. Finally, evidence from Smith (2012) that an inflow of immigrants with a high school degree or less reduced the employment (measured in hours worked) of native teens suggests that newly arrived adult immigrants may be closer substitutes to native teens than to their adult counterparts.<sup>9</sup>

Other work highlights the role of English-language fluency, a factor largely unaccounted for in aggregate analyses, in producing imperfect substitutability between immigrants and native-born with similar observed characteristics. Using census data on immigrant-native wage gaps for immigrants who were fluent compared with immigrants with no English, Lewis (2011b) analyzed how native-immigrant differences in language skills contribute to occupational specialization. He found that native-born workers are more represented in occupations where communication is important, which suggests that within education level, immigrants and natives may be imperfect substitutes. As the length of time spent by immigrants in the United States increases, their English improves and immigrants and native-born with comparable education become closer substitutes. In a similar vein, Somerville and Sumption (2009) found that immigrant concentration in particular industries induces natives to shift into higher paying industries where language and other native skills come into play. Likewise, Peri and Sparber (2011) investigated the role of communication skills in producing immigrant/native-born differences in occupations requiring graduate degrees. They found that the foreign-born specialize in fields demanding quantitative and analytical skills and the native-born specialize in fields where interactive and communication skills are highly valued.

Additional evidence suggesting imperfect substitution between immigrants and the native-born was provided by Ottaviano and Peri (2012). Using a structural production function approach, they estimated substitution elasticities, whose values indicate that immigrants and natives were imperfect substitutes within the typical categories used, especially among the less skilled. The production function approach they employed enabled them to take this imperfect substitutability into account in estimating wage effects. Borjas et al. (2012) challenged these findings and presented evidence that the results are sensitive to assumptions made in the estimation process.<sup>10</sup> Moreover, while Dustmann and Preston (2012) agreed that the usual approach groups together dissimilar immigrants and natives, they

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<sup>9</sup>Orrenius and Zavodny (2008) found a similar result: Minimum wage increases resulted in higher employment rates among adult immigrants while rates fell for native-born teens. The evidence therefore suggests employers switched to older foreign-born workers in lieu of native-born teens once labor costs rose.

<sup>10</sup>Borjas et al. (2012) found, for example, that the inclusion of fixed effects eliminates the finding that comparably skilled immigrants and natives are imperfect substitutes.



also took issue with Ottaviano and Peri's (2012) method of addressing the problem.<sup>11</sup>

Spatial studies potentially have methods for handling imperfect substitutability between immigrants and natives as well. As an example, Altonji and Card (1991) estimated the link between the fraction of immigrants in the population and the wages and employment of less-skilled natives. Their specification allows any impact that immigrants with higher observable skills may have on the low-skilled native group (due to the immigrants' imperfect substitution with higher-skilled natives) to be captured as well. It is also possible to build in adjustments to realign the way new arrivals are sorted into skill cells in these models. Orrenius and Zavodny (2007) examined the impact of immigrant penetration separately by occupational category, to allow immigrant substitutability to differ by skill. They argued that substitutability of immigrants for natives should be greater for less-skilled occupations and found results consistent with this hypothesis. In contrast, in their production function study referenced above, Ottaviano and Peri (2012) hypothesized, and found evidence, that among the highly educated, foreign-born workers are more highly substitutable for native-born workers. While these results differ, both studies found evidence of imperfect substitutability between immigrants and natives that appears to differ by skill level.

Other evidence supportive of imperfect substitutability between immigrants and natives comes from studies examining the impact of immigrant inflows on natives and prior immigrants separately. The idea here is that, if immigrants and natives are imperfect substitutes, the impact of immigrant inflows on prior immigrants should be larger than on the native-born, since immigrants are likely to be closer substitutes for each other than for natives. Many studies focus only on the native-born component of the pre-existing workforce, but when both groups are examined, larger negative wage and employment effects for previous immigrants than for the native-born are generally found (e.g., Card, 2001; Ottaviano and Peri, 2012).

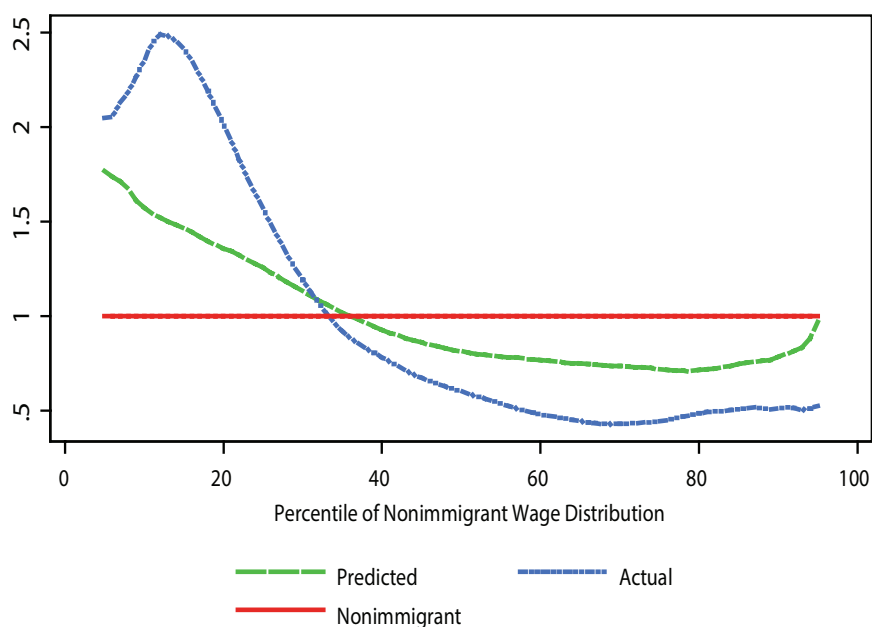
Support for the view that immigrants downgrade upon arrival comes from the study noted above by Dustmann et al. (2013) for the United Kingdom. Although immigrants to the United Kingdom have typically had

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<sup>11</sup>Specifically, Dustmann and Preston (2012) argued that a key assumption in the Ottaviano and Peri (2012) approach is that immigrants and natives can be allocated to age-education cells within which their potential experience and education are comparable. This may, however, not be the case, as immigrants may—at least initially—downgrade, which means they compete with natives in segments of the labor market other than where one would expect them based on their observed education and potential experience. This will cause a bias in the estimates of the elasticity of substitution between immigrants and natives. Due to downgrading, immigrants and natives may appear to be imperfect substitutes even though, if correctly classified, they are not.

more education on average than native-born workers, they have fallen disproportionately at the lower end of the wage distribution. This finding, the authors claimed, has serious consequences for approaches that rely on pre-assigning immigrants to skill cells based on their observed age and education, within which they are assumed to be equivalent in production to natives.

Data from the Current Population Survey (CPS) indicate that downgrading is also an issue in the United States, although to a lesser extent. Figure 5-1 (from Dustmann and Preston, 2012) shows the predicted position, based on age and years of schooling, and the actual position of recent immigrants relative to the native-born wage distribution. The short-dashed line in the graph (labeled “actual”) indicates that recent immigrant workers are more concentrated in the lower quintiles and less concentrated in the



**FIGURE 5-1** Predicted and actual position of recent immigrants (less than 2 years in the United States) in the wage distribution.

**NOTE:** The vertical axis represents densities—the continuous equivalent of probabilities. One can interpret the vertical axis as giving the probability of immigrant workers being in one specific percentile of the native wage distribution. The curve labeled “actual,” then, is not the probability of being in a given wage percentile relative to natives but rather the probability of being in a given percentile of the native wage distribution.

**SOURCES:** Dustmann and Preston (2012, Fig. 1b, p. 222). Original graphic based on Current Population Survey data, 1997 to 2007.

higher quintiles of the native wage distribution than would be predicted by their age and education profiles (the horizontal line is the reference indicating the nonimmigrant wage distribution; the long-dashed line is where one would predict immigrants to be located along the distribution of native wages if they received the same return on labor for their observed education and experience as natives did). Elsewhere in their paper, Dustmann and Preston (2012) showed that downgrading is strongest just after arrival (the period reflected in the graph); they found that over time, immigrants to the United Kingdom catch up to the occupations and wage levels predicted by their education.

Based on observations like these, Dustmann et al. (2013) argued against estimators that require the preallocation of immigrants to skill groups, arguing that this may not lead to meaningful estimates because immigrants may compete with native-born workers at other parts of the skill distribution than those to which one would assign them based on observed characteristics. Using a spatial approach, they proposed an estimator that does not rely on preallocation of immigrants to skill groups but instead regresses skill-group-specific native wages (in their approach, defined as percentiles of the wage distribution) on the overall inflow of immigrants. The resulting estimates have a straightforward interpretation and are not affected by downgrading.

While there is indeed suggestive evidence that immigrants and natives may be imperfect substitutes within skill groups defined by measured characteristics, there remains controversy regarding whether this is an important issue for empirical analyses and how it should be dealt with. The panel considers this issue further, along with the appropriateness of aggregating high school dropouts and high school graduates, in the context of the studies reviewed below.

### 5.3 SPATIAL (CROSS-AREA) STUDIES

In the pioneering work by Grossman (1982) on the “substitutability of immigrants and natives in production”—a paper that influenced much of the subsequent research—labor market boundaries were defined as metropolitan areas. Intuitively, since immigrants choose some destinations with greater frequency than others, comparing wage and employment trends across metropolitan areas should yield evidence about the impact of their arrival. As described above, the methodology involves testing whether native wage growth and employment rates in the high-immigration areas are lower than those in the low-immigration areas.<sup>12</sup> The earliest studies relied solely on cross-sectional variation, while later work, beginning notably with Altonji

<sup>12</sup>Card (2005) describes the spatial approach in detail.

and Card (1991) and including most of the studies summarized here, recognized and attempted to deal directly with the endogeneity problem inherent in this approach: The magnitude of immigrant flows into an area is likely to be correlated with its economic vitality and wage growth.

Studies relying on geographic labor market variation are listed and compared in Section 5.8, Table 5-3. In considering the results of these studies, a useful starting point is the assessment of evidence presented 20 years ago in *The New Americans* (National Research Council, 1997). For the literature surveyed in that report, with the exception of Altonji and Card (1991), the estimated coefficient indicating the sensitivity of native-born wages to an increase in immigrants in a given local labor market was closely clustered around zero. *The New Americans* reported:

The evidence also indicates that the numerically weak relationship between native wages and immigration is observed across all types of native workers, white and black, skilled and unskilled, male and female. The one group that appears to suffer significant negative effects from new immigrants is earlier waves of immigrants, according to many studies. (National Research Council, 1997, p. 223)

As documented below, however, continued study of this issue over the past two decades has led to greater variation and detail in estimates of the wage impacts of immigration obtained from the local labor market approach.

Comparing the experiences of high-immigration and low-immigration geographic areas has a great deal of intuitive appeal. The concept is easy to understand. Blau and Kahn (2015, p. 813) outlined the advantages of the approach:

... the empirical work directly ties the key explanatory variable, immigration, to the outcomes of interest. No assumptions about how labor and other inputs combine in production processes need be made. In particular, one need not assume or try to estimate the degree to which immigrants and natives of equal observed skills substitute for each other, although such a relationship will influence the parameter estimates. In addition, using the area approach will provide more potential observations than using national aggregates, producing more efficient estimates.

The analytic challenges to spatial studies have to do with the endogenous factor flows and trade flows that potentially bias the estimates of cross-area wage differentials.<sup>13</sup> Borjas (2014a), Blau and Kahn (2015), and

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<sup>13</sup>This is also an issue for aggregate skill cell and production function models, discussed in Section 5.4, albeit possibly a lesser one. As explained by Lull (2015), immigrants to the United States do not display random experience levels (ages) and education.

others, as noted below, identified these challenges: (1) Immigrant flows are not randomly distributed across metropolitan area labor markets. As noted above, new arrivals are likely to select areas at least near those that are thriving economically<sup>14</sup>—that is, those experiencing wage and employment growth (e.g., California or Florida in the mid-to-late 1990s). This area-selection bias creates spurious, positive correlations between immigration to an area and that area's employment conditions and relative wages. (2) Local labor markets are not closed, which means that natives (or earlier immigrants) are free to relocate their labor (and capital), which may at least partially equilibrate prices and quantities across markets defined by geographic areas. As possible evidence of this problem, Borjas et al. (1997) showed that, for the 1980-1990 period, the correlation between inflows of low-skilled immigrants and the wages of low-skilled natives was more negative, the larger the geographical area demarcated (regions versus states or states versus metropolitan areas). Similarly, Borjas (2003) included analyses by geographical areas (i.e., states) that reveal smaller negative effects on a skill group's earnings from an immigrant inflow than did the national level estimates. (3) Trade in goods between areas will tend to equalize factor prices, including wages, across areas, in a process known as factor price equalization. Finally, models for which the key independent variable (immigration) is measured for small geographic areas with small samples are susceptible to measurement errors, greatly attenuating the measured impact of immigration (Aydemir and Borjas, 2007).

### **Endogeneity of Change in Immigrant Share and Labor Market Performance**

The above complications associated with estimating cross-area wage and employment effects make it difficult to establish causal links. Regarding the endogeneity challenge, the question is: To what extent do immigrant inflows affect wages and employment and to what extent do wage and employment conditions influence immigrant inflows? Either could explain an observed correlation, and both probably occur to some degree in any given case. Indeed, Cadena and Kovak (2016) showed that low-skilled immigrants have settled in those cities that offer the highest wages, leading to a positive correlation between wage growth and immigrants' location decisions. If new arrivals migrate to strong economies that are already experiencing high or rising wages, measured negative effects of immigration

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<sup>14</sup>Mainly due to housing, immigrants are often priced out of the most economically thriving neighborhoods within a metropolitan area (Saiz, 2008). For this reason, analyses at, for example, the census tract level may produce quite different results from those at the Metropolitan Statistical Area (MSA) or state level.

will be understated unless this counterbalancing influence is accounted for. Conversely, immigration may decline in response to relatively slow wage growth in areas that are economically depressed. Monras (2015) found that, during the Great Recession, “fewer people migrated into the locations that suffered more from the crisis.” This relative shrinking of the labor supply in the most hard-hit metropolitan areas would have alleviated some of the negative wage effects associated with the crisis by spreading the local recession shocks across regions or nationally.

As noted above, this endogeneity problem may be overcome by isolating the variation in immigrant inflows across areas that is neither determined by outcome variables (such as area wages) nor affected by the same unobserved factors that influence wages. The common approach to doing this is to find a variable (or a set of variables) that (1) is correlated with the inflow of immigrants to an area, but (2) is not correlated with factors that determine the growth of wages, other than through the inflow of immigrants. Such variables are called “instrumental variables” (IVs) or just “instruments.” While (1) is an empirical question, and can be tested, (2) is untestable and has to rely on the plausibility of the assumptions under which it is valid. The quality of the study depends therefore on the degree to which the assumptions underlying (2)—called exclusion restrictions—are plausible.

It can be difficult to find instruments that are highly correlated with the inflow of foreign-born workers into a local labor market yet uncorrelated with the other factors that determine wages or job growth in that area. The most common IV strategy, introduced by Altonji and Card (1991) and further developed by Card (2001), relies on the observation that immigrants tend to locate where there are already settlements of their co-nationals (see Bartel, 1989). Reasons suggested for this tendency include the possibility of drawing on preexisting networks, informational advantages, and access to cultural goods that are difficult to obtain without access to co-nationals. While past concentrations of individuals from one’s own country are likely to be correlated with future inflows to a particular area, they are at the same time unlikely to be correlated with future area-specific shocks that affect wages and employment. Based on this line of reasoning, the approach then allocates the overall inflow of immigrants from a particular country to spatial areas based on historical settlement patterns. For example, suppose the United States consisted of a Southern part and a Northern part only; assume further that, in 1980, 10 percent of all immigrants from Mexico lived in the North, while 90 percent lived in the South. Now suppose that 100,000 Mexicans arrived between 1999 and 2000. Based on the historical settlement pattern in 1980, this approach would assign 10,000 to the North and 90,000 to the South. Doing the same assignment process for all immigrant groups and summing up for each region results in an estimate

of the area-specific inflow of immigrants between 1999 and 2000 that is solely based on historical settlement patterns and is unlikely to be correlated with contemporaneous (i.e., 1999-2000) area-specific shocks to wages and employment.

One possible problem with this approach is that economic characteristics that initially made an area attractive to immigrants may persist over time. For example, if traits of the economy driving both economic growth and migration in gateway locations such as California or New York have systematically differed from other regions over many years, the downward impact of immigration on wages may still be masked. However, as Blau and Kahn (2015) noted, the finding by Blanchard and Katz (1992) that the wage effects of local employment shocks die out within 10 years provides some support for the interval, employed in most of these studies in the construction of the instrument, of 10 or more years between the previous immigrant concentrations used to derive the allocation and the current inflows.<sup>15</sup>

Due to concerns about whether local labor market conditions during the analysis period are, or are not, directly related to conditions for the period from which the instrument is constructed, researchers have begun exploring alternative instruments. For example, an IV constructed to deal with endogeneity of location choices may be based on a characteristic such as the distance between origin and destination countries. In a skill cell study based on cross-national comparisons, Llull (2013, p. 2) used variation in “push factors . . . interacted with distance to the destination country in order to construct an instrument based on variation over time and across destination countries.” So, for example, violence in Guatemala would be expected to increase migration to Mexico or the United States at a greater rate than to Europe. Llull further broke out variation by skill level, based on the assumption that destination choices will be more constrained for low-skilled workers because, compared with high-skilled workers, they have fewer resources to travel long distances.

### Native Response to Immigration, Trade, and Technology Adjustments

Mobility of labor, capital, and goods between areas gives rise to a second analytic challenge for spatial studies. Cities and states are not closed economies, meaning that labor and capital flow from one to another, and these flows have the capacity to equalize prices.<sup>16</sup> If immigrants were to

<sup>15</sup>Borjas et al. (1997) attempted to address this issue by controlling for pre-existing population trends. See also Dustmann et al. (2005) for the United Kingdom.

<sup>16</sup>Price equalization pressure would also happen in the presence of trade even if labor and capital were immobile—see below and the theory discussion in Chapter 4. This is important because sometimes papers find that labor is not that mobile and mistakenly conclude that therefore prices are not equalizing.



arrive in disproportionate numbers in a city (or neighborhood, or whatever spatial unit defines the labor market), it is possible that some workers previously there may respond by moving elsewhere, which would diffuse the downward pressure on wages across cities:

... natives may respond to the wage impact of immigration on a local labor market by moving their labor or capital to other cities. These factor flows would re-equilibrate the market. As a result, a comparison of the economic opportunities facing native workers in different cities would show little or no difference because, in the end, immigration affected *every* city, not just the ones that actually received immigrants. (Borjas, 2003, p. 1338.)

In such a scenario, a comparison of wages across cities would reveal little, if any, wage effect.

While predicted by theory, evidence of the equilibrating hand of factor input mobility—specifically, native migratory response to increased job competition—is mixed. On one side, Card (2001), Card and DiNardo (2000), Kritz and Gurak (2001), and Peri (2007) found, for the U.S. context, either no relationship between the entry of immigrants and the exit (or failure to enter) of the native-born or that both immigrants and the native-born moved to the same cities and probably for the same reason: economic opportunity. Economically healthy cities, for example, likely attract inflows of both international and domestic migrants. These results suggest that outflows of natives may not significantly contaminate estimates of immigrant effects based on regional variation.

The evidence on the other side, for factor input mobility, includes Borjas (2006), who used Decennial Census data for the period 1960–2000 to show that internal migration decisions by natives are sensitive to immigrant-induced increases in labor supply. Specifically, high-immigration areas were associated with lower native in-migration rates and higher native out-migration rates. Native migration responses, in turn, “attenuate the measured impact of immigration on wages in a local labor market by 40 to 60 percent, depending on whether the labor market is defined at the state or metropolitan area level” (Borjas, 2006, p. 221). Some heterogeneity in responses has also been detected. For example, Kritz and Gurak (2001) found minimal overall connection between in-migration of foreign-born and out-migration of native-born, but they also found that the results varied by state and by group. They found a positive relationship between immigration and native out-migration for California and Florida and also found that, in states that have experienced the highest immigration, foreign-born men were more likely to out-migrate than were native-born men. That is, prior immigrants were more mobile than natives. Partridge and Rickman (2008) found out-migration responses to immigration to be more significant



in rural counties. In addition, they found that previous interstate movers (immigrant or native-born) were more likely to move from states with high recent immigration than either immigrants living in their state of first settlement or natives living in their state of birth.

A similar masking of cross-area impacts could occur due to intercity and interstate trade. Card (2005, p. 10) noted that, in the presence of trade across cities, “relative wages may be uncorrelated with relative labor supplies, even though at the national level relative wages are negatively related to relative supplies.” If low-skilled international immigrants move to Los Angeles, for example, the production of goods intensive in low-skilled labor will increase there. However, the prices of these goods in Los Angeles may not change compared to other cities because free trade within the United States ensures prices are equalized across cities and regions, and so are wages (which is the factor price equalization theorem). This means that so long as technology does not change, relative wages of low-skilled workers in Los Angeles compared to other cities will not change either. This logic holds as long as the inflow of immigrants is not so large that Los Angeles ceases to produce goods intensive in higher-skilled labor and comes to specialize in low-skilled intensive goods;<sup>17</sup> in this case, relative wages of low-skilled workers in Los Angeles could indeed fall compared to other cities. These results are also contingent on there not being a significant nontraded sector and on Los Angeles producing just a small share of low-skilled intensive goods produced nationally.

In sum, any type of labor market response to immigration—whether along the margin of labor flows, capital flows, or flows of goods—can serve to diffuse the impact of immigration from the localities directly affected to the national economy. This kind of diffusion implies that even though one may not observe adjustments along a particular margin, there may be other unexamined and unexplored margins along which such adjustments can take place. Any such adjustments imply that spatial correlations between wages and immigration may underestimate the national wage impact of immigration.

The adjustments described thus far in this section explain why spatial studies may underestimate any national wage impact of immigration. However, the same reasoning implies that there are other adjustments—international trade in goods and services and capital flows across countries—mitigating the wage effect of immigration at the national level. Imports and exports of goods and services together represented 30.0 percent of U.S. gross domestic product (GDP) in 2014, indicating that the United States is well integrated in world trade. Along with large capital flows between

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<sup>17</sup>See Section 4.5 for discussion illustrating these relations in a simple model with two types of labor and two types of production technologies.

the United States and foreign countries, this trade may prevent or limit any wage response to immigration, though this is difficult to study empirically.

The ability of firms to change their technology is another factor possibly dampening negative wage impacts of immigration. The basic idea is that firms adjust technology to absorb workers who become more abundant through immigration (see Section 4.5). Similar to the situation with trade, this adjustment can lead to a situation where an immigration-induced labor supply shock is absorbed without changes in wages.<sup>18</sup> Hanson and Slaughter (2002) were among the first to compare the trade- and technology-induced adjustments to labor supply shocks on the industry level, while Dustmann and Glitz (2015) extended this literature by investigating adjustments at the firm level and considering the role of firm births and deaths in the adjustment process. Both papers found that technology-induced changes in factor intensity are more important for the absorption of immigration than trade-induced changes in the mix of outputs (see also Lewis, 2013). Lewis (2011a) focused on the technology explanation and examined how investment in automation machinery by U.S. manufacturing plants over recent decades has substituted for different kinds of labor. He concluded that “these investments substituted for the least-skilled workers and complemented middle-skilled workers at equipment and fabricated metal plants.” He found that metropolitan areas that experienced faster growth in the relative supply of less-skilled labor as a result of immigration “adopted significantly less machinery per unit output, despite having similar adoption plans initially [implying that] fixed rental rates for automation machinery reduce the effect that immigration has on less-skilled relative wages” (Lewis, 2011a, p. 1029).

### Illustrative Results from Spatial Studies

Table 5-3 in Section 5.8 summarizes the results from spatial studies of the labor market effects of immigration, most of which employed IV methods to address the endogeneity of immigrants’ locational choices. While these studies are not uniform—they use different data, look at different time periods, and examine varying magnitudes of immigrant inflows—their results suggest that the impact of immigration on the group most likely to be affected, low-skilled workers, ranges from negligible to at least modestly negative. A more precise comparative assessment of the literature is provided in Section 5.5 below. As noted above, some groups such as prior

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<sup>18</sup>In terms of a standard model of production, this interpretation refers to a change in relative inputs due to a technology-induced rotation of the isoquant around a fixed isocost line, while the trade explanation above refers to a situation where relative inputs (i.e. shares of low-skilled to high-skilled labor) change due to the isocost line rotating around a fixed isoquant.

immigrants—for example, the Hispanic immigrants and Hispanic native-born studied by Cortés (2008)—appear to experience somewhat larger negative wage impacts. One contributing factor to the differential wage impact experienced by Hispanics, identified by Warren and Warren (2013) and Massey and Gentsch (2014), is that these groups are often competing in labor markets characterized by a rising share of unauthorized workers who are under increasing enforcement pressure. This may reduce their bargaining power and create downward pressure on wages in those labor markets. Employment impacts, measured in various ways discussed below, are also modest but perhaps vary more broadly across metropolitan areas.

Spatial studies commonly designate the skill group of natives, and sometimes immigrants, according to education level, although some use occupation as the skill dimension. Given the composition of immigrants relocating to the United States historically, the focus has generally been on their impact on low-skilled or other disadvantaged groups. The important study by Altonji and Card (1991) is an example. The IV approach used in most subsequent studies had its beginnings in this study and was later further refined in Card (2001). In Altonji and Card (1991), the 1970 share of immigrants in the population was used to construct the IV for immigrant inflows over the 1970-1980 period. As discussed above with regard to the possible imperfect substitutability of immigrants and the native-born with similar measured characteristics, focusing on the total immigrant share implicitly allows cross-effects to be examined. However, it does not allow an analysis of which immigrants are having the largest impact and instead measures the average effect.<sup>19</sup>

Overall, Altonji and Card (1991) found that immigration had a negative effect on wages, with a 1 percentage point increase in the immigrant share of the population reducing wages of low-skilled, native-born workers by 1.2 percent. They also found that a 1 percentage point increase in a city's foreign-born share predicted a reduction in the earnings of black males with a high school degree or less by 1.9 percent, black females with high school or less by 1.4 percent, and smaller—and statistically insignificant—reductions in earnings for whites with a high school education or less. The only other spatial study that found negative wage effects of similar magnitude is Borjas (2014a); the panel discusses below why these results might differ from those of other studies. Regarding employment (as opposed to wage) effects, Altonji and Card (1991) found that immigration

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<sup>19</sup>For example, two cities may have the same share of immigrants but in one city immigrants may be predominantly high skilled and in another predominantly low skilled. As explored in Section 4.5, the estimated effect of the immigrant share variable may be smaller than if the effect of immigrant shares of low-skilled and high-skilled immigrants on their native counterparts were separately examined.

over the 1970-1980 period in low-wage industries led to modest displacement of low-skilled natives from those industries; but they found no statistically significant reduction in low-skilled natives' weeks worked or the employment-to-population ratio.

LaLonde and Topel (1991) examined the impact of recent immigration on different arrival cohorts of prior immigrants. Their results are notable for identifying a negative relationship between new inflows and the earnings of recent prior immigrants—an effect that appeared to diminish with the amount of time prior immigrants had spent in the United States. In addition, they characterized the estimated effect of immigrants on the wages of nonimmigrants as “quantitatively unimportant” (LaLonde and Topel, 1991, p. 190). While they did not instrument for immigrant inflows, potentially underestimating the negative effect of immigrants, their findings are consistent with evidence discussed above of imperfect substitution between immigrants and native-born workers.

Since immigrants were disproportionately (relative to native-born workers) in the low-skilled category in the time periods examined, researchers expected larger impacts of immigration on the wages of low-skilled native-born blacks than whites because among low-skilled workers, native-born blacks are less skilled and otherwise disadvantaged compared to native-born whites. As noted above, Altonji and Card (1991) found adverse wage effects that were larger for blacks than whites. LaLonde and Topel (1991) also reported a negative effect for young (and hence inexperienced) native-born blacks, finding that a doubling in the number of new immigrants would decrease wages by a very modest 0.6 percent for young native-born black workers. Other studies for this period (e.g., Bean et al., 1988; Borjas, 1998) did not detect an effect for native-born black workers. Original analysis of Decennial Census data in *The New Americans* suggested that one reason for this minimal measured impact was that—as of the mid-1990s—immigrants and the black population still largely resided in different geographic locations and therefore were not typically in direct competition for jobs (National Research Council, 1997, p. 223). Until recently, large proportions of the nation's immigrants were concentrated in relatively few geographic areas, making the distinction between high- and low-immigration areas somewhat intuitive. However, relative to 20 or even 10 years ago, immigrants are now much more spatially diffused, so one should not assume that these historical relationships continue to hold.

Returning to the question of the impact of immigration on the wages of less-skilled natives, subsequent studies by Card (2001, 2005, 2009) concluded that—in line with previous findings other than Altonji and Card (1991)—the impact of immigration on the wages of less-skilled natives was modest for the various time periods considered in these studies. The Card studies all use instrumental variables to address endogeneity of immigrant

inflows, and in Card (2001, 2009) the issue of native out-migration was addressed and found not to play a role. Card (2005, 2009) raised the possibility that high school dropouts and high school graduates are perfect substitutes as an explanation for these small wage effects. As noted above, if this is the case, then the skill distribution of immigrants is quite similar to that of natives and hence large negative wage effects on low-skilled natives are not expected.

While most studies in the spatial literature use education to define skill, it is noteworthy that Card (2001) and Orrenius and Zavodny (2007) focused instead on occupation. The former separated the labor market into different metropolitan areas and, within metropolitan areas, into different occupation groups. Immigrants' inflows into cells defined by occupation and metropolitan area were predicted for each immigrant source country based on (1) the share of earlier immigrant cohorts from the source country living in the metropolitan area and (2) the *national* share of immigrants from the source country in each occupation. Card then summed over source countries to obtain the instrumental variable for immigrant inflows into these occupation-metropolitan area cells.<sup>20</sup> The basic finding of this study was that immigration during 1985-1990 reduced real wage levels by at most 3 percent in low-skilled occupations in gateway U.S. metropolitan areas characterized by the highest immigration levels. Results varied by group: a 10 percent labor supply increase due to immigration (implying a much larger percentage increase in the number of immigrants) was associated with a wage decline of 0.99 percent for male natives and 0.63 percent for female natives, a decline of 2.5 percent for earlier female immigrants, and a change indistinguishable from zero for earlier male immigrants. It is notable that the largest negative effects were for an immigrant group. On the employment side, Card (2001, p. 58) found "relatively modest" effects of recent immigrant inflows on workers in the bottom of the skill distribution in "all but a few high-immigrant cities." A 10 percent labor supply increase was found to have reduced the employment rate by 2.02 percentage points for male natives, by 0.81 points for female natives, by 0.96 points for earlier male immigrants, and by 1.46 points for earlier female immigrants.

Orrenius and Zavodny (2007) used a panel model with instrumental

<sup>20</sup>That is, what Card termed the "supply-push component" of immigrant inflows for group  $g$  into occupation group  $j$  and city  $c$  ( $SP_{jc}$ ) is:

$$SP_{jc} = \sum_g \tau_{gi} \lambda_{gc} M_g,$$

where  $M_g$  represents the number of immigrants from source country  $g$  entering the United States between 1985 and 1990;  $\lambda_{gc}$  is the fraction of immigrants from an earlier cohort of immigrants from country  $g$  who live in city  $c$  in 1985, and  $\tau_{gi}$  is the national fraction of all 1985-1990 immigrants from  $g$  who fall into occupation group  $j$ .

variables to estimate wage impacts of immigration on natives, also by occupation group. The authors found a small negative effect on the wages of low-skilled natives and no wage effect in more-skilled labor markets. A variable quantifying “immigrants who are admitted to the United States in a given year as the spouse of a U.S. citizen by occupation group, area, and year” works as the instrument because it is correlated with the rate of immigration into a given Metropolitan Statistical Area (MSA) and occupation but is uncorrelated with unobserved factors that drive wage growth (Orrenius and Zavodny, 2007, p. 11).

Smith (2012) examined spatial variation in employment for a narrowly defined group of workers under the hypothesis that new immigrant workers often compete in very specific labor markets. Also employing an IV model based on the geographic preferences of previous immigrants, he found that low-skilled immigration since the late 1980s had negatively impacted *youth employment* more than less-educated, native-born adult employment. He estimated that a 10 percent increase in the number of immigrants with a high school degree or less reduced the “average total number of hours worked in a year by around 3 percent for native teens and by less than 1 percent for less-educated adults.” This finding adds a new detail to the previous research that generally found modest negative or no relationship across states or cities between intensity of immigration and *adult* labor market outcomes across metropolitan areas or states (e.g., Card, 1990, 2001; Lewis, 2003). Smith (2012, p. 55) suggested that two factors were at work, “There is greater overlap between the jobs that youth and less-educated adult immigrants traditionally do, and youth labor supply is more responsive to immigration-induced changes in their wage.” His empirical analysis also suggests that, despite modest increases in schooling rates of natives in response to immigration, there is little evidence of higher earnings 10 years later in life. Smith concluded that it is possible “an immigration-induced reduction in youth employment, on net, hinders youths’ human capital accumulation.”

Other recent studies also suggest larger negative effects of immigrant inflows on earlier immigrants than on natives, consistent with LaLonde and Topel’s (1991) earlier findings and the notion of imperfect substitution between the two groups. Cortés (2008) examined the impact of immigrant inflows over the 1980-2000 period in immigrant-intensive predominantly service industries, following Card’s approach of instrumenting immigrant inflows using previous settlement patterns. Similar to Card, she found that low-skilled immigration does not have an effect on low-skilled native wages overall. She did, however, find a modest negative impact on the wages of low-skilled previous immigrants and low-skilled native-born Hispanics, especially those with poor English. Complementary findings by Lewis (2013) indicate that among immigrants, the wages of those with poor English skills are more

sensitive to immigrant inflows than the wages of those with good English skills. This evidence suggests that language skills may be a significant factor influencing substitutability between immigrants and natives with the same observed characteristics.

### Natural Experiments

Sometimes “natural experiments” arise that provide unique opportunities to deal with the endogeneity problems inherent in spatial analysis. Such experiments also provide an opportunity to study the short-run effect of abrupt, unexpected immigration episodes, which should yield the most negative impacts on natives. An example is the pioneering work by Card (1990), who took advantage of one such case—the 1980 Mariel boatlift, which brought thousands of predominantly low-skilled Cuban immigrants (referred to as “Marielitos”) to Miami, expanding that area’s labor force by about 7 percent in just a few months. This circumstance allowed for a well-controlled analysis: Card was able to estimate the impact of this immigration episode by comparing wage and employment changes after the influx in Miami with wage and employment changes in otherwise similar metropolitan areas that did not experience this influx. The endogeneity problem confronting spatial analyses was avoided altogether because the arrival of the Marielitos to Miami had nothing to do with selection of a high wage destination. Card’s study was one of the first to use the identification strategy that became known as the “difference in difference” approach: comparing differences in wages or employment between Miami and other metropolitan areas, and over time. However, it still entails an important assumption—that, in the absence of the Mariel boatlift, wages and employment in Miami would have developed in similar fashion as in the comparison metropolitan areas (the “common trend assumption”).

Using this approach, Card (1990) found that, while the unemployment rate among black workers rose in the 2 years after the Marielito influx into the labor market, the rise was not significantly different from that experienced in four comparison cities (Atlanta, Houston, Los Angeles, and Tampa-St. Petersburg, chosen because of similar racial profiles and employment trends). One explanation Card provides is the flexibility of the Miami labor market in absorbing low-skilled workers by expansion of industries that produce goods that use low-skilled workers more intensively. In this study, the comparison cities substitute for the missing counterfactual: namely, what would have happened if the immigration had never taken place.

First, Borjas (2016b) and Peri and Yasenov (2015) have recently reappraised the Mariel boatlift immigration episode, carefully matching the skills of the arrivals with those of the pre-existing workforce. The skill-matching technique led them to focus on the impact on non-Hispanic (Borjas)



and non-Cuban (Peri and Yasenov) high school dropouts because high school dropouts represented about 60 percent of those arriving on Florida's shores as a result of Castro opening the port of Mariel. The available data do not permit natives and immigrants to be distinguished, but Miami had few non-Hispanic immigrants at that time. Both papers were motivated in part by the development of a new technique (Abadie et al., 2010) to select comparison cities more systematically than did Card. Despite this methodological similarity, the authors reach very different conclusions. Peri and Yasenov concurred with Card, finding no detectable negative effects on wages of non-Cuban workers. Borjas found that a drop, in the range of a 10 to 30 percent decrease, in the relative wage of the least educated Miamians occurred between 1979 and 1985, representing a shock that took the better part of a decade to absorb. The divergent results in the two studies are due in large part to the composition of the samples and data sources examined to analyze wage trends in post-Mariel Miami and the comparison cities.

The misalignment of the study results described above suggests that differences in the implementation of a methodology can result in quite different estimates of the impact of immigration. Consideration of these studies also underlines that what occurred to the wage structure in Miami was a very unusual event—one that can be characterized as a true short-run shock occurring in a compressed time period, as opposed to more-anticipated immigrant flows that typically occur over longer time periods. The decade-long absorption of the supply shock in the Miami labor market was a unique episode and may not be fully informative about the dynamics of how labor markets in general adjust to immigration.

Monras (2015) exploited a different natural experiment. The Mexican peso crisis caused that country's GDP to contract by 5 percent in 1995, leading to a surge in Mexican immigration to the United States for reasons unrelated to changes in the U.S. economy. This event allowed Monras to estimate a short-run effect by comparing wage data for 1994 and 1995 using the CPS. Unlike in the Mariel boatlift case, this natural experiment did not direct immigrants to a particular location in the United States, so Monras used the usual IV for immigrant location based on the 1980 settlement pattern of Mexicans. He found that a 1 percent increase in labor supply due to the immigration of Mexicans with an education of high school or less reduced the wages of pre-existing non-Hispanic workers with an education of high school or less by 0.7 percent. The pre-existing workers in this sample include non-Hispanic immigrants. The observed effect is less negative than that observed by Altonji and Card (1991) but more negative than those observed by Card (1990) and Cortés (2008). Monras found that internal migration caused most of the effect to dissipate within 10 years.

Using a natural experiment approach in the study of immigration is quite attractive, although, as one can see in our discussion of the impact



of the Mariel boatlift, the results are still not free from disagreement. It would certainly be of considerable interest to have a number of such studies for the United States. But, by its nature, this type of exogenous inflow of immigrants is a rare occurrence. While the panel's review in this chapter is focused on empirical evidence for the U.S. experience, in this case, given the paucity of data for the United States, it is worth noting evidence from other countries where natural-experiment situations have arisen.

Blau and Kahn (2015) surveyed not only Card's (1990) analysis of the Mariel boatlift but also studies of four other natural-experiment events: (1) the repatriation of French-Algerians following the end of colonial rule in Algeria in 1962 (Hunt, 1992); (2) the repatriation of Portuguese residents from former Portuguese colonies in Africa in 1974 (Carrington and de Lima, 1996); (3) the migration of Jews from the former Soviet Union to Israel after the loosening of emigration restrictions in 1990 following the fall of Communism (Cohen-Goldner and Paserman, 2011; Friedberg, 2001); and (4) the repatriation of ethnic Germans from Eastern Europe and the former Soviet Union following German reunification (Glitz, 2012). In each case, the immigrant inflows were relatively sudden and quite sizable. Blau and Kahn concluded, from the evidence of these studies, that "while the studies are not unanimous, there is at most weak evidence . . . that these episodes had important effects on the level or distribution of native wages, despite the size of the immigration shocks" (Blau and Kahn, 2015, p. 828).

## 5.4 AGGREGATE SKILL CELL AND STRUCTURAL STUDIES

The spatial studies described in Section 5.3 rely on variation in the immigrant density across metropolitan areas or states to infer differential wage and employment impacts. Skill cell studies, such as the pioneering study by Borjas (2003), exploit variation in the density of immigrants across groups of workers categorized by their work experience (typically using age as a proxy) and education, the principal (observable) determinants of skill. Sorting into these skill cells allows for a comparison of outcomes (typically wages) of workers presumed to compete in approximately the same labor market. Labor supply changes, in the form of new immigration, permeate various skill groups unevenly; for example, recent immigrants have been represented disproportionately at very low and very high education levels. The methodological approach is to compare the changes in natives' outcomes in skill cells that experienced larger increases in immigrant density with the changes in natives' outcomes in skill cells that had smaller increases; the comparison allows the impact of immigration to be inferred. Specifically, the approach measures the wage effect on natives of inflows of immigrants of similar skill, averaged across all skill levels.

Skill cell studies have typically (but not always) been conducted at the

national level, which alleviates the problem in spatial models of diffusion of any national impact across geographic areas.<sup>21</sup> However, the problem remains that incoming immigrants with particular skills may be responding to changes in demand for workers of different skill types, thus leading to spurious correlations between wage growth by skill type and the change in immigrant density by skill type. Another problem with this approach is that the experience and education of immigrants—as reported in survey data—may not be as highly valued by employers as are their equivalents in native-born workers, meaning that immigrants may be allocated by the model to skill cells different from the ones in which they are actually competing with native workers. As noted above in this chapter, Dustmann and Preston (2012) discussed the role of skill downgrading in the sorting of immigrants into occupations. Relatedly, because surveys suitable for the study of immigration do not contain information on actual experience, necessitating the use of age as a proxy, the classification into skill cells is considerably less accurate for women than for men. For this reason, the reported studies using this approach have all limited themselves to analyzing the impact of immigration on males.

A quite distinct set of studies employs the methodological approach referred to as the structural approach. Structural studies of immigration typically divide workers into skill cells at the national level, but the hallmark of the approach is the imposition of theory-based relationships (structure) on the data. An attractive feature of the structural approach is that estimates can be used to simulate economic outcomes associated with different immigration scenarios. For example, a structural model can project the impact of visa policy proposals, such as to increase high-skilled immigration or to create programs allowing unauthorized immigrants credentials to work. However, the technical difficulties associated with this approach require the use of simplifying assumptions that influence the estimated outcomes. This section reviews in turn the published studies corresponding to the two methodologies.

### Aggregate Skill Cell Analyses

Borjas (2003), the first paper using this approach, created skill categories based on four education groups—did not complete high school, completed just high school, attended some college, and completed college—and eight

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<sup>21</sup>National-level estimates do not eliminate this measurement problem to the extent that markets for human and financial capital are global rather than national, as they are increasingly becoming.

experience levels: 1-5 years, 6-10 years, and so on, up to 36-40 years.<sup>22</sup> Borjas (2014a) further divided “completed college” into “college graduate” and “post-graduate” based on evidence that workers with advanced degrees are often not competing closely for jobs with those who have just a college degree. The skill cell approach assumes that workers within each cell, whether foreign- or native-born, are perfect substitutes while workers across cells are imperfect substitutes. The wage impact of immigration on male natives is typically estimated by regressing cell-specific outcomes on the immigrant share in the respective education-experience group (skill cell).

Purely correlational (i.e., ordinary least squares, or OLS, regression) estimates based on Decennial Census data in Borjas (2003) and Borjas (2014a)<sup>23</sup> revealed a negative correlation, for male workers, between wage growth and the share of immigrants by skill group. This relationship is illustrated in Figure 5-2.

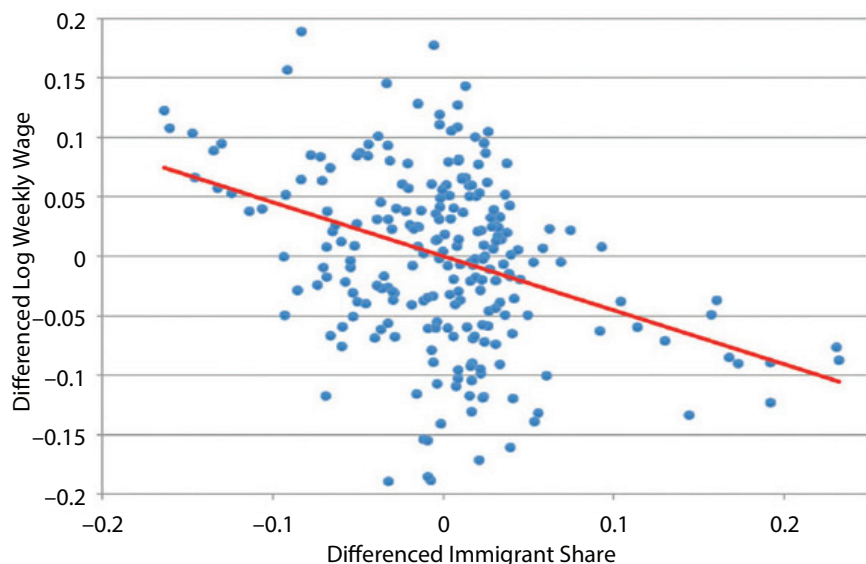
The scatter diagram data suggest that, at the national level, male wages should fall by 3 to 4 percent if immigration increases the number of male workers in a skill group by 10 percent due to immigration (approximately the effect of immigration on labor supply cumulatively from 1980 to 2000) (Borjas, 2003). Most of this effect is driven by observations at the low end of the education spectrum. As summarized later in this chapter, the national skill cell studies find larger negative wage effects on native-born workers from immigration inflows than do other approaches (i.e., spatial and structural studies).

Two papers by different authors expand on the skill cell work of Borjas. Llull (2015) addressed the endogeneity of immigrant density by skill cell and observed that the characteristics of arriving immigrants are not random but determined in part by both the labor demand and wages for a given skill cell in the United States. He developed a new instrument based on a cross-country analysis of the determinants of migration. The number of immigrants of each skill type expected in the United States is predicted based on events abroad: events that are very unlikely to be correlated with the return to education and experience in the United States. His results are striking: using this instrumental variable almost triples the negative effect found by Borjas (2003), yielding the most negative wage effect of any published study (equal to Altonji and Card’s [1991] impact on wages of low-education black men). The panel speculates below as to why this might be.

Card and Peri (2016) focused instead on robustness tests, showing that the wage effects predicted in Borjas’s (2014a, Ch. 4) skill cell model

<sup>22</sup>Experience, sometimes termed “potential experience,” was calculated based on the estimated number of years that had elapsed since the individual finished school.

<sup>23</sup>Borjas (2003) used data from the Public Use Microdata Series, 1960-2000, whereas Borjas (2014a) used the Public Use Microdata Series for 1960-2010.



**FIGURE 5-2** Scatter between male wages and male immigration across skill groups. **NOTE:** Each point in the scatter diagram represents the decadal change in the log weekly wage and the immigrant share (that is, the percentage of immigrants in the workforce) for a native group of working men defined by years of education and work experience. The slope of the regression line is  $-0.450$ , with a standard error of  $0.172$ .

**SOURCE:** Borjas (2003, Fig. II, p. 1345).

are sensitive to the form of the regression used. They found that changes to the way the statistical relationship is estimated and a change in the way immigration is captured each leads to less-negative estimates of the impact of immigration on wages and renders estimates at different levels of geographic aggregation more similar. The issues raised by the sensitivity of the Borjas results to the Card and Peri robustness tests, particularly as they relate to the measure of immigrant inflow, are potentially relevant for a number of immigration studies using a similar approach.<sup>24</sup>

It should be noted that estimates produced using the spatial and non-structural skill cell approaches are not conceptually comparable. Whereas

<sup>24</sup>See, for example, Borjas (2003, 2006, 2009), Bonin (2005), Bratsberg et al. (2013), and Steinhardt (2011). Card and Peri (2016) argued that their immigration measure (immigrant induced labor supply changes) is preferred because it is not biased by endogenous native flows; Borjas (2003, Ch. 4, fn. 8) argued that his measure (the fraction of immigrants in the skill group, including labor-market-specific fixed effects) is preferable because of nonlinearities between wages and measures of the immigrant supply shock.

the skill cell approach identifies the average *direct* effect of increasing the number of workers in the various skill groups on wages of (male) workers in these skill groups, spatial studies often estimate different parameters (depending on the specification), many of which also capture *indirect* effects induced by complementarities between immigrants and native workers at other parts of the skill distribution. These indirect effects may come about because an increase in workers in one skill group may decrease wages of workers in that group but increase wages of complementary workers *across* skill groups (e.g., the case where immigrants compete and harm the wages of construction or kitchen workers but enhance the opportunities and wages of first-line supervisors or wait staff). Further, there must be sufficiently low substitution between age-education cells to allow for estimation of the standard skill cell model. And, as with any methodology, data must be sufficient to allow the analyst to correctly allocate immigrants into skill cells defined by high degrees of substitutability within a cell.

A strong assumption in the skill cell approach—discussed in Section 5.2—is that immigrants and natives with the same measured education and the same age (or potential experience) are very close substitutes. Immigrants' education and labor market experience are often not comparable to that of natives, and immigrants therefore earn less than observationally similar natives, particularly when they first arrive in the host country. This downgrading can be dramatic, as Dustmann et al. (2013) illustrated for the case of the United Kingdom. As a result, immigrants compete most closely with natives in other skill cells than those to which they would be assigned, based on education and experience observables. As an example consider an Iranian surgeon who practiced for 15 years in Iran but upon arrival in the United States speaks little English and is not comfortable with the U.S. operating theatres or technology. This individual's labor market experience in Iran may hold little value in the United States. As a result, the immigrant may initially work in a lower position, perhaps as a nurse, and then possibly move to a physician's position as the individual gains English proficiency and acquires experience and the requisite medical licenses. Thus, although arriving with high measured skills, this immigrant competes with individuals in another skill cell than the one to which the immigrant would be assigned, based on observables.

It is possible to build in adjustments to realign the way new arrivals are sorted into skill cells in these models. For example, by using occupation as the indicator of skill, Orrenius and Zavodny (2007) bypass the estimation problem created by skills downgrading in more restrictive models.

### Structural Estimates

Much of the research described above, including the cross-area (spatial) analyses and simple skill cell correlations, impose little structure on the econometric models from which wage and employment impacts are estimated. In contrast, *structural models* build on theoretical relationships to simulate labor market responses to immigration. In these models, identification (i.e., establishing the differences between a situation with immigration and one without) is achieved by using the model structure, which imposes a relationship between labor supply and wages, the magnitude of which depends on the estimated parameters that characterize the production function (i.e., the relationship between output and inputs of the factors of production). Typically, simple variants are used such as the constant elasticity of substitution (CES) production function,<sup>25</sup> to derive these relationships—specifically, the elasticities of substitution between different skill groups—and describe them with a small number of parameters. These estimated parameters may then be used to simulate the impact of changes in labor supply due to immigration on the relative wages of native-born workers.

The implementation of structural models raises a number of issues. For one, there is the need to select a production function; this imposes functional form assumptions that may be restrictive. As noted above, beginning with Borjas (2003), the literature has used a nested CES framework. Decisions must also be made about which cross-group substitution elasticities to estimate, which can have a strong effect on the findings from structural models. The number of such cross-group effects that may be estimated is limited because, as that number grows, the empirical exercise quickly becomes intractable. For example, Borjas (2003) separated the labor force into 32 skill groups defined by education and work experience. In order to estimate all cross-group elasticities, 1,024 (or  $32 \times 32$ ) effects would have to be estimated. Borjas (2003) instead estimated the extent of substitution across education groups and across experience groups, then calculated the skill-group elasticities from this smaller set of starting estimates. Later researchers—for example, Ottaviano and Peri (2012), discussed below—have modified some of these assumptions.

Structural model simulations may be performed for either short-run or long-run scenarios. As discussed above, short-run analyses measure the wage impact of immigration before there has been sufficient time to adjust capital inputs; that is, in the short run capital is fixed. The long run is a time frame that by definition is sufficiently long to allow firms to adjust the

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<sup>25</sup>As its name suggests, under this production technology assumption, there is a constant percentage change in factor (e.g., capital and labor) proportions at all output levels. A formal presentation of the CES version of the structural model can be found in Borjas (2014a, pp. 106–112).

amount and type of physical capital (e.g., by purchasing new machines or building new plants) used in response to factor shocks.<sup>26</sup> If, for example, there is an immigration-induced decline in the wages of relatively low-skilled production workers, this may lead to an increase in investment in industries using more of this type of labor, potentially cushioning the decrease in their wages (see Section 4.5). The simulations conducted under these two alternative assumptions may be regarded as bounding the wage effects associated with an immigration shock (at least the wage effects estimated using this approach). Borjas (2003), along with a number of other studies, performed simulations of specific labor supply shocks. These studies assume that the entire immigration that occurred over a certain period (such as 1990 through 2010) happened all at once, and then the simulation projects the impact of this supply shock in the short run and in the long run. Borjas (2003), in particular, emphasized the short run and assumed the stock of physical capital is fixed. One rationale for adopting this assumption is the lack of evidence with respect to how long it takes capital to adjust in different situations. Ottaviano and Peri (2012), on the other hand, emphasize the long run.

An important point is that in the empirical literature, temporal distinctions between the short and long run do not necessarily map precisely with the theoretical concepts. In the real economy, there is variation in how long it takes capital to adjust (the defining characteristic of the long run). Indeed, if capital adjusts quickly, the long run could be quite short in calendar time; if it adjusts slowly it might be quite protracted in calendar time. In terms of the structural models, what is really meant by “the short run” is that capital is perfectly inelastic in supply while “in the long run” capital is perfectly elastic in supply.<sup>27</sup>

Another important point is that while structural models can estimate changes in *relative wages* across groups in the short or long run, the assumptions necessary to estimate the model require that the *average wage* cannot be affected by immigration in the long run. The production function specification dictates that a 10 percent immigration-induced increase in supply have a 0.0 percent impact on average wages in the long run and must lower the average wage by 3.0 percent in the short run (Borjas, 2014a, p. 109).<sup>28</sup> This technical assumption cascades to all other estimates of the

<sup>26</sup>Chapter 4 provides examples of simple models that use this common distinction between short-run and long-run effects and illustrate the adjustment differences relevant to the two time frames.

<sup>27</sup>The panel also notes these are static models whereas a full modeling of the long-run/short-run distinction would specify a dynamic model.

<sup>28</sup>See Section 4.2 (or Borjas, 2014a) for a formal explanation of the underlying production function theory behind these numbers. Again, the intuition is that, in the short run and with other inputs to production fixed, additional workers will compete for a limited number of



wage impact of immigration using this framework. As a result, since the average wage cannot change in the long run, adjustments to immigration occur only in relative wages: The groups that received disproportionately large numbers of immigrants may experience a long-term relative decline in their wage, while the wage of the groups that received very few immigrants may see a relative increase in the long run. It is important to keep these mathematical restrictions in mind when interpreting any wage impact estimated from the structural approach.

As with any theoretical approach, the simplifying assumptions entailed in the aggregate production function approach come at a cost (Blau and Kahn, 2015, p. 812):

. . . Specifically, one must decide how to disaggregate labor into skill groups and also what types of substitution/complementarity relationships to allow. As examples of the latter, recall Lewis's (2011b) model allowing skilled and unskilled labor to have asymmetric relationships with capital or Ottaviano and Peri's (2012) models allowing differing substitution relationships between different pairs of education groups. Moreover, researchers must also decide whether to allow immigrants and natives within a skill group to be imperfect substitutes, and if so, whether the immigrant/native substitution parameter should be the same for all skill groups (Lewis, 2011a).

The relative wage and employment impacts predicted by these models hinge crucially on estimates of the elasticities of substitution between native-born and foreign-born workers overall, and the separate elasticities between education and experience groups or between skill groups. The less interchangeable different kinds of workers are, the less they compete and the less downward pressure inflow of one group can exert on wages of another.

An important early paper using the aggregate production function approach in this area was Borjas et al. (1997). These authors compared the actual supplies of workers in particular skill groups to what they would have been in the absence of immigration and then used results from previous studies on the elasticity of substitution among skill groups to compute the impact of the immigrant supply shock on the relative wages of skill groups. The study, which focused on the 1980-1995 period, examined two

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jobs, which exerts downward pressure on wages. In the long run, once firms have had time to adjust capital stocks, the demand for labor increases along with the size of the economy and wages will be pushed back upward toward initial levels. The elasticities of substitution between immigrant workers and different types of established workers in the labor market dictate which workers' pay will change by more than -3 percent and which workers' pay will change by less than -3 percent.



relative wage comparisons: (1) the wages of high school dropouts relative to those with at least a high school degree and (2) college graduates relative to high school graduates (where all workers were aggregated into “high school equivalents” and “college equivalents”). The authors found that immigration accounted for a 3-6 percent decline in the wages of high school dropouts relative to high school graduates between 1980 and 1995—in the range of 27-55 percent of the total decline for that group over the period. In contrast, they found that immigration did not explain much of the increase in the college wage premium (i.e., the college versus high school equivalent comparison). These findings reflect the fact that, for these larger educational group aggregates, immigration did not substantially affect relative supplies of workers in each skill category.

Although the results from Borjas et al. (1997) are intriguing, there were limitations to the study. The underlying production relationships (parameters) were obtained from outside sources and the relative wage effects of immigrant supply shifts were mechanically predicted from these elasticities of substitution. Furthermore, each specification (the wage group comparisons in (1) and (2) above) distinguished (compared) just two types of labor.

These and other issues were addressed by Borjas (2003), who focused on the impact of immigration on relative wages in the United States over the 1980-2000 period using a nested CES production function approach. Borjas assumed—similar to Card and Lemieux (2001)—that workers within the same education category but who differ in their labor market experience are not perfect substitutes in production. As in the analysis by Borjas et al. (1997) of the shorter post-1980 period, Borjas (2003) found substantial negative wage effects of immigration with capital held fixed, particularly on the low skilled. He estimated that the immigrant inflow from 1980 to 2000, equal to an increase in the labor supply of working men of about 11 percent, lowered the wages of male native high school dropouts by 8.9 percent and those of male college graduates by 4.8 percent.

As noted earlier, Borjas disaggregated skill groups by work experience (proxied by age) as well as education levels, forming 32 education-experience cells. His addition of the experience dimension built on the insight from human capital theory that workers enhance their skills not only through investments in formal schooling (i.e., education) but also by accruing skills through labor market experience. He thus assumes that not only are workers with different education levels imperfect substitutes but workers with the same education but different experience levels are imperfect substitutes. In the real world, immigrant inflows vary across education-experience cells, and the extent of that variation changes over time. This variation helps allow the impact of immigration on the labor market to be identified. Borjas assumed that, within education-experience cells, immigrants and natives are perfect substitutes. In contrast to the study by Borjas

et al. (1997), which used outside information to obtain the parameters of the production function, Borjas (2003) directly estimated parameters of the production function and then simulated the wage impacts based on the estimated elasticities.

Even the highly disaggregated approach proposed by Borjas (2003) involves some simplifying assumptions. Recent work suggests that results using the structural approach are sensitive to these assumptions. We illustrate this point with findings from Ottaviano and Peri (2012), a study of the relative wage effects of immigration over the 1990-2006 period based on Census Bureau data (from the Decennial Census and the American Community Survey [ACS]), which used the same broad framework as Borjas (2003) but changed some of the assumptions. A key distinction is that Ottaviano and Peri make different assumptions than Borjas about the supply of capital. Whereas Borjas (2003) assumed that capital supply is inelastic (does not have time to react to growing labor supply), Ottaviano and Peri assumed that it is perfectly elastic.

In addition, Ottaviano and Peri made two important changes in how substitution across groups is specified.<sup>29</sup> First, in contrast to Borjas (2003), Ottaviano and Peri allowed immigrants and natives to be imperfect substitutes. We have already discussed how, given language differences and other factors, it might be reasonable to assume that immigrants and natives are imperfect substitutes. Further, they split the sample in order to allow the substitutability between immigrants and natives for the less educated (high school dropouts and high school graduates) to differ from that for the more highly educated (those with some college and college graduates). The intuition underlying this assumption is that language and other barriers are less prevalent among highly educated foreign-born workers than among less educated foreign-born workers, allowing highly educated foreign-born workers to be closer substitutes for their native-born counterparts.<sup>30</sup> Their estimated elasticities are consistent with imperfect substitutability that differs in magnitude by education category: They obtain a native-immigrant elasticity of substitution of 11.1 for the less educated and 33 for the more highly educated (indicating that workers in the latter category are more interchangeable). Allowing for imperfect substitution between immigrants and natives is potentially important because the less closely immigrants

<sup>29</sup>Manacorda et al. (2012), writing in parallel with Ottaviano and Peri (2012) on the United Kingdom, also developed the same approach based on the idea of immigrants and natives being imperfect substitutes within age-education cells.

<sup>30</sup>The results from Peri and Sparber (2009) offer some support for the imperfect substitutability idea; they found that low-skilled foreign-born workers are employed disproportionately—highly so in some cases—in occupations such as construction, kitchen work, etc., that demand more physical effort and less communication skill.

substitute for natives, the smaller the effect immigrants will have on the wages of natives with the same observable skills.

Second, while Borjas (2003) imposed the same elasticity value for all adjacent education groups, Ottaviano and Peri (2012) specified the elasticity of substitution between education groups as being different (independent of native/immigrant status). They posited that, in the current economy, high school dropouts can fill many of the same kinds of jobs as workers with just a high school diploma; in other words, they hypothesized that high school graduates and dropouts often compete in the same labor market. This would be consistent with Card (2009), who found high school graduates and high school dropouts to be virtually perfect substitutes. (Recall that the economists' designation of perfect substitutes means that, for instance, high school dropouts and high school graduates can be traded at a constant rate, but that rate does not have to be one-to-one.) At other skill levels—for example between those in the labor force with some college and those with a graduate degree—the degree of substitution may be lower. Consistent with this reasoning and with Card (2009), Ottaviano and Peri found that the elasticity of substitution between high school dropouts and high school graduates is at least 10 and is infinite in some estimates, while the elasticity of substitution at higher skill levels is much lower. Since most immigrants to the United States are low skilled, the wage impact of an increase in immigrant supply will be lower if high school dropouts and high school graduates are combined, since the immigrant supply shock will constitute a smaller percentage of the same skill-group labor force in the larger aggregate.

In contrast to Borjas et al. (1997) and Borjas (2003), Ottaviano and Peri (2012) found that immigration had only a very small effect on native wages within skill groups. Using the more detailed set of parameters reflecting imperfect substitutability between natives and immigrants within an education-experience cell, they found that the effect of immigration over the 1990-2006 period was to reduce the wages of native-born high school dropouts in the range of 0.6-1.7 percent. Averaged across all skill categories, the study found that U.S.-born workers experienced a slight increase in wages as a result of immigration.

The Ottaviano and Peri (2012) specification is not without controversy. Borjas et al. (2012) presented evidence that the estimates of their two key substitution elasticities—that between immigrants and natives and that between high school dropouts and high school graduates—are sensitive to the type of data used and to what regressors are included in the underlying production function models.<sup>31</sup> As Blau and Kahn (2015, p. 821) noted,

<sup>31</sup>Dustmann and Preston (2012) presented evidence that downgrading of immigrants may lead to finite estimates of the elasticity of substitution between immigrants and natives even if the true elasticity of substitution is infinite.

“The varying results in the estimates of the substitution elasticities illustrate a potential drawback of this type of approach to estimating the impact of immigration.”

The contrasting findings between the Borjas (2003) and Ottaviano and Peri (2012) studies suggest that results from structural models are influenced by crucial assumptions, some of which involve unobserved and untestable issues. However, these two studies also differ along a number of dimensions, ranging from the time period studied to whether the results are obtained under the assumption of capital being inelastic or perfectly elastic, that make them difficult to compare. To abstract from the impact of extraneous factors and to focus on the importance of substantive decisions, the panel extends an analysis presented in Borjas (2014b). Table 5-1 summarizes wage simulations associated with alternative specifications (“scenarios”) for a consistent time period, 1990-2010, treating all immigration between 1990 and 2010 as if it constituted a single supply shock.<sup>32,33</sup> The table includes the following scenarios for both the short run and the long run (“GB” refers to Borjas, 2003; “OP” refers to Ottaviano and Peri, 2012; variables are defined and discussed below):

- **Scenario 1:** Immigrants and natives in a skill group are perfect substitutes ( $\sigma_{MN} = \infty$ ), and high school dropouts and high school graduates are different groups—similar to GB.
- **Scenario 2:** Immigrants and natives in a skill group are imperfect substitutes ( $\sigma_{MN} = 20.0$ , as in OP), and high school dropouts and high school graduates are different groups (as in GB).
- **Scenario 3:** Immigrants and natives in a skill group are perfect substitutes ( $\sigma_{MN} = \infty$ , as in GB), and high school dropouts and high school graduates are perfect substitutes ( $\sigma_{HS} = \infty$ , as in OP).
- **Scenario 4:** Immigrants and natives in a skill group are imperfect substitutes ( $\sigma_{MN} = 20.0$ ), and high school dropouts and high school graduates are perfect substitutes ( $\sigma_{HS} = \infty$ )—similar to OP.

In Table 5-1, the term  $\sigma_{MN}$  is the elasticity of substitution between immigrants and natives with the same measured skills. This term equals infinity if the two groups are perfect substitutes (the assumption in Borjas [2003]) or equals 20 for the “preferred” estimate in Ottaviano and Peri (2012). The term  $\sigma_{HS}$  is the elasticity of substitution between high school

<sup>32</sup>For an analysis spanning 20 years, one might reasonably argue that—to the extent immigration is less a “shock” than a somewhat predictable flow—investment patterns reflect some level of anticipation of the expansion of the workforce and population generally.

<sup>33</sup>In contrast to the macro literature, in all these scenarios the elasticity of substitution between labor and each of the different types of capital is assumed to be identical, precluding the capital skill complementarities discussed in Chapter 4.

TABLE 5-1 Simulated Percentage for Wage Impacts of 1990-2010 Immigrant Supply Shock

Percentage Supply Shift	High School Dropouts	High School Graduates	Some College	College Graduates	Post-College	All Education Groups
<b>A. Short Run</b>						
Scenario 1*: $\sigma_{MN} = \infty$						
All workers	-6.3	-2.8	-2.3	-3.3	-4.1	-3.2
Scenario 2: $\sigma_{MN} = 20.0$						
Native-born	-4.9	-2.3	-2.0	-2.7	-3.3	-2.6
Foreign-born	-8.5	-6.6	-5.9	-8.1	-8.5	-7.6
All workers	-6.3	-2.8	-2.3	-3.3	-4.1	-3.2
Scenario 3*: $\sigma_{MN} = \infty$ and $\sigma_{HS} = \infty$						
All workers	-3.4	-3.4	-2.3	-3.3	-4.1	-3.2
Scenario 4: $\sigma_{MN} = 20.0$ and $\sigma_{HS} = \infty$						
Native-born	-2.1	-3.0	-2.0	-2.7	-3.3	-2.7
Foreign-born	-5.6	-7.3	-5.9	-8.1	-8.5	-7.2
All workers	-3.4	-3.4	-2.3	-3.3	-4.1	-3.2



dropouts and high school graduates. It is equal to infinity if the two groups are perfect substitutes.

The above scenarios summarize how the key differences in the structural studies literature can be linked back to the studies' modeling assumptions. Allowing capital to adjust (i.e., moving from a short-run to a long-run scenario) reduces the estimated negative effects across the board—that is, for all workers as well as for relative wage effects within each education group. As the elasticity of substitution between native-born and foreign-born is changed from the two groups being perfect substitutes ( $\sigma_{MN} = \infty$ ) to imperfect substitutes ( $\sigma_{MN} = 20.0$ ), the impact on the wages of “all workers” (natives and immigrants) for any given skill group is unchanged, but *within* each skill group, imperfect substitutability is associated with a larger negative wage impact on earlier foreign-born workers (prior immigrants) and a smaller negative wage impact on native-born workers. This makes sense for the following reason: In cases where foreign-born and native-born are close substitutes, one would expect an immigration shock to have a more equal impact on the two groups; imperfect substitutability between the two groups insulates natives from negative effects to some degree. Comparing otherwise similar scenarios in which high school dropouts and high school graduates are imperfect substitutes (Scenarios 1 and 2) versus scenarios in which they are perfect substitutes (Scenarios 3 and 4), one can see that the impact of allowing high school dropouts and high school graduates to be perfect substitutes has the effect of reducing the negative wage impact for high school dropouts. This makes sense, as any negative impact from the inflow of unskilled workers is now diluted across a larger portion of the labor supply (high school dropouts plus high school graduates). A portion of the negative wage impact is averaged into the value for high school graduates, which becomes slightly more negative. The simulations also show that allowing for imperfect substitution between immigrants and natives does not greatly attenuate the wage impact of immigration on high school dropouts. There is still a 2 to 5 percent wage loss, depending on whether one looks at the long run or short run. The scenario that does lead to a much lower negative or even positive impact of immigration on the lowest skilled workers is the one that also incorporates the possibility that high school dropouts and high school graduates are perfect substitutes.

When comparing simulated effects across education groups within a scenario, it is useful to remember that all structural simulated effects reflect a combination of the estimated parameters relating relative wages and relative labor supply across skill groups and the simulated amount of immigration-induced labor supply by skill group. Unlike in spatial and skill cell studies, the impacts cannot be separated into the amount due to the responsiveness of the skill group to changes in labor supply and the magnitude of the group's simulated labor supply change. However, the pattern

across columns in Table 5-1 does mirror qualitatively the magnitudes of the labor supply changes by education over 1990-2010, the values used in the simulation. Negative effects for natives tend to be larger for high school dropouts, the group with the largest immigration inflow, followed by those with post-college education, a group that also experienced relatively large inflows. Native high school graduates and those with some college tend to experience smaller negative effects and, indeed, under most scenarios, slightly positive effects in the long run, consistent with relatively small immigrant inflows over the period. The impacts on college-educated natives are very similar to the mean effects across education.

Key takeaway points from this simulation are that the assumptions about capital—fixed short run versus adjusted long run—and substitutability among skill groups have large effects on estimates of wage impacts. Wage effects (overall and within skill groups) are more negative in the short run than in the long run, when they are sometimes even positive. And, for both the short-run and long-run scenarios, the largest negative effects on native less-skilled workers are for the scenarios in which immigrants and natives are perfect substitutes and high school dropouts and graduates are imperfect substitutes (Scenario 1). The smallest negative effects on native less-skilled workers are for the scenarios in which immigrants and natives are imperfect substitutes and high school dropouts and graduates are perfect substitutes (Scenario 4). Indeed, under this scenario, all native groups except the postcollege-education group benefit from immigration in the long run.<sup>34</sup>

## 5.5 A CROSS-STUDY COMPARISON OF IMMIGRANTS' IMPACT ON WAGES

As is apparent from the literature review above, the results of a given study of the impact of immigration on wages or employment are typically directly comparable to only a handful of others. Sometimes two studies are not directly comparable because the underlying methodology is fundamentally different. For example, skill cell studies estimate the effect of immigrants on the most similar natives, omitting the effect of immigrants on less similar natives that is captured in most spatial studies, while structural studies build in the assumption that average wages are unchanged by immigration in the long run and hence are essentially studies of relative wages. But often, even within a methodology, studies are not immediately

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<sup>34</sup>Recall, also, the all-important point that the absolute wage impact numbers are dictated by production function assumptions; only the relative wage impacts across skill groups are driven by the data. And, here too, the magnitude of the relative wage impacts is tied to the relative size of the immigrant inflows by the assumptions of the model.



comparable because of differences in the way the number of immigrants is captured. For example, the study may focus on immigrants as a share of the labor force or the share of the labor force that is of a particular skill (instrumented by the predicted immigrant inflows of that skill type). For this reason, in Table 5-2, the panel presents in terms of a common metric the results of several prominent spatial and skill cell papers discussed in this chapter, along with the largest and smallest structural impacts for all natives and for native high school dropouts, based on the results in Table 5-1. For each study, the table shows calculations of the wage effect on the indicated group of natives of an increase in immigrants that raises labor supply of the state, occupation, skill cell, or education group by 1 percent. Wage effects in bold are the coefficients reported in the source study; other coefficients were calculated by the panel as outlined in the Technical Notes in Section 5.9.

For most spatial and skill cell studies, the calculations to convert their results into the common metric are straightforward (see Technical Notes in Section 5.9), though they do involve using a particular value of the share of immigrants in the labor force. To make the studies as comparable as possible, the same value of the share of immigrants in the labor force should be used in all the calculations, even though a given study's average share will depend on the exact years of data used. To calculate the underlined values in Table 5-2, the panel set the immigrant share of the labor force at its 2000 value of 12.6 percent for those studies requiring harmonization. However, the harmonization approach for spatial and skill cell papers does not lend itself as readily to the structural studies, which involve several parameters rather than a single parameter. Nevertheless, it is useful to make a more crude adjustment to see whether the structural results are broadly in line with those of other studies, setting aside the issue of relative versus absolute wage changes. For the structural studies, the simulations reported in Table 5-1 above may be thought of as the result of a simple increase in the share of immigrants in the labor force from 1990 to 2010, rather than the result of more complex changes in different types of labor over the period. The wage effects reported in the simulations may then be divided by this increase in immigrant share to get the effect of a percentage point increase in immigrant share, a figure that may then be converted to the effect of a 1 percent increase in the labor supply, as was done for the spatial and skill cell studies. A similar exercise may be performed for Borjas (2016b) and Peri and Yasenov (2015). (See the last two subsections of Section 5.9 for Technical Notes on the panel's calculations for Borjas (2015), Peri and Yasenov (2015), and the structural studies.)

Table 5-2 confirms that there is a wide range of estimated elasticities and makes clearer than do unharmonized results which estimated elasticities are most negative and what patterns exist in the size of elasticities. Consider first the results for all natives and native dropouts (i.e., excluding

results for minorities). There is considerable variation in the findings, with results ranging from a set clustered around zero (including small positive values) to a set in the  $-0.8$  to  $-1.0$  range *within* each of the three approaches (with the exception of three studies noted below). Results close to zero are obtained in the spatial studies of Card (2001) for native men and women and of Cortés (2008) for native dropouts, in Card and Peri's (2016) skill cell regressions for all native men, and also in the long-run structural models for all natives (whose results are close to zero by assumption). Results in the  $-0.8$  to  $-1.0$  range are those of the Altonji and Card (1991) spatial study and the structural short-run calculation for dropouts (Scenario 1, in which capital is fixed and immigrants and natives are perfectly substitutable). Two much more negative estimates (again excluding the elasticities for minorities) are Borjas's (2016b) upper bound for native non-Hispanic men ( $-1.4$ ) and Llull's (2015) skill cell analysis for all native men ( $-1.7$ ). On the other hand, the considerably more positive estimate of  $0.3$  is from Peri and Yassenov's (2015) study of the same Mariel Boatlift immigration episode studied by Borjas (2015).

Some notable patterns emerge. Confirming expectations based on economic theory about which groups are most negatively affected by immigration, native dropouts tend to be more negatively affected than better-educated natives (as indicated by comparing results for dropouts with the overall results for all workers or all men or women). The results in the table also suggest that this negative effect may be compounded for native minorities. Altonji and Card (1991) found more negative results for low-education blacks than low-education whites: The coefficient for black males reported in the table is the most negative effect they reported. Cortés examined a number of groups and found the largest negative effects for Hispanic dropouts with poor English, as well as larger negative effects for Hispanic dropouts than for all dropouts. This could be because native dropout minorities are the closest native substitutes for immigrants. As the results in panel C, Structural Studies, of Table 5-2 show, the closer substitutes immigrants and natives are assumed to be (the higher  $\sigma_{MN}$ ), the more negative the effect of immigration on natives. While not reported in Table 5-2, structural estimates that distinguish between the effects on (prior) immigrants and on natives found larger negative effects on immigrants (Table 5-1), and the relatively large negative effects found by Monras (2015) are for dropouts, *including* non-Hispanic immigrants.<sup>35</sup>

Although theory predicts larger negative effects on native wages of immigrant inflows in the short run than in the long run, this pattern

<sup>35</sup>The Borjas (2016b) study's large negative effects are for male non-Hispanic dropouts, including non-Hispanic immigrants (although the latter are likely few in number and perhaps no more similar to immigrants than they are to natives).

**TABLE 5-2** Effect on Native Wages of an Inflow of Immigrants That Increases Labor Supply by 1 Percent

Study	Wage Effect (%)	Which Natives
<b>A. Spatial Studies</b>		
Altonji and Card (1991)	<u>-1.7</u>	Dropouts, black men
	<u>-1.0</u>	Dropouts
Borjas (2016b)	-1.4	Dropouts, non-Hispanic men
	-0.5	Dropouts, non-Hispanic men
Monras (2015)	-0.7	High school graduates or less, non-Hispanic, including immigrants
Cortés (2008)	-0.6	Dropouts, Hispanic with poor English
	-0.3	Dropouts, Hispanic
Card (2001)	-0.1	Dropouts
	-0.1	Men
	0.1	Women
Peri and Yassenov (2015)	0.3	Dropouts, non-Cuban
<b>B. Skill Cell Studies</b>		
Llull (2015)	<u>-1.7</u>	Men
Borjas (2003)	<u>-0.6</u>	Men
Card and Peri (2016)	<u>-0.2</u>	Men
Card and Peri (2016)	-0.1	Men
<b>C. Structural Studies</b>		
	-0.8	Dropouts
	-0.4	All
	-0.4	Dropouts
	-0.3	Dropouts
	-0.2	All
	0.1	All
	0.1	Dropouts

NOTES: Panel C, “Structural studies,” refers to the results in Table 5-1: the maximum and minimum values for the effect on all natives (except the long-run minimum value for Scenarios 1 and 3, which is zero by assumption) and on native dropouts are reported. “Dropouts” refers to high school dropouts; HS to high school or less. “10-year differences” refers to analysis relating the 10-year change in wage to the 10-year change in immigration; “fixed effects (10-yearly data)” indicates that levels rather than changes were used. All nonstructural coefficients are from instrumental variables estimates except Borjas (2003) and Card and Peri (2016), where they are the ordinary least squares (OLS) coefficients from the nonstructural estimation, and Borjas (2016b).

Altonji and Card’s (1991) black native dropouts had less than 13 years of education, while the dropouts of all races had less than 12 years. The Cortés (2008) sample is of dropouts in immigrant-intensive nontraded sectors. Monras’s (2015) natives included earlier non-Hispanic

Which Immigrants	Short Run?	Note
All	—	10-year difference
All	—	10-year difference
Dropouts	Yes	Upper bound, Mariel boatlift
Dropouts	Yes	Lower bound, Mariel boatlift
HS or less, Mexican	Yes	1-year difference
Dropouts	—	Fixed effects (10-yearly data)
Dropouts	—	Fixed effects (10-yearly data)
Dropouts	—	Fixed effects (10-yearly data)
All	—	5-year difference, wage level
All	—	5-year difference, wage level
Dropouts	Yes	Mariel boatlift
All	—	IV, fixed effects (10-yearly data)
All	—	OLS, fixed effects (10-yearly data)
All	—	OLS, 10-year differences
All	—	OLS, 10-year differences
All	Yes	Scenario 1: $\sigma_{MN} = \infty$
All	Yes	Scenarios 1 and 3: $\sigma_{MN} = \infty$
All	—	Scenario 1: $\sigma_{MN} = \infty$
All	Yes	Scenario 4: $\sigma_{MN} = 20$
All	Yes	Scenarios 2 and 4: $\sigma_{MN} = 20$
All	—	Scenarios 2 and 4: $\sigma_{MN} = 20$
All	—	Scenario 4: $\sigma_{MN} = 20$

immigrants. Natives and immigrants cannot be distinguished in Borjas's (2016b) data. The elasticity of substitution between immigrants and natives is  $\sigma_{MN}$ ; when it is infinite, the two groups are perfect substitutes.

Bolded figures are coefficients reported directly from the cited study; underlined figures are the result of the panel's calculation using the paper's coefficient and an immigrant density of  $p = 0.126$ , the national value for the 2000 labor force. See Section 5.9 for technical notes on these calculations and those for the structural cases and a number of other papers that do not involve  $p = 0.126$  and are implicitly evaluated at a different  $p$  (though a very similar one in the case of the structural papers).

For column 5, the "short-run" designation indicates effects found over a less than 5-year span, or structural calculations with capital held fixed. The length of time required for capital, technology, and other factors to respond to unexpected or expected immigration inflows, and hence the distinction between short and long run, cannot be rigorously determined.

does not come through unambiguously in the table. The pattern is pronounced for the structural studies (see also Table 5-1), where the short run is imposed in accordance with theory by fixing the capital stock at its initial value. But the pattern is less clear in nonstructural studies. Monras's (2015) study of the 1-year effect of unanticipated inflows is clearly capturing the short run and does find a relatively large negative effect ( $-0.7$ ), while Borjas's (2016b) negative elasticities based on the first 7 post-arrival years after an unanticipated immigrant inflow ( $-0.6$  to  $-1.4$ ) are also likely to be capturing a short-run effect. However, Peri and Yasenov (2015) estimated the most positive elasticity of any study ( $0.3$ ), based on the first 3 years after the Mariel Boatlift examined by Borjas (2016b). This elasticity is statistically insignificant, and the authors characterize their paper as finding no negative effect rather than finding a positive effect, but their result would rule out, statistically, effects as negative as the lower bound finding of  $-0.6$  in Borjas (2015).

Studies examining the relation between 10-year changes in immigration and 10-year changes in wages ("10-year differences")—Altonji and Card (1991) and Card and Peri (2016)—capture exactly 10 years of adjustment and hence probably also capture considerable capital adjustment. The same is true for studies using data spaced 10 years apart but not differenced ("fixed effects"), such as Llull (2015), Borjas (2003), and Cortés (2008), which capture adjustment over at least 10 years.<sup>36</sup> Card's 2001 paper examining the effect of flows over 5 years is more difficult to categorize in terms of capital adjustment. The contrasting results of studies examining the same frequency of effects suggest the importance of other factors in determining the elasticity estimated, including the methodological approach.

There appear to be some differences in elasticities by approach not accounted for by the share of studies in each looking at the long versus short term, at dropout natives versus all natives, and minority natives versus all natives. On balance, the skill cell studies find the most negative wage impacts and the structural studies the least negative, with the spatial studies in the middle; differences between approaches are of about the same order of magnitude as the variation among studies using the same approach. Below, the panel revisits some of the methodological differences discussed in Section 5.3 to see if this ranking is expected, with particular attention to the medium- to long-run time frame probably captured by most nonstructural studies.

Spatial studies can be biased either to find a positive effect (if instrumental variables do not correct adequately for immigrant location choice) or to find zero effect (if trade in goods and flows of capital and labor

<sup>36</sup>Baker et al. (1999) showed that only specifications in differences clearly capture effects of a particular frequency.

distribute the effect nationally), but they will also incorporate changes in technology, technique, or sector that genuinely mitigate negative wage impacts, and they will include cross-effects of immigrants on less similar natives. The skill cell studies avoid the biases of the spatial studies, which makes them more likely to find negative effects, as they do, but they do not include cross-effects, whose overall direction (negative or positive) is unknown. Thus, it is not certain that the larger effects from skill cell studies compared to spatial studies are to be expected. All skill cell studies to date have examined the impact of immigration on men only, unlike studies using other approaches. However, other studies do not paint a clear picture of whether women or men are more vulnerable to immigration impacts, leaving it unclear as to whether the gender focus of skill cell studies explains why their estimated wage effects on natives are more negative.

The structural studies preclude any effect on overall wages in the long run, due to the choice of a production function that is assumed to remain constant over time. This rules out any overall shift up in wages due to increasing returns to scale or any immigration-induced skill-neutral technological progress, but it also precludes any overall shift down in wages due to decreasing returns to scale. Moreover, it rules out any downward pressure on dropout wages if the induced technological progress complements high-skilled workers and substitutes for low-skilled workers (though given large inflows of low-skilled immigrants, this would probably not be expected). It is therefore not easy to trace the ranking of the impact by approach back to the methodological characteristics of each.

It is useful to discuss possible reasons for the variations in estimated elasticities within each of the approaches (i.e., spatial, skill cell, and structural studies). The reasons for the variation within the structural approach are transparent: Short-run effects are larger, and effects with natives and immigrants assumed to be perfect substitutes are larger than those where they are not.<sup>37</sup> Further, as discussed above with respect to Table 5-1, assumptions about substitutability across education groups, particularly whether or not high school graduates and high school dropouts are perfect substitutes, also influence the results, with the assumption of perfect substitutability resulting in smaller estimated negative effects. Thus, as suggested by our discussion of the simulation results in Table 5-1, the value of the wage elasticities from the structural estimates in the bottom panel of Table 5-2 depends on the particular scenario being considered. One general conclusion is that the value of the wage elasticity is not as greatly affected when one only allows for imperfect substitution between natives and immigrants with the same level of education. The value of the wage

<sup>37</sup>Note that rounding the elasticities to one decimal place has led to the effects of scenarios that differed slightly in Table 5-1 being reported as the same magnitude here.

elasticity for high school dropouts, however, becomes much less negative or even positive when one adds the assumption that high school dropouts and high school graduates are perfect substitutes.

The differences among studies within the spatial approach seem fairly consistent with differences in the immigrants and natives studied and whether the impact estimated is short or long run. The results of the Altonji and Card (1991) study do, however, appear more negative than expected on this basis. They may be affected by the use of an earlier and less sophisticated historical settlement-pattern instrument than was used in later studies. Additionally, some spatial studies (and some skill cell studies) investigate time periods that are long enough to capture long-run adjustments in capital and technology and in natives' human capital accumulation and to reflect increasing aggregate demand as a result of immigration. Spatial and reduced-form skill cell studies potentially capture some adjustments that the structural analyses rule out and, if the instrumental variable is ineffective, some that are unintended, such as equalization of wages spatially as a result of trade or of capital and labor mobility.

The variation within the skill cell studies may reflect both economic and econometric issues. Llull (2015) may have found a very large negative effect because the novel instrument used picks out the impact of immigrants fleeing turmoil, an immigrant category that may possibly have a more negative impact on native wages (see discussion below). The variation among the other three OLS studies appears to reflect econometric issues. Card and Peri (2016) indicated that the original Borjas (2003) skill cell elasticity of  $-0.6$  is sensitive to changes in the form of regression used.<sup>38</sup> The OLS results should be the same whether the fixed effects or 10-year differences method is employed. Card and Peri showed that the results are considerably less negative for differences ( $-0.2$ ), suggesting a problem of omitted variables or possibly that the regressions are capturing different frequency (short versus long run) effects.<sup>39</sup> Furthermore, when Card and Peri (2016) changed the immigrant variable from the (change in the) immigrant share of the labor force to the change in the number of immigrants divided by the initial labor force, the elasticity becomes close to zero ( $-0.1$ ). They argued that the latter immigrant variable is superior, as it is unaffected by changes in the native labor force that might be driven by the same factors as immigration.<sup>40</sup> It is unclear to what degree the Llull instrumental variables elasticity is robust to these changes.

<sup>38</sup>Card and Peri (2016) tested the robustness of a slightly different Borjas (2003) specification from that in Table 5-2, so their results should be compared to a harmonized elasticity from Borjas (2003) of  $-0.5$ .

<sup>39</sup>See Baker et al. (1999).

<sup>40</sup>Borjas (2014a) argued that the share specification is superior because the relation between the wage and immigration-induced percentage increase in labor supply is highly nonlinear.

Llull's (2015) skill cell study has the most negative elasticity of any study ( $-1.7$ ), which raises a possibility not considered thus far: that the impact of immigrants may vary according to the reason for their migration to the United States. His addition of instrumental variables estimation triples the size of the OLS effect found by Borjas (2003), and his choice of instruments may help inform why instrumental variables raise the magnitude so much. All other instrumental variables studies in the table use an instrument based on historical settlement patterns, which means that the estimated effect is that of immigrants who chose their U.S. location to be close to their co-ethnic predecessors (this is called the Local Average Treatment Effect) and who may therefore be disproportionately composed of immigrants who have been encouraged to come to the United States by family ties. Llull used forced migration as an instrument for the share of immigrants in a skill cell. Economic or political turmoil or natural disasters in the origin country provide random variation in immigration that is not related to better employment opportunities in the destination. His estimates therefore reflect the impacts of immigrants fleeing acute problems and for whom family ties may be less important. This raises the possibility that such immigrants have a more negative effect on natives than do immigrants encouraged by family ties, particularly if their arrival is less likely to be anticipated. An alternative interpretation is that the traditional spatial studies' instrument based on where earlier settlers settled is simply invalid because those earlier settlers settled in high-wage cities.

An important point is that, while Table 5-2 suggests which native wages are more susceptible to a given immigration inflow, what the table does not show is that native groups differ in the magnitude of immigrant inflows they face. For example, since native dropouts experience a larger immigrant-driven labor supply increase than do natives overall (see Chapter 4), their greater susceptibility to immigration is compounded by higher inflows.

The results of these comparative exercises remain consistent with *The New Americans* (National Research Council, 1997) in suggesting that, particularly when measured over a period of 10 years or more, the impact of immigration on the overall native wage may be small and close to zero. However, estimates for subgroups span a wider range and suggest some revisions in understanding of the wage impact of immigration since the 1990s. At that time, the authoring panel's conclusion that "immigration has had a relatively small adverse impact on the wage and employment opportunities of competing native groups" seemed to summarize well what the academic studies indicated. However, the intensive research on this topic over the past two decades, summarized in Table 5-2, displays a much wider variation in the estimates of the wage impact on natives who are most likely to compete with immigrants, with some studies suggesting sizable negative wage effects on native high school dropouts. In addition, the



recent literature is in agreement with *The New Americans* in finding larger negative effects for disadvantaged groups and for prior immigrants than for natives overall, when those effects are examined separately. (Results for prior immigrants are not shown in Table 5-2 but were reviewed earlier in Section 5.3.) Thus, the evidence suggests that groups comparable to the immigrants in terms of their skill may experience a wage reduction as a result of immigration-induced increases in labor supply, although there are still a number of studies that suggest small to zero effects.

## 5.6 HIGH-SKILLED LABOR MARKETS AND INNOVATION

Much of the research on the impact of immigrants focuses on the inflow of immigrants with low education and skills. Immigration patterns for the United States drive some of this emphasis because new arrivals are disproportionately represented in lower educational attainment segments of the population. As of 2011, ACS data show that nearly one-third of foreign-born individuals in the United States do not have a high school diploma and about 23 percent have a high school diploma and nothing beyond (Orrenius and Zavodny, 2014).<sup>41</sup> It is therefore often presumed that the majority of immigrants will enter low-skilled labor markets, and this is where fear has been expressed that natives' job opportunities will be lost. However, as discussed in Chapters 3 and 6, another sizable concentration of immigrants is in high-skilled educational categories, and in recent decades immigrants have become overrepresented in certain occupations—for example, computer software developers, medical scientists, registered nurses, teachers, accountants, computer systems analysts, and physicians—requiring high education and skill levels.<sup>42</sup> ACS data also show that, as of 2011, 27 percent of the foreign-born have a college degree or higher, compared with just over 28 percent for natives, and 29 percent of workers in the U.S. economy with doctoral degrees are foreign-born. Reflecting these trends, researchers considering the overall impact of immigration on wages and employment have become increasingly interested in what is happening at the high end of the skills spectrum. Consideration of the impact on natives of high-skilled immigration raises some similar questions to those considered earlier for less-skilled immigrants. But in addition, new questions arise in the context of high-skilled immigration: High-skilled immigrants may innovate, or help natives innovate, and more generally may have positive spillovers on native productivity.

<sup>41</sup>See Chapter 3 for a more detailed breakdown of education attainment of immigrants.

<sup>42</sup>See Orrenius and Zavodny (2014). The fact that a large share of immigrants is highly skilled is not new. Immigrants have always had a bimodal distribution by education. That the high end is *overrepresented* relative to natives is, however, a new development.

Technological progress is a key driver of productivity growth and ultimately of economic growth (Griliches, 1992). If immigrants innovate and advance technology, they therefore increase the growth rate of native income in addition to raising its level. Jones (2002) estimated that 50 percent of U.S. total factor productivity (TFP)<sup>43</sup> growth in recent decades is attributable to scientists and engineers. One way high-skilled immigrants could increase technological innovation is through a greater concentration than natives in science and engineering occupations. Immigrants are likely to be overrepresented in such occupations, since scientific and engineering knowledge transfers easily across countries; it does not rely on institutional or cultural knowledge, is not associated with occupations with strict licensing requirements like the practice of medicine, and does not require the sophisticated language skills of a field such as law (see Chiswick and Taengnoi, 2007; Peri and Sparber, 2008). High-skilled immigrants could also increase innovation if a combination of immigration policies and immigrant self-selection leads them to be more educated or of higher inventive ability. Even immigrants who do not innovate themselves may increase innovation by providing complementary skills to inventors, such as entrepreneurship. On the other hand, because natives are likely to respond to the arrival of immigrant innovators, any immigrant contribution to innovation is unlikely to be simply additive. Potential native innovators could be deterred by the additional competition or could be attracted by the possibility of collaboration.

These considerations make studies of immigrant innovation and entrepreneurship, and of skilled immigration more generally, of great interest and importance. In this section, after providing background on the visa pathways available to skilled immigrants, the panel examines the effect of high-skilled immigration on native wages and employment. We then review the effect of immigration on innovation followed by the effect of immigration on entrepreneurship. While research in this area is quite recent, there is very little to suggest that wages are driven down or that native workers are displaced in high-skilled occupations; the evidence is stronger, though still inconclusive, that the direction of any impacts is at least modestly positive. The innovation literature as a whole indicates that immigrants are more innovative than natives and increase innovation per capita, thus likely boosting economic growth per capita. Immigrants appear to innovate more than natives not because of greater inherent ability but due to their concentration in science and engineering fields.<sup>44</sup>

<sup>43</sup>TFP is defined as that portion of output not accounted for by the amount of capital stock and (quality-adjusted) labor force used in its production.

<sup>44</sup>Borjas (2014a) and Kerr (2013b) also reviewed this literature.

### Visa Pathways for High-Skilled Immigrants

Foreign-born workers with a bachelor's degree or equivalent initially move to the United States either on a temporary visa or as a permanent resident. A worker who enters as a permanent resident may do so as a relative of a U.S. permanent resident or citizen, sponsored by an employer as an EB-1, EB-2, or EB-3 worker considered particularly qualified, or on an EB-5 investor's visa. Permanent residents are free to change employer. Temporary work visas are issued to the foreign worker's U.S. employer to hire him or her specifically: The worker is not free to choose an employer on arriving in the United States, faces barriers to changing employer after arrival, and may not become self-employed (or start a company) nor become unemployed. Those who enter on temporary visas may succeed in obtaining permanent resident status by marrying a U.S. citizen or through their employer's sponsorship. Some foreign-born workers initially enter the United States as students or trainees on F-1 visas and take advantage of the Optional Practical Training period permitting up to a year and a half of work, and/or they obtain another status after graduation.<sup>45</sup> Individuals who enter as dependents of temporary visa holders and may be unable to work initially gain permanent residence if their family member does.

Because those entering as permanent residents typically stay longer in the United States than do those entering on temporary visas, the initial visa composition of new entrants is different from that of the stock of workers at a given point in time. The National Survey of College Graduates shows that, in 2013, 38 percent of foreign-born, college-educated workers had entered with lawful permanent residence, 16 percent on a temporary work visa, 25 percent on a student or trainee visa, 11 percent as the dependent of a temporary visa holder, and 9 percent on other temporary visas.

The two most common entry work visas are the intracompany transferee visas (L-1A and L-1B), whose numbers are uncapped and are for 1-3 years, renewable for a maximum stay of 5-7 years, and the specialty worker (H-1B) visas, whose number is capped (in the for-profit sector) and which are issued for 3 years, renewable once. Both are "dual intent" visas, meaning the employer may sponsor the worker for permanent residence. Intracompany transferees have been transferred to the United States by an employer for whom they have worked abroad for at least a year. Some skilled workers also enter as a J-1 exchange visitor, although the number of J-1 holders who are skilled is not known.<sup>46</sup> As discussed below, while

<sup>45</sup>For a detailed description of visa types, see <https://www.uscis.gov/working-united-states/working-us> [November 2016].

<sup>46</sup>See Wasem (2016) for information on less common temporary work visas for skilled workers.

H-1B visa holders have been subject to much scrutiny, despite imperfect data, there has been much less analysis of L-1 visa holders.

### Impact of High-Skilled Immigration on Wages and Employment

As noted previously, the impact of high-skilled immigration on native wages and employment has been the focus of less attention than the impact of low-skilled immigration. However, in part due to the substantial and rising share of high-skilled immigrants, as well as the possibility of positive spillovers from this group, increasing attention has focused on them. Much of this research employs the spatial approach. As elsewhere in the spatial literature, it is difficult to identify the causal effect of skilled immigration—again, reverse causality or unobserved common factors may confound results. For example, wage increases for natives may lead to increased growth of immigration by STEM workers—so again, the potential for results to be contaminated by locational choices persists.<sup>47</sup> Analyses must address the possibility that cities with rapid productivity growth will experience wage growth and (for nonobservable reasons) will also attract foreign STEM workers.

A study by Peri et al. (2015a) devised an instrument to address the endogeneity problem, apportioning the changing national-level number of H-1B visas to cities based on the 1980 distribution of foreign-born STEM workers, thus combining the identification methods of Card (2001) and Kerr and Lincoln (2010).<sup>48</sup> Their study period, 1980 to 2010, is especially dynamic because college-educated STEM workers grew from 2.4 percent of total employment to 3.2 percent over the period, and foreign-born workers were responsible for more than 80 percent of this growth. The authors found that a rise in foreign-born STEM workers by 1 percentage point of a city's total employment (close to the total increase over the period) increases the real wages of college-educated natives by 7 to 8 percent and those of noncollege-educated natives by 3 to 4 percent (Peri et al., 2015a, p. 3). The effect on the native employment rate was not statistically significant. These results are consistent with a positive effect of inflows of foreign-born STEM workers on the wages of both college-educated and, to a lesser extent, noncollege-educated natives. However, the very large estimates of

<sup>47</sup>Controlling for factors such as native response may be especially important in this context, given that high-skilled labor markets are likely to be national and even international in spatial scope.

<sup>48</sup>To ensure that this is an effective instrumental variable, the authors tested to confirm that “the initial (1980) distribution of other types of foreign-born workers (e.g., less educated and manual workers), the initial industry-structure of the metropolitan area, and the subsequent inflow of non-STEM immigrants do not predict growth in foreign STEM workers” (Peri et al., 2015a, p. 3).

this wage increase raise the possibility that there may be additional factors driving the determination of wages in high-skilled labor markets that are not captured by this approach.

Other studies of the impact of high-skilled immigration on wages and employment analyze the impact on specific groups of native workers. Because around half of workers receiving H-1B visas in recent years have been hired to work in computer occupations, these jobs are the most likely to be negatively impacted by an inflow of skilled immigrants. To examine this, Peri et al. (2015b) took advantage of the fact that H-1B visas were allocated via lottery in 2007 and 2008. Some cities appeared to satisfy less of their firms' demand for H-1B workers than did others, although the city demand for H-1B visas has to be proxied by firms' preliminary expressions of interest, which are much more numerous than actual applications. The authors found that the more a city's demand for H-1B workers outstripped the visas its firms won in the lottery, the lower the city's employment and wage growth for native-born workers in computer occupations. They inferred that H-1B workers do not displace but rather complement natives in computer-related occupations.<sup>49</sup>

These positive estimated effects on native wages (Peri et al., 2015a, 2015b) and employment (Peri et al., 2015b) are consistent with high-skilled immigrants' being complementary with natives, especially high-skilled natives; with human capital spillovers stemming perhaps from interactions among workers; or with skilled immigrants innovating sufficiently to raise the productivity of all workers. For example, highly educated hires may stimulate the productivity of natives—at least in the computer-related occupations studied—incentivizing firms to expand hiring. This type of mechanism is also explored in important research by Moretti (2010), who found that each job in the tradable high tech sector (making products that need not be consumed locally) generates between 0.5 to 2 additional jobs in the local economy. Immigrant innovation is considered in detail later in this section (Section 5.6).

However, not all studies find beneficial wage and employment effects of skilled immigrants. Borjas (2009) examined the correlation between immigrant share and the earnings of doctorate-holders by doctoral cohort and discipline. He estimated wage elasticities of  $-0.24$  to  $-0.31$ , where these elasticities indicate the percentage change in earnings associated with a 1 percent change in labor supply due to immigration. The larger estimate (absolute value) was obtained when the elasticity was calculated using only the sample of foreign-born doctoral recipients that intended to stay in the United States. In addition, Borjas and Doran (2012) examined

<sup>49</sup>In contrast, a study by Doran et al. (2015) found that firms' employment of H-1B workers did tend to crowd out firms' employment of other workers.

the impact of the arrival of 336 Soviet émigré mathematicians after the collapse of the Soviet Union. They found that American mathematicians in subfields with active émigrés were published and cited less after 1992 and were more likely to move to lower-quality institutions and out of active publishing.

### **Do Natives Change Field or Occupation in Response to Skilled Immigration?**

One reason many high-skilled natives may not be harmed by high-skilled immigration, especially over longer time periods, is that they may shift into other fields in which they have a comparative advantage due, for example, to qualifications or language skills or in which they are complementary to immigrants. Such shifts would increase the economy's productivity via greater specialization and would constitute one of the benefits of immigration. Peri and Sparber (2011) provided evidence that inflows of highly educated immigrants cause natives to switch to more communication-intensive occupations. Cortés and Pan (2014) found that U.S. states with the highest flows of foreign-born nurses experienced decreased numbers of natives entering the profession and sitting for licensing exams; the researchers detected an offsetting increase of similar size in the numbers of natives entering teaching professions in these states. They used an instrument based on historical immigrant flows for foreign nurses. Borjas (2007) employed a fixed effects panel of universities over time to study the effect of foreign-born graduate students on native-born graduate student enrollment. He did not find evidence of a crowd-out effect for the typical native, but there was a strong negative correlation between increases in the number of foreign-born students enrolled at a particular university and the number of white native-born men in that university's graduate program.

The possibility of natives changing occupation or field of study has been of particular interest in the context of immigrants' effect on innovation. Consequently, a number of papers ask whether skilled immigration causes natives to leave or fail to enter STEM fields. Orrenius and Zavodny (2015) examined whether native-born bachelor's students pick a science or engineering major. The covariates of interest measure the concentration of immigrants in college as well as the concentration of immigrants when the natives were of high school age, and the instruments are variants of the historical settlement pattern instrument. They found that the presence of immigrants deterred some native-born women from choosing a science or engineering major; this effect was not found for native-born men. Some evidence of native response to immigrants entering STEM fields was also found by Bound et al. (2015). Using a structural model, the authors estimated that native employment in computer science would have been

7.0-13.6 percent higher in 2004 absent increased immigration after 1994; they also found wages for computer scientists would have been 2.8-3.8 percent higher. However, they found that *total employment* in computer science would have been 3.8-9.0 percent *lower*. This is consistent with the possibility that immigration increased software innovation, although this is of course hard to measure.

Another reason that an increase in the numbers of high-skilled immigrants in the labor market may not lead to lower overall employment or wages of highly educated natives is positive productivity effects, or spillover effects whereby technological progress is spurred through the creation and diffusion of knowledge and innovation. This topic is discussed below.

### Theoretical Considerations Relevant to Innovation

As explained in Borjas (2014a) and discussed above, it is high-skilled immigrants' potential positive externalities, rather than the simple fact that they are more productive individually than low-skilled immigrants, that distinguish their impact on natives from that of other immigrants. Innovation is the channel through which immigrants could potentially have the largest positive externality. Innovation, whether by natives or immigrants, eventually enters the public domain and increases the productivity of workers not linked through the market to the original innovator. Immigrant innovators may also have a positive externality on native innovators, which could magnify the externality due to their own innovation.

However, the arrival of a certain number of innovative immigrants is not likely to boost the number of innovators in the country by the same number. Some innovative immigrants will not enter innovative work, while innovative natives will respond to the immigration. Some natives may leave innovative work to exploit the increase in their comparative advantage in language-intensive work (Peri and Sparber, 2009). Conversely, if immigrant innovators render native innovators more productive, the number of native innovators could rise. Studies of the effect of immigration on innovation must take these responses into consideration when judging whether immigration is likely to have boosted economic growth rather than simply having caused a one-time increase in efficiency.

### Methodological Considerations for the Impact of Immigration on Innovation

Many of the methodological concerns relevant for the impact of immigrants on innovation are the same as those relevant for the impact on wages and employment, especially the endogenous pattern of immigrant density across the units of observation. One dimension along which studying inno-



vation is trickier is measurement: most studies proxy for innovation with patents, while some compute TFP<sup>50</sup> and assess the effect of immigration on productivity. Patent counts measure inventions, a type of knowledge with the potential to increase TFP, but not all inventions are patented and not all innovation comes in the form of inventions. Innovative business practices are not inventions, for example, while innovative software became patentable in 1995 amid debate about whether a software innovation constitutes an invention (see Hall and MacGarvie, 2009). Furthermore, patents vary greatly in terms of quality, though future citations to patents provide a guide to quality. On the other hand, the measurement of TFP is fraught with difficulties such as the specification of the correct production function and further measurement issues such as the rate at which capital depreciates (Aiyar and Dalgaard, 2005).

Conversely, along a second important dimension, studying the impact on innovation is more straightforward than studying the impact on wages. While the presumption of factor price equalization (or at the least, factor price insensitivity) through interregional trade means that the effect of local concentrations of immigrants on wages is likely to be national in part, and not purely local, there is no equivalent of this constraint for patents; whereas the benefits of innovation diffuse across the country, the location of the original inventor does not. Nor would a response of capital flows equalize patenting across regions. The adjustment mechanism that does remain is geographic mobility of native innovators reacting to any immigration-induced changes in innovator wages. If immigrant innovators have negative effects on native innovator productivity and wages in their region, native innovators will avoid immigrant locations. This native relocation will lead a spatial identification approach to underestimate the benefit of immigration. Nevertheless, the forces for national diffusion of innovation responses are weaker than for the diffusion of wage responses. The implication is that using spatial variation in immigration to identify the effect on patenting is subject principally to the endogeneity problem of immigrants possibly choosing their location based on the outcome variable. Studies focusing directly on productivity, however, are subject to problems similar to wage studies: a bias toward finding no effect remains even if immigrant location is successfully instrumented, due to the forces equalizing labor market conditions across regions.

### Are Immigrants More Innovative Than Natives?

Immigrants are most likely to increase innovation if they are themselves more innovative than natives, making an individual-level comparison of

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<sup>50</sup>TFP is defined above, in the introduction to Section 5.6.



immigrants and natives the logical first step. At least as measured by patents, immigrants do innovate considerably more than natives. Using the 2003 National Survey of College Graduates (NSCG), Hunt (2011) showed that among individuals with a bachelor's degree or higher, immigrants are twice as likely to patent as natives, while Kerr (2007) documented the rapid rise from 1975 to 2004 of U.S. patents authored by U.S. residents with Indian and Chinese first and last names: from 2 percent to 9 percent of all patents for Chinese names and from 2 percent to 6 percent of all patents for Indian names. Kerr could not distinguish first and second generation immigrants, but this growth is nevertheless fundamentally fueled by immigration.

More specifically, the Hunt (2011) study showed that 0.9 percent of natives, compared to 2.0 percent of immigrants, had been granted a patent in the previous 5 years. One measure of the quality of these patents is whether they have been licensed or commercialized; 0.6 percent of natives compared to 1.3 percent of immigrants had licensed or commercialized a patent granted in the previous 5 years. All these differences were statistically significant. She also found that, conditional on having at least one patent, immigrants and natives had similar numbers of patents.

Hunt's dataset is one of the few with visa information, and she found that the particularly innovative immigrants were those who entered on a temporary worker visa or a temporary student visa (especially as a graduate student or postdoctoral fellow). It seems that foreign-born workers or students chosen by a firm or university were more innovative than those who entered on a green card, most of whom were joining family in the United States and who patented at levels similar to natives. Hunt also investigated the source of the immigrant advantage and found that the immigrants' edge was due to their being much more likely to have studied science or engineering as a highest degree and to a lesser extent to their having higher education than natives. Her comparison among immigrants and natives with similar fields of study and level of education did not yield any statistically significant differences in patenting.

### **Do Immigrants Increase Innovation?**

The superior innovative performance of immigrants, as measured by instruments such as rates of patenting, does not, however, necessarily imply that immigration increases innovation, since natives are likely to change their behavior in the face of immigration and could reduce their own innovation. One of several studies that tackled the more difficult issue of overall innovation is that of Hunt and Gauthier-Loiselle (2010), who used census and U.S. Patent and Trademark Office (USPTO) data to form a panel of states from 1950 to 2000. The key explanatory variable, the intercensal

change in the share of a state's population that is skilled immigrants, is endogenous: High-skilled workers are more likely to migrate to states that are experiencing positive shocks to innovation, either narrowly or as part of more general skill-biased technological change, unobservable to the econometrician. Like many authors of wage impact studies, Hunt and Gauthier-Loiselle used an instrument based on historical immigrant settlement patterns: in this case, the 1940 settlement pattern.<sup>51</sup>

The results showed that influxes of high-skilled immigrants—those with either at least a bachelor's or master's degree or those working in science and engineering occupations—statistically significantly increased patenting per capita. A 1 percentage point increase in the immigrant college graduates' population share increased patents per capita by 9-18 percent, with the larger effects resulting from the instrumental variables analysis. This means that the net result of the immigrants' own innovation, any native movements in or out of innovative jobs, and any effect of immigrants on the productivity of native innovators was positive. The magnitudes are such that the increase in skilled immigration in the 1990s can account for one-third of the large patenting increase in that decade. In turn, this additional patenting may have increased GDP per capita by 1.4-2.4 percent by the end of the decade.

Immigrants may also increase native patenting, but because U.S. patents do not note the birthplace of the inventor, Hunt and Gauthier-Loiselle (2010) could not directly examine this question. However, calculations of the immigrant contribution based on the individual-level 2003 NSCG suggest that the state panel must reflect considerable positive effects on native patenting. But the standard errors for the calculations are large, and the individual-level immigrant contribution may not always have been at its 2003 level.

Most other papers study the effect of more specific groups of immigrants than Hunt and Gauthier-Loiselle (2010). Kerr and Lincoln (2010), for example, used USPTO patent data and CPS data to form a panel of cities for 1995-2008, but they examined the effect on patenting of increased numbers of workers entering the United States on H-1B visas. Hunt (2011) suggested that these workers are indeed very likely to patent. The difficulty is that the distribution of H-1B holders by states is unknown and must be proxied for by using the number of preliminary applications, Labor Condition Applications, or simply noncitizen immigrants, which introduces measurement error into the regression. Identification of the effect comes from variation in the initial share of the population that is on H-1Bs, interacted

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<sup>51</sup>A potential issue with this approach is that if controls do not account for state-specific patenting shocks that are very persistent and influence national inflows of particular immigrant groups, the instrument could be correlated with the error term. Though this does not seem likely, it cannot be ruled out, for example, that California has had serially correlated positive patenting shocks that caused low-skilled Chinese to settle there before 1940 but that have motivated high-skilled Chinese to move to the United States in more recent years.

with the change in the H-1B national cap—under the assumption that a state's increase is greatest where the initial share is greatest.

Kerr and Lincoln (2010) found that an increase in the national H-1B cap statistically significantly increased patenting in cities with many H-1B holders compared to cities with fewer H-1B holders. A 10 percent increase in the cap was associated with a 0.3-0.7 percent increase in patenting for each standard-deviation change in a city's share of H-1Bs. The magnitude of these results is not easily comparable with those of Hunt and Gauthier-Loiselle (2010). Kerr and Lincoln found that immigrants had little or no effect on the patenting of those with Anglo-Saxon names, who were disproportionately natives. This contrast with the Hunt and Gauthier-Loiselle findings could be attributable either to imperfections in one or both studies relevant to measuring this externality or to the focus by Kerr and Lincoln on short-term effects, whereas Hunt and Gauthier-Loiselle focused on long-term effects.

In contrast to the studies described so far, Doran et al. (2015) found no contribution to patenting from H-1B visa holders. Specifically, they found that relative to firms that lost the 2006 and 2007 H-1B lotteries, winning firms had no increase in the number of patents in the 9 years following their acquiring the H-1B workers. The use of a lottery makes the identification in this study methodology particularly clean.

The differing results across these studies may reflect immigrant heterogeneity generally and among H-1B workers in particular. A large share of the H-1B inflows consists of young computer programmers working for information technology software services firms; often both firm and worker are Indian.<sup>52</sup> Such workers tend to stay only a short time in the United States<sup>53</sup> and reflect U.S. participation in Mode 4 of the General Agreement on Trade in Services;<sup>54</sup> these workers are not expected

<sup>52</sup>For example, in FY 2006, about one-half (51%) of first-time H-1Bs were awarded to computer programmers; 69 percent of first-time H-1B visas were awarded to workers ages 25-34; and 54 percent of first-time H-1B visas were awarded to Indians. See U.S. Citizenship and Immigration Services data at <https://www.uscis.gov/tools/reports-studies/immigration-forms-data> [May 2017].

<sup>53</sup>Clemens (2010, p. 14) reported that for a large Indian software services firm making great use of the H-1B program, typical U.S. assignments last 6-15 months (though it is common for H-1B winners to return to India, then later take another H-1B assignment in the United States).

<sup>54</sup>This trade agreement took effect in January 1995 and is binding on all members of the World Trade Organization, which was established on the same date. Mode 4 concerns the supply of a service by a service supplier of one member, through the presence of natural persons of a member. The United States committed to permitting temporary work permission for intracompany transferees from abroad (an unlimited number of L-1 visas) and for 65,000 specialty occupation workers (H-1B visas). See <https://www.uscis.gov/tools/reports-studies/immigration-forms-data> [May 2017].

to innovate.<sup>55</sup> Such workers are a large share of the flows that drive the results reported by Doran et al. (2015), but they are a much smaller share of the stocks of immigrants who entered on temporary work visas and were found to be so innovative by Hunt (2011). A cross-section such as that used by Hunt (2011) implicitly weights immigrants according to the duration of their stay in the United States.

Two other papers examine fascinating cases of high-skilled immigration and its effect on innovation. Using a clever identification based on the different specializations of American and Soviet mathematicians, Borjas and Doran (2012) showed that American mathematicians' research was reduced by the arrival of Russian mathematicians after the Cold War but that total U.S.-based mathematical research remained approximately constant. In contrast, Moser et al. (2014) showed that German Jews who fled to the United States in the 1930s greatly boosted patenting in chemical fields. They found that the German Jews increased native patenting by attracting to their subfields natives who would otherwise not have patented, while reducing the patenting of natives already in the field. As with Doran and colleagues, their instrument exploits differences in specialization—in this case between German Jews and American chemists. Both of these studies examined the impact of exceptionally skilled immigrants, and one would not necessarily expect to find similar impacts of immigration from, for example, recent immigrants in the H-1B program.

A quite different approach is to measure the effect of immigration on productivity directly. The advantage of this approach is that productivity is the economists' ultimate interest, while the disadvantage is that productivity is difficult to measure and innovations improving productivity diffuse across the country. The measure of productivity most closely linked to innovation is TFP. Measuring TFP involves modeling output by selecting a production function for the economy—a difficult exercise—and measuring the values of inputs, which involves judgments on matters such as the rate of depreciation of capital. TFP is measured as the residual in the modeling exercise and is sensitive to modeling and measurement choices, so this type of evidence cannot provide conclusive proof of an immigration impact on productivity.

Peri (2012) measured state-level TFP for a panel of states and linked this directly to immigration, using as an instrument historic settlement patterns (similar to Hunt and Gauthier-Loiselle, 2010) or distance to the Mexican border. Peri et al. (2015a) calculated the effect of immigrant science

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<sup>55</sup>Computer science graduates in general do not patent more than do workers outside science and engineering (Hunt et al., 2013), but innovation in computer science may often be more akin to improved business organization than invention and hence poorly captured by patent counts.

and engineering workers (unusually broadly defined) on TFP by combining effects on wages and employment, described above, with the assumption that the capital to labor ratio is constant in the long run. Both papers (Peri, 2012; Peri et al., 2015a) found that immigration increases TFP.

### Do Immigrants Foster Growth Through Entrepreneurship?

For inventions to speed growth, they must be brought to market. Inventiveness and business acumen are therefore complementary inputs to technology-spurred productivity growth. These inputs may be embodied in a single person or may be combined through collaboration among two or more people. New inventions are often best developed and marketed in new firms, making entrepreneurship a particularly important type of business acumen in this context.<sup>56</sup> Baumol (1993, p. 260) argued that, just as capital investment and human capital may be treated as endogenous to economic growth, “[t]o some degree, the same story can be told about the exercise of entrepreneurship, investment in innovation, and the magnitude of activity directed to the transfer of technology. These too, clearly, are influenced by past productivity growth achievements and they also, in their turn, influence future growth.” A link can be made between the literature on entrepreneurship and endogenous growth theory (Lucas, 1988) by recognizing that an expanded capacity for entrepreneurial ability is a form of human capital. Schultz (1980, p. 437) stated that “. . . the abilities of entrepreneurs to deal with the disequilibria that are pervasive in a dynamic economy are a part of the stock of human capital. . . . An innovation by a business enterprise (Schumpeter’s innovator) is an endogenous event.”<sup>57</sup>

Researchers interested in economic growth as well as in entrepreneurship and business formation frequently examine the rate at which immigrants open new firms. Fairlie and Lofstrom (2015) used ACS data from 2006 to 2010 to calculate that the 2.4 million immigrant business owners (defined simply as the self-employed, with or without employees) made up a slightly higher share of all business owners (18.2%) than their share of the total U.S. workforce (16.3%). This translates into slightly higher business ownership among immigrants than among natives: 11.0 percent of immigrants and 9.6 percent of natives owned a business in this dataset.

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<sup>56</sup>Wennekers and Thurik (1999, p. 46) described entrepreneurship as the “manifest ability and willingness of individuals, on their own, in teams, within and outside existing organizations, to: perceive and create new economic opportunities (new products, new production methods, new organizational schemes and new product market combinations); and to introduce their ideas in the market, in the face of uncertainty and other obstacles, by making decisions on location, form and the use of resources and institutions.”

<sup>57</sup>See also Acs et al. (2012).

However, there are variations in entrepreneurship by immigrants' country of origin, as well as by industry. Indian immigrants are the most entrepreneurial of any group including natives, and immigrant businesses represent more than a quarter of businesses in the transportation, accommodation, and recreation and entertainment sectors.<sup>58</sup>

Monthly business startup data constructed from matching respondents across months in the 2007-2011 CPS were used by Fairlie and Lofstrom (2015) to estimate that immigrants represented 24.9 percent of new business owners, a figure much higher than the 15.6 percent of the nonbusiness-owning population immigrants represent. This finding seems at odds with the fairly similar overall self-employment rates found for immigrants and natives. One possibility is that the more recent immigration cohorts were more entrepreneurial than either natives or earlier immigrants, which should eventually lead to a larger difference in the stock of self-employed. Figure 5-3, which shows that the immigrant self-employment rate has risen relative to the native rate since 2000, is consistent with this possibility. Alternatively, higher business startup rates could imply a higher failure rate for immigrant entrepreneurs. Consistent with immigrant businesses being younger, they are also smaller: Using data from the 2007 Survey of Business Owners, Fairlie and Lofstrom (2015) found that immigrant-owned firms had \$434,000 in average annual sales and receipts compared with \$609,000 for nonimmigrant firms.

Business owners' level of education may also be used as a measure of the likely contribution of businesses to the economy. Fairlie and Lofstrom (2015) reported that, while immigrants are highly overrepresented among owners with less than a high school degree, at almost 45 percent, they also represent 15.7 percent of owners with a college degree. However, the latter share may overstate the value of immigrants' contribution if immigrants turn to self-employment because their foreign education and experience are less valuable, or less valued, than American education and experience (Borjas, 1986; Fairlie and Meyer, 1996; Portes and Zhou, 1996), rather than because of an innovative business idea. For example, Akresh (2006) found that 50 percent of immigrants experienced occupational downgrading<sup>59</sup> on arrival in the United States. While showing that immigrants contribute significantly to self-employment, data representative of the population thus do

<sup>58</sup>For theoretical and empirical analysis of the clustering of immigrant and ethnic groups in particular types of self-employment, see Kerr and Mandorff (2015). Kloosterman and Rath (2001) focused on small business formation in nontradable sectors such as lower-end retailing and restaurants.

<sup>59</sup>As characterized by the author, this term refers to transitions by immigrants into jobs for which they are overeducated or overqualified and which may entail a loss of occupational status or prestige relative to the job they held in their country of origin.

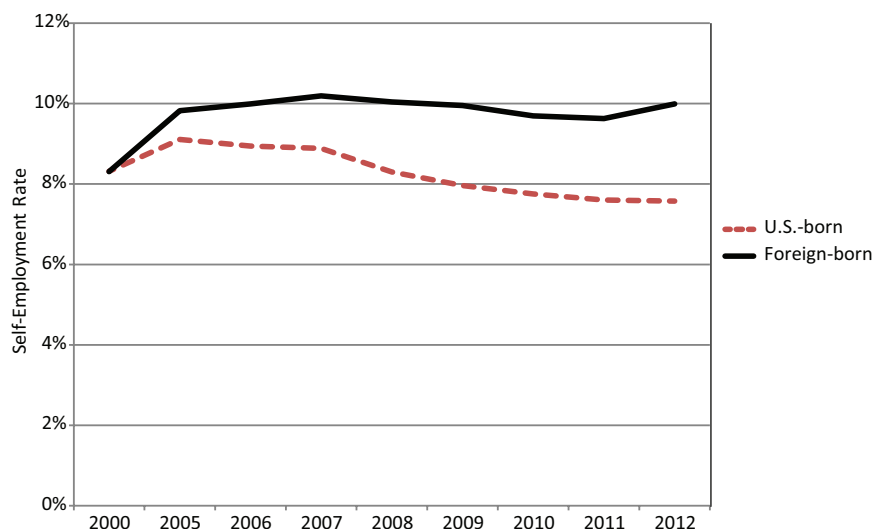


FIGURE 5-3 Self-employment rates by nativity, 2000-2012.

SOURCE: Magnus Lofstrom, *Immigrant Entrepreneurship* (presentation to the panel) based on Current Population Survey data, July 29, 2014.

not show clearly the contribution of immigrant entrepreneurs to successful (in terms of size or growth) or innovative firms.

To pinpoint immigrant contributions to innovative entrepreneurship, better data are required. Currently, it can be difficult to distinguish between the self-employed who have a small number of employees and those that do not, or between businesses that are innovating and those that are not. The smaller average size of immigrant businesses may obscure a pattern in which immigrants disproportionately start small, noninnovative businesses that are less likely to grow as well as successful, eventually large, innovative businesses. There are hints that immigrants disproportionately start very successful businesses, suggested by high-profile examples of public U.S. companies with foreign-born founders, such as Google, eBay, Yahoo!, and Sun Microsystems. In a sample of 1,300 “high-impact” technology firms and 2,000 founders across the United States, Hart and Acs (2011) found that around 16 percent of firms have at least one immigrant founder. Wadhwa et al. (2007) found that immigrants started 25 percent of new high tech companies with more than \$1 million in sales in 2006, while Anderson and Platzer (2006) found that immigrants represented 25 percent of founders of recent public venture-backed companies. Qualitative studies such as Saxenian (1999) also emphasize the large immigrant contribution to technology startups.



Using the 2003 NSCG, Hunt (2011) was also able to narrow the focus to fast-growing startups. Like many surveys, the NSCG includes questions on firm size and self-employment, which permit a distinction between the self-employed with more than 10 employees and the self-employed with fewer than 10 (including none). Hunt (2011) took advantage of unusual additional startup information in the NSCG to examine the probability of founding a firm that grew to more than 10 employees in 5 years. She found that, conditional on characteristics, immigrants are 30 percent more likely to found such firms than are similar natives. In an unconditional comparison between all immigrants and all natives, the result is the same in sign and magnitude, but statistically insignificant: The rarity of the outcome (0.6% of native respondents founded a firm that met the condition) makes standard errors large in all regressions and also precludes investigation of the startup's industry or the founder's patenting activity.

A literature overlapping with the immigrant business formation and entrepreneurship literature examines links between immigrants and their home countries. For example, Saxenian (2002) described a phenomenon she called "brain circulation." As high tech entrepreneurs first migrate to the United States for some combination of education, business experience, and innovation experience, they found technology companies or affiliates at home while maintaining or increasing U.S. ties. Kerr (2008) quantified the positive links between immigrant patenting in the United States and labor productivity and manufacturing (especially high technology) output in immigrants' home developing countries, while Foley and Kerr (2013) showed that an increase in a multinational company's patenting by workers of a particular ethnicity was followed by greater investment by the company in the home country corresponding to the ethnicity. Studies of whether immigrants boost trade between the source and destination country also have implications for growth and entrepreneurship (Gaston and Nelson, 2013).

Immigrants may increase international trade in two ways. First, they may have a taste for goods available only in the home country, which stimulates demand for imports directly and also indirectly as natives acquire a taste for the same foreign goods. Second and more relevant for this section, immigrants know the markets in their home country and maintain business ties there founded on trust and social capital. These ties and knowledge can reduce the problems of incomplete contract enforcement and asymmetric information that constitute barriers to trade. The empirical literature in this area is less sophisticated in dealing with potential endogeneity than other literatures related to immigration. The most rigorous paper examining the United States, Bandyopadhyay et al. (2008), confirmed the results of the wider literature by finding that U.S. states that received an increased number of immigrants from a particular source country increased their exports



to that country. Andrews et al. (2015) confirmed these results for Germany using firm-level data. However, the possibility that a common third factor is increasing both trade and immigration, or that the causality runs both ways, cannot be ruled out in all cases.

The literature on immigrants and entrepreneurship is informative about the number of businesses formed by immigrants and the importance of ties between immigrant innovators and entrepreneurs and their home country, but it is only suggestive about whether immigrants causally stimulate trade or whether immigrants have a causal impact on U.S. growth through fast-growing or innovative startup companies. More research and more data with which to perform it are required to not only confirm the reported associations but also shed light on causation.

## 5.7 KEY MESSAGES AND CONCLUSIONS

Economies respond to immigration through several mechanisms: adjustment of factor prices, shifts in output mix, and changes in the use of production technology. The extensive literature on the economic impacts of immigration primarily focuses on the marginal product of labor and the resultant wage and employment outcomes in receiving countries' labor markets. The review in this chapter reflects this research emphasis. However, shifts in sectoral composition and adaptation of new technology are also discussed, both to fully understand immigration wage and employment dynamics and because they are interesting in their own right. The impact of immigration on capital accumulation and economic output, considered in Chapter 4, is relevant here in differentiating between short- and long-run changes in wages. The panel also considered the relationship between the immigration of high-skilled workers and innovation and how this relationship may generate changes in long-run economic growth; however, this topic is addressed more comprehensively in Chapter 6.

The empirical evidence reviewed in this chapter reveals one sobering reality: Wage and employment impacts created by flows of foreign-born workers into labor markets are complex and difficult to measure. The effects of immigration have to be isolated from many other influences occurring simultaneously that shape local and national economies and the relative wages of different groups of workers. Among the largest of these influences are changes in production technology, communications technology, and the global economy, which together promote international trade in goods and services (and hence offshoring), global supply chains, and foreign investment. Additionally, firm births and deaths occur, people retire, workers switch jobs, and a stream of young native-born job seekers come of age—all factors that affect the labor market. The inflow of the foreign-born at a given point in time is, under normal circumstances, a relatively

minor factor in the \$18 trillion U.S. economy.<sup>60</sup> That said, quantitatively significant labor supply shocks do occur, especially in localized markets, such as that which accompanied the 1980 Mariel boatlift in Miami (Borjas, 2016b; Card, 1990; Peri and Yasenov, 2015). Even then, the wage impacts may be difficult to detect.

The measurement task is further complicated because **the impact of immigration on labor markets varies across time and place, reflecting the size of the inflow, the skill sets of natives and incoming immigrants, the local industry mix, the spatial and temporal mobility of capital and other inputs, and the overall health of the economy.** Some of the processes that are set in motion take place immediately upon arrival of the foreign-born, while others unfold over many years. Aside from supplying labor, immigration (like population growth generally) adds to consumer demand and hence the derived demand for labor in the production of goods and services. This counterbalancing impact potentially plays a role in explaining why much of the empirical research finds small wage impacts associated with immigration. As noted above, the changes in wages and employment attributable to immigration can be difficult to identify because other factors tend to swamp the relatively small role that immigration typically plays in the overall labor market. In short, the uniqueness of immigrant inflows to time and place implies that it is difficult to use the lessons from one episode to predict the impact under different circumstances in the future.

Beyond these real world complexities, several additional measurement problems must be resolved. Primary among these (at least for some kinds of studies) is the endogeneity of immigrants' locational choices—most notably, the interaction between the vibrancy of local economies and people's location choices. Evidence suggests (Borjas, 2001; Somerville and Sumption, 2009) that immigrants locate in areas with relatively high labor demand and wages for the skills they possess and that immigrants are more willing than natives to relocate in response to changes in labor market conditions (Cadena and Kovak, 2016). If immigrants predominantly settle in areas that experience the highest wage growth, a spurious correlation arises: Wage growth (or dampened wage decline) will be erroneously attributed to the increase in labor supply. Additionally, correct identification of the wage and employment effects of immigration must account for the possible migration response of natives to the arrival of immigrants. Researchers have made great strides addressing these identification issues in recent decades; even

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<sup>60</sup>While the incremental *flow* of new immigrants appears to generate modest economic impacts, the *stock* of foreign-born individuals that has accumulated over time may be significant to *long-run economic growth* (see Chapter 6). Also notable is the fact that immigrants account for almost half the labor force growth in the United States since the mid-1990s (see Chapter 2).

so, the degree of success in dealing with them is still debated and methods are still being perfected.

Several analytic approaches have been developed to estimate wage and employment impacts associated with immigration, each with strengths and weaknesses. Spatial studies compare wage and employment trends in high versus low immigration areas, often defined by metropolitan areas, in order to identify the impact of immigration on wages and employment. A different set of studies examines the impact of immigration by exploiting variation in the density of the foreign-born across skill groups, typically defined by experience (age) and education groupings, instead of across geographic areas. Spatial studies must contend with the challenge of the endogeneity of destination locations, as described above. Meanwhile, skill cell studies, by focusing on the effect of immigrants on similar natives, may miss wage and employment effects induced by complementarities between immigrants and native-born workers at other parts of the skill distribution.

An influential variant of the skill cell literature is the third general approach reviewed in depth in this chapter. This structural approach imposes a modeling structure that relies heavily on assumptions about the relationship between output and the inputs to production (including different kinds of labor). The underlying structure assumes that average wages are unchanged by immigration in the long run—a period of time long enough such that all inputs to production, including capital, may be adjusted by firms. This assumption limits such analyses to estimating *relative* wage impacts across different groups, such as across high school dropouts, those with a high school degree, those with some college, and those with a college degree. The technical assumptions are therefore not innocuous; the most significant ones concern the degree to which capital is adjusted by firms in response to new worker inflows, the degree to which immigrants and natives within the same skill group are substitutable, and the degree to which high school graduates and high school dropouts are substitutable.

While many studies conclude that, economy wide, the impact of immigration on average wages and employment is small, a high degree of consensus exists that specific groups are more vulnerable than others to inflows of new immigrants. Theory predicts that the workers already in the receiving labor market who are the closest substitutes for immigrants are most likely to experience immigration-induced wage declines. Prior immigrants are typically the closest substitutes for new immigrants, followed by native high school dropouts, who are more affected due to the large share of low-skilled workers among immigrants to the United States. For this reason and due to concern about the economic well-being of native high school dropouts, much of the empirical literature concentrates on low-skilled labor markets.

Empirical research in recent decades suggests that findings remain by and large consistent with those in *The New Americans* (National Research Council, 1997) in that, when measured over a period of more than 10 years, the impact of immigration on the wages of natives overall is very small. However, estimates for subgroups span a comparatively wider range indicating some revisions in understanding of the wage impact of immigration since the 1990s. As noted above, for example, some studies have found sizable negative short-run wage impacts for high school dropouts, the native-born workers who in many cases are the group most likely to be in direct competition for jobs with immigrants. Even for this group, however, there are studies finding small to zero effects, likely indicating that outcomes are highly dependent on prevailing conditions in the specific labor market into which immigrants flow or the methods and assumptions researchers use to examine the impact of immigration. The literature continues to find less favorable effects for certain disadvantaged workers and for prior immigrants than for natives overall.

For the larger group of studies of natives overall or of low-skilled natives, the panel compared the magnitude of estimated wage impacts after harmonizing (to the extent possible) the effects associated with an immigrant influx equivalent to a 1 percent increase in labor supply. Some notable patterns emerge. Consistent with theory, **native dropouts tend to be more negatively affected by immigration than better-educated natives.** Some research also suggests that, **among those with low skill levels, the negative effect on native's wages may be larger for disadvantaged minorities** (Altonji and Card, 1991; Borjas et al., 2012) and Hispanic high school dropouts with poor English skills (Cortés, 2008). Since native dropouts experience a larger immigrant-driven labor supply increase than do natives overall, their greater susceptibility to a given immigrant inflow is compounded by higher inflows. Another regularity consistent with theory is that **there are larger negative effects on native wages from immigrant inflows in the short run** (i.e., in studies of the immediate impacts of abrupt immigrant inflows or in which inflows are observed over shorter periods of time, or in the case of the structural studies, when capital is assumed fixed). **Estimated negative effects tend to be smaller (or even positive) over longer periods of time (10 years or more) or in the case of structural studies, when capital is assumed to be perfectly flexible.**<sup>61</sup>

The results from our comparison of magnitudes also suggest that some of the differences in the estimated effects of immigration on natives are due to methodology, since they cannot be fully accounted for by whether the studies are looking at the long versus short term, at high school dropout

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<sup>61</sup>In the case of structural studies, when capital is assumed to be perfectly flexible, wage effects on natives are zero, although this result is built in by theoretical assumptions.

natives versus all natives, or minority natives versus all natives. **The skill cell studies appear to find the most negative wage impacts and the structural the least negative, with the spatial studies in the middle.** As noted earlier, the approaches are not fully comparable. The numerical value of some of the elasticities from the structural approach is often built in by the technical assumptions. The skill cell studies avoid the endogeneity biases of the spatial studies, which makes the former more likely to find negative effects. However, they do not include cross-effects, for example the impact of an inflow of immigrants in one skill group on the wages of natives in another skill group, whose overall sign is unknown. If positive, cross-effects would not reverse the sign of the reported net effects but would lessen their magnitude.

Most studies find little effect of immigration on the employment of natives. However, recent research (Smith, 2012) does find that native teen employment, measured in hours worked, but not the employment rate, is reduced by immigration. Moreover, as with wage impacts, there is evidence that the employment rate of prior immigrants is reduced by new immigration—again suggesting a higher degree of substitutability between new and prior immigrants than between new immigrants and natives.

The impact of high-skilled immigration on native wages and employment has been the focus of less attention than the impact of low-skilled immigration. **The results of spatial studies are mixed, but some find a positive impact of high-skilled immigration on the wages and employment of both college-educated and less educated natives.** If confirmed, such findings would be consistent with high-skilled immigrants being complementary with natives, especially high-skilled natives; with human capital spillovers stemming perhaps from interactions among workers; or with high-skilled immigrants innovating sufficiently to raise the productivity of all workers. However, other studies that examine the earnings or productivity of narrowly defined groups of high-skilled workers (such as doctorates in narrow fields or professional mathematicians) found that high-skilled immigration had adverse effect on the wages or productivity of these high-skilled natives.

Finally, immigrants influence the rate of innovation in the economy, which potentially affects long-run economic growth. While research in this area is very recent, literature on the topic as a whole indicates that **immigrants are more innovative than natives; more specifically, high-skilled immigrants raise patenting per capita, which is likely to boost productivity and per capita economic growth.** Immigrants appear to innovate more than natives not because of greater inherent ability but due to their concentration in science and engineering fields. With so much focus on the labor market, this critical issue—the relationship between immigration and long-run economic growth—is sometimes overlooked by researchers and in the public debate. We turn to this and other topics in Chapter 6.

## 5.8 ANNEX: SUMMARY COMPARISON OF SELECTED WAGE AND EMPLOYMENT IMPACT STUDIES FOR THE UNITED STATES

As an aid for readers, Table 5-3 provides a summary comparison of the spatial (cross-area) studies and structural studies discussed in Sections 5.2 through 5.7. For each study, the author, the population sample analyzed, the methodology, and the key findings are listed.

TABLE 5-3 Recent Studies Using Cross-Area, Occupation, or Industry Approaches

Study	Sample, Analysis Unit	Methods	Findings
Altonji and Card (1991)	U.S. men and women, 1970-1980, MSA	Spatial correlation, first differences, IV	1 percentage (pctg.) point increase in immigrant share lowers native wages by 0.3% to -1.2%; employment and participation effects negligible.
LaLonde and Topel (1991)	U.S. men, 1970-1980, MSA	Spatial correlation, first differences	Negative wage effects for new immigrants, effects die out for earlier immigrant cohorts, no effects for natives.
Card (2001)	U.S. men, 1990 cross-section; natives and earlier immigrants by MSA $\times$ broad skill/occupation/gender group	Spatial correlation, IV, analysis across cities and skill levels simultaneously to remove bias from omitted variables	Immigrants lower wages of less skilled natives—wages 0.99 pctg. points (male natives), 2.5 pctg. points (female earlier immigrants), 0 (other groups). 10% labor supply increase reduces employment rate 2.02 pctg. points (male natives), 0.81 pctg. points (female natives), 0.96 pctg. points (male earlier immigrants), 1.46 pctg. points (female earlier immigrants).
Cortés (2008)	U.S. men and women, 1980-2000, MSA	Spatial correlation, IV, country	Low-skilled immigrants don't affect native wages overall. Previous immigrant and Hispanic wages lowered (1-1.5%).
Peri et al. (2014)	U.S. city $\times$ period (periods: 1990-2000, 2000-2005, 2005-2010)	Estimated H-1B-driven rise in STEM workforce, based on 1990 foreign STEM workforce by city and sending country and national-level distribution of H-1B visas by sending country	1 pctg. point increase in foreign share in STEM workers raises native STEM wages 7-8%.

Borjas (2003)	Education level $\times$ experience level $\times$ U.S. census survey, 1960-2000	Number of foreign-born workers in each education-experience-year group	~10% migration-induced labor growth in 1980-2000 cut wages for native non-high school completers 8.9%.
Camarota (1998)	Cross-section (1991) for U.S.	Wages of all workers	Wages: -0.5% overall; wages for workers in low- skilled occupations -0.8%.
Card (2001)	Cross-section (1990), IV for U.S.	Relative wages and employment of low- skilled natives	No effect on relative wages, small negative impact on relative employment.
Card (1990)	Miami men and women, 1980-1985	Spatial correlation; measured impact of increase in low-skilled labor supply shock associated with Mariel boatlift	No effect on wages or unemployment of unskilled workers.
Dustmann et al. (2005)	UK men and women, 1983-2000 (pooled cross-sections)	Spatial correlation, IV methods; first- differences with IV (1983-2000); participation rate, (un)employment rate, and hourly wages of the working population by education	Immigration has statistically insignificant effect on wage of each skill group.
Dustmann et al. (2013)	UK men and women, 1997-2005	Spatial correlation by wage percentile, IV method	Immigration lowers wages at 5th and 10th percentiles, raises average and above median wages.
Clemens (2013)	58 employment offices $\times$ 66 months, North Carolina, Feb. 2005- May 2011	Great Recession-caused unemployment jump, 2008-2009	Even after total unemployed in studied counties rose from 283,000 to 490,000, and with 6,500 job openings, only 7 native workers took and held farm jobs for the 2011 season—the rest were filled by migrants.

*continued*



TABLE 5-3 Continued

Study	Sample, Analysis Unit	Methods	Findings
Smith (2012)	U.S. youth and adults	Spatial correlation, IV	10% increase in immigrants with high school degree or less reduced average number of hours worked by 3-3.5% for native teens; less than 1% for less educated adults.
Kerr and Lincoln (2010)	U.S. cities × year, 1995-2007	Estimated number of H-1B holders in a city, by ethnicity, based on national-level H-1B ethnic breakdown and number of H-1B applications in 2001-2002	Among top quintile of cities in H-1B dependence, 10% increase in national H-1B population associated in same year with 6-12% increase in patent filing by people with Indian or Chinese names and 0-2% rise overall.
Peri (2012)	U.S. states × U.S. Decennial Census, 1960-2006	Distance to Mexican border; estimates of migrant stocks based on 1960 stocks by state and sending country; national-level growth rates by sending country	Immigration increases productivity (output per units of labor and capital input).
Borjas and Doran (2012)	U.S. and Soviet mathematicians who published in 1970-1989	Arrival of ~336 Soviet émigré mathematicians in U.S. just after collapse of Soviet Union	American mathematicians in subfields with active émigrés were published and cited less after 1992 and more likely to leave profession, indicating zero-sum displacement by new immigrants.
Moser et al. (2014)	166 chemistry subfields × year, U.S., 1920-1970	Starting in 1933, arrival of 26 Jewish émigré chemists from Nazi Germany & Austria, distinguishing their pre-departure subfields from ones with active German/Austrian researchers who did not leave	American inventors in subfields with émigrés recorded an extra 170 patents/year in 1933-1970 in total, 70% over pre-1933 level.

Structural (Aggregate Production Function) Approach

Grossman (1982)	1970 Decennial Census data (native, second generation, and foreign-born workers)	Uses cross-section data to estimate a trans-log production function to compute elasticities of substitution between immigrants and natives	Second generation and foreign-born workers are substitutes for 3rd generation and higher native-born.
Borjas et al. (1997)	U.S. 1980-1995, men and women	Applies estimated substitution elasticity of low-skilled for high-skilled workers to immigrant share	Wage elasticity is $-0.322$ ; immigrants lowered wages of high school dropouts relative to high school grads by 4.8%.
Borjas (2003)	U.S. men, 1980-2000	Nested production function, IV methods	Immigrants lower wages of dropouts by 8.9% and college graduates by 4.9%.
Borjas (2014a)	Education level $\times$ experience level $\times$ U.S. census survey, 1960-2010	Nested production function, IV methods; number of foreign-born workers in each education-experience-year group	10.6% migration-induced labor growth in 1990-2010 cut wages for native non-high school completers 6.2% (no capital adjustment) or 3.1% (after full capital adjustment).
Orrenius and Zavodny (2007)	Panel model with IV (1994-2000) (for U.S.)	Wages of natives by occupation groups	Wages of low-skilled natives negatively impacted by immigration ( $-0.26\%$ ); no effect for more-skilled labor.
Ottaviano and Peri (2012)	Education level $\times$ experience level $\times$ native/immigrant $\times$ U.S. census survey, 1990-2006	Nested production function, IV methods; total person-weeks of work in each education-experience-nativity-year group	Small effects on wages of dropouts. Disaggregated, a 10% migration-induced labor growth 1990-2006 <i>raised</i> wages for native non-high school completers 1.7%, cut them for foreign-born 8.1% (both after full capital adjustment).
Borjas (1987)	1980 Decennial Census data (white, black, Hispanic, and Asian natives and immigrants)	Generalized Leontief	Immigrants have small effects on native-born but sizable impact on earnings of immigrants themselves.

### 5.9 TECHNICAL NOTES FOR THE CROSS-STUDY COMPARISON OF THE MAGNITUDES OF IMMIGRANTS' IMPACT ON WAGES

This appendix explains the calculations behind the magnitudes of immigrants' impact on wages reported in Table 5-2. Some papers report the impact of increasing the share of immigrants in the population or labor force by one percentage point, some of increasing the ratio of immigrants to natives by one percentage point, some of increasing immigrants by an amount that would increase the labor force (including natives) by 1 percent, and some the impact of particular episodes of immigration. The goal is to report what each paper implies about the percent change in wages in response to immigration that increases the labor force by 1 percent,  $\frac{\partial \log w_j}{\partial \log L_j}$ , where  $w$  is the wage and  $L$  the labor force, and  $j$  indexes the unit of observation, which may be the labor force of a state, an occupation, or a skill cell or education group.

All papers use the log wage,  $\log w_j$ , as the dependent variable. In several papers, the independent variable is  $\log k_j$ , where  $k_j \equiv \frac{L_j}{L} = \frac{M_j + N_j}{M + N}$ , the share of employment or the labor force or population that is of education or occupation type  $j$ , a share which may be rewritten as a reminder that  $L$  is composed of immigrants  $N$  and natives  $M$ . The dependent variable is instrumented with predicted immigration, making the coefficient on  $k_j$ ,  $\theta$ , the effect of a change in the share that is due to immigration:  $\frac{\partial \log w_j}{\partial \log L_j} = \theta$ . For such cases,  $\theta$  is reported bolded in the table.

In other papers, the dependent variable is  $p_j \equiv \frac{M_j}{M_j + N_j}$ , the share of immigrants in the labor force, occupation, education group, or skill cell  $j$ . In this case,  $\frac{\partial \log w_j}{\partial \log L_j} = \theta(1 - p_j)$ , where  $\theta$  is the coefficient on  $m_j$ .

- Proof: 
$$\begin{aligned} \frac{\partial \log w_j}{\partial \log L_j} &= \frac{\partial \log w_j}{\partial \log p_j} \frac{\partial \log p_j}{\partial \log L_j} = \theta p_j \frac{L_j}{p_j} \frac{\partial p_j}{\partial L_j} \\ &= \theta p_j \frac{L_j}{p_j} \frac{\partial p_j}{\partial M_j} = \theta L_j \left( \frac{1}{L_j} - \frac{M_j}{L_j^2} \right) = \theta(1 - p_j) \end{aligned}$$

In yet other papers, the dependent variable is  $m_j \equiv \frac{M_j}{N_j}$ , the ratio of immigrants to natives in the labor force or education group  $j$ . In this case,  $\frac{\partial \log w_j}{\partial \log L_j} = \theta \frac{1}{(1-p_j)}$ , where  $\theta$  is the coefficient on  $m_j$ .

$$\begin{aligned} \bullet \text{ Proof: } \frac{\partial \log w_j}{\partial \log L_j} &= \frac{\partial \log w_j}{\partial \log m_j} \frac{\partial \log m_j}{\partial \log L_j} = \theta m_j \frac{L_j}{m_j} \frac{\partial m_j}{\partial L_j} \\ &= \theta m_j \frac{L_j}{m_j} \frac{\partial m_j}{\partial M_j} = \theta \frac{L_j}{N_j} = \theta \frac{M_j + N_j}{N_j} = \theta \frac{1}{(1-p_j)} \end{aligned}$$

To make comparable the magnitudes in papers whose dependent variable is  $p_j$  or  $m_j$ , one must choose a value of  $p_j$ . The ideal for any given paper would be the average  $p_j$  in the paper's sample. However, the panel evaluated at a common  $p_j$  value to ensure that the magnitudes of effects across papers do not differ simply because the average immigrant density differs across papers. For papers seeking to estimate the impact of all immigrants, we set  $p = 0.126$ , which is the immigrant share of the labor force in 2000. So  $1 - p = 0.874$ ; magnitudes calculated in this way are underlined in Table 5-1. Below, we explain how we treated results from each paper that can be rendered comparable in this way, and how we treated results from papers assessing particular episodes, including the structural results. While the implicit value of  $p_j$  for the structural papers is close to 0.126, the results from other particular episodes may implicitly or explicitly be evaluated at a different  $p_j$ .

#### Altonji and Card (1991)

- Independent variable is  $p$ .
- $\theta = -1.2$  for all native-born high school dropouts. The most negative coefficient is  $\theta = -1.9$  for black native-born male high school dropouts (Altonji and Card, 1991, Table 7.7; Table 7.8, row 6, final column).
- If the number of immigrants rises sufficiently to raise labor supply by 1 percent, native-born high school dropout wages fall  $(0.874)(-1.2) = -1.0\%$ ; native-born black male high school dropout wages fall  $(0.874)(-1.9) = -1.7\%$ .

**Borjas (2003) Nonstructural Estimation**

- Independent variable is  $p$ .
- $\theta = -0.637$  for native men (own-wage coefficient; Table III, row 3 column 2, in Borjas, 2003). The impact on women was not studied.
- An increase in the number of immigrants sufficient to increase the labor force by 1 percent reduces wages by  $(0.874)(-0.637) = -0.56\%$ .

**Borjas (2015), Peri and Yasenov (2015)**

- Borjas (2016b) reports on p. 27 that wages of (non-Hispanic) dropouts fell 10-30 percent as a result of the Mariel boatlift.
- His Table 2, p. 49, indicates that the boatlift increased the share of Marielitos among high school dropouts from 0 percent (by definition) to 17.5 percent (column 3). The denominator (column 1) appears to be all high school dropout workers including Hispanic non-Marielitos.
- Columns 1 and 2 of Table 2 (and the text on p. 27) indicate that the boatlift increased the labor supply of high school dropouts by 21 percent, assuming column 1 is indeed all dropout workers.
- Since a 21 percent increase in high school dropout labor supply due to immigration reduced wages 10 to 30 percent, a one percent increase reduces wages by  $-0.48$  percent to  $-1.43$  percent.
- Peri and Yasenov (2015) report in their Table 4 that wages rose 4.5 percent immediately after the Mariel boatlift.
- They report on page 7 that the Marielitos increased the number of high school dropouts by 15-18 percent.
- This means that a 1 percent increase in labor supply increased wages by 0.25-0.30 percent.

**Card (2001)**

- Independent variable is  $\log k_i$  ( $\log f_i$  in Card's notation).
- $\theta = -0.099$  for native men,  $+0.063$  for native women (Card, 2001, Table 10, lower panel).
- If the number of immigrants rises sufficiently to increase labor supply by 1 percent, native wages fall by  $\theta$  (this is the local average treatment effect [LATE] interpretation of instrumenting the log share of a group in the labor force with immigration to the group).

**Card and Peri (2016)**

- Independent variable is  $p$  (own-wage coefficient)  $\Delta p$  or  $\frac{\Delta M}{M_{t-1} + N_{t-1}}$ .
- $\theta = -0.237$  (for  $\Delta p$ ; Table 2, 2nd row last column);  $\theta = -0.124$  (for  $\frac{\Delta M}{M_{t-1} + N_{t-1}}$ ; Table 2, 3rd row last column).
- If the number of immigrants rises sufficiently to increase labor supply by 1 percent, native wages fall  $(0.874)(-0.237) = -0.21\%$  (for  $\Delta p$ ; for  $\frac{\Delta M}{M_{t-1} + N_{t-1}}$ , the magnitude may be read directly from the coefficient  $\theta$ , so  $-0.12\%$ ).

**Cortés (2008)**

- Independent variable is  $\log k_j$ .
- $\theta = -0.05$  and is insignificant for all native dropouts (Cortés, 2008, Table 8). There are a variety of  $\theta$  for other native groups (Table 10).
- If the number of immigrants rises sufficiently to increase labor supply by 1 percent, native high school dropout wages fall by  $\theta$  (this is the LATE interpretation of instrumenting the log share of a group in the labor force with immigration to the group).

**Llull (2015)**

- Independent variable is (own-wage coefficient).
- $\theta = -2.0$  (own-wage coefficient; Llull, 2015, Table 7 bottom row).
- If the number of immigrants rises sufficiently to increase labor supply by 1 percent, native wages fall  $(0.874)(-2.0) = -1.75\%$

**Monras (2015)**

- Independent variable is  $m_j$ .
- The calculations below ignore the fact that the regressions in Monras (2015) also control for  $\log L_j$  (theory suggests controlling for  $\log N_j$ , a variable with a coefficient of 0.05).
- Controls for GDP and the size of the labor force mean that implicitly capital is held fixed. However, because the study looks at the short-run effect of an unexpected inflow, these controls may matter little.
- $\theta = -0.75$  (Table 4 column 7, author's preferred coefficient).
- $\bar{p} = 0.055$

- If the number of immigrants rises sufficiently to increase labor supply by 1 percent, native wages fall by  $(-0.75)/(1 - .055) = -0.79\%$ . Alternatively, one can rely on theory and an approximation based on small  $p$  to read the effect directly from the coefficient, to obtain  $-0.75$  percent (for this to be correct,  $\log N_i$  must be controlled for in the regression).

### Structural Wage Effects in Table 5-2

- The wage-effect values shown in the second column of the “Structural Studies” section of Table 5-2 simulate the effect of immigration from 1990 to 2010, when the share of immigrants in the labor force rose from 9.3 percent to 16.4 percent—a 7.1 percentage point rise.
- We focus on the most negative and the least negative (or most positive) scenarios in Table 5-1, ignoring the result that the long-run effect on all workers (Scenarios 1 and 3) is zero, since this is an assumption embedded in the model.
  - For all natives in the short run, wage impacts in Table 5-1 range from  $-3.2$  percent (Scenario 1) to  $-2.6$  percent (Scenario 2).
  - For all natives in the long run, wage impacts in Table 5-1 are  $0.5$  percent (Scenario 4) or  $0.6$  percent (Scenario 2).
  - For native dropouts in the short run, wage impacts in Table 5-1 range from  $-6.3$  percent (Scenario 1) to  $-2.1$  percent (Scenario 4).
  - For native dropouts in the long run, wage impacts in Table 5-1 range is from  $-3.1$  percent (Scenario 1) to  $1.1$  percent (Scenario 4).
- So a 1 percentage point increase in the immigrant share would imply reductions in wages of these amounts divided by 7.1 (the observed percentage point rise in the immigrant share between 1990 and 2010), or:
  - $-0.37$  to  $-0.45$  percent for all natives in the short run
  - $+0.07$  to  $+0.08$  percent for all natives in the long run
  - $-0.89$  to  $-0.30$  percent for native dropouts in the short run
  - $-0.44$  to  $+0.15$  percent for native dropouts in the long run
- If the number of immigrants rises sufficiently to increase labor supply by 1 percent, native wages would fall by 0.874 times the values in the previous bullet. In Table 5-2, values for the wage effect are rounded to one decimal place, which results in several scenarios being reported as having the same effect.

## 6

# Wider Production, Consumption, and Economic Growth Impacts

## 6.1 INTRODUCTION

As consumers, workers, innovators, and entrepreneurs, immigrants help shape nearly every aspect of the economy and of society more broadly. Labor market consequences are perhaps the most visible and most debated economic concern, due to their direct impact on employment and wages. But product, housing, and capital markets are affected by immigration as well, as are some nonmarket activities and—as a result of human capital formation and innovation induced by high-skilled immigration in particular—the trajectory of long-run economic growth. This chapter discusses these economic impacts of immigration that take place beyond the labor market while recognizing that many outcomes associated with them are influenced by their interaction with changes in labor supply and demand over time.<sup>1</sup>

The chapter begins (Section 6.1) with a description of aggregate-level impacts: year-to-year changes in gross domestic product (GDP) or in GDP per capita, driven by expansion of the labor force and physical capital, as well as production-technology adjustments, responding to immigrant flows. Borjas (2013), in considering the impact of immigration on overall economic activity, estimated that the presence of immigrant workers—the *stock* of authorized and unauthorized foreign-born workers—in the labor market makes the U.S. economy an estimated 11 percent larger each year

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<sup>1</sup>Nathan (2014), surveying what is only a fairly recent literature, organized these “wider economic impacts of immigration” (beyond labor markets) into a dynamic framework encompassing the production and consumption sides of the economy; the focus of his literature review is on the role of high-skilled immigrants.



(which amounts to around \$2 trillion in GDP in 2016). As a percentage of the overall economy, annual GDP growth directly attributable to the labor of recent immigrant *inflows* is much smaller, and it mostly accrues to immigrants themselves.

However, when factors beyond those directly attributable to labor force expansion are considered—for example, the contribution of immigrants to capital formation, entrepreneurship, and innovation, which also shape the way and the pace at which growth unfolds—expansion of the aggregate economy attributable to new arrivals becomes much larger. Recent immigrants have higher patenting rates than natives due to their concentration in science and engineering and to their disproportionate representation among highly educated workers. One would expect this increased innovation to exert a positive externality on the productivity of natives, very likely raising per capita GDP growth. Peri (2012) performed a state-level analysis of the impact of immigration on total factor productivity. Using historic settlement patterns (similar to Hunt and Gauthier-Loiselle, 2010) and distance to the Mexican border as instruments to control for endogeneity of immigrants' locational choices, he found immigration increased total factor productivity by promoting efficient task specialization. Similarly, Peri et al. (2015a) found that cities experiencing a greater immigration of science and engineering workers (broadly defined as the share of a city's total employment comprised of foreign science, technology, engineering, and mathematics [STEM] workers) increased the productivity of college labor.

Evidence also exists (see Borjas, 2001; Cadena and Kovac, 2016; Somerville and Sumption, 2009) that immigrants locate in high labor demand/high wage areas for the skills they possess and are more willing than natives to relocate in response to changes in labor market conditions. This tendency may reduce friction and slack in labor markets by reallocating labor in a way that helps equalize compensation across geographic areas (see discussions in Chapter 5 of problems for spatial approaches to measuring wage effects of immigration).

Sections 6.2 and 6.3 discuss the consequences of immigration in specific sectors of the economy where the foreign-born population share is high and consider the influence of immigration on consumer prices and cost of living. Increases in the share of low-skilled immigrants in the labor force appear to have reduced, over time, the prices of immigrant-intensive services such as child care, eating out, house cleaning and repair, landscaping and gardening, taxi rides, and construction. Most of these services are “nontradable,” which means they must be produced and consumed in the same geographic area. The decrease in prices is found to be driven by lower wages paid by those hiring in labor markets populated by low-skilled workers of Hispanic origin, particularly those with relatively low English proficiency and/or who are not legally authorized to work (Baghdadi and Jansen, 2010; Cortés,

2008). Through lower prices, low-skilled immigration creates positive net benefits to users of these services. Furthermore, the availability of low-cost, flexible housekeeping and child care services provided by the foreign-born appears to have allowed women in high-salary jobs to increase their work hours (Cortés and Tessada, 2011).

Housing is a specific sector in which immigrants play an important role. On the supply side, immigrants are disproportionately represented in construction industries (see Chapter 3). Their addition to the labor force may reduce the cost of construction and maintenance services. However, new arrivals also provide a major source of housing demand and, by raising both prices and rents, generate a potential windfall for native owners of housing. Studies of U.S. metropolitan areas have detected this demand-driven impact on the price of housing services. Saiz (2007) estimated that an inflow of legal immigrants equal to 1 percent of the total population would be expected to lead to an increase of about 1 percent for both rents and housing values. Ottaviano and Peri (2012) arrived at similar results.

Section 6.4 shifts the focus from primarily short-term economic impacts created by new immigrant flows to impacts on long-term growth. The emphasis is on technological innovation and human capital formation—viewed here as interacting, or endogenous, components of the evolving economy rather than as factors determined outside the process, or exogenously—as engines of growth that takes place over decades, not years.<sup>2</sup> The potential effects of immigration are assessed using growth models in which future productivity and income growth are determined by investments in human capital and technological innovation.

The difference between the measured economic outcomes generated by endogenous growth models, as opposed to models in which growth is exogenous to the economy, may be significant. The recent endogenous-growth literature suggests that estimates of productivity and wage impacts of immigration can be either larger or smaller than those derived when static conditions are assumed, depending largely on the extent to which new immigrants contribute to human capital formation and innovation. In particular, this literature finds that the positive effects associated with high-skilled immigration and the negative effects associated with low-skilled immigration are amplified when viewed in a long-run endogenous growth context. These results are compatible with evidence about the educational achievement of descendants of immigrants (Chapters 2, 3, and 8). The endogenous growth models also predict that complementarities between immigrants and natives in knowledge production lead to increases in the

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<sup>2</sup>In econometric models, exogenous variables are not systematically affected by changes in the other variables of the model, whereas endogenous variables are at least in part determined by other variables or latent factors that affect them both.

rate of per capita income growth, not just increases in the level of national income (economic activity).

Some endogenous growth models are also consistent with empirical evidence suggesting that the proportion of high-skilled workers immigrating to the United States (as well as to other major receiving countries), relative to total immigration flows, has been increasing in recent decades to the point where, in some sectors, their skill levels already match or surpass those of natives (Ehrlich and Kim, 2015). In terms of their contribution to innovation and average human capital formation, the impacts of immigration that play out in the long run also operate over transitional phases and can appear within one generation. Consider, for example, the educational attainment of the children of relatively high-skilled immigrants, which on average outpaces that of their parents and of the native-born population. Estimated medium-run effects on average wages in the population (such as after 10 years) observed in the literature (see Chapter 5) are by and large consistent with many of the predictions from endogenous growth models.

Economic activities that take place beyond the market, such as in-home production, or in markets that operate on the fringes of taxing authorities, are discussed at the end of the chapter, in Section 6.5. If immigrants devote more time to nonmarket work such as caregiving and housework than do natives—and data from time-use surveys suggest that this may indeed be the case (Ribar, 2012)—or are more likely to be employed in sectors where informal work arrangements are common, reliance on conventional sources of wage and employment data and on GDP measures will result in incomplete assessments of the impact of immigration on the economy.

## 6.2 IMPACT ON OVERALL ECONOMIC ACTIVITY (GDP)

The size of a market economy is a function of the total number of workers, the stock of physical capital, and the average factor output, or productivity. Immigration directly adds to the size of the economy by increasing the population and workforce; it also affects the composition of the population in a number of ways, including age, gender, and education. The presence of immigrant workers (authorized and unauthorized) in the labor market has made the U.S. economy much larger—perhaps 11 percent larger, an increase equivalent to \$1.6 trillion of GDP in 2012 (Borjas, 2013). Extrapolating, in 2016 this contribution to GDP is about \$2 trillion. This makes sense intuitively, as the *stock* of foreign-born workers in the labor market, which has accumulated over many decades, is large. According to Bureau of Labor Statistics (BLS) data on labor force characteristics, there were 25.7 million foreign-born persons ages 16 and older

participating in the labor force in 2014, representing 16.5 percent of the total U.S. workforce.<sup>3</sup>

Quite distinctly from these contributions by the stock of immigrants, it is also of interest to know how much the annual *flow* of new immigrants contributes to economic growth. Under normal circumstances, the annual flow of foreign-born workers into most countries is small relative to the overall population. It is therefore unsurprising that studies focusing on short-run wage and employment impacts (such as those reviewed in Chapter 5) would imply increases in GDP attributable to recent immigration that are quite small when measured as a share of the total economy. In addition, the benefit accruing to U.S. natives (the immigration surplus discussed at length in Chapter 4) is typically estimated to be a small piece of this already small overall impact. Borjas (1995b) found that the foreign-born added about 0.1 percent to the portion of GDP accruing to the native-born. Borjas et al. (1997) and Johnson (1997) found somewhat higher and lower impacts respectively, but the differences do not change the conclusion that the contribution is practically undetectable in aggregate (GDP) data. Based on this and related literature, *The New Americans* (National Research Council, 1997, p. 153) concluded (in the context of the 1980s and 1990s): “Overall, barring sizable immigration-induced economies or diseconomies of scale, the most plausible magnitudes of the impact of immigration on the economy are modest for those [natives] who benefit from immigration, for those who lose from immigration, and for total GDP. The domestic gain . . . may be modest relative to the size of the U.S. economy, but it remains a significant positive gain in absolute terms.”

While aggregate annual impacts are small, immigration can nevertheless make a significant contribution to economic *growth*, especially since immigrants are disproportionately of working age and significantly boost employment growth. Consider how different the U.S. growth path would be had all immigration been cut off 10, 20, or 30 years ago: Clearly GDP would be much smaller, and perhaps per capita GDP would be as well—in no small part because the United States would have an older population with a considerably lower percentage of individuals active in the workforce (Myers et al., 2013).<sup>4</sup> Over the long run, foreign-born inflows have a

<sup>3</sup>See <http://blogs.bls.gov/blog/tag/foreign-born> [November 2016]. The concentration of immigrants varies greatly by geographic location and economic sector. In some cases, immigrants may even supply all of a business's labor and create all of its demand. A restaurant in an enclave that hires only foreign-born workers and where all its customers are from the same community may have little to no effect on native wages and employment, while obviously contributing to a larger national economy.

<sup>4</sup>A recent working paper by Maestas et al. (2016) examines the effect of an aging population on per capita output at the state level in the United States. They found that per capita GDP growth during the period 1980-2010 was 9.2 percent lower than it would have been had the

compounding effect that potentially influences economic and fiscal trends in profound ways. As a result, the Congressional Budget Office and other organizations are interested both in estimating how immigration flows impact GDP and in the fiscal picture for various scenarios of the volume and composition of immigration (e.g., legal status, skill mix).<sup>5</sup>

Conclusions such as the one cited above from *The New Americans*—reflecting estimates derived from a static framework that typically only accounts for the direct labor share of income and the immigrant and native-born shares of the labor force—are being reconsidered in light of evidence that immigrants may increase the productivity of some natives. When factors beyond those directly attributable to labor force expansion are considered—specifically, those effects created indirectly through higher savings, investment, and capital flows—expansion of the aggregate economy attributable to new arrivals becomes larger. Ben-Gad (2008) analyzed the impact on the United States of absorbing an additional 60,000 immigrants per year over the course of a decade. If all these additional immigrants have college degrees, per capita GDP would rise by 0.15 percent at the end of the first decade. Ultimately, as the capital stock continues to adjust, per capita GDP would increase by a further 0.105 percent in the decades that follow. If none of the additional immigrants have college degrees, the additional inflow ultimately lowers per capita GDP by 0.09 percent, though natives still benefit from an immigration surplus.<sup>6</sup>

Yet all these studies, whether static (Borjas, 1995b; Borjas et al., 1997; Johnson, 1997) or dynamic (Ben-Gad, 2008), fall within the neoclassical economics tradition. Different types of labor combine with physical capital to produce output using a predetermined technology. This framework does not exclude analysis of long-run growth as the technology evolves over time; however, there is no sustained immigration-induced technological change. For example, what happens if immigrants themselves change the technology? As detailed in Section 5.6, patenting activity by foreign-born

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population not aged, with two-thirds of this reduction attributable to slower growth in the labor productivity of workers and about one-third attributable to slower labor force growth. Given current population projections, their results imply that “annual GDP growth will slow by 1.2 percentage points this decade and 0.6 percentage points next decade due to population aging” (Maestas et al., 2016). This aging effect would be even more pronounced without the influence of the immigrant population, which is relatively younger than the native-born population.

<sup>5</sup>See <https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/49868-Immigration4.pdf> [November 2016].

<sup>6</sup>Studying the Canadian case, Dungan et al. (2013) used a macroeconometric forecasting model to simulate “the impact on the Canadian economy of a hypothetical increase in immigration.” They found generally positive impacts on real GDP and GDP per capita, aggregate demand, investment, productivity, government expenditures, taxes, and especially net government balances, with essentially no impact on unemployment.

college graduates is estimated to have increased U.S. GDP by 1.4-2.4 percent over the decade of the 1990s (Hunt and Gauthier-Loiselle, 2010). Although the overall macroeconomic impact of immigration that takes place in a given year is modest compared to other factors, the compounding role of foreign-born innovators and other kinds of workers becomes significant to long-run economic growth.

Finally, beyond the impact of immigration on total or per capita GDP, there may be effects on the distribution of income. The flow of immigration typically alters the skill and occupational composition of a country's workforce. If immigrants disproportionately increase the size of the lowest earnings quintiles, their addition to the population will raise overall inequality by any measure (such as a Gini index). The same logic holds for measures of poverty rates. Moreover, if immigrants are concentrated in the lowest *and* in the highest education groups, as is the case in the United States, this change in the composition of the population increases measured wage inequality, although such an accounting does not take into account any (positive or negative) effects of immigration on native-born workers. Analyses of the U.S. economy (e.g., Blau and Kahn, 2015 and Card, 2009) have found this direct compositional effect to be very small. That said, Card (2009) did find the effects of recent immigrant inflows on overall wage inequality in the population (including natives and immigrants) to be somewhat larger than the impact on the relative wages of U.S. natives, "reflecting the concentration of immigrants in the tails of the skill distribution and higher residual inequality among immigrants than natives" (Card, 2009, p. 1). Overall, however, Card found that immigration still accounted for only a small share (5%) of the increase in wage inequality in the United States from 1980 to 2000.

Wage inequality could also be affected when immigration impacts the wages of natives (as described in detail in Chapters 4 and 5). If, for example, immigration increases the relative supply of low-pay, low-skilled workers and there is only a partial offsetting increase in demand for goods and services they produce, the pay of low-wage workers will fall relative to that of high-wage workers—leading to an increase in measured inequality. If low-skilled immigrants competing with natives are, at the same time, complements to business owners and high-skilled workers at the high end of the income distribution, the wages of the latter two groups may rise. Such wage changes would exacerbate inequality, which is already growing due to the increasing demand for high-skilled labor that has taken place since the 1970s. In addition, international trade during this period may have put downward pressure on demand for and wages of workers in medium- and low-skilled sectors.

### 6.3 SECTORAL AND GEOGRAPHIC IMPACTS

Although immigration flows over any given year or quarter have a minimal impact on overall levels of economic activity as measured by GDP or GDP growth, certain sectors or regions may be disproportionately affected. As documented in detail in Chapter 3, foreign-born workers are more likely than native-born workers to be employed in low-wage service sector occupations and less likely to be employed in management, professional, and sales occupations. They are also more likely to be employed in goods-producing sectors such as construction, agriculture, and manufacturing. This occupational and industrial sorting primarily reflects the disproportionate presence of foreign-born workers at the low-education end of the skill spectrum; it also represents different skill sets (e.g., English-language proficiency) that are at least partly independent of years of schooling.

Although the foreign-born have historically been concentrated in construction, farm, and service-sector jobs, they are playing an increasing role in high-skilled occupations, many of them in STEM fields.<sup>7</sup> Research into this trend has found evidence of clear links between high-skilled immigration, entrepreneurship, and innovation in high tech sectors (Kerr, 2013b; Kerr and Kerr, 2011). This line of research, summarized in Chapter 5, supplements work on more traditional ethnic entrepreneurship focusing on small business formation in nontradable sectors such as lower-end retailing and restaurants (Kloosterman and Rath, 2001). As covered elsewhere in this report (Chapter 3 and Section 6.5 below), the higher-education sector in the United States is generating graduates who help meet the demand for high-skilled workers. In 2013, the number of foreign students attending U.S. universities was around 820,000 (F-1 visas); the number of students from China alone was about 200,000 (up from 16,000 in 2003). A large percentage of these foreign-born students, particularly at the graduate level, are enrolled in STEM fields.

Just as the occupational sorting of immigrants has resulted in the concentration of foreign-born workers in certain sectors, both low- and high-skilled, migration flows have also been spatially clumped. Many entry-level service sector jobs are located in urban areas with prior immigration, which draws low-skilled immigrants. Highly educated foreign scientists and

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<sup>7</sup>Lofstrom and Hayes (2011) analyzed earnings differences between H-1B visa holders and U.S.-born workers in STEM occupations and found little evidence that the visa holders were paid less than natives of similar age and education. Hunt (2015) examined immigrant and native skills and wages in U.S. computer and engineering labor markets and found that immigrants earned higher wages on average due to higher average levels of education. The wage advantage was larger for computer workers than for engineering workers, possibly due to greater returns on English proficiency for the latter. Occupation-based samples of the American Community Survey reveal larger wage differentials between the two groups than do education-based samples.



engineers also tend to locate in cities where clustering of human capital and more efficient migrant-native task specialization are facilitated (Peri et al., 2015a). Hall et al. (2011, p. 1) reported that in 44 of the nation's 100 largest metropolitan areas—including large coastal cities such as San Francisco and Washington, DC—college-educated immigrants outnumber immigrants without high school diplomas by at least 25 percent. The low-skilled destinations, which have the reverse distribution, tend to be in the Great Plains and in the border states of the West and Southwest.

Beyond cities, there are examples of immigrants reversing the fortunes of declining regions or helping to fuel growth in small towns. Immigrants typically flow to these towns in response to employment opportunities, such as meat packing or poultry processing. Carr et al. (2012) documented the rise of Hispanic boomtowns and examined rural populations where decline had been slowed and even reversed from an infusion of new immigrants.<sup>8</sup> Hong and McLaren (2015) explored this potential “shot in the arm for local economies,” focusing mainly on the labor market impact of consumer demand for local services. They found that the bump in consumption can “attenuate downward pressure from immigrants on non-immigrants’ wages, and also benefit non-immigrants by increasing the variety of local services available.”<sup>9</sup> Using Decennial Census data from 1980 to 2000, the authors found evidence that, due to these effects, immigrants did in some cases raise native workers’ real wages. They also found an employment effect: specifically, that each immigrant created 1.2 local jobs for local workers, most of them going to native-born workers. Sixty-two percent of these jobs are in nontraded services; that is, where the good or service must be produced and consumed in the same local area.

Explaining why net migration patterns are most likely to affect markets for nontradable goods, Mazzolari and Neumark (2012) noted that, for some kinds of goods and services, trade is impractical due to high cost of transportation, short shelf life (e.g., restaurant meals), fixed location of output (e.g., landscaping), or even for legal or security reasons (e.g.,

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<sup>8</sup>Carr et al. (2012) cite a number of factors that incentivized new arrivals to reside in specific locations where allowed by enforcement and where jobs could be found which, in the process, contributed to the creation of immigrant “boomtowns.” Among these factors were the Immigration Reform and Control Act of 1986; anti-immigrant legislation (e.g., California’s Proposition 187); militarization of the border; transformation of the meat packing industry; and concentration of oil, timber, furniture, carpeting, textiles, and other nondurable manufacturing. See an issue brief from the Immigration and the States project of the Pew Charitable Trusts for data showing the impact of immigrants slowing population decline in some counties (<http://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2014/12/changing-patterns-in-us-immigration-and-population> [November 2016]).

<sup>9</sup>Mazzolari and Neumark (2012) found evidence that immigration in California is associated with fewer stand-alone retail stores but a greater variety of ethnic restaurants.



national defense). These constraints create niches for low-skilled workers in occupations serving these markets.

There is evidence that immigrants are more responsive than natives to regional differences in labor demand, a factor that makes labor markets more efficient because workers flow to where wages are rising (Borjas, 2001; Somerville and Sumption, 2009). Controlling for endogeneity of destination decisions, Cadena and Kovac (2016) culled evidence from the Great Recession to conclude that “Mexican-born immigrants’ location choices in the U.S. respond strongly to changes in local labor demand, and that this geographic elasticity helps equalize spatial differences in labor market outcomes for low-skilled native workers, who are much less responsive” (Cadena and Kovac, 2016, p. 257).

Borjas (2001) examined the role of immigrants in improving labor market efficiency and found that immigration “greases the wheels of the labor market by injecting into the economy a group of persons who are very responsive to regional differences in economic opportunities” (Borjas, 2001, p. 4). The paper explored empirically and theoretically how labor market efficiencies gained from immigrants clustering in higher-wage regions raises GDP, relative to what would have been observed if immigrants had simply replicated the geographic sorting of the native population. Analyzing Decennial Census data for the period 1950-1990, Borjas found evidence that geographic sorting of immigrants reflected interstate wage differences. New immigrants were found to be more likely to locate in states that offer the highest wages for the category of skills that they possess. In other words, new immigrants “make up a disproportionately large fraction of the ‘marginal’ workers who chase better economic opportunities and help equalize opportunities across areas” (Borjas, 2001, p. 2). If the foreign-born respond to increasing wage differentials by moving toward relatively higher paying regions, they may help fill labor demand in expanding industries (such as health care<sup>10</sup>) driven by an aging population or other factors. Borjas also found evidence of greater wage convergence across geographic regions during high-immigration periods. However, at the low-skilled end of the labor spectrum, Orrenius and Zavodny (2008) found evidence that, during the 1994-2005 period, some immigrants “may have been discouraged from settling in states that set wage floors substantially above the federal minimum.” This indicates that, in some cases, immigrants locational choices are more closely linked with job opportunities (employment growth) than with wages. Cadena (2014) corroborated this hypothesis. He found that, over the 1994-2007 period, recently arrived low-skilled immigrants selectively located in states that had not increased their minimum wage levels, suggest-

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<sup>10</sup>OECD and World Health Organization (2010) estimated the large numbers of nurses being recruited by developed economies to help meet health care demands.

ing a sensitivity among workers to the potential for subsequent “disemployment effects” that could be induced. One conclusion reached by the author is that these locational choice patterns may diffuse any negative wage impacts affecting established workers in immediately affected local labor markets throughout the country.

One barrier to this kind of efficient allocation of new workers, foreign-born or otherwise, relates to cost of living (i.e., real wages). Hsieh and Moretti (2015) found that homeowners in high-wage cities have an incentive to restrict housing supply through regulatory means. Studying the contributions of individual U.S. cities to national GDP growth, they showed that worker productivity was increasingly variable across cities, reflecting “an increasingly inefficient spatial allocation of labor across U.S. cities” (Hsieh and Moretti, 2015, p. 1). Part of this variability was tied to housing prices (and policies). They found that the main effect of fast productivity growth in cities like New York, San Francisco, and San Jose—cities with booming high-tech and finance industries—was an increase in local housing prices and local wages, not in employment. In the presence of strong labor demand, tight housing supply effectively limited employment growth in these cities. In contrast, “the housing supply was relatively elastic in Southern cities. Therefore, total factor productivity growth in these cities had a modest effect on housing prices and wages and a large effect on local employment” (p. 34). This constraint means that not all workers, including immigrants, have the option of locating in the most productive cities.<sup>11</sup> It may also partly explain the shift since the 1990s in immigrant location patterns from traditional gateways such as California, Florida, Illinois, New Jersey, and New York to states in the Southeast, Rocky Mountain West, and Pacific Northwest (Pew Charitable Trusts, 2014a).

## 6.4 IMPACT ON PRICES OF CONSUMER GOODS AND COST OF LIVING

### Consumer Prices

In previous chapters, the size and direction of wage impacts driven by immigration was shown to be highly context-dependent, varying by size and duration of inflow, the skill mix of workers, and sector. For similar reasons, immigration has an ambiguous theoretical effect on the relative prices of different goods and services. The same economic change—an increase in the supply of workers—that can lower wages and production costs can also lower prices, particularly in labor-intensive sectors (Baghdadi and Jansen,

<sup>11</sup>It may also reflect the possibility that high-skilled labor markets are more “national” in scope while low-skilled labor markets are more local.

### BOX 6-1 Remittances

After arriving in their destination country, immigrants add to total consumer demand for goods and services and ultimately to the demand for labor used in their production. However, not all of the wages earned by immigrants are spent or saved in their new country; some earnings are sent back to relatives in countries from which they emigrated. There is a large literature documenting the beneficial impacts of such transfers in the origin country where the money is spent, saved, or invested (see Amuedo-Dorantes and Pozo, 2006; Rapoport and Docquier, 2006; Rodriguez and Tiongson, 2001; and Taylor, 1999). But from the perspective of the remittance-sending country, the outflow of income when immigrant workers send remittances “back home” reduces immigrant savings rates and consumption within the United States and deepens the deficit in the current account. The more they send home, the less they can contribute to domestic demand and savings. Little empirical work has been done to analyze the impact of immigration on consumer demand; even less has examined the role of remittances in this scenario.

Olney (2015) is one of the few studies to examine how remittance outflows affect the wages and income of native workers. Using a detailed microdata set that includes information on remittances and wages of immigrant and native-born workers in Germany, the study specified a model to test (1) the extent to which remittances dampen immigration-driven increases in the domestic consumer base and any positive impact on native wages that would be associated with them; and (2) the prediction that remittances will negatively impact wages of native workers in nontraded service industries (since these industries depend more heavily on local consumption) more than wages of native workers overall. The model employs an instrumental variables approach (see Section 5.3) to address endogeneity created if income shocks in particular areas lead simultaneously to higher native wages and to wealthier immigrants remitting more money than in other areas. In Germany, remittances equal roughly 1.3 percent of all income earned, meaning that a 1 percent increase in remittances decreases German national income by 0.013 percent. The model predicts that, as a result of dampened consumption in Germany, a 1 percent increase in the outflow of remittances will lead to a 0.027-0.056 percent decrease in wages (Olney, 2015, p. 23). This is a very small decrease—a loss of 7 to 8 euros on a 30,000-euro annual wage—and does not account for the large benefits derived from remittances in the less-developed countries to which they are sent.

2010; Cortés, 2008). However, immigrants are consumers as well as producers. And, although their average purchasing levels and patterns will not exactly mirror those of the rest of the population due to a range of factors, including the sending of remittances (see Box 6-1), immigrants contribute to the demand for goods and services, creating a potentially offsetting channel

Also important is that the outflow of remittances may have a number of indirect effects of varying magnitude. There is likely to be a small fiscal impact. To the extent that some portion of remitted money would have been spent in the United States, it reduces nonincome-based tax revenues such as sales taxes. There may be offsetting effects as well. The prospect of sending money home could also affect future migration rates by altering the financial calculus associated with the decision to migrate or by directly reducing chain migration. Improving the productive use of immigrant savings and remittances in fund-receiving countries could generate export demand for U.S. products.

Defining remittances as all transfers from the immigration-receiving country to the immigrants' country of origin, the literature distinguishes several motives for remittances, each of which is likely to be affected by the duration of migration. One reason for transferring money is to support family members back home; these are intrafamily transfers across national borders. As it is more likely that immigrants leave their families behind when they plan a return to the home country, this type of remittance flow is likely to be larger for temporary migrations. Funkhouser (1995) presented a simple model for such remittances. A second reason for remitting funds is to create savings held in the origin country for future consumption or investment purposes. Dustmann and Mestres (2010) found that temporary migrants were more likely to hold assets in their home countries. Third, maintaining the option to return to their home country may require immigrants to undertake investments and make contributions to the home community. If seen as an insurance mechanism, this also may be a remittance motive for migrants who currently do not plan to return. Batista and Umblijs (2014) analyzed the relationship between risk aversion and remittances among immigrants in Ireland. They found that more risk-averse individuals and those with higher wages were more likely to remit.

While this discussion emphasizes that remittances may reduce some of the benefits immigration confers on the destination country economy by reducing what immigrants spend and save domestically, such a focus ignores the important benefits that remittances confer upon the origin country. Moreover, native individuals and businesses also increasingly spend and invest abroad. Regardless of its source, such international capital flows are recognized by economists as having a substantial and important role in moving funds from rich to poor countries, which is needed to speed up global growth and reduce cross-country inequality and possibly also international migration.

through which market dynamics may be affected.<sup>12</sup> For example, foreign-born workers in the construction industry may lower the cost of producing new owner-occupied or rentable housing if they reduce wages—Current

<sup>12</sup>Bodvarsson et al. (2008) and Hercowitz and Yashiv (2002) showed that immigrants affect the demand for goods and services immediately upon arrival.

Population Survey data indicate they constitute about 25 percent of all workers in construction industries. However, because they also demand units in which to live,<sup>13</sup> the impact on final prices is ambiguous.

Though the evidence is somewhat limited, the intensive infusion of lower-cost foreign-born labor into certain occupational sectors would be expected to reduce prices, benefiting consumers who purchase these goods and services (see Section 4.4). Among the foreign-born, unauthorized workers may do disproportionately more to reduce prices because they earn less than otherwise comparable authorized workers, foreign- or native-born. Benefits in the form of reduced costs of living created by lower prices to consumers should, as noted above, be largely restricted to nontraded services. Child care, eating out, house cleaning and repair, landscaping and gardening, taxi rides, and construction are a few examples of goods or services that must be produced and consumed in the same geographic location and for which prices are most likely to be affected by local availability of different pools of labor. While international trade allows production processes to be transported to where low-cost labor is located, immigration allows the low-cost labor to be brought to where production takes place. If one takes metropolitan areas as the unit of observation, the local concentration of low-skilled immigrants working in *traded* industries would be expected to have little to no impact on prices, at least at the local level (Cortés, 2008, p. 383).<sup>14</sup>

Using microdata from the BLS Consumer Price Indexes, Cortés (2008) estimated variation in prices across cities and over time in relation to the proportion of low-skilled immigrants in the working population. She found that, overall, a “10 percent increase in the share of low-skilled immigrants in the labor force of a city reduces prices of immigrant-intensive services, such as gardening, housekeeping, babysitting, and dry cleaning, by approximately 2 percent” (Cortés, 2008, p. 382).<sup>15</sup> Over the period 1980-2000, this translated into a decrease in the prices of immigrant-intensive services by a city average of 9 to 11 percent. She found the decrease in prices to be

<sup>13</sup>Myers and Pitkin (2013) found that immigrants constituted 39 percent of the growth in homeowners over the period 2000-2010.

<sup>14</sup>There have been a few studies examining the impact on aggregate prices. For example, in their conclusions, Blanchflower et al. (2007) concluded “. . . at present it appears that A8 [visa] immigration has tended to increase supply by more than it has increased demand in the UK (in the short run), and thereby acted to reduce inflationary pressure.” Bentolila et al. (2007), using Spanish data, found high levels of immigration into Spain had a negative impact on inflation (0.9 percentage points per year), which helped to bring down the overall unemployment rate by almost 7 percentage points over the period 1999-2006.

<sup>15</sup>This finding provides some supports for the idea that low-skilled, foreign-born workers largely compete with one another. In the year 2000, 60 percent of high school dropouts were native born, yet they made up only a quarter of dropouts working in the gardening and housekeeping sectors (Cortés, 2008, p. 389).

driven by decreased wage bills for employers, mainly those who had hired immigrants who competed directly in the labor market populated by individuals of Hispanic origin with relatively low English proficiency.

Next, Cortés used BLS Consumer Expenditure Survey data to identify which groups have the highest propensity to consume goods and services produced by sectors making intensive use of immigrant labor. The overall effect on consumption baskets was found to be largest for high-income households, who are more likely than low-income households to consume products such as child care, landscaping, and restaurant meals that are immigrant-intensive in production. Immigrants working in child care and other household services influence labor market dynamics (and patterns of consumption) in a particularly important way. The lower cost of these services made possible by the increased supply of labor for their provision has allowed native and of course some immigrant families with comparatively high levels of education and income to outsource them. As a result, individuals in these households are able to redirect labor toward higher-earning market occupations. This link is investigated in Cortés and Tessada (2011) who, using Decennial Census data to track immigrant cohorts of the 1980s and 1990s, examined how low-skilled immigration affects the labor supply of highly educated women in the United States. They found a striking correspondence between the availability of low-cost, flexible housekeeping and child care services provided by the foreign-born and increases in the number of hours worked by women in high-salary jobs.<sup>16</sup>

Of course, lower-income households also benefit from reduced prices of clothing, housing, food, etc.; however, they (especially recent immigrant cohorts) have also been empirically shown to bear the brunt of any negative wage impacts associated with new immigration that occurs. As a result, the overall (net) effect on economic well-being is negative for some and positive for others, unless immigration-induced technological progress is sufficient to raise all wages. As put by Cortés (2008, p. 414):

The low-skilled immigration wave of the period 1980-2000 increased the purchasing power of high-skilled workers living in the 30 largest cities by an average of 0.32 percent and decreased the purchasing power of the typical native high school dropouts by a maximum of 1 percent and of Hispanic low skilled natives by 4.2 percent.

These findings support the conclusion that, through lower prices, low-skilled immigration created positive net benefits to the U.S. economy during

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<sup>16</sup>For natives switching time from nonmarket work to market jobs, the reduction in their own home production does not count against GDP, whereas their new work, and that of workers they hire to do the same home tasks, is included in GDP. So, if measured by GDP only, the overall increase in the value of economic activity may be overstated.

the last two decades of the 20th century, while also generating a redistribution of wealth from low- to high-skilled native-born workers.

### Immigration and the Housing Sector

Immigration significantly impacts local housing markets by contributing to the demand for apartments and single-family homes. If there is a resultant increase in home prices, then this raises the wealth of current homeowners. According to the Census Bureau, housing wealth (home equity) accounted for about 25 percent of total wealth in U.S. households in 2011.<sup>17</sup> On the other hand, higher prices reduce housing affordability for potential home buyers. Housing expenses, including utilities and furnishings, account for 33.6 percent of average household consumer spending, with direct shelter expenses of 19.7 percent, compared to 17.6 percent of spending allocated to transportation and 12.9 percent for food. Spending on shelter is moderately higher in absolute terms for homeowners than renters, and spending by homeowners on utilities, supplies, and furnishings is considerably higher than it is for renters (U.S. Bureau of Labor Statistics, 2015b).

Demand for housing is a direct function of the rate of household formation, which depends on a host of demographic factors including immigration but also depends on the health of the economy. Household formation is defined as the net change in the number of households in a given period, also equivalent to the net change in occupied housing units (owned and rented combined). One inhibitor of the economic recovery following the Great Recession is that household formation has proceeded at less than one-half of its normal rate since 2007, eliminating the growth in spending that accompanies it (Paciorek, 2013).<sup>18</sup> A decline in household formation is consistent with a delay in family formation, but it can also signal increased doubling up of individuals in shared housing who otherwise would have lived in separate units. The failure to increase occupancy of more housing units has its greatest impact on the construction industry, which tends to be sensitive to the business cycle.

Immigrants have accounted for roughly one-third of household formations during the last two decades. In the decade of 2000-2010, even though the pace of new immigrant arrivals was somewhat reduced, immigrants

<sup>17</sup>See <http://www.census.gov/people/wealth/files/Wealth%20Highlights%202011%20Revised%207-3-14.pdf> [November 2016].

<sup>18</sup>“This persistent weakness in the housing market has also contributed to the slow pace of the overall economic recovery. For example, the direct contribution of residential investment to annual GDP growth frequently reached 1 to 1.5 percentage points in recoveries prior to the mid-1980s. During the 3 years subsequent to the end of the recession in the second quarter of 2009, the contribution of residential investment to GDP averaged close to zero” (Paciorek, 2013, p. 2).



still accounted for 32.6 percent of the nation's household formations, partly because native-born household formation was contracting (Myers and Pitkin, 2013). The children of immigrants—the second generation—also add to household formation and the demand for housing. A study by the Harvard Joint Center for Housing Studies used tabulations of 1994 and 2014 Current Population Survey data to estimate that second-generation immigrants accounted for the largest share of growth in households among the under-30 cohort during the last 20 years (Masnick, 2015).

The long-term effects of immigrants in the housing market have been documented in a series of studies. The ever-rising share of household growth (owners and renters combined) accounted for by immigrants in recent decades in turn contributed to the demand for homes. Masnick (2015) calculated that the immigrant share of all owner-occupied units increased from 6.8 percent in 1994 to 11.2 percent in 2014. The immigrant share of homeowner *growth* rose from 10.5 percent in the 1980s to 20.9 percent in the 1990s, then to 39.2 percent in the 2000s, and is projected to be 35.7 percent in the 2010s (Myers and Liu, 2005; Myers and Pitkin, 2013). The immigrant share of rental unit growth was 26.4 percent in the 1980s, 60.4 percent in the 1990s, and 31.7 percent in the 2000s; it is projected to be 26.4 percent in the 2010s. The unusually high immigrant share of rental unit growth in the 1990s is attributed to an upswing in immigration in that decade, combined with a downswing in the population growth of native-born young adults, due to the arrival in adult years of the undersized cohort known as Generation X (those born from the mid-1960s to the early 1980s). Similarly, the high share of homeowner growth in the 2000s attributed to immigrants stemmed from advancement of that relatively small native-born cohort into prime home-buying ages, combined with the advancement of immigrants from rental to home-owning status. In the current decade, native-born homeowners are continuing to lag, with immigrants again supplying a large share of the growth that upholds house values.

Immigrants from Asian countries are observed to have higher homeownership rates than immigrants of Hispanic origin, and both rates have been lower than rates for other demographic groups, even after controlling for income (Alba and Logan, 1992; Coulson, 1999).<sup>19</sup> However, one of the strongest findings in the immigrant housing literature is that immigrants advance rapidly into homeownership the longer they reside in the United States, with especially steep gains among Hispanics, who start from lower levels (Myers and Lee, 1998). The research indicates that the gains for the

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<sup>19</sup>Estimates based on the Current Population Survey Annual Social and Economic Supplement (IPUMS) indicate that homeownership rates (the number of owner-occupied housing units divided by the total number of occupied housing units) for Asian and Hispanic groups in 2010 were about 59 and 48 respectively, compared to around 68 for the nation as a whole.



housing market from new immigrant arrivals continue to increase for three decades after their arrival.

The discussion above suggests that immigration, like any increase in the population, has the potential to drive up an area's house prices because, at least in the short run, the supply of housing is relatively inelastic. This is beneficial for homeowners and those who derive income from renting out accommodations. For natives who do not already own homes, whether they plan to continue renting or aspire to eventually purchase a home, this represents an increase in the cost of living. Ottaviano and Peri (2005) and Saiz (2003, 2007) found that the price of housing in metropolitan areas was systematically positively correlated with immigration. Saiz (2003) found strong evidence that the Mariel Boatlift influx of immigrants had a pronounced impact on the Miami housing market for several years following the event. Using a difference-in-difference approach common to spatial wage studies (covered in Chapter 5), he found that the unexpected shock to housing demand caused short-run rental prices in Miami to increase by 8-11 percent more than those for comparable housing markets.

Studies of a more general set of U.S. metropolitan areas have also found this demand-driven impact on the price of housing services. Saiz (2007) estimated that an inflow of legal immigrants equal to 1 percent of the total population would be expected to lead to an increase of about 1 percent for both rents and housing values.<sup>20</sup> Ottaviano and Peri (2012) found the increase in housing prices from a similar event to be between 1.1 percent and 1.6 percent. Because immigrants tend to locate in cities with faster wage (and possible housing price) growth, analyzing local labor market impacts of immigration on native outcomes without controlling for city characteristics will bias estimates. Vigdor (2013) examined the contribution of immigrants in the creation of housing wealth in places like New York City, particularly in downtown neighborhoods, while also showing how prices have stabilized in Rust Belt cities. The study, conducted using county-level data spanning 1970 to 2010, found "the most pronounced impact of immigration on housing values was in thriving Sun Belt cities that remain affordable and in declining Rust Belt cities where immigration acts as a barrier against even greater declines in home values" (Vigdor, 2013).

It should be noted that data limitations make housing price studies difficult in part because most of the data used must be aggregated to at least the metropolitan-area level. If immigrants cluster in specific neighborhoods within metropolitan areas, then analyses using Decennial Census

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<sup>20</sup>For the United States, Saiz (2007) and Saiz and Wachter (2011) found that immigration raises rents and housing values in destination cities, with population and rents rising in proportion. Within cities, the most immigrant-dense neighborhoods saw relatively slower price increases, an effect the authors attributed to native exits and increased urban-level segregation.

data will dilute effects of immigration on housing prices because the data are aggregated for the entire metropolitan area. Thus, data that can be further disaggregated to the area of individual neighborhoods or smaller levels are needed to accurately assess the impact of immigration on housing. Saiz and Wachter (2011) used track-level data from the Decennial Census to show that, even in the presence of an overall positive relationship between housing values and in-migration at the metropolitan area level, a negative relationship often emerges at the neighborhood level. This observation is indicative that immigration may be inducing sorting across neighborhoods as opposed to across metropolitan areas (this sorting still has distributional consequences). Findings by Cascio and Lewis (2011) based on school district level data sources suggest that the negative relationship between in-migration to neighborhoods and housing values may be partly accounted for by parents' housing choices based on preferences regarding the ethnic composition of public schools.

## 6.5 THE ROLE OF IMMIGRATION IN LONG-RUN ECONOMIC GROWTH

As discussed in detail in Chapter 5, much of the research on the economic impact of immigration, such as that focusing on labor market effects, takes a somewhat short-run perspective. While these analyses typically distinguish time durations too short for firms to adjust capital from durations sufficient to allow such adjustments (“the long run”), the focus of the latter is still typically not on periods of history long enough to follow determinants of economic growth. So a further distinction must be made between analyses examining “long-run” changes in wages and employment (as “the long run” was defined for the purposes of Chapter 5) and analyses of the sources of *growth* in an economy. The latter are concerned with the impact of immigration on trends in GDP growth that unfold over decades, not years.

Solow (1956) famously devised a model in which growth in an economy's total output derives from accumulation of the factors of production.<sup>21</sup> As a nation's capital and labor inputs expand—and, crucially, technological progress occurs—economic growth is generated. Factor accumulation alone cannot sustain growth in per capita income; technological progress is needed to overcome diminishing marginal returns to variable factors of production. The contributions of expanding labor and capital are directly accounted for in the production function, while the effects of technological change enter as a residual. The growth in total output is thus

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<sup>21</sup>Presentation of Solow's “neoclassical” growth model can be found in any good macroeconomic text such as Mankiw (2008). Bodvarsson and Van den Berg (2009) presented a graphical representation of the Solow model in the context of the economics of immigration.

accounted for by the growth in the supply of inputs, subject to the depreciation rate of capital, and by growth in total factor productivity due to growth in technology—all determined exogenously.

As explored in detail in Chapters 4 and 5, this aggregate production function framework linking inputs to outputs is a foundational feature of much of the empirical literature measuring the effect of immigration on wages and employment;<sup>22</sup> it provides a method of combining workers of different skills in order to evaluate competitive effects as well as cross-skill complementary effects of immigrants on wages (Ottaviano and Peri, 2012). The structural model studies using the factor proportions approach reviewed in Chapter 5 largely follow Solow by assuming a constant elasticity of substitution baseline production function.

A shortcoming of early growth models was that, once an economy had accumulated a level of physical capital sufficient to meet needs dictated by the current production technology, any further economic growth was predicated on improving that technology, which was exogenously determined. More recent models have introduced investments in knowledge—for example, human capital and innovative activity—to provide a mechanism with which to account for economic growth within the processes modeled, in effect connecting growth to internal forces within the economy and thereby making it endogenous (with respect to that model). In essence, endogenous growth models start where the Solow-type growth model ends. With human capital or other knowledge recognized as critical and *controllable* factors, people's ideas and innovations become a component of technology that is subject to deliberate investment decisions; this treatment, in turn, allows the model to project self-sustaining and persistent long-term growth in both per capita and aggregate output.

Models such as those developed by Romer (1990) and Lucas (1988) shift the analytic emphasis from factor accumulation to increases in productivity by allowing the growth rate of technological progress to be determined within the system rather than exogenously. Barro (1991) and Mankiw et al. (1992) also refined empirical growth modeling by adding the concept of human capital—which includes the knowledge, skills, and experience possessed by individuals—as a factor of production. Since human capital is largely unobserved, Barro used level of academic achievement (education) as a proxy and found the variable to be statistically significant and positively related to economic growth over time. Similarly, Baumol (1993, pp. 259-260) concluded that “. . . so far as capital investment, education, and the like are concerned, one can best proceed by treating them

<sup>22</sup>For example, a nested, constant elasticity of substitution production function was used in Borjas and Katz (2007); Borjas et al. (1997); Card (2009); D'Amuri et al. (2010); Ottaviano and Peri (2012); and other studies.

as *endogenous* variables in a sequential process—in other words, these variables affect productivity growth, but productivity growth, in turn, itself influences the value of these variables, after some lag. These endogenous influences are, then, critical components of a feedback process.”

One motivation behind endogenous growth modeling is to reveal how human capital—specifically the generation of new ideas through research and development (R&D) that create new products and production processes—advances the technological frontier and translates into productivity gains (Lucas, 1988; Romer, 1990). Competition is also created among firms when entrepreneurs create businesses around new ideas (Aghion et al., 2009; Schumpeter, 1950). This reassessment of economic growth processes is potentially very important for characterizing the economic contributions of the foreign-born because immigrants bring with them, and acquire, levels of human capital that are different from those of the general population.

“Endogenizing” human capital into the growth model can allow for consideration, as discussed in Section 5.5, of how innovation and entrepreneurship injected into an economy by immigrants may alter total factor productivity and, in turn, long-term growth in economic output. Peri et al. (2014) found, for example, that STEM workers (foreign- and native-born) may have accounted for 30-50 percent of all U.S. productivity growth between 1990 and 2010. Within endogenous growth frameworks, immigration provides labor and human capital factor growth—the working-age population in countries like Germany and Japan would actually be shrinking (or, in the case of the latter, shrinking more) without it—as well as other forms of capital such as financial, social, and cultural capital. Skilled migrants especially may influence drivers of productivity such as entrepreneurship (discussed in Section 6.4), investment, and innovation (Section 5.5 provides support for this).

### The Main Ideas Underlying the Endogenous Growth Concept

The essence of endogenous growth theory is that the persistent and largely uninterrupted growth in per capita income in the United States and other developed economies over the past 170 years or so can be explained as the outcome of continuous investments in human capital and knowledge formation, or in direct innovative activity at the firm and industry levels, which serve as engines of advancement in total factor productivity and per capita income.<sup>23</sup> While the literature varies in terms of the way that the

<sup>23</sup>Though such growth is ordinarily accompanied by investment in and accumulation of physical capital as well, models that rely solely on the physical capital channel either cannot bring about sustained growth over long time periods or generate empirically implausible predictions.

mechanics and motivating forces of this process are identified, all endogenous growth models share two basic characteristics. One is that the process can be self-sustaining because of continuing *investments* that individuals, families, and firms make in the formation of human capital and associated physical capital. The other is that the process is invariably aided by knowledge spillover effects<sup>24</sup> and related economies in the process of knowledge formation or technological innovations that bring about not just a self-sustaining *level* of productivity and (per capita) income, but a continuous *rate* of growth. Transitions from lower stages of economic development into regimes of continuous productivity growth occur endogenously within the economy through optimal allocation of productive resources into learning, education, basic science, and R&D, rather than exclusively through discrete technological breakthroughs that occur randomly and unpredictably in a way that is largely exogenous to the economy.

Innovation and knowledge formation occur not just through investments by the native population; they can be affected by immigration as well. While most of the theoretical literature on endogenous growth has so far been formulated in a closed-economy set-up, there is a fledgling strand, described below, that is exploring the relevance of immigration to knowledge formation in an open-economy setting. Skilled immigrants contribute to knowledge formation through their own acquired knowledge as well as via “diversity effects” in knowledge formation, as modeled in Ehrlich and Kim (2015).<sup>25</sup> As noted by Hanson (2012), the flow of innovation is constrained by the supply of talented scientists, engineers, and other technical personnel; immigration helps relax this constraint, both in theory and in practice:

Each year, U.S. universities conduct a global talent search for the brightest minds to admit to their graduate programs. Increasingly, foreign students occupy the top spots in the search. Data from the National Science Foundation’s Survey of Earned Doctorates show that between 1960 and the late 2000s, the share of PhDs awarded to foreign students rose from one fifth to three fourths in mathematics, computer science, and engineering; from

<sup>24</sup>Knowledge spillover effects are those that create impacts beyond the entity in which they occurred—for example, when knowledge or ideas accumulated by a specialized or geographically concentrated group of agents stimulate knowledge formation in others through interaction among agents within an organization or through transmission of knowledge across various communication and networking channels outside an organization.

<sup>25</sup>At a highly aggregated (national) level, Alesina et al. (2016, p. 101) found that greater diversity of the skilled workforce (defined by people’s birthplaces) “relates positively to economic development (as measured by income and TFP [total factor productivity] per capita and patent intensity) even after controlling for ethno-linguistic and genetic fractionalization, geography, trade, education, institutions and origin-effects capturing income/productivity levels in the immigrants’ home countries.”

one fifth to three fifths in physical sciences; and from one fifth to one half in life sciences (Hanson, 2012, p. 26).

This process contributes to U.S. economic growth due to the fact that many foreign students stay after completing their schooling; for example, Finn et al. (2005) found that almost two-thirds of foreign-born students in science and engineering fields remained in the United States a decade after they earned their doctoral degree.

### Approaches to Modeling the Mechanics of Endogenous Growth

The two main approaches used to identify the engines of economic growth in this literature are the human-capital-based models and the R&D-based technology-production models. Models using either approach replace the assumption that the technology is exogenous with one in which the economy can grow endogenously through deliberate investments in infrastructure and basic science by individuals, private firms, and the government.

The human-capital-based approach focuses on investments in human knowledge, cognitive skills, and higher education, along with other determinants of human capital (fertility, health, population size). Individuals and families invest in their own or their offspring's learning capacity and knowledge formation.<sup>26</sup> Such knowledge production can lead to self-sustaining, long-term growth in total factor productivity and per capita income on the assumption that "knowledge is the only factor of production that is not subject to diminishing returns" (see Clark, 1923, p. 120).

The technology production approach focuses on technological innovations that are driven by profit-maximizing firms investing in R&D and competing over innovations that yield higher-quality products and production processes or greater variety and superior quality of new goods, innovations that lead to self-generating expansion in real output per capita and individual welfare.<sup>27</sup> This technology production is generally assumed to

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<sup>26</sup>This may be motivated by economic, altruistic, and related intergenerational objectives. The literature following this approach includes the path-setting contributions by Lucas (1988), Becker et al. (1990), and other studies included in Ehrlich (1990), which were based on dynastic-type models of investment in general human capital and fertility. Further expansions by Ehrlich and Kim (2007), Ehrlich and Lui (1991), and Galor and Moav (2004) used overlapping-generations frameworks to identify the role of additional factors that motivate individuals and parents to invest in the education, skill, and health of their children as well as complementary factors of production that enhance human capital formation and economic growth.

<sup>27</sup>The literature following this approach, which includes Romer (1986, 1990) and Stokey (1988), emphasizes profits and rewards to innovators, as well as the market structure within which innovations are produced, as motivating forces influencing investment in innovation and growth.

be subject to economies of scale in R&D production. Even this literature, however, recognizes human capital formation as a critical factor that contributes to innovation.

The bulk of the endogenous growth model literature consists of closed-economy models, which means they do not account for trade and immigration. (The Technical Annex to this chapter, Section 6.8, illustrates the mechanics through which endogenous growth can occur in closed-economy models.) They do, however, emphasize the specific role higher education plays in the development process, essentially because tertiary education is more likely to contribute innovative ideas that enhance scientific and entrepreneurial innovations. Moreover, higher-skilled workers and inventors can generate knowledge spillover effects that enhance knowledge formation and the productivity of lower-skilled workers with whom they interact in production and job training. There is indeed a general recognition in both the literature on innovation and the endogenous growth literature that the processes of knowledge formation, innovation, and economic growth are enhanced not just by individuals' own educational investments but also by the spillover effects conferred by the interaction within and across different skill groups, and thus also by the average skill level and educational attainments in the population.

Beyond the closed-economy models, there is a nascent literature on endogenous growth that adopts an explicit or implicit open-economy setting that allows for the role of immigration in enhancing either R&D/new goods production or human capital formation. The product-innovation-based models of an open-economy focus on the potential contribution of immigrants to the scale of the labor force employed in the R&D sector of the economy through various channels. For example, Lundborg and Segerstrom (2000, 2002) developed two versions of an open-economy model with two trading countries (either "North-North" with two rich countries, or "North-South" with a rich and a poor country) in which self-sustaining growth occurs through continuous product innovation. Firms in both countries compete to become leaders in introducing improved quality products, which are then adopted by consumers in both countries through trade. Growth is measured in terms of real consumption or utility from quality product innovations. Since all products are available to consumers in both countries, both countries share the same growth rate.

The R&D production function in this "quality ladder" model is subject to scale economies, so the equilibrium rate of growth in consumer utility is determined by the size of the labor force engaged in R&D production. Immigration matters in these models simply because it increases population and labor force size. When immigration occurs, the productivity gains enjoyed by the receiving country are offset by productivity losses in the sending country. Where the countries have similar production technolo-



gies but different population endowments and wages, (as in Lundborg and Segerstrom, 2000), there are efficiency gains from workers migrating from the more populated to the less populated country. In Lundborg and Segerstrom (2002), where the North has superior R&D production technology and wages are initially higher, immigration is again treated as an exogenous variable that is determined through the imposition of quotas. In both cases, immigration leads to more efficient production and world output rises. However, immigration reduces the welfare of the receiving country's workers in the case where natives' wages fall.

Another example of an innovation-based model is from Drinkwater et al. (2007), who adopted a model with R&D production serving as the engine of growth. The economy in this model consists of three sectors producing ordinary manufacturing goods and R&D output consisting of blueprints for new varieties of goods. Unlike the Lundborg and Segerstrom (2000, 2002) models, this model recognizes two types of workers—skilled and unskilled—as well as physical capital, and employment in R&D is assumed to be relatively skill-intensive. Self-sustaining growth in income occurs as a result of external economies generated by the “density” of new product varieties: the ratio of new products relative to the economy's population, rather than population size itself. The authors call this density of new product varieties “knowledge capital.”

The focus of the Drinkwater et al. study (2007) is on how immigration, treated as exogenous, affects the receiving country's long-term growth and the net benefit to natives in that country: the “immigration surplus.” Calibrated simulation runs of the model indicate that if immigration involves exclusively high-skilled migrants, the growth rate of real income rises due to an increase in skill-intensive R&D activity. In contrast, the net real income benefits to natives were negative if immigration was exclusively low skilled. These results derived from simulations in which skilled labor and physical capital were assumed to be substitutes in production, but the same qualitative results were obtained in simulations where the two factors were modeled as complementary. The welfare implications remain the same when measured in utility terms, rather than real income terms, in the two illustrated cases in which immigrants were exclusively high skilled or low skilled.

The human-capital-based models focus on the channels through which human capital formation and migration contribute to growth. Zak et al. (2002) developed an overlapping-generations model in which growth is enabled through human capital formation. Children's human capital grows if parents choose to lower fertility, which varies as a function of household income. The economy may be in one of three possible development states: a “poverty trap,” a “middle-income trap,” or a balanced-growth equilibrium



path.<sup>28</sup> The prospect of growth depends on the economy's initial distributions of human capital among natives and immigrants, its initial levels of physical capital, and its "political capacity." All inputs must be sufficiently above a threshold level to enable reaching the balanced growth path. Simulation runs using this model indicate that migration can enhance the level of the growth equilibrium path in the receiving economy only within specific bounds. If the migration inflow is sufficiently high or the human capital of immigrants relative to natives is sufficiently low, the development trajectory of an initially growing economy can reverse, starting a slide toward the poverty trap. But high-income receiving countries are more likely to benefit from a skill distribution of migrants that is skewed toward high levels of human capital. More generally, the model implies that, while skilled immigration can favorably affect the rate of convergence to a balanced growth path or the likelihood the latter occurs, it does not affect the economy's growth rate if the economy is already in a growth equilibrium.

Ehrlich and Kim (2015) added a new dimension to the human-capital-based endogenous growth model that allows for international labor mobility by treating the flow of immigrants and their skill composition, as well as human capital formation, income distribution, and economic growth, as endogenous variables. To this end, they pursue an open-economy model recognizing two interacting countries—destination and source—as well as two types of workers: skilled and unskilled. For analytical convenience, these workers are assumed to be employed exclusively in two sectors producing high tech and low tech consumer goods, respectively. The goods production functions exhibit constant returns to scale in effective labor hours, but they are also subject to external effects that are decreasing in the quantity of workers but increasing in the average worker's human capital due to workplace interactions among workers. The model recognizes both fertility and investment in human capital to be endogenous variables that are determined by parents within each skill type. To derive globally balanced growth equilibrium paths in both countries, the skilled and unskilled natives and immigrants are linked through spillover effects in knowledge production across skill group within each country, as well as across the same skill groups across the receiving and sending countries. The model offers theoretical propositions and supporting empirical evidence showing that a skill-biased technological shock (SBTS), can, for example, lead to a higher skill composition in the migration to receiving countries and that such induced migration can contribute to a higher balanced growth path of per capita income while also moderating the increase in the level of income inequality within receiving countries, both of which occur as a result of the SBTS. In an extended model, the authors allow human capital formation

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<sup>28</sup>As in Becker et al. (1990).

to also benefit from “diversity effects” due to complementarities between immigrants and natives in knowledge production.

### Empirical Evidence of the Role of Human Capital in Migration and Growth

The treatment of immigration flows and the skill distribution of natives and immigrants as exogenous variables is common to the above-described endogenous growth literature. The work by Ehrlich and Kim (2015) differs in that it treats both the growth prospect and the distributions of skill types and human capital attainments in receiving and sending countries and among immigrants as endogenous outcomes of underlying exogenous parameters, including those affecting the production and transmission of knowledge and the costs of parental investments in the quantity and human capital attainments of children. The model can therefore offer testable implications about the impact of changes in the volume and skill distribution of migration flows and population shares, as well as the impact of these changes on the global economy’s balanced growth path.

A plausible scenario in Ehrlich and Kim (2015) that leads to testable implications is one in which a skill-biased technological advance occurs either in just the receiving country or in both the receiving and sending countries simultaneously. A real-world example is the information technology revolution that started in the 1970s, became widely spread around the world in the following decades, and is still continuing. Analytical considerations and calibrated numerical simulation in Ehrlich and Kim (2015) imply that such technological advances generate a higher rate of human capital formation and full-income growth, as well as a generally *rising* level and share of skilled migrants relative to both the migrant and native populations in the receiving countries.

The latter implications have been tested against data from two international panels reporting the skill composition of migrant populations, indicated by college educational attainments: (1) a World Bank panel assembled by Schiff and Sjoblom (2008), including data on the 6 major receiving countries of immigration from 190 sending countries over the period 1975–2000; and (2) a 2013 panel assembled by the Institute for Employment Research, Nuremberg, Germany, (Institut für Arbeitsmarkt- und Berufsforschung, IAB), which contains data on the same receiving countries over the period 1980–2010. Both panels use aggregate census data on immigration assembled by each of the receiving countries. The metric for high skill employed in these panels is having “at least some tertiary education” (13-plus years of schooling).

Regression analysis conducted by Ehrlich and Kim (2015) based on the World Bank data for five of the six major receiving countries<sup>29</sup>—Australia, Canada, France, the United Kingdom, and the United States—indicates that the high-skilled component of net migrant flows from the 190 sending countries has indeed been continually rising over the entire sample period.<sup>30</sup> Detailed raw data from both the World Bank and IAB panels confirm this pattern for each of the receiving countries. Moreover, while the native-born populations in the five receiving countries have experienced a rising trend in the same skill composition measures over the same period, the rise in the skill level of migrant populations has exceeded that in the native-born populations for most of them.

These findings from the World Bank and IAB panels are corroborated by more recent and detailed data from the U.S. Census Bureau. As Table 6-1 indicates, the percentage of the foreign-born population in the United States with bachelor and higher degrees has been generally rising by year of entry of immigrants even before 1970. For those entering the United States over that table's most recent period (2000-2012), the percentage of immigrants with a college degree or higher (32.9%) exceeds that of the native population in 2012 (31.3%, as shown in Table 6-2). As Table 6-2 also shows, in 2012 the percentages of Asian and European immigrants with bachelor and higher degrees were substantially higher than the percentage of the native-born population, while the percentages of Latin American (all) and Mexican immigrants with bachelor and higher degrees were substantially lower. A similar trend is found using Decennial Census data assembled by Smith (2014b) for the *average* years of schooling over an even longer period: 1940-2010 (see Table 6-3). By this measure, while the average years of schooling of all foreign-born entrants is still below that of natives in 2010, the gap has been narrowing over time, with Asian and European migrants' average years of schooling again exceeding that of the native-born population.

### The Immigration Surplus in Endogenous Growth Models

The endogenous growth paradigm, which focuses on the long-term dynamic implications of immigration, also offers new insights concerning the measurement of the net economic costs and benefits to natives associated with immigration—what the literature has often termed the “immi-

<sup>29</sup>The sixth country, Germany, was excluded due to absence of relevant time series data for a reunified Germany prior to 1990.

<sup>30</sup>This pattern was derived from fixed effects models regressing *changes* in migrant population stocks on GDP (in cubic transformation) in destination countries, GDP in source countries, and other standard correlates.

gration surplus.” The standard approach for measuring the immigration surplus is based on a static framework in which the capital stock is a given constant, production of output is subject to constant returns to scale, and the economy is competitive. The surplus is then assessed as the difference between the increased output, which by definition is equal to the income of all natives in the economy (workers and owners of capital) resulting from migration, and the reduced labor wages of native workers brought about by the increased labor supply due to migration (see the simple models described in Chapter 4). Variations in this standard approach include allowances for different labor skills and possible discrete shifts in the economy’s capital stock that may accompany the migration increase. The immigration surplus thus measured is positive, but small—typically less than 1 percent of GDP (see Borjas, 1995b, and Chapter 4).

The difference between the measures of the conventional immigration surplus generated in static models or in dynamic models with exogenously determined growth and those based on the endogenous growth paradigms is that the latter account for the way immigration interacts with the economy’s human capital formation and self-sustaining growth. While it may seem that, by comparison, the measures derived in an endogenous growth context would always result in larger positive magnitudes than the static measures, the literature surveyed below indicates that this is not necessarily the case. Indeed, two of the studies—Drinkwater et al. (2003) and Ehrlich and Kim (2015)—computed the immigration surplus using numerical simulations and found that the estimates can be either larger or smaller than those derived under static conditions, depending on assumptions regarding the mix of high- versus low-skilled immigrants.

The Drinkwater et al. (2003) study provides estimates of the immigration surplus using both a baseline model, where no complementarities between skilled labor and physical capital are assumed, and an alternative model where such complementarities are allowed (the results for the alternative model are shown in parentheses below). If migration is restricted to include exclusively high-skilled migrants, it can result in a dynamic immigration surplus as high as a 3.6 percent (4.3%) increase in the steady-state consumption equivalent for a representative household in the destination country, compared to as low as a 0.33 percent (0.55%) increase in the static case. In contrast, if immigration is restricted exclusively to unskilled migrants, the dynamic immigration surplus becomes negative—as low as –3.5 percent (–4.0%) of the consumption equivalent of the representative household, as opposed to a positive level of 0.18 percent (0.04%) in the static case. Each skill group in the destination country gains less than the representative household when immigration is exclusively by the same skill group, but the change affects more heavily the unskilled group in both the dynamic and static cases. The immigrant surplus magnitudes of

**TABLE 6-1** Educational Attainment as of 2012 of the Foreign-born Population (in thousands), Ages 25 and Older, by Year of Entry

Population (total or by degree attainment)	Total		Year of Entry	
			2000 or later	
	Number	%	Number	%
Total Population	34,162	100.0	10,609	100.0
High School and Above	24,477	71.7	7,607	71.1
Bachelor's and Above	9,943	29.1	3,491	32.9
Master's and Above	3,826	11.2	1,450	13.7
Doctorate	686	2.0	270	2.5

NOTE: In 2012, the percentages of the native population that had attained high school and above, bachelor's and above, master's and above, and doctorate were 90.9%, 31.3%, 11.1%, and 1.5%, respectively.

SOURCE: U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement, 2012, Table 2.5. Available: <https://www.census.gov/data/tables/2012/demo/foreign-born/cps-2012.html> [May 2017].

**TABLE 6-2** Educational Attainment as of 2012 of the U.S. Foreign-born and Native-born Populations (in thousands), Ages 25 and Older, by World Region of Birth

Population (total or by degree attainment)	Total Foreign-Born		Natives	
	Number	%	Number	%
Total	34,162	100.0	170,418	100.0
High School and Above	24,477	71.7	154,826	90.9
Bachelor's and Above	9,943	29.1	53,348	31.3
Master's and Above	3,826	11.2	18,904	11.1
Doctorate	686	2.0	2,492	1.5

SOURCE: U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement, 2012, Table 2.5. Available: <https://www.census.gov/data/tables/2012/demo/foreign-born/cps-2012.html> [May 2017].

1990-1999		1980-1989		1970-1979		Before 1970	
Number	%	Number	%	Number	%	Number	%
9,546	100.0	7,027	100.0	3,867	100.0	3,112	100.0
6,747	70.7	4,921	70.0	826.0	73.1	2,376	76.3
2,665	27.9	1,943	27.7	1,078	27.9	766	24.6
1,008	10.6	665	9.5	390	10.1	314	10.1
158	1.7	129	1.8	68	1.8	61	2.0

World Region of Birth										
				Latin America				Other		
				All		Mexico				
Asia		Europe								
Number	%	Number	%	Number	%	Number	%	Number	%	
9,823	100.0	4,075	100.0	17,971	100.0	9,881	100.0	2,292	100.0	
8,595	87.5	3,675	90.2	10,118	56.3	4,215	42.7	2,089	91.1	
4,939	50.3	1,688	41.4	2,314	12.9	593	6.0	1,002	43.7	
2,027	20.6	715	17.5	684	3.8	144	1.5	401	17.5	
387	3.9	152	3.7	77	0.4	13	0.1	71	3.1	

TABLE 6-3 Mean Years of Schooling of U.S.-born Versus All and Recent Foreign-born Immigrant Populations by World Region of Birth

Population by Birth Origin and Years in U.S. (for foreign-born)	2010	2002	1996	1990	1980	1970	1960	1950	1940
All U.S.-born	13.59	13.31	12.99	12.61	11.78	10.84	10.01	9.43	8.77
All foreign-born	12.27	12.00	11.51	11.31	10.59	8.97	7.74	7.46	6.68
1-5 years in U.S.	12.53	12.32	11.73	11.65	11.25	10.36	9.95	NA	8.90
Foreign-born, Asian	14.22	13.96	13.28	12.94	13.17	11.32	8.37	7.24	7.76
1-5 years in U.S., Asian	14.07	14.73	13.13	12.90	12.50	13.46	12.08	NA	10.44
Foreign-born, European	13.89	13.58	12.89	11.94	10.29	8.99	7.83	7.39	6.74
1-5 years in U.S., European	14.05	14.61	14.65	13.63	12.11	10.35	10.32	NA	8.95
Foreign-born, Hispanic	10.39	9.81	9.27	9.23	8.91	7.91	5.99	5.79	4.71
1-5 years in U.S., Hispanic	10.33	9.84	8.41	9.14	8.26	8.40	7.23	NA	7.25
Foreign-born, Mexican	9.51	8.66	7.93	7.71	6.74	5.59	4.39	4.53	3.97
1-5 years in U.S., Mexican	9.56	8.53	7.52	7.83	6.33	5.93	4.58	NA	6.06

SOURCE: Smith (2014b, Table 4.3); based on Decennial Census data, 1940-1990, and March Current Population Survey for 1996-2000.

the opposite effects become even larger when the Drinkwater et al. (2003) simulations allow for a complementary relation between skilled labor and physical capital (the corresponding percentage changes are shown by the parenthetical figures above).

In the Ehrlich and Kim (2015) benchmark model, the immigration surplus generated by the endogenous increase in immigration is also found to be higher for the average household of natives in the destination country, but it reflects opposite net gains to skilled and unskilled native households (thus generating distributional effects similar to those derived in Drinkwater et al., 2007). Skilled households gain less than the average household and unskilled households gain more. Specifically, in the Ehrlich and Kim model, the percentage change in the full income per capita (FIPC) experienced by natives in the destination country following a SBTS is measured using two scenarios: (a) when the skill composition of immigrants at the destination country is free to adjust following the SBTS, and (b) when the skill composition is confined by an immigration policy restricting it to remain fixed at its initial equilibrium steady state. The percentage difference in the natives' FIPC in scenario (a) versus (b) accounts for the net benefits from the *unrestricted migration* scenario relative to the *restricted migration* scenario, which in this model is the immigration surplus. Ehrlich and Kim estimated this immigration surplus to be 1.48 percent of the natives' FIPC at the end of a 15-generations period, which is equivalent to a modest 0.003 percentage point gain in the average annual growth rate of FIPC over that period. This long period is selected for illustration as it approximates the period over which the economy approaches a new steady state. Note, however, that the rise in the FIPC under these conditions, as well as under the conditions of the simulations reported below, already appears after the first generation following the SBTS and continues over the entire transition phase leading to a new steady state.<sup>31</sup>

Ehrlich and Kim (2015) also simulated the immigration surplus under two alternative scenarios: (a) when the skill composition of immigrants is freely determined in an initial equilibrium steady state at the destination country, and (b) when the destination country *disallows altogether* the migration of either skilled or unskilled migrants. Here, if skilled migration is disallowed, the difference in FIPC between the unrestricted and restricted

<sup>31</sup>Tables 3 and 4 in Ehrlich and Kim (2015) illustrate the magnitudes of the immigration surplus over 5 and 10 generations, as well as the 15-generation period. It is interesting that the *percentage* changes in the natives' initial FIPC in the generations immediately following the SBTS are estimated to be slightly higher than those after 15 years. But the immigration surplus thus measured is "partial": it captures the net benefits from *additional* unrestricted immigration following an SBTS, starting from positive values, rather than *zero* values of skilled and unskilled migration following the SBTS. The latter are captured by the estimates based on the alternative scenarios in the following paragraphs.



immigration scenarios is significantly more pronounced in the benchmark case, where it amounts to a cumulative gain in the natives' initial FIPC of 79.8 percent after 15 generations, equivalent to a 0.376 percentage point gain in the average annual growth rate of FIPC in the unrestricted immigration scenario relative to the restricted immigration scenario over this period. However, the opposite outcome occurs when the destination country disallows any unskilled migration. In this case, natives experience a *gain* of 33.0 percent in FIPC in the restricted immigration scenario relative to the unrestricted scenario (i.e., an immigration surplus of  $-33.0\%$ ) after a period of 15 generations, or a change in the average annual growth rate of FIPC of  $-0.058$  percentage points per annum over this period.

Larger estimates of the immigration surplus are computed in Ehrlich and Kim's (2015) extended model, which allows for positive complementarities or "diversity effects" in knowledge production across natives and immigrants of the same skill group. For example, the immigration surplus in the case where *all* migration is disallowed in the destination country amounts to a persistent gain of 0.593 percent in the annual growth rate of FIPC after a 15-generations period.

Bear in mind that all the immigration surplus estimates reviewed in this section are theoretical and subject to limiting assumptions. They do indicate, however, that the long-term dynamic immigration surplus could far exceed its estimates based on static models, both on the up side and the down side. This realization opens up opportunities for immigration policies that could enhance the benefits of migration to both destination and source countries.

## 6.6 BEYOND GDP—NONMARKET GOODS AND SERVICES AND THE INFORMAL ECONOMY

Immigrants, like their native-born counterparts, also contribute to the economy in ways that are not, or at least not fully, captured by market-based economic statistics such as GDP and employment rates.<sup>32</sup> Much labor used in the provision of health, child, and elder care for family members or friends, for example, goes undetected in official statistics, as a substantial

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<sup>32</sup>Becker (1991) observed that extensive, economically valuable work—from care activities to home maintenance—goes on inside the family but is largely unrecognized in conventional measures of economic output. The National Research Council (2005) report *Beyond the Market* explores in great detail methods for accounting for nonmarket economic activities in the areas of household production, investment in education, investment in health, selected government and nonprofit sector activities, and environmental assets and services.

amount of that valued activity is nonmarket in nature.<sup>33</sup> Immigrant women play a particularly important role in housework and child care, whether done for their own families, working in informal arrangements (which may be market or nonmarket based) for others, or in formal employment. Female participation rates of immigrants in market work are on average lower than for native-born females, indicating that they may be engaged in more nonmarket production. Also, immigrants more often live “doubled up” or in extended family situations, raising the possibility of greater nonmarket production or a shifting of who is doing it (e.g., grandma watches the kids while mom works) relative to nonimmigrant households where child care and other services are more likely to be purchased in the market.

Because home-produced services do not involve market transactions, some of the economic benefits of family-based immigration policies may be underestimated or overlooked by conventional economic statistics. However, the American Time Use Survey has allowed researchers to begin examining immigrant-native differences in nonmarket work. Ribar (2012) provided a broad overview of immigrant time use, using data from this survey. His study confirmed that immigrant women in his dataset devoted more time to household production (caregiving and housework) than native-born women. He also found that they spent more time sleeping. Immigrant men spent more time in market work and less time performing housework, community activities, and leisure than did native-born men.<sup>34</sup> Vargas (2016) found that results vary considerably by country of origin, but over time, immigrant time use becomes more like that of natives.

Alesina and Giuliano (2007) examined time use patterns as well and found that, relative to population averages, strong family ties<sup>35</sup> are associated with a higher number of hours spent in home production and lower labor force participation of women, as well as less reliance on the government for social insurance. Abrams (2013) discussed easy to overlook (and difficult to measure) benefits of family-based immigration policy and assessed the role of immigrants who may not participate in wage-paying labor but who nonetheless contribute in economically valuable ways by providing “unpaid care work in the homes of relatives who are participat-

<sup>33</sup>A common illustrative example is an individual who marries his/her housekeeper. If the housekeeper’s wife/husband continues to clean the house, GDP decreases, even though the amount of economic activity remains the same.

<sup>34</sup>Some of the redistribution of time for immigrants relative to natives may be attributable to the need of the former to engage in assimilation-related activities that are costly and take time; Hamermesh and Trejo (2013) explored this issue.

<sup>35</sup>Strength of family ties is scored based on responses by individuals across 81 countries from the World Value Survey regarding “the role of the family and the love and respect that children are expected to have for their parents.”

ing in market labor, sometimes even making such market participation possible” (Abrams, 2013, p. 21).

Nonmarket activities in the sphere of home production are different from labor that takes place outside the household where immigrants are paid but their compensation is not reported through official channels. Low-skilled immigrants work in a range of sectors where their labor is more likely to be “off the books” and hence untaxed. Occupations for which this may be true (but not always) include house cleaning and babysitting services, home repair, landscaping, and many others.<sup>36</sup>

As noted by Bohn and Owens (2012), informal sector employment—defined in their analysis as paid work that would have been taxable if it had been reported to the tax authorities—is thought to be large and growing. Bohn and Lofstrom (2013) found self-employed, “likely unauthorized” men to be especially concentrated in a handful of industries and occupations—about 46 percent of this group worked in construction while another 17 percent worked in landscaping.<sup>37</sup> Much unreported work, but not all, takes place in “markets” and shows up in GDP. Studies of employment arrangements estimate that over half of the unauthorized immigrants in the United States pay income and payroll taxes through employers withholding from their paychecks or by the immigrants filing tax returns (Congressional Budget Office, 2007).

Some work that takes place informally does so without employment protections, health insurance, Social Security, and other worker benefits. Unregulated work is often connected to immigration through the growth of ethnic economies and because some immigrants lack documentation to work legally in the United States. Across states and over time, there is a relationship between the sizes of informal economies and changing rules and processes for immigrants to attain legal status; enforcement is also a factor. Bernhardt et al. (2009)<sup>38</sup> presented evidence from qualitative fieldwork and the 2008 Unregulated Work Survey about how unauthorized status can play out in the workplace and its correlation with higher rates of

<sup>36</sup>Haskins (2010) reviewed the literature examining reasons why tax evasion is prevalent, using analysis of Internal Revenue Service data plus qualitative interviews with Filipina nannies in the Washington, D.C., area.

<sup>37</sup>Bohn and Owens (2012) found that states with high concentrations of low-skilled male immigrants have higher levels of informal employment in the landscaping industry. Measuring informal work is difficult and requires case studies and specialized surveys (e.g., the National Day Labor Survey). Bohn and Owens used a residual method to estimate informal work in landscaping and other occupations. For construction, the residual was based on a total employment estimate based on “unofficial data”—for example, based on building permits and other information, minus a count of documented workers captured in an “official” source such as the BLS’s Quarterly Census of Employment and Wages for residential construction.

<sup>38</sup>See <http://www.nelp.org/content/uploads/2015/03/BrokenLawsReport2009.pdf> [November 2016].

unemployment and labor law violations, including paying below-minimum wages.<sup>39</sup> In addition to the potential for worker abuse, injury, and exploitation, another secondary economic effect of informal, unreported work is that employers may prefer immigrants to competing native workers when only the immigrants can be employed under arrangements in which payroll taxes are ignored and labor regulations are not observed.

Even in the context of formal labor markets, there is some evidence that immigrants are more likely to hold jobs characterized by poor working conditions or high risk than are natives. Based on individual-level data from the 2003-2005 American Community Survey and from the BLS, Orrenius and Zavodny (2009) found that foreign-born workers were employed in more dangerous jobs than were U.S.-born workers, “partly due to differences in average characteristics, such as immigrants’ lower English-language ability and educational attainment” (Orrenius and Zavodny, 2009, p. 535).

Informal work arrangements also carry fiscal implications when wages are not taxed or if the amount of wages taxed is smaller than it should be. A study of Los Angeles County by Flaming et al. (2005) indicated the substantial role of informal workers in the local economy: 679,000 in 2004, or roughly 15 percent of the county’s labor force. The report estimated that the informal economy in Los Angeles County generated an \$8.1 billion payroll in 2004, which translated into a \$1 billion reduction in Social Security taxes that would have been paid by employers and workers if it were formal work.<sup>40</sup> Flaming et al. (2005) estimated that Medicare taxes paid by employers and workers were reduced by \$236 million for that year; California State Disability Insurance payments paid by workers were reduced by \$96 million; unemployment insurance payments paid by employers were reduced by \$220 million; and Workers Compensation Insurance payments paid by employers were reduced by \$513 million. These estimates illustrate that, since wage transactions in the informal sector are not always taxed, the fiscal impact is negative (relative to equivalent taxed work). Although not all informal work is performed by unauthorized immigrants, and a minority of unauthorized immigrants are engaged in off-the-books employment, legalization of unauthorized immigrants would likely result in a reduction of untaxed labor in the informal market.

The overall impact of the informal economy on jobs, production, tax-paying status, and fiscal consequences is not a thoroughly studied topic.

<sup>39</sup>Surveying unauthorized workers and hard-to-sample groups (where there is no sampling frame) often requires innovative methods such as respondent-driven sampling, which also means the data are not necessarily representative.

<sup>40</sup>A considerable amount of money—estimated to be in billions of dollars—is also paid into the Social Security system that is associated with faulty Social Security numbers or Individual Taxpayer Identification Numbers. A rapid growth in the Social Security Earning Suspense File affects Social Security Trust Fund balances and, in turn, program costs and fiscal projections.

However it does appear that state-level immigration laws can play a role in pushing people off the books. Bohn and Lofstrom (2013) addressed the employment effects of state legislation on employment outcomes of low-skilled, unauthorized workers. Analyzing the impact of the 2007 Legal Arizona Workers Act—which allows the state to suspend or revoke the business licenses of employers found to have knowingly hired unauthorized workers—they found a lower probability of wage and salary employment and a higher rate of self-employment among this group. The size of the gray/underground economy may have been put on a different course after the September 11, 2001, terrorist attacks with changed laws and enforcement protocols; it is now also more difficult to get Social Security numbers, which, for example, are needed to work in many jobs.

There are many other nonmarket impacts created by immigration, sometimes negative but often positive. These issues are not dealt with in any detail in this report, but they are covered elsewhere: The impact of immigration on population health, crime (Castañeda et al., 2015; National Academies of Sciences, Engineering, and Medicine, 2015), and subjective well-being of individuals (Polgreen and Simpson, 2011) are just a few examples. Also, *The New Americans* (National Research Council, 1997, pp. 98-99) discussed how immigration contributes to population growth and congestion in destination countries, which places demands on the environment and infrastructure. However, that report also notes that immigration is primarily distributive, since an immigrant is leaving one place (relieving congestion) and moving to another (adding to congestion).

## 6.7 CONCLUSIONS

The economic impact of immigration extends well beyond the wage and employment interactions reviewed in Chapter 5. With so much focus in the literature on the labor market (and much of this, on the short run), other critical issues—such as the role of immigrants in contributing to aggregate demand, in affecting prices faced by consumers, or as catalysts of long-run economic growth—are sometimes overlooked by researchers and in the policy debates. In fact, by construction, many of the labor market analyses reviewed in Chapter 5 net out the kinds of economic effects that have been discussed in this chapter, many of which are positive, in order to identify direct, short-run wage and employment impacts.

The contributions of immigrants to the labor force reduce the prices of some goods and services, which benefits consumers in a range of sectors including child care, food preparation, house cleaning and repair, and construction. Moreover, new arrivals and their descendants also provide a major source of demand in sectors such as housing, benefiting residential real estate markets. To the extent that immigrants flow disproportionately

to where wages are rising and local labor demand is strongest, **they help equalize wage growth geographically, making labor markets more efficient and lowering slack.**

**Immigration also contributes to the nation's economic growth.** Most obviously, immigration supplies workers, which increases GDP and has helped the United States avoid the fate of stagnant economies created by purely demographic forces—in particular, an aging (and, in the case of Japan, a shrinking) workforce. Perhaps even more important than the contribution to labor supply is **the infusion by high-skilled immigration of human capital that has boosted the nation's capacity for innovation and technological change.** The contribution of immigrants to human and physical capital formation, entrepreneurship, and innovation are essential to long-run sustained economic growth. Innovation carried out by immigrants also has the potential to increase the productivity of natives, very likely raising economic growth per capita. In short, **the prospects for long-run economic growth in the United States would be considerably dimmed without the contributions of high-skilled immigrants.**

In Part III of this report (Chapters 7 through 10), the panel turns to another key component of immigration that must be considered alongside labor market and other economic impacts in order for policy assessment to be comprehensive: the fiscal impact created by the new arrivals.

## 6.8 TECHNICAL ANNEX ON MODELS OF ENDOGENOUS GROWTH IN A CLOSED ECONOMY

The basic mechanism through which endogenous growth occurs can be illustrated using human-capital-based models. The perception of human capital or human knowledge as the economy's engine of growth stems from a wide agreement in economics that knowledge is the major force affecting productivity growth and the only reproducible economic asset that is not subject to diminishing returns (paraphrasing Clark, 1923). This thesis can be supported by examining the critical role played by the accumulated stock of past knowledge in transmitting and facilitating the acquisition of new knowledge, which offsets any diminishing returns from investment in the latter. In Lucas (1988), this process operates implicitly because the investor (or productive enterprise) is infinitely lived. In the Becker et al. (1990) dynastic model and in the Ehrlich and Lui (1991) overlapping generations model, knowledge formation occurs through the transfer of knowledge from finitely lived young parents to offspring via the following human capital production function:

$$(1) H_{t+1} = A (H^e + H_t) (h_t)^\alpha$$

where  $H_t$  and  $H_{t+1}$  measure the human capital acquired by the parent generation ( $t$ ) and the offspring ( $t+1$ ),  $H^e$  denotes an endowed productive capacity measured in units of human capital;  $A$  denotes the technology of knowledge transmission from the parent generation to that of the offspring; and  $h_t$  is the share of total productive capacity,  $(H^e + H_t)$ , or “full income” that young parents devote to promote the acquisition of human capital by their kids. (For simplicity, total productive capacity can be assumed to equal full income if human capital is taken to be the only asset underlying the production of goods and has a neutral effect on the productivity of labor and capital, and thus on the capital/labor ratio.) While the investment share of full income  $h_t$  can be subject to diminishing returns (if  $\alpha < 1$ ) with no loss of generality, the stock of new human capital,  $H_{t+1}$ , is assumed to be linearly related to old human capital,  $H_t$ , consistent with Clark’s assumption that human capital as a productive asset is not subject to diminishing returns. The contribution,  $h_t$ , of the parent generation to the acquisition of future knowledge,  $H_{t+1}$ , is thus seen as the sine qua non for innovation and technological advance.

The assumed production function illustrates the role of intergenerational spillover effects in achieving the growth of innovative human capital. Absent any link between the generations, human capital would be essentially stagnant. But, by this formulation, whether innovative production capacity can actually grow over time crucially depends on the size of investment in new knowledge capital chosen by generation  $t$ . This can be illustrated as follows: if  $\alpha = 1$  and the value of  $h_t$  is assumed to be a constant fraction of total production capacity  $h^*$  that can generate a continuous growth in future production capacity, then by equation (1), the growth evolution equation would be:

$$(2) (H^e + H_{t+1})/(H^e + H_t) = (1 + g_t) = Ab^* + [H^e/(H^e + H_t)]$$

which implies that if  $t$  approaches an infinite value, the last term in equation (2) will disappear and the growth rate of full income will be given by the term  $Ab^*$ . This term indicates that a steady state of continuous growth in total productive capacity, i.e.,  $g > 0$  in equation (2), can be attained only if investment in human capital,  $h^*$  reaches a threshold level  $h^* > 1/A$ . By contrast, a value of  $h^* \leq 1/A$  can be shown to yield a stagnant equilibrium.<sup>41</sup>

The equilibrium steady state of long-term growth,  $g^* > 0$ , is thus essentially a function of the optimal investment parents choose to make in the human capital of their children,  $h^*$ . The conditions that determine this

<sup>41</sup>The solution of the difference equation (1) is given by:  
 $H^e + H_t = (Ab^*)^t [H(0) + H^e] + [(Ab^*)^t - 1]H^e/(Ab^* - 1)$ . Thus, growth can occur if and only if  $Ab^* > 1$ . If  $Ab^* < 0$ , e.g.,  $H^e + H_t = H^e/(1 - Ab^*)$ .

level are a function not just of the technology of knowledge production and transfer but also of the altruistic preferences of parents and the relative costs motivating them to choose between quantity and quality of children and their own consumption, as well as the financing constraints limiting their ability to invest.





## PART III

# FISCAL IMPACTS



## Estimating the Fiscal Impacts of Immigration—Conceptual Issues

### 7.1 INTRODUCTION

In formulating immigration policy, information about the impact of immigration on public finances is crucial. Along with the impact on wages and employment (see Chapters 4 and 5), the per capita impact on taxes and program expenditures is the other factor determining the extent to which immigrants are or will be net economic contributors to the nation. *The New Americans* (National Research Council, 1997, p. 225) identifies two other reasons why estimates of current and long-run fiscal impacts are important to policy: First (as discussed in Section 7.5 below), immigration may create taxpayer inequities across states and local areas; specifically, regions that receive disproportionate shares of immigrants may incur higher short-run fiscal burdens if the new arrivals initially contribute less in revenues than they receive in public services. Second, projections of the consumption of public services and payment of taxes over time are essential in order to predict “the full consequences of admitting additional immigrants into the United States.” This chapter discusses the conceptual issues that arise when estimating the fiscal impacts of immigration, recognizing that it is a complex calculation dependent to a significant degree on what the questions of interest are, how they are framed, and what assumptions are built into the accounting exercise. In so doing, the discussion here provides a foundation for the empirical analyses conducted by the panel and reported on in Chapters 8 and 9.

Understanding of the fiscal consequences of immigration has often been clouded because much of the research is conducted by policy-focused

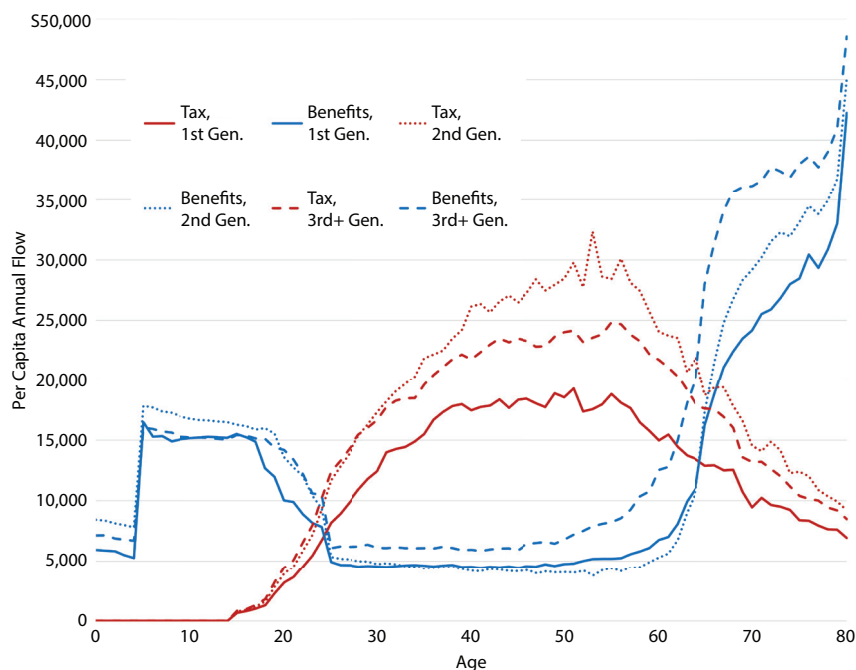
groups that tailor the assumptions to support one position over another. As described by Vargas-Silva (2013, p. 1), “Most of these organizations have a set agenda in favour or against increased immigration. Unsurprisingly, those organizations with a favourable view of immigration tend to find that immigrants make a positive contribution to public finances, while those campaigning for reduced immigration tend to find the contrary.” The partisan nature of the policy debate notwithstanding, careful estimates based on defensible methodologies are possible. *The New Americans*, a pioneering effort in this respect, included a detailed discussion of methodological considerations that is still highly relevant (National Research Council, 1997). That volume, along with more recent studies, such as Auerbach and Oreopoulos (1999), Dustmann and Frattini (2014), Preston (2013), Rowthorn (2008), Storesletten (2003), and Vargas-Silva (2013), significantly advanced the conceptual framework for thinking about fiscal impacts, making the task much easier now than it was at the time that *The New Americans* was written.<sup>1</sup>

The first-order *net fiscal impact* of immigration is the difference between the various tax contributions immigrants make to public finances and the government expenditures on public benefits and services they receive. However, a comprehensive accounting of fiscal impacts is more complicated. Beyond the taxes they pay and the programs they use themselves, the flow of foreign-born also affects the fiscal equation for many natives as well, at least indirectly through labor and capital markets. Because new additions to the workforce may increase or decrease the wages or employment probabilities of the resident population, the impact on income tax revenues from immigrant contributions may be only part of the picture. Revenues generated from natives who have benefited from economic growth and job creation attributable to immigrant innovators or entrepreneurs would also have to be included in a comprehensive evaluation, as would indirect impacts on property, sales, and other taxes and on per capita costs of the provision of public goods.

Additionally, the full fiscal impact attributable to a given immigrant or immigration episode is only realized over many years. As shown in Figure 7-1, albeit with cross-sectional data, the distribution of individuals along the life cycle displays systematically different tax contribution and program expenditure combinations. For example, the child of an immigrant—as with the child of a native-born person—is likely to absorb resources early in life (most notably due to the costs of public education) and therefore is likely

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<sup>1</sup>Referencing this literature affords the opportunity to shorten the methodological discussion here; however, when reporting the panel’s own fiscal estimates, in Chapters 8 and 9, we document in detail the expenditure and revenue categories used in the estimation, along with the underlying methods, assumptions, and modeling choices.



**FIGURE 7-1** Age-specific taxes and benefits, by immigrant generation, United States, 2012.

NOTE: All public spending is included in benefits except pure public goods (defense, interest on the debt, subsidies). Data are per capita age schedules based on Current Population Survey data, smoothed and adjusted to National Product and Income Accounts annual totals.

SOURCE: Panel analysis of Current Population Survey data.

to exert a net negative impact on public finances initially. However, later in the life cycle, working and tax-paying adults typically become net contributors to public finances. A full accounting of the fiscal effects of immigration therefore requires information about “the additional or lower taxes paid by native-born households as a consequence of the difference between tax revenues paid and government benefits received by immigrant households over both the short and the long term” (Smith, 2014a, p. 2). Reliable estimates of taxpayer impacts over time are important elements of a thorough economic analysis of the costs and benefits of immigration (Smith, 2014a).

The impact of immigrants on government finances is sensitive to their characteristics, their role in labor and other markets, and the rules regulating accessibility and use of government-financed programs. It is often important to distinguish country of origin and legal status of immigrants, as

groups differentiated by these characteristics experience different outcomes in the labor market and different take-up rates for government services. Inclusion of detailed individual-level characteristics (age, education, etc.) may adequately address these observed fiscal costs and benefit differences across origin countries.<sup>2</sup> Even so, due to this heterogeneity, it is impossible to reach generalizable conclusions about the fiscal impact of immigration because each country's or state's case is driven by a rich set of contextual factors. Impacts vary over time as laws and economic conditions change (e.g., pre- and post-financial crisis) and by place of destination (e.g., by country, region, and state—each of which has its own policies and population skill and age compositions). It is also important to note that, during periods when fiscal balances for immigrants become increasingly negative, such as during major recessions, they likewise become increasingly negative for natives.

The potential of immigration to alter a country's or state's fiscal path is greatest when the sociodemographic characteristics of arrivals differ distinctly from those of the overall population—and particularly when these characteristics are linked to employment probability and earnings. In the United States, first generation immigrants have historically exhibited lower skills and education and, in turn, income relative to the native-born. Analyses of New Jersey and California for *The New Americans* (National Research Council, 1997, pp. 292-293) concluded that the estimated negative fiscal impacts during the periods 1989-1990 and 1994-1995, respectively, were driven by three factors: (1) immigrant-headed households had more children than native households on average, and so consumed more educational services on a per capita basis; (2) immigrant-headed households were poorer than native households on average, thus making them eligible to receive more state and locally funded income transfers; and (3) due to their lower average incomes, immigrant-headed households paid lower state and local taxes. Recently, though, the share of foreign-born workers in high-skilled occupations has been increasing, partly as a result of the H-1B visa programs initiated in the 1990s. But even after education and other characteristics are accounted for, immigrants' labor market outcomes are often less positive than their native-born counterparts. One explanation is that the skills gap may be exacerbated by underemployment due to downgrading of education and other qualifications, at least for a period after arrival. An interesting question is whether immigration may have some fiscal impact, even if it does not alter the composition of the resident population—that is, if immigrants had the same characteristics as

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<sup>2</sup>In a reassessment of state-level analyses from *The New Americans*, Garvey et al. (2002) found that divergent fiscal impacts, originally attributed to country-of-origin effects, could be explained by different socioeconomic characteristics.

the native-born population. The answer depends in part on the extent to which immigrants assimilate into or out of the welfare state and into or out of the labor market.

Age at arrival is an important determining fiscal factor as well, because of its relation to the three factors identified above. Immigrants arriving while of working age—who pay taxes almost immediately and for whom per capital social expenditures are the lowest—are, on average, net positive contributors. In *The New Americans*' fiscal estimates for the 1990s, a 21-year-old with a high school diploma was found to have a net present value of \$126,000. This value gradually declines with age at arrival; as the projected number of years remaining in the workforce becomes smaller; the figure turned negative for those arriving after their mid-thirties. For immigrants with lower levels of education, the estimated net present value was much smaller initially and turned negative at an earlier age (National Research Council, 1997, pp. 328-330). Immigrants arriving after age 21 also do not themselves add to costs of public education in the receiving country (although, if they have them, their children would). In cases where immigrants are educated in the origin country, the receiving country benefits from the investment without paying for it, creating a distortion in the expenditure estimates.

Relationships between immigrant characteristics and fiscal impact were quantified by Dustmann and Frattini (2014) for the UK case, where immigration patterns have been quite different from the patterns in California and New Jersey during the 1990s and from the U.S. experience in general. Recent history in the United Kingdom has seen the arrival of large numbers of foreign-born individuals near the beginning of their productive working years, *after* completion of their full-time education. When formal education is financed by the countries of origin, a considerable savings—or, perhaps more accurately put, a return on investment made by others—is realized by the receiving countries. Dustmann and Frattini (2014) used an annuity-based quantification strategy that takes into account these “savings” to the destination country, showing how they increase along with the duration of stay in the receiving economy. In the UK case (and unlike the U.S. case), immigrants are on average also more educated than the native-born, although levels of education (absolute and relative) displayed by immigrants have changed over time and differ greatly by country of origin.<sup>3</sup>

Accounting exercises such as those presented in Chapters 8 and 9 create combined tax and benefit profiles by age and education to decompose the timing and source of fiscal effects. Forward projections build scenarios to

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<sup>3</sup>Dustmann and Frattini (2014) do not differentiate between fiscal contributions of high- and low-skilled immigrants. Thus they do not estimate whether low-skilled immigrants to the United Kingdom have made positive or negative fiscal contributions.



demonstrate alternative assumptions about how changes in outlays—e.g., the use of public education and various programs (Supplemental Security Income; Medicaid; the Special Supplemental Nutrition Program for Women, Infants, and Children; Aid to Families with Dependent Children; etc.)—and revenues change by generation and affect fiscal estimates. As discussed in Section 7.4, methodological approaches have been developed to suit different accounting objectives. For some policy questions, multi-generational costs and benefits attributable to an additional immigrant or to the inflow of a certain number of immigrants may be most relevant; for other questions, the budget implications for a given year associated with the stock, or recent changes in the stock, of the foreign-born residing in a state or nation is most relevant. For example, the latter is often what state legislators are most interested in. Sometimes the question is about absolute fiscal impacts; sometimes it is about the impact of an immigrant *relative* to that for an additional native-born person. Although these approaches require very different kinds of aggregations and calculations, the program (expenditure) and tax (revenue) fiscal components are largely the same.

## 7.2 SOURCES OF FISCAL COSTS AND BENEFITS

The first task in estimating fiscal impact of immigration, whether at the federal, state, or local level, is to identify the categories of costs and benefits that are affected. Immigrants contribute to fiscal balances through taxes and other payments they make into the system; they create additional fiscal costs when they receive transfer payments (e.g., Social Security benefits) or use publicly funded services (e.g., education or health care). The net fiscal impact that immigrants impart depends on the characteristics that they bring—their mix of skills and education, age distribution and family composition, health status, fertility patterns—and whether their relocation is temporary, permanent, or circular. It also depends on whether they seek employment on the legal labor market and on other conditions prevailing at destination locations, as well as their success in assimilating economically and socially.

In the context of benefit-cost analyses of state-specific immigration policies, Karoly and Perez-Arce (2016) identified channels through which immigration affects fiscal balances (see Table 7-1).

Benefits and costs may accrue to individuals and employers (predominantly through employment and wage impacts—see Chapters 4 and 5) or to the public sector. Among public expenditures associated with an expanding population, be it immigrant- or native-driven, schooling is often the most

**TABLE 7-1** Domains and Types of Impacts of Immigration That Affect Fiscal Balances

Domain	Impacts to Address
State Economic Output	Gross state product in aggregate and for specific industries
Labor Market	Employment and wages of subgroups of workers defined by education, race/ethnicity, nativity, or other characteristics
P-12 Education	Use of educational services and education outcomes from preschool to grade 12
Higher Education	Use of public and private higher education institutions, including 2-year colleges and 4-year colleges and universities
Law Enforcement	Allocation of resources across specific types of state and local law enforcement activities
Criminal Justice System	Allocation of resources across specific types of criminal justice system costs (e.g., courts, jails, prisons)
Social Welfare System	Specific cash and in-kind transfer programs (may be affected by availability to unauthorized immigrants)
Population Health and Health Care	Health outcomes (e.g., immunization rates, communicable diseases, low birthweight babies) and health care utilization (public and private costs overall)
State and Local Tax Revenues	Specific sources of state and local tax revenues and tax expenditures (e.g., tax credits)
Other	Costs to implement adopted policies and defend them in the courts

SOURCE: Karoly and Perez-Arce (2016).

significant one for state and local budgets.<sup>4</sup> In multigenerational analyses where the specified time horizon is sufficiently long to capture future income returns, the cost of education in the current year is best categorized as an investment. In a single-year static analysis, public education for the school age population will appear as an accounting cost; likewise, for the older working-age taxpaying population, the cost of education incurred in previous periods will not be captured as part of the net calculation.

Beyond public education, a large number of other goods, services, and programs generate public costs at various levels of government:<sup>5</sup> Medicare and Medicaid, Social Security and other protections, housing, prisons and courts, police services, and others—are financed through tax payments by

<sup>4</sup>According to the U.S. Census Bureau's *State Government Finances Summary: 2013*. See <https://www2.census.gov/govs/state/g13-asfin.pdf> [November 2016] expenditure for education comprised 35.6 percent of all general expenditure by state governments.

<sup>5</sup>These components are itemized in detail for the panel's federal and state fiscal estimate calculations in Chapters 8 and 9.

immigrants and the native-born. Economic conditions and the demographic profile of the immigrants determine the participation rate of immigrants in various safety net programs. A general finding for the United States has been that immigrants and their children have been less likely to use some programs (e.g., Social Security, Medicare,<sup>6</sup> cash transfers—though this difference may diminish with length of stay), while others (e.g., bilingual education) are used more intensively. As discussed in Section 7.4, the impact that immigrants have on the cost of providing public goods and services depends on the way their use is attributed.

Ideally, models estimating fiscal impacts of immigration should distinguish between citizens and noncitizens and then, for the latter, authorized and unauthorized individuals. All subgroups make contributions to government finances (pay various kinds of taxes) and consume public services, but the levels differ. Legal status is often central to determining what services immigrants qualify for and tend to use and what taxes they are required to pay. Per capita expenditures on various programs vary by documentation status and are therefore directly affected by policy.<sup>7</sup> Undocumented individuals may make retirement-related payments (e.g., Social Security, Medicare); some will never benefit while others may receive partial benefits or later become citizens and enjoy full benefits.

Safety net programs are aimed at low-income families, children, and the elderly, but immigrants do not have access identical to the native-born, due to restrictions imposed by law. Unauthorized immigrants and individuals on nonimmigrant visas are not eligible for the Supplemental Nutrition Assistance Program, nonemergency Medicaid, Supplemental Security Income, or Temporary Assistance for Needy Families. The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 and the Illegal Immigration Reform and Immigrant Responsibility Act of 1996 introduced additional restrictions. The former made lawful permanent residents and certain other lawfully residing immigrants ineligible for federal means-tested public benefit programs (such as Medicaid) for the first 5 years after receiving the relevant status. The latter statute included a provision intended to prevent

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<sup>6</sup>For example, using Medical Expenditure Panel Survey to determine medical expenses, Zallman et al. (2015) calculated that, from 2000 to 2011, unauthorized immigrants contributed \$2.2 to \$3.8 billion more than they withdrew annually from the Medicare Trust Fund—creating a total surplus of \$35.1 billion. This surplus, just for those 11 years, was estimated to have accounted for 1 additional year in the current projection in which the Medicare program remains solvent through 2030.

<sup>7</sup>A report by the Congressional Budget Office in 2015 titled *How Changes in Immigration Policy Might Affect the Federal Budget* is available at <http://www.cbo.gov/sites/default/files/cbofiles/attachments/49868-Immigration.pdf> [November 2016]. The report lays out how policy change scenarios affecting the status of the currently unauthorized population would affect the federal budget.

states from extending in-state tuition benefits to unauthorized immigrants.<sup>8</sup> Prior to the enactment of these laws, authorized immigrants had access to public assistance and education benefits that were by and large equal to the access of citizens. U.S.-born children of immigrants remain eligible for all programs because they are citizens.

Borjas (2011) examined poverty and program participation among immigrant children<sup>9</sup> using 1994-2009 Current Population Survey (CPS) data on cash assistance, Supplemental Nutrition Assistance Program benefits, and Medicaid received by households. The study divided children into four groups: (a) those who have one immigrant parent (mixed parentage); (b) U.S.-born children who have two immigrant parents; (c) foreign-born children who have two immigrant parents; and (d) U.S.-born children with U.S.-born parents. The analysis revealed that, even though poverty rates<sup>10</sup> decreased for children with two immigrant parents between 1996 and 2000, they have risen since 2007. Among the four groups of children, the poverty rate is highest for foreign-born children with two immigrant parents. Children of mixed parentage exhibit poverty rates that are not significantly different from those of children of native-born parents. Similar conclusions can be drawn from the figures on program participation rates. U.S.-born children with two immigrant parents have the highest program participation rates among the four groups, which is not a surprising outcome as their parents are likely to have lower income and, since they are native-born, they are eligible for various safety net programs.

It is more difficult to estimate expenditure levels for unauthorized immigrants, which adds an element of uncertainty to forward projections. Even the microdata sources from national surveys do not contain enough detail or population coverage to make these distinctions accurately for all programs, and assumptions must be embedded in the estimates about numbers of unauthorized citizens and about their impact on program usage.

### 7.3 STATIC AND DYNAMIC ACCOUNTING APPROACHES

New immigrants affect governments' fiscal balances almost immediately upon arrival—by paying sales, income, and other kinds of taxes and

<sup>8</sup>According to the National Conference on State Legislatures, 18 states have passed legislation since 2001 extending in-state tuition rates to undocumented students who meet a set of requirements. One state, Wisconsin, revoked its law in 2011. See <http://www.ncsl.org/research/education/undocumented-student-tuition-overview.aspx> [November 2016].

<sup>9</sup>Borjas (2011) defined immigrant children as those who are foreign born and migrate to the United States with their foreign-born parents and those who are U.S. born to one or two immigrant (foreign-born) parents.

<sup>10</sup>The poverty rate is defined as the fraction of children in a particular group that is being raised in households where family income is below the official poverty threshold.

by using schools and other services. Impacts compound subsequently, over extended time horizons. State legislators or local school districts may be most concerned about the extent to which immigrants affect current and near-term budgets. Others—policy makers concerned with the long-term solvency of a government program or with multiyear budget projections or a researcher studying long-run economic growth—may be more interested in life-cycle impacts that take place over many decades. The appropriate analytic framework, each requiring specific kinds of data and entailing specific sets of assumptions, is dictated by the temporal concept most relevant to the question at hand. Additionally, while many analyses have attempted to estimate the fiscal impact of all foreign-born individuals or immigrant-headed households currently in the population, it is often more relevant for policy debates to estimate the net impact of new immigrants, since the rate and composition of new arrivals is presumably what policy will affect. It is conceptually muddled to bundle the impact of immigrants who arrived in different historical periods, who may be very different in terms of the way that they have been integrated into society and the economy.

The two basic accounting approaches to estimating fiscal impacts, one static and the other dynamic, capture distinct but connected aspects of immigration processes. The static accounting approach is conducted for a specific time frame, often a tax year, in which contributions by immigrants to public finances—in the form of taxes generated directly by them or indirectly by others (in practice, most analyses are limited to the former)—are compared with expenditures on benefits and services supplied to that population. Such an approach might be used, for example, to answer questions such as, “in California, how much did the foreign-born and their dependents add to tax revenues, and how much did they cost in terms of government expenditures last year?” And, “how much did the grown children of immigrants (and their dependents) add in tax revenue and cost in terms of expenditures last year?” Dynamic accounting approaches, in contrast, compound costs and benefits over extended time periods. This is done by computing the net present value of tax contributions and government expenditures attributable to immigrants—and in some analyses, their descendants—projected over their life cycles. Dynamic analyses involve modeling the impact of an additional immigrant on future public budgets and are useful for addressing questions such as, “over the next 50 years, what will be the impact on fiscal balances if  $x$  immigrants with a given set of characteristics  $y$  enter the country?” In both static and dynamic estimates, difference between immigrants and natives tend to be much larger on the tax revenue side than on the benefits cost side, though the second generation catches up quickly and eventually pays as much or more than the native-born population in general (National Research Council, 1997, p. 314). The earnings and tax profiles for the third generation are more or less the same as for the native population over all.

A static analysis may cover a single year or be repeated for cohorts across a number of years. To a large extent, results are driven by the composition of immigrants in terms of age, education, and other factors, relative to that of the native-born.<sup>11</sup> As described by Preston (2013) and Dustmann and Frattini (2014), immigration can affect static estimates of the public budget constraint in a range of ways because, on average, they pay taxes and consume public services differently from the population as a whole, alter the taxes paid or services consumed by the native-born, and may affect the cost of providing services to natives. A single-year static model may provide a reasonably accurate basis for future projections in a steady state with stable immigrant rates and characteristics. However, historically, this steady-state assumption has not been met because generations of immigrants differ greatly in place of origin, age, skills, education, and other relevant characteristics. Thus, if a static calculation examines the impact of all foreign-born, it will combine people with highly varying characteristics, giving an “inaccurate picture of the impact of any particular generation of immigrants” (National Research Council, 1997, p. 297).

Dustmann and Frattini (2014) used a repeated cross-sectional approach to estimate the net fiscal contribution over the period 2001–2011 for immigrants who arrived in the United Kingdom after 2000. This kind of analysis answers the question “What has been the net fiscal contribution of immigrants who arrived in a country after a given point in time?” (Dustmann and Frattini, 2014, p. 598). Because the analysis is retrospective, data on actual tax payments and public expenditures can be used to estimate the fiscal impact of a cohort of individuals from the start of residency onward to the present in a way that minimizes dependency on underlying assumptions. The analysis does not require projecting income levels, educational costs, or government budgets in future years for which data do not yet exist.

Kaczmarczyk (2013) summarized these advantages of the static approach:

- Conceptual simplicity—it is relatively straightforward to explain the results of the static approach, as they are observed flows of revenues and costs associated with immigrant-driven expansion of the population.
- Use of historical data—no detailed population projection data are needed.

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<sup>11</sup>See *The New Americans* (National Research Council, 1997, pp. 257–263) for a formal description of the steps involved for a static annual fiscal impact analysis. See Dustmann and Frattini (2014) for a detailed description of the repeated cross-sectional approach, and see Chapter 8 for details of the analyses used for this report.

- Eased reliance on assumptions—there is no need to impose strict assumptions about future trends of immigrant and native populations (e.g., size and education, age composition) and about government (e.g., fiscal balance or change in immigration policies).

Among the disadvantages, he lists the following:

- Results lack a forward-looking perspective, which is often critical for informing policy.
- Static analysis has less capacity to assess the long-term consequences of recent migration—for instance, to project how immigrants will use services or pay taxes over their lifetimes, consequences that are particularly important when the immigrants' demographic profiles differ significantly from those of the native population.
- It is difficult to incorporate fiscal impacts of a proposed change in immigration policy unless the annual snapshots are repeated indefinitely, in which case the information will still be retrospective.

In contrast to static fiscal impact estimates, dynamic analyses are designed to project future contributions to public finances and costs of public benefits programs. Such models attempt to account for: (1) future population growth, including the components driven by natural increase and by net migration; (2) projected changes in employment and wage profiles; and (3) government spending and tax rates. Immigrants can affect public finances by changing the age, skills, or other elements of the composition of the population. Assumptions are required about the rate at which immigrant earnings converge with native counterparts for various age/education cells after arrival (see Chapter 3 for evidence on this) and about future fiscal balances (see discussion below in this section).

Using a dynamic intergenerational approach based on mid-1990s data for the United States, *The New Americans* estimated that the net present value of the lifetime fiscal impact (combined federal, state, local) was  $-\$13,000$  for an immigrant with less than a high school education,  $+\$51,000$  for an immigrant with a high school education; and  $+\$198,000$  for an immigrant with more than a high school education (National Research Council, 1997, p. 350). Lee and Miller (2000), updating *The New Americans* and using a similar methodology, showed that the initial fiscal impact of most immigrants (and their households) is negative as a result of low earnings upon arrival and the costs associated with schooling of their children. After about 16 years, the impact of a “representative” immigrant turns and remains positive. The dynamic approach is designed to capture these full life-cycle impacts; by contrast, results from the static approach



will reflect the fiscal impact at a moment in time of the entire distribution of foreign-born of different ages and arrival dates.<sup>12</sup>

An attractive feature of dynamic fiscal projections is that their structure allows the effects of proposed or current policies to be simulated. Different scenarios can be run, for example, to project the impact of a rule change allowing the wages of unauthorized workers to be reinstated on their record of earnings upon obtaining a valid Social Security Number, or the generational consequences of cutting Social Security benefits versus raising payroll taxes. Fiscal impacts of visa policy changes that may affect the age and skill mix in the stock of foreign-born and the population as a whole can also be projected.<sup>13</sup> The mix of visas—working, student, family reunion, seeking asylum—under which immigrants enter will affect both the employment and taxes generated from immigrants and the benefits used. Immigrants entering the country on work visas can reasonably be expected to have more favorable labor market outcomes than those arriving for family or humanitarian reasons. Those entering with work and student visas also have limited access to benefits such as social housing and unemployment compensation and are more likely to generate tax revenues in current and future periods. Ideally, data would allow the flow of the foreign-born population to be decomposed by entry category, since any projected changes in the distribution by these categories would be expected to have a direct impact on fiscal outcomes.

Dynamic analyses vary in terms of how and if various mechanisms through which immigration can impact the economy and the subsequent fiscal picture are incorporated. *The New Americans* (National Research Council, 1997) and Lee and Miller (2000) developed “partial equilibrium” analyses in the sense that they only estimate direct fiscal effects attributable to immigrants themselves. They do not take into account indirect (general equilibrium) impacts of immigration on wages, or on labor force participation and occupational choices of the pre-existing population—mainly because these factors are very difficult to estimate credibly. Over time, the reshaping of the labor force, the expansion of capital stock, and any impact

<sup>12</sup>Figure 7-1 illustrates the fiscal profile by age for a static, cross-sectional analysis of the United States based on 2012 data.

<sup>13</sup>Sometimes, past policies can also be examined to inform possible impacts. Hansen et al. (2015) forecasted the impact of immigration on public finances for Denmark by taking advantage of the natural experiment that occurred there around the year 2000 as a result of shifting from a heavily family reunification-based policy to a skills and employment-based policy. Over the period immediately after the policy shift, from 2000 to 2008, the unemployment gap between native-born in Denmark and immigrants narrowed and public finances improved. More generous social safety net benefits in Denmark were also shown to lead to more negative fiscal impact than in the United Kingdom for low-skilled immigrants (Dustmann and Frattini, 2014).



on productivity and economic growth brought on by immigration will affect public finances through conduits such as corporate taxes and taxes paid by natives. Therefore, assumptions about central growth rates must also be made (see Section 6.5) for general equilibrium analyses. Immigration also produces other indirect effects, such as on housing ownership and rental markets which, in principle, could be integrated into dynamic fiscal models. Also, behavioral responses—such as when an influx of cheap child care or housekeeping service workers changes the labor supply decisions by native workers—can also be studied.<sup>14</sup>

Likewise, static analyses—particularly for a single year—are, by their very structure, partial equilibrium analyses; future periods must be considered in order to incorporate most secondary or indirect effects. Hansen et al. (2015) included general equilibrium effects in their dynamic projection using population register data on both first- and second-generation immigrants. Their model “estimates long term economic activities and sustainability of economic policy” on the basis of submodules projecting the population (incorporating fertility rates, mortality rates, and inward and outward migration); future age-, gender-, and origin-specific education levels of that population; and future proportions of the population within and outside the labor force (Hansen et al., 2015, p. 8).

Storesletten (2003) analyzed the United States using a general equilibrium approach, in the sense that labor supply and payments to the factors of production were treated as endogenous in his model, which was specified to incorporate differential impact of immigrants by age, employment status (working or not), and skill level. In such analyses, variation in the fiscal impact of immigration is dictated less by the size of the immigrant population than by its composition. Chojnicki et al. (2011) used a general equilibrium model to analyze the impact of immigration on social expenditure and the public budget in the United States for the period 1945-2000. They found that immigration had a large positive impact on public finances, relative to a no-immigration scenario, during that period—mainly due to immigrants’ younger age structure and higher fertility rates relative to the total population. These demographic effects reduced transfer payments by lowering the old-age dependency ratios (see Chapter 2).

To summarize the preceding discussion, among the advantages of dynamic fiscal estimation models are the following (Kaczmarczyk, 2013):

- A forward-looking perspective providing a projection of the fiscal impacts of immigration in a life-cycle framework that captures net positive expenditures for younger and older individuals on educa-

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<sup>14</sup>This topic is discussed in Chapter 6.

tion and health care and net positive revenues during working years when tax payments are highest; and

- capacity to assess the impact of immigration on structural changes resulting from population aging (e.g. pension system and its sustainability).

Among the disadvantages of the dynamic accounting approach (or, really, any analytic attempt to estimate future consequences) are the following:

- Outcomes depend strongly on the set of assumptions made about future trends in income and population growth (which depends on projections of fertility rates, life expectancies, and return migration rates), worker productivity, labor market participation rates for immigrants and natives, and government-established tax rates and program spending levels; and
- within the generational accounting framework, huge degrees of uncertainty are introduced due to unknown future deficit and debt profiles. In addition, as noted in *The New Americans* (National Research Council, 1997, p. 256), “dynamic fiscal accounting requires specification of a social rate of discount, so that future tax revenues and spending needs can be compared in terms of current dollars.”

The literature has identified a range of policy-relevant questions for which fiscal impact studies are required: For example, what is the marginal impact of an incremental increase in immigration (i.e., the impact of one additional immigrant); the per capita impact of an increased rate of immigration; the future impact of an immigrant cohort with a given demographic profile; the impact of an additional 100,000 immigrants over current levels; or the consequences of changing numbers or types of visas/entries (e.g., skill based instead of family centric)? Or, alternatively, what has been the net fiscal contribution of the foreign-born who arrived in a country after a given point in time; and how have the net impacts varied by level of government? Defining the question or scenario of interest is clearly the prerequisite to selecting an appropriate modeling framework.

#### 7.4 SOURCES OF UNCERTAINTY: ASSUMPTIONS AND SCENARIO CHOICES IN FISCAL ESTIMATES

Estimating fiscal impacts is data intensive and methodologically complex. Even if accurate microdata were available on the characteristics, taxes paid, and program usage for all immigrants and natives, decisions must still be reached about how to treat various kinds of costs and benefits and—in the case of dynamic projections—the uncertainty of future economic and

policy trends. When data are lacking, or when projections into the future are required, assumptions must be made about program participation rates and policy changes. Dynamic projections rely more heavily on assumptions than do static models but, as identified below, modeling choices are required in any fiscal analysis.

### Unit of Analysis: Individuals Versus Households

A preliminary step in all fiscal analyses is to select the unit of analysis. A decision must be made whether tax payments and expenditures based on program use will be estimated for households as a unit or for each individual. Ideally, this decision would be dictated conceptually by the budget item that is being apportioned. For instance, health and education expenditures accrue for individuals while some taxes and benefits, including most cash-transfer programs, are based on household characteristics. Data realities sometimes prevent the unit of analysis choice from matching the ideal.

For dynamic analyses, the household unit of analysis is problematic because families' living arrangements change over time through marriage, divorce, the departure of grown children, the arrival of additional family members from abroad, return migrations to the country of origin, and deaths. Dynamic fiscal accounting based on households becomes exceedingly difficult "as (often arbitrary) forecasts of family dissolution and formation become necessary" (National Research Council, 1997, p. 255). Further complicating the situation is the increasing prevalence of nonimmigrants in immigrant-headed households, and vice versa. Because households are not stable over time and because the costs and benefits originating in mixed households often need to be divided between native-born and foreign-born members—as opposed to having to ascribe them exclusively to one group or the other—the individual unit of analysis is more flexible and empirically feasible for dynamic analyses. Perhaps for these reasons, this was the approach taken in the dynamic projections in *The New Americans* (National Research Council, 1997).

For cross-sectional analyses, the choice of unit of analysis is somewhat more difficult. Although the individual is used for the baseline scenario in its dynamic analyses, *The New Americans* (National Research Council, 1997, pp. 255-256) states, "Since the household is the primary unit through which public services are consumed and taxes paid, it is the most appropriate unit as a general rule and is recommended for static analysis." While this logic is sound, a case can also be made for again selecting the individual as the primary unit. Aside from the value of being consistent with the method used for the dynamic analysis, there is, even at a point in time, the issue of how to define an immigrant household: by head of household, by requiring both parents in a two-parent household to be foreign born,

etc. Assigning the public cost of children to parents as individuals allows the costs to be attributed to multiple immigrant generations when called for by the situation (e.g., cases in which households consist of one first generation adult and one native-born adult). Moreover, the static analysis in this report extends beyond that used in *The New Americans* by repeating the cross-sectional estimates over 20 years, a period more than long enough to see household composition change.

### Accounting for the Second Generation

The treatment of native-born individuals with foreign-born parents is an issue in both static and dynamic approaches.<sup>15</sup> In forward-looking projections, the logic for including second generation effects is straightforward: Even if children of immigrants are native-born citizens, they generate costs and benefits to the receiving country directly as a result of their parent(s) having entered the population. Children of immigrants, whether born in the origin or destination country, consume public education services while they are of school age, and they may be expected to contribute to the net fiscal balance in a positive way by paying taxes later in their lives. In a cross-sectional analysis, this life-cycle effect will be driven by current demographic composition. It will be captured only to the extent that data are detailed enough to reveal the grown children of immigrants who have graduated into tax-paying adults at a point in time. Most of the flagship population data sources in the United States, including the Decennial Census (after 1970) and the American Community Survey (ACS), which replaced the Decennial Census long form, do not identify second generation respondents.<sup>16</sup> Fortunately, information on parental birthplace has been available since 1994 from the CPS, and these data are used in the state and local level analysis in Chapter 9 and at various points in the national analysis in Chapter 8.<sup>17</sup>

<sup>15</sup>Beyond the conceptual question, as discussed below, capturing the relevant population is complicated by lack of data in most Census Bureau datasets on parental place of birth. This makes identification of second generation individuals difficult once they have left the immigrant-headed household.

<sup>16</sup>See Massey (2010) on analytic limitations created by the absence of data on parents' birthplaces in the Decennial Census and the ACS. As just one example among many, the ability to identify second generation respondents is necessary for estimating tax revenues contributed by the children of immigrants after leaving the education system (and leaving immigrant-headed households) and entering the labor market. If not accounted for, this biases estimates of the net fiscal contributions of immigrants in a negative direction.

<sup>17</sup>As noted by Massey (2010), relative to the ACS, the sample size of the CPS is quite small, which means that the Census Bureau data sources only yield stable estimates for large immigrant groups and highly aggregated geographic areas (e.g., large-population states and at the national level).

Dynamic cohort analyses attempt to capture second and later generation effects but must make assumptions about return immigration rates and economic assimilation that affect future employment and earnings profiles.<sup>18</sup> For intergenerational projections, assumptions must be made not only about the future flow of immigrants into the country but also about the education and skills that they will bring or will acquire upon arrival. Predicted tax payments and benefit expenditures will differ dramatically for a high-education versus a low-education scenario. For immigrants that arrive after age 25, it is generally assumed that they will maintain the education level observed on arrival, so no further predictions about their education have to be made. For immigrants arriving at younger ages, their future final educational attainment is typically predicted as a function of parental education. And, when estimating the marginal cost of immigrants to education budgets, the children of immigrants are typically included, independent of birthplace. In the research used as an input to the fiscal projections in *The New Americans*, Lee and Miller (1997) found that including projected lifetime impacts of children of immigrants into the analysis provided a strongly positive fiscal contribution regardless of their parents' educational attainment. That said, the initial estimates of fiscal contribution for immigrants themselves (prior to factoring in second generation effects) were highly dependent on educational attainment. Immigrants with education beyond high school were projected to add positively to net present value while those with lower levels of education caused a net fiscal loss. Similarly, Storesletten (2003) found the net cost to society of immigrants to be highly variable, with the difference between amount paid in taxes and amount of public goods and services used over the life cycle ranging from a \$36,000 cost to a \$96,000 benefit, depending on the individual's education level.

As noted above, choices must also be made about how to handle the increasingly common cases of children of mixed (one native-born, one foreign-born) couples. The literature includes analyses in which the children are put in one group or the other and analyses in which they are split between the two groups. *The New Americans* assigned native-born children of native/foreign-born couples by the birth status of household head (National Research Council, 1997). Dustmann and Frattini (2014) considered children of mixed couples as half natives and half immigrants and allocated the costs accordingly. As will be seen in Chapters 8 and 9, how the children of immigrant-headed households are treated can have a large impact on fiscal estimates; details about how second generation individuals are handled in the national and state and local level estimates are provided in those chapters.

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<sup>18</sup>The role of educational attainment assumptions for the second generation is discussed by Blau et al. (2013).

### Stay and Return Rates of Immigrants

Population projections underlying dynamic fiscal projections must incorporate estimates of survivorship, fertility rates, and net in-migration. Since not all foreign-born individuals who come to the United States stay long term, return migration must also be taken into account. Immigrant return rates and length-of-stay patterns affect the population demographics and, in turn, a receiving country's fiscal picture. A student may return home after completing a degree. A person entering on a work visa may do the same after completing a job. Historically, circular migration has occurred as well, especially for people who worked seasonally in the United States, many of whom were unauthorized.<sup>19</sup> When foreign-born individuals move to a country to work but then return home, they are less likely to ultimately tap into expensive late-life benefits such as Social Security and publicly funded medical care. Yet they may enroll in pension systems and begin contributing income and payroll taxes immediately. If immigrants are temporary and do not claim pensions or other post-retirement benefits from the destination country, their net fiscal contribution is likely to be very positive. In contrast, immigrants who stay will typically create system costs later in life.

Circular and return migration patterns, and assumptions about them, are especially important for forward-looking, dynamic fiscal estimates. Most obviously, for the foreign-born who return or circulate out, the second generation impacts are not in play, unless they have U.S.-born children who stay or eventually return. Therefore, assuming that all foreign-born individuals who appear in the data will stay until death can lead to large errors in fiscal (and economic) impact studies. The population projections underlying the dynamic model in Chapter 8 assume that children of immigrants ages 0-19, whose parents emigrate, leave with them, even if they are U.S. born. Largely following the Census Bureau methodology, immigrants are assumed to have a much higher risk of emigration during the first 10 years after arrival in the United States. Fiscal projections will be affected especially if the characteristics—for example, age, skill, earnings—of out-migrants are systematically different from averages for all foreign-born individuals such that selection effects come into play.

Conceptually, then, the ideal fiscal analysis would factor in return rates and separately track the characteristics of permanent and temporary immigrants. Data constraints typically make this impossible, so assumptions are made based on partial information. The baseline scenario in the dynamic models developed for *The New Americans* was that 30 percent of

<sup>19</sup>Massey et al. (2015) argued that return and circular migration among undocumented immigrants (primarily from Mexico) has dropped sharply in response to the massive increases in border enforcement of the past two to three decades.

immigrants later emigrate, taking with them all their young children; 16 percent of those born in the second generation were assumed to emigrate with their parents. Such assumptions about return migration affect only the projected numbers of immigrants in the country; secondary effects in the labor market and in earnings profiles reflecting different characteristics and self-selection patterns among stayers and leavers (which, historically, is the norm) are not captured.

Storesletten's (2003) intergenerational model incorporates estimates of out-migration rates and post-migration take-up rates of social benefits to demonstrate how fiscal contributions are affected in different scenarios. One notable finding for the United States was that return migration of high-skilled immigrants under age 50—quite common during the first few years after arrival—decreases their time-discounted fiscal contributions. Kirdar (2012), studying the German pension and unemployment insurance systems, found that building immigrant return decisions into his model as an endogenous choice increased the net expected gain to the destination country's finances. (Storesletten did not address selection effects differentiating career paths of temporary versus permanent immigrants.) This is explained by the observation that those most likely to be beneficiaries later on—low income immigrants—are also the ones most likely to return first due to inferior labor market outcomes. A summary report by OECD (2013) on the fiscal impact of immigration also found important differences for most developed countries in the tax contribution and benefit use patterns of native-born populations, permanent immigrants, and temporary immigrants.

### Indirect/Secondary Fiscal Impacts

Most intergenerational fiscal projections are limited by a partial equilibrium perspective. That is, they focus on first-order tax revenue and program spending effects—those discussed above—while assuming that no market or behavioral changes take place in response to new immigrants. Labor market displacement or enhancement, capital adjustments, housing price pressures, etc., are not factored in. The same is true for the static approaches described above where, for example, any labor market displacement of natives—and in turn the impact on the tax contributions they make and public services they use—have been largely ignored.

Second-order market effects do clearly occur, and several studies noted above attempt to account for some of them. As discussed in Chapter 6, immigration-induced expansion of the population can increase housing prices and rents; low-skilled migrants willing to work in house-cleaning or child or elder care services enable native workers, particularly high-skilled



women, to supply more labor to the market, which affects tax contributions. In a comprehensive analysis, these ripple effects in the economy would be accounted for; however, due to the complexity of operationalizing a general equilibrium approach into the accounting framework, they typically are omitted. The fiscal impacts literature has generally concluded that these kinds of impacts are minor relative to overall economic activity. However, even if *overall* (nationwide) labor market effects of immigration are likely to be small, whether the direction is positive or negative, the impact may be large in specific geographic areas or types of markets.

Karoly and Perez-Arce (2016) provided a policy-relevant example of main and secondary impacts, using college tuition as the case study. Table 7-2 itemizes the direct and secondary economic and fiscal effects that she found associated with a policy granting in-state tuition benefits to undocumented immigrants. Such a policy may incentivize foreign-born individuals to come to the United States (or to a particular state) to take advantage of the benefit—a direct cost, but it may also create more high-skilled workers who, at least in time, would raise wages and in turn tax revenues, improving the fiscal picture.

TABLE 7-2 Multiple Impacts of Granting Eligibility to Undocumented Immigrants for In-State Tuition

Potential Main Impact	Potential Secondary Impacts
Increased Number of Unauthorized Immigrants	Decreased wages of unskilled workers Increased economic output/decreased price of some services Increased tax revenue and increased government expenditures
Increased Educational Attainment of Unauthorized Immigrants	Effects through changes in individual human capital: <ul style="list-style-type: none"><li>• Increased earnings for unauthorized immigrants</li></ul> If demand for subsidies exceeds supply: <ul style="list-style-type: none"><li>• Decreased subsidized enrollments by other groups (legal immigrants, nonimmigrants)</li></ul> If net increase in subsidized enrollments: <ul style="list-style-type: none"><li>• Increased government expenditures for higher education subsidies</li></ul> If net increase in college-educated versus noncollege-educated population and labor supply: <ul style="list-style-type: none"><li>• Increased wages of low-skilled workers</li><li>• Increased economic output</li><li>• Increased tax revenue and decreased government expenditures</li></ul>

SOURCE: Karoly and Perez-Arce (2016).



### Allocating Costs of Government-Provided Goods and Services

Both static and dynamic fiscal analyses must make assumptions about how to allocate government spending among newly arrived immigrants (authorized and not), established foreign-born residents, and the native-born. To do this, it is necessary to consider how broadly and intensively immigrants use public services and transfer benefits. Take-up rates by the foreign-born for various programs, described in Chapter 3, become important parameters in fiscal estimates. The models in Chapters 8 and 9 necessarily include such parameters for assigning costs. A default assumption might be that immigrants' use-rate is equal to that for the population, so that they account for the same per capita consumption of public services as do natives. If possible (that is, if data exist), it is preferable to consider to use patterns of the many government-provided goods and services on a case-by-case basis, as the nature of their consumption is highly variable. Differences in the characteristics of immigrants and native-born individuals also come into play. Obvious examples for which use patterns vary for different groups are English as a second language (ESL) classes taught in schools or translation services offered in hospitals. Since these services are used disproportionately by immigrants, it may make sense to attribute a higher average cost to recent arrivals than to established foreign-born or native-born individuals.

For some services, such as education and health care, data may reveal that the total cost of provision is roughly proportional to the number of recipients. This argues for assigning costs on a pro rata, or per capita average cost, basis in the accounting exercise (Dustmann and Frattini, 2013). In other cases, the marginal cost of provision may differ significantly from the average cost. Publicly provided goods that depend only partly on the size and composition of the population, such as public infrastructure, public administration, and police forces are examples. In the case of "congestible public goods," the marginal costs of additional population (immigrant or native) may be higher or lower than average cost but is greater than zero. Such might be the case if a district's schools were operating at or above capacity and an influx of immigrants created the need to build new schools and hire additional teachers. Proper accounting of congestible goods requires information—or lacking appropriate data, assumptions—about how the provision and consumption of goods and services change with the share of immigrants in the population.<sup>20</sup> Most studies attribute the costs of these kinds of goods equally across the whole population—that is, propor-

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<sup>20</sup>For computational feasibility, analyses frequently assume that the quality and level of services are fixed. Thus, with a flow of immigrants added to the population, total costs must increase to maintain that quality level for most goods and services. Income transfers, for example, are more like private goods, and per-person spending must be maintained if service levels for all are to be held constant (National Research Council, 1997, p. 256).

tional to the number of recipients (Rowthorn, 2008). Whether or not there is resource strain and congestion—with resulting impacts on the sustainability of public services or population welfare programs—relates closely to the way the marginal analysis is framed. Congestion may be irrelevant when considering the current fiscal year impact for school or infrastructure budgets created by an additional immigrant. In contrast, congestion is a central concern when considering long-term costs associated with a growing population. Similarly, the marginal cost calculus will be quite different when considering the marginal addition of one immigrant at a point in time versus the addition of many thousand immigrants over a period of time.

“Pure” public goods—goods defined by the trait that their value and availability is not diminished by additional users—also enter fiscal estimates. Such goods, at least within a range, are unaffected by population size. National defense, which accounts for about 18 percent of the U.S. federal budget, is a classic example. The marginal increase in these costs due to immigration is, at least in the short run, zero or close to it. Other candidates to be treated as pure public goods include government administration and interest on the national debt. Dustmann and Frattini (2014, p. 7) contrast pure versus congestible public goods:

‘Pure’ public goods and services are not rivals in consumption and the marginal cost of providing them to immigrants is likely to be zero. For example, the expenditure for defence or for running executive and legislative organs is largely independent of population size. ‘Congestible’ public goods and services are—at least to some extent—rival in consumption, so the marginal cost of providing them is unknown, although probably smaller than the average cost and positive. For example, the cost of fire protection services, waste management and water supply may indeed increase with the size of the resident population. . . . The ideal—if data were limitless—would be to measure the marginal cost of providing each public good and assign it to every new immigrant.

In the case of pure public goods, immigration has the beneficial effect of allowing fixed program costs to be spread over a greater number of taxpayers—thereby lowering per capita costs for the population in general (Loeffelholz et al., 2004). In fiscal accounting exercises, this savings would therefore enter as a reduction in the per capita tax burden imposed on current native residents (and established, taxpaying immigrants). One could challenge this treatment for very long run analyses by arguing that, over time, public goods such as defense spending have been correlated with gross domestic product (GDP) and population size.

The fiscal analyses in Chapter 8 present alternative scenarios, allocating the costs of pure public goods to natives only in one subset and to everyone

in another (that is, spreading the costs equally across the entire population, including the arriving foreign-born). To understand this assumption, it is useful to consider types of expenditure that are the opposite of pure public goods—for example, an ESL program. To a first approximation, there would be no costly ESL programs if not for the arrival of new immigrants. This suggests that one should ascribe the program's cost to them alone. Putting aside economies of scale in providing such programs, an additional immigrant increases the total cost of providing ESL education. By the same logic, the arrival of an additional immigrant does not change in any meaningful way the cost of defending the country; in fact, as pointed out above, it lowers the per capita cost of a given amount of defense (as the numbers of aircraft carriers, etc., remain the same) as long as the immigrants contribute something, even if it is below average, to the overall size of the tax base. For analyses estimating the fiscal impact of other kinds of immigration scenarios—for example, for large numbers of arrivals taking place over a multiyear period—the zero marginal cost assumption becomes less tenable.

Since public good items such as national defense represent a large part of the federal budget, the difference between allocating expenditures on them pro rata or at a zero marginal cost will have a very large impact on fiscal estimates. In fact, such assumptions are likely to swamp the impact of most of the other assumptions and data issues that arise in fiscal impact analyses.

In the Dustmann and Frattini (2014) analysis of UK fiscal balances for the period 2001-2011, the total net contribution of all immigrants ranged from −£76 billion (2011 prices) under the average cost scenario (public goods costs are assigned to immigrants pro rata) to +£27 billion under the marginal cost (public goods costs are assigned to natives only) scenario. These are large numbers in absolute terms but, relative to the size of the overall economy, still fairly modest: −0.7 percent and +0.3 percent of UK GDP respectively. The fiscal analysis in *The New Americans* showed similarly contrasting estimates made under marginal versus average cost assumptions, albeit for a forward-looking projection:

If all the expenditures we categorize as provision of public goods (military expenditures are the leading case) were instead treated as private or congestible goods, so that a per capita cost is allocated to immigrants and their descendants, then the average NPV [net present value] would drop from +\$80,000 to −\$5,000, just slightly negative, or by \$85,000, thus identifying public goods as contributing powerfully to the result. A similar calculation shows that treating congestible goods (roads, police, etc.) as public goods with zero marginal costs would add \$80,000 to the baseline NPV, for a total of +\$160,000 (National Research Council, 1997, p. 346).

A static analysis by Passel and Fix (1994), in which the marginal cost of providing a range of public services to immigrants was assumed to be zero, estimated the net fiscal impact of immigration in the United States to be +\$25 billion for 1992. Replicating this analysis—but changing the allocation assumption to one in which the marginal cost of providing public services to immigrants is set equal to the average cost—Borjas (1994) re-estimated the net annual fiscal impact associated with immigration in the United States to be about −\$16 billion.

Some public expenditures pose additional, interesting analytic issues. One is law enforcement. While data limitations are significant and the research on the topic undeveloped, a review of recent literature on crime and immigration (commissioned by the sister panel to this one) reached a number of conclusions—among them the following from Kubrin (2014):

- Immigrants are generally less crime prone than their native-born counterparts.
- However, this individual-level negative association between immigrants (relative to the native-born) and crime rate appears to wane across immigrant generations: The U.S.-born children of immigrants exhibit higher offending rates than their parents.
- Areas, and especially neighborhoods, with greater concentrations of immigrants have lower rates of crime and violence, all else being equal.
- Theories to explain this negative association between crime rate and immigration have not been sufficiently empirically evaluated.

These findings suggest that a practical starting point for treating crime and law enforcement is to assign costs on a pro rata, or per capita average cost basis. However, with more granular data, it could be reasonably argued that a smaller-than-average per capita cost should be assigned to new immigrants.

Border enforcement is a special subcategory of law enforcement, and the literature is quite unresolved about how to treat its cost. The Secure Fence Act of 2006 authorized hundreds of additional miles of fencing along the U.S.-Mexico border. The annual budget of the Border Patrol increased from \$363 million in 1993 to \$3.5 billion in 2013. Since the creation of the Department of Homeland Security in 2003, the annual budget of Customs and Border Protections, which includes the Border Patrol, doubled from \$5.9 billion to \$11.9 billion in 2013. Spending on Immigration and Customs Enforcement, the interior-enforcement counterpart to Customs and Border Protections within the Department of Homeland Security, grew from \$3.3 billion since its inception in 2003 to \$5.9 billion in 2013. The budget for Enforcement and Removal Operations has increased from

\$1.2 billion in 2005 to \$2.9 billion in 2012.<sup>21</sup> These are large budget increases for individual programs, but they represent only a very small fraction of government expenditures, and so they can only have a limited effect on estimates of per capita fiscal impacts.

There are at least two defensible options for allocating the cost of these programs. Probably the least controversial default option is to divide the cost among all, foreign-born and native-born. The foreign-born who have been in the country for a long time have pretty much the same things to gain and lose as the native-born. Conceptually, it might make sense to treat recent immigrants, especially those still trying to unify families, etc. differently, but to try to slice it that fine in the actual projections would be very difficult.

Alternatively, an analysis could start with the premise that unless one thinks that the bulk of the money is spent processing new immigrants or handling their visas (unlikely), this is not a cost of immigration but rather the cost of keeping immigrants out. Ascribing that cost to immigrants creates the perverse effect that the more effective the program is (or the more money devoted to it), the more expensive it is per immigrant who arrives in the United States during the period of analysis. Consider the following example: suppose that (at immense expense) U.S. border security and immigration control programs manage to seal the U.S.-Mexico border so effectively that during an entire year, only one illegal immigrant manages to successfully cross it. Using the approach in question, the billions spent on these programs would be ascribed to that one person. The more immigrants who manage to cross the border, the lower are the per capita cost of the programs. In light of these perverse consequences, it appears more reasonable to treat these programs as additional pure public goods and to not ascribe their cost to (arriving) immigrants only but to spread the cost across all residents, either including or excluding the arriving immigrants.

In a general equilibrium analysis, the question of how to distribute these costs is more complicated, as the efficacy of border enforcement affects labor and other markets throughout the economy. Massey et al. (2015), using data from the Mexican Migration Project, estimated the determinants of departure and return according to legal status. They found that, since 1986, Mexico-U.S. circular migration “has declined markedly for undocumented migrants but increased dramatically for documented migrants . . . [and] return migration by undocumented migrants dropped in response to the massive increase in border enforcement.” Return migration of documented migrants was unaffected (Massey et al., 2015, p. 1015).

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<sup>21</sup>Ewing, W.A. (2014). *The Growth of the U.S. Deportation Machine and Its Misplaced Priorities*. Available: <http://immigrationimpact.com/2014/03/10/the-growth-of-the-u-s-deportation-machine-and-its-misplaced-priorities> [November 2016].

Given the economic benefits of circular and temporary migration for work purposes,<sup>22</sup> it is certainly possible that additional costs have been created to the economy by the increased border enforcement, beyond the narrow costs of the programs themselves in the federal budget.

Finally, if indirect impacts are also considered (see “Indirect/Secondary Fiscal Impacts” above in Section 7.4), accurate estimation of fiscal impacts would require including the contribution of immigrants to the delivery of public services, not just their consumption of these services. In a number of government service sectors (e.g., health care), recent immigrants have lowered costs because of their availability and willingness to work at a lower wage than native-born workers. This type of effect would only be detected in partial equilibrium analyses, such as most of those reviewed in Chapter 5, if, for instance, their presence in the labor market lowered native wages or reduced their employment.

### Fiscal Imbalance—Dealing with Debt

For forward-looking projects such as the *generational accounting* model used in Chapter 8 (and in *The New Americans*), assumptions must be made about the government’s intertemporal budget constraint and about the tax burden across generations. To calculate the path of revenues and expenditures (and accumulating deficits), it is necessary to overcome the reality that one does not know what future fiscal balances will look like and what the level of deficit financing will be. Budgetary adjustments imposed to conform to an assumption about the debt/GDP ratio must be divided between tax increases and benefit reductions. Assumptions about how (and to what extent) net tax payments made by current and future generations cover the present value of future government expenditures and help to pay the debt can have a large impact on the estimates of fiscal impacts. In *The New Americans*, this assumption was handled as follows: A government “cannot let its debt grow without limit relative to the economy, as measured by gross domestic product (GDP), without losing credibility in its ability to repay and may eventually face default. To reflect this, it is necessary to assume that the ratio of debt to GDP stabilizes at some point” (National Research Council, 1997, p. 299). The baseline scenario for that study used 2016 as the time when fiscal policy would hold the debt/GDP ratio constant. Among the alternatives cited in *The New Americans* (National Research Council, 1997, p. 300) to the assumption that government must be in balance or that debt cannot exceed a given percentage of GDP (e.g.,

<sup>22</sup>See Zimmermann (2014), which examines how circular migrants fill labor shortages in host countries while also encouraging the transfer of skills (“brain circulation”) from one geographic area to another.

current policy remains in place until the debt/GDP ratio hits 1.0), were the following:

- Current tax and expenditure policies will continue, causing the debt to explode over time (Auerbach, 1994; Congressional Budget Office, 1996).
- Debt/GDP ratio is stabilized immediately at its current value.
- Current policy remains in place for 10 years, after which the ratio is stabilized.

All three options can in principle be modeled (although the first would be complicated in a general equilibrium analysis in which one was trying to quantify what would happen to the economy as a result of an exploding national debt). Assuming a constant debt/GDP ratio means adjustment gets harder and harder for program costs like Medicare. Different scenarios will lead to different adjustments in taxes and benefit payments over time.

Assumptions about budget imbalances invoked in several of the Chapter 8 scenarios rely on the Congressional Budget Office's (CBO's) fiscal forecast from its long-term budget outlook. In the past, the CBO assumed that the upper limit for debt could reach stratospheric levels of 1,000 percent of GDP (debt/GDP ratio of 10), but since 2010 the CBO has adopted a maximum ratio of 250 percent. This constraint seems likely because at that level either the cost of debt service plus whatever else the government spends exceeds the maximum amount that can be raised in taxes (this is where tax revenue reaches the top of the Laffer curve in their models) and because there is no precedent in modern history for sustaining this level of debt (the relevant precedent is the United Kingdom after the Napoleonic Wars, when the debt/GDP ratio reached about 230%). Of course 250 percent is still very high,<sup>23</sup> and it is hard to imagine that fiscal policy will not have to change long before that ratio is reached, but any number that is chosen will be equally arbitrary.

Fiscal balance also plays a role in static analyses. For the average individual in the population, the net fiscal contribution must be negative if the country is running a deficit for the year of analysis. Therefore, as Dustmann and Frattini (2014, p. 598) pointed out, "The absolute net contributions of different populations may not be a meaningful measure of their fiscal contribution because these figures depend on the magnitude of the deficit. What is more insightful is their relative contribution in comparison to other population groups, especially as this comparison somewhat 'eliminates' the common deficit effect as far as it affects different groups in the same way."

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<sup>23</sup>The current debt-to-GDP ratio (including external debt) for the United States is about 105 percent; the all-time high for the country, reached in 1946, was about 122 percent.



### Appropriate Discount Rate (for dynamic analysis only)

The government borrowing rate determines, in expected value, the present value of future net dollar flows in the budget. A discount rate may be higher than the borrowing rate if it reflects additional risk characteristics of future income or income taxes (Auerbach et al., 1991). The practical importance of the choice of discount rate is that it determines the relative importance of fiscal flows at different points in time. Lower discount rates will place more-similar weight on an immigrant's near-term expenditures and taxes (e.g., during school and early working years) and longer term ones (e.g., during retirement), compared with a higher rate. By extension, the lower rate will place a relatively higher weight on descendants in the calculation of net present value. In contrast, higher rates discount future flows more heavily than lower rates, giving greater weight to near-term fiscal flows and less to those far into the future, such as taxes paid or program expenditures for descendants. The alternative interest rate scenarios in *The New Americans* illustrate that changing the discount rate has a large effect on the net present value estimates of an immigrant's fiscal impact. The "baseline scenario" for that report—which, among its required assumptions (listed on pp. 325-326), used a real interest rate of 3 percent—yielded a lifetime total fiscal impact (federal and state/local combined) for an "average" immigrant of +\$80,000 (net present value). However, the net present value climbs to +\$219,000 if the interest rate is changed to 2 percent, and drops to +\$39,000 if a 4 percent rate is used. When interest rates of 6 and 8 percent are used to reflect "the uncertainty of future tax revenues," the net present value of the average fiscal impact of an additional immigrant falls to +\$15,000 and +\$8,000 respectively.<sup>24</sup>

One discount rate that has been used in fiscal impact analyses is the real rate of interest at which the U.S. Treasury can borrow. This rate is hard to predict, and even retrospectively it depends on the maturity of the bonds being sold. The CBO uses 1.7 percent as the real interest rate of Treasury borrowing for 2014 to 2039 and 2.2 percent thereafter for real returns but 2.5 percent for debt held by the Social Security and Medicare Trust Funds.<sup>25</sup> By contrast, to reflect a particular risk profile for investment in

<sup>24</sup>We do not perform this sensitivity analysis for our lifetime net fiscal impacts calculations in Chapter 8, but the order of magnitude in variation with changes in the interest rate assumption would be similar to that described here.

<sup>25</sup>As noted by the CBO (Congressional Budget Office, 2014a, pp. 110-111):

The estimates and assumptions underlying the economic benchmark suggest that the inflation adjusted rate of return on 10-year Treasury notes will be one-half to two-thirds of a percentage point lower in the coming decades than it was during the 1990–2007 period. Therefore, CBO projects that the interest rate on 10-year Treasury notes (adjusted for the rate of increase in the CPI-U) will rise in the next



the context of the economic impacts of climate change, William Nordhaus's DICE-2013R model uses 4.25-5.00 percent, depending on whether the model is running a near-term or long-term scenario (Nordhaus and Sztorc, 2013, p. 38). The panel views a discount rate in the 2-3 percent range as a reasonable compromise.

### 7.5 DISTRIBUTIVE FISCAL EFFECTS— FEDERAL, STATE, AND LOCAL

Tax inequities arise across states and regions because (1) public goods and services are provided by governments at the federal, state, and local levels; (2) different kinds of taxes are collected at these levels; and (3) immigrants are not uniformly distributed across jurisdictions. Equitable immigration policy making must take these inequities into account. Among the wide range of services financed by states and local governments—ranging from public welfare and health, to capital outlays on highways and to police and fire protection—the largest expenditure category is investment in the population's education. Because immigrants are not distributed uniformly across the country (and because people frequently find jobs in locations other than where they were educated), inequalities in fiscal impacts attributable to their arrival can occur across areas. About 74 percent of all foreign-born lived in 10 states as of 2010, and in these states they are concentrated in major metropolitan areas.

Whereas state and local governments tend to support programs for the young, the federal government's fiscal responsibility falls disproportionately on programs for the elderly—specifically pensions and health care—which

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few years from its current, extraordinarily low level to average 2.5 percent over the 2014–2039 period and over the longer term—compared with its average of 3.1 percent between 1990 and 2007. The average interest rate on all federal debt held by the public tends to be a little lower than the rate on 10-year Treasury notes. The reason is that interest rates are generally lower on shorter-term debt than on longer-term debt, and the average maturity of federal debt is expected to remain at less than 10 years. Thus, CBO projects that the average real interest rate on all federal debt held by the public (adjusted for the rate of increase in the CPI-U) will be 1.7 percent over the 2014–2039 period and 2.2 percent over the longer term. (The average interest rate on all federal debt is projected to rise more slowly than the 10-year rate because only a portion of federal debt matures each year.) CBO generally uses the average interest rate on all federal debt as a discount rate when it calculates the present value of future streams of total federal revenues and outlays in its long-term projections, as it does in estimating the fiscal gap described in Chapter 1. The Social Security and Medicare trust funds hold special-issue bonds that generally earn interest rates that are higher than the average real interest rate on federal debt. Therefore, in projecting the balances in the trust funds and calculating the present value of future streams of revenues and outlays for those funds, CBO uses an interest rate equal to 2.5 percent in the long run.

occur later in life. When immigrants are on average younger than the population as a whole—as has traditionally been true (though this is changing somewhat in recent decades)—states tend to incur the more immediate costs of new immigrants.<sup>26</sup> Furthermore, only a portion of the fiscal benefit of immigrants—the taxes they pay—accrue to state and local governments, with a substantial share going to the federal government. This means that, even if the arrival of immigrants creates a neutral net fiscal impact in the long run, some subnational areas will incur net costs, while others and the federal government may incur net benefits. Additionally, some states may be net exporters to other states of college-educated graduates transitioning into the workforce. Ideally, life-cycle fiscal impact models would quantify the benefits over the long term that accrue to states that have made strong investments in public education, taking into account subsequent interstate migration of those who have been educated.

The state analyses of New Jersey and California reported on in *The New Americans*, which were based on Garvey and Espenshade (1998) and Clune (1998), respectively, confirmed the intuition that an inflow of foreign-born individuals affects state finances disproportionately. For New Jersey, in the fiscal year 1989-1990, the net fiscal cost to state and local budgets associated with immigrant-headed households was estimated to be \$232 (adjusted to 1996 USD) per native household. In the case of California, the state and local fiscal burden imposed on native residents by immigrant-headed households was estimated to be \$1,178 per native household for fiscal year 1994-1995 (again adjusted to 1996 USD). For both studies, all publicly provided goods other than national defense were assigned equally (pro rata) across the full population, foreign-born and native-born. In contrast, the addition of immigrants in these states was estimated to have generated net fiscal contributions to the federal budget (National Research Council, 1997, pp. 292-293).

Lee and Miller (2000), updating results from the analysis in *The New Americans*, confirmed that the fiscal impact of immigration at the federal level is largely positive and typically negative at the state and local levels. However, fiscal outcomes are sensitive to both the amount of immigration and the kinds of immigration that occur, as well as the prevailing tax rates and rules on benefits. Local results vary widely depending on whether or not a locality receives large numbers of immigrants. Areas that do not attract immigrants may still benefit from the federal tax advantages that are created without having to shoulder the marginal local costs generated

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<sup>26</sup>In a review of the literature for the United States, Kandel (2011) concluded that the relatively young age distribution of the foreign-born accentuates the degree to which state and local governments incur greater fiscal costs from the foreign-born than the federal government.

by incoming populations. Additionally, spending patterns (e.g., on schools or other benefits) and taxes (e.g., property taxes) may in turn influence the level and composition of immigration attracted to an area.

While education expenditures and income tax revenues create much of the redistribution from state to federal jurisdictions, there are other factors. One example is the cost of public safety, law enforcement, and corrections; the federal government reimburses state and local entities a fraction of costs to incarcerate criminal aliens, the remaining costs are borne by local governments. Though a growing population will typically add to the total cost of policing and enforcement, evidence cited above suggests that the marginal cost added by an immigrant may be less than the average cost for the population, as the new arrivals generally exhibit lower crime rates than do natives. Another cost of immigration is created by the use of welfare programs (see Chapter 3 for a detailed profile). Programs, such as Social Security and Medicare, Medicaid, and Temporary Assistance for Needy Families, create expenditures affecting the fiscal picture at the federal level. However, because the foreign-born are disproportionately of working age and contributing through payroll taxes, increases in immigration have improved Social Security's finances (Social Security Administration, 2015). Immigrant households' use of food assistance programs and Medicaid is much higher than that of native-headed households—not as a result of not working (in 2009, 95% of immigrant households with children had at least one person working) but because of lower levels of education and income. Use of cash and housing programs for the two groups is similar. The extent of the impact differential for welfare programs between foreign- and native-born varies by state, by localities within state, and by specific program (see Table 3-15, Chapter 3, on welfare use for immigrant and native households with children). Likewise, the burden of immigration on law enforcement is not evenly distributed across states because a handful of states incarcerate the majority of noncitizens who commit crimes. Additionally, Branche (2011) explored the costs that cities incur under various programs of immigration enforcement and found that federal contributions did not suffice to compensate for the loss at the state level.

## 7.6 SUMMARY AND KEY POINTS

Estimating the fiscal impacts of immigration is complex. How the exercise is framed and what assumptions are built into the model depend to a significant degree on the questions of interest. For some policy questions, forward-looking costs and benefits projected to accrue as a result of an additional immigrant (and his or her descendants), or the in-flow of some number of immigrants, may be most relevant. For other questions, the budget implications for a given year associated with the stock, or recent

changes in the stock, of foreign-born people residing in a state or nation may be the primary interest—this is often the case for legislators. Sometimes the question is about absolute net fiscal impacts; sometimes it is about the impact of immigrants *relative* to the native-born.

All population subgroups make contributions to government finances by paying various kinds of taxes and add to expenditures by consuming public services—but the levels differ. Therefore, **models of the fiscal impacts of immigration must distinguish between citizens and noncitizens and, for the latter, authorized and unauthorized individuals.** Legal status is often central to determining what services immigrants qualify for and tend to use and what taxes they are required pay.

There are two basic accounting approaches to estimating fiscal impacts, one static and the other dynamic. Static models are conducted for a specific time frame, often a tax year. The contribution to public finances of immigrants (and, in many analyses, dependent household members) as well as government expenditures on benefits and services supplied to that population are computed and are often compared with those of the native-born. If data are available, cross-sectional static models can be repeated over multiple years to gain a sense of fiscal impacts for a historical period. Dynamic accounting approaches, in contrast, compute the net present value of tax contributions and government expenditures attributable to immigrants, and in some analyses the resulting generations, projected over the immigrants' (and their descendants', if included in the analysis) life cycles. Such analyses involve modeling the impact of an additional immigrant on future public budgets.

Among the advantages of the **static approach** (and, implicitly, the disadvantages of the dynamic projections) are the following:

- **Conceptual simplicity due to comparatively less reliance on assumptions**—assumptions are not needed about future population trends (which depend on further assumptions about fertility rates, life expectancies, and return migration rates), income growth, economic performance, tax rates and program use, deficit and debt profiles, and immigration policy changes—which introduce a high degree of uncertainty into estimates that require such assumptions.
- The backward-looking perspective of a static analysis enables the **use of data on observed flows of revenues and expenditures associated with immigrant-driven expansion of the population.**
- If repeated cross-sectionally, a static approach can provide **rigorous estimates of the net fiscal contribution of immigrants up to the present time** (or, as far as is covered in the data) who arrived in a country after a given point in time.

Among the advantages of **dynamic projection models** (and, implicitly, disadvantages of the static approach) are the following:

- They provide a **forward-looking perspective for estimating the fiscal impacts of immigration in a life-cycle framework**, creating the capacity to incorporate results into policy scenarios using alternative assumptions about the number of immigrants entering the country, their characteristics, and their legal status.
- They provide a **capacity to adjust for structural differences between migrants and natives**—for example, to assess the impact of immigration on population aging, which in turn may affect economic outcomes and the sustainability of government programs.

A preliminary step in all fiscal analyses is to select the unit of analysis. For dynamic analyses, the household unit of analysis is problematic because household structure changes over time through marriage, divorce, widowhood, the departure of grown children, the arrival of additional family members from abroad, death, etc. (National Research Council, 1997, p. 305). Additionally, native-born individuals reside in immigrant-headed households and vice versa. Therefore, **the individual unit of analysis is appropriate for dynamic analysis** since households are not stable over time and because it allows the costs and benefits originating in mixed households to be divided between native-born and foreign-born members, as opposed to having to ascribe them exclusively to one group or the other.

For cross-sectional analyses, the choice is somewhat different, although a case can still be made for again selecting the individual as the primary unit. Aside from being consistent with the method used for the dynamic analysis, even at a point in time, there is an issue of how to define an immigrant household—by head, by requiring both adults to be foreign born, etc.—that is largely avoided by focusing on individuals. This task becomes even more problematic for a repeated cross-sectional analysis that spans 10 or 20 years.

Assumptions must also be made about how to treat fiscal impacts generated by the children of immigrants. In forward-looking projections, the logic for including second generation effects is straightforward: Even if children of immigrants are native-born citizens, the costs and benefits that they generate would not have been realized without the initial addition to the population of the immigrant parent(s). Given that educational attainment drives projected earnings and tax payments, assumptions must be made about it as well. Final education level attained is typically predicted as a function of parental education. In cross-sectional analyses, this life-cycle effect will be driven by current demographic composition. Costs associated with educating the children of immigrants that accrue during the analysis

period are included in the fiscal estimate; however, a good case can be made for treating these expenditures as an investment, due to the strongly positive association between level of education and eventual contributions to tax revenues. This return on investment is only captured (and imperfectly, except in a steady state) in cross-sectional data to the extent that the data are detailed enough to reveal the earnings of grown children of immigrants. Even then, except in a steady state, the net fiscal contribution of today's grown children of immigrants is a blunt estimate of the future impact of today's young children.

Assumptions must also be made about the legal access to and use by immigrants of public services and how this additional use affects the cost of their provision. Ideally, data would be available to allow estimates of how a marginal immigrant changes public costs (and quality of service). In the absence of such data, assumptions must be made. **For services such as education and health care, where the total cost of provision is roughly proportional to the number of recipients, expenditures should be assigned on a pro rata basis, or per capita average cost basis, in the accounting exercise.** A practical starting place for treating crime and law enforcement is to assign costs on a pro rata, or per capita average cost basis as well. In other cases, the marginal cost of provision may differ significantly from the average cost. For some “congestible public goods,” the marginal costs of additional population (immigrant or native) may be higher than average cost. For pure public goods<sup>27</sup> (defense, government administration, interest on the national debt), the marginal cost due to immigration is, at least in the short run, zero or close to it. **Thus, for answering some questions, it may be reasonable to allocate the costs of pure public goods to the native-born or to the resident population prior to the arriving immigrants (a resident population consisting of natives and earlier immigrants). Since public goods such as national defense represent a large part of the federal budget, the choice of how to allocate these expenditures will have a large impact on fiscal estimates.** It is instructive to run alternative scenarios to gain a sense of the magnitude imparted by this choice.

For the forward-looking generational accounting model, assumptions must be made about the government's intertemporal budget constraint and about the tax burden across generations. **Projections of future fiscal policy and deficits depend on many unknown and uncertain aspects of the future context, about which choices must be made.** For example, one set of estimates in Chapter 8 relies on the CBO's fiscal forecast from its long-term budget outlook. Since 2010, the CBO has adopted a maximum deficit level

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<sup>27</sup>A pure public good has the characteristics that (1) its consumption by one individual does not reduce the amount available to be consumed by others, and (2) it is not possible to exclude any individuals from consuming the good.

of 250 percent of GDP and no more. This choice is driven by the notion that, at this level, the cost of debt service plus whatever else the government spends exceeds the maximum amount that can be raised in taxes and by the fact that there is no precedent in modern history for sustaining this level of debt.

The government borrowing rate determines, in expected value, the present value of future net dollar flows in the budget. For the panel's analyses, the relevant discount rate is the real rate of interest at which the U.S. Treasury can borrow. This is hard to predict and, even retrospectively, it depends on the maturity of the bonds being sold. The CBO uses 1.7 percent for the discount rate from 2014 to 2039 and 2.2 percent thereafter for real returns, but 2.5 percent for debt held by the Social Security and Medicare Trust Funds. The choice of discount rate has a large impact on estimated net present value of future fiscal impacts of an additional immigrant. **Because this and other assumptions have such a substantial impact on absolute estimates, comparative figures—for example, comparisons of the estimates for different education groups or for immigrants relative to the native-born—are more interesting and reliable than the absolute figures.**

Finally, tax inequities across states and regions arise because (1) different types of government goods and services are provided by federal, state, and local levels, (2) different kinds of taxes are collected at these jurisdictions, and (3) immigrants are not uniformly distributed across jurisdictions. Previous research (e.g., Lee and Miller, 2000) has firmly established that **the fiscal impact of immigration at the federal level is largely positive and typically negative at the state and local levels.** However, fiscal outcomes are sensitive to both the amount of and the kinds of immigration that occur, as well as the prevailing tax rates and benefits rules.

## 8

## Past and Future Fiscal Impacts of Immigrants on the Nation

### 8.1 INTRODUCTION

Chapter 7 described accounting approaches for assessing the fiscal impact of immigration and outlined the conceptual challenges involved in its measurement given that the counterfactual scenario (no immigration) is unobservable. In this chapter, the panel applies these concepts to estimate the fiscal impacts of immigration at the national level. In so doing, the underlying variation across geographic regions that is important for a full understanding of the impacts of immigration is ignored at this point. These national estimates incorporate the U.S. federal government budget in its entirety and a single aggregation of budgets in the 50 states and their localities. Chapter 9 explores variation in state and local fiscal impacts across states in detail.

The panel chose to set geographic variation aside (for the time being) in order to focus on how fiscal impacts of immigrants have changed over time. As described in Chapter 9 and elsewhere in this report, over time there has been considerable change both in states' fiscal policies and practices and in geographic patterns of immigrant receiving and internal migration. These are important features that mediate impacts on particular geographic regions. But the aggregated national analysis may be more directly useful for national immigration policy, and it provides a feasible method of assessing trends in fiscal impacts over time.

In the sections that follow, the panel first documents the path of net annual fiscal impacts and the relevant characteristics among immigrants and natives during a recent historical period for which good coverage in



annual cross-sectional data exists. Covering 20 years of immigrants' experiences, from 1994 to 2013, these data allow annual fiscal effects to be decomposed into amounts attributable to different immigrant generations. However, it is important to note that these cross-sectional estimates of fiscal impacts are heavily influenced by the age distribution of the underlying groups at the time of data collection. Thus, although such cross-sectional "snapshots in time" are instructive, they do neglect the evolution of fiscal costs and benefits over time that occurs as these groups age—an evolution that we know to be important (see Chapter 7). After children are born, their average fiscal impacts remain negative for many years because they absorb benefits in the form of public education and other support while paying little or no taxes. But children eventually become adults, many of whom work and, for sustained periods, pay more in taxes than they receive in expenditures on benefits. In old age, the fiscal-impact pendulum typically swings back the other way. To some extent, today's older immigrants may be taken as proxies for today's young immigrants observed in future periods. But simply assuming an older age group in a cross section is identical to a younger age group observed at a later time is likely to offer a misleading portrait of the cumulative fiscal impacts of any particular cohort of immigrants over that cohort's life span.

The above limitation of the cross-sectional analysis establishes the rationale for estimating life-cycle fiscal impacts. The second task undertaken in this chapter is to formalize conjectures about future life-cycle fiscal impacts in a systematic way. The panel presents a longitudinal forecast of the future national fiscal impacts of immigrants arriving today, using updated methodologies developed for the 1997 *New Americans* report (National Research Council, 1997) and updated data and assumptions about future growth rates, interest rates, and demography. Because the children of immigrants play an important role in the fiscal impact of immigration, we pay special attention to fertility rates and intergenerational patterns of educational attainment, and we factor in return-migration behavior. The forecast aims to answer the following question: In today's dollars, what is the predicted long-term net benefit to domestic governments of an additional immigrant and that immigrant's descendants?

## 8.2 HISTORICAL FISCAL IMPACTS OF IMMIGRATION, 1994-2013

This section provides cross-sectional estimates of the fiscal impact of immigration for the nation at specific points in recent history. These estimates are possible because data essential for this kind of analysis have now been available for an extended period. The addition of questions about parents' places of birth to the annual demographic supplement to the Current Population Survey (CPS) enabled *The New Americans* to explore the

current and future fiscal impacts of first and second generation immigrants, which tended to differ significantly (National Research Council, 1997). At that time, only samples for 1994 and 1995 were available with sufficient data fields to identify generational status, so pooling these years to allow for sufficient sample size generated a dataset for a single cross-sectional analysis. With almost two decades of additional data now available, the current panel was able to create a sequence of multiple cross-sectional samples. Thus, we can examine the impacts of immigration, taking into account both the first and second generation, during this historical time interval.

### Notes on Measurement

As in the national fiscal projections for the 1997 report, the analyses in this chapter focus on individual immigrants rather than immigrant households (although, when the costs of children are allocated to adults in the same households, as is done much of the time here, a quasi-household structure is created). While many studies of the fiscal impacts of immigration adopt immigrant-headed households as the unit of account, measuring benefits and taxes at the individual level facilitates longitudinal calculations of the type presented in Section 8.3, where the future fiscal impacts of immigration are explored. Households may change their composition over time through marriage and divorce, deaths, births, adoptions, move-ins and move-outs, additions or subtractions of members beyond the nuclear family, and so forth. Also, immigrant-headed households often contain nonimmigrant members. Following individuals is simpler because decision rules for allocating fiscal flows in the face of some of these family-dynamic complications can be avoided.

Within the data analysis approaches used in this chapter, fiscal positives (taxes) and fiscal negatives (expenditures on program benefits) are first allocated to the individuals most closely linked to them. In some cases this individual allocation creates some additional interpretive tasks, relative to household analyses, in order to identify the fiscal impact of a particular population group defined by nativity and generation. The costs of educating the U.S.-born children of immigrants are particularly important in this regard. In a household-based analysis, public education unambiguously creates a cost attributable to the immigrant-headed household. For an individual-based analysis, the cost of public education is detected due to the presence of a child in the household and is initially assigned to that child. In some of the analyses below, we present data in such a way that the age- and individual-specific timing of fiscal impacts (both positives in the form of taxes and negatives in the form of program costs) can be shown—even for children. In other analyses, the fiscal impacts of individuals and their dependents are combined and the impacts of the latter are attributed their parents' genera-

tional groups. Details about which allocation procedure is used are provided for each of the accounting exercises reported on below.

Age profiles—indicating average flows of taxes or benefits by education, by immigrant generation, and in some cases by time since the immigrant's arrival—are central to the accounting and forecast methods used here. To generate these profiles, the panel used data from the Annual Social and Economic (March) Supplement of the CPS, which provides annual estimates of program utilization as well information on the characteristics (such as education and nativity) of respondents. These age profiles are used in both the historical static and lifetime forecast analyses presented in this chapter.<sup>1</sup> Single-year age profiles were constructed by averaging three adjacent years' worth of data for smoothness. These age profiles are then rescaled for each middle year so that—when applied to population estimates by age, education, immigrant generation, and time-since-arrival in that middle year—they capture the total flows for a given program in that year in an estimate that is consistent with administrative sources.<sup>2</sup> Details

<sup>1</sup>The main alternative to the CPS that could have been used is the Survey of Income and Program Participation (SIPP), conducted by the Census Bureau. The CPS and SIPP each have advantages and disadvantages. While ultimately choosing not to use it for other reasons, *The New Americans* (National Research Council, 1997) panel concluded that the greatest strength of SIPP is that it contains more accurate monthly data on program participation and expenditures and richer information on wealth and income sources than does the March CPS. The current panel, like the panel that authored the 1997 report, chose to use the CPS due to its substantially larger sample size. Because the analyses in this report required cells defined by age, immigrant generation, and education, as well as some separate analyses at the state level, sample size was critical. The March CPS also has an oversample of Hispanics (and a number of other groups, including Asians), which increases representation of immigrant and second generation households. In addition, because the March CPS is conducted every year, it is possible to combine across years to further increase the sample size. Moreover, the state-level analysis in Chapter 9 would not have been possible using the SIPP, and the panel felt it was important to use a consistent data source across analyses. Timeliness was also an issue. The lags in release of new SIPP data are much longer than those for the March CPS, which is available in the fall of each survey year. Current immigration research based on SIPP is using the data from the 2008 panel. The immigrant population had a different composition by 2011-2013 relative to 2008—specifically, the more recent period has lower percentages of unauthorized immigrants, fewer Mexican immigrants, and more Asian immigrants. Also, program use and employment change over time. Regarding potential bias, both data sources are known to underreport income and program use. And although internal panel calculations indicated that SIPP shows higher program use than does the CPS, the differences were about the same for immigrants and natives, so the bias was not related to immigrant status but rather just an overall feature of the CPS. Thus, adjustment to administrative totals for income and program use addresses much of the known underreporting problem.

<sup>2</sup>The analyses in this chapter make the de facto assumption that immigrants are represented in the CPS roughly proportionally to their representation in the population. For each benefits program, CPS data are adjusted for under- or over-reporting by scaling each record by a single multiplicative factor for that particular program so that the accumulated aggregate over all records match program totals from National Income and Product Accounts. However, there is

about the estimation methods for specific programs are listed in the Technical Annex to this chapter.

To assess the robustness of the panel's historical estimates, we conducted a sensitivity analysis by varying assumptions about program utilization and about how public expenditures are attributed. We broadly followed the methodology of Dustmann and Frattini (2014), who specified two overarching cost scenarios in which immigrants incur either the average cost or the marginal cost of public goods, plus a number of subscenarios within each of these two. Their baseline specification has immigrants incurring the average cost of public goods. For our analysis, we used the eight scenarios listed in Box 8-1, the first of which is the average-cost baseline, consistent with Dustmann and Frattini (2014).

Dustmann and Frattini (2014) explained the rationale for examining these particular scenarios. In theory, as explained in Chapter 7, pure public goods can be enjoyed by an unlimited number of citizens, implying that the cost of providing them to an additional immigrant should be zero (the marginal cost scenario). But in practice one expects most services provided by governments to be susceptible to congestion. As described in detail in Chapter 7, assigning to immigrants the average cost of public goods—like defense spending, or total defense outlays—calculated across all U.S. residents is a conservative assumption in that it generates estimates that may overstate the net cost of an additional immigrant. Thus, to examine robustness of findings based on the average-cost approach, the panel included scenarios (5 through 8) that assign a marginal cost of zero for public goods, under the assumption that an additional immigrant does not increase the total cost to the nation of services such as national defense.

Scenario 1 includes interest payments as a component of public goods spending, along with defense, foreign aid, and state and local spending

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likely a differential undercount of the unauthorized component of the immigrant population. Based on a residual method that compares survey estimates of the resident population with administrative data on legal immigration, a number of researchers (e.g., Baker and Rytina, 2013; Passel and Cohn, 2014; Warren and Warren, 2013) have estimated the characteristics of the unauthorized population, including its fiscal impacts. These estimates suggest that unauthorized immigrants as a group may have a more positive fiscal impact than authorized immigrants, but only because of their age structure. The average undocumented immigrant is of younger working age than the average documented immigrant (there are very few undocumented immigrants of retirement age); thus, the net fiscal impact of the former is more positive at the federal level and overall. Also, as detailed in Chapter 3, undocumented individuals, young unauthorized immigrants who qualify for the Deferred Action for Childhood Arrivals Program, temporary visa holders, and recent legal permanent residents are ineligible to receive benefits from some programs; and unauthorized immigrants do not qualify for the earned income tax credit. Nonetheless, since, at any given age, unauthorized immigrants tend to earn less than their authorized counterparts, controlling for age, they are less of a benefit to public finances than authorized immigrants.

**BOX 8-1**  
**Alternative Scenarios for Attributing Public**  
**Expenditures to Immigrants and Natives**

- Scenario 1: Immigrants and natives incur the average cost of public goods
- Scenario 2: Same as scenario 1, but interest costs are excluded
- Scenario 3: Same as scenario 1, but immigrants' consumption and sales and excise taxes are reduced by 20 percent
- Scenario 4: Same as scenario 1, but capital income taxation is not contributed by immigrants before 10 years in the country
- Scenario 5: Immigrants incur the marginal cost of public goods (zero), and natives incur the total cost
- Scenario 6: Same as scenario 5, but interest costs are excluded
- Scenario 7: Same as scenario 5, but immigrants' consumption and sales and excise taxes are reduced by 20 percent
- Scenario 8: Same as scenario 5, but capital income taxation is not contributed by immigrants before 10 years in the country

categories such as subsidies and interest payments. In scenarios 2 and 6, we remove interest payments from the public goods calculation because they represent the cost of servicing debt attributable to past spending and deficits from which new immigrants did not benefit.<sup>3</sup> Scenarios 3 and 7 follow *The New Americans* (National Research Council, 1997) in estimating the consumption of immigrants by assuming a constant real amount of income is remitted to the country of origin and thus not spent in the United States. Based on a conservative reading of a study using data on Germany, Dustmann and Frattini (2014) assumed that immigrants send remittances back to their home countries at levels that affect consumption such that U.S. sales and excise taxes paid by them are reduced by 20 percent relative to the average for the general population. This adjustment factor is used in scenarios 3 and 7 to provide another robustness assessment that is consistent with their methodology. In scenarios 4 and 8, the panel explores

<sup>3</sup>Interest payments, the vast majority of which go to servicing the debt, are not raised right away by an immigrant entering the country—they represent the current cost of servicing past deficits to which new immigrants did not contribute. Over time, an additional immigrant may affect the level of debt and thus debt payments, depending on his or her net fiscal impact. But, particularly for the intergenerational projection exercise (in the second part of this chapter), this calculation would be very complicated as each lifetime profile of marginal fiscal net contribution or cost uniquely affects the debt and debt service costs. Treating the marginal contribution of immigrants to debt service as either zero or average cost as we do provides a range of possible results, although given the impact of discounting on future flows, the true impact would be much closer to the zero cost than the average cost scenario.

the effects from assigning zero capital income taxation to immigrants who have been in the United States for less than 10 years. In the other scenarios, the implicit assumption is that ownership of company shares is distributed similarly across native- and foreign-born populations. But scenarios 4 and 8 assume that recent immigrants do not own shares of U.S. companies and therefore do not make capital tax payments. Although new arrivals do have lower ownership than the general population, this simplifying assumption is clearly an overstatement of the difference in stock equity between natives and immigrants. Nonetheless, it is useful for understanding the potential impact of assumptions about capital ownership by immigrants.

In the sections that follow, the panel first describes the policy environment, and then explores the age structure and number of children of U.S. immigrants, and trends in education, working, and earnings among immigrants. We then examine the effects of variations in patterns of program utilization, receiving government benefits, and paying taxes, by age. Because the assumption about how the costs of public goods are assigned varies across scenarios, our initial analysis of age-related patterns (which follows immediately below) omits them—this allows the discussion to focus first on fiscal impacts linked to age structure. In the subsequent sections, we reintroduce public goods in order to present complete fiscal impact estimates for immigrants and natives for scenario 1 and, to test for robustness, across the other seven scenarios.

### A Changing Policy Environment

*The New Americans* (National Research Council, 1997) was released immediately after passage of welfare reform via the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA). PRWORA was one of the largest changes in fiscal policy in recent decades. The 1997 report attempted to estimate the effects of PRWORA on the fiscal impacts of immigrants, bearing in mind that the law denied certain means-tested benefits to noncitizens. Its authors assumed immigrants received no such transfers until after 5 years of residence.<sup>4</sup> The changes in net fiscal impact of immigration associated with PRWORA, although modest, were found to make immigrants less costly to states and localities and more beneficial to federal finances (National Research Council, 1997). Subsequent analyses by Bitler and Hoynes (2013), Borjas (2002), and others indicated that, in the aftermath of PRWORA, participation rates at the national level of immigrants declined for a number of programs relative to those of natives

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<sup>4</sup>The affected programs were Supplemental Security Income, Aid to Families with Dependent Children (AFDC), food stamps (SNAP), nonemergency Medicaid, energy assistance, rent subsidies, and public housing.

(see discussion in Chapter 3). Borjas (2002) found that much of the national decline was attributable to immigrants living in California, who experienced “a precipitous drop in their welfare participation rate (relative to natives).”

In the years since welfare reform, there have been other significant changes to U.S. fiscal policy that likely factor into the fiscal impacts of immigrants. In particular, other income support programs have grown to fill the gaps left by welfare reform. The Earned Income Tax Credit has been expanded several times over the past three decades, rising more than five-fold from an \$11 billion program in 1994 to a \$58 billion program in 2013. Similarly the child tax credit, introduced in the late 1990s, has grown into a \$22 billion program that aims to support working families. Participation in the Supplemental Nutrition Assistance Program (SNAP), also known as food stamps, declined initially after welfare reform before rising strongly due to policy reforms prior to the Great Recession, during which SNAP participation rates rose even more (Ganong and Liebman, 2013). In 2013, SNAP assistance totaled \$75 billion, up from \$23 billion in 1994.

Other changes in the federal safety net during this period included the addition of a prescription drug benefit to Medicare starting in 2006, the expansions of Medicaid, and introduction of health insurance subsidies in 2014 via the Affordable Care Act (ACA), which also aimed to rein in future Medicare spending. Undocumented immigrants are explicitly omitted from coverage and subsidies under the ACA, but authorized immigrants are fully eligible. Because the panel’s period of historical data ends in 2013, we do not include the ACA in our historical analysis. In the longitudinal forecast of the future fiscal impacts of immigrants (Section 8.3), we model the effects of the ACA following the assumptions of the Congressional Budget Office (CBO).

There were also changes in tax policy during the historical period. Income tax rates were cut across the board in 2001 but partially reinstated for high-income households in 2013. Tax rates on capital gains and dividends were cut in 2003 and were also partially reinstated for high-income households in 2013. By 2011, these tax cuts had reduced average federal tax rates on all income groups, but by more in the lowest four quintiles (Congressional Budget Office, 2014b).

By 2013, most of the federal policy responses to the Great Recession, which significantly lowered taxes and raised spending starting in 2008, had run their course. In particular, payroll tax rates, which were lowered in 2011 and 2012, returned to their precrisis levels. However, usage of means-tested benefits remains elevated compared to prerecession levels (Congressional Budget Office, 2015).

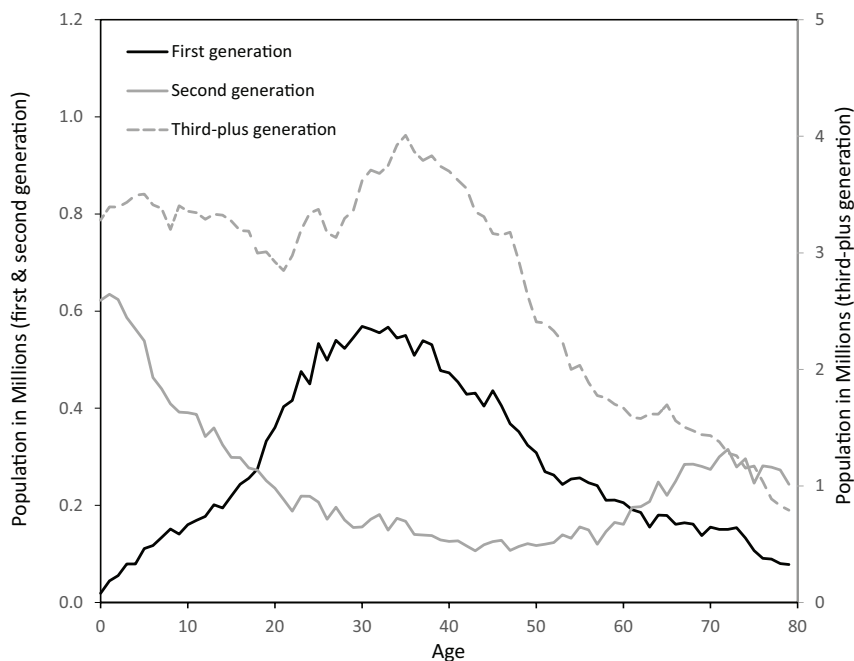
In addition to these changes at the federal level, state and local fiscal policies have also been in flux during the historical period. Chapter 9 provides details about differences across states in the effect of immigration on subnational fiscal situations.



### The Age Structure of Immigrant and Native Populations

Immigrants and their children differ from natives in a variety of ways, but perhaps most notably in terms of age structure. Figure 8-1 shows the age structure in 1995 of first generation immigrants (the foreign-born) and their native-born children (the second generation), both plotted against the left vertical axis, and the rest of the native-born population (referred to here as the third-plus generation) plotted against the right axis. Figure 8-2 shows the age distributions of these three groups in 2012.

To repeat the definition of immigrant generations given in Chapter 1, “first generation” refers to foreign-born persons, excluding those born abroad and granted citizenship at birth because their parents are U.S. citizens. The second generation consists of U.S.-born persons who have one or more first generation parents. The third-plus generation includes U.S.-born persons of two U.S.-born parents and those born abroad but granted citizenship at birth because their parents are U.S. citizens. Note that persons born in U.S. outlying areas such as Puerto Rico are considered U.S. born

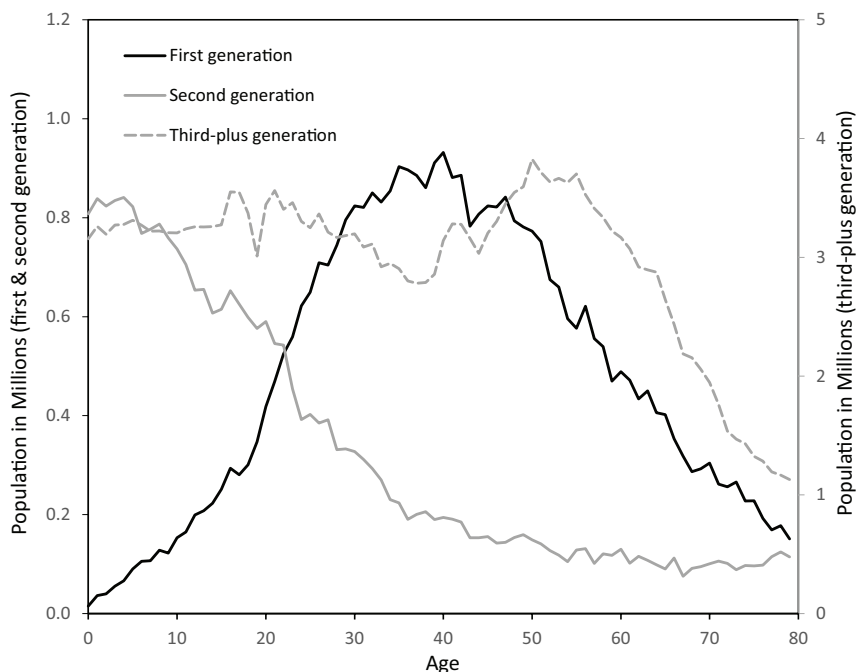


**FIGURE 8-1** The U.S. population by age and immigrant status in 1995.

NOTE: “Third-plus generation” includes third and higher generations since ancestors arrived in the United States.

SOURCE: Data are from the 1994-1996 March Current Population Surveys.





**FIGURE 8-2** The U.S. population by age and immigrant status in 2011.

NOTE: “Third-plus generation” includes third and higher generations since ancestors arrived in the United States.

SOURCE: Data are from the 2011-2013 March Current Population Surveys.

in this analysis because they are citizens at birth and thus, barring legal changes in citizenship, their movement to or from the 50 states would not be affected by immigration policy.

As both figures reveal, the first generation is heavily concentrated at working ages and does not contain many very young or very old people—the latter reflects the unusually small numbers of immigration arrivals during the mid-20th century. The second generation, which in 1995 still included children of early 20th century immigrants, is nearly the mirror image of the first generation, with comparatively few members of working age and higher shares of children and the elderly. By 2012, the second generation had become more concentrated at young ages, including younger adults, reflecting the substantial growth in their parents’ population—first generation immigrants of working ages—and the mortality of the second generation children of earlier immigrant waves. By contrast, the age structure of the third-plus generation has remained more stable. However, the aging of the Baby Boom generation has produced a more rectangu-

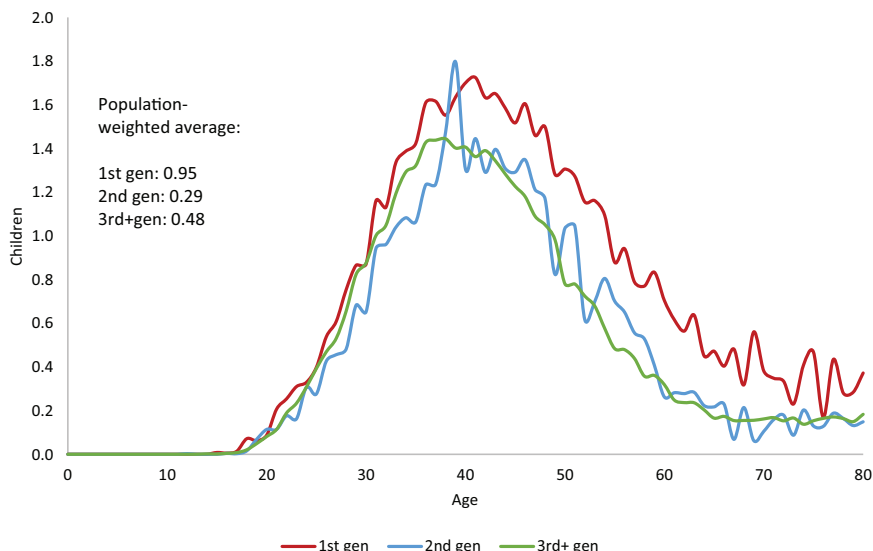
lar (rather than pyramidal) age distribution than was typical in the past, roughly equalizing the shares of young, working-age, and older third-plus generation Americans.

Age structure is crucially important for contextualizing fiscal impacts of a group with a particular nativity status *at a point in time*—or cross sectionally. While lifetime fiscal impacts may turn out to be more similar across groups, the short-term impact of a group that is concentrated at working ages when tax contributions are high will be more positive than that of a group that is, at that time, either relatively young or elderly or both, because the latter age ranges typically receive more transfers than they contribute in taxes. Given the patterns evident in Figures 8-1 and 8-2, if tax payments are attributed to the first generation, many of whom are of working age, and the use of public expenditures on education are attributed to their second-generation children, one would expect the current net fiscal impact of the first generation to be positive and the impact of the second generation to be negative. The net fiscal impact of the third-plus generation could be positive or negative, but is likely to have become less positive with the aging of the Baby Boom cohorts. After 20 more years, the age distribution of those currently in the first generation will look a lot more like the current third-plus generation.

However, when the costs of dependent children are attributed to their parents—which, for many questions, will be the most relevant allocation—estimates of the current-year fiscal impact generated by first generation immigrants change dramatically. There are large counterbalancing fiscal impacts in an “immigrant household” grouping scheme. When a population is disproportionately of working ages, and therefore paying taxes and creating a positive fiscal impact, they are also likely to be disproportionately parents of children creating a fiscal negative, primarily in the form of public education costs. As shown below, this demographic characterization accurately describes first generation immigrants for the 1994-2013 period. In 2013, first generation immigrant households had a weighted average of 0.95 children in their households (see Figure 8-3)—much higher than the weighted averages of 0.29 and 0.48 for second generation and third-generation households. As indicated in Figure 8-3, some of this difference is accounted for by the fact that immigrants have had higher fertility over the past 17 or so years (suggested by the higher position at early parenting ages of the red line representing the first generation) and are also more likely to live in multi-generational households as elders.<sup>5</sup> But these children-in-households profiles do not account for the full difference in the weighted averages across the

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<sup>5</sup>This is mostly “explained” by Hispanic ethnicity and family reunification policies that brought many older first generation immigrants to join their first generation children. Second generation persons have the lowest fertility, and in Figure 8-3 the whole curve for that generation is shifted a few years to the right compared with either the first or third-plus generation.



**FIGURE 8-3** Average number of own children in household, by immigrant generation in 2013.

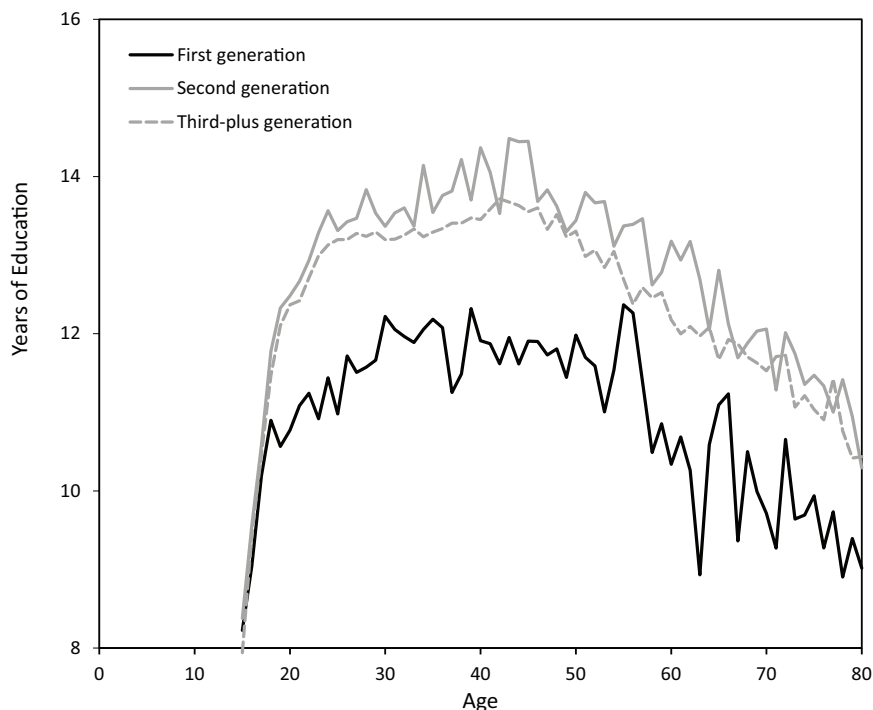
NOTE: Figures based on the Integrated Public Use Microdata Series (IPUMS)-imputed child variable, which includes biological and adopted children and step-children of any age or marital status. Second generation includes persons with one or two foreign-born parents. “Third-plus generation” includes children with parents who are second or higher generation since ancestors arrived in the United States.

SOURCE: Data are from the March 2013 Current Population Survey.

three generational categories; in fact most of the difference can be attributed to the much higher percentage of immigrants in the parenting age range relative to other populations. The average number of children for the first generation is expected to decrease as the group grows older due to slower replacement (with new immigrants arriving) than in the past.

### Trends in Education, Employment, and Earnings by Immigrant Status

In addition to age and number of dependents, an individual’s education level and employment status are also important determinants of fiscal impact. Earnings and thus tax contributions tend to rise strongly with age and experience. They also rise with the level of education, and they track employment patterns in a predictable fashion. Benefits may vary inversely with education and employment to the extent that the safety net compensates need, but old-age entitlements also tend to rise with lifetime earnings and longevity, which are correlated positively with education.



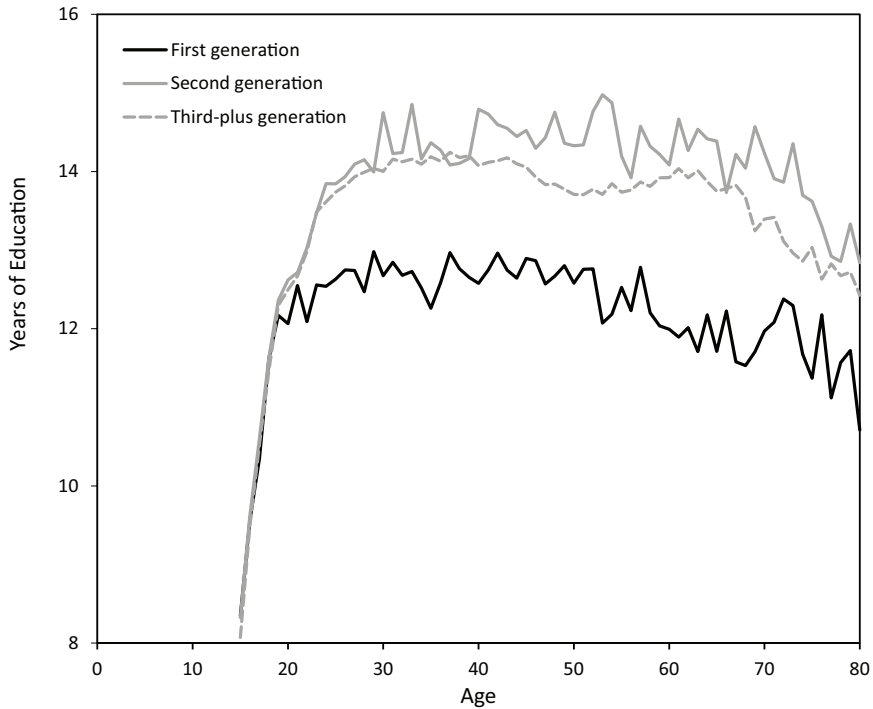
**FIGURE 8-4** Average years of education across age by immigrant generation in 1994.

SOURCE: Data are from the March 1994 Current Population Survey.

Figure 8-4 shows average education levels across age by immigrant generation in 1994 as measured in the CPS.<sup>6</sup> Average education declines for all groups beyond age 40 because earlier birth cohorts were less well educated. On average, first generation immigrants in 1994 had 1.5 fewer years of education than either the second or third-plus generations. Second generation education in 1994 was similar to but higher than that of the third-plus generation by 0.35 years; the children of immigrants tended to have higher education levels than other natives at every age.

Age-specific education levels have been changing over time for all U.S. residents as younger cohorts with more education have replaced older cohorts with less. Figure 8-5 depicts the same age patterns of educational attainment as Figure 8-4 but for immigrant generations in 2013. Each line is higher than it was in 1994 by roughly 1 year. The gap between the first

<sup>6</sup>We transformed educational attainment categories in the CPS into years of attainment using the crosswalk method suggested by Jaeger (1997).



**FIGURE 8-5** Average years of education across age by immigrant generation in 2013.

**SOURCE:** Data are from the March 2013 Current Population Survey.

and third-plus generations has narrowed slightly during this interval from 1.5 to 1.25 years, while the second generation maintained the same 0.35 year advantage over the third-plus generation.

Patterns in employment across age also vary by immigrant status and have shifted somewhat over time. Figure 8-6 shows that in 1994, employment for all groups followed the expected inverted-U shape with increasing age and that immigrants worked less, at a given age, than natives (i.e., the first generation worked less than the second and third) except at some typical retirement ages.<sup>7</sup> On average, immigrants ages 20 and older were about 5 percentage points less likely to be employed than the second or third-plus generations. But by 2013, as depicted in Figure 8-7, that gap had

<sup>7</sup>As detailed in Chapter 3, the lower employment ratio of immigrants has historically been driven by lower participation of foreign-born women in the labor market. After an adjustment period, immigrant men often have employment ratios equivalent to natives and for some groups (e.g., low-skilled categories) they are considerably higher.

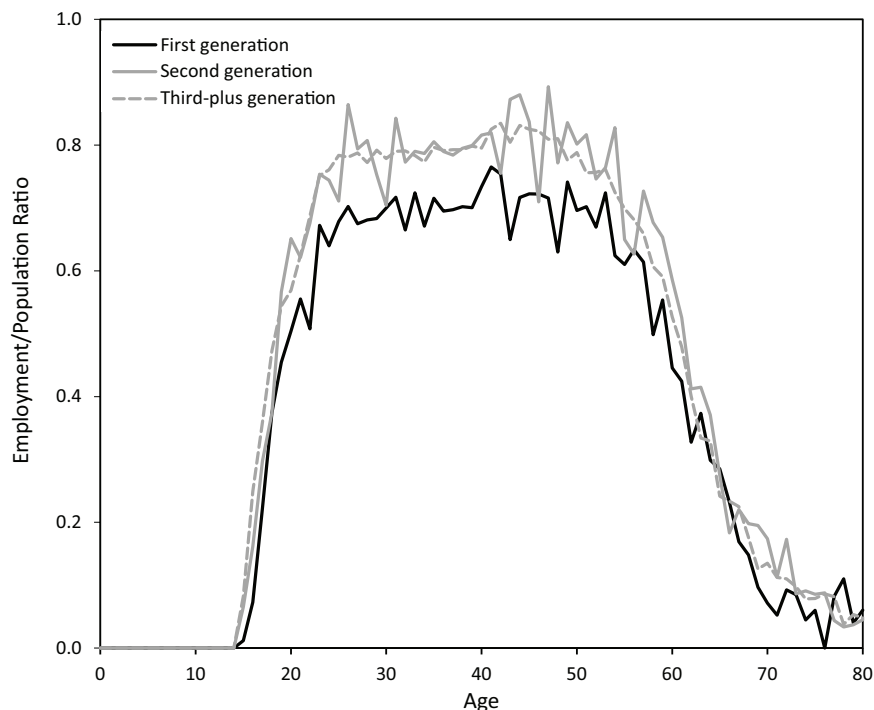
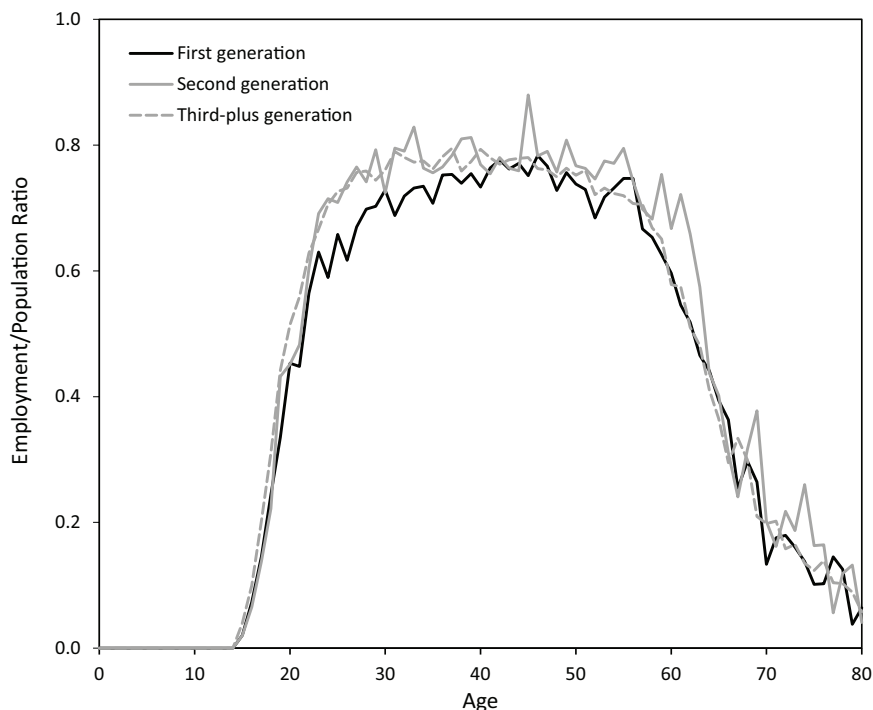


FIGURE 8-6 Employment-to-population ratio across age by immigrant generation in 1994.

SOURCE: Data are from the March 1994 Current Population Survey.

narrowed to 2 percentage points—mostly as a result of increasing employment of immigrant women (see Chapter 3), with lingering differences by immigrant status only under age 40. Employment rates by age among the second generation have remained broadly similar to those of the rest of the native-born population.

Although employment patterns of immigrants and natives have converged somewhat over time, if one adds the impact of wages the trends in relative earnings are more similar to trends in relative education, which display less convergence. Figure 8-8 shows large differences by immigrant generation in wage and salary income in 1995, measured in 2012 dollars and including those with zero earnings. On average, immigrants ages 20 and older in 1995 earned about \$5,500, or 23 percent, less than natives of comparable age. In contrast, the second generation earned roughly \$3,000, or 12 percent, more than the third-plus generation. Estimates vary, but an additional year of schooling may raise earnings by 10 percent (Card, 2001). Relative to that baseline, the immigrant earnings penalty is larger than



**FIGURE 8-7** Employment-to-population ratio across age by immigrant generation in 2013.

SOURCE: Data are from the March 2013 Current Population Survey.

might be expected, given their education disparities, but the remaining difference could be explained by reduced employment rates or hours worked. The earnings advantage of the second generation relative to the third-plus generation appears larger than would be explained by educational differences alone.

Figure 8-9, which shows earnings by age and immigrant status in 2012, visually suggests the second generation had pulled further away from the third, which is true. Note that these estimates are the average wage and salary income over people who are working and who are not. If one takes the average wage and salary income for the peak earning ages of 35-55 years old, earnings grew by about 12-13 percent for first and second generation persons but only by 9 percent for third-plus generation persons. So compared to third-plus generation wage and salary earnings, the second generation is pulling ahead and the first generation is catching up.

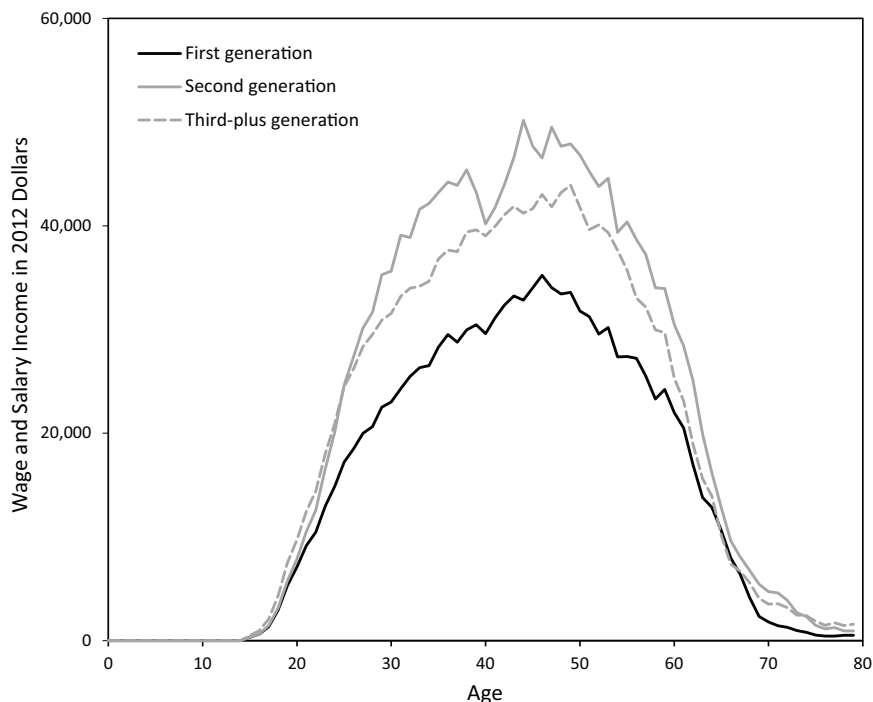


FIGURE 8-8 Wage and salary income in 2012 dollars by immigrant generation in 1995.

SOURCE: Data are from the March 1994-1996 Current Population Surveys.

### Trends in Fiscal Flows by Age and Immigrant Generation

Now that we have considered many of the relevant characteristics of each generational group, we put this all together to examine fiscal flows. In this section we continue to take the individual as the unit of analysis, attributing tax receipts and benefit cost flows—which, when combined, yield net fiscal impacts—to each individual across the full age spectrum. This approach is useful for showing how fiscal flows vary by age and, controlling for age, across generational groups. However, such an approach disregards that children and other dependents are linked to independent adults, often from a different generational group. For this reason, in the section after this one, our analysis shifts focus by redefining generational groups to include dependents; so, for example, the first generation immigrant (the foreign-born) group includes foreign-born individuals ages 18 and older, *plus their dependent first and second generation children* (see Box 8-2). For now, in



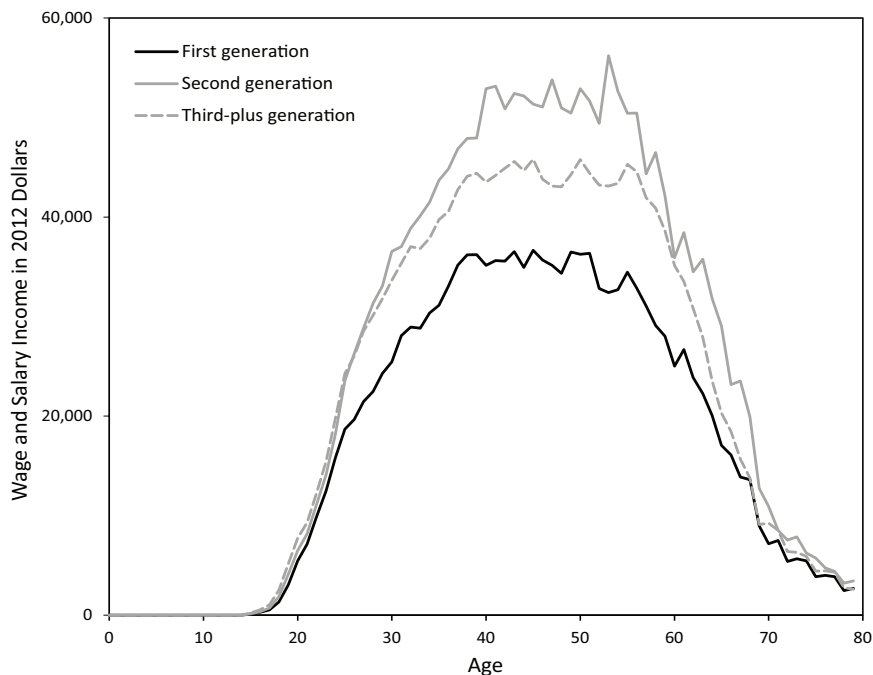


FIGURE 8-9 Wage and salary income in 2012 dollars by immigrant generation in 2012.

SOURCE: Data are from the March 2011-2013 Current Population Surveys.

this section, we continue to look at the fiscal flows associated with individuals without taking their dependents into account.

The cost of educating the young dominates fiscal flows early in the life cycle; contributions in the form of taxes paid dominate the middle years, and the cost of health care dominates the later years. This pattern is illustrated for first generation immigrants in Figure 8-10. Given that taxes and fiscal transfers in the United States are largely based on earnings, one would expect the persistent earnings disadvantage of immigrants and the persistent advantage of the second generation to be mirrored in patterns of tax payments and program utilization. This is certainly true in the case of taxes paid to all levels of government, which is shown in Figure 8-11 for the year 1995 and in Figure 8-12 for the year 2012. In both years, tax contributions strongly track the age profiles of wage and salary income shown in Figures 8-8 and 8-9 up to retirement ages. Because retirees continue to pay taxes on wealth and on some forms of income, their tax contributions remain positive even after their earnings cease. Immigrants ages 20 and

### BOX 8-2

#### Definitions of Dependent and Independent Persons

**Dependent:** For the purpose of the panel's estimates, we consider dependents to be anyone: (1) under age 18, (2) ages 18 through 21 and in high school full time, or (3) ages 18 through 23 and in school full time or part time with income below half of the poverty level for one person. We also consider single individuals who are ages 18 through 23 and not in school but with income below half of the poverty level (for one person) who live with at least one independent person (typically a parent) as a dependent person; 1.2 percent of the population are in this category and they are treated as dependents but are not assigned education costs.

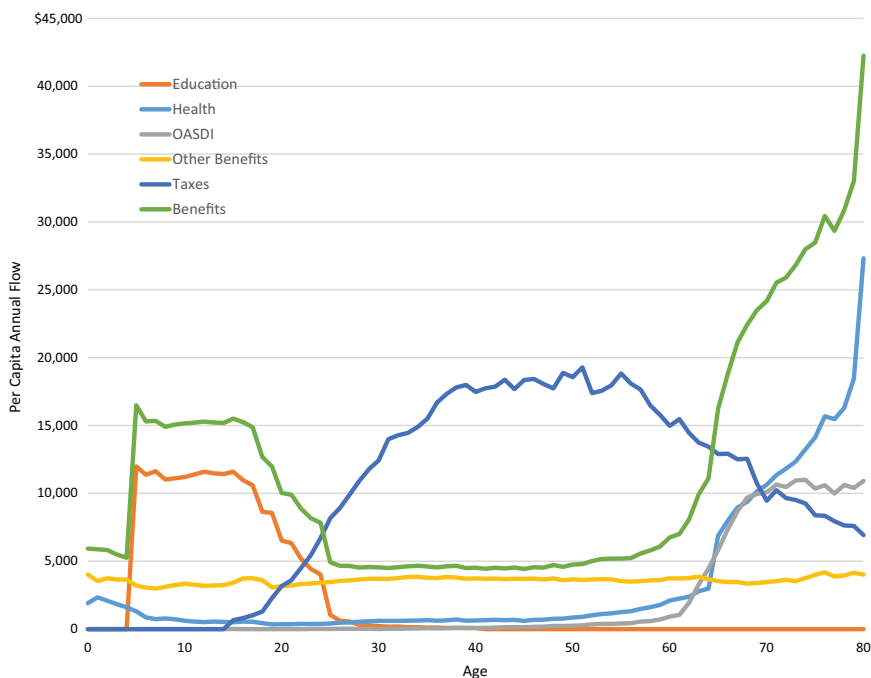
**Independent person:** Any person (most of whom are adults ages 18 and older) who is not a dependent child. We consider individuals ages 18 through 23 who are in school and working more than part time to be independent regardless of income level.

There are a few exceptions to the aforementioned criteria. If a person is married, he or she is considered independent irrespective of age. If a person is single with children and there are no family members other than children in the household, and the person is earning above half the poverty level, the person is considered independent. If there is a household with no members satisfying the above criteria for being independent, we consider any household member with income above the average amount in the household and age 18 and older (or age 16 and older if all in the household are under 18) to be the independent person(s) in the household.

older contributed about 23 percent less than the third-plus generation<sup>8</sup> in both years, while the second generation contributed 12 percent more than the third-plus in 2012 versus 10 percent in 1995.

Comparison of the data shown in Figures 8-8, 8-9, 8-11, and 8-12 also reveals relatively moderate increases over time in tax contributions relative to the growth in earnings. Between 1995 and 2012, per capita taxes paid rose 10 percent for immigrants, 13 percent for the second generation, and 11 percent for the third-plus generation. This is about half as fast as the growth in earnings during this period; if all taxes were levied on earnings, it would imply reductions in average tax rates of about 10 percent as well. One can see by comparing the graphs in Figures 8-11 and 8-12 that all of

<sup>8</sup>Again, throughout this report, "third-plus generation" refers to all persons in the third and higher generations after immigration. In short, anyone resident in the United States who is not first or second generation is in the "third-plus generation" as defined for this chapter.

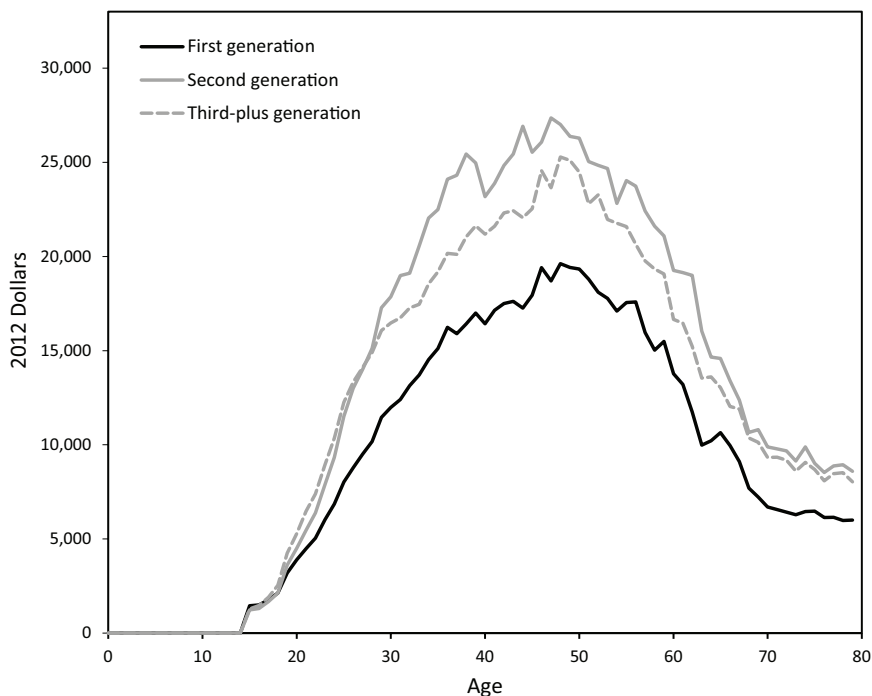


**FIGURE 8-10** Fiscal flows, first generation immigrants to the United States, 2012. NOTE: All public spending is included, *except* pure public goods (defense, interest on the debt, subsidies). The “Health” category includes Medicaid and Children’s Health (CHIP) programs. Data are Current Population Survey (CPS)-based per-capita age schedules, smoothed and adjusted to National Income and Product Accounts (NIPA) annual totals.

SOURCE: Data are from the March 2011-2013 Current Population Surveys.

the increase in inflation-adjusted tax contributions came from increases at older ages.

In contrast to the tax picture, per capita government benefits have risen in real terms across all age and nativity groups at an average rate that was slightly faster than the growth in earnings. This is largely attributable to the influence of current economic conditions compared to those in the 1990s: employment and wages have grown slowly in the wake of the Great Recession, while federal spending was increased to respond to the crisis. While the levels may have changed, Figures 8-13 and 8-14 (which attribute program costs of education at the age points of the children being edu-



**FIGURE 8-11** Total taxes paid per capita in 1995 at all levels of government, by age and immigrant generation.

SOURCE: Data are from the 1994-1996 March Current Population Surveys, normalized to program totals.

cated<sup>9</sup>) show that little change has occurred in the shape of the age profiles of benefits over time, nor has there been much change in the distribution of benefits across groups defined by immigrant status. But each age profile has risen, with growth most apparent (by comparing the lines in Figures 8-13 and 8-14) at the youngest and oldest ages.

Growth in per capita benefits from 1995 to 2012 was most rapid for those under age 20, where outlays increased 31 percent for immigrants, 38 percent for the second generation, and 33 percent for the third. But the second-most rapid rate of growth in benefits was actually among individuals of working ages, 20 to 64, which is not easy to see in the figures.

<sup>9</sup>For other programs where the benefit depends on household size or that require the presence of children to qualify, the benefit is allocated equally to all members of the family unit receiving the benefit. These programs include AFDC, other welfare programs, and the Earned Income Tax Credit (EITC).

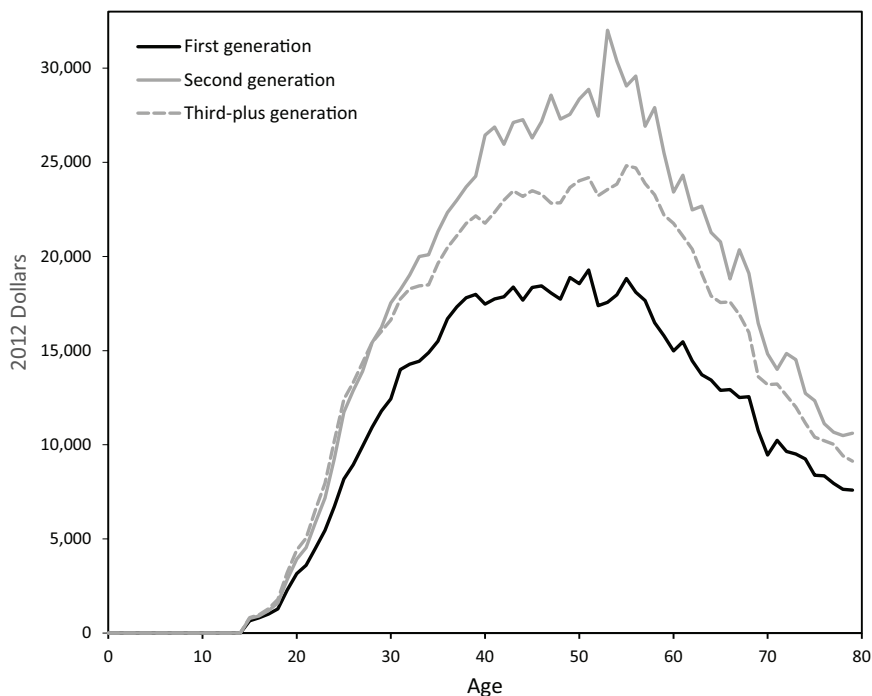


FIGURE 8-12 Total taxes paid per capita in 2012 at all levels of government, by age and immigrant generation.

SOURCE: Data are from the 2011-2013 March Current Population Surveys, normalized to program totals.

Benefits absorbed in the working-age range rose 33 percent for immigrants, 34 percent among the second generation, and 32 percent for the third-plus generation. Increases in benefit *amounts* at these ages were considerably less than the increases in benefit *amounts* for other age groups because benefits started from a smaller base. Benefit levels in retirement were already the highest of any age group, and they increased the most in dollar terms during this period. But the *percentage* growth in benefits for the retirement age group was only 16 percent for immigrants, 12 percent for the second generation, and 18 percent for the third-plus generation.

Another noteworthy aspect of these trends is that per capita benefits absorbed by the third-plus generation exceed those for the first and second

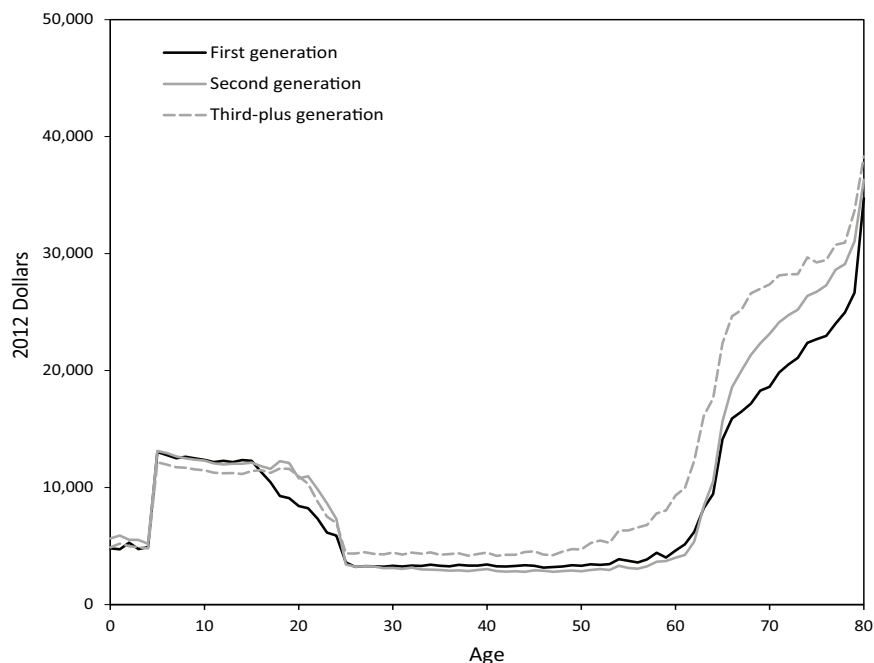
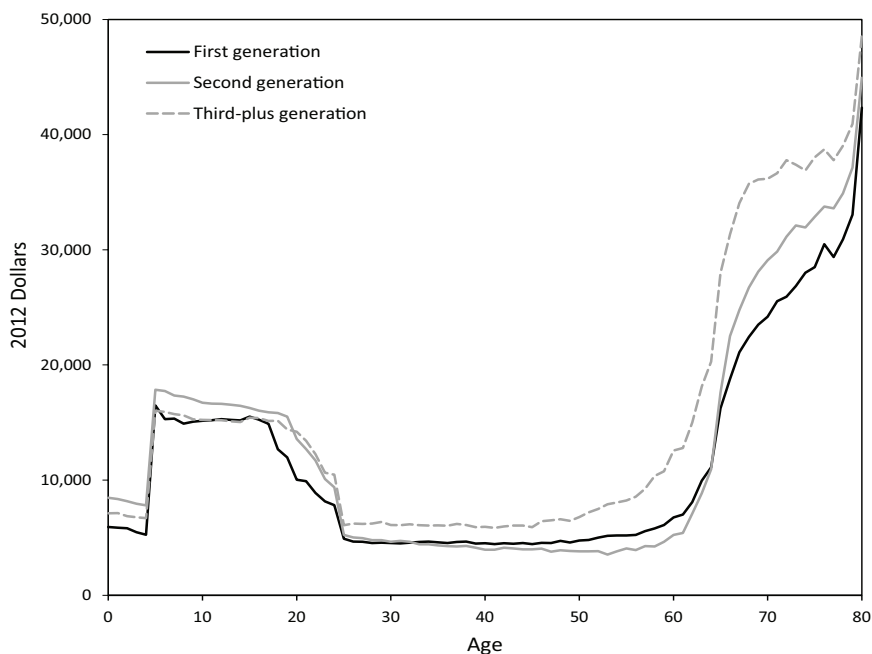


FIGURE 8-13 Total per capita benefits received in 1995 at all levels of government, by age and by immigrant generation.

SOURCE: Data are from the 1994-1996 March Current Population Surveys, normalized to program totals.

generations at all ages past the typical years of college attendance.<sup>10</sup> To the extent that receipt of some government benefits is contingent on years spent in the country, some of this is to be expected. But it is striking that the U.S.-born second generation absorbs fewer benefits than other natives at all such ages in both 1994 and 2012. The underlying patterns of program use contributing to differential benefit receipt by native-born children of immigrants and other natives at adult ages are primarily twofold. Up until about age 50, the third-plus generation uses means-tested programs such as Medicaid, unemployment benefits, food stamps, and the Earned Income

<sup>10</sup>This finding is consistent with those in the peer-reviewed research literature. Sevak and Schmidt (2014), for example, link Health and Retirement Study survey data to restricted Social Security administrative data to show that immigrants have lower levels of benefits than do natives. The amount included here as state and local retirement benefits includes defined benefit plans but not defined contribution plans. The latter are typically not categorized as a public benefit and should be distinguished from payments out of tax revenues.

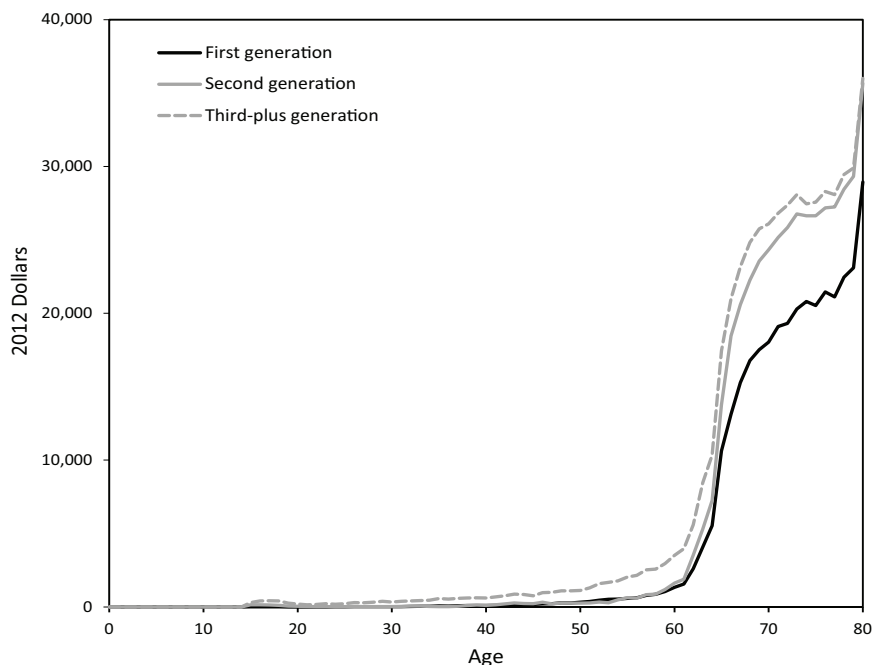


**FIGURE 8-14** Total per capita benefits received in 2012 at all levels of government, by age and by immigrant generation.

SOURCE: Data are from the 2011-2013 March Current Population Surveys, normalized to program totals.

Tax Credit (EITC) more intensively than does the second generation. After age 50, the third-plus generation absorbs more old-age benefits, such as Social Security pensions and disability payments, federal retirement payments, and state and local retirement benefits.

These patterns of program use are also revealed in Figure 8-15, which shows receipt of benefits associated with federal old-age support programs (Social Security, Medicare, Medicaid payments to nursing homes, federal worker retirement, and other programs), and in Figure 8-16, which shows federal means-tested programs for the poor (the rest of Medicaid, Supplemental Security Income, unemployment insurance, food stamps, the EITC, and other support); data are shown for 2012 in both figures. Old-age benefits are nonzero prior to retirement because of the inclusion of disability insurance, but they rise rapidly for all groups after age 62. Immigrants receive less Social Security than natives because they have typically paid less into the system or have immigrated after working ages. Prior to age 62, the excess spending generated by the third-plus generation relative to the second generation is



**FIGURE 8-15** Federal old-age benefits received per capita in 2012, by age and immigrant generation.

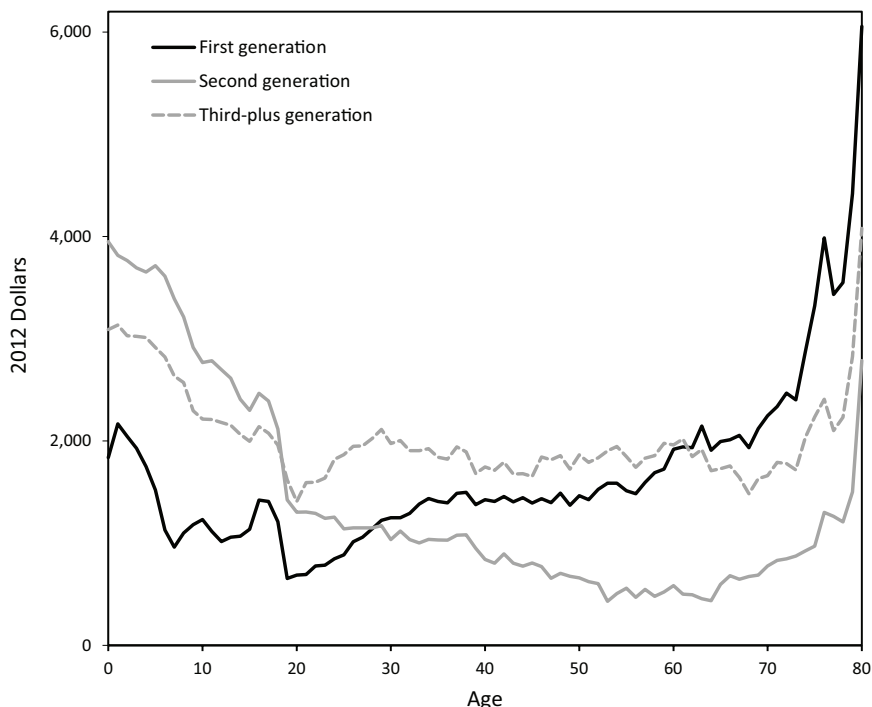
SOURCE: Data are from the 2011-2013 March Current Population Surveys, normalized to program totals.

due to federal disability insurance, whereas after age 62 it is attributable to federal retirement benefits (i.e., Social Security), which rise steeply with age.

For working-age individuals, the means-tested federal antipoverty benefits tracked in Figure 8-16 show the third-plus generation as receiving the highest per capita benefits. At young ages, per capita benefit receipt is highest for the second generation (the children of immigrants). A similar conclusion can be drawn from the data on program participation rates. As detailed in Chapter 3, U.S.-born children with two immigrant parents have higher program participation rates than those with one or two native-born parents because they are likely to live in households with lower than average incomes and, since they are U.S. born, they are eligible for various safety net programs. At the oldest ages, the first generation absorbs the most means-tested antipoverty benefits on a per capita basis.<sup>11</sup>

<sup>11</sup>Of course, the aggregate expenditure amounts are greatest for natives because they are by far the largest group.



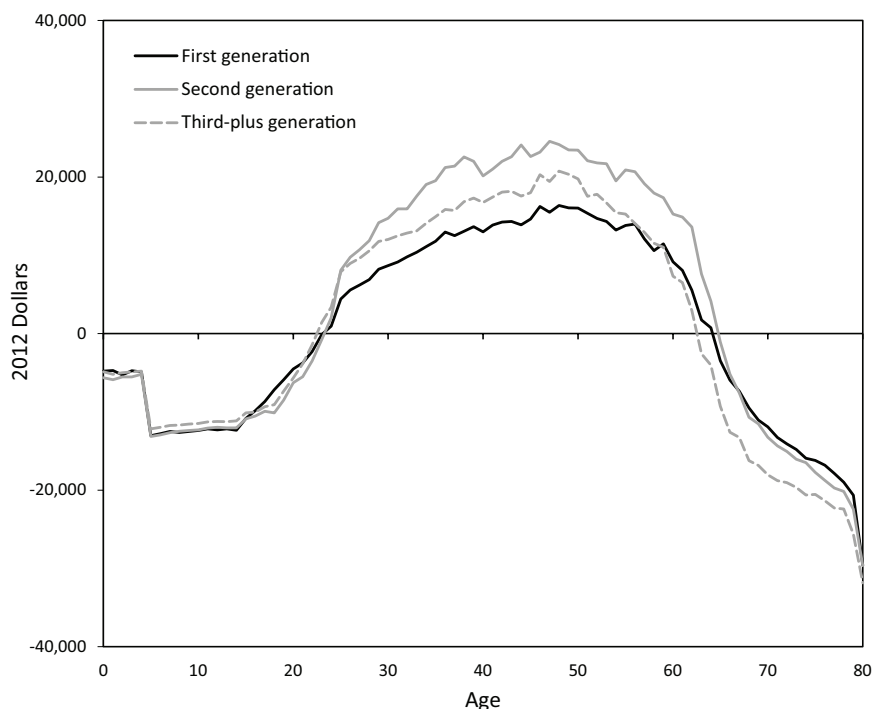


**FIGURE 8-16** Federal means-tested antipoverty benefits received per capita in 2012, by age and immigrant generation.

SOURCE: Data are from the 2011-2013 March Current Population Surveys, normalized to program totals.

Medicaid and Supplemental Security Income, which are included here and are typically characterized as means-tested, effectively serve as substitutes for Medicare and Social Security for older immigrants, many of whom do not qualify for those old-age entitlements because of abbreviated domestic work histories. Differences by nativity in usage of means-tested programs at working ages are partially mechanical in nature; recent arrivals do not qualify for many of these programs initially. But program eligibility cannot explain the differences between the second and third-plus generations during working ages, so these differences are likely instead driven primarily by more favorable socioeconomic status among the second generation.

*Net fiscal impacts* by age and immigrant status are depicted for 1995 and 2012 in Figures 8-17 and 8-18, respectively. These graphs reveal that the second generation has had a more positive net fiscal impact at almost every age than either the first or third-plus generation. Individuals of the



**FIGURE 8-17** Net fiscal impact in 1995, per capita, including all levels of government, by age and immigrant generation.

SOURCE: Data are from the 1994-1996 March Current Population Surveys, normalized to program totals.

second generation contribute considerably more in taxes during working ages than either of the other generational groups, although they also absorb slightly more benefits at younger ages. By contrast, at least prior to around age 60, the net fiscal impact of the first generation has been consistently less positive than the other two generational groups.

Although the third-plus generation contributes more in taxes during working ages than does the first generation, and thus its net fiscal impact during working ages is more positive than immigrants, this pattern switches in retirement. In old age, the third-plus generation has consistently been more expensive to government on a per capita basis than either the first or second generation, despite the higher per capita utilization of means-tested benefits in old age by the first generation.

Net fiscal impacts at the state and local level by age and immigrant status (not shown, but based on the data sources cited for the figures)

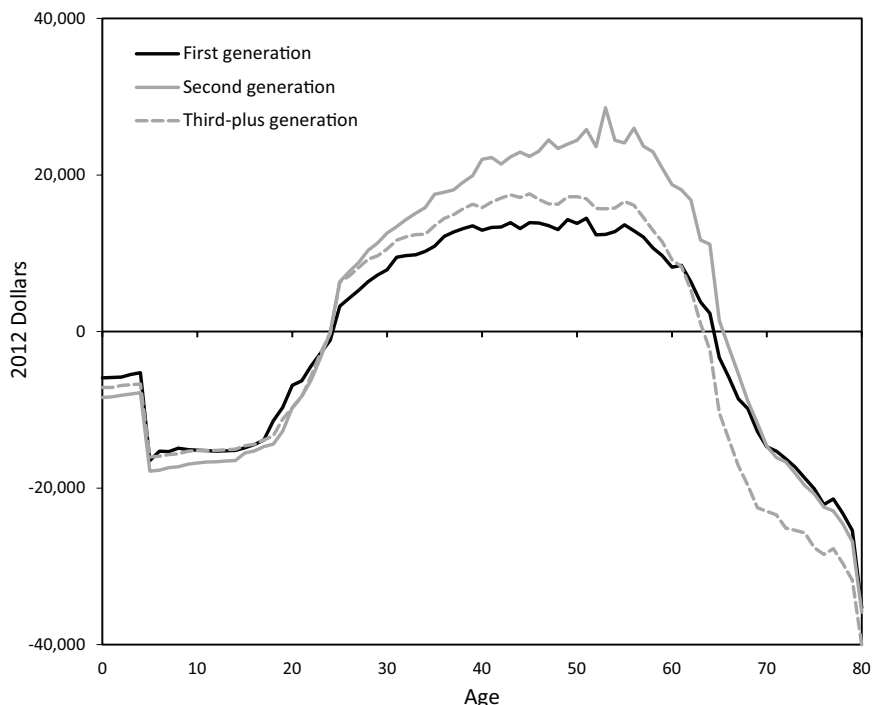


FIGURE 8-18 Net fiscal impact in 2012, per capita, including all levels of government, by age and immigrant generation.

SOURCE: Data are from the 2011-2013 March Current Population Surveys, normalized to program totals.

broadly conform to these patterns, with larger deficits at younger ages for the first and second generations, followed by larger surpluses at working and older ages. Federal net fiscal impacts (not shown in the figures) are also similar in pattern to those illustrated but, because transfers to the young are primarily channeled through states and localities, the negative net impacts for individuals positioned in the pre-working ages of the life cycle are smaller (in absolute terms).

### Annual Fiscal Impacts by Immigrant Status

In this section, the panel considers the fiscal impact of different population subgroups defined by immigrant status. The total net fiscal impact of a subpopulation depends on its age structure, depicted earlier in this chapter, and on the age profile of net fiscal impacts, as presented in the preceding

discussion. Because U.S. subpopulations identified by nativity are so different in size, their aggregate fiscal impacts also vary widely in magnitude, which complicates comparisons. Thus, it is useful to recast the net fiscal impacts of immigrant groups either on an average (per capita) basis, as was done above, or as the ratio of government receipts contributed (taxes paid) to expenditures on benefits received, as was done by Dustmann and Frattini (2014). When this “fiscal ratio” is greater than unity, the group pays more in taxes than it receives in benefits, whereas a fiscal ratio less than unity indicates that the group pays less in taxes than it receives in benefits. However, this approach does not control for a group’s age structure, which we have seen is quite important—this is a topic to which we return later in the chapter when we examine the fiscal impact of the foreign born and native born controlling for their characteristics.

We begin by examining the annual fiscal impacts of all age cohorts of three broadly defined generational groups as identifiable in our pooled March CPS data samples for the 1994-2013 analysis period. Our definitions of first, second, and third-plus generation are unchanged from earlier in the chapter. However, for the analysis here—and in contrast to the analyses up to this point in the chapter—we have created groupings that are partially mixed. The first group consists of first generation immigrants (the foreign-born) ages 18 and older, *plus their dependent first and second generation children* (see Box 8-2). The second group consists of independent individuals (those ages 18 and older) in the second generation *plus their dependents (who typically are third generation by nativity status)*. The third group consists of independent individuals in the third and higher generations, *plus their dependents*.<sup>12</sup> The rationale, in this exercise, of grouping dependents with their parents is so that the full fiscal impact created by an immigrant or a native born person (which includes their family members, or other dependents) can be estimated for a given year; without the presence of the independent persons to which they are linked, dependents could not factor into the fiscal picture. Later in this chapter, we analyze the impact of these same three generational groups on fiscal impact, adjusting for age, education, and other characteristics; this analytical framework allows for assessment of the net fiscal impacts, at the federal and state levels of government, of these first and second-generation groups separately, in comparison to the third-plus generation group, specified as the reference group.

Associating dependent children with an independent individual responsible for them entails assigning the children to the generational group

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<sup>12</sup>For all three groups, dependent children—identified at the individual level in the CPS data—are included in their parents’ generational group. Therefore, some second generation individuals (i.e., dependent children) appear in the first generation group; the same logic applies to the membership of the groups labeled “second generation” and “third-plus generation.”

defined by the nativity status of that individual (typically their parent(s)); this is done for the dependent children of independent individuals in each of the generational groups. Dependent children are assigned to the parental generation if one or more independent parents are present in the household.<sup>13</sup> If there are no parents in the household, then the generational group of the oldest co-resident independent relative is assigned. Defining generational groups in this way attributes the costs to governments associated with dependent children—most notably, in terms of magnitude, public expenditures on education—to the generation of a parent or relative responsible for raising the child.<sup>14</sup> Of course, dependent children of any population subgroup, foreign-born or native-born, generate a net fiscal cost (they are not yet working and they need to be educated). As expected, and as shown quantitatively below, the fiscal costs associated with dependent children to some extent counterbalance the positive fiscal impact for the first generation (see Figures 8-17 and 8-18) created by the fact that, during the analysis period at hand, this generation was disproportionately of working age and hence paying taxes (refer to Figures 8-1, 8-2, 8-11, and 8-12).

Table 8-1 reports subpopulation size, per capita fiscal impacts, and fiscal ratios for these groups of independent-persons-plus-dependents at different levels of government in 1994 and 2013. The cost of public goods is assigned on an *average cost* basis as specified in scenario 1 (defined in Box 8-1, above); results for the alternative scenarios are discussed later in the chapter. Recall, that these may be considered relatively conservative estimates because the addition to government costs associated with public goods (like national defense) created by one addition (or a small number of additions) to the population may be close to zero. The calculations reveal that the population group consisting of immigrants (first generation) and their dependent children has a lower fiscal ratio than either of the groups composed of native-born independent individuals and their dependent children. The overall fiscal ratio of the second generation (independents plus their dependents) is more similar to that of the first generation group in 1994 but more similar to that of the third-plus generation group in 2013; we provide an explanation of this observation below. A major source of the overall differential between the first generation group and the two native-born groups originates from the considerably lower fiscal ratio at the state

<sup>13</sup>It is possible for a dependent to be associated with independent persons in different generational groups (e.g., a child of a first generation mother and third-plus generation father). In order to sort the group of children with this ambiguous generational identification, a randomly selected half are assigned to the mother's generation and the other half to the father's. This is done instead of splitting the flows of each child to avoid ending up with a group-weighted per capita flow that does not match the total population per capita flow.

<sup>14</sup>In those few cases where there was no independent co-resident parent, the associated independent person was usually a grandparent.

**TABLE 8-1** Net Per Capita Fiscal Impacts, in 1994 and 2013, of First Generation Immigrants and Their Dependents, Second Generation Native-born Independent Individuals and Their Dependents, and Third-plus Generation Native-born Independent Individuals and Their Dependents, by Level of Government

	1st Generation and Their Dependents (population: 29.9 million)			2nd Generation and Their Dependents (population: 20.8 million)			3rd Generation and Their Dependents (population: 212.2 million)		
	Outlays	Receipts	Receipts/ Outlays	Outlays	Receipts	Receipts/ Outlays	Outlays	Receipts	Receipts/ Outlays
<b>1994</b>									
Federal	8,408	5,769	0.686	13,853	8,022	0.579	8,996	7,734	0.860
State and Local	5,104	3,215	0.630	4,601	4,659	1.013	4,621	3,901	0.844
Total	13,511	8,985	0.665	18,454	12,681	0.687	13,617	11,635	0.854
	1st Generation and Their Dependents (population: 55.5 million)			2nd Generation and Their Dependents (population: 23.3 million)			3rd Generation and Their Dependents (population: 237.3 million)		
	Outlays	Receipts	Receipts/ Outlays	Outlays	Receipts	Receipts/ Outlays	Outlays	Receipts	Receipts/ Outlays
<b>2013</b>									
Federal	9,767	7,117	0.729	13,093	9,495	0.725	12,050	9,473	0.786
State and Local	6,141	3,769	0.614	6,101	5,039	0.826	5,844	4,813	0.823
Total	15,908	10,887	0.684	19,194	14,534	0.757	17,894	14,286	0.798

NOTE: "Dependent" and "independent" are defined as in Box 8-2. Outlays include all government spending, including interest payments and public goods, which are allocated equally to all groups on a per capita basis. Population counts are the sum of independents and dependents in each group. Data are from March Current Population Surveys. Estimates are for scenario 1 (see Box 8-1) which assigns the average costs of public goods to new immigrants, as opposed to the marginal cost, and includes interest payments.

and local level of government for the former group whose adult members, during the analysis period, were more likely to be of parenting age and who also experienced higher fertility rates.<sup>15</sup> These differentials in state- and local-level fiscal impacts largely reflect differences in the groups' total cost of educating dependents.<sup>16</sup> In the longer term, these dependent children will grow up to be contributing adults and thus these educational expenditures may reasonably be considered an investment in their future productivity.

The first generation group displays a lower fiscal ratio than does the third-plus generation group at the federal level. This fiscal effect, and a portion of the fiscal difference at the state and local level as well, reflects the lower average education levels—and, related to these, the lower wages and employment—of the first generation independent persons compared to the second and third-plus generation independents in the other two groups (see the cross-sectional results presented in the previous section). Interestingly, the fiscal ratios in Table 8-1 at the federal level actually rose for the first and second generation groups between 1994 and 2013, whereas they fell for the third-plus generation group. To some extent, this may reflect new programs and expansion of others (such as EITC) that some native-born individuals are eligible for and some immigrants are not, as well as declining fertility rates among immigrants. But the trend is mainly driven by the aging of the native-born population. In 2013, the third-plus generation (as defined by nativity status) population included a higher proportion of elderly persons than it did in 1994. The second generation population, in contrast, had a relatively much higher concentration of individuals in the fiscally expensive retirement age groups in 1994 than in 2013 (refer back to Figures 8-1 and 8-2). As described in Chapter 2, at the beginning of the 1994-2013 analysis period, a large portion of the second generation consisted of the children of earlier heavy waves of immigrants who arrived around the beginning of the 20th century and were thus an older group. The elderly are, of course, associated with increased federal outlays. By 2013, more of the children of newer waves had reached adulthood and were thus more heavily represented among second-generation independent persons, reducing the average age of this group.

Readers will note that the figures in Table 8-1 translate into quite large fiscal shortfalls *overall*—the fiscal ratio (Receipts/Outlays columns) falls well below 1.0 for *all three* groups. For 2013, the 55.5 million first generation independent persons and their dependents, 23.3 million second

<sup>15</sup>We stress again that these are averages; the foreign-born are an extremely heterogeneous group along many of the dimensions being considered here, and consequently they are also heterogeneous in their per capita fiscal ratios.

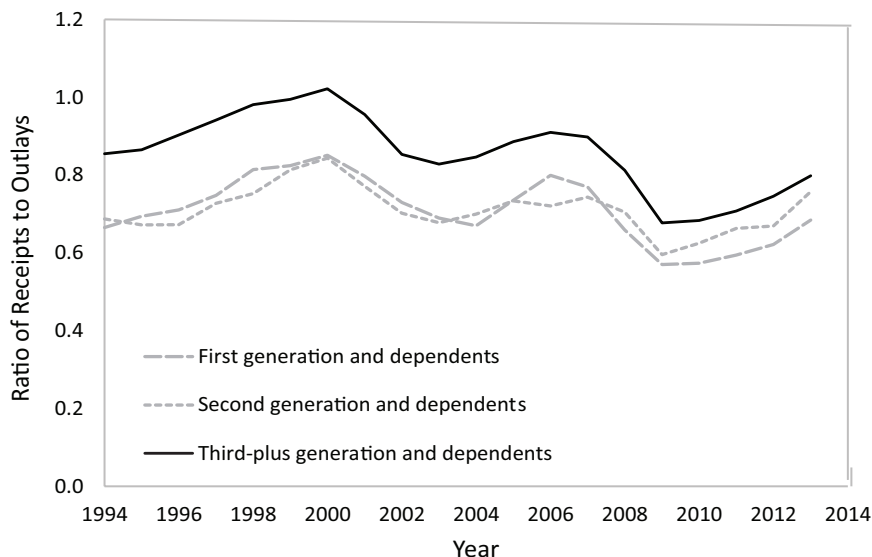
<sup>16</sup>The per-child cost of education in our estimates is the same for all groups. The differences referenced here are due to differences in the average number of dependent children per independent individual in the three groups.

generation independent persons and their dependents, and 237.3 million third-plus generation independent persons and their dependents yield a total fiscal shortfall of \$1,243 billion. The total fiscal burden is \$279 billion for the first generation group (average outlays of \$15,908 minus average receipts of \$10,887, multiplied by 55.5 million individuals), \$109 billion for the second generation group (average outlays of \$19,194 minus average receipts of \$14,534, multiplied by 23.3 million individuals), and \$856 billion for the third-plus generation group (average outlays of \$17,894 minus average receipts of \$14,286, multiplied by 237.3 million individuals). Under this scenario, the first generation group accounts for 17.6 percent of the population but 22.4 percent of the total deficit. In contrast, the second generation group accounts for just a slightly higher share of the total deficit (8.7%) than its share in the population (7.4%). The third-plus generation group, with 75 percent of the population, accounts for just 68.9 percent of the deficit. Note that, while the fiscal shortfall for the average person in the first-generation group (i.e., the per capita shortfall) was larger than was the per capita shortfall in either native-born group, the shortfall for the latter two groups would have been larger without the presence of the first generation group. This is because federal expenditures on public goods such as national defense (assigned to immigrants on an average cost basis in scenario 1) would have to be divided among a smaller population of second and third-plus generation individuals.

Cross-checking against alternative sources indicates that, although the overall deficit numbers in Table 8-1 are large, the totals (for all three groups) are consistent with actual deficit figures in the National Income and Product Accounts for the federal and state-and-local level budgets combined: The difference in 2013 between total taxes and contributions for government social programs (\$4,332 billion) and total expenditures including all public goods (\$5,584 billion) was \$1,252 billion. The consolidated deficit for that year was actually smaller by about \$400 billion because, on the revenue side, government asset income (which immigrants are assumed to not pay) and current transfer receipts (mainly fines and fees) are not included in the panel's estimates.

To elaborate on trends in net fiscal impacts since *The New Americans* (National Research Council, 1997), Figure 8-19 plots the total fiscal ratio of receipts to outlays for the three generation groups, as defined for Table 8-1, across all years since 1994. Crucially, there is no correction made here (or in Table 8-1) for different age distributions across groups and over time. The net impact of each group grows more positive during the boom of the late 1990s before falling and rising during and after the mild recession of 2001, then falling and rising again during and after the financial crisis of 2008





**FIGURE 8-19** Ratio of receipts to outlays for first generation and native-born groups as defined for Table 8-1.

**SOURCE:** Data are from the 1994-2013 March Current Population Surveys normalized to program totals. Estimation is for scenario 1, which assigns the average costs of public goods including interest payments to both immigrants and the native-born.

which precipitated the Great Recession.<sup>17</sup> In addition to this cyclical variation, a noteworthy pattern here is the reduction in the gap between the first and second generation groups, represented by the two dashed lines, and the third-plus generation group, shown by the solid line. As the Table 8-1 data show, the second generation group in particular becomes quite similar by 2014 to the third-plus generation group.

While all part of the same story, the data representations in Figure 8-19 and in Table 8-1 reveal determinants of the fiscal impact of generational groups that are quite distinct from those previously captured in Figures 8-5 through 8-12. The earlier figures show the second generation (including independents and dependents of that generation together) exceeding even the third-plus generation along a number of dimensions, including years of education, per capita wage and salary income, and per capita taxes paid.

<sup>17</sup>The recession of the early 2000s began in March 2001 and ended in November 2001; the Great Recession began in December 2007 and ended in June 2009. These dates are determined by the National Bureau of Economic Research's Business Cycle Dating Committee at <http://www.nber.org/cycles/cyclesmain.html> [November 2016].

However, the data in the earlier figures provide estimates of these variables for individuals in each generation group *by age*, regardless of calendar year. In contrast, Figure 8-19 and Table 8-1 present data in a way that prominently reflects group demographic composition and changes therein over the 1994-2013 analysis period. In Table 8-1 and Figure 8-19, the comparatively low fiscal ratios for the second generation group, relative to the third-plus generation group, in the beginning of the period reflect the former group's comparatively high concentration in the (fiscally expensive) retirement ages of the distribution at that time. The closing gap in fiscal ratios between the generations shown in Figure 8-19 reflects the more recent profile, which is now younger for the second generation, as well as the relative aging of the third-plus generation into retirement. In other words, the second generation has been gaining something of a demographic advantage from a fiscal perspective as the composition of its adult population has become younger while the third-plus generation has been growing older. The aging of the third-plus generation has also reduced the gap in fiscal ratios between the first and third-plus generation groups. The elderly are associated with increased federal outlays regardless of nativity status. The higher number of dependent children among the first generation, and the associated fiscal costs particularly at the state and local levels, offset this reduction of the fiscal ratio gap between the first generation group and the native-born groups somewhat. This interpretation of the relative fiscal impacts of the first, second, and third-plus generation groups (as defined for Table 8-1) becomes clearer below, where fiscal impacts of these groups are compared while controlling for age and other characteristics. The more favorable fiscal situation of the second generation group compared to the first is germane to a consideration of the impact of immigration since many people think of this group as part of the immigrant stock.

We now turn to the set of alternative scenarios defined in Box 8-1 above (following the approach of Dustmann and Frattini, 2014). Table 8-2 repeats the estimates for 2013 under scenario 1 (from the lower panel of Table 8-1) and then presents the estimates for 2013 under the seven alternative scenarios. For each scenario, the changes from scenario 1 are applied to all members of a defined generational group. For example, in the subset of scenarios developed to assess changes in magnitude when assuming a marginal-cost allocation of public goods (scenarios 5 through 8), instead of the average cost allocation in scenarios 1 through 4, the marginal-cost allocation is applied to all members of the first generation group, including the second-generation dependent children of first generation independents. In these scenarios, the total net fiscal impact of the first generation group becomes much more favorable, as it must mathematically. In each of scenarios 5 through 8, the total fiscal ratio for the first generation group now exceeds that for the second and third-plus generation groups. The main

**TABLE 8-2** Net per Capita Fiscal Impacts of First, Second, and Third-plus Generation Groups (each with dependents) in 2013, by Scenario and Level of Government

		1st Generation and Their Dependents (population: 55.5 million)			
		2013	Outlays	Receipts	Receipts/ Outlays
Scenario 1	Immigrants pay average cost of public goods	Federal	9,767	7,117	0.729
		State and Local	6,141	3,769	0.614
		Total	15,908	10,887	0.684
Scenario 2	Scenario 1, but interest costs are excluded	Federal	8,466	7,117	0.841
		State and Local	5,517	3,769	0.683
		Total	13,983	10,887	0.779
Scenario 3	Scenario 1 but immigrants' sales taxes are 80%	Federal	9,767	7,051	0.722
		State and Local	6,141	3,475	0.566
		Total	15,908	10,525	0.662
Scenario 4	Scenario 1, but new immigrants' corporate taxes are zero	Federal	9,767	6,937	0.710
		State and Local	6,141	3,769	0.614
		Total	15,908	10,706	0.673
Scenario 5	Immigrants pay marginal cost of public goods	Federal	6,154	7,117	1.157
		State and Local	5,515	3,769	0.683
		Total	11,669	10,887	0.933
Scenario 6	Scenario 5, but interest costs are excluded	Federal	6,154	7,117	1.157
		State and Local	5,515	3,769	0.683
		Total	11,669	10,887	0.933
Scenario 7	Scenario 5, but immigrants' sales taxes are 80%	Federal	6,154	7,051	1.146
		State and Local	5,515	3,475	0.630
		Total	11,669	10,525	0.902
Scenario 8	Scenario 5, but new immigrants' corporate taxes are zero	Federal	6,154	6,937	1.127
		State and Local	5,515	3,769	0.683
		Total	11,669	10,706	0.917

NOTE: See note to Table 8-1. The eight estimation scenarios are described in Box 8-1 and accompanying text.

2nd Generation and Their Dependents (population: 23.3 million)			3rd-plus Generation and Their Dependents (population: 237.3 million)		
Outlays	Receipts	Receipts/ Outlays	Outlays	Receipts	Receipts/ Outlays
13,093	9,495	0.725	12,050	9,473	0.786
6,101	5,039	0.826	5,844	4,813	0.823
19,194	14,534	0.757	17,894	14,286	0.798
11,792	9,495	0.805	10,749	9,473	0.881
5,477	5,039	0.920	5,220	4,813	0.922
17,269	14,534	0.842	15,970	14,286	0.895
13,093	9,507	0.726	12,050	9,486	0.787
6,101	5,092	0.835	5,844	4,868	0.833
19,194	14,600	0.761	17,894	14,353	0.802
13,093	9,536	0.728	12,050	9,513	0.790
6,101	5,039	0.826	5,844	4,813	0.823
19,194	14,576	0.759	17,894	14,326	0.801
13,734	9,495	0.691	12,691	9,473	0.746
6,216	5,039	0.811	5,959	4,813	0.808
19,949	14,534	0.729	18,650	14,286	0.766
12,208	9,495	0.778	11,165	9,473	0.848
5,478	5,039	0.920	5,221	4,813	0.922
17,686	14,534	0.822	16,386	14,286	0.872
13,734	9,507	0.692	12,691	9,486	0.747
6,216	5,092	0.819	5,959	4,868	0.817
19,949	14,600	0.732	18,650	14,353	0.770
13,734	9,536	0.694	12,691	9,513	0.750
6,216	5,039	0.811	5,959	4,813	0.808
19,949	14,576	0.731	18,650	14,326	0.768

source of the shift occurs at the federal level, where the cost of public goods such as national defense accrues. However, even the fiscal ratio for the state and local levels rises somewhat for the first generation group, since there are some public costs that accrue to governments at the subnational level.

Looking in greater detail at the results in Table 8-2, one can see that, as alluded to above, the biggest difference across the scenarios is in the way that government spending on public goods like national defense and interest payments is allocated. Government expenditures on public goods are large at the federal level in the United States, with defense outlays totaling \$617.1 billion and federal interest payments adding \$417.4 billion in 2013. Subsidies and grants accounted for another \$125 billion. All together, these categories of federal spending accounted for almost one-third of total federal spending as reflected in the National Income and Product Accounts that year. Therefore, allocating none of the costs associated with these public goods to individuals in the first generation group, as is done under the marginal-cost scenarios, changes the fiscal ratio estimates significantly. Fiscal ratios for the first generation group rise and become considerably closer to one relative to scenarios 1 through 4, in which the average cost of public goods is allocated to the full population, including immigrants and their dependents. Most but not all of the increase in the fiscal ratio for the first generation group is linked to the change in the public goods assumption that results in vastly reduced federal spending on this group—from an estimate of \$9,767 per individual in scenario 1 down to \$6,154 in scenario 5—a reduction that raises the ratio of receipts to outlays from 0.729 to 1.157. State and local spending on the first generation group also falls modestly for the marginal-cost scenarios, due to a reduction in some interest payments and subsidies treated as public goods, but not by as much as the federal spending declines. In scenario 5, the total fiscal burden for the first generation group drops to \$43.4 billion while it rises to \$126.2 billion for the second generation group and to \$1,035.6 billion for the third-plus generation group. In this scenario, the first generation group accounts for less than 4 percent of the total deficit (while still of course accounting for 17.6 percent of the sample population). As noted, government expenditures on public goods account for almost one-third of total federal spending. Therefore, the average-cost versus marginal-cost assumption—along with other assumptions having to do with how expenditures are allocated—are quantitatively extremely important in driving estimates of the fiscal impact different generational groups.

Thus, while for scenarios 1 through 4 the first generation group displays slightly lower but quite comparable fiscal ratios at the federal level, compared with the third-plus generation group,<sup>18</sup> the ordering reverses

<sup>18</sup>Here as elsewhere in the report, “third-plus generation” is a short-hand way of referring to everyone who is neither an immigrant nor a U.S-born child of at least one immigrant parent.

and a wide gulf between the first and third-plus generation groups appears for scenarios 5 through 8. If it is assumed that spending on defense and other pure public goods does not increase with a marginal immigrant and instead these costs are assigned to the native-born only (both second and third-plus generation groups), the first generation group appears in a much more favorable light relative to the scenarios in which its members share in the cost of pure public goods equally. Comparisons between scenarios 1-4 and 5-8 also reveal a small compounding effect associated with the native-born groups (the second and third-plus generation groups). A consequence of the zero marginal-cost allocation assumption is that these two groups appear more costly because they bear an increased burden in public goods costs—costs that in these scenarios are spread across a population that is decreased by the number of foreign-born and their dependent children.

Results also vary somewhat across the other scenarios in Table 8-2, but these differences pale in comparison with the choice between assuming marginal cost versus average cost for public goods. Excluding interest payments—that is, when only the fiscal flows generated by current, but not by past, program usage as reflected in deficits, debt, and interest payments are counted—as is done for scenarios 2 and 6, outlays for all generational groups are naturally reduced and the ratios of receipts to outlays rise.<sup>19</sup> The differences between immigrants and the native-born groups remain qualitatively unchanged, but the first generation comes closer to “breaking even”—and actually does so at the federal fiscal level in scenario 6—compared with scenarios 1 and 5.

Scenarios 3, 4, 7, and 8 adjust the first generation’s contributions of tax receipts downward either in terms of their sales and excise taxes (3 and 7) or corporate income taxes (4 and 8). The motivation for these scenarios is the recognition that some immigrants, especially new arrivals, send remittances to their country of origin rather than spending all of their discretionary income in the receiving country and that they may not yet own taxable U.S. capital assets. The scenarios that test these factors (described in Box 8-1 above) reduce tax receipts somewhat but do not drastically alter the picture. These reductions in tax receipts do little to change the relative value of the immigrant and native-born generational groups (as defined for Tables 8-1 and 8-2) in terms of their net fiscal impacts.

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<sup>19</sup>This calculation is meant mainly to serve as a sensitivity test and not to be realistic. However, debt was incurred by generations now dead as well, and an additional living person (native-born or immigrant) should not be counted as having contributed to that portion of the debt.

### Comparing Immigrants to Natives, Controlling for Characteristics

While informative, the per capita net fiscal impacts and fiscal ratios reported thus far are associated with broad groups of individuals of widely varying age and other characteristics. As the age profiles examined earlier have suggested, the pattern, during this report's period of analysis, of net fiscal impacts of the first generation group is shaped in large part by their disproportionate presence in the working-age and family-rearing portion of the life cycle. In the aggregate, they have made large positive contributions in the form of tax revenues (although still paying less per capita in taxes than their second and third generation counterparts—refer to Figure 8-11), while also drawing on public expenditures at higher than average rates, mainly due to the presence of more children in their households relative to native-born groups. As today's immigrants age, as their children continue to move out of parental households, and as they themselves eventually move into retirement, their fiscal profiles will change substantially.

To more fully grasp the fiscal impact of immigrants and to better understand the reasons for the observed differences, it is useful to adjust for characteristics that tend to vary substantially with nativity. Chief among the key factors are age and education, as well as the calendar year—more specifically, the point in the business cycle, which clearly shifts the fiscal contributions of all population groups, as revealed by Figure 8-19 above. In Table 8-3, the panel explores how net fiscal impacts correlate with immigrant-native differences in characteristics in our pooled March CPS samples spanning 1994 to 2013. As in the analysis that produced the Table 8-1 results, the first group consists of first generation (foreign-born) immigrants, plus their *dependent* children. The second group consists of independent individuals in the second generation and their dependents. In both these groups, as in the analysis for Table 8-1, the potentially productive parents (from a tax contribution perspective) are paired with their children who generate net public costs, predominantly in the form of education. Those in the third-plus generation group include all U.S.-born persons ages 18 and older who do not have a foreign-born parent, plus their dependent children. Unlike the presentation of results in Tables 8-1 and 8-2, in Table 8-3 the estimated fiscal impacts for the third-plus generation group are used as the reference group (or benchmark) for a regression analysis of how the first and second generation groups differ from this benchmark. The unit of analysis in the regression analysis is the *independent* individual; therefore, unlike in the previous analysis, the total number of observations is less than the population (which also includes dependents). Here, the flow of program outlays and tax receipts for dependents are rolled up into the flows of the independent person to which they are linked in the data. This was an explicit decision for this type of analysis because the goal is to

**TABLE 8-3** Regression Analysis of Net Fiscal Impacts (in dollars per person) of First and Second Generation Groups Relative to Third-plus Generation Group, 1994-2013, by Level of Government

	Federal	State and Local	Total
<b>Model 1 – Controls: none; N = 2,537,262</b>			
1st generation group	–1309 ***	–1940 ***	–3249 ***
2nd generation group	–4380 ***	535 ***	–3845 ***
3rd+ gen ref. group	—	—	—
R <sup>2</sup>	0.002	0.003	0.002
<b>Model 2 – Controls: age group, year, sex; N = 2,537,262</b>			
1st generation group	–2181 ***	–1748 ***	–3929 ***
2nd generation group	1927 ***	738 ***	2665 ***
3rd+ gen ref. group	—	—	—
R <sup>2</sup>	0.223	0.040	0.152
<b>Model 3 – Controls: age group, year, sex, education; N = 2,537,262</b>			
1st generation group	–803 ***	–1303 ***	–2107 ***
2nd generation group	1109 ***	554 ***	1663 ***
3rd+ gen ref. group	—	—	—
R <sup>2</sup>	0.296	0.062	0.220
<b>Model 4 – Controls: age group, year, sex, education, race/ethnicity; N = 2,537,262</b>			
1st generation group	34	–649 ***	–615 ***
2nd generation group	1233 ***	825 ***	2058 ***
3rd+ gen ref. group	—	—	—
R <sup>2</sup>	0.303	0.067	0.229
<b>Model 5 – Controls: age group, year, sex, education, race/ethnicity, number of dependents; N = 2,537,262</b>			
1st generation group	277 ***	–382 ***	–104
2nd generation group	981 ***	547 ***	1529 ***
3rd+ gen ref. group	—	—	—
R <sup>2</sup>	0.344	0.285	0.338

NOTES: The first, second, and third-plus generation groups (as defined at the beginning of the chapter) consist only of independent individuals. Dependents are not included (hence *N* is smaller than in the earlier analysis), but their fiscal flows are rolled into those of the independent person(s) to whom they are linked. Each column presents coefficients and significance levels from a separate ordinary least squares regression of net fiscal impact at the given level of government (dependent variable) on indicators for generational group assignment (*x* variables) and indicators for the other characteristics listed as controls.

*continued*



TABLE 8-3 Continued

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The control variables added for each successive model are highlighted in boldface.

Coefficients indicate the marginal per capita effects, in 2012 dollars, that are associated with that generational group relative to the third-plus generation group. A positive coefficient indicates an improvement, or savings to the government level, in net fiscal impact; a negative coefficient indicates a budgetary reduction for that government level. Thus, a coefficient on “First generation group” equal to 100 implies that, compared to an average member of the third-plus generation group, an average member of the first generation group has a net fiscal impact that is \$100 more positive for that level of government.

Age groups are measured in 5-year intervals.

Asterisks denote statistical significance at the 1 percent (\*\*\*), 5 percent (\*\*), or 10 percent (\*) levels. Estimation applies to scenario 1, which assigns the average costs of public goods, including interest payments, to each member of the first generation group (as well as to each member of the second and third-plus generation groups).

A note on the  $R^2$  values: In an alternative specification in which (1) the fiscal costs and benefits linked to first generation and second generation individuals were grouped independently of age, and (2) dependents were not assigned to a parent’s generational group, the  $R^2$  values were quite a bit larger. This change in the strength of correlation occurs because, when the fiscal impacts of dependent children are not included in the generational group of the parent or responsible adult to which the children are assigned, the age variable explains a lot more of the total variation in fiscal impacts compared to the specification used for this table, in which age as a driving factor of fiscal impact is diluted by grouping dependents with the independent individual to which they are assigned.

estimate the impact on the regressions of the independent person’s characteristics—most notably age, education, and number of dependents.

Table 8-3 shows the results of a number of regression analyses designed to understand how differences in characteristics between independent individuals in the first and second generation groups (as defined above) and the third-plus generation reference group contribute to group differences in per capita fiscal impact. In each model, the net fiscal impact in 2012 dollars is regressed on generational group status (i.e., first generation or second generation group, with the third-plus generation group constituting the reference category). Model 1 includes no additional explanatory variables and hence shows unadjusted difference in net fiscal impacts for the first and second generation groups relative to the third-plus generation group. Each subsequent model incorporates an additional control variable or group of control variables. A comparison of the coefficients of each subsequent model with the preceding one illuminates the role of the control variable(s) that have been added in explaining the differences between the first and second generation groups and the third-plus generation group. For this very large pooled sample, the regression coefficients are nearly always statistically significant (the level of statistical significance is shown by the asterisks after a coefficient, as explained in the table note).

Model 1 represents the differences in net fiscal impacts of the first and second generation groups relative to the third-plus generation group when differences in characteristics of the two groups are not taken into account. Hence, it corresponds to what would be obtained if one simply examined the averages for each generational group. Using Model 1, the first generation group's net fiscal impact is \$1,309 less per independent person<sup>20</sup> at the federal level and \$1,940 less at the state and local level, for a total of \$3,249 less in net fiscal impact per person overall. The corresponding figures for the second generation group are \$4,380 less per person at the federal level and \$535 more per person at the state and local level, totaling \$3,845 less overall.

The extremely large deficit for the second generation group at the federal level in Model 1 might seem surprising in light of Figures 8-17 and 8-18, which indicate that second generation *individuals* generally have a more positive fiscal picture than third-plus generation *individuals* at most adult ages (and have a similar picture in the remaining ages). Although the comparison in those two figures do not take the fiscal impact of dependents into account, it seems unlikely that their inclusion would shift the picture so drastically. The major factor accounting for the large shift is the differences in the age distribution between second and third-plus generation individuals, as illustrated in Figures 8-1 (for 1994) and 8-2 (for 2012). One can think of the regression sample (spanning 1994-2013) as representing a mixture of the two age distributions for each immigrant generation. When the panel examined the data for this period, we found that, among adults, the second generation was concentrated among both younger individuals, prior to their peak earning years, and (especially) older individuals. The latter are most expensive for the federal government due to their lower taxes paid and higher benefits received, but not very expensive for the states (because they still pay property taxes). This makes the fiscal impact of second generation independent persons at the federal level quite negative relative to the third-plus generation group. Results for Model 2, discussed below, confirm this reasoning.

Model 2 adds basic controls for age, calendar year, and sex. The results control for differences in age profiles for the first generation and second generation groups relative to the third-plus generation group, as well as any differences in sex composition or in the year of the CPS source survey. Under Model 2, a negative coefficient on the generation group indicator means that, adjusted for age, sex of group members, and survey year, the net fiscal impact is more negative for a member of that group than for a

<sup>20</sup>The *N*s in Table 8-3 are the numbers of independent individuals present in each generational group; the flows of dependents are rolled into those of the independent individuals in the household to which they are linked.

member of the third-plus generation (reference) group. Of course a positive coefficient indicates the opposite. Comparing the results for Model 2 with those for Model 1 shows that, controlling for age and the other two variables, the fiscal impact of the first generation group remains quite negative relative to the third-plus generation group.

The impact of differences in the age distribution of the first and third-plus generation groups is seen by comparing the coefficients for the first generation group in Model 2 to those obtained in Model 1. The fiscal impact of the first generation group becomes *more negative* (by \$872 per person) at the federal level, while it becomes *less negative* (by \$192 per person) at the state and local level. These results indicate that the age distribution of the first generation group has a (fairly substantial) positive effect on that group's fiscal contribution relative to the reference group at the federal level (because the first generation group's contribution becomes more negative when one controls for age) but a (smaller) negative effect on the first generation group's fiscal contribution at the state and local level. These findings reflect the concentration of first generation immigrants in the working ages, which increases their federal tax contributions, but it also means they have more dependent children, on average, which increases state and local expenditures on education. Taking both the federal and state and local contributions together, controlling for age (as well as sex and year) results in the total fiscal impact of the first generation group becoming *more negative* (by \$680 per person), meaning that the immigrant age distribution has a positive effect on that group's fiscal contribution overall. This analysis highlights that the first generation group's concentration in the working ages has a favorable effect on their fiscal impact at the federal level and overall but a (relatively small) negative effect on their fiscal impact at the state level.

In contrast to the findings for the first generation group, the Model 2 results for the second generation show positive net fiscal impacts for this group at both the federal and state and local levels, totaling \$2,665 per person. These results indicate that the large negative effect for this group at the federal level in Model 1 were entirely due to the group's age distribution (concentration at both younger and, especially, older ages), since controlling for age (as well as sex and year) transforms this to a sizable positive effect (\$1,927 per person).

Models 3, 4, and 5 sequentially add controls for education, race/ethnicity, and number of dependents, respectively. Again, for brevity, we report regression coefficients only for first and second generation groups; these coefficients can be interpreted as 2012 dollars of net fiscal impact associated with being a member of the first or second generation group, compared to being a member of the third-plus generation group. In Model 3, where educational differences are taken into account, the negative net fiscal

impacts of the first generation become considerably attenuated. Relative to Model 2, the negative impact on federal finances falls by more than half, from  $-\$2,181$  to  $-\$803$  per person, while the effect on state and local finances falls by about a quarter, from  $-\$1,748$  to  $-\$1,303$ . In Model 4, which controls for differences in racial/ethnic identity, the net fiscal impact of the first generation moves even closer to that of the third-plus generation: essentially on par at the federal level ( $+\$34$ ) and becoming much less negative (just  $-\$615$  per person, down from  $-\$2,107$ ) in total. One rationale behind this specification is that, in the United States, race and ethnicity may proxy for differences in treatment and opportunity. Along with age and education, race and ethnicity can affect earnings opportunities and may also be related to labor force participation.

The trend of converging fiscal impacts across immigrant generation groups continues in Model 5. Controlling for number of dependents—where a higher average number of dependents, relative to the third-plus generation, creates more-negative fiscal impacts for immigrants in a raw analysis—lowers the total net fiscal impact for the first generation to a statistically insignificant negative difference ( $-\$104$  per person) from the third-plus generation. In short, this comparison of first generation and third-plus generation individuals of similar age and race/ethnicity, with similar education levels and in households with similar numbers of dependents, yields estimated net fiscal impacts that are quite similar.

For the second generation, the net fiscal impacts in Models 3 through 5 continue to be more positive than the third-plus generation reference group across the board, as they were for Model 2. Taking Models 2 through 5 together, the second generation's positive impact on federal finances is somewhat large, varying between  $\$981$  per person in Model 5 and  $\$1,927$  per person in Model 2. Impacts on state and local finances are also positive but smaller, ranging from  $\$547$  per person in Model 5 to  $\$825$  per person in Model 4.

It is perhaps not surprising that controlling for education and race/ethnicity eliminates a significant portion of the immigrant penalty (that is, the negative net fiscal impact relative to the third-plus generation) for the first generation. At working ages, net fiscal impact is likely to rise with human capital and skills relevant for U.S. labor markets. These results also reflect that members of the second generation (like all nativity groups) are costly primarily during their youth (when this analysis links them as dependents with a foreign-born parent). Once they are independent adults, this analysis shows their net fiscal impact to be quite positive, even when they are linked with their own dependents.

When a similar regression analysis is applied to the seven alternative scenarios, one finds that assigning public goods only to the native-born (i.e., the second and third-plus generations) strongly increases the estimated

net fiscal impact of being an immigrant (member of the first generation). Because that scenario assigns the cost of public goods to the second and third-plus generations alike, coefficients on the second generation indicator do not change.

### Historical Fiscal Impacts: Summary

While cross-sectional estimates of fiscal impacts are limited in a number of ways, 20 years of CPS data on first and second generation immigrants provide numerous insights about the fiscal impacts of immigrants.

**Immigrant and native-born populations have historically been and remain very different in terms of their age structure.** For the 1994-2013 analysis period, first generation individuals were heavily concentrated in working ages, reflecting growth in immigration leading up to this period and the typical young age profile of immigrants. During the early years of this period, the second generation had comparatively higher shares of elderly, especially, and also young individuals relative to the first and third-plus generations<sup>21</sup> because members of that generation tended to be the children of earlier large waves of immigrants. By 2012, the second generation was mainly concentrated at young ages, including younger adults, reflecting substantial recent growth in the immigrant cohort of working-age adults with children, coupled with mortality of the second generation children of earlier waves of immigrants.

Considering the fiscal contributions of individuals (without including dependent children), cross-sectional data from 1994-2013 reveal that, **at any given age, adult members of the second generation typically have had a more positive net fiscal impact for all government levels combined than either first or third-plus generation adults.** Reflecting their slightly higher educational achievement, as well as their higher wages and salaries (at a given age), the second generation contributes more in taxes on a per capita basis during working ages than either the first or second generations.

The same cross-sectional data reveal that **the net fiscal impact of individuals in the first generation—at least prior to around age 60—has been consistently less positive than the fiscal impact of the second and third-plus generations.** Relative to the other two generation groups, the foreign-born contribute less in taxes during working ages, and thus their net positive impact during working ages is lower. However, **this pattern switches in retirement, when the third-plus generation has consistently been more expensive to government on a per capita basis than either the first or second**

<sup>21</sup>As noted earlier, throughout this report, “third-plus generation” refers to individuals of the third generation *and higher*—that is, all U.S. residents who are neither immigrants nor children of at least one foreign-born parent.

**generation.** This change reflects the greater use of Social Security benefits by the third-plus generation.

A different perspective on these same data results from examining the annual per capita fiscal impact for the 1994-2013 analysis period in a way that reflects the age structure of each generational group as it actually existed in each year. For this analysis, the panel defined generational groups such that each group includes the dependent children of independent individuals. For these generational groups, the net fiscal costs of dependent children are included as part of the calculations of outlays, receipts, and net fiscal impacts for the group. For purposes of per capita comparisons, the population of each group is counted as the number of independent individuals of that generation plus the number of their dependent children. **Assigning the per capita fiscal cost of public goods such as national defense on an average cost basis, the first generation group (independent individuals plus their dependents), has a lower fiscal ratio (taxes paid divided by expenditures on benefits received) than the second and third-plus generation groups.** This outcome, portrayed in Table 8-1 and Figure 8-19, is driven by two factors: (1) The lower average education level of the first generation group translates into lower incomes and, in turn, lower tax payments. (2) Higher per capita costs (notably those for public education of dependent children) are generated by the first generation group at the state and local levels because this group has, on average, more dependent children per adult member. A partially offsetting positive fiscal impact is that, during the analysis period, first generation adults were disproportionately of working ages and paying taxes. The regression results, which adjust for characteristics—most notably age and education—corroborate this interpretation (refer to Table 8-3). Controlling for age, the results indicate that, during the analysis period, the concentration of independent individuals of the first generation group in the working ages created a favorable effect on the group's fiscal impact at the federal level and overall but a (relatively small) negative effect on its fiscal impact at the state and local level. The regression results further indicate that **the more negative fiscal impact of the first generation group (relative to the two native-born groups) overall is accounted for by (1) lower average educational levels for first-generation adults and (2) their larger average number of dependents.**

Looking again at every year over the 1994-2013 period of historical analysis, and again assigning the per capita fiscal cost of public goods such as national defense on an *average cost* basis to all generational groups, **the fiscal ratio for the second generation group (including dependent children) is only modestly more positive than the fiscal ratio for the first generation group over the period as a whole, and it is well below that of the third-plus generation group.** The fiscal ratio (shown in Table 8-1 and Figure 8-19) is similar to that of the first generation group in 1994, but becomes more like

that of the third-plus generation group by 2013 (although it remains lower). This result may at first blush be somewhat surprising, given the data represented in Figures 8-8 through 8-12, which show that the second generation (as individuals without dependent children) exceeded the third-plus generation along a number of dimensions, including years of education, per capita wage and salary income, and per capita taxes paid. Remember, however, that data underlying those earlier figures were arranged to estimate these variables for individuals in each group *at a given age*. The comparatively low fiscal ratios for the second generation group relative to the third-plus generation group reflects, in the beginning of the 1994-2013 period, the former group's comparatively high concentration in the (fiscally expensive) retirement portion of the age distribution. The closing gap in fiscal ratios between the generational groups (shown in Figure 8-19) reflects the more recent age profile, characterized by a younger second generation of independent individuals and an aging of the third-plus generation's independent individuals to a higher concentration in retirement. The regression analysis in Table 8-3 indicates that **the larger negative effect for the second generation group (compared to the third-plus generation group) during the analysis period was due entirely to the two groups' age distributions.**

Because the federal government has typically run budget deficits during the analysis period, the three generational groups mostly have negative net fiscal impacts between 1994 and 2013. However, **both federal and total fiscal ratios increased for both the first and second generation groups between 1994 and 2013, while they generally decreased for the third-plus generation group.** The net fiscal impact of each generational group grew more positive during the boom of the late 1990s before falling and rising during the 2000s and again during and after the financial crisis of 2008.

Data for the analysis period (shown in Table 8-1) translate into large fiscal shortfalls overall: The total fiscal ratio falls well below 1 for *all three generational groups*. Cross-checking against alternative sources indicates that, although these numbers are large, they are consistent with deficit figures in the National Income and Product Accounts for the federal and state-and-local budgets combined. For 2013, the data in Table 8-1 show the 55.5 million people in the first generation group (independent individuals and their dependents), 23.3 million people in the second generation group (independent individuals and their dependents), and 237.3 million people in the third-plus generation group (independent individuals and their dependents) as producing a total (federal plus state-and-local) fiscal shortfall of \$1,243 billion. The total fiscal burden was \$279 billion for the first generation group (average outlays of \$15,908 minus average receipts of \$10,887, multiplied by 55.5 million individuals), \$109 billion for the second generation group (average outlays of \$19,194 minus average receipts of \$14,534, multiplied by 23.3 million individuals), and \$856 billion for the third-plus



generation group (average outlays of \$17,894 minus average receipts of \$14,286, multiplied by 237.3 million individuals). Under the assumptions of this analysis, the first generation group accounted for 17.6 percent of the population and 22.4 percent of the total deficit. In contrast, the second generation group accounted for a slightly higher share of the total deficit (8.7%) than its share in the population (7.4%). While the fiscal shortfall for the average person in the first generation was larger than it was for the average person in either the second or third-plus generation groups, the shortfall for the latter two groups would have been larger without the addition of the first generation group because federal expenditures on public goods such as national defense (assigned to all members of that group on an average cost basis under scenario 1) would have to be divided among a smaller population. Some argue that this is an important benefit of immigration.

Government expenditures on public goods are large, accounting for almost one third of total federal spending. Therefore, the average versus marginal cost assumption is quantitatively extremely important in driving fiscal impact estimates. **When a marginal cost allocation of public goods is assumed, instead of the average cost allocation, the total net fiscal impact of the first generation group becomes much lower than that of the two native-born groups.** In this case, the first generation group accounts for less than 4 percent of the total deficit (while still of course accounting for 17.6 percent of the sample population).

**Fiscal impacts vary strongly by level of government.** States and localities bear the burden of funding educational benefits enjoyed by immigrant and native children. The federal government transfers relatively little to individuals at young and working ages but collects much tax revenue from working-age immigrant and native-born workers. Inequality between levels of government in the fiscal gains or losses associated with immigration appears to have widened since 1994.

### 8.3 FORECASTS OF LIFETIME NET FISCAL IMPACTS

#### Introduction

Section 8.2 addressed the question of the fiscal impacts of immigration using current and historical data to describe what has happened in recent decades. One insight from that analysis was that recent fiscal impacts reflect the youthful age structure of immigrants currently and thus may not be indicative of their future fiscal impacts. In this section, the future fiscal impacts of immigrants are explored using a different type of analysis. Among the focal questions are the following: If an immigrant arrives in the United States and pays taxes and receives benefits over his or her lifetime, will that additional immigrant contribute positively to public finances on



net, by paying more in taxes than that individual receives in benefits? Or will this additional immigrant represent a net fiscal cost by absorbing more in benefits than is paid in taxes? What about the children of that immigrant who may create public costs today but who may work and pay taxes in future years? In short, what is the magnitude of the total new net contribution or burden associated with the immigrant's arrival, including the net contribution or burden of the immigrant's descendants?

This research question is best examined with a dynamic, forward-looking calculation, as was done in the pioneering work on future fiscal impacts in *The New Americans* (National Research Council, 1997) almost two decades ago. The calculation assumes the condition and subsequent life experience of an "average" new immigrant, based on the characteristics of recent arrivals to the United States, and follows the immigrant into the future, adding up tax payments and benefit receipts each year from the time of entry, weighted by the probability of the immigrant's survival and probability of remaining in the country. The model also forecasts the immigrant's fertility, and the taxes paid and benefits absorbed by children of the immigrant. The fiscal impacts of descendants are also weighted by probabilities of their survival and of remaining in the United States.

Including the impact of an immigrant's descendants over a significant part of the life cycle is an important feature of the forward-looking calculation presented here, and one that distinguishes it from other types of fiscal impact models. Descendants of immigrants often only enter the debate as children, because this is often where they appear in cross-sectional data providing a point-in-time snapshot; currently the average immigrant household is a net fiscal burden in part because young children of immigrants, like the children of natives, receive public education. Following the descendants of immigrants further into the future, when they become workers and start paying taxes, provides a more complete measure of fiscal impact because it includes not just the cost of their education but also the delayed fiscal benefits of that education: larger tax payments made possible by the investment in human capital that education represents.

As discussed in Chapter 7, forward-looking analyses require assumptions about future developments which are inherently uncertain. The panel has addressed these uncertainties by examining the robustness of results across an array of reasonable alternative scenarios. The CBO and the Social Security Trustees<sup>22</sup> routinely conduct analyses of long-term fiscal

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<sup>22</sup>Technically, there are three boards of trustees overseeing the Social Security and Medicare programs: the Board of Old Age and Survivors Insurance Trust Fund and the Disability Trust Fund, the Board of the Hospital Insurance Trust Fund (Medicare Part A), and the Board of the Supplemental Medical Insurance Trust Fund (Medicare Part B). Currently the same six trustees serve on all three boards. For further information, see [www.ssa.gov/history/reports/trustees/historypt.html](http://www.ssa.gov/history/reports/trustees/historypt.html) [November 2016].

developments that many observers view as meaningful, given that they supply “official” projections, even though they are subject to high levels of uncertainty. Those analyses similarly evaluate robustness by comparing results across a range of scenarios. We adopt a broadly similar research design and array of assumptions about central rates of growth and change in future periods.

### Methodology

Broadly speaking, the budget concepts and methodologies adopted here were developed in *The New Americans* (National Research Council, 1997). Age profiles are estimated for a comprehensive list of government tax and spending programs at federal and at state and local levels. The approach is partial equilibrium in nature, which means that an additional new immigrant is assumed to pay taxes and receive benefits in the same way that an average immigrant with similar characteristics does along whichever temporal baseline is being projected. Any economic or policy responses to the presence of the new immigrant are not taken into consideration. In addition, we do not model macroeconomic responses to debt or tax rates beyond those that are implicit in CBO forecasts, which we describe in detail below. For small changes, these assumptions are likely to be reasonable, but one should not extrapolate these results to forecast the effects of large numbers of new immigrants.

As discussed in the preceding section presenting the historical analysis, a key question is how to account for government spending on public goods. There are several such categories, but by far the largest is federal defense spending which today amounts to around \$2,000 per person annually. Pure public goods, by definition, do not trigger additional costs with additional users—at least as long as the number of additional users is small—so the marginal impact should be zero; and it almost certainly would be if one were to take literally the scenario of only one additional immigrant. But it may be incorrect to assume that a large increase in the population, whether obtained through immigration or some other channel, would exert no pressure on the defense budget and similar programs. In order to examine the robustness of our results, we include alternative assignments for federal defense spending and other categories of public goods in a subset of scenarios. As in *The New Americans* (National Research Council, 1997), we also model several categories of spending as *congestible goods*—that is, goods subject to congestion with more users, and thus a cost that rises with population increase. Public administration expenses, police and fire-fighting services, and incarceration are all treated as congestible costs. In the forward-looking calculation, we omit interest payments, the vast majority of which are federal interest payments on the

debt. Interest payments are conceptually distinct from spending on public goods; they represent the current costs of servicing past deficits that have accumulated into the current debt.<sup>23</sup> New immigrants are responsible only for the net fiscal impacts incurred once they have arrived in the country, which are fully accounted for by their annual tax contributions less their absorption of benefits (which, in some scenarios, includes public goods such as defense).

The panel's methodology measures the future net fiscal impact of an immigrant and descendants over a 75-year time horizon, with dollar amounts discounted to present values using standard techniques. Because of the length of human life spans, fiscal planning is best informed by projections that cover a long time horizon. For example, the Social Security Trustees annually project program balances over a 75-year horizon, which is long enough for most current workers to age out of the system. Since 2003, the Social Security Trustees have also presented supplemental forecasts of actuarial balance over an infinite future, and *The New Americans* (National Research Council, 1997) projected net fiscal impacts of immigrants over an infinite horizon. For this report, the panel adopted the 75-year horizon of the Trustees, which also appears in supplemental long-term forecasts prepared by the CBO (Congressional Budget Office, 2014a), which it calls its extended baseline or "projections for the very long term."

One of the challenges of projecting taxes and spending either in aggregate or associated with an (incremental) immigrant and descendants over such a long time horizon is that the forecasts may or may not imply fiscal sustainability. Assumed fiscal sustainability may specify a national debt that does not grow without limit, interest rates that do not explode in reaction to ballooning debt levels, and gross domestic product (GDP) that continues to grow with population and productivity rather than shrink in response to a debt crisis. The authors of *The New Americans* (National Research Council, 1997) opted to forecast a future in which the ratio of debt to GDP was stabilized at 80 percent through a balanced mix of tax increases and benefit reductions. In their forecast, the ratio first hits that target level in 2016 (National Research Council, 1997, p. 324).<sup>24</sup> For this report, the panel opted instead to generate three forecast scenarios; these are based on:

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<sup>23</sup>In other words, it does not make sense to treat interest payments on past debt as a benefit received by a new immigrant. Also, it goes directly counter to the argument that, as far as interest payments are concerned, immigrants are a positive to government budgets as they help spread the cost of debt payments across more individuals.

<sup>24</sup>Economists believe the ratio of publicly held debt to GDP is a good measure of fiscal sustainability. To date, the 80 percent threshold has only been crossed by the U.S. government during World War II.

- **CBO's Long-term Budget Outlook** that assumes no changes in current legislation—that is, all current laws persist and no new laws are passed to change taxes or spending in the future. Current entitlement programs continue to pay benefits exactly as they do now, and provisions of newer legislation such as the Affordable Care Act grow as currently legislated. Tax breaks enacted after the Great Recession expire as legislated and, as wages rise, more taxpayers end up in higher tax brackets. This scenario does not prevent the federal debt from growing to what many economists believe are levels that would severely impact economic growth and the continuing ability to borrow money. To implement the CBO's long-term budget projections for this exercise, age profiles of the various taxes and benefit programs are adjusted to match aggregate program amounts as projected by the CBO.
- **CBO's Long-term Budget Outlook with Deficit Reduction** that takes the previous scenario as its starting point but, beginning in 2015, narrows the gap between federal spending and revenue using a 50/50 split between tax increases and spending cuts. Adjustments narrow annual deficits to half of their projected levels after 20 years, which is about the time the debt-to-GDP ratio is projected to exceed 90 percent in the CBO current legislation scenario. This represents approximately \$3 trillion in projected deficit reduction from 2015 to 2035: raising taxes 3 percent higher than their projected level by 2035 and lowering noninterest spending by 3 percent compared to its projected 2035 level.
- **No Budget Adjustments**, our “business-as-usual” forecast in which spending and taxes simply increase by the rate of productivity growth, which is set at 1 percent, and stay fixed relative to one another across all age profiles.<sup>25</sup> An annual rate of 1 percent was chosen in order to parallel the basic assumptions in other long-run studies (such as those used in budget projections by CBO and in *The New Americans*). In this scenario, in contrast to the CBO projections, no currently legislated or expected fiscal changes, such as an increase in Social Security retirement ages or a sunseting of tax cuts, are included. The only change over time is that the current

<sup>25</sup>State and local governments are typically subject to balanced-budget amendments, and we generally adhere to the methodologies described in the 1997 report to forecast these budgets. In the two CBO-based scenarios that we present here, we assume both per capita spending and revenue grow at the same rate as per capita GDP in CBO's long-term budget outlook. This holds the state-funded portion of Medicaid to a lower growth rate than is assumed for the program as a whole, and it is assumed that the federal government assumes any excess costs. In the third scenario of “business-as-usual” or “no budget adjustments,” we let spending and revenue grow at the central rate of 1 percent.

observed age schedule of tax payments and benefit receipts for each group shifts up at the same rate every year.

Table 8-4 shows the resulting average annual inflation-adjusted growth rates over the projection interval in several categories of per capita flows across these three scenarios. Except for the category of other discretionary spending, growth in per capita expenditures is higher in the two CBO scenarios than in the third scenario. Federal revenue grows at a 2.2 percent rate on average in CBO's deficit reduction scenario, 0.2 percentage points faster than federal spending.

Under the no budget adjustments scenario (third bullet above), annual growth in per capita expenditure flows is set at 1 percent per year for each age group; any deviation from that in Table 8-4, column 3, is driven by change in the population age structure. For example, even though growth in spending on each age group's Medicare benefits is set at 1 percent, the overall growth rate is higher (1.7%) because the population is shifting disproportionately into ages that receive the benefit. The CBO projections build in this effect as well, but also reflect that medical costs have been rising at a faster rate than economic growth, a trend that is assumed to continue (in the CBO scenarios). In the CBO-based scenarios, the Student Health Insurance Plan and the Affordable Insurance Exchanges experience

**TABLE 8-4** Average Annual Growth in per Capita Flows, 2012-2087  
(under three scenarios, in percentage)

	CBO Long-Term Budget Outlook	CBO with Deficit Reduction	No Budget Adjustments
Federal Spending (excluding public goods)	2.1	2.0	1.5
OASDI	2.1	2.0	1.7
Medicare	2.9	2.8	1.9
Medicaid, SHIP, Exchanges	3.0	2.9	1.4
Other Discretionary	0.7	0.6	1.0
Federal Revenue	2.1	2.2	1.0
Income Tax	2.4	2.5	1.0
FICA	1.6	1.7	1.0
Corporate Taxes	1.8	1.9	1.0
Other Taxes	2.5	2.6	1.2

NOTES: CBO = Congressional Budget Office, OASDI = Old-Age, Survivors, and Disability Insurance Program, SHIP = Student Health Insurance Plan, and FICA = Federal Insurance Contributions Act.

additional growth pressure from legislative changes that will continue to go into effect as a result of the Affordable Care Act. On the revenue side, the CBO projections show faster growth than the panel's No Budget Adjustments scenario mainly due to tax bracket creep: the fact that, in the absence of legislative changes to the tax code, assumed economic growth will place an increasing proportion of the population in higher tax brackets.

The goal of this exercise is to assess the net present value (NPV) to governments of an additional immigrant and that immigrant's descendants; to do so, a real rate of interest (or discount rate) must be specified in order to value future dollars in terms of current dollars. The Social Security Trustees have assumed rates of 2.4, 2.9, and 3.4 percent for their three alternatives in two consecutive actuarial reports (Board of Trustees, Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds, 2014, 2015). CBO assumed a 2.5 percent interest rate in its 2014 long-range forecasts and 2.3 percent in its 2015 forecasts (Congressional Budget Office, 2014, 2015).<sup>26</sup> The panel chose a relatively conservative real discount rate of 3 percent. A higher value will reduce the impact of future cash flows on the bottom line. Because many fiscal impacts of immigration, such as the education of the children of immigrants, are more negative in the short run than they are in the long run, a rate that is too high would tend to understate the net fiscal benefit or overstate the net fiscal cost of an immigrant.

### The Future in Context

As discussed earlier in this chapter, both immigrants and government budgets have changed since the mid-1990s, when a similar exercise was undertaken for *The New Americans* (National Research Council, 1997). Each of these changes, discussed below, has implications for the estimation of the fiscal impacts of immigrants.

#### *Who Is the New Immigrant?*

Each immigrant arrives with a particular set of characteristics that contribute to shaping that person's experience once he or she arrives in the United States. The panel focuses on the characteristics that are most important in determining the amount of taxes an immigrant pays and the cost of benefits they receive: their education, age at arrival in the country, and time since arrival. Education is correlated with current and future earnings,

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<sup>26</sup>On the other hand, reflecting a particular risk profile for investment in the context of the economic impacts of climate change, William Nordhaus's DICE-2013R model uses discount rates in the 4.25-5 percent range, depending on whether they are being applied to a near-term or long-term scenario (Nordhaus and Sztorc, 2013, p. 38).

and thus tax payments. Earnings also determine eligibility for means-tested benefits and for government benefits that are pegged to past earnings, like Social Security or unemployment benefits. Age determines where a person is in his or her career and where that individual falls on the inverse-U-shaped earnings curve. Time since arrival is important in three ways: Time in the country is one eligibility rule for several important government benefit programs; it correlates with extent of assimilation, which among other things allows immigrants to at least partially close earnings gaps with their native-born counterparts; and, in combination with a fixed current date, it delineates different arrival cohorts with different characteristics that are correlated with tax and benefit flows.

In order to accurately portray how the fiscal impacts of today's immigrants might have changed since the research for *The New Americans* (National Research Council, 1997) was done in the 1990s, it is necessary to identify the characteristics of recent arrivals and of the overall population of immigrants in the country. Starting with education, today's immigrants have more people in the highest educational groups and fewer in the lowest. This trend is revealed in Table 8-5, which shows educational distributions based on five categories of attainment: less than a high school diploma, high school diploma, some college but no degree, bachelor's degree, and additional years of schooling or degrees beyond a bachelor's (which includes attainment of advanced degrees). For comparative purposes, distributions for the second and third-plus generations<sup>27</sup> are also shown for the current period and for the mid-1990s. Because these generations differ significantly in their age structure, the table shows age-standardized measures of these educational distributions. These figures are obtained by applying age-specific education rates for different groups to a single profile of the population by age—in this case, that of first generation immigrants.

As shown previously, immigrants have had systematically different levels of education depending on their arrival cohort. To explore this, the panel varied the first generation group examined in the top and bottom panels of Table 8-5. The top panel focuses on immigrants who have arrived within the past 5 years, while the bottom panel includes the entire stock of immigrants. Both the top and bottom panels define the second and third-plus generations the same way but, because each panel standardizes to the age structure of its first generation, the educational achievement rates change slightly for both of the native-born generations. Averages for each nativity group within the five tiers of the educational

<sup>27</sup>The generations used for Table 8-5 include all individuals by their nativity status only, whether they are independent or dependent individuals; dependent children of a different nativity status are not included in their parents' generation.

TABLE 8-5 Educational Distribution by Generation, Ages 25 and Older, for Recent (past 5 years) and All Immigrants

	First Generation			Second Generation			Third-plus Generation		
	1994-1996	2011-2013	Change	1994-1996	2011-2013	Change	1994-1996	2011-2013	Change
First generation includes recent immigrants only:									
<HS	0.36	0.21	-0.14	0.11	0.08	-0.03	0.12	0.07	-0.05
HS	0.21	0.23	0.02	0.28	0.24	-0.04	0.35	0.29	-0.06
SomCol	0.13	0.14	0.01	0.30	0.29	0.01	0.28	0.30	0.02
BA	0.19	0.25	0.06	0.21	0.25	0.05	0.18	0.23	0.05
>BA	0.11	0.16	0.05	0.10	0.14	0.04	0.07	0.10	0.04
Total	1.00	1.00		1.00	1.00		1.00	1.00	
Average (numbering education groups 1-5):	2.50	2.93	0.43	2.92	3.14	0.22	2.71	3.00	0.29
First generation includes all immigrants:									
<HS	0.38	0.26	-0.12	0.13	0.08	-0.05	0.16	0.08	-0.07
HS	0.22	0.24	0.02	0.30	0.25	-0.05	0.35	0.31	-0.05
SomCol	0.11	0.14	0.02	0.27	0.28	0.00	0.26	0.29	0.03
BA	0.18	0.23	0.04	0.18	0.23	0.05	0.16	0.21	0.05
>BA	0.10	0.14	0.03	0.11	0.16	0.05	0.07	0.11	0.04
Total	1.00	1.00		1.00	1.00		1.00	1.00	
Average (numbering education groups 1-5):	2.41	2.74	0.33	2.83	3.13	0.30	2.64	2.95	0.31

NOTE: The distributions for the second and third-plus generation groups are standardized on the age distribution of the first generation group. Figures in the bottom rows of each panel show the weighted average of the fraction of individuals at each education level multiplied by the number assigned to the level, from 1 to 5.

SOURCE: All data used in the analysis are from the 1994-1996 and 2011-2013 March Current Population Survey.



distribution are shown along the bottom of each panel. These statistics show that, in both the earlier and current periods, the second generation achieves the highest educational attainment, the third-plus generation is next highest, and the first generation has the lowest educational attainment of the three.

While all nativity groups have improved their educational distributions, the first generation has caught up over time. Recent first generation immigrants, depicted in the first two data columns of the top panel, show the most improvement. Their share in the lowest educational group has shrunk the most (the less than high school, <HS, group decreased by 14 percentage points) and their share in the highest educational group has grown the most (the group with additional years beyond a bachelor's degree, >BA, increased by 5 percentage points). Among all first generation immigrants, shown in the first two data columns of the lower panel, the trends are similar but, as one might expect, the educational distribution is shifted toward less attainment because earlier immigrants have less education than recent immigrants. In both panels, the first generation has experienced the largest decrease in the lowest education group and the largest overall increase in average education level.

Increasing education levels over time motivated the panel to adopt a methodological change in its approach to longitudinal forecasting compared to previous work. In *The New Americans*, the analysis used only three education categories: less than high school, high school diploma, and more than a high school diploma. No distinction was drawn between the top three categories in Table 8-5 because there were fewer immigrants in those categories. This may have been a reasonable strategy given the distribution of education among immigrants at the time, but as Table 8-5 reveals, it has become increasingly insufficient for analysis.

Changing educational attainment patterns means that, relative to the 1990s, a greater percentage of recent immigrants are found in higher earning and higher taxpaying groups. Likewise, a smaller percentage are now found in the lower socioeconomic groups that—once citizenship or sufficient time in the country has been established—may qualify for means-tested benefit programs such as the EITC, Medicaid, and Supplemental Security Income (SSI). Table 8-5 also shows that, over this time period, the educational attainment of the second generation did not improve as much as it did for the first generation. But the second generation remains the most educated of these three groups.

Recent immigrants are slightly older on average than were those who arrived during the 1990s, following the global trend of population aging affecting both the United States and almost every sending country in the

world.<sup>28</sup> Age is important because, as shown earlier in this chapter, young and old age groups are net recipients of government benefit programs, paid for by those in the working ages who are net taxpayers. Figure 8-18 shows this pattern, in which the first crossover occurs around age 25, when young adults begin working and paying enough taxes to break even; the second crossover occurs around age 65, when most U.S. residents become eligible for Social Security and Medicare. Using these cross-over points as age boundaries, Table 8-6 shows the age distributions for immigrants and natives now and in the mid-1990s. First generation immigrants today are even more heavily concentrated at working ages, as defined by the 25-65 age group, than they were at the time of *The New Americans* (National Research Council, 1997). This is true regardless of whether one looks at recent immigrants, shown in the leftmost columns, or all first generation immigrants as shown in the middle columns. Although current workers get older and eventually become expensive retirees, one would still expect these developments to be good for government finances in the short term. By contrast, the age structure for natives has not changed much during this period. The Baby Boom generation, located solidly within the working-age group in the early period, has begun to move into retirement and will continue to do so. The bottom line most relevant here is that these shifts in age structure imply that an average new immigrant today is more likely to be of working age than 20 years ago. Thus, our forecast of that average new immigrant's lifetime net fiscal impact begins at a more advantageous age for government budgets now compared with when the estimates for *The New Americans* (National Research Council, 1997) were created.

The sections that follow assess the fiscal impacts that are associated with an “average immigrant”—a weighted average of flows based on the distribution of age and education either of recent arrivals or of all current first-generation immigrants, depending on the scenario.

### *What Does a New Immigrant Currently Pay in Taxes and Receive in Benefits?*

In Section 8.2, age profiles of taxes and benefits, based on estimates of program utilization from the March CPS, were presented; essentially the same age profiles are used for the analysis here. However, age profiles across nativity groups are further disaggregated by time in the United States and across the five educational categories described above.<sup>29</sup> A key challenge

<sup>28</sup>The older age and higher education of recent immigrants also reflect the decline of Mexican immigration. This is not thought to be a fluke of the recession but reflects long-term changes in Mexico, especially the decline in fertility that once produced surplus workers needing to find work outside their native country.

<sup>29</sup>To summarize briefly, these age profiles are schedules of tax and benefit flows per person by age, which are estimated from 3-year pooled CPS samples, smoothed using standard

of this forward-looking exercise involves dealing with incomplete educational histories for the young. For a large share of individuals ages 0-24 years, their schooling has not yet been completed. In these cases, we assign to these individuals' records the educational group of a parent, which we impute if no parents are co-resident in the household.

We begin by examining age profiles of wage and salary earnings, which are shown in Figure 8-20. For each generation group, there is a clear gradient in earnings according to education, and it is broadly similar within each group. One visible difference is that immigrants of the first generation earn less of a premium for a high school degree compared to the other two groups. The first generation earns less at each level of education except the highest and, even within that group, immigrants at older working ages still suffer an earnings penalty compared to other workers. Relative to the third-plus generation and higher, whose average earnings rise with age until roughly age 60, immigrants with more than a bachelor's degree exhibit a more steeply rising earnings profile and an inflection point near age 45.

Net fiscal impacts by age across education and nativity are shown in Figure 8-21. Children and young adults under age 25 with incomplete education are coded as having the education level of a parent (or average if there are two). Net fiscal impacts begin negative at young ages for all groups before dropping sharply at the age of public elementary schooling. Trajectories by education crisscross one another after high school, when the net impact of individuals who drop out of or stop at high school rises more than those who continue in school. Fiscal impacts then tend to rise strongly and become positive during working years, increasing until the mid-50s for the second and third-plus generation but plateauing earlier among the first generation. Another aspect here that mirrors patterns in earnings is the compression of the educational gradient within the first generation.

Gradients across educational groups within the third-plus generation

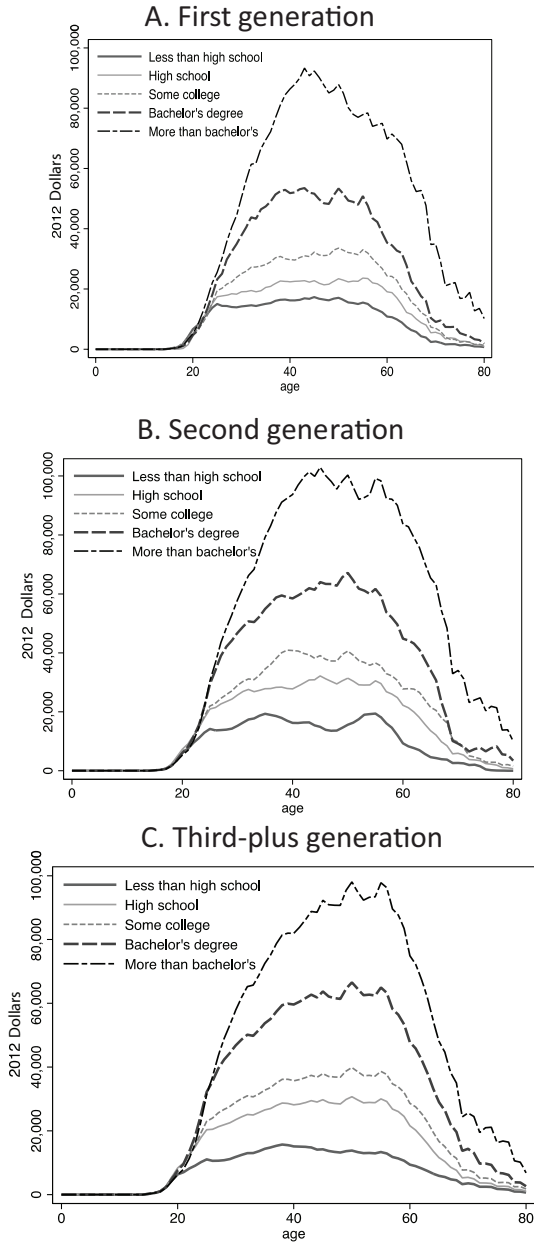
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techniques, and augmented with other data sources where necessary. We estimate age profiles across five groups identified by nativity and time in the United States: foreign-born arriving within the last 0-4 years, foreign-born arriving within the last 5-9 years, foreign-born arriving more than 10 years ago, native-born of foreign-born parents, and native-born of native-born parents. We also measure these age profiles separately across the five education groups as described in the previous section. For each program, we adjust CPS data for under- or over-reporting by scaling each record by a single multiplicative factor for that particular program so that the accumulated aggregate over all records matches program totals from the National Income and Product Accounts (NIPA). In our calculations, 2012 is the first year of the forecast; for *The New Americans* (National Research Council, 1997) work, it was an average of 1994 and 1995. When the CPS has individual-level indicators of a particular flow, those are used. Where only a household-level flow is available, we make assumptions about the allocation of the household amount to individuals within the household that mirror the methodologies in *The New Americans*. A full discussion of the panel's methodologies is in the Annex (Section 8.4) at the end of this chapter.

TABLE 8-6 Age Distribution by Generation, 1994-1996 and 2011-2013

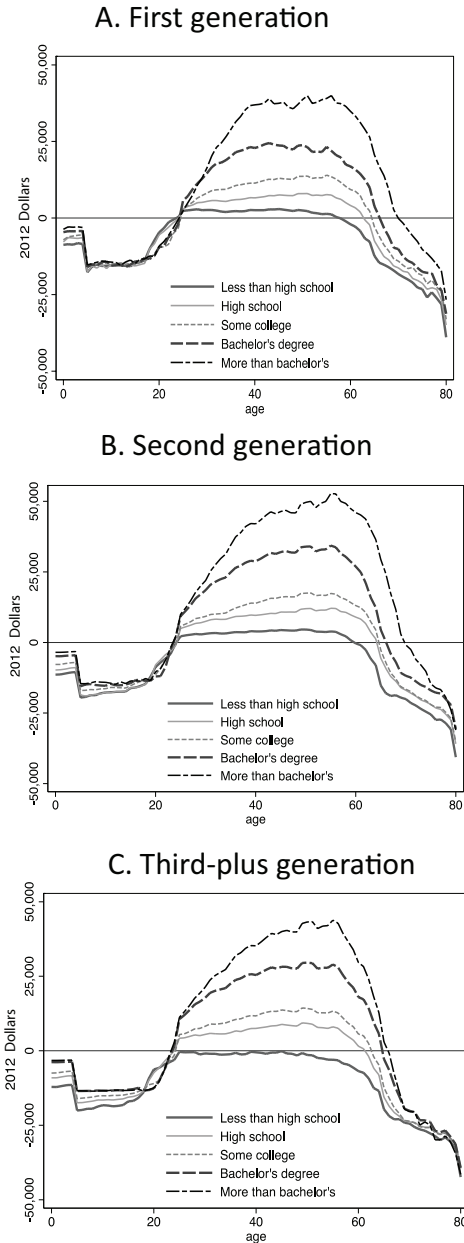
Age Group	<u>Recent First Generation</u>			<u>All First Generation</u>			<u>All Native Born</u>		
	1994-1996	2011-2013	Change	1994-1996	2011-2013	Change	1994-1996	2011-2013	Change
0-24	0.47	0.37	-0.10	0.22	0.14	-0.08	0.38	0.36	-0.01
25-64	0.50	0.59	0.09	0.66	0.73	0.07	0.50	0.50	0.00
65+	0.03	0.04	0.01	0.12	0.13	0.01	0.12	0.14	0.01
Total	1.00	1.00		1.00	1.00		1.00	1.00	

NOTE: "Recent First Generation" means individual arrived in the United States within 0-4 years of the analysis period  
SOURCE: All data used in the analysis are from the 1994-1996 and 2011-2013 March Current Population Survey.



**FIGURE 8-20** Age profiles of wage and salary income by educational attainment and nativity, 2012.

SOURCE: Data from the 2011-2013 March Current Population Surveys.



**FIGURE 8-21** Age profiles of net fiscal impact by educational attainment and nativity, 2012.

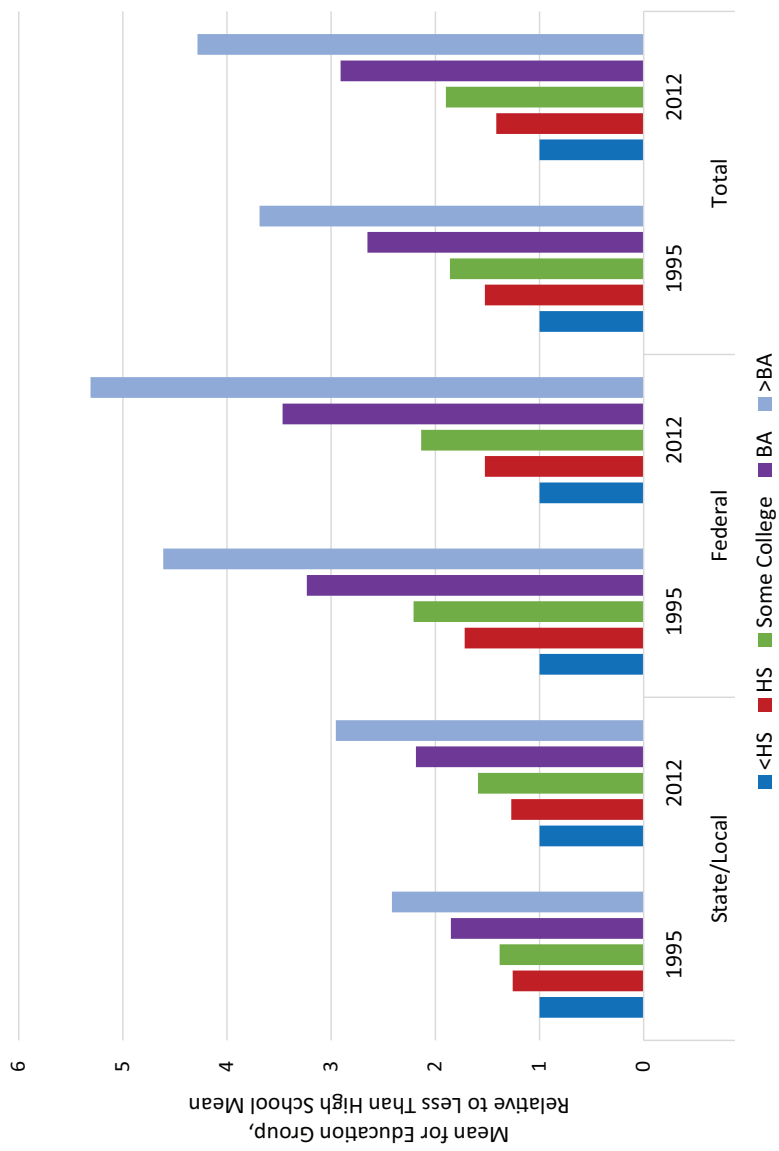
**SOURCE:** Data are from the 2011-2013 March Current Population Surveys, normalized to administrative control totals.

are arguably most interesting here. The largest differences between groups in terms of absolute dollars is found at working ages, when those with the most education are contributing much more on net than those with the least. Third-plus generation persons without a high school degree never contribute more than they receive, a striking result that is not true for either the first or second generation. Children of the third-plus generation also exhibit a wider educational gradient in their net fiscal impacts than either of the other two groups. The explanation for both of these patterns must be greater usage of fiscal transfer programs by third generation working-age parents, given their education levels compared to immigrants. For the first generation, part of this is purely mechanical; eligibility for some fiscal transfers depends on time spent in the country. But the second generation should have close to the same access as the third-plus generation; but Figure 8-21 shows signs of less program utilization by the second generation.

Figure 8-22 shows how strongly tax contributions rise with educational attainment for immigrants. Each set of 5 vertical bars in the figure shows taxes paid by an educational group relative to those paid by the least educated in each period and at each level of government. So, in 2012 for example, as represented in the far-right bar chart, those with a bachelor's degree paid on average almost three times as much in total taxes as did those with less than a high school education. Taxes paid by immigrants in the highest education group are considerably higher than those paid by the other education groups, and they appear to be rising faster. This trend is more pronounced at the federal level than at the state and local levels, presumably because the federal income tax is relatively more progressive than most taxes collected at the state level. The trends shown in Figure 8-22 are roughly the same for second and third-plus generation taxpayers.

For benefits, the relative flows are more similar across education groups than they are for taxes where, on average, the high education groups pay much more than the low education groups.<sup>30</sup> Regulations requiring documentation of legal status or minimum time in the United States to qualify for some benefit programs have had the expected effect of decreasing immigrants' participation in those programs. Focusing on those age groups that are net receivers of benefits, Table 8-7 shows that, while benefits have grown in real terms for all nativity groups since the time (circa 1995) of the data used in *The New Americans* (National Research Council, 1997), benefits have grown more slowly for the first generation than for the other two generational groups. Given these underlying trends in taxes and benefits by nativity since *The New Americans*, one should expect new immigrants to

<sup>30</sup>For all groups regardless of immigration status, the government has shifted its benefit portfolio away from the poorest of the poor and toward the working poor (Moffitt, 2015).



**FIGURE 8-22** Average taxes paid by immigrants, ages 25-64, by education group, relative to educational attainment of less than high school.  
**SOURCE:** Data are from the 2011-2013 March Current Population Surveys, normalized to administrative control totals.



**TABLE 8-7** Average per Person Benefits Received, by Age Group and Generational Group, 1995 and 2010 (in thousands of 2012 dollars)

	State/Local Benefits			Federal Benefits		
	1995	2010	% Change	1995	2010	% Change
<b>Ages 0-24</b>						
1st Generation	7.6	9.1	19	1.7	2.6	49
2nd Generation	7.3	9.5	30	2.6	4.4	73
3rd+ Generation	7.1	8.8	23	2.5	4.3	68
<b>Age 65+</b>						
1st Generation	3.0	3.3	10	20.9	22.5	22
2nd Generation	3.6	4.2	16	24.3	33.5	38
3rd+ Generation	4.7	6.5	38	25.2	32.4	28

NOTE: Includes all government spending other than defense, interest payments, and subsidies.

SOURCE: Panel generated using Current Population Survey data pools from 2011-2013.

now cost government less, relative to the other generational groups, than they did in the 1990s.

### *What Will an Additional Immigrant and Descendants Pay in Taxes and Receive in Benefits in the Future?*

In order to forecast taxes and benefits for an average immigrant and descendants, it is necessary to first forecast the ultimate educational attainment for young immigrants and the future educational attainment of the offspring of immigrants. The panel predicted the education of offspring as a function of parental education using regression analysis based on CPS samples 15 years apart. The earlier sample gives the education of parents born in particular regions who have children ages 10-16 living in their households. The later sample gives the education of people ages 25-31 whose parents were born in that region. Adult child education is regressed on parental education by birth region, with separate equations for native-born children versus foreign-born children. This generates equations that are used to predict a child's ultimate educational attainment; a random error term is included in the equations to obtain realistic educational distributions for each generation. Separate regressions are used to estimate the transmission of educational attainment from foreign-born parents to foreign-born children (not shown) and, for comparative purposes, from U.S.-born parents to their U.S.-born children.

Results from this estimation are presented below as transition matrices. Table 8-8 shows the transition for U.S.-born children of an immigrant parent; Table 8-9 shows the transition for U.S.-born children of a U.S.-born parent. Each cell of the matrix shows the chance that the child attains the

**TABLE 8-8** Predicted Educational Distribution of U.S.-born Children of a Foreign-born Parent, Percentages of Parental Offspring Expected to Be in an Educational Category (rows add to 100)

Parent's Education	Child's Education				
	Less Than High School	High School Graduate	Some College	Bachelor's Degree	More Than Bachelor's Degree
1. Less than high school	17.1	44.1	32.4	6.2	0.3
2. High school graduate	4.3	27.2	46.2	20.3	2.0
3. Some college	0.7	11.9	40.2	38.0	9.2
4. Bachelor's degree	0.1	2.2	21.7	46.5	29.5
5. More than bachelor's degree	0.0	0.6	8.8	37.7	52.9

NOTE: Educational distributions are the panel's predictions using the methodology described in the text introducing the table.

**TABLE 8-9** Predicted Educational Distribution of U.S.-born Children of a U.S.-born Parent, Percentages of Parental Offspring Expected to Be in an Educational Category (rows add to 100)

Parent's Education	Child's Education				
	Less Than High School	High School Graduate	Some College	Bachelor's Degree	More Than Bachelor's Degree
1. Less than high school	29.4	50.9	18.4	1.3	0.0
2. High school graduate	7.6	42.2	42.2	7.8	0.2
3. Some college	1.0	16.9	50.1	28.8	3.2
4. Bachelor's degree	0.0	2.3	26.0	51.8	19.9
5. More than bachelor's degree	0.0	0.3	7.0	40.3	52.4

NOTE: Educational distributions are the panel's predictions using the methodology described in the text introducing the table.

educational level indicated in the column head, given the parent's educational attainment shown in the row stub. A strong pattern of upward educational mobility is apparent for the children of immigrants. Numbering the five education categories from 1 to 5, with 1 being the lowest and 5 the highest, the offspring of those with less than a high school education (category 1) would have an average education group of 2.3. Meanwhile, a category 2 parent could expect offspring that average 2.9, a parent of category 3 could expect offspring at 3.4, a category 4 parent could expect 4.0, and a category 5 parent's offspring average 4.4 (offspring of parents in the highest educational category have nowhere to go but down, of course). These averages are consistent with the phenomenon of reversion

to the mean in correlated measures: Those lowest in the distribution on one measure are more likely to have a large increase on the other measure, while those at the highest end of the distribution are more likely to have a decrease. Still, there is an overall trend toward increasing educational attainment with immigrant generation. To see this, imagine starting with just five parents, each in one of the parental education categories, so that their average group category is 3. If they all had the same fertility pattern, they would have offspring with an average group category of 3.4.

Comparing Tables 8-8 and 8-9 shows that children of U.S.-born parents also have upward educational mobility, but not as much as the children of immigrants. For example, the children of immigrants with less than a high school education have a 17.1 percent chance of achieving only this level (i.e., making no upward transition), while children of third-plus generation parents in category 1 have a 29.4 percent chance of only attaining that same level. Repeating the calculation in which five parents, one from each educational category, have children, the children's average group category would be only 3.2, in contrast with the 3.4 for the children of immigrants. Note that this calculation abstracts from the education distribution of the parents and only indicates relative upward educational mobility. The fact that immigrants' children appear to have more upward mobility is perhaps consistent with the narrative of immigrants coming to the United States for the specific purpose of giving their children better opportunities than they had in their home countries. If true, first generation parents may be relatively more focused on educational attainment for their children than native-born parents. This result carries through to the patterns of tax payments by generation: If second generation children go on to achieve higher levels of education, one would also expect that they will be higher earners and thus pay relatively more in taxes than other groups.

Table 8-10 provides a different perspective on how educational transmission plays out in the forecast for a sample of new immigrants ages 20-30 who have been in the United States less than 5 years. Each column shows an educational distribution. The leftmost column is the immigrants' actual education as observed in the CPS. Immigrants who are observed at ages under 25 are at first assigned their parent's observed education, as shown in the leftmost column. Their projected ultimate educational attainment after age 25 (second column in Table 8-10) can be higher or lower than this initial assignment. Although some immigrant children of highly educated immigrants may end up with less education, the overwhelming trend here is toward upward mobility (e.g., compare the second column with the first), with the share projected to be in the lowest attainment category falling to half that of their immigrant parents. The third and fourth columns show the predicted ultimate educational distribution of the children and grandchildren of the immigrants whose observed distribution is in the first column. The

**TABLE 8-10** Observed and Projected Educational Distribution for Immigrants, Ages 20-30, Who Arrived in the United States in the Past 5 Years and Their Descendants

	Observed in CPS	Projected Educational Distributions		
		Immigrant	Children	Grandchildren
1. Less than high school	0.42	0.21	0.04	0.04
2. High school graduate	0.16	0.18	0.17	0.13
3. Some college	0.12	0.22	0.30	0.32
4. Bachelor's degree	0.18	0.27	0.32	0.31
5. More than bachelor's	<u>0.11</u>	<u>0.12</u>	<u>0.17</u>	<u>0.20</u>
<b>TOTAL</b>	1.00	1.00	1.00	1.00
Average category score	2.40	2.90	3.40	3.50

NOTE: The "average category score" is the weighted average of the education categories numbered 1 through 5, using the proportional distribution as weights.

SOURCE: Data represent both analysis of Current Population Survey data and panel's projections.

third column, compared with the first two, reveals an upward shift between first and second generations that is similar on average (shown in the bottom row) to the half-category jump experienced by the first generation after arrival. Differences between the second and third-plus generation exist but are not as large, which is what one might expect to see in repeated application of transition matrices. The important implication of these patterns for the fiscal analysis that follows is that even an immigrant arriving with little education, whom one would expect to pay relatively less in taxes and cost relatively more in benefits, will likely have offspring with more education. That education will cost the government and taxpayers in the near term, but that investment ultimately pays off in the form of elevated tax contributions by the second and higher generations in the future. However, computations using a positive discount rate reduce the present value of those future payoffs.

### *How Long Do the New Immigrants Stay, and How Many U.S.-born Children Do They Add to the Population?*

The final piece of the longitudinal calculation concerns the demography of the new immigrant and that immigrant's descendants—specifically, the mortality, fertility, and migration schedules that apply to each individual. We account for the immigrant's likelihood of survival each year into the future, of remaining in the United States (not emigrating back to the home country or to another country), and of having descendants through fertility. Similar forecasts apply to the immigrant's descendants whose fiscal impacts

are also appropriately weighted by their probabilities of remaining alive and within the United States. In particular, we assume that any immigrant who leaves the country will take along any children younger than age 20. The mortality, fertility, and emigration probabilities are the same as those used to generate the demographic projections in Chapter 2.

Table 8-11 shows several indicators of vital rates across current first, second, and third-plus generations (labeled “Current”), plus the same indicators as observed in the mid-1990s and used in the 1997 report *The New Americans* (labeled “Circa 1990s”). Following global trends, the total fertility rate has fallen, as shown in the top left panel of Table 8-11, and fertility has also shifted toward older ages in all generational groups, as shown in the bottom left panel.<sup>31</sup> The largest changes were experienced by the first generation and to some extent by the second generation. The middle panels of Table 8-11 show that the immigrant and all-native-born generational groups have also experienced longevity increases since the 1990s. Survivorship is not very different across generations, with a slight advantage for immigrants. The right-hand panels show cumulative emigration probabilities. These have risen since the 1990s time frame used by *The New Americans* (National Research Council, 1997), but the increases are small. Comparison of the cumulative probabilities of emigration over the two time horizons listed in the table, within 10 years of arrival and within 50 years, reveals that the risk of emigration decreases the longer the immigrant stays in the country. According to current statistics, 24 percent of an immigrant cohort will leave the United States within the first 10 years after arrival, whereas only an additional 7 percent leave between year 10 and year 50, for a cumulative total of 31 percent. These are the figures used in the projections of fiscal impacts for this report.

### The Fiscal Impacts of a New Immigrant—Detailed Results

Estimates of the present value of the net fiscal impact associated with a new immigrant vary widely, depending on a number of assumptions. Table 8-12 captures this variation. The age of the immigrant upon arrival varies across the columns within each panel of data; the education level of the immigrant varies down the rows of each panel. The panels in Parts 1 and 2 of Table 8-12 vary assumptions about the addition of descendants and the future fiscal regime. The panels from top to bottom vary the

<sup>31</sup>The fertility indicator in Table 8-11, the Total Fertility Rate, measures “children per woman” implied by age-specific rates of birth in a period. In our fiscal impacts calculation, the panel counted half of the projected offspring of an immigrant as the second generation. Children with two immigrant parents will be fully counted by this technique, while a child of one immigrant parent and one native-born parent will be half-allocated to the immigrant and half to the native-born parent.

TABLE 8-11 Demographic Indicators Used in Fiscal Impact Calculations

Fertility Indicators by Generation	Mortality Indicators by Generation			Cumulative Probability of Emigration
	1st	2nd	3rd+	
Total Fertility Rate	Probability of Survival, Birth to Age 40			Within 10 Years of Arrival
Circa 1990s	2.7	2.3	2.0	Circa 1990s
Current	2.3	2.0	1.9	Current
Change	-0.4	-0.4	-0.1	Change
Average Age of Age-Specific Fertility Schedule	Probability of Survival, Ages 40 to 80			Within 50 Years of Arrival
Circa 1990s	26.6	26.6	26.6	Circa 1990s
Current	30.2	29.1	29.1	Current
Change	3.6	2.5	2.5	Change

NOTE: The two generational groups used for the mortality indicators are first-generation immigrants (“1st”) and all native-born (2nd+).  
SOURCE: Values in the rows labeled “Current” are the indicator values used in the calculations done for this report based on the 2011-2013 March Current Population Survey; values in the “Circa 1990s,” rows are those used in *The New Americans* (National Research Council, 1997).

TABLE 8-12 75-year Net Present Value Flows for Consolidated Federal, State, and Local Governments for Two Future Budget Scenarios, by Education and Age of Arrival, Varying the Treatment of Public Goods and Characteristics of an Average Immigrant (fiscal impacts are in thousands of 2012 dollars)

PART 1												
CBO Long-term Budget Outlook												
	Total Impact				Immigrant				Descendants			
	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.
AVERAGES BASED ON RECENT IMMIGRANTS												
No Public Goods Included in Benefits												
<HS	35	-225	-257	-117	23	-198	-257	-109	11	-26	0	-8
HS	239	-42	-164	49	140	-50	-164	11	98	8	0	39
SomCol	401	157	-155	261	236	99	-155	155	165	58	0	106
BA	4,958	504	-160	4814	301	366	-160	330	194	138	0	150
>BA	446	994	-100	812	287	805	-100	635	159	190	0	177
Avg.	291	269	-201	259	177	196	-201	173	114	73	0	85
Benefits Include Defense, Subsidies, and Rest-of-World Payments												
<HS	-77	-294	-279	-200	-32	-246	-279	-158	-45	-47	0	-43
HS	127	-112	-187	-33	85	-99	-187	-39	42	-14	0	6
SomCol	288	82	-178	170	180	49	-178	104	107	33	0	67
BA	385	426	-186	395	245	316	-186	279	140	110	0	116
>BA	339	915	-123	726	231	754	-123	583	108	161	0	142
Avg.	180	195	-224	173	121	147	-224	123	59	48	0	50

continued

AVERAGES BASED ON ALL IMMIGRANTS													
No Public Goods Included in Benefits													
<HS	49	-239	-253	-196	32	-221	-253	-186	17	-18	0	-10	
HS	271	-82	-155	-47	157	-88	-155	-65	114	6	0	19	
SomCol	425	63	-144	99	249	28	-144	45	176	35	0	54	
BA	540	290	-157	280	324	218	-157	195	216	72	0	85	
>BA	515	648	-99	547	321	556	-99	452	194	91	0	95	
Avg.	301	53	-183	58	181	27	-183	22	121	26	0	37	
Benefits Include Defense, Subsidies, and Rest-of-World Payments													
<HS	-65	-299	-274	-259	-23	-266	-274	-230	-42	-33	0	-29	
HS	156	-143	-177	-109	102	-133	-177	-109	55	-9	0	0	
SomCol	310	2	-166	34	194	-18	-166	0	117	20	0	33	
BA	427	230	-180	216	268	172	-180	150	159	57	0	66	
>BA	404	588	-122	485	265	510	-122	407	139	78	0	77	
Avg.	188	-8	-205	-5	125	-19	-205	-22	63	12	0	18	



PART 2 No Budget Adjustments							
	Total Impact			Immigrant		Descendants	
	0-24	25-64	65+	Avg.	0-24	25-64	65+
AVERAGES BASED ON RECENT IMMIGRANTS							
No Public Goods Included in Benefits							
<HS	-118	-231	-254	-185	-18	-176	-254
HS	13	-105	-170	-67	61	-70	-170
SomCol	117	35	-163	67	127	47	-163
BA	172	283	-177	235	160	251	-177
>BA	140	627	-120	469	143	565	-120
Avg.	45	116	-206	77	82	118	-206
Benefits Include Defense, Subsidies, and Rest-of-World Payments							
<HS	-266	-322	-282	-295	-90	-239	-282
HS	-136	-198	-197	-176	-12	-132	-197
SomCol	-33	-63	-192	-53	55	-17	-192
BA	26	181	-206	122	87	186	-206
>BA	-2	523	-149	355	69	499	-149
Avg.	-103	19	-234	-36	9	54	-234

AVERAGES BASED ON ALL IMMIGRANTS											
No Public Goods Included in Benefits											
<HS	-107	-237	-250	-219	-6	-199	-250	-177	-101	-38	0
HS	36	-129	-160	-112	80	-105	-160	-88	-44	-24	0
SomCol	135	-21	-151	-10	142	-15	-151	-4	-7	-7	0
BA	204	147	-174	123	184	130	-174	107	20	17	0
>BA	187	405	-119	318	176	374	-119	293	11	30	0
Avg.	54	-28	-189	-36	93	-16	-189	-23	-38	-11	0
Benefits Include Defense, Subsidies, and Rest-of-World Payments											
<HS	-258	-316	-276	-301	-78	-259	-276	-233	-180	-58	0
HS	-116	-208	-187	-193	8	-164	-187	-145	-124	-44	0
SomCol	-17	-101	-179	-96	70	-74	-1798	-62	-87	-27	0
BA	55	68	-202	39	112	71	-202	49	-57	-3	0
>BA	40	326	-147	236	103	314	-147	235	-63	12	0
Avg.	-96	-107	-216	-119	20	-79	-216	-80	-117	-31	0

NOTE: The “total” figures equal the fiscal impact of the individual, starting at age 25, plus the fiscal impacts of that individual’s descendants. See accompanying text for a discussion of the difference between scenarios without and with public goods included. The discount rate used for the net present value calculations is 3 percent.

SOURCE: Values are panel generated, using the same 2011-2013 Current Population Survey data pools used for the earlier projections.

breadth of spending programs assumed to be affected by an additional immigrant, either with or without spending on public goods, and the pool of immigrants on which the analysis computes characteristics of an average immigrant. The first set of data panels in Parts 1 and 2 use the pool of recent immigrants who have arrived within the past 5 years; the second set use the pool of all first generation immigrants.

Each cell in the table is the amount, in thousands of inflation-adjusted 2012 dollars, of the net fiscal impact associated with an immigrant's arrival today under the assumptions of that data-panel's scenario. For example, the highlighted statistic of "259" in the first set of data panels of the table means that, under the CBO Long-term Budget Outlook scenario, the total fiscal impact of a new immigrant who most resembles recent immigrants in terms of average age and education creates a positive fiscal balance flow to all levels of government with an NPV of \$259,000. The cells four and eight columns to the right of this cell shows that, under these same assumptions, the projection attributes \$173,000 of this total impact to the immigrant as an individual and \$85,000 to that immigrant's descendants.<sup>32</sup>

These are large numbers, and a comparison with the corresponding statistics that appear directly to the right of this first data panel, under the no-budget-adjustments scenario, reveals that a large part of these average fiscal impact amounts is accounted for by the assumptions made by CBO in their future fiscal scenarios. Table 8-4, presented above, indicated significant differences in the growth of benefits programs across fiscal scenarios. Application of the CBO assumptions increases estimates of an immigrant's net present value of fiscal impacts to levels that may at first glance seem unreasonably high. Because the present value of labor earnings for an average immigrant under these assumptions is in the neighborhood of a million dollars,<sup>33</sup> tax rates would have to be very high or benefit rates very low to produce a present value of net fiscal impact associated with that immigrant that is roughly 17.3 percent of lifetime earnings.<sup>34</sup> However, it is important to remember the timing of life-cycle fiscal flows. Working-age people pay more in taxes than they consume in benefits and, in old age, they consume more in benefits than they pay in taxes. The large expenditures

<sup>32</sup>We have rounded the statistics in Table 8-12 to the nearest thousand dollars to enhance readability, so the total for immigrant as an individual plus that immigrant's descendants may not exactly match the total impact statistic.

<sup>33</sup>The present value of a stream of annual earnings that starts at \$35,000 and grows at a real rate of 1 percent over 35 years of working from age 30 to 65 is equal to \$907,195 when the real discount rate is 3 percent.

<sup>34</sup>During the historical period of CPS data used by the panel in Section 8.2, covering 1994 to 2013, taxes as a share of GDP hovered around 27 percent, or 18 percent at the federal level and 9 percent at the state and local level. Spending was 30 percent, split between 20 percent at the federal level (of which 4% was defense) and 10 percent at the state level.

on retirement benefits are, on average, more heavily discounted relative to tax dollars contributed during the working years. With a discount rate of 3 percent and a 35-year difference between the age at which individuals become a net fiscal positive (taxes paid are greater than benefits received) and the age at which they again become net fiscal negatives (vice versa), the net benefits are discounted to about a third of what they would be using the discount applied to the net fiscal positive years. Additionally, assuming productivity growth of 1 percent, the effective discount rate becomes 2 percent and the adjustment is less extreme.

By comparison, under the No Budget Adjustments scenario, smaller net fiscal impact estimates are produced, reflecting an assumed growth in the size of government that is more in line with historical precedent. For immigrants and descendants combined, the highlighted statistic in the first set of data panels in this scenario is \$77,000. It is noteworthy that under this scenario, the immigrant's own contribution to this number is a surplus of \$92,000, shown four columns further to the right, while the fiscal impact of that average immigrant's descendants, is a deficit of -\$15,000. These projections contrast with those presented in *The New Americans*, in which the descendants of immigrants had net positive impacts in part because of the assumption about imposed fiscal sustainability. Under the CBO Long-term Budget Outlook scenarios in Table 8-12—in which some categories of spending are projected to grow less rapidly and some taxes grow more rapidly (for a likely net effect of reduced levels of debt compared to the No Budget Adjustments scenario)—the descendants of immigrants almost universally have positive fiscal impacts on the bottom line.

Table 8-12 also reveals that, if the arrival of a new immigrant raises spending on public goods by its per capita level, the immigrant's net fiscal impact becomes less positive and may become negative. This is shown in the second panel in Parts 1 and 2, where it is assumed that an immigrant's arrival raises spending on public goods such as defense (and therefore the calculation includes the average cost of public goods as part of the immigrant's fiscal costs). The highlighted average fiscal impact on the left-hand side of this panel is \$173,000, down from \$259,000 in Part 1 in which an additional immigrant does not raise spending on public goods. In Part 2, the average fiscal impact has fallen from \$77,000 to -\$36,000. The third and fourth data panels in Table 8-12 recalculate these statistics using all first generation immigrants as the basis for computing the effect of a new immigrant. This assumption pushes all the fiscal impacts more negative because the more heterogeneous group of all living first generation immigrants has less education and is older than the group of recent arrivals. The average fiscal impact (the four highlighted data cells) across these four scenarios range from \$58,000 to -\$119,000. The stock of all first generation immigrants reflects the characteristics of both recent and further-past arrivals, and (as

discussed in Chapter 3) these characteristics have been changing over time. It is perhaps surprising that some of the numbers in these panels remain positive after weighting the calculations to include the characteristics of those earlier arrivals.

Within each of the data panels, Table 8-12 also contains detailed information about how net fiscal impacts vary by an immigrant's age at arrival and level of education. As one might expect, the net fiscal impact is less positive (or more negative) when the immigrant arrives during youth or at retirement ages and becomes more positive with higher educational attainment.<sup>35</sup> Note that there are no descendants for those arriving at age 65+ because fertility rates are zero after age 50 in the demographic projections. Those arriving at older ages may have brought children with them, but those children would be immigrants themselves and are counted as new arrivals in their own right.

### Broader Patterns across Major Scenarios

Given the considerable stability in gradients by age and education, it is possible to focus on net fiscal impacts at the average age and education level in order to sharpen conclusions about robustness across scenarios.<sup>36</sup> These category averages appear as shaded and boxed areas in Table 8-12, and Figure 8-23. Figure 8-23 also shows results for the second CBO scenario, in which there is planned deficit reduction over time achieved by explicitly raising taxes and cutting benefits.

The black bars in Figure 8-23 show net fiscal impacts when spending on public goods is assumed to not increase in response to an immigrant's arrival. As discussed earlier, this scenario is arguably most reasonable when considering the marginal impact of one additional immigrant's arrival and is less reasonable when considering the arrival of many new immigrants. The gray bars show results for when spending on public goods is assumed to rise with an additional immigrant, calculated by assigning the per capita amount spent on residents to immigrants as well. Bar pairs are shown for each of the three budget scenarios: black for the scenario without assign-

<sup>35</sup>The one exception to this relationship is when the BA category is compared with the >BA category for immigrants arriving at ages 0-24. For these immigrants, initial education is that of their parents. Because of reversion to the mean, having parents in the highest education category means that there is a substantial chance that the children will, on average, end up with less education than their parents.

<sup>36</sup>For both age and education, the averages are weighted averages of the 75-year present values for each of 81 age groups (ages 0-80+) by five education categories, with the weights derived from either the age-by-education distribution of recent immigrants in 2011-2013 or the age of all immigrants alive, as indicated by the data panel headings in Table 8-12 and the New Arrival versus All Immigrants bars in Figure 8-23.

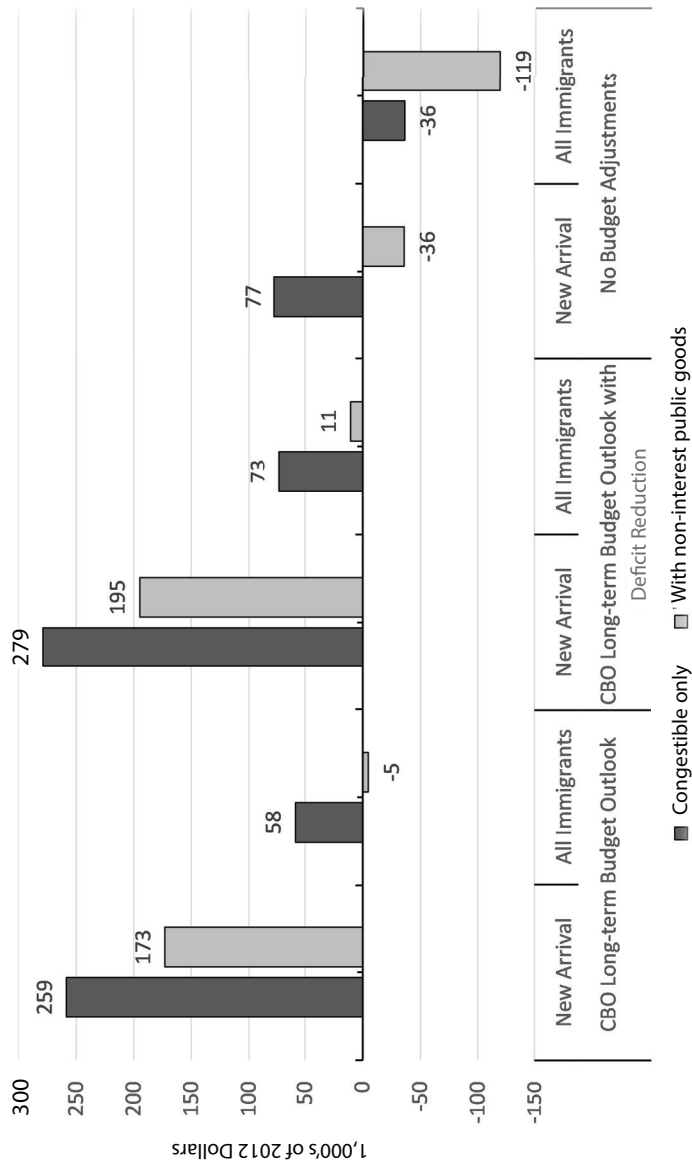


FIGURE 8-23 Net fiscal impacts of immigration, by budget scenario, treatment of public goods, and average characteristics of new immigrants.

ing public goods (“congestible only”) and gray for the scenario with cost of public goods assigned to immigrants. The pairs are grouped by the two measures of an average immigrant’s characteristics: first by whether just recent arrivals are pooled or all first-generation immigrants currently alive are included, then by the three budget outlook scenarios.

Figure 8-23 indicates that estimates of an immigrant’s net fiscal impact vary fairly widely across scenarios—from +\$279,000 to −\$119,000. The average of the 12 estimates in Figure 8-23 is \$77,000, and the standard deviation is \$125,000.<sup>37</sup> Shifting the pool from which one calculates characteristics of an average immigrant has a relatively large impact on the final estimate. Assuming that a new immigrant resembles recent immigrants yields a more positive net fiscal impact than does assuming the new immigrant is drawn from the entire stock of first generation immigrants currently in the country.

The choice of budget or fiscal adjustment scenario is also important. Under the CBO-based scenarios, the net fiscal impacts are higher (more positive) than under the scenario with no budget adjustment because spending grows less rapidly than taxes in the former than in the latter. Note that all three of these scenarios assume unsustainable increases in deficits and debt over time, although the No Budget Adjustments scenario reaches unrealistic levels of debt much faster than the CBO scenarios. The CBO “extended baseline” model—which is the basis for the first (Long-term Budget Outlook) scenario in Figure 8-23, and in which interactions between fiscal flows and projected economic growth are estimated—shows the federal-debt-to-GDP ratio reaching 100 percent by 2036 and 219 percent by the end of the 75-year projection window. The ratios are much larger for the No Budget Adjustments scenario, and a little bit smaller for the CBO scenario with deficit reduction.

### The Fiscal Impact of Immigrants Relative to Natives

Thus far in Section 8.3, we have focused on whether an additional immigrant will benefit or be a drain on public finances. The results of the panel’s projections show that the age and education characteristics of entering immigrants have a major influence on the answer to this question. This leads naturally to another question: if new immigrants have the same age and education as native-born persons, will their fiscal impacts be the same? This question is of interest for assessing whether it is immigrant status that is relevant for understanding fiscal impacts or whether it is just a matter of adding an additional person to the economy. In other words, is it simply

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<sup>37</sup>The standard error of the mean is the sample standard deviation divided by the square root of  $N$ , here equal to \$36,000.

age and education that distinguishes immigrants from natives as far as fiscal impacts are concerned, or are there other differences? Certainly there are statutory differences, in that many benefit programs prohibit paying benefits to immigrants at all or before some waiting period, but there is no similar prohibition on collecting taxes from immigrants. This would suggest that an immigrant would be less costly than a native with exactly the same age and education characteristics at a particular point in time. However, there may be other differences beyond just age and education. Similar immigrant and native levels of educational attainment might be associated with different earnings and thus taxes paid; for example, otherwise comparable groups might have different levels of language proficiency that would impact earnings, or there may be other unobservable differences. Adding a future-looking perspective, there are additional demographic differences between immigrants and natives that will be reflected in the fiscal calculation: they have somewhat different levels of fertility and mortality, and immigrants may emigrate out of the population, which is far less likely for natives. Thus, it becomes an empirical question whether there are consistent differences in the net fiscal impact of immigrants and natives of the same age and education.

The panel explored this question. Results are summarized in Table 8-13, which shows the projected total net fiscal impacts for an immigrant entering the country at age 25, versus a native-born person observed from the time he or she reaches age 25. Note that this calculation is not affected by the past of these hypothetical 25-year-olds: The fact that the U.S. government did not have to pay for the immigrant's education is not included; nor is the fact that the native-born 25-year-old had native-born taxpaying parents who helped finance his or her education. These past issues are set aside to follow only the immigrant's and the native's impact on government budgets from their 25th year on. The calculation is broken out to show the fiscal impact component attributed to the 25-year-old as an individual and the component attributed to that individual's descendants. As in Table 8-12, net fiscal impacts for the immigrant and the native-born individual are shown for each educational attainment category under two budget scenarios (CBO Long-term Budget Outlook and the No Budget Adjustments scenario). Here, pure public goods are omitted for everyone, natives and immigrants (top panel) or assigned equally to everyone (bottom panel). Differences in the fiscal impacts of the immigrant and the native-born are shown in shaded bars, positive numbers indicating cases in which that the immigrant is better for fiscal balances and negative numbers indicating cases in which the native is better.

To understand the patterns, first look at the columns labeled "Individual," which show the fiscal impact for the immigrant or native as an individual (excluding fiscal impact of descendants) for the scenario in which



**TABLE 8-13** 75-year Net Present Value Flows Comparing an Immigrant Arriving at Age 25 with a Native-born Person Followed from Age 25, for Consolidated Government Finances under Two Future Budget Scenarios, by Educational Attainment, Varying the Treatment of Public Goods (in thousands of 2012 dollars)

		CBO Long-term Budget Outlook			No Budget Adjustments		
		Total	Individual	Descendants	Total	Individual	Descendants
No Public Goods Included in Benefits							
<HS	Immigrant	-186	-109	-77	-246	-87	-159
	Native	<u>-388</u>	<u>-251</u>	<u>-137</u>	<u>-427</u>	<u>-234</u>	<u>-193</u>
	Imm-Nat	202	142	60	181	147	34
HS	Immigrant	72	49	23	-79	21	-100
	Native	<u>14</u>	<u>61</u>	<u>-47</u>	<u>-139</u>	<u>-7</u>	<u>-132</u>
	Imm-Nat	58	-12	70	60	28	32
SomCol	Immigrant	347	205	142	109	136	-27
	Native	<u>262</u>	<u>208</u>	<u>54</u>	<u>26</u>	<u>97</u>	<u>-71</u>
	Imm-Nat	85	-3	88	83	39	44
BA	Immigrant	821	514	307	433	361	72
	Native	<u>895</u>	<u>684</u>	<u>211</u>	<u>473</u>	<u>446</u>	<u>27</u>
	Imm-Nat	-74	-170	96	-40	-85	45
>BA	Immigrant	1,362	972	390	795	670	125
	Native	<u>1,344</u>	<u>1,020</u>	<u>324</u>	<u>766</u>	<u>674</u>	<u>92</u>
	Imm-Nat	18	-48	66	29	-4	33

continued

Benefits Include Defense, Subsidies, and Rest-of-World Payments							
<HS	Immigrant	-302	-164	-138	-398	-158	-240
	Native	<u>-503</u>	<u>-313</u>	<u>-190</u>	<u>-580</u>	<u>-315</u>	<u>-265</u>
	Imm-Nat	201	149	52	182	157	25
HS	Immigrant	-44	-6	-38	-231	-50	-181
	Native	<u>-191</u>	<u>-1</u>	<u>-100</u>	<u>-292</u>	<u>-88</u>	<u>-204</u>
	Imm-Nat	57	-5	62	61	38	23
SomCol	Immigrant	231	150	81	-43	65	-108
	Native	<u>147</u>	<u>146</u>	<u>1</u>	<u>-127</u>	<u>16</u>	<u>-143</u>
	Imm-Nat	84	4	80	84	49	35
BA	Immigrant	705	459	246	281	290	-9
	Native	<u>780</u>	<u>622</u>	<u>158</u>	<u>320</u>	<u>365</u>	<u>-45</u>
	Imm-Nat	-75	-163	88	-39	-75	36
>BA	Immigrant	1,246	917	329	643	599	44
	Native	<u>1,229</u>	<u>958</u>	<u>271</u>	<u>613</u>	<u>593</u>	<u>20</u>
	Imm-Nat	17	-41	58	30	6	24

TABLE 8-13 Continued

	CBO Long-term Budget Outlook			No Budget Adjustments		
	Total	Individual	Descendants	Total	Individual	Descendants
Benefits Include Defense, Subsidies, Rest-of-World Payments, and Interest Payments						
<HS	Immigrant	-716	-316	-522	-216	-306
	Native	<u>-915</u>	<u>-490</u>	<u>-705</u>	<u>-381</u>	<u>-324</u>
	Imm-Nat	199	174	183	165	18
HS	Immigrant	-458	-158	-355	-108	-247
	Native	<u>-513</u>	<u>-178</u>	<u>-417</u>	<u>-154</u>	<u>-263</u>
	Imm-Nat	55	20	62	46	16
SomCol	Immigrant	-183	-2	-167	7	-174
	Native	<u>-265</u>	<u>-31</u>	<u>-252</u>	<u>-50</u>	<u>-202</u>
	Imm-Nat	82	29	85	57	28
BA	Immigrant	291	307	157	232	-75
	Native	<u>368</u>	<u>445</u>	<u>195</u>	<u>299</u>	<u>-104</u>
	Imm-Nat	-77	-138	-38	-67	29
>BA	Immigrant	832	765	519	541	-22
	Native	<u>817</u>	<u>781</u>	<u>488</u>	<u>527</u>	<u>-39</u>
	Imm-Nat	15	-16	31	14	17

NOTE: The "total" figures equal the fiscal impact of the individual, starting at age 25, plus the fiscal impacts of that individual's descendants. See accompanying text for a discussion of the difference between scenarios without and with public goods included. The discount rate used for the net present value calculations is 3 percent.

SOURCE: Values are panel generated using 2011-2013 Current Population Survey data pools for the projections.

pure public goods are left out (top panel). Notice that these values are more similar for immigrant and native within the same educational category than they are for either individual across educational categories. The fiscal impact is negative only for individuals in the lowest educational attainment category (less than high school, <HS). This is true for both natives and immigrants, with values of  $-\$251,000$  for the fiscal impact of a native-born person and  $-\$109,000$  for an immigrant. The low-skilled immigrant is less costly than the low-skilled native mainly because the former will not qualify for as many welfare programs. For all educational attainment groups from completing high school (HS) and higher, net impacts are positive and greater for the native-born person—but the differences between immigrant and native-born are relatively small. For example, strictly from the perspective of fiscal balance, an immigrant with a bachelor's degree (BA) (positive fiscal impact of  $\$514,000$ ) is preferable over a native with only some college (positive impact of  $\$208,000$ ).

In contrast, as shown in the next column, descendants of the immigrant always contribute more to fiscal balances than do the descendants of the native-born person, no matter what the individual's educational attainment is, which budget scenario is assumed, or how public goods are treated. This is mostly due to the greater average educational attainment of an immigrant's descendants, compared to the average educational attainment of descendants of the native born. To a lesser extent, there is also a small advantage for second generation persons in estimated earnings, and thus tax payments, within education category, compared to third-plus generation persons.

Combining the fiscal impact of the individual with that of the individual's descendants (the "Total" columns in Table 8-13), one can see that the hypothetical immigrant in this projection is almost always more positive (or less negative), from a fiscal balance perspective, than the hypothetical native-born person. The exception is the BA educational attainment category. Nonetheless, the lesson to draw from these projections is that the variability in fiscal impact is much greater across education categories than between immigrants and natives with the same educational attainment. Under the conditions of this projection, the major driver of fiscal impacts is educational attainment, not immigrant status.

Note that the above discussion does not touch on the results for the lower half of Table 8-13, in which most types of public goods are included as benefits paid for by both the immigrant and the native-born individual and to their descendants. This is because the patterns discussed are similar for the scenario with public goods costs included, just with more negative fiscal impacts. Because the same average value of the additional public goods is assigned to immigrants, natives, and descendants alike, the only differences for that scenario, compared to the scenario with no public

goods, will be driven by demographic differences, such as different fertility, mortality, and emigration, and those differences are slight.

### Looking within Net Impacts

It is helpful to disaggregate the results of the panel's projection into taxes paid versus benefits received and also into impact by level of government. Tables 8-14, 8-15, and 8-16 do this for the accounting scenario in which an additional immigrant does not trigger additional spending on public goods, and therefore the cost of public goods is not added into the benefits received. Tables 8-17 and 8-18 present total and federal-only fiscal impacts when the alternative scenario is used, in which a new immigrant is assumed to increase spending on public goods by the per capita cost of those goods. Throughout Tables 8-14 through 8-18, the analysis calculates the characteristics of an average immigrant by drawing from the CPS pool of recent immigrants (CPS survey data for 2011 through 2013).

In all five tables, as in Tables 8-12 and 8-13 above, many of these fiscal impact estimates may seem large, but recall that they are the sums of discounted (NPV) flows over 75 years. For comparison, consider the lifetime earnings of a native-born worker without a college degree who earns \$35,000 a year. Over a 40-year working life from ages 25 to 65, assuming an average tax rate of 25 percent in income, property, sales, corporate and other taxes, plus another 7.65 percent for employees' contributions for FICA taxes, this worker will accumulate tax payments of \$457,000 in undiscounted dollars. Assuming an annual rate of real growth of 1 percent and a discount rate of 3 percent, the present value of this flow of taxes becomes \$318,000. This is roughly consistent with the total taxes paid in the No Budget Adjustments scenario in Table 8-14 for a new immigrant who arrives ages 0-24. The 75-year present value of taxes paid by that person is \$283,000 if his parent had less than a high school education, \$350,000 if the parent had a high school diploma, and \$417,000 if the parent had some college. (These figures are from the column under the No Budget Adjustments scenario for just the immigrant's own flows, without the flows from dependents. Adding the future flow of taxes in the descendants column increases the NPV of taxes to the estimates shown in the Total Impact column.)

These tables also illustrate the differential impacts of education on taxes paid versus benefits received. For instance, in the No Budget Adjustments section of Table 8-14, an immigrant who arrives during working ages (i.e., ages 25-64) with a BA will pay much more in taxes than an immigrant of similar age with less than a high school education (\$704,000 versus \$258,000). The educational gradient in the receipt of benefits, which is inverted with higher education groups receiving less in benefits, is much less

TABLE 8-14 75-year Present Value Flows for Consolidated Federal, State, and Local Governments for Three Future Budget Scenarios, by Grouped Ages of Immigrant Arrival in the United States, with Public Goods Excluded from Incremental Benefit Costs to Immigrants and Descendants (flows in thousands of 2012 dollars)

CBO Long-term Budget Outlook									
	Total Impact			Immigrant			Descendants		
	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.	Avg.
Total Net									
<HS	35	-225	-257	-117	23	-198	-257	-109	-8
HS	239	-42	-164	49	140	-50	-164	11	39
SomCol	401	157	-155	261	236	99	-155	155	106
BA	495	504	-160	481	301	366	-160	330	150
>BA	446	994	-100	812	287	805	-100	635	177
Avg.	291	269	-201	259	177	196	-201	173	85
Taxes									
<HS	778	340	38	503	382	216	38	272	230
HS	942	475	33	620	482	318	33	365	255
SomCol	1,096	659	40	844	576	438	40	491	354
BA	1,159	978	53	1,005	638	682	53	649	355
>BA	1,088	1,445	78	1,314	618	1,101	78	939	375
Avg.	989	771	43	822	521	543	43	515	307
Benefits									
<HS	743	565	295	619	358	414	295	381	238
HS	704	517	197	570	342	368	197	354	216
SomCol	696	501	194	583	340	340	194	336	247
BA	665	474	213	524	337	316	213	319	205
>BA	641	450	179	503	331	296	179	304	198
Avg.	698	502	244	563	344	347	244	342	221

continued

TABLE 8-14 Continued

CBO Long-term Budget Outlook with Deficit Reduction												
	Total Impact				Immigrant				Descendants			
	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.
Total Net												
<HS	56	-212	-254	-101	34	-189	-254	-99	22	-23	0	-2
HS	263	-28	-162	67	153	-40	-162	22	110	13	0	45
SomCol	427	174	-151	283	250	110	-151	168	178	64	0	115
BA	522	525	-157	503	316	381	-157	345	206	145	0	159
>BA	472	1,023	-97	840	302	826	-97	654	170	197	0	186
Avg.	316	288	-199	279	190	209	-199	186	126	79	0	93
Taxes												
<HS	791	345	38	510	388	218	38	276	404	127	0	235
HS	959	481	33	630	490	321	33	370	470	160	0	260
SomCol	1,116	668	40	858	585	443	40	498	531	225	0	361
BA	1,181	992	53	1,021	650	690	53	659	531	302	0	362
>BA	1,108	1,467	79	1,336	629	1,117	79	954	478	351	0	383
Avg.	1,007	782	43	835	530	550	43	522	477	232	0	313
Benefits												
<HS	735	556	292	611	353	407	292	375	382	149	0	236
HS	697	509	195	563	337	361	195	348	360	147	0	215
SomCol	689	494	192	576	336	333	192	330	353	161	0	246
BA	658	467	211	517	333	310	211	314	325	157	0	204
>BA	636	444	176	496	327	290	176	299	309	154	0	197
Avg.	691	494	242	556	339	341	242	336	352	153	0	220

No Budget Adjustments									
Total Impact				Immigrant				Descendants	
	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.	
Total Net									
<HS	-118	-231	-254	-185	-18	-176	-254	-115	0
HS	13	-105	-170	-67	61	-70	-170	-29	0
SomCol	117	35	-163	67	127	47	-163	78	0
BA	172	283	-177	235	160	251	-177	210	0
>BA	140	627	-120	469	143	565	-120	427	0
Avg.	45	116	-206	77	82	118	-206	92	0
Taxes									
<HS	514	258	37	349	283	181	37	213	0
HS	616	352	30	432	350	258	30	282	0
SomCol	716	479	35	576	417	348	35	372	0
BA	746	704	47	697	451	532	47	493	0
>BA	693	1,025	64	909	428	827	64	695	0
Avg.	643	558	39	569	375	424	39	391	0
Benefits									
<HS	631	489	291	534	300	358	291	328	0
HS	603	458	200	499	290	328	200	311	0
SomCol	599	444	198	509	290	301	198	293	0
BA	574	421	224	462	291	281	224	283	0
>BA	552	397	185	440	286	262	185	268	0
Avg.	598	442	246	491	292	307	246	299	0

NOTE: The "total" figures equal the fiscal impact of the individual immigrant plus the fiscal impacts of that individual's descendants. See accompanying text for a discussion of the difference among scenarios without and with public goods included. The discount rate used for the net present value calculations is 3 percent.

SOURCE: The values are panel generated using Current Population Survey data pools from 2011-2013.



TABLE 8-15 75-year Present Value Flows for Federal Government Only, for Three Future Budget Scenarios, by Grouped Ages of Immigrant Arrival in the United States, with Public Goods Excluded from Incremental Benefit Costs to Immigrants and Descendants (flows in thousands of 2012 dollars)

CBO Long-term Budget Outlook												
	Total Impact				Immigrant				Descendants			
	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.
Federal Net												
<HS	165	-192	-229	-43	13	-215	-229	-119	152	23	0	76
HS	335	-53	-152	76	108	-109	-152	-36	227	56	0	112
SomCol	474	109	-149	271	189	2	-149	85	285	107	0	187
BA	570	399	-160	434	264	220	-160	222	306	178	0	212
>BA	544	793	-104	703	271	567	-104	467	272	226	0	236
Avg.	388	205	-186	256	149	87	-186	99	239	118	0	157
Federal Taxes												
<HS	540	209	15	334	252	121	15	168	288	87	0	166
HS	670	310	15	423	329	197	15	236	342	114	0	187
SomCol	791	449	18	596	402	286	18	332	390	163	0	264
BA	849	700	23	724	456	476	23	456	393	224	0	269
>BA	800	1,073	45	974	446	810	45	688	354	263	0	285
Avg.	710	541	19	582	362	372	19	354	348	170	0	228
Federal Benefits												
<HS	376	400	244	377	239	336	244	287	137	64	0	90
HS	336	363	167	348	221	306	167	272	115	57	0	75
SomCol	317	340	167	324	213	284	167	247	105	56	0	77
BA	279	301	182	291	192	256	182	234	87	45	0	57
>BA	256	280	149	271	175	243	149	221	81	37	0	50
Avg.	322	337	204	326	213	285	204	255	109	52	0	71

continued

CBO Long-term Budget Outlook with Deficit Reduction												
	Total Impact				Immigrant				Descendants			
	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.
Federal Net												
<HS	186	-179	-226	-27	24	-206	-226	-110	162	27	0	82
HS	359	-38	-150	93	121	-99	-150	-26	238	60	0	119
SomCol	501	126	-146	293	203	14	-146	97	298	112	0	195
BA	598	420	-157	457	279	235	-157	236	319	185	0	220
>BA	570	822	-101	731	286	589	-101	487	284	233	0	244
Avg.	413	224	-186	277	162	100	-183	112	251	123	0	165
Federal Taxes												
<HS	553	213	15	342	258	123	15	172	296	90	0	170
HS	687	317	15	433	337	200	15	241	350	116	0	192
SomCol	811	459	18	610	411	292	18	339	400	167	0	270
BA	871	714	23	741	467	485	23	465	403	230	0	276
>BA	820	1,096	46	995	457	826	46	702	363	270	0	293
Avg.	728	553	19	596	370	379	19	361	358	174	0	234
Federal Benefits												
<HS	367	392	241	370	234	329	241	282	133	63	0	88
HS	328	355	165	340	216	299	165	266	112	56	0	74
SomCol	310	332	165	317	208	278	165	242	102	55	0	75
BA	273	294	180	284	188	250	180	229	85	44	0	55
>BA	251	274	147	265	171	237	147	216	80	37	0	49
Avg.	315	329	202	319	208	278	202	250	107	51	0	69

TABLE 8-15 Continued

No Budget Adjustments														
	Total Impact					Immigrant				Descendants				
	0-24	25-64	65+	Avg.		0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.	
Federal Net														
	<HS	-2	-205	-228	-120	-23	-193	-228	-123		21	-11	0	3
	HS	101	-117	-158	-44	38	-124	-158	-70		64	7	0	26
	SomCol	188	-9	-158	78	92	-41	-158	17		96	32	0	61
	BA	247	188	-176	194	136	116	-176	113		110	71	0	81
	>BA	235	447	-123	374	139	348	-123	278		96	98	0	96
Avg.	135	57	-191	76	64	17	-191	26		71	39	0	60	
Federal Taxes														
	<HS	317	142	15	207	169	95	15	121		148	47	0	86
	HS	391	208	13	264	217	148	13	167		174	60	0	97
	SomCol	463	296	15	365	265	211	15	230		198	85	0	135
	BA	490	460	19	456	293	345	19	319		197	116	0	137
	>BA	457	699	34	615	281	564	34	470		176	135	0	146
Avg.	413	357	17	364	236	269	17	247		177	88	0	117	
Federal Benefits														
	<HS	320	347	243	327	192	289	243	244		127	58	0	83
	HS	289	325	171	308	179	272	171	237		110	53	0	71
	SomCol	275	305	173	287	173	252	173	213		102	53	0	74
	BA	243	273	195	261	157	228	195	206		86	44	0	56
	>BA	222	252	157	241	142	215	157	192		81	37	0	49
Avg.	278	300	208	288	173	251	208	221		105	49	0	68	

NOTE: The “total” figures equal the fiscal impact of the individual immigrant plus the fiscal impacts of that individual’s descendants. See accompanying text for a discussion of the difference among scenarios without and with public goods included. The discount rate used for the net present value calculations is 3 percent.

SOURCE: The values are panel generated using Current Population Survey data pools from 2011-2013.

**TABLE 8-16** 75-year Present Value Flows for State and Local Governments only, for Three Future Budget Scenarios, by Grouped Ages of Immigrant Arrival in the United States, with Public Goods Excluded from Incremental Benefit Costs to Immigrants and Descendants (flows in thousands of 2012 dollars)

CBO Long-term Budget Outlook											
	Total Impact				Immigrant				Descendants		
	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.	0-24	25-64	65+
											Avg.
State/Local Net											
<HS	-130	-33	-28	-74	10	16	-28	10	-141	-49	0
HS	-96	11	-12	-26	32	58	-12	47	-128	-48	0
SomCol	-73	48	-5	-10	47	96	-5	70	-120	-48	0
BA	-75	105	0	47	37	146	0	108	-113	-41	0
>BA	-98	202	4	109	16	238	4	168	-114	-36	0
Avg.	-97	65	-16	2	28	109	-16	74	-125	-44	0
State/Local Taxes											
<HS	237	132	23	168	130	94	23	104	107	37	0
HS	272	165	18	196	153	121	18	129	119	43	0
SomCol	305	209	22	249	174	152	22	159	131	58	0
BA	310	278	30	280	182	206	30	193	127	72	0
>BA	287	372	33	341	172	291	33	251	115	81	0
Avg.	279	229	24	239	159	171	24	161	120	58	0
State/Local Benefits											
<HS	367	164	51	242	119	78	51	94	248	86	0
HS	368	154	30	233	121	63	30	81	247	91	0
SomCol	379	161	27	259	128	56	27	88	251	106	0
BA	385	176	31	233	145	60	31	85	240	113	0
>BA	385	170	29	232	156	53	29	83	229	117	0
Avg.	376	165	40	237	131	62	40	87	245	102	0

*continued*

TABLE 8-16 Continued

CBO Long-term Budget Outlook with Deficit Reduction												
	Total Impact				Immigrant				Descendants			
	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.
State/Local Net												
<HS	-130	-33	-28	-74	10	16	-28	10	-141	-49	0	-84
HS	-96	11	-12	-26	32	58	-12	47	-128	-48	0	-74
SomCol	-73	48	-5	-10	47	96	-5	70	-120	-48	0	-80
BA	-75	105	0	47	37	146	0	108	-113	-41	0	-61
>BA	-98	202	4	109	16	238	4	168	-114	-36	0	-59
Avg.	-97	65	-16	2	28	108	-16	74	-125	-44	0	-72
State/Local Taxes												
<HS	237	132	23	168	130	94	23	104	107	37	0	64
HS	272	165	18	196	153	121	18	129	119	43	0	68
SomCol	305	209	22	249	174	152	22	159	131	58	0	90
BA	310	278	30	280	182	206	30	193	127	72	0	87
>BA	287	372	33	341	172	291	33	251	115	81	0	90
Avg.	279	229	24	239	159	171	24	161	120	58	0	78
State/Local Benefits												
<HS	367	164	51	242	119	78	51	94	248	86	0	148
HS	368	154	30	223	121	63	30	81	247	91	0	141
SomCol	379	161	27	259	128	56	27	88	251	106	0	170
BA	385	173	31	233	145	60	31	85	240	113	0	148
>BA	385	170	29	232	156	53	29	83	229	117	0	148
Avg.	376	165	40	237	131	62	40	87	245	102	0	150

No Budget Adjustments												
	Total Impact				Immigrant				Descendants			
	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.
State/Local Net												
<HS	-116	-27	-27	-65	5	17	-27	8	-121	-44	0	-73
HS	-89	12	-12	-23	23	55	-12	42	-112	-43	0	-65
SomCol	-71	44	-5	-11	35	88	-5	61	-106	-44	0	-72
BA	-75	96	-1	41	24	135	-1	97	-99	-39	0	-56
>BA	-94	181	3	96	4	216	3	149	-98	-36	0	-53
Avg.	-90	59	-15	2	19	100	-15	66	-109	-41	0	-64
State/Local Taxes												
<HS	196	115	22	142	113	86	22	93	83	29	0	50
HS	225	144	17	168	133	110	17	115	92	34	0	52
SomCol	253	183	20	211	152	138	20	141	101	45	0	70
BA	256	244	28	241	158	188	28	174	98	56	0	67
>BA	235	326	30	294	148	263	30	225	88	63	0	69
Avg.	230	201	23	205	138	156	23	144	92	45	0	61
State/Local Benefits												
<HS	312	142	49	207	108	69	49	84	204	73	0	123
HS	314	133	29	191	110	56	29	73	203	77	0	118
SomCol	324	139	26	222	117	50	26	80	207	89	0	142
BA	330	148	29	200	134	53	29	77	196	95	0	123
>BA	330	146	27	198	144	47	27	76	186	98	0	123
Avg.	321	142	38	203	120	55	38	78	201	86	0	125

NOTE: The "total" figures equal the fiscal impact of the individual immigrant plus the fiscal impacts of that individual's descendants. See accompanying text for a discussion of the difference among scenarios without and with public goods included. The discount rate used for the net present value calculations is 3 percent.

SOURCE: The values are panel generated using Current Population Survey data pools from 2011-2013.



*continued*

CBO Long-term Budget Outlook with Deficit Reduction											
	Total Impact				Immigrant				Descendants		
	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.	0-24	25-64	65+
Total Net											
<HS	-54	-280	-276	-186	-21	-236	-276	-148	-33	-43	0
HS	153	-97	-185	-15	98	-88	-185	-28	55	-9	0
SomCol	317	101	-175	193	195	62	-175	117	121	39	0
BA	415	449	-180	419	261	331	-180	294	153	118	0
>BA	367	946	-120	755	246	776	-120	603	121	169	0
Avg.	207	215	-221	195	135	161	-221	136	72	54	0
Taxes											
<HS	791	345	38	510	388	218	38	276	404	127	0
HS	959	481	33	630	490	321	33	370	470	160	0
SomCol	1,116	668	40	858	585	443	40	498	531	225	0
BA	1,181	992	53	1,021	650	690	53	659	531	302	0
>BA	1,108	1,467	79	1,336	629	1,117	79	954	478	351	0
Avg.	1,007	782	43	835	530	550	43	522	477	232	0
Benefits											
<HS	844	624	315	693	408	454	315	423	436	170	0
HS	806	578	217	644	392	409	217	397	414	169	0
SomCol	800	567	215	665	390	381	215	381	409	186	0
BA	766	544	234	602	389	359	234	364	378	184	0
>BA	741	522	199	581	383	340	199	351	358	181	0
Avg.	800	567	264	640	394	389	264	386	405	178	0



TABLE 8-17 Continued

	No Budget Adjustments									
	Total Impact				Immigrant				Descendants	
	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.	0-24	25-64
Total Net										
<HS	-267	-322	-282	-296	-90	-239	-282	-179	-176	-84
HS	-135	-197	-197	-176	-12	-132	-197	-93	-123	-65
SomCol	-33	-63	-192	-53	55	-17	-192	12	-88	-46
BA	26	181	-205	122	87	186	-205	144	-61	-5
>BA	-2	523	-149	355	69	499	-149	360	-70	24
Avg.	-103	19	-234	-36	9	54	-234	26	-112	-35
Taxes										
<HS	514	258	37	349	283	181	37	213	231	76
HS	616	352	30	432	350	258	30	282	265	94
SomCol	716	479	35	576	417	348	35	372	299	130
BA	746	704	47	697	451	532	47	493	295	172
>BA	693	1025	64	909	428	827	64	695	264	198
Avg.	643	558	39	569	375	424	39	391	268	134
Benefits										
<HS	780	580	319	644	373	420	319	392	407	160
HS	751	550	227	608	362	390	227	376	389	159
SomCol	749	542	227	629	362	365	227	360	387	177
BA	720	523	253	575	364	346	253	349	356	177
>BA	695	502	231	554	360	328	213	336	335	174
Avg.	746	539	273	604	365	370	273	365	381	169

NOTE: The “total” figures equal the fiscal impact of the individual immigrant plus the fiscal impacts of that individual’s descendants. See accompanying text for a discussion of the difference among scenarios without and with public goods included. The discount rate used for the net present value calculations is 3 percent.

SOURCE: The values are panel generated using Current Population Survey data pools from 2011-2013.

TABLE 8-18 75-year Present Value Flows for Federal Government Only, for Three Future Budget Scenarios, by Grouped Ages of Immigrant Arrival in the United States, with Public Goods (defense, federal subsidies, and rest-of-world payments) Included in Incremental Benefit Costs to Immigrants and Descendants (flows in thousands of 2012 dollars)

CBO Long-term Budget Outlook												
	Total Impact				Immigrant				Descendants			
	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.
Federal Net												
<HS	53	-261	-251	-127	-43	-263	-251	-168	95	2	0	42
HS	23	-123	-175	-7	52	-157	-175	-86	170	34	0	79
SomCol	361	34	-173	180	134	-47	-173	34	228	81	0	147
BA	460	321	-183	348	208	170	-186	171	252	151	0	177
>BA	436	714	-127	616	215	517	-127	415	222	197	0	201
Avg.	277	131	-209	171	93	39	-209	48	184	93	0	122
Federal Taxes												
<HS	540	209	15	334	252	121	15	168	288	87	0	166
HS	670	310	15	423	329	197	15	236	342	114	0	187
SomCol	791	449	18	596	402	286	18	332	390	163	0	264
BA	849	700	23	724	456	476	23	456	393	224	0	269
>BA	800	1,073	45	974	446	810	45	688	354	263	0	285
Avg.	710	541	19	582	362	372	19	354	348	170	0	228
Federal Benefits												
<HS	487	470	266	461	294	384	266	337	193	85	0	124
HS	447	433	189	430	276	354	189	322	171	79	0	108
SomCol	430	415	191	415	268	333	191	299	162	82	0	117
BA	389	378	206	376	248	306	206	285	141	73	0	91
>BA	363	359	172	357	231	293	172	273	132	66	0	84
Avg.	433	411	227	412	269	334	227	306	165	77	0	106

continued

TABLE 8-18 Continued

CBO Long-term Budget Outlook with Deficit Reduction												
	Total Impact				Immigrant				Descendants			
	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.
Federal Net												
<HS	77	-247	-248	-109	-31	-253	-248	-158	107	6	0	49
HS	249	-107	-172	12	66	-146	-172	-75	184	39	0	87
SomCol	390	53	-170	203	148	-34	-170	47	241	87	0	156
BA	490	344	-180	372	224	185	-180	186	266	158	0	186
>BA	465	744	-124	646	231	539	-124	435	234	205	0	210
Avg.	304	151	-206	193	107	52	-206	62	197	99	0	131
Federal Taxes												
<HS	553	213	15	342	258	123	15	172	296	90	0	170
HS	687	317	15	433	337	200	15	241	350	116	0	192
SomCol	811	459	18	610	411	292	18	339	400	167	0	270
BA	871	714	23	741	467	485	23	465	403	230	0	276
>BA	820	1,096	46	995	457	826	46	7020	363	270	0	293
Avg.	728	553	19	596	370	379	19	361	358	174	0	234
Federal Benefits												
<HS	4,477	460	263	452	289	376	263	330	188	84	0	122
HS	438	424	187	421	271	346	187	316	167	78	0	106
SomCol	421	406	188	407	263	326	188	293	158	80	0	114
BA	381	371	203	368	243	299	203	279	138	71	0	89
>BA	356	352	170	350	227	287	170	237	129	65	0	83
Avg.	424	402	225	403	263	327	225	300	161	75	0	104

No Budget Adjustments									
Total Impact				Immigrant			Descendants		
	0-24	25-64	65+	Avg.	0-24	25-64	65+	Avg.	
Federal Net									
<HS	-151	-295	-255	-231	-96	-256	-255	-187	-43
HS	-47	-209	-185	-153	-35	-187	-185	-135	-18
SomCol	38	-107	-187	-42	20	-105	-187	-49	7
BA	101	85	-205	81	63	51	-205	47	34
>BA	92	342	-151	259	65	283	-151	210	49
Avg.	-12	-41	-219	-37	-9	-47	-219	-40	2
Federal Taxes									
<HS	317	142	15	207	169	95	15	121	86
HS	391	208	13	264	217	148	13	167	97
SomCol	463	296	15	365	265	211	15	230	135
BA	490	460	19	456	293	345	19	319	137
>BA	457	699	34	615	281	564	34	470	145
Avg.	413	357	17	364	236	269	17	247	117
Federal Benefits									
<HS	468	438	270	437	265	351	270	308	129
HS	438	417	199	417	252	335	199	302	115
SomCol	425	403	202	407	2,445	316	202	280	128
BA	390	375	224	375	230	293	224	272	103
>BA	365	356	185	356	216	281	185	260	96
Avg.	425	398	236	401	246	315	236	287	115

NOTE: The “total” figures equal the fiscal impact of the individual immigrant plus the fiscal impacts of that individual’s descendants. See accompanying text for a discussion of the difference among scenarios without and with public goods included. The discount rate used for the net present value calculations is 3 percent.

SOURCE: The values are panel generated using Current Population Survey data pools from 2011-2013.

steep than the gradient for taxes paid. An immigrant arriving at working age with a college degree will receive less in benefits than the high school dropout (\$281,000 compared to \$358,000), but this difference is far less than it was for taxes paid (\$532,000 versus \$181,000). Overall, since taxes are sharply increased with education, and benefits are reduced (albeit not as dramatically), one can see why the higher levels of education among recent immigrants produce a more positive net fiscal impact than previous immigrants produced.

The consolidated amounts in Tables 8-12, 8-13, and 8-14 are the sum of the corresponding federal amounts in Table 8-15 and the state/local amounts in Table 8-16. The two CBO-based scenarios are the same at the state and local levels because there is no deficit reduction plan for state and local budgets. By statute, those budgets are required to balance. These results show that almost all of the positive fiscal impacts of immigration come from the federal level. State and local impacts are mostly negative for the average new immigrant as an individual and for that individual's descendants. Comparing the difference in fiscal impacts of the individual with those of the immigrant's descendants gives some indication of what drives these patterns. The descendants' amounts are mostly negative because state and local governments must pay the upfront costs of education for young immigrants who are still dependents and for the young native-born children of new immigrants. Even though working-age immigrants pay state and local taxes, these receipts are not large enough to compensate for the cost of educating their children. In addition, the 75-year time window for our future-looking projections cuts the analysis off when some of the children and grandchildren of the hypothetical immigrant are in their highest earning, highest tax-paying ages. Although those amounts would be heavily discounted in the calculations because they are relatively far in the future, there would likely be some additional benefit from these flows into state and local budgets if the projection was extended further and captured them.

Table 8-16 also does not show as wide a spread in the present value of tax revenues by education group at the state and local level as at the federal level. State and local governments rely much more heavily on revenue sources other than income taxes than does the federal government. Sales and property taxes are less correlated with education than are income taxes. A key upshot of this is that higher levels of education among recent immigrants, which seems to be such a boon to federal budgets, cannot help as much to maintain fiscal balance at the state and local level. Another is that educating the children of immigrants, while demonstrably helpful at the federal level because of the progressivity of federal taxes, is much less of a gain for the states, where the sales and property tax contributions of more educated residents do not seem to exceed those of less educated residents as much as taxes do at the federal level.

### Future Impacts: Summary

Although estimates vary across scenarios, fiscal impacts of immigrants are generally positive at the federal level and negative at the state and local levels. State and local governments bear the burden of providing education benefits, upon arrival and continuing, to young immigrants and to the children of immigrants, but their methods of taxation tend to recoup relatively fewer contributions later from the most highly educated taxpayers. Federal benefits, in contrast, are largely focused on the elderly, so the relative youthfulness of arriving immigrants means that they tend to have positive fiscal impacts on federal finances in the short term. In addition, federal taxes are more strongly progressive, drawing more contributions from the most highly educated. The investment in public education requires public funds and pays public dividends, but a key issue is that the public dividends tend to be absorbed by the federal government, while the public funds are provided by the states. The fact that states bear much of the fiscal burden of immigration may incentivize state-level policies to exclude immigrants. Equity issues between the federal government and across states should be given consideration in future iterations of immigration policy.

Forward-looking projections of the net fiscal impact of an additional immigrant and descendants generate a relatively wide range of possible results. Future developments are uncertain, and, across a range of reasonable scenarios, the fiscal impact from an additional immigrant can be positive or negative depending on which assumptions are used in the calculation. Three assumptions are particularly important in determining the results: the future of government budgets, the treatment of public goods (i.e., how costs on budget items such as national defense change are assumed to change with an additional immigrant), and the immigrant's characteristics.

The future path of fiscal policy is important for assessing the fiscal impacts of immigrants. Under "business as usual," in which federal deficits continue and debt increases rapidly relative to GDP, immigrants are not valuable to governments (i.e., they do not have a positive fiscal impact) because nobody is valuable to governments. The net fiscal impact for any U.S. resident, immigrant or native-born, is negative. When fiscal sustainability is assumed to result in future spending cuts and tax increases, immigrants are more valuable than native-born Americans (that is, their net fiscal impact is greater in a positive direction).

The treatment of spending on public goods is important for assessing the fiscal impact of immigrants. Federal defense spending is a very large part of the budget. But the addition of a single citizen through immigration or birth cannot plausibly increase defense spending, which is easily shared by all citizens, while it clearly must increase spending on transfer programs

such as Social Security. Therefore, it is reasonable to omit the per capita cost of pure public goods, such as national defense, from the incremental cost to government of a single additional citizen. However, for larger increases in population through sustained immigration, this reasoning no longer holds and the net fiscal impact of immigrants may dip negative if spending on public goods is assumed to increase with the resulting population increase.

**The characteristics of a new immigrant are important for assessing the fiscal impact.** During the past 20 years, there has been considerable change in many characteristics of immigrants, chief among them—for purposes of understanding fiscal impacts—being age structure and educational attainment. If a future immigrant looks like recent new immigrants, rather than like an average immigrant of the entire first generation alive today, that immigrant will have a more positive net fiscal impact because of increased levels of education and concentration at working ages, the characteristics most lucrative to governments from the perspective of tax collections.

**Today's immigrants have more education, making them more positive contributors to government finances than immigrants in the past.** If today's immigrants had the same lower educational distribution as immigrants two decades ago, their positive fiscal impact would have been 30-70 percent lower. Whether these trends will continue or not remains uncertain, but the historical record suggests that the total net fiscal impact of immigrants across all levels of government may have become more positive over time.

**An immigrant and a native-born person with similar characteristics will likely have about the same fiscal impact.** Persons with higher levels of education contribute more positively to government finances regardless of their immigrant status. Furthermore, within age and education categories, immigrants generally have a more salutary effect on budgets than a native-born person because they are disqualified from some benefit programs and because their children, on average, tend to achieve higher levels of education, earnings, and tax paying. Of course, government policy has much more control over levels of immigration than over rates of native population growth, and thus the policy implications of this point are minimal.

## 8.4 ANNEX: TECHNICAL DOCUMENTATION FOR THE FISCAL ESTIMATES

Chapter 8 contains estimates of costs and benefits of U.S. residents by generation, as well as discounted flows, of taxes paid and benefits received, that are expected to arise from one new immigrant arriving in the United States in the future, including flows attributable to that immigrant's descendants. This annex explains the calculation steps involved in the creation of this dataset of flows and in all of the NPV calculations that appear in Chapter 8. After an overview of the calculation steps, the second section documents in detail how the age profiles of taxes and benefits were generated. The third section explains the methodology for estimating educational transmission from one generation to the next and projecting educational attainment of future immigrants and descendants. The fourth subsection covers the projection of future taxes and benefits, and the final subsection documents how key demographic characteristics (survivorship, emigration, and number of descendants) were projected for future immigrants and their descendants.

### Overview of Calculation Steps

The same input data that were used in the historical static calculations in Section 8.2 were used in the forward projections in Section 8.3, but the future-looking projected flows are only used in the 75-year horizon calculations. The steps in the forward-looking calculation are described briefly in this section in a numbered list. The subsequent sections of the annex give complete details for each step.

#### *1. Estimate Age Profiles of Tax and Benefit Flows by Immigrant Status and Education*

The profiles are smoothed, per capita age schedules of tax and benefit flows, estimated from rolling 3-year CPS samples and augmented with other data sources where necessary. They are adjusted by an overall factor (i.e., one multiplicative factor is applied to all age groups) so that the aggregates match totals from the NIPA for the central year of the 3-year period. For example, the age profiles for 2012 come from pooled CPS samples for 2011-2013 and are adjusted to 2012 NIPA total. The “jumping-off” year for the future-looking 75-year flow projections is 2012.

Age profiles are estimated for five immigrant groups and five educational attainment groups. The immigrant groups are foreign born arriving within the last 0-4 years, foreign-born arriving within the last 5-9 years, foreign-born arriving more than 10 years ago, native-born children of foreign-born



parents, and native-born children of native-born parents. The five education groups are less than high school completion (<HS), completed high school (HS), some college (SomCol), graduated from college with a degree (BA), and education beyond the first college degree (>BA). When the CPS has individual-level indicators of a particular flow, those are used. Where a household-level flow is available, assumptions are made about the allocation of the household amount to individuals within the household.

Some flows are not attributable to individuals but instead can be assigned to everyone in the population on a per capita basis. These include public goods, such as defense and subsidies, interest payments on debt, general costs of public administration, and other costs shared across society such as the costs of police, fire, and building and maintaining public infrastructure. For some analyses, it is appropriate to exclude some of these costs, for others it is more reasonable to include them. The tables in the chapter specify whether and which public goods were included in per capita costs.

For the historical static calculations in Section 8.2, the same rolling 3-year pooled CPS samples are used, but at the individual level rather than collapsed into per capita age profiles. However, the microdata is still adjusted to agree with NIPA totals for the central year at the aggregate level. The data sources and assumptions for each flow are listed in the next subsection of this annex, followed by details on the aggregate NIPA amounts to which the age profiles were adjusted.

## *2. Estimate Future Educational Attainment of Young Immigrants and of All Immigrant Descendants*

Because an individual's tax payments and benefit receipts differ so much by the individual's educational attainment, to predict future flows for an immigrant one must first predict the educational level that individual and his descendants will attain. An immigrant who arrives after age 25 is likely to maintain the education level observed on arrival, so we assume no change in educational attainment after age 25. If the immigrant arrives before age 25, we instead predict a future education level by estimating regression functions that predict offspring education based on parental education.

The regression functions were estimated using Decennial Census samples 15 years apart. The earlier sample was used to observe the education of parents born in particular regions who had children ages 10-16 living in their households. The later sample provided observations of the education of persons ages 25-31 whose parents were born in that region. These distributions were compared to derive regression functions to predict a child's educational attainment based on parents' education and birth region. Separate functions were derived for native-born children and for foreign-born

children. In predicting ultimate education levels, random error terms were added to maintain realistic educational distributions at each generation. More details on this process are included below.

### *3. Project Future Taxes and Benefits*

The NPV calculations start with the jumping-off year of 2012 and continue forward 75 years to 2087. To estimate federal flows, three different scenarios are used, as follows:

1. The CBO's Long-Term Budget Outlook's extended baseline scenario, which projects what would happen in the future under all currently legislated tax and spending provisions but no new ones (Congressional Budget Office, 2014a).
2. A CBO version of the extended baseline scenario but with a long-term plan to reduce federal deficits.
3. A simple No Budget Adjustments scenario in which no budget-mitigation mechanisms are assumed but the age profiles themselves simply shift up every year by an assumed rate of productivity growth (1% was used).

State and local budgets were handled differently because they cannot run large deficits like the federal government can. For the CBO-based scenarios, we assumed that all state and local flows grow at the same rate as national GDP in CBO's baseline budget projection (which does not include economic feedbacks from debt to economic performance, although CBO does have alternative projections that do incorporate equilibrium effects). For the No Budget Adjustments scenario, state and local flows were handled in the same way as federal flows, with age profiles of taxes paid and benefits received shifting upward by an assumed 1 percent per year. More details on these projections and what they do to future deficits appear in the detailed discussion below.

### *4. Project Survivorship, Emigration, and Number of Descendants*

To project fiscal impacts of an immigrant arrival into the future, one needs to know how likely the immigrant is to survive in each future year and to not emigrate from the United States (either back to the immigrant's country of origin or to another country). To project the fiscal impacts of the immigrant's descendants, one needs to know how many children will be born and what their survivorship and risk of emigration will be. For the projections in Chapter 8, all of these demographic factors are the same as those used for the demographic projections elsewhere in the report.

However, there is one additional assumption needed to cover the case of young children whose immigrant parents choose to emigrate. We assume here that children of immigrants ages 0 to 19 years whose parents emigrate will also emigrate, even if they are native born. See the section below on projection of demographic characteristics for further details.

*5. Final Calculation: Sum Up Discounted Projected Future Flows Based on Entry Characteristics and Apply a Discount Rate*

The final “thought experiment” of estimating the fiscal impact of the arrival of one additional immigrant combines the results from steps 3 and 4. Defining survivorship broadly to include the risk of emigration along with the risk of death, this process then involves weighting the projected per capita flows by the survivorship probability of a hypothetical immigrant and that immigrant’s hypothetical descendants at each year from 2012 to 2087, given the immigrant’s level of education and age at entry.

To talk through one example, imagine an immigrant arriving at age 32 in 2012 with less than high school education. The age profiles specify that this immigrant will have a particular level of taxes paid and benefits received in 2012, and the difference between them is that person’s net fiscal impact in 2012. For 2013, the calculation uses the projected taxes paid and benefits received of a now 33-year-old with less than high school education, weighted by the probability of having survived to age 33 and not emigrated, discounted by 3 percent. The process continues for a 34-year-old in 2014, this time discounted by 3 percent each year for 2 years. The net fiscal impact for the 35-year-old immigrant in 2015 is discounted for each of 3 years, and so on. The discounted annual net fiscal impacts for all 75 years are then added together to give the NPV of the immigrant’s arrival attributable just to that individual (excluding flows from the immigrant’s descendants).

The discounted NPV for each of the immigrant’s descendants is calculated similarly. Based on fertility rates, the immigrant has an expected number of births in 2013, weighted by the probability of a newborn surviving (and not leaving with an emigrating parent). This number of children is multiplied by the taxes paid less benefits received that are expected to accrue to a newborn child in 2013, and so for each year as the expected children age and progress through their years of public schooling. Eventually in one or another future year, each surviving child of the immigrant is old enough to have a positive expected number of births, and the discounted NPV calculation process will continue forward for the immigrant’s grandchildren as well. All expected (based on fertility, survivorship and emigration rates, etc.) offspring over the 75-year period are included in deriving the summed-up fiscal impact for the immigrant’s descendants.

For comparative purposes, a similar analysis can be done for native-born persons of native-born parents. Even though natives only ever “arrive” at birth (age 0), the calculation for a native-born individual that is included in Chapter 8 is for the discounted flows starting from age 25. But that calculation is used just for comparison with an immigrant arriving at age 25 (to equalize the comparison, given that the immigrant does not receive public schooling benefits in the United States).

The immigrant calculations described here give the 75-year present values for a particular age and education at arrival. However, for purposes of the issues discussed in Chapter 8, we are usually interested in the discounted present value for a set of average characteristics for a particular group. In the chapter, averages for recent immigrants and all immigrants are shown.

### Age Profiles of Taxes and Benefits

#### *CPS Data and Definition of Immigrant Generations*

Most of the profiles used in *The New Americans* (National Research Council, 1997) were based on CPS data, pooling March samples for 1994 and 1995. Federal tax and benefit flows were adjusted to national aggregates as measured in NIPA for 1994. State and local benefits were adjusted to agree with 1994 fiscal year totals, while state and local taxes were adjusted to follow a balanced budget rule.

The age profiles used in this report also use mostly CPS data, pooling samples over 3 years to get the appropriate age shape for the central year, then adjusting to national aggregates for the central year. The profiles shown here are for 2012: The age profiles are calculated from CPS samples for 2011, 2012, and 2013 and are adjusted to be consistent with national aggregates for calendar year 2012.

For each age profile, the source in the CPS for that profile is noted below, as is the source for the national aggregate that the age profile is adjusted proportionally to match. Separate profiles were generated for each of five immigration groups with each of five education levels. Immigrants are divided by generation and, for the first generation, by the time since their arrival in the United States:

- Foreign-born (first generation)<sup>38</sup>  
–arrived 0-4 years ago

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<sup>38</sup>This group does *not* include those born abroad of American-citizen parents, as those persons would be considered citizens at birth and thus not affected by immigration policy. Such persons are considered to be third-plus generation for this report.

- arrived 5-9 years ago
- arrived 10 or more years ago
- Native-born with two foreign-born parents (second generation)
- Native-born with two native-born parents (third generation)<sup>39</sup>

In its computations, *The New Americans* (National Research Council, 1997) split native-born person with one foreign-born parent and one native-born parent 50/50 between the second and third-plus generations. This is appropriate for the forward-looking present value calculation because it credits an immigrant and nonimmigrant who have a child together as each having half of that child. Thus, higher or lower expected fertility for immigrant groups as compared to native groups will be accounted for in the calculation of net fiscal impacts of descendants. However, for the historical static calculations in Section 8.2, these children can be considered as either second or third generation, depending on the calculation scenario.

The age profiles were further separated into the five education groups, with immigrant descendants and immigrants themselves moving from one education category to another based on estimated generational transitions. The five education groups, abbreviated as <HS, HS, SomColl, BA, and >BA, are defined above in the “Overview of Calculation Steps.”

### *Institutionalized Persons (mainly nursing home residents)*

Because the CPS does not include persons in institutions, each age profile must be adjusted to reflect the total U.S. resident population instead of just the household-resident population. This issue is most acute at oldest ages, when there are high rates of nursing home residence. For some age profiles, the adjustment for the “missing” residents in the CPS is made by assuming the value for the net fiscal flows for these persons is zero, or is the same as those not in nursing homes. For other age profiles, a different assumption is made based on external data sources. Data on the percentage of persons in institutions, by age and immigration status, are from the Integrated Public Use Microdata Series (IPUMS) for 1980, 1990, and 2000 and the American Community Survey (ACS) for the period 2006-2012, interpolated for years with no sample.

The IPUMS and ACS data for most years do not allow separation of nursing home residence by other types of institutionalization. All persons ages 65 and older in institutions are assumed to be in nursing homes. Also, IPUMS and ACS only allow separating institutionalization percentages by first generation versus second or higher generations. For this report, the

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<sup>39</sup>Throughout this report, the term “third-plus generation” is used as shorthand to refer to all U.S. residents who are technically third generation or more from an immigrant ancestor.

proportion institutionalized for second and higher generations is applied to both the second and third-plus generation estimates.

While rates of institutionalization are generally lower for immigrants compared to natives, and much lower for recent immigrants, they are very relevant for estimating the correct flows of some transfer programs that benefit the oldest age groups, such as Medicare and Medicaid, and for estimating the difference between average benefits for immigrants and the native-born.

### *Allocations to Individuals When CPS Data Are Household Level*

When CPS source data are used at individual level, the data are used “as is,” unless otherwise noted. When the source data are at the household level, the allocation of the household amount to individuals within the household is specified for each variable.

### *Top Codes*

CPS income variables have top codes to prevent identification of individuals. For most years and most survey items, a group average for those to whom the top code applies is given in the CPS data. Where CPS data do not have a top-coded value (mostly for years prior to 2011), twice the value of the highest non-topcoded value is substituted for records in that category.

### *Levels of Government*

Flows are divided into federal government flows and state/local government flows. For programs where federal and state/local resources are combined, the program is treated as federal if the federal government provides a large proportion of the resources for the program, treated as state/local if state/local governments provide most of the funding, and divided into separate flows with the same age shape but different aggregate controls where there are substantial funding components from both levels of government.

### *Variable List*

The following list defines the variables used in the datasets derived from the CPS data to generate the age profiles for taxes paid and benefits received. This information is provided for readers interested in working with the panel’s datasets or with data extracts similar to those used by the panel for the forward-looking projections in Chapter 8.

*Group characteristics:*

year	Year of age profile (central year of 3-year pooled CPS samples)
age	Age groups, single year to 80+
immig	Immigration groups (see following section for groups)
edu	Education groups (see following section for groups)
totpop	Total resident population represented by year/age/immig/edu group

*Federal taxes:*

inctx_f	Income tax, federal
corptx_f	Corporate tax, federal
extx_f	Excise tax, federal
fica_f	FICA contributions (employer and employee combined), federal
smicon_f	Contributions for Supplementary Medical Insurance (Medicare Part B), federal
unmpcon_f	Unemployment insurance contributions, federal
othtx_f	Other taxes, federal

*State/local taxes:*

inctx_s	Income tax, state/local
prptxown_s	Property tax attributed to owners of property, state/local
prptxrent_s	Property tax estimated as “passed down” to renters, state/local
salestax_s	Sales tax, state/local
othtx_s	Other taxes, state/local

*Federal benefits:*

oasdi_f	Social Security payments (Old-Age and Disability Insurance), federal
hi_f	Medicare Part A benefits (hospital insurance), federal
smi_f	Medicare Part B benefits (also called supplementary medical insurance), federal
mcaidnhom_f	Medicaid payments to nursing homes, federal portion
mcaidnoninst_f	Medicaid payments to other than nursing homes, federal portion
incunemp_f	Unemployment benefit payments, federal
retrr_f	Railroad retirement, federal

incssi_f	Supplemental security income (to low-income old, blind, disabled), federal
eitcred_f	EITC payments, federal
fdstmp_f	Food stamp benefits (now called SNAP), federal
schlunch_f	School lunch benefits, federal
incwelfr_f	Welfare program benefits (AFDC, TANF, GA, welfare reform benefits), federal
jail_f	Incarceration costs, federal
vetben_f	Veterans' benefits (military retirement, disability, readjustment), federal
refugee_f	Refugee settlement programs, federal
scholar_f	Scholarships and student loan subsidies, federal
rentsub_f	Rent subsidies, federal
pubhous_f	Public housing benefits, federal
heatsup_f	Energy payment subsidies for low-income people, federal
ret_f	Retirement benefits, federal
cong_f	Congestible goods (transportation, public admin, etc.), federal

*State/local benefits:*

mcaidnhom_s	Medicaid payments to nursing homes, state portion
mcaidnoninst_s	Medicaid payments to other than nursing homes, state portion
schip_s	SCHIP benefits, state
incssi_s	Supplemental security income (to low-income old, blind, disabled), state
jail_s	Incarceration costs, state/local
wic_s	WIC benefits, state
lowedu_s	Primary and secondary education, state/local
college_s	Public college and university support, state/local
ret_s	Retirement benefits, state/local
incwkcom_s	Workers' compensation benefits, state/local
bilingual_s	Bilingual education costs, state/local
cong_s	Congestible goods (police, public admin, etc.), state/local

*For comparative purposes:*

wgsal	Wages and salary income
gia_x	Grants-in-aid from federal to state/local governments (on a per capita basis)



*“Pure” public goods (all distributed on a per capita basis to the entire population, so no further documentation for these flows appears in this annex):*

int_fx	Interest payments on the federal debt
def_fx	Defense spending, federal
sub_fx	Subsidies, federal
rowgr_fx	Grants to rest-of-world, federal
int_sx	Interest payments by state and local governments
sub_sx	Subsidies, state/local

*Summary groups of age profiles:*

purepub	All variables in “pure” public goods group above
fedtax	All variables in federal tax group above
sltax	All variables in state/local tax group above
fedold	Federal benefits based on old age (oasdi_f, hi_f, smi_f, retrr_f, ret_f)
fedpoor	Federal benefits based on low income (mcaidnhom_f, mcaidnoninst_f, incunemp_f, incssi_f, eitcred_f, fdstmp_f, schlunch_f, incwelfr_f, rentsub_f, pubhous_f, heatsup_f)
fededu	Federal education benefits (scholar_f)
fedother	Other federal benefits (jail_f, vetben_f, refugee_f, cong_f)
fedben	Total federal benefits (fedold, fedpoor, fededu, fedother)
slold	State/local benefits based on old age (ret_s)
slpoor	State/local benefits based on low income (mcaidnhom_s, mcaidnoninst_s, incssi_s, schip_s, wic_s)
sledu	State/local education benefits (lowedu_s, college_s, bilingual_s)
slother	Other state/local benefits (jail_s, incwkcom_s, cong_s)
slben	Total state/local benefits (slold, slpoor, sledu, slother)
fednet	Net federal impact (taxes-benefits)
slnet	Net state/local impact (taxes-benefits)
tottax	Total taxes (fed and s/l combined)
totben	Total benefits (fed and s/l combined)
totnet	Net total impact (fed and s/l combined)

*Codes for immigration groups (immig variable):*

0	All groups combined
10	Foreign-born (FB, all arrival groups combined)
11	FB, arrived 0-4 years ago

12	FB, arrived 5-9 years ago
13	FB, arrived 10+ years ago
20	Native-born (NB) of 2 FB parents (2nd generation)
25	NB with 1 FB parent, 1 NB parent (2.5 generation)
30	NB with 2 NB parents plus FB but citizen at birth (3rd generation)

*Codes for education groups (edu variable):*

0	Total population (all education groups combined)
1	Less than HS
2	HS graduate or GED
3	Some college
4	Bachelor's degree
5	Any post bachelors

*Details on Each Flow*

The following documentation describes source data, aggregates to which totals are normalized, and assumptions underlying tax revenue and various benefit and public cost flow calculations used in the fiscal impact estimates. This section does not include description of flows assigned on a per capita basis.

**Federal Income Taxes (variable name: *inctx\_f*)**

- 
- Source data: CPS individual-level variable *fedtax*, which is imputed by the Census Bureau's tax model. For married couples filing jointly, the tax model assigns the whole amount to one of the spouses; but this has been recoded to give half of the amount to one spouse, half to the other.
- Aggregate: NIPA (National Income and Product Accounts) Table 3.2, Federal Government Current Receipts and Expenditures, personal current taxes.
- NH assumpt: Non-household (i.e., institutionalized) persons assumed to pay no income tax.
- Topcoding: *fedtax* = 99997 for years before 2011, used 2 x highest non-topcoded value for the year.

**Federal Corporate Taxes (variable name: *corptx\_f*)**

- 
- Source data: 80% of CPS individual-level variables for dividend and interest income (*incdivid+incint*) plus 20% of CPS individual-level variable for wages (*incwage*).

- Aggregate: NIPA Table 3.2. Federal Government Current Receipts and Expenditures, taxes on corporate income. (There is a much smaller amount in the state/local expenditures table titled “taxes on corporate income,” but that is considered to be similar enough to a sales tax that it is included with state sales taxes.)
- NH assumpt: Non-household persons are assumed to have 20% of assets of persons in households. Data underlying this assumption originate from U.S. National Transfer Accounts publications by Lee et al. (2011).
- Topcoding: `incdivid = 99997` and `incint = 99997` for years prior to 1999, used 2 x highest non-topcoded value for the year (*incwage* has imputed values for topcodes).

### Federal Excise Taxes (variable name: `extx_f`)

- Source data: Excise taxes are predicted based on a regression equation estimated from data from the Consumer Expenditure Survey where household adjusted gross income (AGI) and household structure predict the amount the household spends on consumption of alcohol, tobacco, and gasoline. (These three items make up the bulk of excise taxes in most years.) This regression equation is then applied to the household sum of values in the individual-level CPS variable `adjginc`. Household amount is allocated to individuals in the household based on individual shares of household AGI, but dividing total spousal couple AGI evenly between both spouses. AGI amount reduced by \$1,250 as in *The New Americans* (National Research Council, 1997) (\$1,250 real 1994 dollars are adjusted to real value for each subsequent year) for first generation, as this amount is assumed to be remitted to the country of origin.
- Aggregate: NIPA Table 3.2. Federal Government Current Receipts and Expenditures, Excise taxes.
- NH assumpt: Non-household persons are assumed to have \$0 for these taxes.
- Topcoding: `adjginc = 99997` for years prior to 1999, used 2 x highest non-topcoded value for the year.

### FICA Taxes (variable name: `fica_f`)

- Source data: CPS individual-level variable `fica`, which is imputed by Census Bureau’s tax model; same change made for married couples filing jointly as for federal income taxes (assigned 50/50 to spouses).

Aggregate: NIPA Table 3.6. Contributions for Government Social Insurance, Employer and Employee contributions for Old-Age, Survivors, and Disability Insurance; and Hospital Insurance.  
 NH assumpt: Non-household persons are assumed to pay no FICA tax.  
 Topcoding: No topcoding.

---

**Federal SMI Contributions (variable name: smicon\_f)**

---

Source data: Allocated based on enrollment in Medicare (CPS variable himcare = 2).  
 Aggregate: NIPA Table 3.6. Contributions for Government Social Insurance, Supplementary Medical Insurance.  
 NH assumpt: Non-household persons are assumed to have \$0 for these taxes.  
 Topcoding: Not applicable.

---

**Federal Unemployment Contributions (variable name: unmpcon\_f)**

---

Source data: Allocated based on any contributions to FICA taxes in Medicare (CPS variable fica > 0) to reflect flat amount contributed by employers for each employee.  
 Aggregate: NIPA Table 3.6. Contributions for Government Social Insurance, Unemployment Insurance.  
 NH assumpt: Non-household persons are assumed to have \$0 in federal unemployment contributions.  
 Topcoding: Not applicable.

---

**Other Federal Taxes (variable name: othtx\_f)**

---

Source data: Following *The New Americans* (National Research Council, 1997), federal “other” has same age shape as federal income tax.  
 Aggregate: Remaining revenue items from federal taxes and social contribution tables.  
 NH assumpt: Non-household persons are assumed to have \$0 for these taxes.  
 Topcoding: Not applicable.

---

**State Income Taxes (variable name: inctx\_s)**

---

Source data: CPS individual-level variable state tax, which is imputed by Census Bureau’s tax model. For married couples filing jointly, amount is divided 50/50 between spouses.  
 Aggregate: NIPA Table 3.3, State and Local Government Current Receipts and Expenditures, personal current taxes.

NH assumpt: Non-household persons are assumed to have \$0 for these taxes.

Topcoding: `statetax` = 99997 for years prior to 2011; used 2 x highest non-topcoded value for the year.

### Property Tax (owners/renters) (variable names: `prptxown_s`, `prptxrent_s`)

Source data: For owners, CPS household-level variable `proptax`, for those households occupied by the owners (`ownership` = 10). For renters, it is based on percentage who rent. For both, amount is allocated to adults (i.e., nondependents) in the household but weighted by family size. (For example, if a household has two families in it, an adult couple and a couple with two children, one-third of the amount would be allocated to the couple, two-thirds to the nuclear family, but then each family's amount would be divided evenly among the two adults in that family.)

Aggregate: State/local property taxes (NIPA Table 3.3, line 8), divided into that paid on owned housing versus rental housing based on shares of consumption of owned housing versus rental (Table 2.4.5. Personal Consumption Expenditures by Type of Product). Of the portion attributed to rental housing, 70% allocated to renters, 30% to property owners.

NH assumpt: For renters, non-household population is assumed to pay \$0. For owners, non-household population is assumed to pay 20% of the amount paid by the household population, based on data from the National Nursing Home Survey showing about 20% of non-household residents pay for the nursing home using their own insurance or own income/assets. The rest are either using means-tested government programs that require the resident to spend down assets or they are using help from relatives or charities, implying that they have no assets.

Topcoding: Not applicable.

### Sales Taxes (variable name: `salestax_s`)

Source data: Similar to excise taxes. Excise taxes are predicted based on a regression equation estimated from data from the Consumer Expenditure Survey where household AGI and household structure predict total taxable consumption. This regression equation is then applied to the household sum of values in the individual-level CPS variable `adjginc`. Household amount is allocated to individuals in the household based on individual

- shares of household AGI, but dividing total spousal couple AGI evenly between both spouses. AGI amount is reduced by \$1,250 (real 1994 dollars are adjusted to real value for each subsequent year) for the first generation, as this amount is assumed to be remitted to the immigrant's country of origin.
- Aggregate: NIPA Table 3.3. State and Local Government Current Receipts and Expenditures, sales taxes.
- NH assumpt: Non-household persons are assumed to pay \$0 sales tax.
- Topcoding: adjginc = 99997 topcode through 2010 (original value was \$99999); adjginc = 9999997 topcode beginning in 2011 (original value was \$9999999); before 2011, used 2 x highest non-topcoded value for the year.

#### Other State/Local Taxes (variable name: othtx\_s)

- Source data: Following *The New Americans* (National Research Council, 1997), state/local "other" has same age shape as state/local income tax.
- Aggregate: Remaining revenue items from state/local taxes and social contribution tables.
- NH assumpt: Non-household persons are assumed to have \$0 for these taxes.
- Topcoding: Not applicable.

#### Federal OASDI (variable name: oasdi\_f)

- Source data: CPS individual-level variable incss (includes payments to retirees, survivors, and the disabled).
- Aggregate: NIPA Table 3.12 Government Social Benefits.
- NH assumpt: Same as for non-nursing home (i.e., household) population.
- Topcoding: Not applicable.

#### Hospital Insurance (Medicare Part A) (variable name: hi\_f)

- Source data: CPS individual-level variable on Medicare enrollment (himcare = 2), but weighted by total per capita personal health care expenditures by age from the 2011 National Health Accounts.
- Aggregate: Total Medicare costs come from Government Social Benefits (NIPA Table 3.12), multiplied by the percentage going to Part A from Medicare Trustees Report.
- NH assumpt: These are mostly hospital costs associated with nursing home residents when they have serious complications, and such costs are very expensive. Non-household persons are assumed

to be consuming at twice the level of household residents. Data underlying this assumption originate from U.S. National Transfer Accounts publications by Lee et al. (2011).

Topcoding: Not applicable.

### **Supplemental Medical Insurance (Medicare Parts B & D)**

(variable name: *smi\_f*)

Source data: (Same as for *hi\_f*) CPS individual-level variable on Medicare enrollment (*himcare* = 2), but weighted by total per capita personal health care expenditures by age from the 2011 National Health Accounts.

Aggregate: Total Medicare costs come from Government Social Benefits (NIPA Table 3.12), multiplied by the percentage going to Parts B & D from Medicare Trustees Report.

NH assump: Same as for the household population.

Topcoding: Not applicable.

### **Medicaid Payments to Nursing Homes**

(variable names: *mcaidnhom\_f*, *mcaidnhom\_s*)

Source data: Federal and state/local levels are coded separately. Because this flow is for persons not in the household population, CPS does not have indicators for this. Instead, we assign these costs based on the percentage of population in nursing homes, ages 65 and older, as measured in IPUMS/ACS for that year. These sources do not have generational detail, so the profile only differentiates between the first generation and native-born generations; (the second and third-plus generations are assigned the weight for native-born [second and higher] generations.

Aggregate: Government Social Benefits (NIPA Table 3.12, Medicaid), multiplied by the proportion that Medicaid paid to nursing homes as measured in National Health Expenditures data. Also separated into federal and state/local portions from the National Health Expenditure data.

NH assump: Not applicable.

Topcoding: Not applicable.

**Medicaid Payments to Other Than Nursing Homes**(variable names: *mcaidnoninst\_f*, *mcaidnoninst\_s*)

- 
- Source data: Federal and state/local levels are coded separately. Assigned based on Medicaid enrollment (CPS variable *himcaid* = 2) but weighted by total per capita personal health care expenditures by age from the 2011 National Health Accounts.
- Aggregate: Government Social Benefits (NIPA Table 3.12, Medicaid), multiplied by proportion Medicaid paid to non-nursing homes from National Health Expenditures data and also separated into federal and state/local portions from National Health Expenditure data.
- NH assumpt: These are mostly hospital costs associated with nursing home residents when they have serious complications, and such costs are very expensive. Non-household persons are assumed to be consuming at twice the level of household residents. Data underlying this assumption originate from U.S. National Transfer Accounts publications by Lee et al. (2011).
- Topcoding: Not applicable.

**Unemployment Insurance Income (variable name: *incunemp\_f*)**

- 
- Source data: CPS individual-level variable *incunemp*. This variable does contain some payments from private sources, but as long as those are not huge or radically different by age or immigrant generation, it is corrected for in the aggregate adjustment.
- Aggregate: Government Social Benefits (NIPA Table 3.12, unemployment insurance).
- NH assumpt: Non-household persons are assumed to have \$0 for this benefit.
- Topcoding: *incunemp* = 99997 for years 1995, 1996, 1998, 2000-2007, 2009-2013; replace with 2 x top value for the non-topcoded observations.

**Railroad Retirement (variable name: *retrrr\_f*)**

- 
- Source data: CPS individual-level variable *increti1* (amount of income from first source) and *screti1* = 5 (receives U.S. Railroad retirement pension); similarly *increti2* and *screti2* = 5 for the second source of income. If there is an amount attributed to someone with a spouse in the household, that amount is divided evenly between the two spouses.
- Aggregate: Government Social Benefits (NIPA Table 3.12, U.S. railroad retirement).
- NH assumpt: Same as household population.



Topcoding: *increti1* and *increti2* = 99997 for years up to and including 1998 and from 2011 forward. Substituted 2 x highest non-topcoded value.

---

**Supplemental Security Income (variable names: *incssi\_f*, *incssi\_s*)**

---

Source data: Federal and state/local levels are coded separately. CPS individual-level variable *incssi*.

Aggregate: Government Social Benefits (NIPA Table 3.12), SSI federal and state/local amounts are listed separately.

NH assumpt: Same as household population.

Topcoding: Not applicable.

---

**EITC (variable name: *eitcred\_f*)**

---

Source data: CPS individual-level variable *eitcred* is imputed by Census Bureau's tax model. Allocation is made by summing all *eitcred* in a family unit and dividing evenly among people in the family.

Aggregate: Government Social Benefits (NIPA Table 3.12, line 25, Refundable Tax Credits).

NH assumpt: Non-household persons are assumed to have \$0 for this benefit.

Topcoding: Not applicable.

---

**Food Stamps/SNAP (variable name: *fdstmp\_f*)**

---

Source data: CPS household-level variable *stampval* (value of food stamps received), divided equally among all household members.

Aggregate: Government Social Benefits (NIPA Table 3.12, federal SNAP benefits).

NH assumpt: Non-household persons are assumed to have \$0 for this benefit.

Topcoding: Not applicable.

---

**Federal School Lunch Program (variable name: *schlunch\_f*)**

---

Source data: CPS household-level variable *lunchsub*, which indicates households where some or all of the children received free or reduced price school lunches, and CPS household-level variable *frelunch*, which indicates how many children in the household received free or reduced price lunches. An equal value is assigned to all children households with *lunchsub* = 1 and is allocated to all children ages 5-18, starting with the youngest, until reaching the total number in the household given in *frelunch*. (There is no individual-level indicator of which children received the free lunches.)

- Aggregate: Federal budget historical tables (Table 11.3—Outlays for Payments for Individuals by Category and Major Program, child nutrition and special milk programs).
- NH assump: Non-household persons are assumed to have \$0 for this benefit.
- Topcoding: Not applicable.

---

**Welfare (variable name: *incwelfr\_f*)**


---

- Source data: This includes AFDC, Temporary Assistance for Needy Families, welfare reform benefits, and general assistance. CPS individual-level variable *incwelfr*. Allocation is made by summing all *incwelfr* in a family unit and dividing evenly among people in the family.
- Aggregate: Government Social Benefits (NIPA Table 3.12, family assistance and general assistance).
- NH assump: Non-household persons are assumed to have \$0 for this benefit.
- Topcoding: Not applicable.

---

**Incarceration Costs (variable names: *jail\_f*, *jail\_s*)**


---

- Source data: Percentage institutionalized under age 65 from IPUMS/ACS. We were only able to distinguish difference between the first and native-born (second and higher) generations. Federal and state/local levels are coded separately.
- Aggregate: NIPA Table 3.16. Government Current Expenditures by Function, prison costs, separated out by federal versus state/local levels.
- NH assump: Not applicable.
- Topcoding: Not applicable.

---

**Military Retirement and Other Veteran's Benefits (variable name: *vetben\_f*)**


---

- Source data: CPS individual-level variables *incvet*, plus *increti1* (amount of income from first source) if *screti1* = 3 (receives military pension), and similarly *increti2* and *screti2* for the second source of income. Amounts to veteran with spouse in the household is divided equally between spouses.
- Aggregate: Government Social Benefits (NIPA Table 3.12, line 17 Veterans' benefits).
- NH assump: Same as for non-nursing home population.
- Topcoding: Not applicable.

**Refugee Support (variable name: refugee\_f)**

---

Source data: Assigned equally to all 1st generation immigrants.

Aggregate: Federal Budget Historical Table 11.3—Outlays for Payments for Individuals by Category and Major Program: 1940–2020, “refugee assistance.”

NH assump: \$0.

Topcoding: Not applicable.

**Student Aid (cash scholarships) (variable name: scholar\_f)**

---

Source data: CPS individual-level variable *incedu* if CPS variable *srcedu* indicates that source of the funding is from government, for ages 18–24.

Aggregate: Government Social Benefits (NIPA Table 3.12, for education).

NH assump: \$0.

Topcoding: For years 1997 and 2011–2013, topcoded 99997. Substituted 2 x highest non-topcoded value.

**Rent Subsidies (variable name: rentsub\_f)**

---

Source data: CPS household-level variable *rentsub* indicates if the household received a rent subsidy. This is attributed equally to individuals in the household (so individuals in smaller households with subsidy have greater attribution).

Aggregate: Historical Federal budget tables, Table 11.3—Outlays for Payments for Individuals by Category and Major Program: 1940–2019 gives amount spent on housing, Table 12.3—Total Outlays for Grants to State and Local Governments by Function, Agency, and Program: 1940–2015, gives part used for rent subsidies on private property as opposed to government-owned public housing).

NH assump: \$0.

Topcoding: Not applicable.

**Public Housing (variable name: pubhous\_f)**

---

Source data: CPS household-level variable indicating if household is part of a government housing project, allocated equally to all individuals in public housing households.

Aggregate: Historical Federal budget tables, Table 11.3—Outlays for Payments for Individuals by Category and Major Program: 1940–2019 gives amount spent on housing, Table 12.3—

Total Outlays for Grants to State and Local Governments by Function, Agency, and Program: 1940–2015, gives part used for public housing as opposed to rent subsidies).

NH assumpt: \$0.

Topcoding: Not applicable.

#### Energy Assistance (varname: heatsup\_f)

Source data: CPS household-level variables indicating if household received energy assistance (*heatsub*) and if so how much it was worth (*heatval*). Value divided equally among all household members.

Aggregate: Government Social Benefits (NIPA Table 3.12, energy assistance).

NH assumpt: \$0.

Topcoding: Not applicable.

#### Government Retirement Benefits (federal and s/l separately) (variable name: ret\_f/ret\_s)

Source data: For federal, CPS individual-level variable *increti1* (amount of income from first source) and *screti1* = 2 (receives federal government pension), and similarly *increti2* and *screti2* for the second source of income. For state/local, CPS individual-level variable *increti1* (amount of income from first source) and *screti1* = 4 (receives state/local government pension), and similarly *increti2* and *screti2* for the second source of income. For both age profiles, if the amount was to a person with a spouse in the household, the amount is allocated to both spouses equally.

Aggregate: For Federal, Historical Federal budget tables, Table 11.3—Outlays for Payments for Individuals by Category and Major Program: 1940–2019. State/local: NIPA Table 7.23. Transactions of State and Local Government Defined Benefit Pension Plans.

NH assumpt: For both, same as for household population.

Topcoding: *increti1* and *increti2* = 99997 for < = 1998 and > = 2011. Substituted 2 x highest value.

#### Congestible Goods—Federal and State/Local (variable name: cong\_f / cong\_s)

Source data: None. Same by all ages by assumption.

Aggregate: Residual, after all accounted for flows and “pure” public goods are subtracted from total expenditures (NIPA table 3.2 for Federal, 3.3 for State/Local).

NH assumpt: Same as for household population.

Topcoding: Not applicable.

---

**State Child Health Insurance Program (SCHIP) (variable name: schip)**

---

Source data: CPS individual-level variable indicating if person ages 0-18 was enrolled in health insurance through SCHIP. No cost information so age shape is just based on enrollment. CPS enrollment rates are known to be less than estimates from other sources, but as long as there is no correlation between enrollment discrepancy and age or immigration status then the aggregate adjustment will take care of the error.

Aggregate: National Health Accounts, total spent by SCHIP program (includes pure federal amount and amount spent by states, both of their own funds and from grants-in-aid from federal to state governments).

NH assumpt: \$0.

Topcoding: Not applicable.

---

**WIC (variable name: schip)**

---

Source data: CPS individual-level variable *gotwic* indicates if a woman was receiving WIC benefits. Allocated equally to all of those women and any of their children in the household ages 0-4.

Aggregate: NIPA Table 3.12, Government Social Benefits, line for State/local “other” which is WIC, but also includes some small amounts for foster care and adoption assistance that were not able to be separated out.

NH assumpt: \$0.

Topcoding: Not applicable.

---

**Primary and Secondary Education (variable name: lowedu\_s)**

---

Source data: • This age profile is complex and combines 4 pieces of data: (1) percentage enrolled, (2) state-by-state relative per pupil spending, (3) percentage of schoolchildren with limited English proficiency (LEP), and (4) relative costs of educating a student with LEP vs. not.

• Enrollment is assumed to be 100% for ages 5-14. For high school, enrollment based on CPS variable *schlcoll* with half weight given to those half-time enrolled. (This variable doesn’t distinguish between public and private schools.) Note that the universe for this variable was ages 16-24 prior to 2013 but changes to 16-54 in 2013. For high school enrollment, how-

ever, the extended ages make little difference because of the very low high school enrollment above age 19.

- Average per pupil spending by state comes from the Census Bureau’s Census of Governments (Finance—Survey of School System Finances). Each state’s spending level is turned into a weight relative to the national average.

- The data for % LEP for first generation immigrants come from IPUMS/ACS samples. For first generation, the proportion of schoolchildren who either do not speak English at home (variable *language* not equal to 1) or are reported to not speak English or not speak English well (variable *speakeng* is 1 or 6) is defined here as LEP for the first generation. The % LEP for third-plus generation is assumed to be zero; % LEP for second generation is assumed to be halfway between the empirical estimate for first generation and the assumed 0% for third-plus generation.

- Following footnote 13 from *The New Americans* (National Research Council, 1997), Chapter 7, the relative costs of education for students who are LEP is 1.44, compared to 1 for non-LEP.

- So, the overall estimate for each age/immigrant group is percentage enrolled, weighted by relative state spending and relative costs based on how many students are LEP. This is then adjusted to the aggregate control as for all age profiles.

Aggregate: Table 3.16. Government Current Expenditures by Function, expenditures on primary and secondary education.

NH assumpt: 0.

Topcoding: Not applicable.

#### Public College and Other Postsecondary (variable name: college\_s)

Source data: Based on enrollment in college, with half weight given to those half-time enrolled. The enrollment data uses the CPS variable “schlcoll.” As noted above, the universe changes from ages 16-24 before 2013 to 16-54 in 2013. For the projected age profiles, the 2013 proportions enrolled are used for ages 25-54, while the pooled sample of 2011, 2012, and 2013 is used to calculate proportion enrolled for ages 16-24. For the historical age profiles, the comparison between 1994 and 2013 suffers from this change in data collection, but the impact is minor because of the low levels of higher education enrollment for age 25+ and because of the adjustment of per capita age profiles to national-level aggregate flows. Thus, there is a slight

discrepancy in the age of the public higher education benefit receipt over the period, but no difference in the total expenditure or average expenditure across the total population.

Aggregate: Table 3.16. Government Current Expenditures by Function, expenditures on higher education (federal and state/local combined).

NH assump: 0.

Topcoding: Not applicable.

#### **Workers' Compensation (variable name: *incwkcom\_s*)**

Source data: CPS individual-level variable *incwkcom*.

Aggregate: Government Social Benefits (NIPA Table 3.12, federal and s/l worker's compensation combined, but this is mostly state/local).

NH assump: 0.

Topcoding: 99997 for 1995, 1996, 1998-2001, 2003, 2004, 2006, 2007, 2009-2013, replaced with 2 x maximum value.

#### **Bilingual Education (variable name: *bilingual\_s*)**

Source data: Age share comes from the % limited English proficiency (LEP) for first generation and for second generation with two foreign-born parents (see details on *lowedu\_s* for source data for LEP status). Note that this is supposed to represent the costs of a particular educational program designed to teach in two languages. It is included as a cost beyond just the general cost of educating students with LEP, which is already included in the *lowedu\_s* age profile.

Aggregate: 2.5% of total amount spent on elementary and secondary education (this is the same assumption used in NA).

NH assump: 0.

Topcoding: Not applicable.

#### **Details on Administrative Totals**

Each measured flow is adjusted by a single multiplicative factor so that the population-weighted aggregate is consistent with totals reported in the annual tables of the National Income and Product Accounts, as compiled by the Bureau of Economic Analysis (see <http://www.bea.gov/national> [November 2016]). Note the handling of federal grants-in-aid to state and local governments: they are counted as government expenditures and not as state and local revenue, to avoid double counting this flow. An example for 2013 is shown, but all years are calculated in a similar fashion:

NIPA Table Extracts for 2013 (Billions)			
	Table 3.1	Table 3.2	Table 3.3
	<u>Consolidated</u>	<u>Federal</u>	<u>State/Local</u>
<b>Receipts</b>	<b>4,788.6</b>	<b>3,113.0</b>	<b>2,125.6</b>
Tax receipts	3,283.6	1,811.8	1,471.8 [1]
Contributions for government social insurance	1,109.9	1,092.3	17.7 [1]
Income receipts on assets	244.4	164.7	79.7
Transfer receipts [2]	180.4	59.5	570.8
Portion that is federal grants-in-aid (GIA) to s/l	---	---	450.0
Surplus of gov't enterprises	(29.6)	(15.3)	(14.3)
<b>Expenditures</b>	<b>5,662.9</b>	<b>3,762.1</b>	<b>2,350.8</b>
Consumption expenditures	2,547.6	963.0	1,584.5
Portion spent on defense	617.1	617.1	---
Consumption expenditures LESS Defense	1,930.5	345.9	1,584.5 [1]
Government social benefits to persons	2,372.2	1,806.8	565.4 [1]
Government social benefits to rest of world	18.9	18.9	---
Other transfer payments [2]	46.4	496.3	---
Portion that is federal grants-in-aid (GIA) to s/l	---	450.0	---
Interest payments	617.7	417.4	200.3 [2]
Subsidies	60.2	59.7	0.5 [2]
Amounts Included in Fiscal Impacts Analysis			
GIA are attributed in the analysis as federal expenditures and subtracted from s/l to avoid double counting.			
	<u>Total</u>	<u>Federal</u>	<u>State/Local</u>
<b>Total Taxes</b>	<b>4,393.6</b>	<b>2,904.1</b>	<b>1,489.5</b>
Tax receipts	3,283.6	1,811.8	1,471.8
Contributions for government social insurance	1,109.9	1,092.3	17.7
<b>Total Benefits</b>	<b>4,302.6</b>	<b>2,602.7</b>	<b>1,699.9</b>
Consumption expenditures LESS Defense	1,930.4	345.9	1,584.5
Government social benefits to persons [3]	2,372.2	1,806.8	565.4 [3]
Federal grants-in-aid (GIA) to s/l	-	450.0	(450.0)
<b>Taxes less benefits</b>	<b>91.0</b>	<b>301.4</b>	<b>(210.4)</b>
<b>Public Goods</b>	<b>1,360.2</b>	<b>1,159.4</b>	<b>200.8</b>
Defense	617.1	617.1	---
Interest	617.7	417.4	200.3 [2]
Subsidies	60.2	59.7	0.5 [2]
Transfers and social benefits to ROW	65.2	65.2	---
[1] Included in all fiscal impacts analyses as congestible goods assigned to individuals.			
[2] Non-congestible goods included in some analysis scenarios, assigned on a marginal or per capita basis.			
[3] Includes \$450.0B in federal grants-in-aid to state/local government. Thus, the consolidated amount equals federal amount + state/local amount - federal grants-in-aid.			



*Estimates of Education Transmission and Projection of Educational Attainment*

In the future-looking analysis, we want to estimate the fiscal impact of persons in the future and that impact differs by education—persons of different education earn, pay taxes, qualify for and accrue benefits at different levels. For those people who begin the 75-year projection period very young or are born in the projection period, we need to estimate which education group they will be in when they grow up. This section describes the process used to project education for those who are ages 0-24 in 2012 or are born during the projection.

*Estimating Education Prediction Functions*

Using CPS samples from early years, we identified a cohort of parents who are age 25 or older (and thus have completed their educations), based on the co-residence of young children in their households. We then identified that cohort of children in a later year when the children are age 25 or older (and thus also likely to have completed their educations). Both parents and children are disaggregated, based on parental birth region, and separate CPS samples are taken as distinct data points. This gives a sufficient sample to estimate the average expected educational attainment of children based on the average educational attainment of parents. This was done separately by parental birth region, and a separate set of predictions was made for U.S.-born children versus non-U.S.-born children.

Specifically, the data come from CPS samples from 1994 to 2014. We observe the children's educational attainment each year from 2009 to 2014 and compare that to the parental educational attainment in each year from 1994 to 1999, generating a set of six paired parent-child averages for each region. We could not observe parental cohorts earlier than 1994 because there were no data collected on birthplace in earlier samples. We could not observe children's cohorts later than 2014 because that was the most recent CPS sample available at the time the analysis was done. The comparisons were done separately by regional groups of parental birth and also by whether the child was U.S. born or foreign born.

For the U.S.-born offspring, a cohort of parents for each region in each year  $X$  (where  $X$  varies from 1994 to 1999) is identified by the following characteristics: they have at least one co-resident U.S.-born own-child, ages 10-16, in the household (own-child as imputed by IPUMS-CPS) and the parent was born in that region. The cohort of children of these parents is identified in year  $X + 15$  (where  $X + 15$  varies from 2009 to 2014) by the following characteristics: they are ages 25-31, were born in the United States, and indicate that they have at least one parent born in the designated region.

For the foreign-born child case, the comparison is similar, except that the own-child of the parents must be born in the parental region and the children identified in the children's cohort must be born in the parental region.

The 10-16 year-old age group in year X was chosen to be as large an age group as possible to increase the sample size, but it had to also satisfy two additional criteria: (1) young enough that the children in year X were likely to still be living in the parental home, and (2) old enough that the children in year X + 15 have mostly all completed their education or at least achieved the highest educational category.

Educational outcomes were based on the CPS variable for years of schooling, but were grouped into more categories than the educational groups used for the fiscal flows analysis. This difference allowed for better identification of the parent-child educational relationships, but the education predictions of the offspring were recoded into the five educational attainment categories for use in the 75-year discounted flows calculations.

The parental birth regions were as follows: United States (or born abroad to citizen parents), Mexico, Central America (excluding Mexico), South America, Canada, Europe, Africa, East Asia, Southeast Asia, Other Asia (Eurasia, Central Asia, Oceania). The average education of the parent and child for each region for six consecutive CPS samples was calculated, and a regression was run to predict children's average educational attainment based on the parental average educational attainment. Canada and Africa were not included in the regressions because the sample sizes in the average were too small (in most years, fewer than 50 observations in the child cohort group).

The charts below (Figures 8-24 and 8-25) show the resulting estimates and linear regression equations that were used to predict educational attainment based on parental education. Two separate regression equations were used for two sets of regions: one included Mexico, South America, and Central America; the other included all of the other regions. Although the predictions for U.S.-born children of U.S.-born parents are not needed in estimating the 75-year discounted net fiscal impact of immigrants, the prediction equation for U.S.-born children of a U.S.-born parent was estimated as well for comparative purposes. The results are shown below. The parent-child paired averages are plotted as points; the predicted regression line representing educational assimilation is shown as well.

### Projected Future Taxes and Benefits

Each tax and benefit flow must be projected forward 75 years from the starting year of 2012. This was done in several different ways to create different scenarios of future fiscal flows.

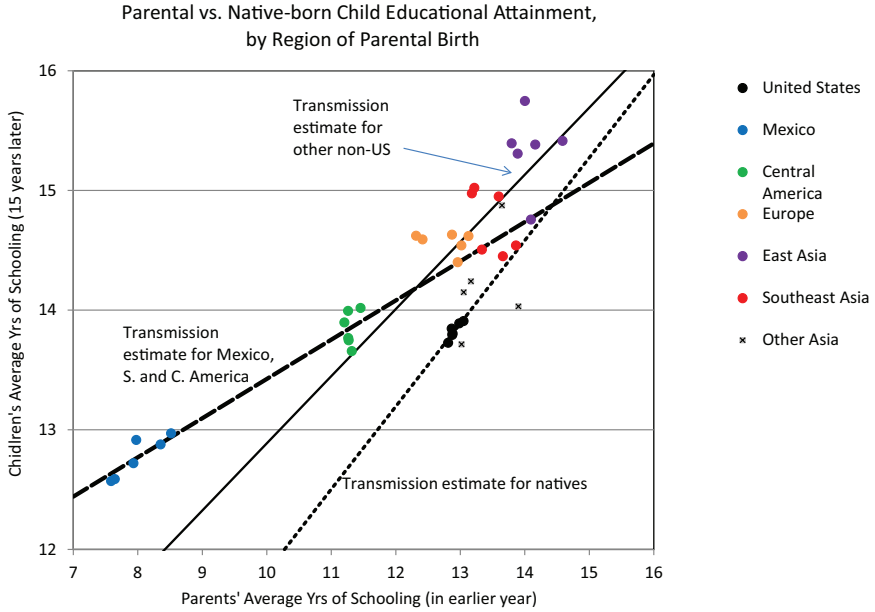


FIGURE 8-24 Predicted educational attainment for native-born children.

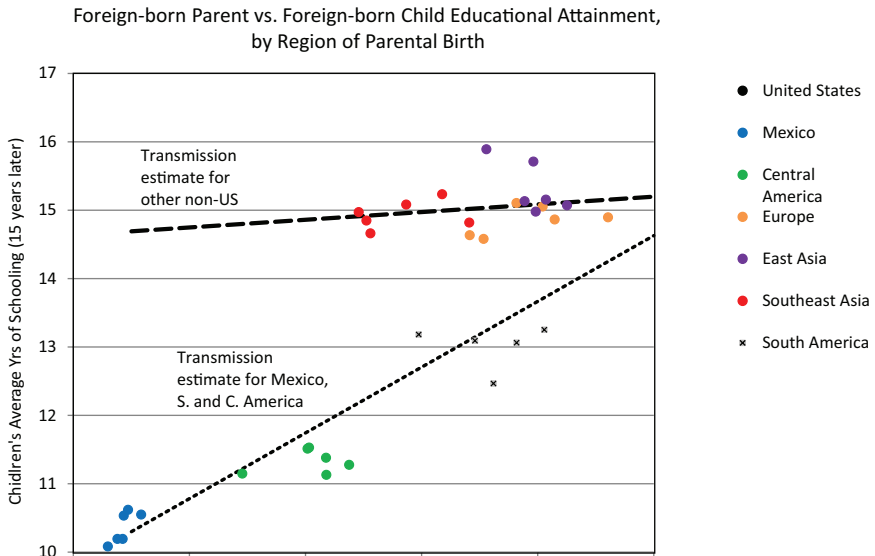


FIGURE 8-25 Predicted educational attainment for foreign-born children.

The simplest approach to understand is that for the no budget adjustments scenario. This scenario takes the per capita tax and benefit age profiles of 2012 and increases them each year by the assumed rate of productivity growth, 1 percent in our projections. This approach implies that the federal and state/local governments change nothing about its tax rates and spending and that no other aspects of the economy change. All per capita amounts at all ages, education, and immigration groups simply grow at 1 percent per year. This scenario leads to quickly increasing levels of debt, which the federal government may be able to sustain for quite some time but not indefinitely. State and local budgets function in a very different statutory environment compared to the federal government and typically have balanced-budget requirements that would constrain their ability to tax and spend in this fashion, but no provision is made for that requirement in this scenario.

More complex is the scenario that uses CBO's long-term budget projections and matches the growth of various fiscal flows to be consistent with that scenario. At the time the projection work was done, the most recent report was CBO's *2014 Long-Term Budget Outlook*, published in July 2014 (Congressional Budget Office, 2014a, <https://www.cbo.gov/publication/45471> [November 2016]), with supplemental data tables available at <https://www.cbo.gov/about/products/budget-economic-data#1> [November 2016]).

The method used by the panel for matching to the projections in the CBO report is simple for flows that are the same for all age groups. They are simply increased year over year by the same per capita growth rate reported in the supplemental tables. This is the case for general government congestible spending such as public administration, police, fire, etc. It is also the case when we apply public goods such as defense or interest on public debt on an average cost basis. When these items are applied on a marginal cost basis—that is, when they are assigned as zero cost attributed to immigrants—the nonimmigrant amounts are estimated to be a per capita amount that generates an aggregate level of these flows if the per capita amount is paid by each nonimmigrant (with the numbers of nonimmigrants provided by the Pew Research Center projections). Of course, the per capita value in the marginal cost case is only relevant for the one piece of data reported in Chapter 8 where 25-year-old natives are compared to 25-year-old immigrants.

Matching the CBO report for flows that do vary by age is more complex. In this case, in order to match overall per capita growth rates projected by CBO, we must project the amount of growth or decline that is inherent in population age structure by using the population projections from the Pew Research Center to find a baseline population-driven change and then calculate the additional change above or below that necessary to match CBO projections. To illustrate the calculation, imagine that a hypo-

thetical benefit flow is projected by CBO to rise from 100 to 110 per person in a year. If that flow is assigned to all age groups equally, then the adjustment to match the CBO projection is simply to increase the estimated age profile by 10 percent at each age. Imagine, however, that this flow mostly benefits the elderly. If the population of interest is aging, then from one year to the next, without altering the age profile at all, the population per capita flow may grow from 100 in year 1 to 102 in year 2, simply because the population is aging. To make the overall per capita flow equal to 110, we must first calculate the population-driven change of 100 to 102, and then multiply the overall age profile by  $110/102 = 1.0784$  to grow the rest of the necessary amount. In this illustrative case, the overall per capita age profile must increase by only 7.8 percent to have the average flow increase by 10 percent.

The CBO projections cover only federal flows, so the panel's projections must make assumptions about what will happen with state and local government taxing and spending in order to project those flows into the future. For this case, we assumed both per capita spending and revenue grow at the same rate as per capita GDP in CBO's long-term budget outlook (Congressional Budget Office, 2014a). This holds the state-funded portion of Medicaid to a lower growth rate than is assumed for the program as a whole. This assumption implies that the federal government will assume any excess costs.

The CBO baseline projection is intended to be the best guess as to government budgets if current policy is completely unchanged. It does not include any economic feedbacks from this no-policy-change scenario but simply looks at current government tax and spending policy and combines that with the Census Bureau's population projections and assumptions about the future of economic variables such as interest rates. In this scenario, then, there is no attempt to deal with any future fiscal imbalances that may arise, and thus the overall deficit and national debt rise sharply.

Thus, the panel employed a third scenario in which, relative to the CBO baseline case, taxes are increased and benefits decreased (on a 50/50 basis) to achieve \$3 trillion in deficit reduction by 2035, relative to the baseline scenario. By trying different levels of tax increases and benefit reductions on an ad hoc basis, we found that the path that achieved this \$3 trillion in reduction was about 3 percent higher, by 2035, in taxes paid and about 3 percent lower in benefits received, compared to 2013 in the CBO baseline case. State and local budgets in this scenario are handled similarly to the way they are treated in the CBO baseline scenario.

**Projected Demography:  
Survivorship, Emigration, and Number of Descendants**

The rates of fertility, mortality, and emigration used in projecting future survivorship, numbers of surviving offspring, and probability of remaining in the United States (as opposed to emigrating), are from the Pew Research Center projections discussed above in Chapter 2. Where the Pew Research Center rates vary by race/ethnic group, these have been combined by current race/ethnic composition to produce an overall population average.

Five generations of descendants are counted in the demographic projections, to cover all potential births for the 75-year forward-looking observation period.



## 9

State and Local Fiscal  
Effects of Immigration

## 9.1 INTRODUCTION

Of concern to policy makers and the public are not only the net fiscal effects of immigration for the nation as a whole, currently and over time, but also the effects on revenues and expenditures for state and local governments. Immigrants are not distributed equally among the states or localities, and state and local governments differ in their fiscal policies generally and in their policies toward immigrants specifically. Consequently, any examination of the fiscal effects of immigration at the state and local levels and the extent to which immigrants are a net fiscal burden or benefit must consider the individual circumstances of each jurisdiction.

The 1997 National Research Council report, *The New Americans*, estimated the net state and local government fiscal effects of immigration for only two states: California and New Jersey (National Research Council, 1997). Around that time, based on 2000 Decennial Census long-form sample data, California alone accounted for nearly one-third of the total number of 31 million foreign-born, while California and New Jersey, together with Florida, Illinois, New York, and Texas, accounted for about 70 percent of the foreign-born population. By 2011-2013, American Community Survey (ACS) data indicate that a larger number of immigrants had become more widely dispersed so that California accounted for about one-quarter of the total number of 41 million foreign-born and the same six states accounted for about 65 percent of the foreign-born population. Other states with significant numbers of foreign-born in 2011-2013 included Arizona, Georgia, Maryland, Massachusetts, and Virginia. Relative to the total



population, the foreign-born increased from 11 percent of the U.S. total in 2000 to 13 percent in 2011-2013. By state, as of 2000, the foreign-born accounted for 14 percent or more of the population in only seven states, while by 2011-2013 the foreign-born accounted for 14 percent or more of the population in 12 states; see further discussion in Section 9.3 below.

This chapter examines the state and local government fiscal effects of immigration for each of the 50 states and the District of Columbia for the 3-year period 2011-2013. We focus on the individual as the unit of analysis—more specifically, the independent individual. The panel’s analysis here attributes the fiscal costs of (and taxes received from) dependents to their parents. This independent-person concept best acknowledges that the fiscal costs or benefits of children are due to the decisions of their parents independent of the children’s own immigrant status. In addition, as in portions of Chapter 8, we distinguish among three immigrant generations (first, second, and third-plus, where “third-plus generation” is used as shorthand for all U.S. residents with two native-born parents).

Before proceeding to describe our measurement methods and results, it is worth referencing the extensive discussion of how, theoretically, immigrants’ net costs to state and local governments are treated in *The New Americans* (National Research Council, 1997, pp. 254-270). That discussion, well worth reviewing, also details the range of simplifying assumptions that are necessary to derive empirical estimates of net costs. For example, for tractability, one must generally assume that immigrants use government services, such as public libraries or highway maintenance, at the same rate as natives (except when there is an explicit eligibility criterion excluding immigrants). Under this assumption, the costs of each service are allocated equally to immigrants and to natives on a per capita basis. In our evaluation, we present results making similar assumptions but then also examine what the relative costs of immigrants would be using different assumptions about whether the overall level of spending on a particular service is likely to change. For example, if the number and staffing of libraries is assumed to be unchanged, we would ask, “What is the relative cost of immigrants, assuming they produce zero marginal costs to state and local governments for library services?” The rationale behind the marginal and average cost choice for allocating the cost of public goods—particularly pure public goods such as national defense—is discussed in detail in Chapters 7 and 8.

A key difference between the fiscal impact study in this chapter and the state-level analyses in *The New Americans* (National Research Council, 1997) is the unit of analysis. In *The New Americans*, analysis was done at the household level using the nativity of the household head to determine immigrant status. This panel’s preferred estimates present results based on independent individuals, including the cost of dependent children in the net benefit or burden of their parent(s). This makes our results more com-

parable to those presented in Chapter 8 and better captures revenues and expenditures of all immigrants, independent of who is listed as householder. We do also present results on a household basis (see Table 9-7).

## 9.2 MEASUREMENT METHODS

We constructed our estimates from the Current Population Survey (CPS) Annual Social and Economic Supplement (ASEC). This nationally representative survey of people in households and group quarters, excepting institutions (e.g., jails, nursing homes), enabled us to identify generation status, including *first generation immigrants* (individuals who were born abroad who are noncitizens or naturalized citizens), *second generation individuals* (individuals who were born in the United States with at least one foreign-born parent), and *third-plus generation individuals* (individuals who were born in the United States with two native-born parents).<sup>1</sup> For each generation, we examined household living arrangements, income from various sources, and estimated taxes paid. It is important to account separately for second generation immigrants; this was not done in the state estimates in *The New Americans* (National Research Council, 1997), but it is done in the analysis in this chapter. At any point in time, many second generation immigrants are of working age and, when treated as independent individuals as in this report, contribute revenues that exceed costs. However, they may have represented a cost burden for their state and locality as children—costs that would not have been borne if their parent(s) had not entered the United States. Indeed, many second generation immigrants are themselves school-age children, whom we assign to their first generation parent(s) and who will likely represent a net burden for state and local governments for their education.

In order to achieve sufficient sample size for our analysis, we pooled 3 years of the CPS ASEC data covering 2011-2013.<sup>2</sup> Our sample represents, on a weighted basis and averaging over the 3 years, about 223 million independent people (essentially adults, as described below), of whom 16 percent are first generation and 8 percent are second generation. The remaining 76 percent are third-plus generation individuals, many of whose families have been in the United States for decades or centuries. The sample also repre-

<sup>1</sup>The second generation also includes those born abroad to an American parent with their other parent foreign-born, and the third-plus generation also includes those who are born abroad to two American parents.

<sup>2</sup>Were the ACS to include a question on place of birth of parents, it would be possible to carry out an analysis of state-level fiscal effects of immigration, by immigrant generation, with a much larger sample and correspondingly greater reliability than is possible with the CPS ASEC, even pooling over 3 years (see Chapter 10).

sents about 85 million dependent children in each year.<sup>3</sup> In our study, as discussed more fully below, revenues and expenditures for dependent children are assigned to their parent(s) for estimation purposes, independent of the child's own immigrant status.

We used the 3-year average of the 2011-2013 Census of Governments (COG) Annual Survey of State and Local Government Finances<sup>4</sup> as our source for estimates of state and local revenues and expenditures of various kinds. Because different states provide different services at the state versus local level, we found it most useful to combine state and local revenues and expenditures to provide a complete picture of nonfederal government services. We did not have sufficient sample sizes or information on individuals to provide estimates for most substate areas—indeed, our estimates for many states are highly variable due to small sample sizes. These limited sample sizes also mean we do not estimate differences across places of origin.

We used simulation methods to piece together the data from the CPS ASEC and the 2011-2013 COG to estimate—for each independent person and his or her dependent children in the sample, weighted to be representative of their numbers in their state's population—the revenues each provides to his or her state and locality of residence and the expenditures incurred by that state and locality on his or her behalf (including expenditures on behalf of any dependent children). Additional description of this method, as well as of differences in this approach from that used in *The New Americans* (National Research Council, 1997), is provided in the relevant sections below.

We then compared the resulting estimates of net state and local government fiscal benefit (or burden) for independent persons, characterized by immigrant status (first, second, or third-plus generation). We present comparisons among the states on an average-per-independent person unit basis by generation and on an aggregate basis. It can be the case, at one extreme, that a state has not only a high net fiscal burden (expenditures exceed revenues) per first and/or second generation immigrant but also a large number of first and/or second generation immigrants. At the other extreme, a state may have not only a low net fiscal burden (or a net fiscal benefit) per first and/or second generation immigrant but also a small number of immigrants. And there can be any combination in between. We further assessed how differences among and within the states in estimates of

<sup>3</sup>Of these dependent children, considered in their own right, 4 percent are first generation, 21 percent are second generation, and 75 percent are third-plus generation. There are as many second generation dependents as independent adults; their costs in part explain why first generation independent persons are more costly.

<sup>4</sup>Available: [https://www.census.gov/govs/local/historical\\_data.html](https://www.census.gov/govs/local/historical_data.html) [November 2016] .

net fiscal burden result from differences in characteristics of first and second generation immigrants, such as their age distribution, education level, and number of dependents as compared to native born individuals.

We also assess how differences among states in net fiscal burden result from differences in taxation and spending policies of individual states and their localities. We finally present some analyses to indicate the sensitivity of our main results to alternative assumptions about some components of revenues and expenditures. The key driver of differences has to do with education costs—the largest single part of state and local expenditures.

As defined in Chapter 7, the approach used in this chapter is a static analysis, producing estimates for a point in time. We did not attempt, for example, to play out, over time, the consequences for a state of its investment in education of first and second generation immigrant children on the skill mix of its labor force at a future date. Such an analysis would be difficult to conduct, not least because of the mobility of the population among the states so that children educated in one state may, to a greater or lesser extent, work as adults in another state.

### Constructing Independent Person Units for Analysis

Most people live in households, as opposed to institutions and other similar living situations. Although a significant number of household residents live alone, many others live with relatives or with nonrelatives as in a group house. Many tax and expenditure programs are carried out on a family or household basis (e.g., state income and local property taxes and benefits from many low-income assistance programs, such as school meals). So the household would seem to be a natural unit of analysis, and *The New Americans* (National Research Council, 1997) carried out its analysis of net fiscal state and local government burdens for California and New Jersey on a per-household basis. Households, however, change in their composition within and across years and also may contain a mix of immigrant generations and a mix of related and unrelated members. For this conceptual reason, we conducted our analysis in terms of persons, which is also the unit for our analysis of fiscal effects over time at the national level in Chapter 8. Specifically, we constructed “independent person” units, consisting of one independent adult plus an assignment of any dependent children in whole or in part, as described below. Box 9-1 repeats the definitions of independent persons and dependent children given in Box 8-2 and also defines “independent person unit.”

Having classified each individual in the sample as independent or dependent, we then constructed independent person units for analysis. The assignment of dependent children in a household to independent

### BOX 9-1 Definitions of Independent and Dependent Persons

**Dependent:** For the purpose of the panel's estimates, we consider dependents to be anyone: (1) under age 18, (2) ages 18 through 21 and in high school full time, or (3) ages 18 through 23 and in school full time or part time with income below half of the poverty level for one person. We also consider single individuals who are 18 through 23 and not in school but with income below half of the poverty level (for one person) who live with at least one independent person (typically a parent) as a dependent person; 1.2 percent of the population are in this category and they are treated as dependents but are not assigned education costs.

**Independent person:** Any person (most of whom are adults ages 18 and older) who is not a dependent child. We consider individuals ages 18 through 23 who are in school and working more than part time to be independent regardless of income level.

There are a few exceptions to the aforementioned criteria. If a person is married, he or she is considered independent irrespective of age. If a person is single with children and there are no family members other than children in the household, and the person is earning above half the poverty level, the person is considered independent. If there is a household with no members satisfying the above criteria for being independent, we consider any household member with income above the average amount in the household and ages 18 and older (or age 16 and older if all in the household are under 18) to be the independent person(s) in the household.

**Independent person unit:** Comprises the independent person plus assigned dependent children (which typically is half of any child assigned to two parents).

individual(s) includes all of their revenue and expenditure flows.<sup>5</sup> Dependent children and their flows are split between parents if they reside in a two-parent household; they are assigned fully to the resident parent if in a single-parent household. They are assigned to the grandparent(s) if their parents are dependents; they are assigned to the householder when parents are not present and the householder is a foster parent or grandparent. Dependents in households with family members other than parents or grandparents are assigned to the highest earning independent relative.

<sup>5</sup>In the case when the dependent weights differ from that of the independent person they are assigned to, the dependents and their flow amounts are multiplied by their dependent weight and then divided by the weight of the independent person(s) they are assigned to.

Dependents in households without any family members are assigned to the highest earning independent household member. As with dependent children in two-parent households, nonchild dependents (related and unrelated) are split between married couples in cases where they are assigned to one of the spouses. Ninety-four percent of dependent children in our dataset are assigned to parents, with an additional 5 percent assigned to other family members (remaining dependents are assigned to nonfamily members).

### **Defining Immigrant Generations for Independent Person Units**

The classification of independent person units by immigrant generation was performed on the basis of the independent person's status as follows: as in the other analyses in this report, independent individuals born abroad who are not citizens or who are naturalized citizens are classified as first generation immigrants. Independent individuals who are native born (including those born in Puerto Rico) and one or both of whose parents are foreign born are classified as second generation, as are those born abroad to an American parent with their other parent foreign-born. As defined above, the third-plus generation includes independent individuals who are native born to two native-born parents, as well as those who are born abroad to two American parents.

It bears repeating that independent person units are classified by the generation of the independent person; children are assigned to one or two independent persons on the basis of relationship and not generation. Thus, first generation independent person units with children may include children born abroad, those who in their own right would be classified as second generation, or both. Similarly, second generation independent person units with children may include children who are second or third generation when considered in their own right.

### **Estimating State and Local Revenues per Independent Person Unit**

After constructing independent person units, the next step was to assign the revenues each such unit provided to its state and locality, using 2011-2013 COG data on taxes and other forms of revenue. Revenues (and expenditures) were assigned to each individual, with flows for dependents then being wrapped up to the independent persons who support them. So, for example, any benefits received by a child living with two parents would be assigned to the child and then half of the value would be pulled into each parent's independent person unit amounts. For many types of revenue, the amount assigned to each independent person unit depended on the unit's demographic and economic information. For example, state income taxes paid depended on income and taxes reported in the CPS data. Because CPS

data, on average, underreport income, amounts allocated for income and sales taxes were scaled up to equal COG state aggregates. The following types of revenues were assigned to independent person units (their percentage of all state and local revenues is shown in parentheses, but these average numbers mask the wide variations among states):

- property taxes (14%);
- general sales taxes (10%);
- selective sales taxes and public utilities (5%);
- individual income taxes (9%);
- business taxes (3%);
- higher education charges (tuition, etc.) (3%);
- school lunch sales (less than 1%);
- other education charges (less than 1%);
- insurance trust revenue (15%);
- other revenue (22%); and
- intergovernmental revenue (18%).

Table 9-11, in the Technical Annex to this chapter, provides detailed information on each revenue type and how the revenues for each type were allocated to independent person units.

### Estimating State and Local Expenditures per Independent Person Unit

After the assignment of revenues, the next step was to assign state and local expenditures to independent person units using 2011-2013 COG data. Similar to revenues, these amounts often vary with individual characteristics; most notably, education expenses depend on the number and age of dependents. CPS noninstitutional Medicaid and public welfare expenditure amounts were scaled up to equal COG state aggregates. The following types of expenditures were assigned (their percentage of all state and local expenditures is shown in parentheses, and again these average values mask wide variations among states):

- higher education expenditures (7%);
- elementary and secondary education expenditures (16%);
- other education expenditures and libraries (4%);
- Medicaid and public welfare (16%);<sup>6</sup>
- insurance trust expenditures (11%);

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<sup>6</sup>While it is included in the 16 percent of COG expenditures from Medicaid and public welfare, we do not assign the 2 percent of the total 2011-2013 COG expenditures that went to institutional Medicaid spending.

- other expenditures and capital outlays (45%); and
- intergovernmental expenditures (less than 1%).

Table 9-12 in the Technical Annex provides additional information on each expenditure type and how the expenditures for each type were allocated to independent person units.

### Differences from the Approach Used in *The New Americans*

We followed a similar but not identical approach to that used in *The New Americans* (National Research Council, 1997, Ch. 6) to estimate the cross-sectional, point-in-time net fiscal effects of immigrants on state and local government budgets. Below we indicate key differences and the reasons for them:

- **Coverage.** The 1997 report constructed net fiscal effects estimates for just two states—California and New Jersey—using March 1995 CPS data for California and the 1990 Public Use Microdata Sample for New Jersey. By using 3 years of pooled CPS ASEC data in our analysis,<sup>7</sup> we were able to construct estimates for all 50 states and the District of Columbia, although small sample sizes for many states impair the quality of the estimates.
- **Unit of analysis.** The 1997 report used households as the unit of analysis on the grounds that most government programs and services are planned on a household basis. As argued above, this panel views households as too heterogeneous in composition. We therefore used an independent person unit of analysis, consisting essentially of an adult and any dependent children (or shares of children if married). This difference in analysis unit means that dollar amounts of net effects per unit are not comparable between the 1997 study and this report (even if one accounted for inflation and other differences). The reason is that there are about twice as many independent person units as there are households. Section 9.6 includes information at the household level and highlights how differences in household size can affect relative costs or benefits.
- **Immigrant characteristics.** The 1997 report distinguished between households headed by foreign-born individuals (further catego-

<sup>7</sup>The CPS ASEC for any one year in 2011-2013 has about twice the sample size of the 1995 March CPS, and the pooling of the CPS ASEC over 3 years increases the CPS ASEC sample size of unique respondents twice again. We keep respondents appearing in 2 consecutive years in our sample for both years so that each of the 3 data years is fully representative of the non-institutionalized population in that year and we capture these respondents' different revenue and expenditure flows in each of the 2 years.



rized by region of origin—Europe/Canada, Asia, Latin American, and other) and households headed by native-born individuals. Other household members might include a mix of foreign- and native-born people. This study, in contrast, looked at three groups of independent persons: first, second, and third-plus generation. (Dependent children were assigned to one or two parents or another independent person in their household regardless of their own immigrant generation.) This grouping permitted us to ascertain the contribution of second generation independent persons, which in many states provide a return on the investment made in their education as children through taxes paid when they become working-age adults. We did not look at region of origin for first generation independent persons, in part due to small sample sizes for many states.

- ***Revenues and expenditures.*** The 1997 report broke out state from local revenues and expenditures, which we did not do because of differences among states in how functions such as education are allocated between the state and local governments. The 1997 report also looked at revenues and expenditures at the federal level for households living in California. In contrast, our analysis did not attempt to estimate federal fiscal effects for independent person units by state if those effects involved the individual directly rather than flowing through state or local governments. For example, federal funds for primary and secondary (K-12) education are included because the money is directed to the states and then distributed. In contrast, federal Social Security payments are excluded because the funds are directly sent to individuals. Similarly, state income taxes are included but not federal income taxes.

### 9.3 GEOGRAPHIC AND DEMOGRAPHIC DISTRIBUTION OF IMMIGRANTS

As background for our discussion of state and local fiscal effects, we provide information for two periods, 2011-2013 and 2000, not only on the geographic distribution of immigrants by state in the two time periods but also on variations among states in the demographic composition of their immigrant populations. For comparability when examining changes over time, we look at distributions of the foreign-born (noncitizens or naturalized citizens born abroad), which corresponds to the sum of “independent

persons” in the first generation plus any of their children born abroad.<sup>8</sup> Comparisons across and within states among different groups are for the three generations of independent persons as defined above.

### Geographic Distribution of the Foreign-born, 2000 Compared to 2011-2013

Table 9-1 shows the percentage of foreign-born in each state’s population for the period 2011-2013 compared with 2000, using data from the 2011-2013 ACS and the 2000 Decennial Census long-form sample. The states are ranked from highest to lowest percentage of foreign-born in 2011-2013. Also shown is the percentage point change between 2000 and 2011-2013. Percentages are expressed in whole numbers without decimals to remind the reader that the data are estimates from samples of the resident population.

For the United States as a whole, the foreign-born population as a percentage of the total increased by 2 percentage points over the period—from 11 percent in 2000 to 13 percent in 2011-2013. Percentage point increases by state ranged narrowly from no change in several states to 4 points in Maryland. Accordingly, it is not surprising that the patterns of geographic dispersion of the foreign-born were broadly similar in the two periods. Thus, the seven states with the highest percentages of foreign-born in 2011-2013—California, Florida, Hawaii, Nevada, New Jersey, New York, and Texas—were the states with the highest percentages of foreign-born in 2000, although overall the concentration of foreign-born individuals in these states has declined.

Table 9-1 also shows the numbers of foreign-born in 2011-2013 and the increase from 2000 (in thousands) by state. Numeric gains are important to keep in mind when considering how immigration may affect states’ fiscal pictures and their policies toward immigrants. **Every state has experienced positive net numeric growth in its immigrant population since 2000.** California, Florida, and Texas gained between 1 million and 1.4 million immigrants over the period, and New York State gained over 500 thousand. Six states gained between 300 and 500 thousand, five states gained between 200 and 300 thousand, and seven states gained between 100 and 200 thousand immigrants. Of the 22 states that experienced increases in numbers of immigrants of 100 thousand or more, 12 had populations with

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<sup>8</sup>Our analysis in this chapter is subject to the same caveats about the difficulties of identifying immigrants with existing data that are outlined in the Technical Annex to Chapter 2 above. In addition, as discussed further below, our state-level analysis is compromised by small sample sizes for many states in the CPS ASEC, even after pooling data over 3 years.

**TABLE 9-1** Percentage Foreign-born Population by State, 2011-2013 and 2000, Ordered from Highest to Lowest Percentage Foreign-born in 2011-2013

State	Percentage Foreign-born		Percentage Point Change Since 2000	Number Foreign-born (in thousands)	
	2011-2013	2000		2011-2013	Change Since 2000
California	27	26	+1	10,262	1,397
New York	22	20	+2	4,376	508
New Jersey	21	18	+3	1,902	425
Florida	19	17	+2	3,760	1,089
Nevada	19	16	+3	528	211
Hawaii	18	18	0	249	37
Texas	16	14	+2	4,273	1,373
Massachusetts	15	12	+3	1,010	237
Connecticut	14	11	+3	491	121
District of Columbia	14	13	+1	90	16
Illinois	14	12	+2	1,801	272
Maryland	14	10	+4	835	317
Arizona	13	13	0	880	224
Rhode Island	13	11	+2	138	19
Washington	13	10	+3	922	308
Virginia	11	8	+3	937	367
Georgia	10	7	+3	955	378
Colorado	10	9	+1	502	132
New Mexico	10	8	+2	204	55
Oregon	10	8	+1	384	94
Delaware	9	6	+3	78	33
North Carolina	8	5	+3	738	308
Utah	8	7	+1	240	82
Alaska	7	6	+1	52	15
Kansas	7	5	+2	195	60
Minnesota	7	5	+2	400	140
Idaho	6	5	+1	94	30
Michigan	6	5	+1	610	87
Nebraska	6	4	+2	120	45
New Hampshire	6	4	+2	74	20
Oklahoma	6	4	+2	214	83
Pennsylvania	6	4	+2	778	270
Arkansas	5	3	+2	135	61
Indiana	5	3	+2	310	123
Iowa	5	3	+2	142	50
South Carolina	5	3	+2	227	111
Tennessee	5	3	+2	302	143
Wisconsin	5	4	+1	273	79

TABLE 9-1 Continued

State	Percentage Foreign-born		Percentage Point Change Since 2000	Number Foreign-born (in thousands)	
	2011- 2013	2000		2011- 2013	Change Since 2000
Louisiana	4	3	+1	177	61
Missouri	4	3	+1	239	87
Ohio	4	3	+1	465	126
Vermont	4	4	0	26	3
Alabama	3	2	+1	165	77
Kentucky	3	2	+1	143	62
Maine	3	3	0	46	9
North Dakota <sup>a</sup>	3	2	+1	19	6
South Dakota	3	2	+1	24	10
Wyoming	3	2	+1	20	9
Mississippi	2	1	+1	66	26
Montana <sup>a</sup>	2	2	0	20	3
West Virginia	2	1	+1	28	8
United States	13	11	+2	40,918	9,910

<sup>a</sup>Estimate is from the American Community Survey 5-year estimates because 3-year estimates are not available due to small sample size.

SOURCE: Foreign-born in 2000 from 2000 Decennial Census long-form sample, Summary File 4, Table QT-P14, Population Group—Total population, Nativity, Citizenship, see <http://www.census.gov> [November 2016]. Foreign-born in 2011-2013 from American Community Survey 3-year estimates, Table S0501: Selected Characteristics of the Native and Foreign-Born Populations, see <http://www.census.gov> [November 2016].

13 percent (the U.S. average) or more foreign-born in 2011-2013, and 10 had populations with smaller percentages of foreign-born.

### Geographic Distribution of Independent Persons by Generation, 2011-2013

Turning to our analysis for 2011-2013, we first consider the composition by state of independent person populations from the CPS ASEC, classified by immigrant generation (first, second, or third-plus). Table 9-2 provides estimates of the three immigrant generations as percentages of each state's population of independent persons, ordered from highest to lowest percentage for the first generation. We use this ordering for subsequent tables as well, to help readers focus on the states with the largest percentages of first generation independent persons, which are also the states

**TABLE 9-2** Percentage Independent Persons by Immigrant Generation, by State, 2011-2013, in Order from Highest to Lowest Percentage (first generation independent persons)

State	Immigrant Generation (% of total independent persons in state)		
	First	Second	Third+
California	35	15	50
New Jersey	28	12	60
New York	27	12	60
Nevada	25	11	64
Florida	23	9	68
Texas	21	10	69
Hawaii	21	15	64
Maryland	19	7	74
Arizona	18	11	70
District of Columbia	17	8	74
Massachusetts	17	12	71
Illinois	17	8	75
Washington	17	10	74
Connecticut	16	11	72
Rhode Island	16	14	70
Virginia	14	5	82
Delaware	12	4	83
Georgia	12	3	85
New Mexico	12	7	81
Oregon	11	8	81
Colorado	11	7	82
Alaska	11	7	82
Nebraska	11	4	85
Idaho	10	5	85
North Carolina	10	4	87
Utah	9	6	85
Michigan	9	6	85
Minnesota	9	5	86
Kansas	8	4	88
Pennsylvania	7	6	87
Iowa	6	3	90
New Hampshire	6	8	86
Wisconsin	6	5	90
Tennessee	5	2	92
Arkansas	5	2	93
Kentucky	5	2	93
South Carolina	5	2	93
Oklahoma	5	3	92
Vermont	5	8	87

TABLE 9-2 Continued

State	Immigrant Generation (% of total independent persons in state)		
	First	Second	Third+
Indiana	5	4	92
Ohio	5	4	91
Louisiana	4	2	94
Missouri	4	3	93
South Dakota	4	4	92
Alabama	4	2	94
Maine	3	7	89
North Dakota	3	5	92
Wyoming	3	4	93
Montana	3	6	92
Mississippi	3	1	96
West Virginia	1	2	96
United States	16	8	76

NOTE: See text for definitions of independent person and immigrant generation. Rows may not sum to 100% for a state due to rounding error (values of 0.5 to 0.9 percent are rounded up).

SOURCE: Panel tabulations of the Current Population Survey Annual Social and Economic Supplement for 2011-2013.

with the largest sample sizes for the first generation. (Tables 9-13 and 9-14 in the Technical Annex provide, respectively, annualized weighted sample counts and total 3-year unweighted counts of first, second, and third-plus generation independent persons by state in the pooled CPS ASEC data for 2011-2013.)<sup>9</sup> For the United States as a whole, first generation independent persons are 16 percent of all independent persons, second generation independent persons are 8 percent of all independent persons, and third-plus generation independent persons are 76 percent of all independent persons.<sup>10</sup>

By state, West Virginia has the lowest proportion of first generation

<sup>9</sup>As noted in Tables 9-13 and 9-14 in the annex, the full 2011-2013 sample does not account for overlap among sample cases due to the rotation group design of the survey.

<sup>10</sup>The estimated percentages of first generation independent persons in 2011-2013 in Table 9-2 are generally higher than the corresponding estimated percentages of foreign-born in Table 9-1 (e.g., 16% versus 13% for the United States). The reason is that the denominator in Table 9-2 is all independent persons (essentially all adults) and not the total population, combined with the fact that, proportionally, the first generation includes more independent persons compared with dependent children (considered in their own right) than does the remaining population. Nonetheless, the ordering of states is not that different between Tables 9-1 and 9-2.

independent persons in the state's total independent population (1%) and California has the highest proportion (35%). Ten states have first generation independent populations that make up less than 5 percent of the state's total independent population.<sup>11</sup> First generation independent individuals in these 10 states (and the other 26 states below the national average of 16%) are less represented in the first generation independent population nationwide than are all of their independent individuals in the national independent population. Seven states have first generation independent populations that comprise at least 20 percent of their total independent population.<sup>12</sup> First generation individuals in these seven states (and the other seven states and District of Columbia above the national average) are more represented in the first generation independent population nationwide than are all of their independent populations in the national independent population. Consequently, caution should be taken in comparing *national* averages of state and local revenue and expenditure flows for the first, second, and third-plus generations, due to the differing composition of individuals in each state among the three generations.

### Demographic Distributions of Independent Persons, 2011-2013

The three immigrant generations of independent persons that we define differ among themselves within and among states on characteristics that affect the net fiscal benefit or burden they entail for their state (and its localities). Among these characteristics are age, number of dependent children associated with the independent person unit, unit income, and education, for which we provide a broad overview below.

#### *Age*

The age of an independent person has an effect on the person's net fiscal benefit or burden for the state and locality. Working-age people with employment, for example, typically pay significantly more in taxes than they receive from expenditures and therefore provide a net fiscal benefit to their state and locality, other things equal. However, if their independent person unit includes dependent children, these benefits are lessened and often reversed because of costs for the children's education and other services. We observed these patterns in the national level analyses in Chapter 8 as well. The net fiscal benefit or burden of retirees will depend on a state's

<sup>11</sup>These 10 states are Alabama, Louisiana, Maine, Mississippi, Missouri, Montana, North Dakota, South Dakota, West Virginia, and Wyoming.

<sup>12</sup>These seven states are California, Florida, Hawaii, Nevada, New Jersey, New York, and Texas.

tax structure and social services for the elderly; for low-income retirees on Medicaid, the net fiscal impact is likely to be negative.<sup>13</sup>

Table 9-3 shows the average age of independent persons by state and generation and the percentage who are 65 and older in our data for 2011-2013. Nationwide, first generation independent persons are 45.8 years on average; second generation independent persons are older, at 46.5 years on average; and third-plus generation independent persons are older still, at 48.5 years on average. Nationwide, the elderly population (age 65+) comprises 14 percent of first generation independent persons, 23 percent of second generation independent persons, and 19 percent of third-plus generation independent persons.

The general patterns evident for the nation hold for states, but there are some significant exceptions. For example, among the seven states with the highest percentages of first generation independent persons, the average age of this generation varies from 44 years in Texas to 51 years in Hawaii. Florida has higher-than-average percentages of people ages 65 and older in all three generations (20%, 27%, and 24%, respectively), while Hawaii has even higher percentages of people ages 65 and older in its first and second generation independent person populations (24% and 32%, respectively) but a lower-than-average percentage in its third-plus generation independent person population (17%).

### *Number of Dependent Children*

The number of children in an independent person unit has an important effect on its net state and local benefit or burden, primarily stemming from the expenditure side of the ledger, for at least two reasons. First, education expenditures, which are allocated to school-age children, are a large item in state and local budgets (23% on average). Second, the more children in an independent unit, the larger the amount the unit is assigned for expenditures that are allocated to all persons (these expenditures total 49% on average—4% on other education and libraries and 45% on all other—see Table 9-12 in the Technical Annex to this chapter). Similarly, revenues that are allocated to all persons also total about half of revenues—see Table 9-11 in the Technical Annex to this chapter.<sup>14</sup>

<sup>13</sup>As indicated in Table 9-12, Medicaid costs for the institutionalized, who are not represented in the CPS ASEC, are not included in the allocation of expenditures to independent person units.

<sup>14</sup>A few of the expenditures and revenues we include in the group of those allocated to all persons are allocated selectively based on age. Liquor store expenditures, which are part of other expenditures, are allocated to all persons ages 21 and older. Motor fuels and tobacco product sales taxes, which are part of selective sales taxes, and motor vehicle license and motor vehicle operators license revenues, which are part of other revenues, are allocated to



**TABLE 9-3** Average Age and Percentage, Ages 65 and Older, Independent Persons by Immigrant Generation by State, 2011-2013

State	Immigrant Generation					
	First		Second		Third+	
	Avg. Age	% 65+	Avg. Age	% 65+	Avg. Age	% 65+
California	47	14	41	14	48	19
New Jersey	45	14	52	35	49	19
New York	48	19	49	28	48	17
Nevada	47	15	44	24	48	18
Florida	49	20	49	27	51	24
Texas	44	9	41	12	47	17
Hawaii	51	24	51	32	48	17
Maryland	45	13	45	20	48	18
Arizona	46	13	46	22	49	19
District of Columbia	42	10	39	11	45	17
Massachusetts	47	16	53	38	48	18
Illinois	45	13	45	22	49	19
Washington	45	14	47	22	48	18
Connecticut	47	15	55	38	49	17
Rhode Island	47	14	54	40	48	18
Virginia	44	11	44	13	49	19
Delaware	42	10	53	38	50	21
Georgia	42	9	39	9	47	16
New Mexico	44	8	45	18	50	23
Oregon	44	9	48	24	49	20
Colorado	44	12	47	21	47	17
Alaska	47	15	41	11	46	12
Nebraska	40	6	49	32	48	19
All						
					Avg. Age	% 65+
					47	16
					48	19
					48	19
					47	18
					50	23
					46	15
					49	21
					49	19
					47	16
					45	13
					47	18

Idaho	43	11	43	17	49	21	48	20
North Carolina	42	6	44	20	49	21	48	19
Utah	42	7	43	15	45	16	44	15
Michigan	46	17	55	39	49	19	49	20
Minnesota	42	11	52	34	48	18	48	18
Kansas	43	10	47	26	48	21	48	20
Pennsylvania	44	13	58	45	49	20	49	21
Iowa	41	6	51	36	48	18	48	18
New Hampshire	46	13	57	42	48	17	49	18
Wisconsin	44	10	57	41	49	19	49	20
Tennessee	40	8	46	18	49	20	48	19
Arkansas	39	8	42	14	49	22	48	21
Kentucky	41	9	44	18	48	19	48	18
South Carolina	43	10	49	20	49	20	49	20
Oklahoma	42	7	40	15	48	20	48	19
Vermont	50	22	56	35	49	18	49	20
Indiana	43	10	47	24	49	20	49	20
Ohio	44	16	54	32	49	20	49	20
Louisiana	45	13	44	14	48	19	48	19
Missouri	44	12	52	32	48	19	48	20
South Dakota	41	8	59	49	48	18	48	19
Alabama	42	9	48	19	49	19	48	19
Maine	47	16	59	44	49	19	50	21
North Dakota	41	7	62	58	46	15	47	17
Wyoming	43	11	54	35	47	16	47	17
Montana	45	15	61	52	49	22	49	23
Mississippi	43	9	44	14	49	20	49	20
West Virginia	48	17	52	31	50	19	50	19

*continued*

TABLE 9-3 Continued

State	Immigrant Generation					
	First		Second		Third+	
	Avg. Age	% 65+	Avg. Age	% 65+	Avg. Age	% 65+
Top 15 States by % in First Generation	47	15	45	21	48	19
United States	46	14	47	23	48	19

NOTES: See text for definitions of independent person and immigrant generation. States are listed from highest to lowest percentage of first generation independent persons in the state's population of independent persons (see Table 9-2).

SOURCE: Panel tabulations of the Current Population Survey Annual Social and Economic Supplement for 2011-2013.

In our data for 2011-2013, nationwide, first generation independent persons have an average of 0.52 children per unit, second generation persons have an average of 0.33 children per unit, and third-plus generation persons have an average of 0.36 children per unit (see Table 9-15 in the Technical Annex to this chapter). For most states, independent individuals in the second generation have fewer children than those in the first and third-plus generations, although the second and third-plus generations are quite similar (independent persons of the second generation in California have more children on average than do those in the third-plus generation). Among the seven states with the largest percentages of first generation independent persons, the average number of children per first generation independent person unit ranges from 0.39 in Florida to 0.64 in Texas, while the range per second generation independent person unit is from 0.24 in New Jersey to 0.47 in Texas. The range per third-plus generation independent person unit is from 0.31 in Florida to 0.38 in Texas. For the next seven states and District of Columbia that have between 15 and 20 percent of their independent persons in the first generation, the variation is even greater, with the District of Columbia having the lowest average number of children in each generation. States with smaller shares of immigrants also show wide variation in their average number of children per independent person, with Vermont averaging 0.29 children while Utah averages 0.53 children.

### *Income and Education*

Income levels affect taxes paid and benefits received for independent persons and their children (see Table 9-16 in the Technical Annex to this chapter). Nationwide, average adjusted gross income (AGI) is lowest among first generation independent person units at about \$29,450 per unit, considerably higher among second generation independent person units at \$34,900 per unit, and higher still among third-plus generation units at \$35,900 per unit. Among the seven states with the highest percentages of first generation independent person units, average AGI for the first generation varies from \$26,100 per unit in Texas to \$35,700 per unit in New Jersey. Average AGI for the second generation in these seven states varies from \$28,250 per unit in Nevada to \$37,900 per unit in New Jersey. For third-plus generation independent person units, New Jersey again has the highest average income of \$47,250, in contrast to the lowest average income for third-plus generation independent person units of \$33,800 in

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all persons ages 18 and older. Alcoholic beverage sales taxes, which are part of selective sales taxes, and liquor store revenues, which are part of other revenues, are allocated to all persons ages 21 and up.

Florida. Among states with over one-quarter of their independent persons in the first or second generation (or at least 15 percent of independent individuals in the first generation), Arizona has the lowest average income for first generation independent person units (\$25,100).

Income levels relate to education levels, and education levels differ significantly across generations. A larger percentage of first generation independent persons have not received a high school degree (28%) than is the case for the second and third-plus generations (10% and 9%, respectively). However, the percentage of first generation immigrants with advanced degrees beyond a bachelor's degree is comparable to that of the other two generations (all between 10% and 12%; Table 9-17 in the Technical Annex to this chapter presents the state-by-state figures). The percentage with at least a bachelor's degree is likewise comparable between the first and third-plus generations (28% and 29%, respectively). However, these statewide averages in part mask differences in higher education both across and within states. For example, in California, 8 percent of first generation independent persons have more than a bachelor's degree, compared with 10 percent for second generation and 12 percent for third-plus generation independent persons. The District of Columbia has the highest share of individuals with more than a bachelor's degree (29%), but 45 percent of second generation independent persons have more than a bachelor's degree compared to 27 and 28 percent, respectively, of first and third-plus generation individuals. Part of the difference comes about because many of the states with small immigrant populations also have lower numbers of residents with more than a bachelor's degree.

#### 9.4 FISCAL VARIATION AMONG STATES, 2011-2013

We next look at state and local government revenues and expenditures by state and immigrant generation. States must generally balance their budgets year by year, but they vary greatly in the types and amounts of taxes they levy and the level of services they provide. Given the large differences in population size among states, it is important when examining state and local government fiscal data to convert the information to an appropriate population base. While we have calculated revenues, expenditures, and net fiscal effects for all states, the discussion below focuses on the 14 states and the District of Columbia with at least one-quarter of independent persons in the first or second generation (these states and the District of Columbia also have the 15 highest percentages of first generation individuals). Calculations are available, and presented in the tables, for all states, but caution must be exercised when examining differences for other states, especially those near the bottom of the tables, due to limited sample sizes. We also round all dollar amounts to the nearest \$50 to emphasize that the basis for

our estimates is a relatively small sample. In the remainder of the chapter, we present estimates of revenues, expenditures, and net fiscal effects on a per-independent person unit basis (where dependent children and their revenues and expenditures are assigned to their parents).

### State and Local Government Revenues

While most state governments rely on general sales and income taxes and local governments rely primarily on property taxes, the composition of state and local revenues varies substantially. Nine states (including Florida, Nevada, Texas, and Washington) do not levy a broad-based personal income tax, and five states do not levy a general sales tax.

Table 9-4 provides population-based revenue estimates by state for all independent person units and those in each generation with per-unit amounts derived using the allocation process described in Table 9-11 in the Technical Annex to this chapter. For the United States as a whole, 2011-2013 annualized state and local government revenue averaged \$14,700 per independent person unit. This amount masks considerable variation by state, particularly at the higher end. Thus, 17 states averaged between \$11,650 and \$12,950 per independent person unit; 13 states averaged between \$13,000 and \$14,500; 16 states averaged between \$14,550 and \$17,800; and five states exceeded \$17,800 per independent person unit. The five jurisdictions with the highest average state and local government estimated revenue per independent person unit were Alaska (\$36,400), the District of Columbia (\$27,600), Wyoming (\$24,150), New York (\$22,400), and North Dakota (\$20,300), while the five states with the lowest state and local government estimated revenue per independent person unit were Idaho (\$11,650), Florida (\$11,800), New Hampshire (\$11,850), Georgia (\$11,900), and Arizona (\$11,900). If we limit our analysis to the 15 jurisdictions with the largest shares of first and second generation immigrants, the average revenue per independent person unit is \$15,750 and varies from \$11,800 in Florida to \$27,600 in the District of Columbia.

By generation nationwide, state and local government revenue averaged about the same amount per first generation and third-plus generation independent person unit: \$14,350 and \$14,700, respectively. Revenue was higher for the second generation, averaging \$15,500 per second generation independent person unit. However, these national similarities among generations mask large differences across states among generations. For the 15 jurisdictions with the largest shares of first and second generation immigrants, the average revenue for an independent person unit in the third-plus generation exceeds that of a unit in the first generation by \$1,450 (\$16,100 versus \$14,650) and is only slightly lower than that of a unit in the second generation (\$16,200).

**TABLE 9-4** State and Local Revenues per Independent Person Unit (rounded to nearest \$50), by Immigrant Generation by State, 2011-2013

State	Immigrant Generation			All	Difference: First less Third+
	First	Second	Third+		
California	\$15,600	\$18,450	\$19,150	\$17,800	-\$3,550
New Jersey	14,350	15,050	16,700	15,850	-2,350
New York	20,200	22,200	23,450	22,400	-3,250
Nevada	11,500	12,350	13,100	12,650	-1,600
Florida	11,050	11,550	12,050	11,800	-1,000
Texas	11,950	12,950	12,850	12,650	-900
Hawaii	14,200	14,850	16,400	15,700	-2,200
Maryland	13,900	13,850	14,350	14,250	-500
Arizona	11,000	12,000	12,150	11,900	-1,150
District of Columbia	24,700	28,400	28,200	27,600	-3,500
Massachusetts	14,900	15,300	16,600	16,150	-1,700
Illinois	12,450	13,850	14,750	14,300	-2,250
Washington	14,650	14,900	15,250	15,100	-600
Connecticut	14,800	15,900	17,050	16,550	-2,250
Rhode Island	14,300	13,950	15,900	15,350	-1,600
Virginia	12,500	13,500	12,800	12,800	-300
Delaware	16,050	15,300	16,150	16,100	-100
Georgia	10,850	12,200	12,050	11,900	-1,200
New Mexico	17,450	15,400	14,850	15,200	2,600
Oregon	16,050	15,500	15,150	15,250	950
Colorado	12,950	14,200	14,250	14,100	-1,250
Alaska	37,250	38,700	36,100	36,400	1,150
Nebraska	15,700	15,550	16,400	16,300	-700
Idaho	10,400	11,600	11,800	11,650	-1,400
North Carolina	12,800	13,500	13,250	13,200	-450
Utah	13,650	13,650	13,900	13,850	-250
Michigan	12,300	12,450	13,250	13,100	-950
Minnesota	14,550	14,400	16,150	15,900	-1,600
Kansas	13,750	13,200	13,800	13,750	0
Pennsylvania	14,050	12,050	13,550	13,500	500
Iowa	15,750	15,000	15,150	15,200	600
New Hampshire	11,500	11,600	11,900	11,850	-400
Wisconsin	13,850	13,450	14,550	14,450	-700
Tennessee	12,000	11,750	12,250	12,250	-250
Arkansas	11,950	12,800	12,200	12,200	-300
Kentucky	12,200	13,750	12,050	12,100	150
South Carolina	13,150	14,550	12,900	12,950	300
Oklahoma	12,100	14,300	12,800	12,850	-700
Vermont	15,650	14,950	15,650	15,550	0
Indiana	12,400	12,350	12,250	12,250	150

TABLE 9-4 Continued

State	Immigrant Generation			All	Difference: First less Third+
	First	Second	Third+		
Ohio	13,450	14,450	14,850	14,750	-1,350
Louisiana	12,950	14,450	14,650	14,550	-1,650
Missouri	12,150	12,800	12,500	12,500	-350
South Dakota	12,900	10,550	13,500	13,350	-600
Alabama	12,650	12,200	12,500	12,500	150
Maine	12,750	12,050	12,700	12,650	50
North Dakota	20,700	17,050	20,450	20,300	250
Wyoming	24,100	21,950	24,250	24,150	-150
Montana	15,000	10,700	13,450	13,350	1,550
Mississippi	14,450	15,050	14,350	14,400	100
West Virginia	16,100	13,350	12,950	13,000	3,100
Top 15 States by % in First Generation	14,650	16,200	16,100	15,750	-1,450
United States	14,350	15,500	14,700	14,700	-350

NOTES: See text for construction of revenues by state and generation. Because the difference between first and third-plus generation revenue amounts is taken from the unrounded estimates and then rounded to the nearest \$50, the value may differ from the first generation column less the third-plus due to rounding in some cases. States are listed from highest to lowest percentage of first generation independent persons in the state's population of independent persons (see Table 9-2). Caution should be taken when examining the state-level estimates, especially those near the bottom of the table, because of small first (and second) generation populations for many states.

SOURCE: Panel estimates implemented on the Current Population Survey Annual Social and Economic Supplement for 2011-2013.

### State and Local Government Expenditures

Spending varies across states, with some states raising and spending more money than others. Note that, due to balanced budget rules, the states that raised more revenues almost always spent more funds. Table 9-5 provides population-based expenditure estimates by state for all independent person units and by generation with per-unit amounts derived using the allocation process documented in Table 9-12 in the Technical Annex to this chapter. For the United States as a whole, 2011-2013 annualized state and local government expenditures averaged \$13,850 per independent person unit, or about \$900 less than was raised in revenue. Sixteen states had average expenditures between \$10,450 and \$11,950 per independent unit; 17 states were between \$12,000 and \$14,000; 13 states were between



\$14,050 and \$16,700; and five states exceeded \$16,700 of expenditures per independent unit. The five states with the highest average state and local government expenditures per independent unit were Alaska (\$29,950), California (\$16,750); the District of Columbia (\$28,500), New York (\$20,700); and Wyoming (\$20,750); the lowest were Arizona (\$10,900); Arkansas (\$10,900), Florida (\$10,850), Idaho (\$10,450, and Indiana (\$11,250). If the analysis is limited to the 15 states with the largest state share in the first generation, the average spending per independent person unit is \$14,950 (which is higher than the national average) and ranges from \$10,850 in Florida to \$28,500 in the District of Columbia: the same two lowest and highest jurisdictions among these 15 for average revenue per independent person unit.

**TABLE 9-5** State and Local Expenditures per Independent Person Unit (rounded to nearest \$50), by Immigrant Generation by State, 2011-2013

State	Immigrant Generation			All	Difference: First less Third+
	First	Second	Third+		
California	\$17,650	\$16,900	\$16,050	\$16,750	\$1,600
New Jersey	16,200	12,750	16,000	15,650	200
New York	21,700	17,800	20,850	20,700	800
Nevada	12,800	11,350	11,150	11,550	1,650
Florida	11,450	10,350	10,700	10,850	700
Texas	14,000	13,350	11,450	12,200	2,500
Hawaii	14,900	13,600	14,700	14,600	200
Maryland	13,950	11,800	13,800	13,700	150
Arizona	12,350	11,750	10,400	10,900	1,950
District of Columbia	27,500	21,300	29,500	28,500	-2,000
Massachusetts	17,150	13,000	16,150	15,950	1,050
Illinois	15,150	13,250	13,750	13,950	1,400
Washington	17,750	14,300	14,500	15,000	3,250
Connecticut	15,400	12,300	15,750	15,300	-350
Rhode Island	15,800	11,800	14,300	14,200	1,500
Virginia	13,050	12,200	11,950	12,150	1,100
Delaware	16,550	13,250	15,450	15,450	1,150
Georgia	12,100	11,550	11,200	11,300	850
New Mexico	19,950	15,150	13,850	14,650	6,150
Oregon	17,950	13,250	13,450	13,950	4,500
Colorado	15,950	13,150	13,300	13,600	2,600
Alaska	33,300	32,950	29,250	29,950	4,050
Nebraska	17,900	14,100	14,500	14,850	3,400
Idaho	11,450	11,000	10,300	10,450	1,150
North Carolina	13,450	11,750	11,750	11,900	1,700

TABLE 9-5 Continued

State	Immigrant Generation			All	Difference: First less Third+
	First	Second	Third+		
Utah	15,550	14,100	13,400	13,650	2,200
Michigan	12,600	9,900	12,450	12,300	150
Minnesota	19,650	11,100	13,950	14,300	5,650
Kansas	16,200	12,050	12,600	12,900	3,600
Pennsylvania	15,300	10,300	13,300	13,250	2,000
Iowa	16,800	12,450	13,600	13,750	3,200
New Hampshire	12,050	9,850	11,350	11,300	700
Wisconsin	17,550	11,900	13,000	13,200	4,550
Tennessee	12,700	10,500	11,500	11,550	1,150
Arkansas	13,150	11,150	10,750	10,900	2,350
Kentucky	13,150	11,300	11,950	12,000	1,200
South Carolina	13,000	12,100	12,300	12,350	700
Oklahoma	11,900	12,350	11,350	11,400	600
Vermont	15,400	11,550	14,600	14,400	800
Indiana	12,250	10,600	11,200	11,250	1,050
Ohio	13,000	10,750	13,350	13,200	-300
Louisiana	13,400	15,550	14,850	14,800	-1,500
Missouri	12,350	10,550	11,300	11,350	1,050
South Dakota	13,450	9,050	11,650	11,600	1,800
Alabama	13,700	9,650	11,900	11,950	1,800
Maine	13,100	9,600	11,950	11,800	1,150
North Dakota	17,500	11,500	15,050	14,950	2,450
Wyoming	22,800	18,400	20,800	20,750	2,000
Montana	13,100	9,500	12,550	12,350	600
Mississippi	13,150	12,400	13,000	13,000	150
West Virginia	15,550	9,500	11,450	11,450	4,100
Top 15 States by % in First Generation	16,350	14,600	14,450	14,950	1,950
United States	15,950	13,800	13,400	13,850	2,550

NOTE: See text for construction of expenditures by state and generation. Because the difference between first and third-plus generation expenditure amounts is taken from the unrounded estimates and then rounded to the nearest \$50, the value may differ from the first generation column less the third-plus due to rounding in some cases. States are listed from highest to lowest percentage of first generation independent persons in the state's population of independent persons (see Table 9-2). Caution should be exercised when examining the state-level estimates, especially those near the bottom of the table, because of small first (and second) generation populations for many states.

SOURCE: Panel estimates implemented Current Population Survey Annual Social and Economic Supplement for 2011-2013.

By generation, for the United States as a whole, annualized state and local government expenditures for the 2011-2013 period were considerably higher for first generation independent person units (\$15,950) than for second generation (\$13,800) or third-plus generation (\$13,400) independent person units. This was due to greater program participation (including public education). For the 15 states with the largest share of their independent population in the first generation, average expenditures for each immigrant generation were higher than the national averages by generation, but the gap *between* the generations was smaller (with average expenditures of \$16,350 for the first generation versus \$14,600 for the second and \$14,450 for the third-plus generation).

### 9.5 AGGREGATE FISCAL EFFECTS BY STATE

Total state and local government revenues averaged \$3.3 trillion per year in 2011-2013, while total state and local government expenditures averaged \$3.17 trillion, nearly balancing out. In theory, when one looks across the amount of revenues contributed by each generation and the expenditures received by each generation, and if balanced budget rules held, the net total across generations in each state should be zero. In fact, because certain state and local funds run surpluses and deficits, no state actually has state and local revenues precisely equal to state and local expenditures. California, the state with the largest population and the largest number and percentage of first generation independent person immigrants, had the largest positive net difference in dollars between total average annual state and local revenue and expenditure flows in 2011-2013 (\$22.9 billion) out of all 50 states and the District of Columbia. With spending exceeding revenues by \$2.4 billion, Pennsylvania had the largest negative net difference in dollars. The District of Columbia had the largest negative net difference as a percentage of state and local revenues (-6%), while North Dakota had the largest positive net difference (+23%).

We exclude the institutional portion of Medicaid spending (\$72 billion) from our estimates due to missing this population in our data, which widens the gap between aggregate U.S. revenues and expenditures in 2011-2013. After we take out institutional Medicaid spending, all but two states have positive budget balances (compared with seven negative-balance states when all expenditure flows are included).

Nationwide, the fact that the state and local government revenues we allocated exceeded expenditures by \$197 billion, after excluding institutional Medicaid spending, means that an average net difference of \$900 was assigned per independent person unit. By state, average net differences resulting from fiscal imbalances that were assigned at the unit level varied from -\$850 in the District of Columbia to \$6,450 in Alaska (see the "All"

column of Table 9-6). With net differences in revenues and expenditures ranging from positive to negative across states, when comparing net differences per independent person unit for different immigrant generations, it can be difficult to disentangle how much variation is from across-generation cost differences versus net cost differences among states.

Our analysis is for a specific time period for which state fiscal balances may not be typical. For example, the difference between state and local total revenues and total expenditures was positive in 2011 (\$281 billion, or \$353 billion after excluding Medicaid institutional spending). In 2012, this

**TABLE 9-6** Net Difference between State and Local Revenues and Expenditures per Independent Person Unit (rounded to nearest \$50), by Immigrant Generation by State, 2011-2013

State	Immigrant Generation			All	Difference: First less Third+
	First	Second	Third+		
California	-\$2,050	\$1,550	\$3,100	\$1,050	-\$5,150
New Jersey	-1,850	2,300	700	200	-2,550
New York	-1,500	4,400	2,600	1,700	-4,050
Nevada	-1,300	1,000	1,950	1,050	-3,250
Florida	-350	1,200	1,350	950	-1,700
Texas	-2,050	-400	1,400	450	-3,450
Hawaii	-700	1,250	1,700	1,150	-2,400
Maryland	-100	2,050	550	550	-650
Arizona	-1,350	250	1,750	1,000	-3,100
District of Columbia	-2,800	7,100	-1,300	-850	-1,500
Massachusetts	-2,250	2,300	500	250	-2,750
Illinois	-2,700	550	1,000	350	-3,650
Washington	-3,050	600	750	100	-3,850
Connecticut	-600	3,550	1,300	1,250	-1,900
Rhode Island	-1,500	2,100	1,600	1,150	-3,100
Virginia	-600	1,300	800	650	-1,400
Delaware	-500	2,050	750	650	-1,250
Georgia	-1,250	650	800	550	-2,050
New Mexico	-2,550	250	1,000	550	-3,550
Oregon	-1,900	2,250	1,650	1,300	-3,550
Colorado	-2,950	1,050	900	500	-3,850
Alaska	3,950	5,800	6,850	6,450	-2,900
Nebraska	-2,200	1,500	1,900	1,450	-4,100
Idaho	-1,050	600	1,500	1,200	-2,550
North Carolina	-650	1,700	1,500	1,300	-2,150
Utah	-1,950	-450	500	250	-2,450
Michigan	-250	2,550	800	800	-1,050

*continued*

TABLE 9-6 Continued

State	Immigrant Generation			All	Difference: First less Third+
	First	Second	Third+		
Minnesota	-5,100	3,250	2,200	1,600	-7,250
Kansas	-2,450	1,150	1,150	850	-3,600
Pennsylvania	-1,250	1,750	250	250	-1,500
Iowa	-1,000	2,550	1,550	1,450	-2,600
New Hampshire	-550	1,750	550	600	-1,100
Wisconsin	-3,650	1,550	1,550	1,250	-5,250
Tennessee	-700	1,250	750	700	-1,450
Arkansas	-1,200	1,650	1,450	1,300	-2,650
Kentucky	-950	2,400	100	100	-1,050
South Carolina	150	2,400	550	600	-450
Oklahoma	200	1,950	1,500	1,450	-1,300
Vermont	250	3,400	1,000	1,150	-750
Indiana	150	1,750	1,050	1,050	-900
Ohio	450	3,650	1,500	1,550	-1,050
Louisiana	-400	-1,100	-250	-250	-200
Missouri	-150	2,250	1,200	1,200	-1,400
South Dakota	-550	1,500	1,850	1,750	-2,400
Alabama	-1,100	2,500	550	550	-1,650
Maine	-350	2,450	750	850	-1,100
North Dakota	3,250	5,500	5,400	5,350	-2,200
Wyoming	1,300	3,550	3,450	3,400	-2,150
Montana	1,850	1,250	950	950	950
Mississippi	1,300	2,600	1,350	1,400	-50
West Virginia	550	3,850	1,500	1,550	-950
Top 15 States by % in First Generation	-1,700	1,650	1,650	800	-3,400
United States	-1,600	1,700	1,300	900	-2,900

NOTES: See text for construction of revenues and expenditures by state and generation. Because the difference between first and third-plus generation net difference (revenue less expenditure) amounts is taken from the unrounded estimates and then rounded to the nearest \$50, the value may differ from the first generation column less the third-plus due to rounding in some cases. Similarly, because differences between revenues and expenditures are calculated on unrounded numbers and then the difference is rounded, these values may differ from calculated differences between Tables 9-4 and 9-5. States are listed from highest to lowest percentage of first generation independent persons in the state's population of independent persons (see Table 9-2). Caution should be taken when examining the state-level estimates, especially those near the bottom of the table, because of small first (and second) generation populations for many states.

SOURCE: Panel estimates implemented on the Current Population Survey Annual Social and Economic Supplement for 2011-2013.

switched to a negative difference, largely due to a very significant decline in insurance trust revenue (government employee retirement revenue fell from \$554.3 billion to \$169.9 billion) between the 2 years, reflecting changes due to delayed payments during the recession. In 2013, the net fiscal state balance became positive again. To smooth out these cycles, we averaged revenues and expenditures for 2011-2013. If 2011 rather than 2011-2013 state and local revenue and expenditure amounts were assigned to our sample, the average net difference per independent person unit would become even more positive, going from \$900 to approximately \$1,600 per independent person unit. If, instead, we had used 2012 amounts, the individual unit average net difference would turn negative (−\$200). If we had eliminated all insurance trust contributions and payments along with excluding the institutional portion of Medicaid spending, averaged over the 2011-2013 period, 11 states would be estimated to have higher expenditures than revenues, while, on average per independent person unit, there would be \$200 more in revenues raised than spent in the country as a whole.

## 9.6 NET EFFECTS OF IMMIGRATION ON STATE AND LOCAL BUDGETS

### Estimated Differences in Net Fiscal Effects per Independent Person Unit by Generation

Table 9-6 shows the estimated net differences between state and local revenues and expenditures, by generation per independent person unit. Our estimates are derived using the replicate weights in the 2011-2013 CPS ASEC, whereby calculations of net differences are run many times in order to estimate an appropriate standard error and coefficient of variation, or CV (the standard error as a percentage of the estimate). We used replicate weights and show CVs in this part of the analysis (see Table 9-18 in the Technical Annex to this chapter) because we have reached the primary question of interest: How much do first and second generation units cost their states and localities? Also, the net differences are the result of balancing revenue and expenditure assignments, thereby magnifying the errors in each.<sup>15</sup>

As seen in Table 9-6, for the United States as a whole, **first generation independent person units (which include first and second generation children assigned to independent first generation persons) cost the states on net about \$1,600 each. In contrast, second generation independent**

<sup>15</sup>Not only does the CPS ASEC have sampling error, which is large for many states even pooled over 3 years, but also both the CPS ASEC and the COG have other sources of error, such as response error, imputation error, and the like.

person units (which include second and third generation children assigned to independent second generation persons) contribute on net to state and local budgets about \$1,700 each, and third-plus generation independent person units (which include their children) contribute on net to state and local budgets about \$1,300 each.<sup>16</sup> These estimates of the fiscal impact imply that the total annual aggregate impact of the first generation and their dependents, averaged across 2011-2013, is a cost of \$57.4 billion, while the second and third-plus generation individuals (and their children) create benefits of \$30.5 billion and \$223.8 billion, respectively. Note that the surplus revenues raised amount to \$197 billion, which equals the surplus across all 50 states.<sup>17</sup> This overall pattern is largely driven by the larger education costs for first generation independent person units, which include more children on average than units of the other two generations. By the second generation, immigrants are a net win for the states as a whole, given that they have fewer children on average than first generation units and are contributing in revenues more than they cost in expenditures.<sup>18</sup> State by state, however, there are wide variations in net gains or losses, although the panel is unable to make claims as precisely as we would like for many of our state and local estimates because of the large sampling errors.

The demographic differences between the first, second, and third-plus generation independent person units serve as the drivers of the differences

<sup>16</sup>The finding here, that the first generation generates higher net fiscal costs at the state and local level, is consistent with that from the parallel analysis in Chapter 8 (Table 8-1). The numbers for the second and third-plus generations here and for the second and third-plus generation in Chapter 8 do not map exactly, due to slight methodological differences. The Chapter 8 analysis is for 2013, while the analysis here averages over the 2011-2013 period. More importantly, the two analyses treat grant-in-aid spending from the federal government (which pays for programs like Medicaid and some welfare programs) differently. Chapter 9 includes these revenue transfers to states in state revenues (with the exception of the institutional portion of Medicaid spending), while Chapter 8 does not. Also, in Chapter 8, the funding raised by the federal government to pay for the grants-in-aid is treated as either federal taxes or federal deficit spending, which leads to both lower spending and lower revenue estimates at the state and local level. Finally, in the Chapter 8 analysis, there is no balanced budget assumption—the aggregates are as reported in the National Income and Product Accounts. If grants-in-aid are taken off both sides of the state/local ledger, the net fiscal balance becomes more negative.

<sup>17</sup>The \$197 billion aggregate surplus here is calculated by totaling the unrounded estimates of net fiscal effects by state multiplied by the average number of independent persons in each year (see Table 9-13 in the Technical Annex to this chapter); this will differ somewhat from the total if the rounded estimates in Table 9-6 are used instead.

<sup>18</sup>These results are driven by the fact that the costs of dependents are assigned to their parents. If, instead, taxes paid and services received were assessed at the individual level, with dependent children considered in their own right, the relative costs would shift across groups. Because half of all second generation individuals are dependents, allocating all costs and benefits to each person (rather than wrapping up dependent children to independents) would cause the average net fiscal cost for first generation individuals to decline and reverse sign in many states, while the costs for second generation individuals would increase.

**in revenue and expenditure flows across them.** First generation independent person units generate higher costs due to the presence of more dependent children, on average, in those units. Much of this comes from the assignment of K-12 education spending, which accounts for 16 percent of all state and local spending. If we remove all K-12 education expenditures from our estimates, rather than assigning school spending to the students themselves (which in most cases means wrapping it up to the independent parents/individuals who support them), the spending difference between the first and third-plus generations decreases from \$2,900 to \$1,950, a 32 percent decrease.

Beyond education spending, the 45 percent of spending flows that are classified as “other” (hospitals, health, veterans’ services, etc.—see Table 9-12 in the Technical Annex to this chapter) is allocated to all people, both dependent and independent, evenly. Thus, first generation independent individuals on average have higher total expenditure amounts from these flows allocated to all because they have more flows wrapped up from more dependent children. However, if a portion of these spending costs were treated as fixed expenditure flows, irrespective of population numbers (analogous to the treatment of national defense in some scenarios in Chapter 8), the addition of first generation independent person units to the population base would reduce these average costs for the second and third-plus generation units; the dollar amounts would be spread across a larger population (which is what we did in our baseline estimates), but the marginal cost to the state would not change. Additionally, although it is not evident in cross-sectional estimates, the majority of the dependent children of first generation immigrants who are second generation and whose costs are assigned to their parents will go on to become net contributors once they reach working ages.

**Although per unit spending on the second generation independent person units is slightly more than it is on the third-plus generation units, the per unit net *difference* between revenues and expenditures is the most *positive* for second generation independent person units.** With a positive net difference of \$1,700, second generation independent person units contribute \$400 more on average than third-plus generation units. This corroborates findings reported in Chapter 8. However, this is largely due to the distribution of second generation independent person units across states, rather than the relative contribution of second versus third-plus generation units within a state. The third-plus generation independent person units contribute less in taxes and other revenue flows on average than the second generation, despite having the highest average income of all three generations. Looking at specific tax flows, the second generation units contribute the most in both state income tax and general sales tax on average, followed by the third-plus generation units and then the first



generation independent person units, reflecting the lower average AGI of first generation independent persons in the sample. However, this is driven by differences in tax structures in place across different states, rather than differences in the characteristics of the independent person units.

Note that the average U.S. spending and revenues raised per independent person unit hide differences across states. Thus, because many of the states with small numbers of first generation independent person units also have lower spending and taxes, the spending per third-plus generation independent person unit is lower for these states than for the states where immigrants often settle. Focusing on the 14 states and the District of Columbia with the highest share of first generation independent person units, one can see differences across generations as well. Moreover, as noted above, these differences can vary from year to year depending on whether a state is running a surplus or deficit. While first generation independent person units have more spent on them than revenues contributed in these 15 jurisdictions, this amount varies from a net cost of \$100 in Maryland to a net cost of \$3,050 in Washington State. For the second generation independent person units, while on average across states more revenues are raised than money spent on them, the differences vary from a net cost of about \$400 per second generation independent person unit in Texas to a net contribution of \$7,100 per such unit to the District of Columbia's budget. Similarly, whether an average third-plus generation independent person unit costs or contributes to a state (and local) budget varies from a net cost of \$1,300 in the District of Columbia to a net contribution of \$3,100 in California. These differences are largely driven both by different demographic and economic characteristics of individuals and by fiscal choices made by state and local governments.

### **Estimated Differences in Net Fiscal Effects at the Household Level**

If, instead of independent person units, one were to use self-identified households, very similar patterns result across generations (as defined by the generation of the designated head of household), albeit the estimates are often about double the estimates for independent person units. That is, one finds that first generation households in general have higher state and local net costs or smaller contributions than do the second or third-plus generation households (see Table 9-7). Again, this pattern varies across states, with second generation households often, but not always, contributing more to a state and local surplus than either first or third-plus generation households. The estimated amounts are higher because, typically, average household size includes more than one independent person. Differences in household size and composition will affect the relative size of net contribution or burden. Table 9-19 in the Technical Annex to this chapter presents

**TABLE 9-7** Net Difference between State and Local Revenues and Expenditures per Household Unit (rounded to nearest \$50), by Immigrant Generation by State, 2011-2013

State	Immigrant Generation (household units)			All
	First	Second	Third+	
California	-\$4,400	\$2,500	\$5,750	\$2,150
New Jersey	-4,400	4,200	1,500	400
New York	-2,750	7,600	4,600	3,100
Nevada	-2,500	1,700	3,400	1,950
Florida	-800	1,950	2,400	1,700
Texas	-4,550	-300	2,500	900
Hawaii	-2,300	3,150	3,600	2,400
Maryland	-450	4,600	1,000	1,000
Arizona	-2,800	-150	3,250	1,800
District of Columbia	-5,650	11,100	-1,950	-1,400
Massachusetts	-4,200	4,400	750	450
Illinois	-5,350	750	1,650	600
Washington	-6,600	800	1,450	200
Connecticut	-1,050	5,200	2,550	2,300
Rhode Island	-3,050	3,950	2,850	2,100
Virginia	-1,650	3,900	1,400	1,200
Delaware	-700	2,600	1,350	1,200
Georgia	-2,450	300	1,450	1,000
New Mexico	-5,050	-700	1,950	1,000
Oregon	-3,900	4,500	3,000	2,400
Colorado	-6,200	2,050	1,650	900
Alaska	7,350	10,300	12,300	11,700
Nebraska	-4,450	2,750	3,300	2,600
Idaho	-2,000	700	2,800	2,250
North Carolina	-1,650	2,000	2,700	2,300
Utah	-4,800	-1,150	1,050	450
Michigan	-650	4,650	1,450	1,450
Minnesota	-10,000	4,550	3,900	2,900
Kansas	-5,050	2,200	2,000	1,550
Pennsylvania	-2,150	2,950	450	450
Iowa	-2,250	2,100	2,850	2,550
New Hampshire	-1,000	2,050	1,150	1,100
Wisconsin	-8,300	2,450	2,800	2,250
Tennessee	-300	1,650	1,300	1,250
Arkansas	-2,150	5,000	2,550	2,400
Kentucky	-1,700	3,500	150	150
South Carolina	-100	1,000	1,100	1,050
Oklahoma	500	3,150	2,650	2,550

*continued*

TABLE 9-7 Continued

State	Immigrant Generation (household units)			All
	First	Second	Third+	
Vermont	-850	5,000	1,950	2,100
Indiana	200	4,700	1,800	1,850
Ohio	850	6,600	2,600	2,750
Louisiana	-850	1,250	-500	-450
Missouri	50	3,150	2,100	2,050
South Dakota	-2,300	3,400	3,200	3,050
Alabama	-1,300	5,450	1,000	1,000
Maine	-500	3,400	1,400	1,500
North Dakota	4,900	8,500	9,350	9,200
Wyoming	3,700	6,450	6,000	5,950
Montana	1,950	2,100	1,650	1,650
Mississippi	2,350	8,000	2,400	2,500
West Virginia	2,700	7,600	2,600	2,700
Top 15 States by % in First Generation	-3,600	2,850	3,050	1,550
United States	-3,300	3,000	2,400	1,600

NOTE: See text for construction of revenues and expenditures by state and generation and for definitions of household immigrant generation. States are listed from highest to lowest percentage of first generation independent persons in the state's population of independent persons (see Table 9-2). Caution should be taken when examining the state-level estimates, especially those near the bottom of the table, because of small first (and second) generation populations for many states.

SOURCE: Panel estimates implemented on the Current Population Survey Annual Social and Economic Supplement for 2011-2013.

information on average household size by generation (of head of household) by state. Table 9-20 in the Technical Annex to this chapter provides annualized weighted sample counts of first, second, and third-plus generation households by state in the pooled CPS ASEC 2011-2013 data.<sup>19</sup>

An advantage of using households as the unit of analysis is that assumptions do not have to be made about allocation of income, dependents, or receipt of social services among independent persons in the household—they can be assigned to the whole household. However, a single generation status must be assigned to the entire household, even for cases in which different independent persons within the household are of different genera-

<sup>19</sup>As noted in Table 9-20, the full 2011-2013 household sample does not account for overlap among sample cases due to the rotation group design of the survey.

tions. Thus, for the estimates presented here, the panel assigned generation status at the household level using the generational status self-reported by the householder. For mixed cases, if the nonimmigrant is more likely to be the householder (say, because of more facility with English), then our estimates will be muddled. While not the standard procedure, which would use either all individuals, all households, or all families, presenting results according to independent person units (and assigning dependent children to their parents to form a unit) provides a cleaner comparison, as it avoids inconsistencies caused by differences in household size or composition.

### Decomposing Cross-Generation Differences

To highlight the relationship between the demographic and economic differences across generations of independent person units and the variations in state and local revenues and expenditures across these generations, the panel examined how differences in characteristics like age structure and education levels of the first, second, and third-plus generations impact the average net contribution (or burden) of independent person units of each generation. Table 9-8 shows results from multiple regression analyses that follow closely those conducted in Chapter 8 and reported in Table 8-3, in which net fiscal impact at the state and local level is regressed on generation as defined by independent person units.<sup>20</sup> The third-plus generation of independent person units is used as the reference category so that coefficients can be reported on indicators for the first and second generations. We present six models, with each subsequent model adding more control variables to account for cross-generational differences. For brevity, we only report the regression coefficients for immigrant generation, which represent, in dollars, the net fiscal impacts associated with being a first or second generation independent person unit, compared to third-plus generation independent person units.

In almost all cases, the regression coefficients for immigration generation are statistically significant, with first generation independent person units having a net fiscal cost relative to the third-plus generation, while the opposite is true for second generation independent person units. Note that, because time since arrival is not accounted for, the net fiscal burden

<sup>20</sup>Some of the methodological differences between Chapter 8 and Chapter 9 in how net fiscal impact estimates at the state and local level are generated are detailed in footnote 16. In addition, the sample for the estimates and regression analyses here in Chapter 9 differs from the sample used in Chapter 8. The Chapter 8 regression analysis uses observations of independent individuals from a pooled CPS 1994-2013 sample that has adjusted population weights to represent the total residential population (including institutionalized residents). Chapter 9 uses observations of independent individuals from a pooled CPS 2011-2013 sample that is representative of the noninstitutionalized population.

**TABLE 9-8** Regression Analysis of Net Fiscal Impact at the State and Local Level per Independent Person Unit, by Immigrant Generation, 2011-2013

	OLS regression	With state fixed effects
<b>Model 1 – Controls: none; N = 416,284</b>		
1st generation (+ dependents)	-2,913 ***	-3,183 ***
2nd generation (+ dependents)	384 ***	150 *
3rd+ gen (+ dependents) ref. group	—	—
R <sup>2</sup>	0.009	0.012
<b>Model 2 – Controls: age group, year, sex; N = 416,284</b>		
1st generation (+ dependents)	-2,429 ***	-2,682 ***
2nd generation (+ dependents)	762 ***	547 ***
3rd+ gen (+ dependents) ref. group	—	—
R <sup>2</sup>	0.056	0.059
<b>Model 3 – Controls: age group, year, sex, education; N = 416,284</b>		
1st generation (+ dependents)	-1,478 ***	-1,591 ***
2nd generation (+ dependents)	422 ***	327 ***
3rd+ gen (+ dependents) ref. group	—	—
R <sup>2</sup>	0.128	0.132
<b>Model 4 – Controls: age group, year, sex, education, race/ethnicity; N = 416,284</b>		
1st generation (+ dependents)	-1,166 ***	-1,190 ***
2nd generation (+ dependents)	565 ***	537 ***
3rd+ gen (+ dependents) ref. group	—	—
R <sup>2</sup>	0.135	0.140

of a first generation independent person unit is not the same as that for a *new* first-generation immigrant (as just 14% of our first generation sample arrived in the U.S. after 2006). On average, recently arrived first generation independent person units (since 2006) have small net fiscal burdens relative to first generation units that have been in the United States longer because the new first generation immigrants heading the unit tend to be younger, have more education, and have fewer dependent children.

Following the same order as in Chapter 8, we add control variables that typically explain (statistically account for) demographic and economic differences; an additional model directly controls for income so that the importance of that factor can be discussed. Note that the order in which the control variables are added matters, so decreases in the difference from the comparison group (third-plus generation independent person units) with each additional variable can be seen as the additional marginal effect of including that variable. For example, the effects we find on age in part

TABLE 9-8 Continued

Model 5 – Controls: age group, year, sex, education, race/ethnicity, number of dependents; N = 416,284		
1st generation (+ dependents)	-706 ***	-660 ***
2nd generation (+ dependents)	258 ***	291 ***
3rd+ gen (+ dependents) ref. group	—	—
R <sup>2</sup>	0.407	0.412
Model 6 – Controls: age group, year, sex, education, race/ethnicity, number of dependents, income; N = 416,284		
1st generation (+ dependents)	-421 ***	-243 ***
2nd generation (+ dependents)	19	177 ***
3rd+ gen (+ dependents) ref. group	—	—
R <sup>2</sup>	0.553	0.559

NOTES: Each column presents coefficients and significance levels from a separate ordinary least squares (OLS) regression of net fiscal impact at the state and local level (dependent variable) on indicators for immigrant status (*x* variables) and indicators for the other characteristics listed. Coefficients are the marginal effects in terms of dollars per independent person unit that are associated with the given immigrant status, relative to third-plus generation independent person units. A positive number is an improvement or savings in net fiscal impact; a negative number is a reduction or deficit. Thus a coefficient on a “1st generation” independent person unit equal to +1,000 implies that, compared to a third-plus generation unit, a first generation unit has a more positive net fiscal impact by \$1,000 at the state and local level. Age groups are measured in 5-year intervals. Asterisks denote statistical significance at the 1 percent (\*\*\*), 5 percent (\*\*), or 10 percent (\*) level.

SOURCE: Panel estimates implemented on the Current Population Survey Annual Social and Economic Supplement for 2011-2013.

are related to the likelihood of having different numbers of dependents at different points in an independent person’s life cycle.

Model 1, which does not include any control variables, reports the difference in net fiscal impacts of the first and second generation independent person units relative to the third-plus generation units. Controlling for no other factors, a first generation independent person unit on average costs state and local governments \$2,913 more than an additional third-plus generation independent person unit, while an additional second generation independent person unit *contributes* \$384 more than an additional third-plus generation unit. If the regression analysis controls for average state spending and taxes by introducing state fixed effects, as is shown in the right-hand column of Table 9-8, first and second generation independent person units are on average about \$200 more costly, compared to a third-plus generation independent person unit, than with no state fixed effects (middle column of Table 9-8, labeled “OLS Regression”). Table 9-8

includes regression model runs with and without state fixed effects, but the discussion below will focus on the coefficients for the model runs without the state fixed effects.

Model 2 adds a set of basic controls for age of the independent person, calendar year, and gender. As discussed in Section 9.3, the first generation independent individuals are on average the youngest of the three generations. With more independent persons concentrated in child-raising ages, the first generation units have, on average, more dependent children and consequently have higher state and local expenditures on education. Because we are limiting our estimates to a 3-year period that is at a similar point in the economic cycle, the year controls make little difference and the coefficients on calendar year are not significant in this model (although they do have small but statistically significant effects in later models).<sup>21</sup> Similarly, the gender makeup of each generation does not affect the relative fiscal impact. While male independent person units appear to contribute more than females in this model, the difference in income between the two genders is driving this and there is no significant difference between men and women in our later model that controls for income.<sup>22</sup> Thus, after controlling for age group (as well as year and gender), the fiscal impact of the first generation units ( $-\$2,429$ ) becomes less negative relative to the third-plus generation independent person units by about  $\$500$ . The second generation units have the highest share of elderly independent persons in them (age 65 and older), relative to the units of the other two generations, leading to additional public costs. When this is controlled for under Model 2, the second generation's fiscal impact ( $+\$762$ ) becomes more positive, relative to the third-plus generation by about  $\$400$ .

Because the independent persons in the first generation units have less education on average than those in second and third-plus generation units, controlling for education (Model 3) shrinks the negative net fiscal impact for first generation independent person units to  $-\$1,478$  (a decrease of about 40 percent from the Model 2 net fiscal impact). Conversely, controlling for education lowers the positive net fiscal impact for second generation units due to the higher educational attainment of second generation independent persons compared to third-plus generation independent persons.

Model 4 incorporates controls for race and ethnicity in addition to the controls already included in Model 3. As noted in the discussion of the Chapter 8 regression analyses, race and ethnicity may proxy for differences

<sup>21</sup>The coefficients on calendar years 2012 and 2013 (relative to the comparison group for calendar year 2011) in Model 2 are  $-34$  and  $-72$ , respectively, and are not statistically significant.

<sup>22</sup>The coefficient on male (relative to the female comparison group) in Model 2 is  $1,689$  and is statistically significant at the 1 percent level. However, when we introduce a control for income in our final model the coefficient on male is  $-36$  and no longer statistically significant.

in treatment and opportunity, affecting earnings opportunities and possibly labor force participation. Under Model 4, the first-to-third-plus generation gap in net fiscal impact closes further (to just  $-\$1,166$ ) and the independent person units in the second generation show a small increase (going from  $+\$422$  to  $+\$565$ ) in their net fiscal impact relative to units in the third-plus generation.

Controlling for the number of dependent children (Model 5) has a dramatic effect on the relative costs of an average unit in the first and second generations, relative to an average third-plus generation unit. Because first generation independent person units have more dependent children on average compared with third-plus generation units (0.52 versus 0.36), they incur higher public education costs when education expenditures are assigned fully to school-aged children rather than a portion being considered a public good. Controlling for the number of dependents decreases the negative net fiscal impact of a unit in the first generation relative to third-plus generation units by close to  $\$500$  (going from  $-\$1,166$  to  $-\$706$ ). In contrast, due to having fewer dependent children as compared to third-plus generation independent individuals, the fiscal benefit of second generation units relative to third-plus generation independent person units declines by about half (to  $+\$258$ ), compared to the fiscal benefit before controlling for dependents (Model 4). The coefficient on number of dependents indicates that, for each additional dependent child, an independent person unit's net fiscal impact is decreased by almost  $\$9,750$ .<sup>23</sup>

Finally, Model 6 in Table 9-8 shows how the net impact changes when AGI is controlled for in the regression. With average incomes for first generation independent person units being the lowest of the three generations (see Table 9-16 in the Technical Annex to this chapter), they contribute less to state and local tax revenues and are more likely to receive government benefits. Adding income to the control variables already included in Model 5 further diminishes the difference in net fiscal impact between independent person units in the first and third-plus generations to just  $-\$421$ , and the difference between independent person units in the second and third-plus generations is not statistically significant. The Model 6 coefficient on AGI indicates that for each additional  $\$100$  of income, a unit's net fiscal impact is made more positive by about  $\$11$ .<sup>24</sup> Thus, after adding controls for age group, year, sex, education, race and ethnicity, number of dependents, and income, the average negative net fiscal impact of the first generation units relative to independent person units in the third-plus generation is

<sup>23</sup>The coefficient on the number of dependents in Model 5 is  $-9,739$  and is significant at the 1 percent level.

<sup>24</sup>The coefficient on AGI in Model 6 is 0.107 and is statistically significant at the 1 percent level.



significantly diminished. **Demographic and economic characteristics of first generation independent person units account for close to  $-\$2,500$  of the original  $-\$2,931$  gap relative to third-plus generation units.** These characteristics also account for all of the positive contribution of second generation independent person units relative to the third-plus generation units.

When the regression analysis sample is limited to independent person units living in the 14 states and the District of Columbia in which at least one-quarter of all independent persons belong to the first or second generation, the results for the first generation are similar to those in the sample that includes all states. Demographic and economic characteristics of first generation independent person units in these jurisdictions account for close to  $\$3,100$  of their original  $\$3,383$  net fiscal cost relative to a unit in the third-plus generation. For second generation units in these jurisdictions, the initial difference in fiscal impact compared with third-plus generation independent person units is statistically insignificant, but after controlling for demographic and economic characteristics, a second generation unit would contribute  $\$150$  more than an average third-plus generation unit.

## 9.7 ALTERNATIVE TREATMENTS OF EDUCATION COSTS

As noted in Section 9.6, much of the differential expenditure burden for first generation independent person units comes from the cost of educating the dependent children in the unit. However, these children will grow up to be higher contributing second generation adults. In our baseline estimates, the panel assigned the cost of education to families that include children attending school. This means K-12 costs are assigned based on the presence of school-age children and public higher education payments are assigned to independent persons who are either attending, or have a dependent attending, an institution of higher education. This allocation ignores the future public benefit of education to those with and without children and the benefit to society of a better educated population. On average, K-12 spending per student is almost  $\$9,000$  in the United States as a whole but varies from  $\$5,400$  per pupil in Utah and  $\$5,550$  in Arizona to  $\$26,950$  in the District of Columbia.

To examine the possible public benefit spillovers, the panel re-ran the baseline estimates with various alternative assumptions about who receives the benefit (or would be responsible for the cost) of K-12 and public higher education. We first assigned half of the cost of K-12 education accruing to state and local governments to everyone within the state (including all independent and dependent persons) on a per capita basis. The remaining half was assigned to students as in the baseline scenario. This approach recognizes a level of public value to others of school spending. Table 9-9 shows how these differences in assigning education expenses affect estimates of

the relative costs for the United States as a whole and for specific states. Allocating half of K-12 expenses per capita in this manner, the net fiscal burden of first generation independent units declines by about \$250 per independent unit (a change in net fiscal impact from  $-\$1,600$  to  $-\$1,350$ ). The costs borne by second generation independent person units increase by about \$150 per unit, reflecting the lower number of dependents for second generation independent units overall; costs remain about the same for the third-plus generation units under this alternative scenario.

If we instead allocate half of the K-12 expenditures to just the independent persons, rather than to all persons, and the remaining half to students, the net fiscal impact of first generation units becomes  $-\$1,250$  and the second and third-plus generations have small increases in the costs they bear. This reduces the difference in net costs between first and third-plus generation independent person units from  $\$2,900$  to  $\$2,500$ . Row 4 of Table 9-9 shows the results of assigning half of state and local spending on both K-12 and higher education to just the independent persons. Including higher education spending in this assignment approach has little effect on relative revenues and expenditures as reflected in the U.S. averages for independent person units in the first and third-plus generations.

The lower three panels of Table 9-9 illustrate, for specific states, how independent person units in the generations fare when education expenses are allocated differently. Most of the changes are small, but when we allocated half of the K-12 education benefits in California to independent persons, the net cost of first generation units declined by \$300, with a similar decline in the net benefit from units in the second and third-plus generations. Interestingly, second generation Californian independent person units have increased fiscal contributions to the state under the scenario in which half of K-12 and higher education costs are attributed to all independent persons. This reflects higher-than-average usage of higher education by second generation Californians. Similarly, how educational expenses are allocated in New Jersey affects the relative costs and benefits between units in the first and second generations, with the relative benefits for third-plus generation units staying fairly constant.

## 9.8 MARGINAL VERSUS AVERAGE FIXED COSTS

*The New Americans* (National Research Council, 1997) included a theoretical discussion of the relative cost of a new immigrant family in terms of its marginal cost to governments. However, most of that report's estimates of household level state and local finances were based on allocating revenues and expenditures across existing immigrant and nonimmigrant households on an average cost basis; the same was true for that report's treatment of federal spending (with the exception of national defense).

**TABLE 9-9** Net Difference between State and Local Revenues and Expenditures per Independent Person Unit with Alternative Assignment of Education Expenditures (rounded to nearest \$50), by Immigrant Generation, 2011-2013

State	Immigrant Generation		
	First	Second	Third+
<b>All 51 States</b>			
Education expenditures to students	-\$1,600	\$1,700	\$1,300
Half of K-12 expenditures to students, half to all as public good	-1,350	1,550	1,300
Half of K-12 expenditures to students, half to all independents as public good	-1,250	1,450	1,250
Half of K-12 and higher education expenditures to students, half to all independents as public good	-1,250	1,650	1,250
<b>Top 15 States by % in First Generation</b>			
Education expenditures to students	-\$1,700	\$1,650	\$1,650
Half of K-12 expenditures to students, half to all as public good	-1,500	1,450	1,600
Half of K-12 expenditures to students, half to all independents as public good	-1,400	1,400	1,550
Half of K-12 and higher education expenditures to students, half to all independents as public good	-1,400	1,600	1,550
<b>California</b>			
Education expenditures to students	-\$2,050	\$1,550	\$3,100
Half of K-12 expenditures to students, half to all as public good	-1,850	1,450	2,950
Half of K-12 expenditures to students, half to all independents as public good	1,750	1,400	2,900
Half of K-12 and higher education expenditures to students, half to all independents as public good	1,850	1,700	2,900
<b>Florida</b>			
Education expenditures to students	-\$350	\$1,200	\$1,350
Half of K-12 expenditures to students, half to all as public good	-300	1,150	1,300
Half of K-12 expenditures to students, half to all independents as public good	-250	1,100	1,300
Half of K-12 and higher education expenditures to students, half to all independents as public good	-200	1,250	1,250
<b>New Jersey</b>			
Education expenditures to students	-\$1,850	\$2,300	\$700
Half of K-12 expenditures to students, half to all as public good	-1,550	1,800	700
Half of K-12 expenditures to students, half to all independents as public good	-1,450	1,600	700

TABLE 9-9 Continued

State	Immigrant Generation		
	First	Second	Third+
Half of K-12 and higher education expenditures to students, half to all independents as public good	-1,550	1,750	700

NOTE: See text for construction of revenues and expenditures by state and generation.

SOURCE: Panel estimates implemented on the Current Population Survey Annual Social and Economic Supplement for 2011-2013.

The evidence on the public versus private nature of government-provided services is mixed. Whereas total public spending no doubt increases with the size of the population, some categories of spending are likely to be unaffected, at least for a small increase in immigrant population and in the short run.

For the analyses in this chapter, about half of all spending (and revenues) is allocated based on personal or family attributes. But for many spending categories such as public safety, hospitals, and libraries, the costs have been allocated across all persons (both independent and dependent). Similarly, some revenue sources—such as transfers from the federal government for roads and those from natural resource extraction, which would be the same even if there were more new immigrants—are allocated on a per capita basis. While the panel did not specify which particular expenditures are public goods, it is important to highlight that some of these fixed costs are not higher due to the presence of immigrants.<sup>25</sup> The amounts of these fixed costs assigned to second and third-plus generation persons are lower than they otherwise would be due to the presence of more first generation arrivals as these costs become spread across a larger population. Not surprisingly, the implicit savings to nonimmigrants created by spreading fixed costs across a larger population varies with the population share in the first generation. For some communities, especially those facing declining populations, the influx of new immigrants can help lower their fixed costs. Indeed, for some costs, notably capital expenditures, bond repayments, and public pension obligations, the benefits of the government spending may have been received by earlier generations so having a larger population to pay off these debts benefits the existing population.

While not definitive, Table 9-10 highlights the difference in fiscal gaps that results from changing from an approach in which the fixed revenues

<sup>25</sup>Fixed costs are the part of expenses that do not change with the addition of another individual.

and fixed costs for public goods are allocated to all individuals to a marginal allocation in which they are allocated only to second and third-plus generation independent persons and their dependents. When these fixed revenues and expenditures are assigned only to second and third-plus generation independents and their dependents on a per-person basis, instead of being assigned evenly to persons from all generations—thus assuming a marginal amount of zero to first generation independents and their dependents—the negative gap in net fiscal impact between first and third-plus generation independent person units decreases (in absolute terms) from  $-\$2,900$  to  $-\$450$  (Table 9-10). Thus, part of the higher fiscal costs for first generation independent units found in most of the analyses in this chapter are from these fixed costs. Under the assumption that first generation independent person units do not bear these costs, net positive fiscal impacts decrease or turn negative for second and third-plus generation independent person units—and these cost increases are highest in the states with more immigrants. For the 15 jurisdictions with the largest percentage of their populations in the first generation, the fiscal cost gap between first and third-plus generation independent person units closes from  $-\$3,400$  to  $-\$150$ . In terms of overall fiscal impact, in California, for example, if these fixed costs (and revenues) were only allocated to second and third-plus generation independent persons and their dependents, the state's first generation independent person units change from generating a large net negative burden for the state to making a net positive contribution (going from generating a net cost of  $\$2,050$  to a net fiscal benefit of  $\$1,050$ —about  $\$400$  less than that of third-plus generation independent units under a marginal allocation). As the share of the population that is composed of first generation independent person units declines, the impact of shifting from an average to a marginal allocation of these fixed revenues and expenditures diminishes.

Note that, if one were to only shift the fixed costs (and revenues) currently being borne by *new* immigrants who have arrived since 2006 (rather than all first generation individuals) to the remaining population (including other first generation individuals previously resident), the fixed costs for the rest of the population (both independent and dependent) would increase by about  $\$50$  per independent person unit; and, in most states, recent immigrants would provide a net fiscal benefit. Again, the size of the shift in costs depends on the number and makeup of recent immigrant families. For example, the increase in net fiscal costs for nonrecent first generation independent person units in California would be about  $\$100$ . This alternative approach recognizes that, in many states, first generation independent persons are long-term residents of this country.

## 9.9 CONCLUSIONS

While previous chapters have highlighted the role immigrants play in affecting federal budgets and in their impact across state and local governments combined, it is important to recognize that **the burdens and contributions to fiscal balance sheets vary tremendously across states.**<sup>26</sup> Under the strictest set of assumptions, in which all costs of public education fall on the parents of those being educated and in which the cost of public goods are shared across the population equally, first generation independent person units are estimated to be the most costly relative to second and third-plus generation units. **For the 2011-2013 period, first generation independent person units incurred a net cost on average of \$1,600 per unit per year, compared to a net benefit of \$1,700 for second generation independent person units and \$1,300 for third-plus generation units.**

Most states follow the national pattern in which units in the second generation contribute the most per unit due to slightly higher incomes and fewer average dependents, but this is not the case in California. Additionally, among the 15 states with the most first and second generation independent individuals, California has the largest difference, \$5,150, between the fiscal shortfall of independent person units in the first generation (–\$2,050) and the fiscal benefit of units in the third-plus generation (\$3,100), while Maryland has the smallest difference at \$650. In Maryland, independent person units in the second generation generate an even higher level of per-unit fiscal benefit (\$2,050) than do units in the third-plus generation (\$550), while in California, the positive fiscal impact of units in the second generation, at \$1,550, falls short of that for units in the third-plus generation. Both states have progressive income taxes, and some of these differences appear to be related to Maryland having a larger percentage of first and second generation independent persons with more than a bachelor's degree. In many of the states with the fewest first generation independent person units, the difference in relative contribution between units in the first and third-plus generations is negligible, while units in the second generation contribute more to a state's bottom line.

**The relative contribution or burden of any independent person unit is driven largely by that unit's demographic and economic characteristics—most notably the number of dependents in the unit and the unit's income levels.** Because first generation units tend to have less income and more dependents than units in the second or third-plus generation, they are more costly to state and local governments. However, the children of

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<sup>26</sup>Fiscal impacts also vary widely at substate levels. Ideally, our analysis would estimate impacts at city and county levels, as insights about local jurisdictional responsibilities and benefits are of great interest to those governments. However, for the kinds of analyses done here, it is not possible to analyze at the local level with the available data, due to sample size limitations.

**TABLE 9-10** Net Difference between State and Local Revenues and Expenditures per Independent Person Unit with a Marginal Allocation of Fixed Revenues and Expenditures<sup>a</sup> (rounded to nearest \$50), by Immigrant Generation by State, 2011-2013

State	Immigrant Generation			All	Difference: First less Third+
	First	Second	Third+		
California	\$1,050	-\$150	\$1,450	\$1,050	-\$350
New Jersey	750	1,350	-300	200	1,000
New York	1,750	3,250	1,350	1,700	400
Nevada	1,100	200	1,200	1,050	-100
Florida	850	850	950	950	-100
Texas	-1,150	-650	1,150	450	-2,250
Hawaii	2,150	550	950	1,150	1,200
Maryland	2,100	1,550	50	550	2,050
Arizona	-450	0	1,550	1,000	-1,950
District of Columbia	2,200	6,150	-2,350	-850	4,550
Massachusetts	-100	1,850	50	250	-150
Illinois	300	-50	350	350	-50
Washington	-250	100	200	100	-450
Connecticut	2,800	2,950	600	1,250	2,200
Rhode Island	-950	2,000	1,500	1,150	-2,450
Virginia	1,200	1,000	500	650	700
Delaware	600	1,900	600	650	0
Georgia	-100	500	650	550	-750
New Mexico	-3,600	400	1,150	550	-4,700
Oregon	-1,200	2,150	1,600	1,300	-2,800
Colorado	-550	800	600	500	-1,200
Alaska	-5,500	7,000	7,950	6,450	-13,450
Nebraska	-950	1,350	1,750	1,450	-2,700
Idaho	-800	600	1,500	1,200	-2,300
North Carolina	50	1,650	1,450	1,300	-1,350
Utah	-700	-600	400	250	-1,100
Michigan	200	2,500	750	800	-550
Minnesota	-3,500	3,150	2,050	1,600	-5,550
Kansas	-900	1,050	1,050	850	-1,900
Pennsylvania	250	1,650	150	250	150
Iowa	-300	2,500	1,500	1,450	-1,850
New Hampshire	850	1,650	450	600	400
Wisconsin	-2,000	1,450	1,450	1,250	-3,450
Tennessee	-550	1,250	750	700	-1,300
Arkansas	-1,200	1,650	1,450	1,300	-2,650

*continued*

TABLE 9-10 Continued

State	Immigrant Generation			All	Difference: First less Third+
	First	Second	Third+		
Kentucky	-250	2,400	50	100	-300
South Carolina	450	2,400	550	600	-100
Oklahoma	-300	2,000	1,500	1,450	-1,800
Vermont	800	3,350	1,000	1,150	-150
Indiana	1,150	1,700	1,000	1,050	150
Ohio	1,400	3,600	1,450	1,550	-50
Louisiana	850	-1,150	-300	-250	1,150
Missouri	600	2,200	1,200	1,200	-550
South Dakota	850	1,450	1,800	1,750	-950
Alabama	-850	2,500	550	550	-1,400
Maine	700	2,400	700	850	0
North Dakota	850	5,600	5,500	5,350	-4,650
Wyoming	-800	3,650	3,500	3,400	-4,300
Montana	2,400	1,200	900	950	1,500
Mississippi	750	2,650	1,400	1,400	-650
West Virginia	-500	3,850	1,500	1,550	-2,000
Top 15 States by % in First Generation	700	700	900	800	-150
United States	500	1,000	950	900	-450

NOTES: Fixed revenue flows include other revenues and intergovernmental revenues (see Table 9-11 in the Technical Annex to this chapter for more information). Fixed expenditure flows include expenditures on other education and libraries, public welfare vendor payments to private vendors and administration expenditures, and other expenditures and capital outlays (see Table 9-12 in the Technical Annex to this chapter for more information). See text for more detail on the construction of revenues and expenditures by state and generation. Because the difference between first and third-plus generation net difference (revenue less expenditure) amounts is taken from the unrounded estimates and then rounded to the nearest \$50, the value may differ from the first generation column less the third-plus due to rounding in some cases. States are listed from highest to lowest percentage of first generation independent persons in the state's population of independent persons (see Table 9-2). Caution should be taken when examining the state-level estimates, especially those near the bottom of the table, because of small first (and second) generation populations for many states.

“The marginal cost allocation of fixed expenditures in these estimates reassigns fixed revenues and expenditures to second and third-plus generation independents and their dependent children, rather than assigning them to all individuals (both independent and dependent) in all generations as in the average cost allocation in the baseline estimates (see Table 9-6).

SOURCE: Panel estimates implemented on the Current Population Survey Annual Social and Economic Supplement for 2011-2013.



immigrants who are being educated grow up to become second generation adults, the group that, in general (but not always), contributes the most, when assessed in terms of independent person units, to a given state's fiscal health. In addition, the age distribution of independent persons also affects the relative contribution they make as a unit (with their dependents) to a state's budget. The share of the population that is elderly increases costs and decreases tax revenues to states. While not as costly as dependent children, the smaller share of first generation independent persons who are ages 65 and older offsets some of the costs for states, most notably in the form of Medicaid payments.

**While the characteristics of individuals within an independent person unit affect the relative contribution or burden made by that unit, decisions made by the state and local governments about the level and structure of taxes and services provided also affect the relative burden or contribution of the unit.** In places with higher spending on K-12 schools, for example, the relative cost of units in the first generation is higher than for units in the second or third-plus generation because the first generation units include more dependents.

**The differences in contributions or burdens across generations and states also depend on whether fixed costs are allocated to all persons equally.** The cost of an additional independent person unit in the first generation (or for that matter, an additional unit in any generation) is dampened to the extent that many of the costs that accrue to state and local governments are not sensitive to a small increase in the population. **Using a marginal cost allocation, under which an additional immigrant is presumed not to add to the costs of administering the subset of state and local government services categorized as public goods, leads to more similar estimates of per-unit fiscal impacts across the three generations.** The reason is that expenditures for the second and third-plus generation units increase, while those for first generation units decrease. In this respect, the cross-generation fiscal patterns are quite similar to those presented in Chapter 8 for the national level.

## 9.10 TECHNICAL ANNEX: SUPPLEMENTAL TABLES

This annex includes tables referenced in the text of this chapter but that are not included at the point of reference.

**TABLE 9-11** Census of Governments (COG) State and Local Revenue Flow Types and Allocation Methods

Revenue Flow Type (% of 2011-2013 COG revenue)	Allocation to Independent Person Units (name of CPS ASEC variable <sup>a</sup> in <i>italics</i> )
Property Taxes (14%)	CPS ASEC <i>proptax</i> if owner household, divided across all independents in the household. Property tax assigned to renters (CPS <i>ownership</i> indicator for paying with cash rent) using the state average of property tax as a percentage of household income for owners from the CPS; property tax set to zero for renters if household income is less than or equal to zero. Difference between the sum of CPS property tax for owners plus property tax assigned to renters and the COG total amount assigned to all independent adults.
General Sales Taxes (10%)	State sales tax amounts from IRS tables assigned based on CPS <i>adjginc</i> (split between spouses for married filing jointly and less remittances of 5% for first generation) and scaled up to match COG total. <sup>b</sup>
Selective Sales Taxes and Public Utilities (5%)	Assigned to all ages 18 and older: <ul style="list-style-type: none"> <li>▪ Motor fuels sales taxes</li> <li>▪ Tobacco product sales taxes</li> </ul> Assigned to all ages 21 and older: <ul style="list-style-type: none"> <li>▪ Alcoholic beverage sales taxes</li> </ul> Assigned to all: <ul style="list-style-type: none"> <li>▪ Public utilities and other selective sales taxes</li> </ul>
Individual Income Taxes (9%)	CPS <i>stataxac</i> scaled to match COG amount (split between spouses for married filing jointly).
Business Taxes (3%)	Assigned within states based on AGI distribution: <ul style="list-style-type: none"> <li>▪ Corporate income tax (split between spouses for married filing jointly); Documentary and stock transfer taxes; Corporations in general license; Alcoholic beverages license; Amusements license; Occupation and business license, NEC</li> </ul>
Higher Education Charges (3%)	Assigned to all in college (weighted for full time versus half time).
School Lunch Sales (<1%)	Taken out of K–12 expenditures (see Table 9-12).
Other Education Charges (<1%)	Remaining revenue from education charges assigned to all.

*continued*

TABLE 9-11 Continued

Revenue Flow Type (% of 2011-2013 COG revenue)	Allocation to Independent Person Units (name of CPS ASEC variable <sup>a</sup> in <i>italics</i> )
Insurance Trust Revenues (15%)	Assigned to all people with wage income: <ul style="list-style-type: none"> <li>▪ Unemployment compensation contributions</li> <li>▪ Workers' compensation contributions and other insurance trust revenue</li> </ul> Assigned to all state and local government employees: <ul style="list-style-type: none"> <li>▪ State and local employee retirement contributions</li> </ul>
Other Revenues (22%)	Assigned to all: <ul style="list-style-type: none"> <li>▪ Taxes: Death and gift taxes; Severance taxes; Taxes NEC</li> <li>▪ License taxes: Hunting and Fishing license; Public utilities license; Other license taxes</li> <li>▪ Current charges (excluding education): Hospital; Highways; Air transportation; Parking facilities; Sea and inland port facilities; Natural resources; Parks and recreation; Housing and community development; Sewerage; Solid waste management; Other charges</li> <li>▪ Miscellaneous general revenue</li> <li>▪ Utility revenue</li> </ul> Assigned to all ages 18 and older: <ul style="list-style-type: none"> <li>▪ Motor vehicle license and motor vehicle operator's license</li> </ul> Assigned to all ages 21 and older: <ul style="list-style-type: none"> <li>▪ Liquor store revenues</li> </ul>
Intergovernmental Revenues (18%)	COG intergovernmental revenues (from federal government) less COG intergovernmental expenditures (to federal government) assigned to all.

<sup>a</sup>Variable names reflect CPS data variable names used in the Integrated Public Use Microdata Series.

<sup>b</sup>State sales tax amounts (prior to scaling to COG totals) come from the IRS Optional State and Certain Local Sales Tax Tables. We do not explicitly account for additional local sales taxes but expect them to be captured in scaling to COG totals. The one exception to this is Alaska, which has a statewide local sales tax but no state sales tax; in this case we use the IRS Optional Local Sales Tax Tables for Certain Local Jurisdictions.

**TABLE 9-12** Census of Governments (COG) State and Local Expenditure Flow Types and Allocation Methods

Expenditure Flow Type (% of 2011-2013 COG expenditures)	Allocation to Independent Person Units (name of CPS ASEC variable <sup>a</sup> in <i>italics</i> )
Higher Education Expenditures (7%)	Amount (less capital outlays) assigned to all in college (weighted for full time versus half time).  <i>Alternative—examine if half of the COG expenditure amount assigned to college students as above and the remaining half assigned evenly to all independent individuals in states.</i>
Elementary and Secondary Education Expenditures (16%)	Amount (less capital outlays and school lunch sales) assigned to all in K-12 (weighted for full time versus half time for high schoolers).  <i>Alternative—examine if half of the COG expenditure amount assigned to K-12 students as above and the remaining half assigned evenly to all persons or all independent individuals in states.</i>
Other Education Expenditures and Libraries (4%)	Amount (plus capital outlays from higher education and elementary and secondary education) assigned to all.
Medicaid/Public Welfare (16%)	Medicaid: CPS <i>pmvcaid</i> (for CPS recipients) scaled to match COG vendor payments amount (less the remainder of total Medicaid institutional spending <sup>b</sup> after subtracting out COG spending on institutions for public welfare).  Other public welfare: CPS <i>incwelfr</i> (for CPS recipients) scaled to match COG public welfare spending on SSI, TANF, and other cash assistance.
Insurance Trust Expenditure (11%)	Assigned to all: <ul style="list-style-type: none"> <li>▪ Vendor payments to private vendors for services other than medical</li> <li>▪ Public welfare administration expenditures</li> </ul> Assigned to all people with wage income: <ul style="list-style-type: none"> <li>▪ Unemployment compensation</li> <li>▪ Workers' compensation and other insurance trust</li> </ul> Assigned to all state and local government employees: <ul style="list-style-type: none"> <li>▪ State and local employee retirement</li> </ul>

*continued*

TABLE 9-12 Continued

Expenditure Flow Type (% of 2011-2013 COG expenditures)	Allocation to Independent Person Units (name of CPS ASEC variable <sup>a</sup> in italics)
Other Expenditures and Capital Outlays (45%)	Assigned to all: <ul style="list-style-type: none"> <li>▪ Hospitals; Health; Social insurance administration; Veterans' services; Highways; Air transportation; Parking facilities; Sea and inland; Police protection; Fire protection; Correction; Protective inspection and regulation; Natural resources; Parks and recreation; Housing and community development; Sewerage; Solid waste management; Financial administration; Judicial and legal; General public buildings; Other governmental administration; Interest on general debt; Miscellaneous commercial activities; Other and unallocable</li> <li>▪ Utility expenditure</li> </ul> <p>Assigned to all ages 21 and older:</p> <ul style="list-style-type: none"> <li>▪ Liquor store expenditure</li> </ul>
Intergovernmental Expenditure (<1%)	COG intergovernmental expenditure amount (to federal government) taken out of COG intergovernmental revenue amount (from federal government).

<sup>a</sup>Variable names reflect CPS data variable names used in the Integrated Public Use Microdata Series.

<sup>b</sup>Total Medicaid institutional spending (2% of total 2011-2013 COG expenditures) is taken from the Centers for Medicare & Medicaid Services 2015 report *Medicaid Expenditures for Long-Term Services and Supports in FY 2013*, appendix Table D. See <http://www.medicare.gov/medicaid-chip-program-information/by-topics/long-term-services-and-supports/downloads/ltss-expenditures-fy2013.pdf> [November 2016].

**TABLE 9-13** Annualized Weighted Sample Cases of Independent Persons by Immigrant Generation by State, Current Population Survey Annual Social and Economic Supplement for 2011-2013

State	Immigrant Generation			Total
	First	Second	Third+	
California	9,250,306	4,136,035	13,307,832	26,694,173
New Jersey	1,751,320	772,147	3,771,057	6,294,524
New York	3,861,185	1,723,287	8,503,595	14,088,067
Nevada	477,237	218,729	1,247,935	1,943,901
Florida	3,258,513	1,312,743	9,763,553	14,334,809
Texas	3,818,671	1,756,376	12,193,672	17,768,719
Hawaii	205,752	150,674	621,632	978,057
Maryland	814,468	307,380	3,159,673	4,281,520
Arizona	865,223	531,020	3,285,407	4,681,650
District of Columbia	85,316	40,448	362,412	488,176
Massachusetts	828,697	577,464	3,447,603	4,853,764
Illinois	1,540,692	718,036	6,908,763	9,167,490
Washington	822,229	482,882	3,655,282	4,960,393
Connecticut	415,692	293,845	1,861,099	2,570,636
Rhode Island	126,085	108,649	545,477	780,212
Virginia	782,112	275,958	4,710,072	5,768,143
Delaware	80,814	29,431	544,748	654,993
Georgia	815,187	235,106	5,750,442	6,800,735
New Mexico	168,429	107,035	1,184,370	1,459,834
Oregon	315,531	231,330	2,288,182	2,835,044
Colorado	398,306	264,829	2,975,143	3,638,278
Alaska	52,703	35,281	405,367	493,351
Nebraska	139,263	51,548	1,124,233	1,315,044
Idaho	107,882	57,765	928,129	1,093,776
North Carolina	652,743	260,141	5,944,608	6,857,492
Utah	173,479	109,824	1,552,991	1,836,295
Michigan	628,807	438,991	6,003,030	7,070,828
Minnesota	328,484	210,376	3,320,867	3,859,727
Kansas	160,448	83,215	1,769,231	2,012,894
Pennsylvania	654,971	542,680	8,283,510	9,481,161
Iowa	141,651	74,120	1,979,890	2,195,661
New Hampshire	62,234	77,990	842,922	983,146
Wisconsin	231,605	196,104	3,723,672	4,151,382
Tennessee	254,822	113,462	4,316,184	4,684,468
Arkansas	111,359	45,188	1,965,865	2,122,411
Kentucky	162,813	63,359	2,932,800	3,158,972
South Carolina	170,719	73,929	3,112,174	3,356,822
Oklahoma	134,805	85,287	2,466,798	2,686,889
Vermont	22,308	38,284	418,140	478,731

*continued*

TABLE 9-13 Continued

State	Immigrant Generation			Total
	First	Second	Third+	
Indiana	207,956	166,713	4,143,988	4,518,657
Ohio	376,581	355,286	7,577,243	8,309,110
Louisiana	136,282	68,343	2,955,957	3,160,582
Missouri	173,581	121,130	4,056,352	4,351,063
South Dakota	22,998	25,087	540,674	588,759
Alabama	133,617	71,586	3,249,440	3,454,644
Maine	34,121	75,909	907,094	1,017,124
North Dakota	16,025	25,584	460,026	501,636
Wyoming	13,059	15,212	385,954	414,226
Montana	19,432	41,598	678,111	739,141
Mississippi	52,251	28,357	1,956,632	2,037,241
West Virginia	19,248	30,344	1,327,807	1,377,398
Top 15 States by % in First Generation	28,121,384	13,129,714	72,634,993	113,886,092
United States	36,078,012	17,856,095	169,417,639	223,351,747

NOTES: See text for definitions of independent person and immigrant generation. These sample counts are the average number of weighted cases classified as independent persons per year in the Current Population Survey Annual Social and Economic Supplement (ASEC) for 2011-2013. Note that these counts are not representative of the annualized total U.S. population in these years because they do not include dependent children. The ASEC includes cases in February, March, and April of each year. Because of the rotation group design, by which addresses are in the sample for 4 months, out for 8 months, and in again for 4 months, the total 3-year sample double-counts individuals who are in the sample in pairs of years (2011-2012 or 2012-2013). States are listed from highest to lowest percentage of first generation independent persons in the state's population of independent persons (see Table 9-2).

SOURCE: Panel tabulations of the Current Population Survey Annual Social and Economic Supplement for 2011-2013.

**TABLE 9-14** Sum of Unweighted Sample Cases of Independent Persons by Immigrant Generation by State, Current Population Survey Annual Social and Economic Supplement for 2011-2013 Total

State	Immigrant Generation			Total
	First	Second	Third+	
California	15,823	6,653	18,173	40,649
New Jersey	2,706	983	4,899	8,588
New York	5,526	2,132	10,459	18,117
Nevada	1,901	739	3,914	6,554
Florida	4,889	1,580	10,966	17,435
Texas	6,087	2,731	15,425	24,243
Hawaii	1,725	1,216	4,838	7,779
Maryland	2,190	719	7,415	10,324
Arizona	1,232	663	3,485	5,380
District of Columbia	1,209	509	4,656	6,374
Massachusetts	1,185	697	4,338	6,220
Illinois	2,561	1,048	9,102	12,711
Washington	1,366	696	5,054	7,116
Connecticut	1,641	983	6,540	9,164
Rhode Island	1,222	894	4,589	6,705
Virginia	1,411	460	7,100	8,971
Delaware	905	277	5,311	6,493
Georgia	1,267	325	7,294	8,886
New Mexico	518	304	3,218	4,040
Oregon	766	474	4,460	5,700
Colorado	1,209	706	7,257	9,172
Alaska	587	355	3,964	4,906
Nebraska	828	251	5,125	6,204
Idaho	560	261	3,537	4,358
North Carolina	928	311	6,909	8,148
Utah	595	294	4,062	4,951
Michigan	900	550	7,827	9,277
Minnesota	1,019	498	7,927	9,444
Kansas	581	256	4,935	5,772
Pennsylvania	960	657	10,543	12,160
Iowa	618	256	6,535	7,409
New Hampshire	560	616	6,799	7,975
Wisconsin	533	355	6,759	7,647
Tennessee	330	138	4,982	5,450
Arkansas	304	96	3,876	4,276
Kentucky	328	115	5,280	5,723
South Carolina	311	120	4,929	5,360
Oklahoma	302	162	4,603	5,067
Vermont	289	436	4,816	5,541

*continued*



TABLE 9-14 Continued

State	Immigrant Generation			Total
	First	Second	Third+	
Indiana	341	226	5,391	5,958
Ohio	530	434	9,492	10,456
Louisiana	192	87	3,737	4,016
Missouri	284	187	5,852	6,323
South Dakota	263	232	5,511	6,006
Alabama	209	91	4,274	4,574
Maine	243	472	6,042	6,757
North Dakota	185	227	4,480	4,892
Wyoming	210	193	4,879	5,282
Montana	103	200	3,399	3,702
Mississippi	112	51	3,734	3,897
West Virginia	70	85	3,977	4,132
Top 15 States by % in First Generation	51,263	22,243	113,853	187,359
United States	70,614	33,001	312,669	416,284

NOTES: See text for definitions of independent person and immigrant generation. These sample counts are the total number of cases classified as independent persons in each Current Population Survey Annual Social and Economic Supplement (ASEC) for 2011-2013. The annual observations for each state and immigrant generation are approximately one-third of the counts listed above. The ASEC includes cases in February, March, and April of each year. Because of the rotation group design, by which addresses are in the sample for 4 months, out for 8 months, and in again for 4 months, the three-year sample counts shown above double count individuals who are in the sample in pairs of years (2011-2012 or 2012-2013). States are listed from highest to lowest percentage of first generation independent persons in the state's population of independent persons (see Table 9-2).

SOURCE: Panel tabulations of the Current Population Survey Annual Social and Economic Supplement for 2011-2013.

**TABLE 9-15** Average Number of Children (dependents) per Independent Person Unit, by Immigrant Generation by State, 2011-2013

State	Immigrant Generation (average number of children per independent person unit)			All
	First	Second	Third+	
California	0.52	0.39	0.34	0.41
New Jersey	0.48	0.24	0.37	0.38
New York	0.44	0.26	0.36	0.37
Nevada	0.56	0.34	0.34	0.39
Florida	0.39	0.28	0.31	0.32
Texas	0.64	0.47	0.38	0.44
Hawaii	0.44	0.28	0.36	0.37
Maryland	0.47	0.23	0.35	0.36
Arizona	0.59	0.46	0.34	0.40
District of Columbia	0.28	0.14	0.28	0.27
Massachusetts	0.44	0.22	0.35	0.35
Illinois	0.54	0.35	0.36	0.39
Washington	0.56	0.29	0.34	0.37
Connecticut	0.46	0.24	0.37	0.37
Rhode Island	0.47	0.22	0.32	0.33
Virginia	0.51	0.40	0.35	0.38
Delaware	0.49	0.28	0.36	0.37
Georgia	0.57	0.45	0.40	0.42
New Mexico	0.72	0.44	0.35	0.40
Oregon	0.64	0.29	0.32	0.35
Colorado	0.63	0.34	0.36	0.39
Alaska	0.56	0.53	0.40	0.43
Nebraska	0.64	0.33	0.36	0.39
Idaho	0.64	0.41	0.41	0.44
North Carolina	0.61	0.39	0.36	0.39
Utah	0.77	0.44	0.51	0.53
Michigan	0.49	0.22	0.38	0.38
Minnesota	0.64	0.25	0.35	0.37
Kansas	0.65	0.35	0.37	0.39
Pennsylvania	0.50	0.19	0.33	0.33
Iowa	0.56	0.27	0.36	0.37
New Hampshire	0.40	0.23	0.33	0.33
Wisconsin	0.70	0.27	0.35	0.36
Tennessee	0.57	0.29	0.35	0.36
Arkansas	0.64	0.4	0.35	0.37
Kentucky	0.47	0.29	0.36	0.37
South Carolina	0.55	0.37	0.37	0.38
Oklahoma	0.60	0.46	0.37	0.39

*continued*

TABLE 9-15 Continued

State	Immigrant Generation (average number of children per independent person unit)			All
	First	Second	Third+	
Vermont	0.36	0.19	0.30	0.29
Indiana	0.56	0.43	0.40	0.41
Ohio	0.43	0.27	0.37	0.37
Louisiana	0.40	0.32	0.42	0.41
Missouri	0.46	0.34	0.36	0.36
South Dakota	0.53	0.25	0.38	0.38
Alabama	0.74	0.23	0.37	0.38
Maine	0.40	0.18	0.30	0.30
North Dakota	0.44	0.16	0.35	0.34
Wyoming	0.46	0.23	0.36	0.36
Montana	0.29	0.18	0.35	0.34
Mississippi	0.52	0.28	0.43	0.43
West Virginia	0.56	0.24	0.32	0.32
Top 15 States by % in First Generation	0.51	0.34	0.35	0.39
United States	0.52	0.33	0.36	0.38

NOTE: See text for definitions of independent person unit, dependent person or child, and immigrant generation. States are listed from highest to lowest percentage of first generation independent persons in the state's population of independent persons (see Table 9-2).

SOURCE: Panel tabulations of the Current Population Survey Annual Social and Economic Supplement for 2011-2013.

**TABLE 9-16** Average Adjusted Gross Income (AGI) per Independent Person Unit (rounded to nearest \$50), by Immigrant Generation by State, 2011-2013

State	Immigrant Generation (\$ AGI per independent person unit)			All
	First	Second	Third+	
California	\$28,800	\$35,950	\$42,450	\$36,700
New Jersey	35,700	37,900	47,250	42,900
New York	28,650	37,550	39,200	36,100
Nevada	26,650	28,250	34,700	32,000
Florida	26,350	32,050	33,800	31,950
Texas	26,100	29,850	37,550	34,300
Hawaii	28,750	29,000	36,400	33,650
Maryland	38,700	45,450	44,700	43,600
Arizona	25,100	28,500	36,100	33,200
District of Columbia	41,950	74,150	55,750	54,850
Massachusetts	35,850	41,200	43,500	41,950
Illinois	27,650	35,200	39,850	37,450
Washington	33,300	34,800	40,900	39,050
Connecticut	40,350	43,050	47,600	45,900
Rhode Island	29,500	29,100	39,650	36,550
Virginia	42,200	52,750	42,200	42,700
Delaware	33,200	32,800	33,250	33,200
Georgia	28,200	37,450	34,000	33,450
New Mexico	31,300	33,050	34,750	34,200
Oregon	28,650	32,850	32,800	32,350
Colorado	29,550	39,150	41,800	40,250
Alaska	33,800	43,050	39,450	39,100
Nebraska	24,800	31,100	37,250	35,700
Idaho	23,100	28,700	31,350	30,400
North Carolina	29,850	35,800	30,900	31,000
Utah	27,100	31,450	34,900	33,950
Michigan	30,700	31,900	32,650	32,400
Minnesota	28,200	34,050	39,650	38,400
Kansas	24,750	27,550	34,850	33,750
Pennsylvania	33,650	29,200	33,950	33,700
Iowa	26,400	25,050	33,850	33,050
New Hampshire	41,850	35,100	41,100	40,650
Wisconsin	24,200	29,900	34,900	34,100
Tennessee	28,650	27,500	28,500	28,500
Arkansas	23,500	31,550	25,950	25,950
Kentucky	22,550	35,650	27,500	27,450
South Carolina	30,350	37,500	27,550	27,900

*continued*

TABLE 9-16 Continued

State	Immigrant Generation (\$ AGI per independent person unit)			
	First	Second	Third+	All
Oklahoma	32,300	37,000	32,300	32,450
Vermont	31,550	34,000	34,750	34,500
Indiana	35,400	32,300	30,900	31,150
Ohio	28,150	38,450	30,850	31,050
Louisiana	20,850	25,950	29,200	28,800
Missouri	29,550	33,750	34,000	33,800
South Dakota	24,150	23,150	32,800	32,050
Alabama	28,250	39,650	30,050	30,150
Maine	32,750	28,400	32,050	31,800
North Dakota	37,000	22,650	39,800	38,850
Wyoming	27,100	30,300	35,800	35,300
Montana	23,450	21,650	28,900	28,350
Mississippi	30,000	30,550	26,850	27,000
West Virginia	36,150	39,450	28,200	28,600
Top 15 States by % in First Generation	29,150	35,150	39,850	36,700
United States	29,450	34,900	35,900	34,800

NOTES: See text for definitions of independent person unit and immigrant generation. States are listed from highest to lowest percentage of first generation independent persons in the state's population of independent persons (see Table 9-2).

SOURCE: Panel tabulations of the Current Population Survey Annual Social and Economic Supplement for 2011-2013.

**TABLE 9-17** Percentage with Less Than a High School Degree (<HS) and More Than a Bachelor's Degree (>BA), Independent Persons by Immigrant Generation by State, 2011-2013

State	Immigrant Generation (independent persons)					
	First		Second		Third+	
	<HS	>BA	<HS	>BA	<HS	>BA
California	34	8	10	10	7	12
New Jersey	18	13	9	15	7	12
New York	22	11	9	16	9	14
Nevada	26	6	13	6	7	8
Florida	19	8	6	13	8	10
Texas	43	7	18	8	10	9
Hawaii	17	8	8	9	4	10
Maryland	19	21	4	23	8	15
Arizona	36	9	12	9	8	11
District of Columbia	23	27	3	45	8	28
Massachusetts	19	17	6	22	7	17
Illinois	26	12	8	13	7	11
Washington	25	12	7	12	5	11
Connecticut	17	19	9	16	7	16
Rhode Island	33	9	13	11	9	13
Virginia	16	17	4	19	9	13
Delaware	27	14	5	11	8	9
Georgia	23	12	6	14	10	9
New Mexico	40	12	14	17	11	14
Oregon	25	12	4	16	7	10
Colorado	37	10	9	14	5	14
Alaska	18	8	11	7	7	9
All					<HS	>BA
					17	11
					10	13
					13	13
					12	8
					10	10
					18	8
					8	10
					10	16
					14	11
					10	29
					9	17
					10	11
					9	11
					9	17
					14	12
					10	14
					10	10
					12	10
					15	14
					9	11
					9	13
					8	8

*continued*

TABLE 9-17 Continued

State	Immigrant Generation (independent persons)							
	First		Second		Third+		All	
	<HS	>BA	<HS	>BA	<HS	>BA	<HS	>BA
Nebraska	45	9	10	6	5	9	9	9
Idaho	45	6	12	9	6	8	10	8
North Carolina	32	12	13	16	11	9	13	9
Utah	30	9	8	10	6	9	8	9
Michigan	19	19	7	16	8	9	9	10
Minnesota	26	13	8	10	5	9	7	10
Kansas	31	15	14	17	6	11	9	11
Pennsylvania	14	17	10	12	10	9	10	9
Iowa	37	13	13	12	8	7	10	7
New Hampshire	10	19	8	14	6	12	7	12
Wisconsin	31	12	13	12	6	9	8	9
Tennessee	31	8	7	6	12	8	13	8
Arkansas	37	10	9	5	13	6	14	6
Kentucky	24	17	4	13	13	7	13	8
South Carolina	24	16	8	17	13	9	13	9
Oklahoma	31	14	17	13	9	8	10	9
Vermont	12	15	8	16	8	13	8	13
Indiana	32	14	10	6	9	8	10	8
Ohio	22	15	8	12	10	7	11	8
Louisiana	26	7	6	10	14	7	14	7
Missouri	18	21	14	19	11	9	11	10
South Dakota	33	10	17	4	7	7	9	7
Alabama	42	14	9	14	13	9	14	9

Maine	14	19	14	10	8	9	8	10
North Dakota	16	18	19	5	6	7	7	7
Wyoming	26	12	14	5	7	7	8	7
Montana	11	14	8	10	6	9	6	9
Mississippi	21	9	NA	8	16	7	16	7
West Virginia	8	39	3	12	13	7	13	8
Top 15 States by % in First Generation	29	10	10	12	8	12	13	11
United States	28	11	10	12	9	10	12	10

NOTES: See text for definitions of independent person and immigrant generation. States are listed from highest to lowest percentage of first generation independent persons in the state's population of independent persons (see Table 9-2). NA: Not available (Mississippi has no sample persons in this category).

SOURCE: Panel tabulations of the Current Population Survey Annual Social and Economic Supplement for 2011-2013.



**TABLE 9-18** Net Difference between State and Local Revenues and Expenditures per Independent Person Unit (rounded to nearest \$50), Including Coefficient of Variation Below, by Immigrant Generation by State, 2011-2013

State	Immigrant Generation			All
	First	Second	Third+	
California	-\$2,050 (9%)	\$1,550 (15%)	\$3,100 (6%)	\$1,050 (13%)
New Jersey	-1,850 (23%)	2,300 (15%)	700 (45%)	200 (130%)
New York	-1,500 (24%)	4,400 (12%)	2,600 (12%)	1,700 (15%)
Nevada	-1,300 (24%)	1,000 (38%)	1,950 (9%)	1,050 (16%)
Florida	-350 (46%)	1,200 (20%)	1,350 (9%)	950 (10%)
Texas	-2,050 (9%)	-400 (68%)	1,400 (9%)	450 (23%)
Hawaii	-700 (77%)	1,250 (26%)	1,700 (13%)	1,150 (19%)
Maryland	-100 (407%)	2,050 (24%)	550 (37%)	550 (33%)
Arizona	-1,350 (32%)	250 (172%)	1,750 (15%)	1,000 (20%)
District of Columbia	-2,800 (35%)	7,100 (14%)	-1,300 (48%)	-850 (60%)
Massachusetts	-2,250 (23%)	2,300 (24%)	500 (61%)	250 (116%)
Illinois	-2,700 (13%)	550 (72%)	1,000 (17%)	350 (50%)
Washington	-3,050 (22%)	600 (76%)	750 (35%)	100 (196%)
Connecticut	-600 (66%)	3,550 (10%)	1,300 (20%)	1,250 (16%)
Rhode Island	-1,500 (33%)	2,100 (18%)	1,600 (16%)	1,150 (20%)
Virginia	-600 (73%)	1,300 (48%)	800 (23%)	650 (25%)
Delaware	-500 (130%)	2,050 (33%)	750 (36%)	650 (39%)
Georgia	-1,250 (29%)	650 (103%)	800 (18%)	550 (24%)

TABLE 9-18 Continued

State	Immigrant Generation			All
	First	Second	Third+	
New Mexico	-2,550 (30%)	250 (338%)	1,000 (27%)	550 (46%)
Oregon	-1,900 (36%)	2,250 (29%)	1,650 (15%)	1,300 (17%)
Colorado	-2,950 (14%)	1,050 (31%)	900 (20%)	500 (37%)
Alaska	3,950 (31%)	5,800 (21%)	6,850 (5%)	6,450 (6%)
Nebraska	-2,200 (29%)	1,500 (45%)	1,900 (13%)	1,450 (14%)
Idaho	-1,050 (50%)	600 (89%)	1,500 (21%)	1,200 (25%)
North Carolina	-650 (74%)	1,700 (43%)	1,500 (12%)	1,300 (14%)
Utah	-1,950 (31%)	-450 (146%)	500 (36%)	250 (82%)
Michigan	-250 (189%)	2,550 (18%)	800 (18%)	800 (18%)
Minnesota	-5,100 (18%)	3,250 (20%)	2,200 (11%)	1,600 (14%)
Kansas	-2,450 (37%)	1,150 (57%)	1,150 (16%)	850 (23%)
Pennsylvania	-1,250 (41%)	1,750 (23%)	250 (56%)	250 (57%)
Iowa	-1,000 (58%)	2,550 (24%)	1,550 (14%)	1,450 (15%)
New Hampshire	-550 (104%)	1,750 (19%)	550 (26%)	600 (23%)
Wisconsin	-3,650 (23%)	1,550 (43%)	1,550 (11%)	1,250 (16%)
Tennessee	-700 (71%)	1,250 (60%)	750 (27%)	700 (27%)
Arkansas	-1,200 (89%)	1,650 (72%)	1,450 (17%)	1,300 (18%)
Kentucky	-950 (77%)	2,400 (38%)	100 (156%)	100 (170%)
South Carolina	150 (441%)	2,400 (42%)	550 (31%)	600 (28%)
Oklahoma	200 (345%)	1,950 (44%)	1,500 (12%)	1,450 (12%)

*continued*

TABLE 9-18 Continued

State	Immigrant Generation			All
	First	Second	Third+	
Vermont	250 (414%)	3,400 (16%)	1,000 (23%)	1,150 (19%)
Indiana	150 (574%)	1,750 (36%)	1,050 (14%)	1,050 (14%)
Ohio	450 (153%)	3,650 (18%)	1,500 (12%)	1,550 (11%)
Louisiana	-400 (211%)	-1,100 (99%)	-250 (97%)	-250 (88%)
Missouri	-150 (478%)	2,250 (37%)	1,200 (22%)	1,200 (23%)
South Dakota	-550 (169%)	1,500 (42%)	1,850 (13%)	1,750 (13%)
Alabama	-1,100 (86%)	2,500 (39%)	550 (33%)	550 (35%)
Maine	-350 (360%)	2,450 (17%)	750 (26%)	850 (22%)
North Dakota	3,250 (33%)	5,500 (12%)	5,400 (4%)	5,350 (4%)
Wyoming	1,300 (61%)	3,550 (21%)	3,450 (6%)	3,400 (5%)
Montana	1,850 (54%)	1,250 (69%)	950 (32%)	950 (32%)
Mississippi	1,300 (110%)	2,600 (52%)	1,350 (19%)	1,400 (19%)
West Virginia	550 (250%)	3,850 (24%)	1,500 (18%)	1,550 (17%)
United States	-1,600 (5%)	1,700 (6%)	1,300 (3%)	900 (4%)

NOTES: See text for construction of revenues and expenditures by state and generation. Coefficient of variation (CV) = standard error divided by the estimate; generally estimates with a CV of less than or equal to 10 percent of the estimate are considered statistically reliable in the profession. States are listed from highest to lowest percentage of first generation independent persons in the state's population of independent persons (see Table 9-2). Caution should be taken when examining the state-level estimates, especially those near the bottom of the table, because of small first (and second) generation populations for many states.

SOURCE: Panel estimates implemented on the Current Population Survey Annual Social and Economic Supplement for 2011-2013.

**TABLE 9-19** Average Household Size per Household Unit, by Immigrant Generation by State, 2011-2013

State	Immigrant Generation (household units)			All
	First	Second	Third+	
	3.35	2.85	2.41	2.77
California				
New Jersey	3.13	2.17	2.48	2.60
New York	2.77	2.22	2.34	2.43
Nevada	3.19	2.51	2.36	2.55
Florida	2.70	2.25	2.25	2.34
Texas	3.42	2.87	2.46	2.68
Hawaii	3.31	2.55	2.73	2.81
Maryland	3.20	2.37	2.50	2.60
Arizona	3.00	2.68	2.34	2.49
District of Columbia	2.31	1.84	1.99	2.02
Massachusetts	2.83	2.24	2.52	2.53
Illinois	3.20	2.41	2.34	2.47
Washington	3.23	2.39	2.41	2.53
Connecticut	2.93	2.14	2.49	2.51
Rhode Island	2.81	2.07	2.40	2.41
Virginia	3.33	2.33	2.43	2.52
Delaware	3.37	2.16	2.47	2.55
Georgia	3.11	2.90	2.42	2.50
New Mexico	3.20	2.42	2.37	2.47
Oregon	3.26	2.25	2.34	2.43
Colorado	3.20	2.44	2.39	2.47
Alaska	3.07	2.90	2.43	2.52
Nebraska	3.29	2.31	2.37	2.45
Idaho	3.44	2.52	2.62	2.69
North Carolina	3.23	2.61	2.33	2.40
Utah	3.75	2.92	2.97	3.03
Michigan	2.97	2.20	2.45	2.48
Minnesota	3.27	2.05	2.38	2.42
Kansas	3.05	2.35	2.36	2.41
Pennsylvania	2.76	2.01	2.38	2.38
Iowa	3.12	2.15	2.36	2.39
New Hampshire	2.86	2.17	2.49	2.48
Wisconsin	3.30	2.03	2.35	2.38
Tennessee	3.00	2.11	2.36	2.39
Arkansas	3.39	2.73	2.36	2.42
Kentucky	2.54	2.19	2.36	2.37
South Carolina	3.18	2.41	2.33	2.37
Oklahoma	2.96	2.57	2.43	2.46
Vermont	2.55	2.11	2.36	2.34

*continued*

TABLE 9-19 Continued

State	Immigrant Generation (household units)			All
	First	Second	Third+	
Indiana	3.01	2.47	2.46	2.48
Ohio	2.70	2.16	2.39	2.39
Louisiana	2.71	2.14	2.43	2.44
Missouri	2.86	2.32	2.37	2.38
South Dakota	2.98	2.10	2.39	2.40
Alabama	3.26	2.00	2.40	2.42
Maine	2.52	2.02	2.33	2.31
North Dakota	2.54	1.77	2.33	2.30
Wyoming	2.74	2.19	2.41	2.41
Montana	2.64	1.84	2.32	2.30
Mississippi	2.89	2.27	2.47	2.48
West Virginia	2.85	2.15	2.32	2.32
Top 15 States by % in First Generation	3.12	2.53	2.39	2.57
United States	3.11	2.46	2.40	2.50

NOTE: See text for definitions of household immigrant generation. States are listed from highest to lowest percentage of first generation independent persons in the state's population of independent persons (see Table 9-2).

SOURCE: Panel tabulations of the Current Population Survey Annual Social and Economic Supplement for 2011-2013.

**TABLE 9-20** Annualized Weighted Sample Cases of Households by Immigrant Generation by State, Current Population Survey Annual Social and Economic Supplement for 2011-2013

State	Immigrant Generation (household units)			All
	First	Second	Third+	
California	4,165,605	1,909,347	7,290,777	13,365,729
New Jersey	800,286	417,914	2,014,610	3,232,810
New York	1,931,804	938,610	4,799,345	7,669,759
Nevada	221,452	114,295	708,295	1,044,042
Florida	1,633,088	714,054	5,590,941	7,938,082
Texas	1,790,863	897,525	6,734,224	9,422,612
Hawaii	87,836	75,432	298,703	461,970
Maryland	355,518	167,081	1,692,462	2,215,061
Arizona	434,177	288,928	1,840,934	2,564,039
District of Columbia	45,174	25,062	230,009	300,244
Massachusetts	402,195	326,099	1,849,285	2,577,578
Illinois	725,138	398,153	3,941,849	5,065,140
Washington	396,778	262,069	2,011,809	2,670,655
Connecticut	209,041	166,248	1,006,186	1,381,475
Rhode Island	64,911	61,840	302,730	429,481
Virginia	344,930	146,510	2,616,571	3,108,012
Delaware	33,915	17,280	298,211	349,406
Georgia	382,297	116,885	3,286,581	3,785,763
New Mexico	85,943	65,467	650,302	801,713
Oregon	157,829	133,985	1,249,616	1,541,430
Colorado	197,560	148,757	1,659,617	2,005,935
Alaska	25,451	18,874	227,630	271,955
Nebraska	65,732	30,673	639,860	736,265
Idaho	51,831	30,059	507,833	589,722
North Carolina	292,724	142,004	3,429,987	3,864,714
Utah	75,762	56,737	790,040	922,539
Michigan	309,768	242,271	3,310,617	3,862,656
Minnesota	162,845	133,355	1,868,256	2,164,456
Kansas	79,486	45,724	1,027,262	1,152,473
Pennsylvania	332,324	332,286	4,593,236	5,257,846
Iowa	67,251	47,449	1,124,796	1,239,496
New Hampshire	29,221	46,888	444,335	520,444
Wisconsin	108,938	126,223	2,098,162	2,333,323
Tennessee	128,032	61,266	2,444,634	2,633,932
Arkansas	51,843	20,457	1,097,159	1,169,458
Kentucky	91,897	39,889	1,660,988	1,792,775
South Carolina	74,065	35,736	1,746,109	1,855,910
Oklahoma	68,796	51,493	1,393,898	1,514,187
Vermont	10,733	22,360	230,817	263,910

*continued*

TABLE 9-20 Continued

State	Immigrant Generation (household units)			All
	First	Second	Third+	
Indiana	103,939	99,918	2,341,293	2,545,150
Ohio	180,261	226,818	4,293,483	4,700,562
Louisiana	67,474	36,549	1,649,038	1,753,061
Missouri	86,649	77,525	2,327,948	2,492,123
South Dakota	11,226	16,247	309,966	337,439
Alabama	67,486	40,388	1,780,690	1,888,564
Maine	20,112	45,719	499,588	565,419
North Dakota	7,936	16,919	266,819	291,675
Wyoming	6,955	9,593	219,098	235,646
Montana	7,903	26,384	394,971	429,258
Mississippi	23,561	16,190	1,097,737	1,137,487
West Virginia	10,119	21,168	751,852	783,140
Top 15 States by % in First Generation	13,263,865	6,762,657	40,312,156	60,338,678
United States	17,086,659	9,508,706	94,641,157	121,236,522

NOTES: See text for definitions of household immigrant generation. These sample counts are the average number of weighted cases classified as households per year in the Current Population Survey Annual Social and Economic Supplement (ASEC) for 2011-2013. The ASEC includes cases in February, March, and April of each year. Because of the rotation group design, by which addresses are in the sample for 4 months, out for 8 months, and in again for 4 months, the total 3-year sample double-counts households that are in the sample in pairs of years (2011-2012 or 2012-2013). States are listed from highest to lowest percentage of first generation independent persons in the state's population of independent persons (see Table 9-2).

SOURCE: Panel tabulations of the Current Population Survey Annual Social and Economic Supplement for 2011-2013.

## 10

## Research Directions and Data Recommendations

A detailed review of the research literature upon which this report is built reveals that much is known about the economic and fiscal impacts of immigration. A rich portrayal of the roles that immigrants have played in recent U.S. economic history can be drawn, and short-run labor market and public finance outcomes can even be forecast reasonably well (Kerr and Kerr, 2013). But even with the theoretical and empirical advances of recent decades, some questions remain difficult to answer comprehensively and accurately. In some cases, research is constrained by a still emerging conceptual clarity; more often, however, it is hindered by data limitations. Data on immigrants and their descendants—on nativity, education, age and date of arrival, time spent in the United States, and legal status at present and upon entry—are central to analyses of the economic and fiscal impacts of immigration.

In this chapter, the panel recommends next steps for improving the data infrastructure necessary to support continued advances on the research topics detailed in this report. The data needed to study fiscal and economic impacts of immigrants are similar to the data needed to study their integration into society. Therefore, many of the recommendations presented here previously appeared in the report by our sister panel, *The Integration of Immigrants into American Society* (National Academies of Sciences, Engineering, and Medicine, 2015, hereafter “the *Integration* report”). In addition to presenting formal recommendations, we identify several opportunities to enhance available data but do not formally recommend them. While these data would be valuable to researchers, they do not rise to the



same level of importance or their collection may be less feasible than the data enhancements we recommend.

### 10.1 COUNTING AND CHARACTERIZING IMMIGRANTS AND THEIR DESCENDANTS

To understand the effects of immigration on society and the economy, it is necessary to know how many immigrants have arrived in the country, when they arrived, and from where. As discussed in Chapter 2, answers to these seemingly basic questions can be surprisingly difficult to obtain and will continue to be so without further improvement of data sources. Every Decennial Census from 1850 to 2000 included a question on birthplace (foreign-born respondents were also asked about country of birth), which allowed the size of the foreign-born population to be measured. Data on the foreign-born are also collected by the American Community Survey (ACS), a large household survey that replaced the long-form Decennial Census after 2000, and, since 1994, the Current Population Survey (CPS), which is designed for the primary purpose of monitoring labor market trends. These data sources provide information about basic demographic and socioeconomic characteristics—age, sex, marital status, employment status, occupation, income, earnings, and educational attainment—of the foreign-born. The foreign-born population includes permanent residents, persons on temporary work and student visas, and undocumented residents who entered the country either without inspection or have overstayed visas; however, neither the CPS nor the ACS identify the legal status of respondents. The Census Bureau also produces population projections that estimate the future size of the foreign-born population based on a set of demographic assumptions.<sup>1</sup>

Although it is important to build into the nation's statistical infrastructure the capacity to monitor progress of the foreign-born population, it is equally critical to do so for their U.S.-born children who, as native-born citizens, reveal a great deal about how new Americans are integrating into society and helping to shape the nation's economic and demographic landscape. The ability to identify second generation respondents is extremely desirable for empirical analyses of both labor market and fiscal impacts of immigration. As with the foreign-born themselves, their children may on average attain different education and skill levels (often higher—see

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<sup>1</sup>Because of the inconsistencies in the Decennial Census series and the lack of counts of the second generation population, the Pew Research Center also produces projections, including separate projections for the second and third-plus generations, which are used for some of the fiscal impact estimates in Chapter 8 of this report. The Pew population series differs slightly from official census data because of methods of adjustment, estimation, and projection, but the differences are generally less than 1 percentage point, well within the margin of error.

Chapter 8), achieve different occupational outcomes, and generate at least slightly different fiscal impacts compared with the general population. In turn, their presence may affect employment rates and composition (either positively or negatively), as well as per capita earnings, taxes paid, and social program utilization—all integral to fiscal and labor market outcomes.

Thus, for analyzing the earnings and occupational integration of immigrants and their descendants, and for a range of other research purposes, a question on parental birthplace is needed for a large representative sample of the population. Such a question was first added to the 1890 Decennial Census<sup>2</sup> but was dropped for the 1980 and subsequent Decennial Censuses. In 1994, the CPS helped to ameliorate the situation by adding two questions about parental birthplace: “In what country was your father born?” and “In what country was your mother born?” The CPS is, however, not exactly comparable to the Decennial Census or to the ACS; it only covers the civilian, noninstitutionalized population, and it includes data on a different set of potential covariates. Massey (2010) provides a definitive discussion of immigration measurement issues and explains why a question about parents’ birthplace is crucially needed on the ACS. In so doing, he also notes the primary constraint inherent in the relatively small sample size of the CPS (compared to the ACS or the long-form Decennial Census): the CPS sample size is often inadequate to address questions about immigrants by nationality groups, and the problem is intensified for smaller geographic areas.<sup>3</sup> As Massey (2010, p. 128) notes, the CPS allows one to “study second-generation Mexican immigrants in California, but is of little use if one seeks information about second-generation Koreans in Oregon—the sample will just be too small.” For cases in which the CPS is inadequate for studying subgroups, the ACS would often provide the sample size needed to do so. For this reason, and others cited above, a modification to the ACS is warranted:

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<sup>2</sup>From 1890 through 1930, parental birthplace questions were asked of all census respondents. With the advent of sampling in the 1940 census, these questions were asked only to a subset of the population: for every 20th person (5%) in the 1940 census, for every 5th person (20%) in the 1950 census, for 25 percent of *households* in the 1960 census, and for 15 percent of *households* in the 1970 census.

<sup>3</sup>The relevant part of the CPS (the March supplement) has a sample size of around 75,000 households, which yields, on average, information on more than 11,000 foreign-born households and 26,000 foreign-born individuals. The March supplement also significantly oversamples Hispanics and, to a lesser degree, Asians. A list of all the surveys that collect data on immigration can be found at the University of California, Berkeley, Population Center. Available: [http://www.popcenter.berkeley.edu/resources/migration\\_data\\_sets/data\\_by\\_region.php](http://www.popcenter.berkeley.edu/resources/migration_data_sets/data_by_region.php) [November 2015].

**Recommendation 1:** The U.S. Census Bureau should add a question on the birthplace of parents to the American Community Survey.<sup>4</sup>

With such an enhancement to the ACS, fiscal analyses such as those reported on in Chapter 9 of this report would be more robust because more characteristics of the foreign-born and the second generation could be compared against the rest of the population at the state or substate level.

During this panel's work estimating the fiscal impact of immigration, it also became clear that, in addition to asking about parental birthplace, it would be useful to have data on parents' educational attainment. The absence of this information even in the CPS, which includes information on parental birthplace, means that both *The New Americans* (National Research Council, 1997) and the analyses in this report (Chapter 8)—along with many other studies—must rely on average intercohort education levels (a comparison of the mean values for different cohorts), a simplifying assumption that affects a large research literature, not just that on immigration. If microdata existed to compare individuals and their parents, estimates of intergenerational transmission of educational attainment and the determinants thereof would be much more precise.

**Recommendation 2:** As a first step toward addressing the issue of intergenerational transmission of educational attainment, the Current Population Survey should ask respondents about parents' educational attainment as a follow-up to the existing questions about parental birthplace.

As discussed below, some research questions about immigrants and their descendants are best addressed by tracking populations over a number of years. Longitudinal studies of the second generation are needed to provide information about their economic and social contributions, about their labor market and fiscal impact, and about how they integrate along various dimensions over time—essential aspects of the country's overall immigration experience. Past academically sponsored efforts, such as the New Immigrant Survey (Jasso et al., 2006), have attempted to do this, but that particular survey was limited to legal immigrants arriving in certain years. A survey similar to the National Education Longitudinal Studies, but focused on a large second generation sample followed from early adolescence into adulthood, would enhance immigration research.<sup>5</sup>

<sup>4</sup>This recommendation is replicated from the *Integration* report (p. 429, Recommendation 10-1).

<sup>5</sup>Detailed, individual-level data of this kind, often required for capturing and analyzing processes as they unfold, require safe access that protects privacy and confidentiality.

In addition, the *Integration* report recommends that a number of currently operating national longitudinal surveys “should oversample the foreign-born, especially the smaller Asian and non-Mexican Hispanic groups that, when combined, make up a significant share of the immigrant population.” Existing models of how to oversample key populations can be found in a range of surveys, such as the National Health Interview Survey, the Panel Study of Income Dynamics, and the National Health and Nutrition Examination Survey (National Academies of Sciences, Engineering, and Medicine, 2015, p. 432).

## 10.2 INFORMATION ON LEGAL STATUS

A second major limitation of Decennial Census, ACS, and CPS data for studying immigration is that neither current visa status nor visa status at time of arrival are recorded, making it impossible to distinguish between lawful permanent residents (“green card” holders), persons on temporary nonimmigrant visas for work or study, persons with other types of visas, and persons who lack an official visa. As a result, it is common statistical practice to refer to the foreign-born population in a census or survey as “immigrants” even though such a categorization will typically include foreign students, various workers on temporary employment visas, those on temporary residence visas, and migrants who are not authorized to be in the country.<sup>6</sup> For this reason, better data are needed on visa status, initially and currently, as well as on time and age at arrival (which is already collected).

There is considerable mobility across visa categories as well, and current visa status does not always predict who stays permanently. Legal status has been shown in a number of surveys to be a dynamic variable that changes over time, as immigrants’ circumstances change. As highlighted in the *Integration* report (National Academies of Sciences, Engineering, and Medicine, 2015, p. 430), “The attainment of legal status and eventual citizenship are likely to be crucial steps in the process of economic and social integration, yet researchers presently lack the means to model them.”

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Such protections are a feature of the U.S. Census Bureau’s Federal Statistical Research Data Centers, which enable researchers—albeit with some level of burden relative to public access sources—to access and analyze microdata and small-area data (for details, see <http://www.census.gov/fsrdc>).

<sup>6</sup>There are many types of temporary visas that permit people to reside (and sometimes work) legally in the United States—usually for 1 year or less, although some temporary visas can be renewed for several years. Temporary resident visas are issued for visitors; fiancés and spouses of U.S. citizens; entertainers, athletes, and religious workers; Canadian and Mexican professionals; business trainees; and others that are allowed to reside in the United States for short periods of time. See Chapter 3 of the *Integration* report for details on the various visa and other statuses for temporary and long-term entry to the United States.

Because there is no official count of persons who are in the United States without a valid visa—the unauthorized population<sup>7</sup>—an additional question should be considered for the CPS:

**Recommendation 3:** The U.S. Census Bureau and the Bureau of Labor Statistics should test and, if feasible, add a question on the monthly Current Population Survey that allows respondents to select among various well-defined legal statuses at entry or at present, leaving those in undocumented status to be identified by process of elimination.<sup>8</sup>

Following this guidance provides a good starting point but undocumented persons are likely to be under-enumerated in surveys and censuses. The purpose of the recommended pretest is to determine whether the inclusion of such questions might have a deleterious effect on survey participation. For these reasons, in addition to the “process of elimination method” suggested in the above recommendation, creative use of administrative and other kinds of data is desirable to identify immigrant populations of interest, such as the authorized and nonauthorized.<sup>9</sup>

It is also possible to tap into legalization programs to learn more about the subset of immigrants applying for citizenship. As an example of how this opportunity has been exploited in the past, the *Integration* report cites the 1986 Immigration Reform and Control Act (IRCA), which mandated a survey of immigrants who legalized. The survey, which collected data on “how they entered the United States, where they fit into the labor market, demographic characteristics, family composition, use of social services, migration behavior and origins . . . illuminated the behavior of a population for which there previously was little systematic information” (*Integration* report, p. 430). The potential of this kind of instrument points to a clear strategy for additional systematic data collection:

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<sup>7</sup>The expert consensus is that the unauthorized population peaked at approximately 12 million in 2007, then fell to about 11 million in the wake of the Great Recession (Baker and Rytina, 2013; Passel et al., 2013).

<sup>8</sup>This recommendation is adapted from the *Integration* report (p. 430, Recommendation 10-2).

<sup>9</sup>Van Hook et al. (2014) presented evidence about coverage of the Mexican-born population in the 2000 U.S. Decennial Census and in the ACS using death and birth registrations and a net migration method. “For the late 1990s and first half of the 2000–2010 decade, results indicate that coverage error was somewhat higher than currently assumed but had substantially declined by the latter half of the 2000–2010 decade . . . [and] that U.S. census and ACS data miss substantial numbers of children of Mexican immigrants, as well as people who are most likely to be unauthorized: namely, working-aged Mexican immigrants (ages 15–64), especially males” (Van Hook et al., 2014, p. 699).

**Recommendation 4:** Congress should include a provision in the next immigration bill to survey the undocumented population. Data should be collected in two ways: USCIS [U.S. Citizenship and Immigration Services] should collect data on applicants who were previously out-of-status or entered without inspection, and government statistical agencies should conduct surveys similar to those conducted after the Immigration Reform and Control Act.<sup>10</sup>

Legalization programs certainly create targeted opportunities to learn more about individuals who were previously living without legal status in a way that provides a window on the broader group; however, it is important for data users to recognize that those who legalize are a selected group that is not fully representative of their counterparts who have not legalized.

Currently, data on legal immigrants entering the United States and those applying for benefits such as naturalization collected by the Department of Homeland Security (including USCIS), the State Department, and the Office of Refugee Resettlement are generally limited to data items needed for processing cases. The collection of additional information would make it possible to maximize the research value of these administrative data and to allow specific questions of interest to be addressed.

**Recommendation 5:** Data on naturalizations (for which the Department of Homeland Security has a record of every case) should be linked with the data on admissions. Similarly, data on attaining lawful permanent resident status should be linked to the individual's temporary visa history. This would make it possible to monitor how individuals progress through the immigration system.

Additional data, such as on occupation and education, could be collected from all applicants for lawful permanent resident status. Information on family members admitted at the same time could be linked and information on sponsors added. These additional data items could be collected from a sample of the people processed every year. A 10 percent sample of the admissions/naturalizations each year, for example, would generate a dataset with about 100,000 awards of lawful permanent residence and 75,000 naturalizations every year. Of course, as pointed out in the *Integration* report (National Academies of Sciences, Engineering, and Medicine, 2015, p. 431), such an expansion in administrative data collection only creates value if the information can be made available to researchers and the public in secure data centers.

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<sup>10</sup>This recommendation is adapted from the *Integration* report (p. 431, Recommendation 10-4).

Understanding of the unauthorized and other immigrant populations could be further enhanced by exploiting longitudinal data sources. This panel supports the idea behind the recommendation advanced in the *Integration* report (National Academies of Sciences, Engineering, and Medicine, 2015, p. 430) to add questions about legal status to a select set of longitudinal surveys that contain significant numbers of foreign-born respondents. The New Immigrant Survey, the Survey of Income and Program Participation, and the Los Angeles Family and Neighborhood Study are examples of surveys that include direct questions on legal status. This modification could be considered for the Panel Study of Income Dynamics, the National Health Interview Survey, the National Education Longitudinal Survey, and the National Health and Nutrition Examination Survey. However, careful pretesting would be needed to assess the potential impact on response rates overall, and of undocumented immigrants in particular, of asking respondents about legal status. The integrity of these very important surveys should not be risked unless it can be convincingly established that eliciting truthful answers about legal status from respondents will not create undue risks to the entire enterprise.

### 10.3 MEASUREMENT OF IMMIGRATION AND EMIGRATION PATTERNS

Longitudinal data are also essential for uncovering the correlates of a range of social and economic outcomes of immigration (National Research Council, 1996). Likewise, the ability to follow individuals and cohorts over time is crucial to understanding factors behind geographic movements—for example, those affecting emigration, circular migration, and interstate migration—and analyzing selection effects associated with these behaviors (in this case, the factors or characteristics that are causally linked with immigration and emigration). Given that the earnings, tax payments, or program use of those who stay are systematically different from those who leave, measures of return and circular migration are especially important for estimating long-term economic impacts.<sup>11</sup>

For the same reasons, longitudinal data that are valuable for tracking changing legal status of individuals, return or circular migration, or changes in patterns of program use are also essential for projecting fiscal impacts with precision. In their discussion of return migration, Kerr and Kerr (2011) pointed out that analyses of fiscal impacts often assume that immi-

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<sup>11</sup>The U.S. Immigration and Naturalization Service ceased publishing emigration data in 1958 because the data available were thought to be incomplete, but alternative estimates based on recent research suggest that current emigration levels are not insignificant (Van Hook et al., 2006).



grants remain permanently in the host country after arrival; public service use and taxes paid are then estimated on the basis of cross-sectional patterns. The authors conclude that, in order to “provide a better estimate of the mean effect and also characterize the heterogeneity in immigrant types,” calculations of both labor market and fiscal impacts need to consider rates of return migration and identify selective outflow (Kerr and Kerr, 2011, p. 69). This advice is followed in the forward-looking fiscal projections presented in Chapter 8, which incorporate population projections by the Pew Research Center that include adjustments to account for out-migration.<sup>12</sup>

Better data on remittances would also enhance immigration research. Remittances dampen the contribution of immigrants to aggregate demand in the host country while stimulating aggregate demand in the origin country into which the funds flow; by extension, some fiscal benefits in the host country attributable to immigrants may likewise be weakened (Kerr and Kerr, 2011). If questions on respondents’ own and parental nativity were added to an existing survey, such as the Survey of Consumer Finances and the Consumer Expenditure Survey, the resultant data could prove useful for refining understanding of spending and remittance behavior among immigrants. The fiscal accounting exercises in Chapters 8 and 9 build in adjustments to account for the impact of remittances on consumption and sales taxes paid; however, these adjustments were based on data for Germany because adequate U.S. data were unavailable.

#### 10.4 EXPLOITING MULTIPLE DATA SOURCES

For a wide range of information needs underpinning immigration research, strategic linking of administrative datasets—on visa status for example—and other sources beyond traditional household surveys can greatly enhance the capacity to track variables of interest, particularly at the individual level, over time. USCIS and other federal agencies compile administrative data containing detailed information about immigrants, including flows of new arrivals by visa status and data on newly naturalized U.S. citizens. However, the published data are aggregated in a way that offers only very basic cross-tabulations. It is impossible to use these data for fine-grained analyses, which typically require micro-level data on individuals and the ability to link to additional information sources, such as aggregate data on localities.

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<sup>12</sup>The cumulative return rates used in the analysis are segmented by age and by duration in the United States. The return rate is about .24 for immigrants in their first 10 years in the country and about .31 during the first 50 years after arrival. These estimates are within a percentage point or two of the return rates used in the forward looking fiscal analysis presented in *The New Americans* (National Research Council, 1997).



Sometimes key pieces of information cannot be gleaned from household surveys. An example, used in the estimation of state and local fiscal impacts, is the cost of bilingual education and of educating students for whom English is a second language (not necessarily in a bilingual education program). The costs of such programs cannot be estimated from a household survey because they are incurred by schools, not parents. The source of data used in this report for modeling the added costs for language-assistance instruction is a now fairly outdated study by the Urban Institute (Clark, 1994). Updated information would be useful for sharpening estimates of education costs associated with immigration.

Beyond the survey data realm, another action that would be useful for generating fiscal projections would be for the Congressional Budget Office to make its budget projection engine public and give users the ability to experiment with different scenarios to see how changes affect estimated fiscal flows, tax rates, the size of the national debt, etc. For federal fiscal estimates, such as those produced in Chapter 8 of this report, this capability would have provided the opportunity to generate additional scenarios and to flesh out more exhaustively how reasonable each one appears. Achieving this is a complex proposition, but the capability would benefit research projects estimating future fiscal impacts of various policies—immigration related or otherwise.

Exploiting multiple data modes also has the potential to advance research on employment dynamics. To quantify the mobility of workers, or the extent to which displacement of pre-existing workers occurs, longitudinal data that “measure layoffs, unemployment spells, changes of residence and occupational and industrial mobility” are critical (Longhi et al., 2008, p. 25). Record linkages between surveys and detailed administrative records are now available to study firm and worker interactions and status changes. For the United States, the pioneering Longitudinal Employer-Household Dynamics Program<sup>13</sup> has proven highly useful for analyzing how labor markets adapt to changing circumstances and, in so doing, has expanded opportunities for more sophisticated studies of employment effects associated with immigration inflows.<sup>14</sup> In general, research in the United States has more frequently examined wage impacts than employment effects; European scholars have given more attention to analyzing employment impacts.<sup>15</sup> Foged and Peri (2015) analyzed labor market outcomes of low-

<sup>13</sup>For details, go to <http://lehd.ces.census.gov/research>.

<sup>14</sup>Mouw et al. (2012) and Rho (2013) examined worker displacement in high immigration industries using evidence from the Longitudinal Employer-Household Dynamics Program.

<sup>15</sup>As reviewed in Chapter 5, there has been some work in the United States on employment impacts. Smith (2012) analyzed the impact of immigration on hours worked of low-skilled native-born workers and found that the largest negative effect was on teenagers.

skilled natives in response to an inflow of low-skilled immigrants using longitudinal employer-employee data from Denmark.

Another area in which multiple data sources could advance research on the impact of immigration on wages and employment is in measuring capital formation. As discussed in Chapter 5, the demand for labor and the capacity of the economy to absorb new workers, including immigrants, is strongly influenced by the speed at which firms invest and adjust their capital stock and production technologies. Assumptions are often made or implied about this process which, in certain kinds of models, strongly influence wage and employment impact estimates. At this point, there is little empirical basis for these assumptions because the temporal characteristics of how capital formation occurs in response to changing factors of production is an under-researched topic (Longhi et al., 2008, p. 25). Better microdata on investment and capital stock at industry and regional levels are needed and might be supplemented by a variety of non-survey-data sources such as firm administration records or commercial databases.

Long-term multisource data projects are also important for studying economic and social mobility—a topic that has recently gained heightened visibility among researchers, policy makers, and the general public. Concerns about growing income and wealth inequality and about the health of the “American dream” have spurred research into intergenerational issues, which often have even more acute implications for immigrants and their descendants. The *Integration* report points out that “matched individual-level records from Decennial Censuses (and the ACS) with income data from Internal Revenue Service and the Social Security Administration would allow for longitudinal studies of the socioeconomic progress of immigrants in American society and allow for the measurement of both intracohort change and intercohort change (for cohorts based on time of arrival in the United States) for successive waves of immigrants.” Additionally, “matched Census and USCIS records would allow for in-depth studies of pathways to legalization and also the impact of legal status on socioeconomic outcomes of individuals and their children”<sup>16</sup> (National Academies of Sciences, Engineering, and Medicine, 2015, p. 431). This opportunity should be pursued:

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<sup>16</sup>Similar data are collected in the French Permanent Demographic Sample (EDP), which is a pioneering longitudinal database maintained by the French National Institute of Statistics and Economic Studies, a central government agency located in Paris. The EDP is a panel survey based on immigrant arrival and census data that comprises a 1 percent sample of all immigrants that have entered France since 1967. The panel database includes information on immigrants at the time of arrival, linked to the General Population Census of 1968 and later censuses. It provides a rich database on the social and economic adjustment of immigrants over recent decades. A study by Richard (2013) provides an example of the usefulness of EDP data for studying labor outcomes.

**Recommendation 6:** The U.S. Census Bureau and U.S. Citizenship and Immigration Services should create a system that links administrative data to Census Bureau-administered surveys, including the Decennial Census, the American Community Survey, and the Survey of Income and Program Participation, following protocols that have recently been used to link Internal Revenue Service data to Census Bureau data and/or following protocols developed for the American Opportunity Study (National Research Council, 2013).<sup>17</sup>

The American Opportunity Study (AOS) is a new project, still under way, that takes as its goal to digitize and link data across Decennial Censuses, the ACS, and other administrative sources (such as Internal Revenue Service datasets) for the purpose of studying social mobility and related topics such as the following (Grusky et al., 2015):<sup>18</sup>

- Parent-child social mobility across a variety of dimensions (income, education, occupation) and with repeated measurements
- Social mobility within small geographic units
- Three-generation analyses (and beyond)
- Subgroup analyses (e.g., immigrants from specific countries or regions)
- Study of complex families (distinguishing social, biological, and financial parents)
- Intergenerational inheritance of program participation

A key topic motivating the AOS project is to improve the measurement of intergenerational changes in the immigrant population, ultimately improving the evidence base for policy.

Due to its high profile and its centrality among policy issues, research will continue on immigration regardless of whether the changes recommended in this chapter are implemented, and much of the focus of this research will be on the fiscal and economic consequences topics covered in this volume. However, initiatives such as the AOS and others that create a coordinated data infrastructure will, if successful, greatly enhance these

<sup>17</sup>This recommendation is replicated from the *Integration* report (National Academies of Sciences, Engineering, and Medicine, 2015 p. 431, Recommendation 10-5).

<sup>18</sup>The linkages across Census Bureau and administrative data will be designed to promote social, behavioral, and economic research in a way that creates savings on survey costs, improves data accuracy, and increases the ability to understand the long-term consequences of economic and social change. A longitudinal panel of the population, with identifiers for immigrants and later generations, could be constructed, and research using it could be conducted in restricted data environments such as the Census Bureau's Research Data Centers (National Academies of Sciences, Engineering, and Medicine, 2015).

research efforts. In this chapter, the panel has briefly identified next steps for pushing the knowledge frontier forward so that a report published 20 years from now will be able to present an even more comprehensive assessment of how immigration contributes to the economy and affects those engaged in its activities.



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# Appendix

## Biographical Sketches

### PANEL MEMBERS

**FRANCINE D. BLAU** (*Chair*), Department of Economics, Cornell University, is a research associate at the National Bureau of Economic Research, a research fellow of the Institute for the Study of labor (IZA) and the Center for Economic Studies/Ifo Institute, and a research professor at the German Institute for Economic Research. She has written extensively on gender issues, immigration, wage inequality, and international comparisons of labor market outcomes. She was president of the Society of Labor Economists, the Midwest Economics Association, and the Labor and Employment Association; and vice president of the American Economic Association. She was editor of the *Journal of Labor Economics* and serves or has served on the editorial boards of the *American Economic Review*, *Journal of Economic Perspectives*, *Journal of Labor Economics*, *Labour Economics*, and *Industrial and Labor Relations Review*, among others. She is a fellow of the Society of Labor Economists, American Academy of Political and Social Science, and Labor and Employment Relations Association. She received the Carolyn Shaw Bell Award in 2001 from the American Economic Association and the IZA Prize in 2010 for outstanding achievement in labor economics. She has a B.S. in industrial and labor relations from Cornell University, and an M.A. and a Ph.D. in economics from Harvard University.

**MICHAEL BEN-GAD** is professor of economics at City, University of London, and has served as head of the Department of Economics. He has worked in the research department of the Bank of Israel and was a faculty



member of the University of Houston and the University of Haifa and a visiting professor at the Central European University and the International School of Economics at Tbilisi State University. He serves on the academic advisory group of the Tax Administration Research Centre (TARC), sponsored by the UK Economic and Social Research Council, HM Treasury, and HM Customs and previously served on the council of the Israel Economic Association. His research focuses on dynamic macroeconomics with applications to taxation, public debt, the economic effects of immigration, optimal fiscal policy, and the emergence of multiple equilibria in models of economic growth. He has written on immigration, fiscal policy, macroeconomic theory, and defense policy and has published in many peer-reviewed journals. He has a B.A. in economics from the Hebrew University of Jerusalem, and an A.M. and a Ph.D. in economics from the University of Chicago.

**GEORGE J. BORJAS** is Robert W. Scrivner professor of economics and social policy in the John F. Kennedy School of Government at Harvard University, research associate at the National Bureau of Economic Research, research fellow at IZA, and an elected fellow of the Society of Labor Economists. His teaching and research interests focus on the impact of government regulations on labor markets, with an emphasis on the economic impact of immigration. His academic work provides a theoretical and empirical framework for analyzing the welfare effects and distributional consequences of immigration. He has authored numerous books as well as articles in peer-reviewed journals. He is an editor for the *Journal on Human Capital* and *The International Migration Review*. He has a B.S. in economics and mathematics from St. Peter's College, and an M.A., an M.Phil., and a Ph.D. in economics from Columbia University.

**CHRISTIAN DUSTMANN** is professor of economics at University College London, director of the Centre for Research and Analysis of Migration, and president of the European Association of Labour Economists. He has served as president of the European Society of Population Economics and scientific director of the Norface Programme on Migration. He is a research fellow of the Centre for Economic Policy Research and research associate of the Institute for Fiscal Studies. He is a labor economist whose research focus is migration, education, and wage structures, areas in which he has widely published. He has conducted research projects for national governments and international organizations and regularly advises government bodies, international organizations, and the media on migration issues. He has a B.A. in business economics from the University of Bielefeld, Germany, and a Ph.D. in economics from the European University Institute, Florence.

**BARRY EDMONSTON** is research professor in the Department of Soci-

ology at the University of Victoria. His areas of interest include internal and international migration, population distribution, human ecology, and demographic methods. Another interest is Canadian demographic issues; he served as vice-president and president of the Canadian Population Society from 2008 to 2012. He currently serves on the demographic technical advisory committee to Statistics Canada. He has frequently organized joint Canada-U.S. forums at meetings of professional population societies and coauthored a chapter on international migration for the second edition of *Methods and Materials of Demography*. His current research includes major studies with colleagues on the socioeconomic integration of Asian immigrants and their children in Canada and the United States and on interethnic, internativity, and interreligious marriages in Canada, as well as studies of internal migration of immigrants and the elderly and living arrangements of the elderly. He recently was guest editor for a special issue of *Canadian Studies in Population* dealing with life-course perspectives on immigration. He has a B.A. from the University of Oregon, and a Ph.D. from the University of Michigan.

**ISAAC EHRLICH** is State University of New York (SUNY) and University at Buffalo (UB) distinguished professor, chair of the Economics Department in the College of Arts and Sciences, and Melvin H. Baker professor of American enterprise in the School of Management at UB, SUNY. He is director of the UB Center of Excellence on Human Capital, Technology Transfer, and Economic Growth and Development; a research associate of the National Bureau of Economic Research; a research fellow at IZA; and editor in chief of the *Journal of Human Capital*. Previously he held appointments at Tel-Aviv University and the University of Chicago and was a visiting fellow at the Hoover Institution of Stanford University, visiting professor at the Hong Kong University of Science and Technology, and visiting fellow at the Hong Kong Monetary Authority. He is the author of numerous articles in major refereed journals on law and economics, crime and corruption, human capital and health economics, advertising and information, risk and insurance, asset management, Social Security, and economic growth and development. He has edited two books and a special issue of the *Journal of Political Economy* on the problem of development. He has a B.A. from the Hebrew University of Jerusalem, and a Ph.D. from Columbia University.

**CHARLES HIRSCHMAN** is Boeing international professor in the Department of Sociology and the Daniel J. Evans School of Public Policy and Governance at the University of Washington-Seattle. He is a social demographer with interests in race and ethnicity, immigration to the United States, and social change in Southeast Asia. He recently completed a book manuscript

based on longitudinal survey data from the University of Washington's Beyond High School project. Prior to 1987, he taught at Duke University and Cornell University. He teaches undergraduate classes on comparative and historical social change and on immigration and ethnicity and post-graduate courses on demography and on comparative race and ethnicity. He was president of the Population Association of America in 2005 and is an elected fellow of the American Academy of Arts and Sciences and the American Association for the Advancement of Science. Dr. Hirschman received his B.A. from Miami University, Ohio, and his Ph.D. from the University of Wisconsin.

**JENNIFER HUNT** is James Cullen professor of economics in the Department of Economics at Rutgers University. During 2013-2015, she served as deputy assistant secretary for microeconomic analysis in the Office of Economic Policy, U.S. Department of the Treasury, and as chief economist at the U.S. Department of Labor. Before joining Rutgers in 2011, she held positions at McGill University, the University of Montreal, and Yale University. Dr. Hunt is a research associate at the National Bureau of Economic Research, research fellow at the Centre for Economic Policy Research, and research fellow at IZA. She is co-editor of the *Journal of Human Resources* and associate editor of the *Journal of Labor Economics*. She has conducted research in the areas of employment and unemployment policy, immigration, wage inequality, the transition from communism, crime, and corruption. Her current research focuses on immigration and innovation in the United States, the U.S. science and engineering workforce, and wage inequality. Dr. Hunt has an S.B. in electrical engineering from the Massachusetts Institute of Technology, and a Ph.D. in economics from Harvard University.

**DOWELL MYERS** is professor of policy, planning, and demography in the Sol Price School of Public Policy at the University of Southern California, where he also directs the Population Dynamics Research Group. He is a member of the American Planning Association, American Sociological Association, Population Association of American, and the American Real Estate and Urban Economics Association. His research approach of integrated demography treats demographic factors as interwoven with aggregate behaviors and impacts, including public perceptions and reactions to demographic change. Recent research has focused on public narratives about immigration, aging, and taxation; projections of generational change in the United States, California, and Los Angeles; and the upward mobility of immigrants with duration of U.S. residence. He was an advisor to the Census Bureau, an academic fellow of the Urban Land Institute, and a member of the Governing Board of the Association of Collegiate Schools

of Planning. He has received the Haynes Award for Research Impact. He has a B.A. in anthropology from Columbia University, an M.C.P. in city and regional planning from the University of California, Berkeley, and a Ph.D. in urban and regional planning from the Massachusetts Institute of Technology.

**PIA ORRENIUS** is vice president and senior economist in the research department at the Federal Reserve Bank of Dallas, where she manages the regional economy group. She is executive editor of *Southwest Economy* and works primarily on regional economic growth and demographic change. She co-edited *Ten Gallon Economy: Sizing up Texas' Economic Growth* (2015), co-wrote *Beside the Golden Door: Immigration Reform in a New Era of Globalization* (2010) and has published extensively on the labor market impacts of immigration, unauthorized immigration, and U.S. immigration policy. She is a research fellow at the Tower Center for Political Studies at Southern Methodist University and at IZA, an adjunct scholar at the American Enterprise Institute in Washington, D.C., and adjunct professor at Baylor University (Dallas campus), where she teaches in the executive MBA program. She was senior economist on the Council of Economic Advisers in the Executive Office of the President, Washington, D.C., in 2004-2005, advising the Bush administration on labor, health, and immigration issues. She holds a Ph.D. in economics from the University of California, Los Angeles, and bachelor's degrees in economics and Spanish from the University of Illinois at Urbana-Champaign.

**JEFFREY S. PASSEL** is a senior demographer at the Pew Research Center's Hispanic Trends Project. Previously he served as principal research associate at the Urban Institute's Labor, Human Services, and Population Center. His expertise focuses on immigration to the United States and the demography of racial and ethnic groups. Dr. Passel has authored numerous studies on immigrant populations in America, undocumented immigration, the economic and fiscal impact of the foreign-born, and the impact of welfare reform on immigrant populations. He regularly discusses Pew project findings in print and broadcast media. Dr. Passel has an M.A. in sociology from the University of Texas at Austin, and a Ph.D. in social relations from the Johns Hopkins University.

**KIM RUEBEN** is a senior fellow of the Urban Institute and director of the State and Local Finance Initiative of the Urban-Brookings Tax Policy Center at the Urban Institute. She is also an adjunct fellow at the Public Policy Institute of California (PPIC) and is currently serving on the Council of Economic Advisors to California State Controller Betty Yee. Her expertise focuses on state and local public finance and the economics of education;

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**MARTA TIENDA** is Maurice P. Daring '22 professor in demographic studies, professor of sociology and public affairs, and research associate in the Office of Population Research at Princeton University. Previously she held permanent positions at the universities of Chicago and Wisconsin-Madison and visiting appointments at New York University, Stanford, and Brown. Her research focuses on race and ethnic differences in various metrics of social inequality—ranging from poverty and welfare to education and employment—to address how ascribed attributes acquire social and economic significance. She is developing two research initiatives on age and immigration. She is an independent trustee of the Teachers Insurance Annuity Association, the Jacobs Foundation of Switzerland, and the Sloan Foundation and serves on the boards of the Population Reference Bureau and the President's Commission on Educational Excellence for Hispanics. She has served on the boards of Brown University, the Federal Reserve Bank of New York, the W.T. Grant Foundation, the Carnegie Corporation of New York, the Kaiser Family Foundation, and the Russell Sage Foundation and was president of the Population Association of America. She has a B.A. in Spanish (education) from Michigan State University, and an M.A. and a Ph.D. in sociology from the University of Texas at Austin.

**YU XIE** is Bert G. Kerstetter '66 university professor of sociology at Princeton University and has a faculty appointment at the Princeton Institute of International and Regional Studies. Previously he was distinguished university professor of sociology, statistics, and public policy at the University of Michigan and visiting chair professor at the Center for Social Research, Peking University. His main areas of interest are social stratification, demography, statistical methods, Chinese studies, and sociology of science. His recently coauthored *Marriage and Cohabitation, Statistical Methods for Categorical Data Analysis* and *Is American Science in Decline?* Dr. Xie has a B.S. in metallurgical engineering from Shanghai University of

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### CONSULTANTS

**GRETCHEN STOCKMAYER DONEHOWER** is a research specialist with the Center on the Economics and Demography of Aging at the University of California, Berkeley. Her work focuses on quantitative research methods and has contributed to research in population forecasting, the economics of population aging, primate ecology, residential segregation, and education. Her current research projects are on understanding the age dimension of economic activity and on adding a gender perspective to economic analysis by measuring the value of women's unpaid care services and housework. Previously she worked in private industry as an investment analyst and as a statistician for a software company and was a mathematics teacher in the U.S. Peace Corps in Nepal. She has a B.A. in economics and mathematics from Yale University, and an M.A. in statistics and a Ph.D. in demography, both from the University of California, Berkeley.

**RYAN D. EDWARDS** is associate professor of economics at Queens College, a member of the doctoral faculty at the Graduate Center at the City University of New York (CUNY), a faculty associate at the CUNY Institute for Demographic Research, and research associate in health economics at the National Bureau of Economic Research. Previously he held postdoctoral positions at Stanford University and the RAND Corporation and was a visiting professor at the University of California, a visiting scientist at Harvard University, and a staff economist on the U.S. Council of Economic Advisers. His research interests focus on the economics of aging and health, macroeconomics, public finance, and economic demography. He is a member of the American Economic Association and the Population Association of America. He has presented at numerous workshops and seminars and has served as a referee for journals including *American Economic Review*, *American Economic Journal*, *Applied Economics*, *Demographic Research*, and *Population Studies*. He has a B.A. in public and international affairs from Princeton University and a Ph.D. in economics from the University of California, Berkeley.

**SARAH GAULT** is a research assistant in the Urban-Brookings Tax Policy Center at the Urban Institute, contributing to the State and Local Finance Initiative. She works primarily on topics relating to state and local public finance and has also supported research on financial transaction taxes and the simplification of student financial aid. She holds a bachelor's degree in economics from the College of William and Mary, where she worked

as a research assistant estimating Hispanic-white wage gaps for men and women.

**JULIA GELATT** is a research associate in the Center on Labor, Human Services, and Population at the Urban Institute, where her mixed-methods research focuses on immigration, child well-being, and early education. Her work on immigration includes a compilation of state policies toward immigrants and analysis of their impact on immigrant families' material well-being, a review of promising practices for connecting immigrant families to prekindergarten, a profile of the limited English proficient population in Washington, DC, and research on the implications of parents' and children's immigration status for children's health and well-being. Dr. Gelatt's work on child well-being includes a focus on instability in families' access to child care subsidies, analysis of the child care settings used by parents working nonstandard schedules, an examination of the contexts that shape parenting practices, and a study of the factors influencing immigrant families' child care choices. Previously she worked on topics related to U.S. immigration policy and immigrant integration at the Migration Policy Institute. She received her Ph.D. in sociology and social policy from Princeton University.

#### STAFF

**CHRISTOPHER MACKIE** (*Study Director*) is a senior program officer with the Committee on National Statistics of the National Academies of Sciences, Engineering, and Medicine, where he specializes in economic measurement and statistics. He has directed projects on the measurement of self-reported well-being and on measuring civic engagement and social cohesion. He was study director for the expert committees that produced the reports *At What Price? Conceptualizing and Measuring Cost-of-Living and Price Indexes*; *Beyond the Market: Designing Nonmarket Accounts for the United States*; *Understanding Business Dynamics: An Integrated Data System for America's Future*; *Accounting for Health and Health Care: Approaches to Measuring the Sources and Costs of Their Improvement*; *Improving Measurement of Productivity in Higher Education*; and *Subjective Well-being: Measuring Happiness, Suffering, and Other Dimensions of Experience*. He is author of *Canonizing Economic Theory: How Theories and Ideas Are Selected in Economics*. He holds a Ph.D. in economics from the University of North Carolina and has held teaching positions at the University of North Carolina, North Carolina State University, and Tulane University.



**ESHA SINHA** joined the Committee on National Statistics as an associate program officer in July 2009. Previously she worked with SUNY Binghamton student records on such topics as whether advanced placement or SAT scores are better predictors of college success and performance of transfer students. She is currently supporting two expert panels and one workshop and has worked on a variety of panel studies, workshops, and planning meetings under the Committee on National Statistics. She co-edited *Improving Measurement of Productivity in Higher Education* and was co-rapporteur of *National Patterns of R&D Resources: Future Directions for Contents and Methods: Summary of a Workshop*. She has an M.A. in economics from GIPE, India, and worked as research assistant in the Indian Institute of Management, Ahmedabad, before attending SUNY Binghamton. She has a Ph.D. in economics from SUNY Binghamton.





### COMMITTEE ON NATIONAL STATISTICS

The Committee on National Statistics was established in 1972 at the National Academies of Sciences, Engineering, and Medicine to improve the statistical methods and information on which public policy decisions are based. The committee carries out studies, workshops, and other activities to foster better measures and fuller understanding of the economy, the environment, public health, crime, education, immigration, poverty, welfare, and other public policy issues. It also evaluates ongoing statistical programs and tracks the statistical policy and coordinating activities of the federal government, serving a unique role at the intersection of statistics and public policy. The committee's work is supported by a consortium of federal agencies through a National Science Foundation grant, a National Agricultural Statistics Service cooperative agreement, and several individual contracts.

