The Effect of Immigration on the Internal Migration of the Native-Born Population, 1981-1990

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Abstract. This study examines the impact of immigration on the labor market opportunities of the native-born population by looking through the window of migration. We use Current Population Survey data to analyze the one-year migration patterns of Anglos and Blacks and include the presence of recent immigrants in the origin and (potential) destination US states among the covariates. Our departure model employs a logit specification to predict outmigration (vs not) from the state during the year prior to the survey. Our arrival model uses a conditional logit discrete choice specification with sampling among the alternatives to predict destination state. The data are taken from the 1981, 1984, 1987, and 1990 Current Population Surveys. This work adds to other knowledge of the migratory response of workers and sheds light on theories of substitution and complementarity in labor markets. States with high levels of recent immigration are less likely to retain Anglo workers or receive new Anglo interstate migrants, but this apparent substitution effect is partially offset by the presence of long-term immigrant stock. Lower skilled Anglos are more susceptible to this substitution effect than those of higher skill level. In the black population, results are more complex. Lower skilled blacks are less attracted to high immigrant locations, but African-Americans of higher skill level in selected occupations and industries are predicted to be more likely to remain in or choose states with many recent immigrants.

Key words: Labor migration, Immigrants, Spatial distribution, Population policy, Ethnic groups

Introduction

The *New York Times* on 27 June 1993 reported on page 1 the results of a survey with the headline, 'Poll Finds Tide of Immigration Brings Hostility'. To be sure recent years have seen a large upturn in the amount of immigration to the USA. This absolute increase in numbers has been accompanied by a shift in the country of origin of immigrants (toward Asia and Latin America and away from Europe) and an apparent rise in the number and proportion of such immigrants who are undocumented. The June 1993 poll reported in the newspaper indicated that 61% of American adults believed that immigration should be decreased, compared to only a 33% figure in 1965, the year of the removal of the national origin quota system.

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Economic issues figure prominently in American attitudes toward immigration. The article mentioned above cites the sluggish economy as a possible reason for the lowered receptivity to immigrants. Over one-third of respondents said that they believed immigrants, 'take jobs away from American citizens'. A recent study finds that public sentiment against immigration tracks closely with national unemployment rate (Espenshade & Hempstead, 1996). Still, more than half agreed with the statement that immigrants 'mostly take jobs that Americans don't want' (*New York Times* 27 June 1993; pp. 1, 16). Clearly, perceptions of the economic impact of immigrants will feed into opinion (and likely policy) about how wide to open the doors to the USA; and clearly, too, public opinion is somewhat divided about the degree of labor competition between immigrants and natives.

The visibility of this debate continues to rise. Brimelow's recent tract argued that many of the consequences of immigration were negative for the USA (Brimelow 1995). In the *New York Times Sunday Magazine*, Frey has argued that the arrival of immigrants may be associated with the departure of natives in US metropolitan areas (Frey 1996a). Frey even uses the phrase 'demographic Balkanization' to label the implications of these and other demographic shifts (Frey 1995a, b). To be sure, concern about displacement and long-term consequences of substantial immigration is high.

We can associate with each of these economic opinions a theoretical argument about labor market competition. On one side immigrants 'take jobs away'. This is the *substitution* hypothesis, in which immigrants offer similar skills as natives. Immigrants, then compete directly with natives, and this direct competition is expected to lower the economic returns of natives. Such lowered market outcomes would be visible in lower wages, unemployment, or displacement out of the labor market. The immigrant physician or farm-worker who (allegedly) replaces a native-born employee presents such a case. The alternative view that immigrants 'mostly take jobs that Americans don't want' is roughly consonant with the labor market *complementarity* hypothesis. Complementarity is actually more general. In this case immigrants do not possess directly competitive skills, rather complementary immigrants bring unique skills or occupy niches that native-born workers avoid. Under the complementarity scenario, immigrants can actually raise the productivity of other workers. Higher productivity for complementary native-born workers could be expected to raise wages and decrease unemployment, just the opposite of the substitution hypothesis. The immigrant domestic worker is an oft-cited example of such a case.

These two poles, *substitution and complementarity*, frame our analysis. Both are plausible from the point of economic theory (Friedberg & Hunt 1995). Both hypotheses argue that one wants to examine not only general

labor market competition between natives and immigrants, but also sector-specific effects. Both hypotheses suggest that effects are more likely to be visible in certain occupations and industries, in which immigrant provide the substitute or complementary labor. While specific cases can be cited (as above) in which one would expect complementarity or substitution to operate, the overall balance between these two forces remains unclear. Relatedly, the quantitative effect within sectors is also extremely desirable information for policy.

Several mechanisms might operate as labor markets adjust to the presence of immigrants. When substitution is operating native workers might experience longer unemployment durations or lower wages. Secondly, substitute workers might move out of the occupations and industries which are most favored (and hence competitive) with immigrant labor. Thirdly, native workers might depart the local labor market altogether, seeking their fortune elsewhere. For workers whose skills are complementary with immigrant labor, the opposite effects might be observed. With all three kinds of effects operating, each perhaps in two directions, and immigrants still accounting for only a small share of workers in most labor markets, the prospect of empirically identifying such effects can be daunting.

This paper focuses on the third effect, interregional migration, for two reasons. First, the growing body of research literature on labor market effects of immigration has concentrated on wage and employment effects, with less attention to intersectoral job mobility and interregional migration. Also, migration might be a particularly informative place to look for labor market effects because of some of its social features. Econometric studies have shown not only that immigrants clearly compete with other immigrants in local labor markets but also that local economies can benefit from the presence of large numbers and high concentrations of immigrants (Butcher & Card 1991; LaLonde & Topel 1991; Enchautegui 1993).

Chain migration and immigrant networks in the social process of international migration (Massey 1990), would tend to initially create high immigrant concentrations. Social capital – cultural familiarity, language affinity, job networks, and the like – would tend to sustain such concentrations. Newcomers especially stand to benefit from these local features of the social structure. The benefits would in turn, tend to offset the local competitive pressure. In more concrete terms the Mexican rural immigrant to Los Angeles has support mechanisms available in that city (Spanish language media, job networks, sojourners from the same origin village or region, etc.) that are neither as decisive nor as geographically limited for the native worker. Thus, newcomers may trade some employment disadvantage, e.g. lower wages, to gain the advantages that inhere in residing where many fellow immigrants also reside.

For natives the picture is different. Although natives may have many local ties that bind them to a particular metropolis, their job hunting prospects in other regions should be better than those of immigrants. The native worker who is (or might be) deleteriously affected by immigrants' presence would be more likely to move out of (less likely to move into) high immigrant regions.

In sum, since labor is mobile, we would expect *migration* to also occur as markets adjust. Where substitution (complementarity) dominates native workers are expected to be more (less) likely to leave regions with high concentrations of immigrants. Also where substitution (complementarity) dominates native workers are expected to be less (more) likely to migrate to regions with high concentrations of immigrants.

Wage and employment studies are now too numerous to review in detail, but the chronology of their findings is of note. Studies conducted in the 1980s (e.g., Grossman 1982; Borjas & Tienda 1987; Muller & Espenshade 1985; Bean, Lowell & Taylor 1988) generally found only modest effects of immigrant presence on native workers. Many such studies worked with more aggregate data. More recent studies tend to focus on population subgroups, industrial sectors or use alternative methods. Often these revisions fail to turn up much evidence of negative impacts on natives' employment and wages (Greenwood & Hunt 1995; Enchautegui 1995).

The National Bureau of Economic Research sponsored a series of studies on the topic. For example, LaLonde and Topel examined effects on two US groups most likely to be negatively effected by immigrant competition. They found that a ten percent increase in immigration is associated with a 0.6% decline in black male earnings and a 0.15% decline in Hispanic male earnings (LaLonde & Topel 1991). The overall effects were modest enough that co-editors of a National Bureau of Economic Research volume could write in 1991, 'the broad implication is that immigrants have been absorbed into the American labor market with little adverse effect on natives' (Abowd & Freeman 1991). More recent work does not always offer such a benign assessment, however. In the successor to the Abowd and Freeman NBER volume, co-editors Freeman and Borjas are more circumspect, and even suggest in their overview, 'the effect of immigration on the earnings and employment opportunities of native-born workers is much greater than was reported in the first NBER volume' (Borjas & Freeman 1992: 6).

In the second volume Borjas, Freeman, and Katz argue that about half the 10 percentage point decline in the relative weekly wage of American workers without a high school degree may be attributable to the *combined* effect of international trade (which effectively increases the 'supply' of less skilled, overseas workers) and immigration (Borjas, Freeman & Katz 1992). A recent review of analyses of more localized influences of immigrants on labor mar-

kets finds sharper effects, both positive and negative (Tienda & Liang 1994). They identified several studies which argued that immigrant social and economic organization opened up job opportunities, included opportunities for native-born minorities. They also cite micro-level evidence from Chicago neighborhood studies that suggest that Mexican immigrants experience superior employment outcomes than similarly situated blacks.

One recent review in the economics literature concludes, 'empirical estimates in a variety of settings using a variety of approaches have shown that the effect of immigration on the labor market outcomes of natives is small' (Friedberg & Hunt 1995). Another recent review echos the sentiment (Schultz 1995). Friedberg and Hunt state that effects may depend crucially on the human capital immigrants possess. This suggests that efforts to control for skill level, as we do here, will be a useful advance.

Studies of the impact of immigration on native *geographic mobility* are more limited, and we review a few of them here. One of the earliest examinations of the impact of immigration looked at the Southern California economy. No adverse effects of immigration were found on unemployment or occupational attainment, even among blacks who were seen as most likely to suffer. Analysis of migration patterns suggests, however, that a 'major alteration' may have taken place, with lower skilled workers departing and young, skilled workers arriving (Manson, Espenshade & Muller 1985; 32]. Altonji and Card suggest that lower skilled native workers did depart from employment in those local industries receiving large numbers of immigrant workers (Altonji & Card 1991). They can not discern in their analysis whether such departures are intersectoral shifts (the second adjustment mechanisms discussed above) or interregional migration (the third mechanism and the one of interest to us here). Disentangling the direction of causation from correlations of migratory flows can be quite difficult, however (Mueser & White 1989).

Filer did uncover some substitution effects seen through migration. He found a correlation of -0.21 ($p < 0.001$) in the native metropolitan area net migration rate, and the lagged immigrant migration rate. In a multivariate analysis of over 200 metropolitan areas using cross-sectional census data, he finds that an increase of 1 percent in an areas labor force attributable to immigration predicts a decrease of 1.2 percent in the net native migration to that location (Filer 1992: 261). Multivariate results are not developed by sector of employment or demographic subgroups of the native population. Still, Filer's results are suggestive of the effects that might be found.

Walker, Ellis, and Barff find that the larger the number of recent immigrants in a metropolis, the smaller the net migration of blue collar workers for the corresponding period (marginally significant at the 0.05 level). Conversely they find that the larger the number of immigrants, the *larger* the net migra-

tion of professional and managerial workers (Walker, Ellis & Barff 1992). Other work with aggregated data, comparing SMSA-level immigration and outmigration flows between 1970 and 1980 found little effect of immigrant presence on native migration (White & Imai 1994).

In a series of papers Frey has explored the pattern of the population flows across US regions, states, and metropolitan areas. Frey examines particularly the balance between the patterns of movement of immigrants and natives (Frey 1995a, b). He finds, for instance, that several large metropolitan areas have been experiencing large inflows of immigrants, while also experiencing net outflows of internal migrants (Frey 1996b). In statistical analyses he finds that this impact appears to be larger upon the less educated and lower income populations than on those with at least a college degree (Frey 1995a, c).

This work, and the continuing debate that revolves around the issue itself, suggests that further analysis of the labor mobility of natives as a response to immigration is valuable. To be sure one needs to study geographic mobility and wages in tandem. Also emerging from this review of both employment and mobility studies is the suggestion that gross effects may be modest, but for particular sub-sectors of the economy the impact of immigration could be notable. The work we undertake in this paper will build on this prior work; we also seek to improve upon it by examining several successive cross-sections with Current Population Survey data. By using single year mobility rates, in contrast to the five-year mobility rates of the decennial census, we may be better able to capture short-term adjustments. We also include in our models measures of both immigrant stock before the decade of interest and relative immigrant impact during the decade, indicating in turn long and short term influences on internal migration.

Our hypotheses are straightforward, and can be seen in terms of the derived demand for labor working through migration (White 1977). An influx of *substitute* workers will shift out the supply curve. On the one hand, this could drive down the wage of the potential substitute native workers. On the other hand, the competition could induce outmigration (lower inmigration). Conversely, an influx of workers whose skills are *complementary* to those already in the labor market (e.g. native workers) may increase their wage, or induce inmigration (lower outmigration). These are precisely the phenomena we seek to detect. Such substitution effects will be more visible the more narrowly focused the labor market competition.

We argue further that social capital is likely to vary more by geography for immigrants than for natives. On the one hand, these social resources help support the cumulative causation mechanism for immigrants from less to more developed regions (Massey 1990). On the other hand, the native workers' wider set of options in other locations will promote mobility.

The decade of the 1980s is a particularly useful time to take up this question. The decade produced a near-record level of documented immigration (7.4 million, including refugees and the legalizing 'amnesty' population), which was accompanied by a large amount of undocumented immigration. In 1986 the USA enacted the Immigration Reform and Control Act (IRCA), offering the opportunity for certain undocumented migrants to regularize their status. Over 3 million persons applied and many now have passed through the process to legal residence (Bean, Keely & Vernez 1990). IRCA offered many lower wage, lower skill workers a more secure footing in the US labor market. Since the pace of legal immigration, undocumented immigration, and legalization is quite high for the 1980s, data from the decade may offer more opportunity to detect immigration effect or demonstrate the lack of any real competitive effect within the American economy.

Model, data and methods

We examine interstate migration with pooled cross-sectional data for the 1980s. We analyze in separate models in-migration and out-migration as a function of state and individual characteristics. First, we predict the probability that a worker will leave his or her state of residence during a one-year interval. Second, we examine the probability a migrant will choose (in the same one-year interval) a particular state. Included among the state characteristics are the concentration of foreign born as of 1980 and the number of recent immigrants to the state.

Our individual level data are taken from March Current Population Survey (CPS) of 1981, 1984, 1987, and 1990, collected and released by the US Bureau of the Census. The March round of the CPS in each of these years asked place of residence one year ago, and from this response migration can then be coded. Our outmigration analysis includes data from only 1984, 1987, and 1989. While interstate migrants are known in the 1981 CPS, 1980 state of residence is not recorded in the public release file, so that it is not possible to code the characteristics of the state of origin to the record of the individual person. The in-migration, or 'destination-choice' model uses all four samples.

The outmigration sample includes persons who were resident of the USA (one of the 50 states or the District of Columbia) in the year prior to the CPS. We limit our sample to individuals in the prime labor force years, ages 25–64 in the year of the survey. Unfortunately the March samples of the CPS (which gather migration information) do *not* ask nativity or citizenship status in these years. Thus, we are forced to provide a proxy population. We estimate our models for the Non-Hispanic white (Anglo) and black populations. The 1980 census and more recent survey data indicate that less than five percent of

Anglos and blacks were foreign born (Farley & Allen 1987). For completeness we estimate a model for the total population, but this of course has problem of the part-whole comparison, since it includes the immigrants, particularly Asian and Hispanic recent immigrants. The part-whole problem is presumably exacerbated by the fact that immigrants are disproportionately represented in some states and therefore weigh more into statewide characteristics. Recent survey data (1994 CPS) indicate that in California and Florida only about seven or eight percent of non-Hispanic whites and blacks are immigrants; in New York state the figure is thirteen percent. This could have a modest effect on our state-level measure, but the overall effect on our national coefficients should be quite small.

To make more efficient use of the data for estimation, the analysis uses 100% of the interstate migrants, and a 5% subsample of the remainder of the population (nonmovers and movers within the state). Appropriate weights are calculated and Huber standard errors are employed in the estimation itself. These alternative standard errors are more robust. They are more appropriate when standard assumptions do not apply strictly, such as the clustered (repli-cated) observations we employ in the destination choice model (Huber 1967). It has been argued that Huber's procedure is an analog to the bootstrap. The destination choice sample includes only those who made interstate moves over the year. This is a much smaller subsample and, of course, makes the analysis conditional on the event of interstate migration.

To the microdata we append information on the state of origin (or potential destination), and thereby create a contextual file. These contextual data come from the 1980 Census, the State and Metropolitan Area Data Book, and Immi-gration and Naturalization Service (INS) Statistical Yearbooks. Each datum is attached to the individual record according to the state geographic code. In many respects metropolitan areas would provide the preferable geography for such a study (White & Hunter 1993), but very few Metropolitan Statistical Areas (MSAs) are identified in the CPS. For this reason we have elected to use the state. All states are identified. Thus, our data are geographically com-prehensive, but do not represent distinct local labor markets. Earlier labor mobility research has used state-level data with success (Long 1988), and also suggests that the state provides a meaningful migration-defining bound-ary (White & Mueser 1989). Because immigrants have been concentrated into selected destinations, we also observe appreciable variation in the stock and recent flow of immigrants to states.

The use of demographic subgroups and state-level geography are compro-mises we accept in order to gain the advantage of having several observations within the decade and a shorter migration interval, which itself may be more sensitive to the labor market shifts induced by immigration. The CPS data are

also particularly advantaged in that they allow us to examine a wider range of employment characteristics, particularly employment history over the past few years. The CPS has an additional advantage in that it is based on a direct interview vs the census self-report. Direct interviews and the attention paid to original sampling and follow- up would be expected to result in more accurate information. There is, of course, the possibility that the presence of US government (Census Bureau) workers would produce less accurate information than an anonymous questionnaire, but we are unaware of any evidence on this point with respect to the issues we study here.

Outmigration analysis. We predict departure of Anglo, black (and total) residents from a state in the intervals 1983–84, 1986–87, and 1989–90, as a function of a set of individual and state-level characteristics. Characteristics of the individual include age (and age-squared), education (measured a highest grade attained), marital status (dummy variable for currently married vs not), sex (dummy for male), and several measures of personal economic activity. We include dummy variables for unemployed now, whether a currently unemployed person worked (a) during the past year, (b) 1–2 years ago, (c) 2–3 years ago, and (d) 3–4 years ago. We code selected occupation of the individual, including professional, service worker, and machine operative. We code also selected industry with a set of dummy variables including extractive (mostly agriculture), manufacturing, and finance. Table 1 contains means and standard deviations of the variables used. These were current industry and occupation as reported in the CPS, and we must recognize, that as with other survey-based data, they could change over time. Since the migration interval in the CPS is only one year, this is less of a problem than it is in other data, such as the census. Because of the closer temporal proximity we should be able to more accurately capture any sector-specific labor market response that exists. In census data the longer time lag may mistakenly miss job (and related residence) changes that results from labor market substitution or complementarity.

We examine both industry and occupation because of the nature of the discussion surrounding the impact of immigrants on the economy. Industrial category records the kind of activity of the establishment for which the person works, while occupation captures the individuals skills and tasks. Some discussions about the effect of immigrants emphasize industry; some emphasize occupation. Since industry and occupation are sometimes correlated for certain cases, one must make judicious selections of which traits to include. Our choices reflect some initial experimentation with a larger set of industry and occupation categories. Industry and occupation dummy variables were identified with reference to two digit 'Major occupation' (01–14) and 'Major

Table 1. Mean and standard deviation of independent variables, state outmigration

Variables	Mean	sd
Individual characteristics		
Age	39.665	11.213
Age squared	1699.023	968.486
Male	0.478	0.499
Married	0.687	0.464
Years of schooling	13.149	2.931
Work now	0.708	0.455
Unemployed	0.057	0.232
– worked during the last year	0.014	0.117
– worked 1–2 years ago	0.007	0.085
– worked 2–3 years ago	0.008	0.092
– worked 3–4 years ago	0.027	0.161
Extractive industry	0.022	0.146
Manufacturing industry	0.083	0.276
Finance industry	0.056	0.224
Professional occupation	0.261	0.439
Service occupation	0.083	0.276
Machine operator occupation	0.030	0.173
State level characteristics		
Population (millions)	0.884	7.699
Land area (million sq. miles)	0.080	0.831
Unemployment rate (%)	7.179	2.534
Manufacturing (proportion of workers)	0.163	0.056
Service (proportion of workers)	0.214	0.065
Finance (proportion of workers)	0.056	0.016
Foreign born (proportion of population)	0.060	0.045
Recent immigrants (proportion of population)	0.003	0.003
N	18194	

industry' (01–14) recodes identified by the CPS. We also tried to choose classifications to maintain consistency across different sample years.

We include contextual variables, chosen to indicate economic-base and patterns of immigration to each state. Models include total 1980 state population and land area. To give an indication of the economic base of the state we include proportion of workers employed in manufacturing, service, and financial industries. We also include the unemployment rate of the state in the year prior to the survey. The outmigration models also include period effects (dummy variable for 1987 and 1990).

To capture the effects of immigrant presence on internal migration of natives, we include both a long-term and a short term measure. This is also an advance over most prior work, which tends to include either a stock or recent flow measure. Arguments exist that suggest the influence of each. We include the proportion foreign born in the state as of 1980. This item should help give an indication of the 'immigrant' character of the labor market in the state. The labor market is likely to have adjusted, however, to the accumulated history of immigration. Thus, we include a more direct measure of the competitive population, the ratio of recent immigrants to the population of the state, as follows:

$$\frac{R_{jt}}{P_{jt}} \tag{1}$$

where R_j is the number of immigrants intending to reside in state j for year t and P_j is the population of the state in year t. The numerator comes from the INS statistical yearbook. The preferred measure would be lagged to a year before the CPS. We did this, save that the residence datum was not available for 1981, so we substituted the 1983 figure. Population figures for year t are estimated from linear interpolation from census years. We recognize that INS data record only documented migration and that 'intended' state of residence is not always actual state of residence; still, this statistic would be very highly correlated with the flow of actual residents into the various states. Our hope is that these two items (stock and flow) will complement one another.

We enter several interaction terms between state recent immigration flow and the labor force niche of the person. They measure the degree to which persons in certain occupational and industrial categories are more or less likely to leave the state, given its level of immigration. For example, if substitution operates for low-skilled individuals, we would expect a positive coefficient on the interaction between immigration and machine operatives. Conversely complementary occupations and industries would be indicated by a negative sign on the interaction. This is admittedly an aggregated group, but it does enable us to examine the overall patterns of employment substitution and complementarity. In this way our work is parallel to other studies of labor market competition.

We use a simple logit model to predict the probability of interstate migration for the individual. As such, our dichotomous dependent variable represents the log-odds of an individual being an outmigrant from a particular state.

$$\log\left[\frac{p_j}{1 - p_j}\right] = \beta_0 + \beta_1 X_{1j} + \beta_2 X_{2j} + \beta_3 X_{3j} + \cdots + \epsilon_j \tag{2}$$

Here the X vector contains measures of individual traits, state characteristics, and interactions between the two. Preliminary analyses tested for

the importance of a wider range of personal, occupational, and industrial characteristics. We retained only those occupational and industrial character- istics that were significant predictors of mobility in these initial outmigration equations. We estimate successive hierarchical models.

In-migration analysis. The inmigration analysis proceeds in parallel fashion. Our sample is limited to interstate migrants in 1980–81, 1983–84, 1986–87, and 1989–90. Again these individuals are ages 25–64 (in corresponding CPS year) and we conduct analyses separately for Anglos, blacks, and the total population.

We model destination choice. Conditional logit models treat the choice among alternatives as a function of the characteristics of those alternatives. Consequently we wish to include among the predictor the *set of character- istics of alternative destinations*. The contextual information is matched to the destination (state) chosen *and* a set of competing alternatives. The idea is that once the individual has elected to move, he or she can choose from all the remaining states for a destination. These states form a set of discrete choices. More concretely, the migrant who is leaving New York can choose California, Georgia, Illinois, or any one of the other states. Under our model, the characteristics of the potential destinations (including immigrant concen- tration and recent arrivals) feed into this decision. We estimate a conditional logit model:

$$P_{ij} = \frac{e^{X\beta}}{\sum_{j=1}^{N} e^{X\beta}} \qquad (3)$$

as such, the probability of the choice of location j by person i depends on the characteristics of the outcomes. In a mixed model, such as ours, P_{ij} may also depend on individual traits (Hoffman & Duncan 1988). This destination choice model has an aggregate analog in the destination selection propensity measure used by Frey and others (see, e.g., Frey & Speare 1988).

We also engage in *sampling from the choice set* (Ben-Akiva & Lerman 1985). This is a simple way to maintain the model of discrete choices (of state destinations) without becoming overwhelmed with data. Consider a migrant. He or she has 50 potential destinations from which to choose: all states (and DC) outside the one the migrant is leaving. By hypothesis the actual choice is a function of the characteristics of all of these alternatives, including the economic base, employment conditions, and presence of immigrants in the competing destinations. A full specification would argue for the inclusion of all potential destinations and their characteristics for *each* observation, thereby requiring us to replicate the number of records in the data forty-nine- fold. Instead we take a *random* subsample of all the alternative (not chosen)

destinations. We must include the actual destination state and so 'sample' it with probability one. We take a 15% random sample of the remaining potential destinations.

All this requires some careful data manipulation. For an individual *person*, the data set has multiple records formed as follows.
- The state of origin (say New York) is excluded
- The state of destination (say Georgia) is included
- A 15% random sample of records from the remaining states is included (CA, MO, ND, VA, etc.)

One *must* include the actual destination within the alternative set, since this choice carries unique information about the actual behavior of the migrant. The other 49 locations stand in parallel – potential destinations not chosen – and so provide similar information. This structure allows us to efficiently incorporate information and avoid bias. For these a random subsample can suffice, under the same logic that enables us to draw a sample from the population. An indicator variable tells which destination was actually selected by the migrant. We carried out the analysis in STATA.

The standard conditional logit model produces one vector of coefficients, in contrast the multinomial logit model, which produces a vector of coefficients for each alternative less one. It is possible to mix these two models (Hoffman & Duncan 1988). Our approach has been to include two sets of covariates: (1) measures of the states themselves, and (2) interactions between the personal characteristics of the migrant and recent immigration for the state. Since both of these measures are actually aggregate-level covariates, we still retrieve only one vector of coefficients which describes the probability of choosing a location as a function of its characteristics. The interaction term provides the further interpretation of how the probability of choice (for that trait) differs with individual characteristics. In this sense the interaction term make this a mixed model.

Most covariates are the same as used in the outmigration model. The state-level characteristics include population, land area, economic base (number of workers in manufacturing, service, finance), unemployment rate (%) in the year preceding the CPS, immigrant proportion in 1980, and recent immigrant proportion. Individual characteristics (all expressed as interactions with recent immigration) include age, education, sex (dummy for male), industry (dummy for extractive, manufacturing, and finance) and occupation (professional, service, machine operative). Again we include dummy variables for period, interacted with recent immigration for the state.

We did explore several other models with different sets of covariates. As with the outmigration model, we tested other occupation and industry categories, but they added little information. Most importantly, we did examine conditional logit models in which a dummy variable for selected states

and individual characteristics of age and education were entered. But these involved the estimation of many parameters, and somewhat arbitrary choices about which states would be identified explicitly with e dummy variables, we opted for the more parsimonious model we present here. More details about the alternative estimation strategies are available from the authors.

Results

Outmigration. Our results for the analysis of the determinants of state out-migration are contained in Table 2. Where significant we can see that most results tend to be consistent for Anglos and blacks, and hence for the total population. Among individual characteristics, we find coefficients that con-firm what many micro-level studies of the determinants of interstate migration have found (Long 1988). Age reduces the propensity to migrate, although its effect declines as the individual grows older. The married are less likely to move. This is appreciably so and significant among Anglos and not significant among blacks. Persons who report that they are working at the time of the survey are much less likely to be migrants. The currently unemployed are much more likely to be migrants, particularly those individuals who worked within the last year. (These coefficients are not significant for blacks, but they are similar in size.) The long term unemployed are less likely to be migrants. Males and the more highly educated are more likely to be migrants.

We find selected effects of occupation and industry of the individual, skip-ping for a moment the state characteristics. Anglo workers in extractive industries are significantly less likely to depart the state; and manufacturing workers are slightly less likely to migrate ($p = 0.063$). Black manufacturing workers are much less likely to depart; extractive workers are more likely and finance workers less likely ($p = 0.075$) to move, but neither of these two effects is significant. The influence of occupation on migratory behavior comes through more strongly as would be expected. Anglo and black pro-fessionals are considerably more migratory than other workers. Interestingly, the less skilled service workers and machine operatives are significantly less migratory among whites, but more migratory among blacks. The inclusion of these occupational and industrial dummy variables is an attempt to control for the general labor market circumstances, such as the degree to which workers are tied into contracts or participate in national labor markets.

We now turn to the effect of state characteristics on retaining residents. Our results are roughly consistent with standard gravity models, which take population flows between regions to be a function of population size and land area at the origin and destination. We find that more populous states produce more migrants, and states with larger land area retain more of their

residents (results hold for Anglos only). States with high unemployment rates have *lower* outmigration rates, once characteristics of individuals (including their personal employment condition) are controlled. Economic base is also related to migration, with movers less likely from state with concentrations of manufacturing, service, and finance activities. (For the black sample, state concentration in finance predicts *more* migration.)

The state foreign born stock in 1980 is a strong predictor of migratory behavior in this model, which controls all other personal and state character- istics. In the Anglo sample an increase of 0.01 in the foreign born fraction (e.g. from the mean of 0.06 foreign born to 0.07) predicts a *decline* in the log odds of outmigration by 0.059 units. In the black sample the effect is slightly weaker (and not statistically significant), with the same change predicting a decline in the log odds of 0.043 units. It is worth recalling that this is the cumulative immigrant population of the state as of the time immediately prior to the four waves of the CPS used here.

The recent immigrant ratio in the equation is designed to measure more directly the labor market competition between current residents and new immigrants. For Anglos this coefficient is positive and highly significant. Each 0.001 unit increase in the fraction of new immigrants to the state pre- dicts an increase in the log-odds of departure of 0.076; among blacks the effect is not statistically significant and is smaller in magnitude. Since both recent immigrant ratio and cumulative foreign born proportion are positively correlated ($0.82 < r < 0.94$ across the three time points), it is important to consider these results in tandem. The scale of the mean of recent immigrant proportion is about 1/20th that of the foreign born stock. Effects would tend to offset one another. There is always concern that these immigrant stock and recent flow variable are correlated with other state traits, particularly econom- ic characteristics that are driving the flow. We cannot completely disentangle these effects, but our inclusion of a series of state economic characteristics and exploration of alternative models buttresses the present interpretation. States with a substantial stock of immigrants that have experienced some slowdown in the flow of new arrivals are places that are more likely to retain their current residents.

The final group of variables are interactions between the occupation and industry dummies and the recent immigrant ratio. These interaction terms test whether individuals in certain occupations and industries are more likely to depart from states where recent immigration has been heavy. Results in Table 2 reveal differing effects for Anglos and blacks. Anglo workers in extractive industries (predominantly farming) and machine operatives were significantly more likely to depart states receiving many recent immigrants. These represent two labor force niches thought to be most likely to experience

Table 2. Logit regression results predicting individual interstate out-migration from personal and state-level characteristics

Variables	Total	Anglo	Black
Individual characteristics			
Age	−0.112**	−0.109**	−0.162**
	(0.012)	(0.014)	(0.050)
Age squared	0.000**	0.000**	0.01*
	(0.000)	(0.000)	(0.000)
Married	−0.137[88]	−0.174**	−0.062
	(0.036)	(0.042)	(0.141)
Work now	−0.576**	−0.611**	−0.606**
	(0.051)	(0.059)	(0.197)
Unemployed	0.304**	0.353**	0.291
	(0.081)	(0.098)	(0.248)
Work during the last year	0.409**	0.480**	0.430
	0..49	(0.170)	(0.562)
Worked 1–2 years ago	0.251	0.212	−0.243
	(0.199)	(0.214)	(0.869)
Worked 2–3 years ago	0.134	0.250	−0.432
	(0.181)	(0.207)	(0.729)
Worked 3–4 years ago	−0.370**	−0.309*	−0.657
	(0.113)	(0.128)	(0.468)
Male	0.196**	0.196**	0.205
	(0.036)	(0.040)	(0.140)
Years of schooling	0.103**	0.091**	0.061*
	(0.007)	(0.009)	(0.027)
State characteristics			
Population (millions)	0.023**	0.021**	−0.021
	(0.004)	(0.005)	(0.021)
Land area (million sq. miles)	−0.829**	−0.021**	0.228
	(0.245)	(0.005)	(1.28)
Unemployment rate (%)	−0.028**	−0.021*	−0.121**
	(0.008)	(0.009)	(0.033)
Manufacturing	−2.44**	−2.44**	−4.368**
(proportion of workers)	(0.374)	(0.411)	(1.601)
Service	−1.597**	−1.014*	−4.080**
(proportion of workers)	(0.345)	(0.452)	(1.119)
Finance	−0.0004**	−4.405*	13.528*
(proportion of workers)	(0.0003)	(1.811)	(6.903)
Foreign born	−5.795**	−5.900**	−4.330
(proportion of population)	(0.891)	(1.059)	(3.433)
Recent immigrants	30.994*	75.885**	27.283
(proportion of population)	(13.640)	(16.855)	(51.990)

Table 2 (continued)

Variables	Total	Anglo	Black
Individual industry			
Extractive	−0.437**	−0.645**	0.609
	(0.142)	(0.167)	(1.621)
Manufacturing	−0.189*	−0.165	−1.232**
	(0.081)	(0.089)	(0.3318)
Finance	0.102	0.170	−0.619
	(0.107)	(0.122)	(0.348)
Individual occupation			
Professional	0.161***	0.218**	0.601*
	(0.057)	(0.062)	(0.270)
Service	0.358***	−0.360**	0.884**
	(0.083)	(0.096)	(0.287)
Machine operators	−0.180	−0.374*	0.606
	(0.0008)	(0.153)	(0.416)
(Proportion of recent immigrants) – Industry			
Extractive	56.97	105.109*	−120.591
	(28.59)	(52.712)	(504.830)
Manufacturing	−10.088	1.030	232.123*
	(17.331)	(20.833)	(97.593)
Finance	16.045	38.211	−126.141
	(16.045)	(309.34)	(69.98)
Proportion of recent immigrants) – Occupation			
Professional	10.757	−18.037	−3.760
	(11.912)	(13.819)	(56.292)
Service	−34.445	−27.236	−59.006
	(17.951)	(24.173)	(63.535)
Machine operators	30.319	114.139**	117.002
	(29.903)	42.282	(96.003)
Time period			
CPS 1987	−1.312*	−1.570*	−1.081
	(0.605)	(0.709)	(2.412)
CPS 1990	−0.857	−1.911*	−1.226
	(0.775)	(0.914)	(2.866)
Intercept	−0.746*	−0.671	1.544
	(0.296)	(0.336)	1.954
N	18194	14301	1451
Log likelihood	−2340.4718	−1946.1642	147.65038
Pseudo R^2	0.0449	0.0464	0.0763

* $p < 0.05$; ** $p < 0.01$.
Figures between parentheses: standard error.

substitution. Anglo workers in manufacturing and finance are only slightly more likely to depart (coefficients not significant), while Anglo workers in service and professional occupations are somewhat less likely to migrate out of the state.

In the black sample we find only one significant coefficient among the six interaction terms. Non-Hispanic black workers in manufacturing occupations are much more likely to leave states with a large immigrant influx.

The pooled equations include not only these two samples of Anglos and blacks but also members of all other ethnic groups in the 25–64 age range. These pooled results tend to track the results of the Anglo population (who compose about three quarters of the pooled sample), although effects are understandably weaker for coefficients in which blacks and Anglos differ. There is some indication that net of all the other effects in the equations workers are less migratory in recent time periods.

Destination choice: In-migration.   The conditional logit model developed here contains measures of the state economy and immigrant presence. These measure the change in the log-odds of a sample member choosing a state, per unit change in that (any) state's value on the characteristic. The model also contains a set of interaction terms between individual traits and the number of recently arrived immigrants. These are best interpreted as the change in the log-odds of selecting a state as a function of both immigration and individual traits. For example a negative coefficient on age means that older individuals are less likely to choose a destination state with a large concentration of recent immigrants. Generally, negative coefficients indicate that immigrants dissuade interstate migrants from choosing the state.

Table 3 contains the coefficient values for the full model. State characteristics are very strongly predictive of the destination choices of Anglo migrants, and only slightly less predictive of blacks' choices. Interstate migrants are more likely to relocate to populous and geographically more extensive states, as the gravity model and previous work on migration would expect. Anglo migrants are less likely to choose states with a heavy manufacturing or finance base in the 1980s, but this does not hold for blacks. Both groups of migrants are more likely to choose states with a strong presence in the service sector. Higher state unemployment rates deter migrants.

In results that parallel the outmigration analysis, we find that Anglo interstate migrants are much more likely to choose states with a relatively large 1980 stock of foreign born persons. A one percentage point increase in the foreign born stock immigrant concentration is associated with about a 0.067 unit increment in the log-odds of an Anglo choosing that destination. For blacks this coefficient is of opposite sign and not significant.

A large influx of recent immigrants to the state deters interstate migrants, but this effect is only significant for Anglos. In fact the scale of this effect is over twice that of the corresponding coefficient in the outmigration equation discussed earlier. While this coefficient is not statistically significant for blacks, its magnitude is also greater in this equation. The pooled version of the equation contains statistically significant results of slightly smaller magnitude for these two variables.

Few interaction terms (between recent immigrant ratio and individual traits) are statistically significant. Among black interstate migrants none of these interactions are statistically significant at the five percent level, although the suggestion is that extractive and service workers are less likely to choose high immigrant states, while finance workers, professionals, and operatives are more likely to do so. Within the Anglo sample we do find that the more educated are significantly more likely to choose states with a high immigrant ratio, lending support to the complementarity hypothesis. Anglo manufacturing workers and operatives ($p = 0.111$) are less likely to choose such destinations, a result consistent with labor market substitution. Period dummy variables are not significant in these equations.

Discussion and conclusion

Our objective has been to examine the issue of labor force competition of immigrants and natives. Two competing hypotheses exist. First is that immigrants 'take away jobs' and hence are substitutes for native labor. Second is that immigrants 'take jobs that others do not want' and so are complements to native labor. We examine this issue through the lens of internal migration. This strategy is designed to not only complement (and perhaps corroborate) studies of wage and employment outcomes, but also be a bit more sensitive to the economic impacts of immigration.

We develop a pair of models. Our outmigration analysis uses a simple binary logit specification, and takes the individual's move to be a function of his or her individual traits, and those of the state of residence one year prior to the survey. The second analysis examines choices of destinations (states) among migrants. We employ a conditional logit model with sampling across the alternatives. This specification returns to us measures of the influence of state-level characteristics (including the presence of immigrants) and measures of how the recent immigration to the state changes the destination propensity according to characteristics of individuals and the immigrant concentration of the state.

Compared to other work in this area, our analysis has the advantage of using multiple cross-sections over a decade of substantial immigration with

Table 3. Conditional logit results predicting state in-migration from personal and state characteristics

Variables	Total	Anglo	Black
State characteristics (destinations)			
Population (millions)	0.054**	0.050**	0.097**
	(0.003)	(0.003)	(0.012)
Land area (million sq. miles)	1.615***	1.689**	1.042
	(0.135)	(0.139)	(0.671)
Manufacturing	−1.943**	−2.111**	0.635
	(0.232)	(0.238)	(0.973)
Service	1.099**	0.600**	3.789**
	(0.200)	(0.200)	(0.632)
Finance	−4.285*	−5.709**	8.119*
	(1.126)	(1.206)	(3.781)
Unemployment	−0.024**	−0.027**	−0.008
	(0.006)	(0.006)	(0.025)
Foreign born (proportion)	5.602**	6.739**	−3.611
	(0.675)	(0.707)	(2.610)
Proportion recent immigrants	−145.560**	−178.673**	−42.071
	(31.394)	(32.585)	(126.171)
Interaction terms: Proportion recent immigrants with individual characteristics			
Age	0.095	0.248	0.471
	(0.360)	(0.380)	(1.353)
Education	4.250*	5.331*	0.422
	(1.666)	(1.696)	(7.612)
Male	−7.768	−9.127	26.015
	(7.450)	(7.916)	(24.750)
Interactions: Proportion recent immigrants with industries			
Extractive	−8.416	1.974	−387.549
	(29.951)	(30.228)	(252.230)
Manufacturing	−31.419*	−31.307*	−13.920
	(15.175)	(15.741)	(69.476)
Finance	38.349**	36.581*	51.002
	(14.761)	(15.630)	(53.729)
Interactions: Proportion recent immigrants with occupations			
Professional	2.953	1.991	18.306
	(8.901)	(9.381)	(31.851)
Service	−17.446	−18.994	−34.960
	(13.885)	(15.266)	(33.917)
Machine operator	−27.878	−42.283	96.279
	(24.260)	(26.530)	(74.271)

Table 3 (continued)

Variables	Total	Anglo	Black
Interactions: Proportion recent immigrants with CPS year			
CPS 1984	0.022	0.070	1.807
	(0.546)	(0.565)	(2.312)
CPS 1987	−0.307	0.108	−3.795
	(0.534)	(0.555)	(2.169)
CPS 1990	0.439	0.942	03.122
	(0.614)	(0.634)	(2.618)
Intercept	−3.943**	−3.748**	−5.626**
	(0.073)	(0.076)	(0.303)
N	70907	65694	5213
Log likelihood	6730.5696	6230.7667	480.79747
Pseudo R^2	0.0165	0.0166	0.0521

* $p < 0.05$; ** $p < 0.01$.
Figures between parentheses: standard error.

a short migration time-interval. Although we have to organize samples by ethnic group (because we do not have direct measures of nativity), we do have the advantage of relatively detailed information about the labor force status of individuals. Our basic results for individual characteristics do tend to recapitulate those in the migration and labor mobility literature, so we do not dwell on them here.

Our results do not support the view of a simple substitution between immigrants and natives. Places with a relatively large stock of immigrants actually tend to retain natives, while places with large recent flows lose native residents and internal migrants. Since recent immigrants tend to pick locations that earlier immigrants chose, these conditions are inevitably correlated and tend to partially offset one another.

The calculation of predicted probabilities can give some indication of the influence of personal and state characteristics. We have calculated such probabilities, fixing for a hypothetical individual age 40, male, married, currently employed, in a state with characteristics at the mean for employment and economic base characteristics. To illustrate the differential effects of occupation and industry we calculate the outmigration probability for four hypothetical persons: (A) a 'reference' individual, a person with a high school education (about a year less than the sample mean) but not in any of the specific occupation or industrial categories we have identified in Tables 2 and 3, (B) a less skilled operative worker in manufacturing with 12 years of schooling, (C) a professional working in finance with 18 years of schooling, and (D) a service

worker in the finance industry with 14 years of schooling. Since we estimated separate equations for blacks and Anglos, and since results differ for several key coefficients, we calculate predicted probabilities separately as well. In each case we strongly vary the recent immigrant concentration (notably holding constant foreign born stock in 1980) from 0 to the mean (0.003) to the mean plus one standard deviation (0.006) to the maximum value of 0.016 attained in California.

Predicted probabilities are presented in Table 4. The reference Anglo individual shows an increasing propensity to leave the state as the recent immigrant ratio rises. The predicted outmigration probability at the maximum immigrant concentration is about three times the probability that obtains where there are no recent immigrants. This extreme example, while illustrative, is also artificial. Not only does it pit the extreme cases against the null case, it also does not incorporate any increased counter-effect through the coefficient on foreign born. A more realistic comparison is between a hypothetical state at the mean and one located one standard deviation above the mean in recent immigrant ratio. In this latter case the predicted outmigration rate for the reference category rises from 0.022 to only 0.028. Inmigration selection probability declines from 0.022 to 0.015. (We still are ignoring the likely countervailing effect of foreign born stock.) In the black sample the simulation exercise produces very modest effects. While recent immigration to the state promotes outmigration of the reference (black) individual, the two middle cases (mean vs mean ± sd) are virtually indistinguishable. In the *in*-migration case, and increasing immigrant ratio actually improves the chance that the destination will be selected.

Person B is the least skilled of the remaining three. In the Anglo simulation this individual is most sensitive to recent immigrant influx. Such a worker is ten times more likely to depart the state with the maximum immigrant ratio (outmigration $p = 0.178$) than a similar state with a mean level of recent immigration ($p = 0.018$). The inmigration probability of selected a high immigrant ratio state falls from 0.017 to 0.002 in the parallel contrast.

The hypothetical professional, C, is much less sensitive to such variation, although professionals are more mobile as an occupational group. At the mean the predicted outmigration probability for an Anglo professional is about four percent, and at an additional standard deviation it is about 5.6 percent. There is very little change in the destination selection (inmigration) probability near the mean. For black professionals the results are contrary to the substitution hypothesis: there is a substantial reduction in outmigration propensity (0.045 at the mean; 0.033 at mean + sd) with increasing immigrant concentration. Furthermore this apparently attractive effect of immigrants on black professionals apparently carries over to *in*-migration as well.

Table 4. Predicted probabilities of migration for persons with selected traits

Recent immig. ratio	Outmigration				In-migration			
	0	Mean	Mean + sd	Max	0	Mean	Mean + sd	Max
Anglo								
A	0.018	0.022	0.028	0.057	0.030	0.022	0.015	0.005
B	0.011	0.018	0.033	0.178	0.030	0.017	0.010	0.002
C	0.032	0.042	0.056	0.131	0.030	0.026	0.023	0.015
D	0.037	0.033	0.043	0.095	0.030	0.023	0.018	0.008
Black								
A	0.013	0.014	0.015	0.019	0.027	0.027	0.028	0.030
B	0.006	0.010	0.016	0.060	0.027	0.035	0.045	0.102
C	0.060	0.045	0.033	0.012	0.027	0.034	0.043	0.088
D	0.077	0.040	0.024	0.005	0.027	0.029	0.031	0.039

A: 12 years of schooling; 'reference' industry and occupation.
B: 12 years of schooling; manufacturing industry; operative occupation.
C: 18 years of schooling; finance industry; professional occupation.
D: 14 years of education; finance industry; service occupation.

The hypothetical Anglo service worker, D, is about one-third more likely to leave a state with an immigrant ratio one standard deviation above the mean than at the mean itself. Such a worker appears to be a bit more sensitive than the Anglo professional counterpart in terms of destination selection. Results for black workers are again contrary to hypothesis. Black service workers are predicted to be less likely to leave a state and more likely to enter it as the fraction of recent immigrants grows. (For the maximum vs the minimum of zero, the difference is over eight-fold.)

The lessons of this exercise are that the labor market response of domestic workers can be complex, differing across ethnic group, occupation, and industry. It should be viewed against a wider backdrop of other major influences on geographic mobility, which also appear in our results: human capital variation, regional differential in unemployment rates, industrial base, and the like. In our initial experimentation, we found few occupations and industries which were clearly influenced by immigrant presence. While one can interpret the coefficients on recent immigrant influx to indicate substitution effects, statistical results for non-Hispanic whites do not always carry over to African Americans, a group other scholars have considered to be more susceptible to substitution. Notably the coefficient on immigrant stock (accumulated immigrants) generally operates in the opposite direction from that the

coefficient on recent immigration. This suggests that a worthwhile avenue of investigation would involve modeling the dynamic adjustment process itself.

Disentangling the effect of immigration on the job opportunities of native workers can be complex and difficult, particularly as reasonable hypotheses posit effects in different directions. We interpret our results as providing evidence for both substitution and complementarity. Low-skilled workers are generally more likely to leave and less likely to choose states with many recent immigrants, holding all else constant. Our results also indicate, however, that these apparent overall substitution effects may be mitigated for workers in more skilled occupations, for whom the complementarity hypothesis has been posed.

Acknowledgments

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