Migration and labor markets

Ernesto F. L. Amaral

March 5, 2018
Migration (SOCI 647)

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Outline

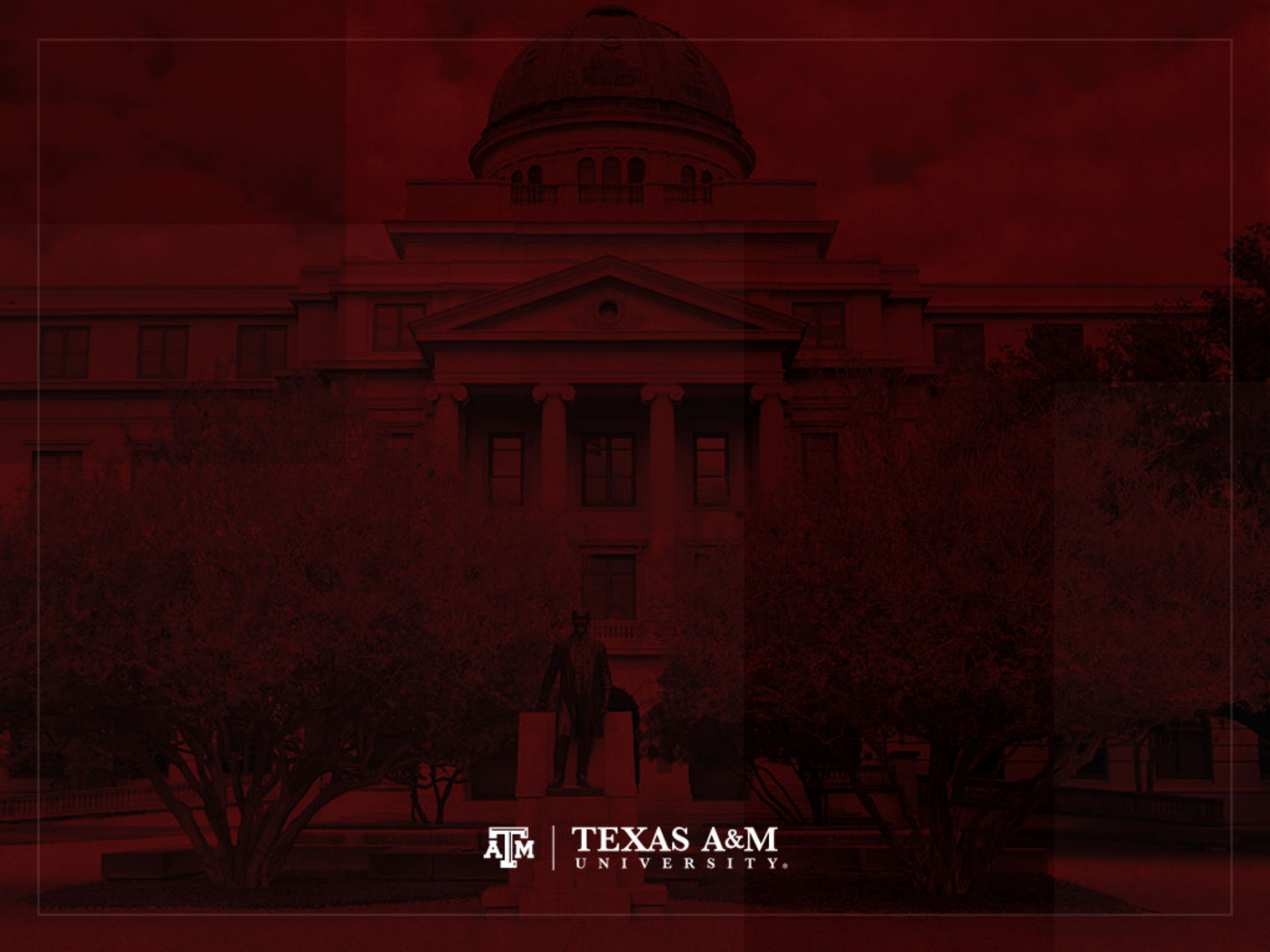
- Impact of immigration on the labor market
  - Borjas 2003
- Rethinking effect of immigration on wages
  - Ottaviano, Peri 2012
- Immigration and inequality
  - Card 2009, 2012
- Dealing with reverse causality
  - Amaral et al. 2016
- Immigrants equilibrate labor markets (discussion)
  - Cadena, Kovak 2016

Immigrants and natives

- Immigration raises concerns that native workers might experience negative impacts on earnings and employment
  - Mainly those with lower levels of education
  - These natives might experience an increasing competition for low-paying jobs with immigrants and refugees

- Does an increase in labor supply, due to immigration, have negative effects on labor outcomes of competing low-skilled native workers?
  - There are no definitive answers, because numerous and concurrent effects are related to economic outcomes

    (Blau, Mackie 2017)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Impact of immigration

- Several studies have analyzed the impacts of immigration on labor market outcomes in recent decades
- Different approaches were implemented to compare employment opportunities between immigrants and natives across regions
- These studies reflect varying results, depending on the countries, methods, unit of analysis, and data utilized
- According to Borjas (2003), a 10% increase in labor supply (due to immigration) decreased wages of natives between 3% and 4%

Source: Borjas 2003.

TABLE I

LOG WEEKLY WAGE OF MALE NATIVE WORKERS, 1960–2000

Education	Years of experience	1960	1970	1980	1990	2000
High school dropouts	1–5	5.535	5.758	5.722	5.494	5.418
	6–10	5.920	6.157	6.021	5.839	5.751
	11–15	6.111	6.305	6.166	6.006	5.932
	16–20	6.188	6.360	6.286	6.087	5.989
	21–25	6.201	6.413	6.364	6.180	6.034
	26–30	6.212	6.439	6.368	6.268	6.036
	31–35	6.187	6.407	6.419	6.295	6.086
	36–40	6.175	6.377	6.418	6.295	6.168
High school graduates	1–5	5.940	6.132	6.090	5.837	5.773
	6–10	6.257	6.476	6.343	6.159	6.140
	11–15	6.392	6.587	6.497	6.309	6.273
	16–20	6.459	6.639	6.609	6.415	6.323
	21–25	6.487	6.664	6.638	6.495	6.406
	26–30	6.478	6.677	6.662	6.576	6.414
	31–35	6.450	6.674	6.667	6.572	6.493
	36–40	6.435	6.622	6.657	6.548	6.460
Some college	1–5	6.133	6.322	6.237	6.085	6.013
	6–10	6.412	6.633	6.472	6.387	6.366
	11–15	6.535	6.752	6.641	6.534	6.489
	16–20	6.604	6.805	6.762	6.613	6.591
	21–25	6.634	6.832	6.764	6.711	6.626
	26–30	6.620	6.841	6.789	6.771	6.648
	31–35	6.615	6.825	6.781	6.740	6.662
	36–40	6.575	6.728	6.718	6.658	6.623
College graduates	1–5	6.354	6.612	6.432	6.459	6.458
	6–10	6.625	6.891	6.702	6.766	6.747
	11–15	6.760	7.032	6.923	6.908	6.943
	16–20	6.852	7.109	7.043	7.005	7.046
	21–25	6.876	7.158	7.087	7.112	7.051
	26–30	6.881	7.146	7.085	7.122	7.084
	31–35	6.867	7.095	7.079	7.095	7.074
	36–40	6.821	7.070	6.985	6.950	6.944

The table reports the mean of the log weekly wage of workers in each education-experience group. All wages are deflated to 1999 dollars using the CPI-U series.

Source: Borjas 2003.

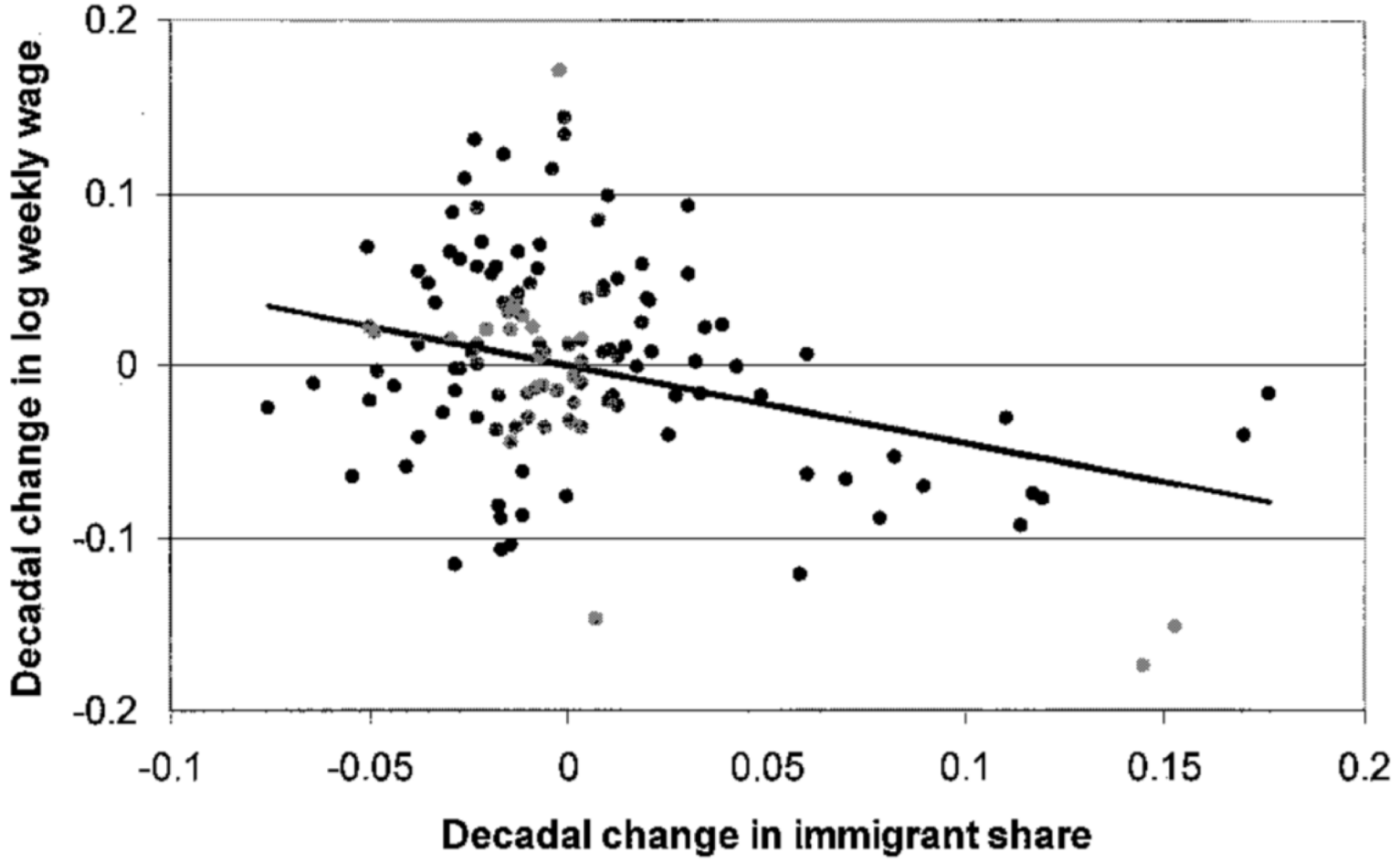


FIGURE II

Scatter Diagram Relating Wages and Immigration, 1960–2000

Source: Borjas 2003.

TABLE III

IMPACT OF IMMIGRANT SHARE ON LABOR MARKET OUTCOMES OF NATIVE EDUCATION-EXPERIENCE GROUPS

Specification:	Dependent variable: Log annual earnings	Log weekly earnings	Fraction of time worked
1. Basic estimates	−0.919	−0.572	−0.529
	(0.582)	(0.162)	(0.132)
2. Unweighted regression	−0.725	−0.546	−0.382
	(0.463)	(0.141)	(0.103)
3. Includes women in labor force counts	−0.919	−0.637	−0.511
	(0.661)	(0.159)	(0.148)
4. Includes log native labor force as regressor	−1.231	−0.552	−0.567
	(0.384)	(0.204)	(0.116)

The table reports the coefficient of the immigrant share variable from regressions where the dependent variable is the mean labor market outcome for a native education-experience group at a particular point in time. Standard errors are reported in parentheses and are adjusted for clustering within education-experience cells. All regressions have 160 observations and, except for those reported in row 2, are weighted by the sample size of the education-experience-periodcell. All regression models include education, experience, and period fixed effects, as well as interactions between education and experience fixed effects, education and period fixed effects, and experience and period fixed effects.

Source: Borjas 2003.

TABLE IV

Impact of Immigrant Share on Native Labor Market Outcomes, by Education Group

Dependent variable:	High school dropouts	High school graduates	Some college	College graduates	At least high school graduates
1. Log annual earnings	−1.416	−2.225	−0.567	1.134	−1.184
	(0.313)	(0.622)	(0.421)	(0.436)	(0.668)
2. Log weekly earnings	−0.947	−2.074	−1.096	0.610	−0.335
	(0.164)	(0.510)	(0.461)	(0.440)	(0.612)
3. Fraction of time worked	−0.086	0.393	0.567	0.300	−1.040
	(0.073)	(0.251)	(0.385)	(0.499)	(0.211)

The table reports the coefficient of the immigrant share variable from regressions where the dependent variable is the mean labor market outcome for a native education-experience group at a particular point in time. Standard errors are reported in parentheses and are adjusted for clustering within experience cell (in the first four columns) and within education-experience cells (in the last column). All regressions are weighted by the sample size of the education-experience-periodcell. The regressions reported in the first four columns have 40 observations and include experience and period fixed effects. The regressions reported in the last column have 120 observations and include education, experience, and period fixed effects, as well as interactions between education and experience fixed effects, education and period fixed effects, and experience and period fixed effects.

Source: Borjas 2003.

TABLE V

IMPACT OF IMMIGRANT SHARE ON LABOR MARKET OUTCOMES OF NATIVE STATE-EDUCATION-EXPERIENCE GROUPS

Dependent variable:	(1)	(2)	(3)	(4)
1. Log annual earnings	−0.115	−0.276	−0.253	−0.217
	(0.079)	(0.053)	(0.046)	(0.068)
2. Log weekly earnings	−0.124	−0.217	−0.203	−0.183
	(0.042)	(0.039)	(0.038)	(0.050)
3. Fraction of time worked	−0.038	−0.100	−0.078	−0.119
	(0.030)	(0.015)	(0.015)	(0.021)
Controls for:				
(State × period), (education × period), (experience × period), (state × education) fixed effects	Yes	Yes	Yes	Yes
(State × education × experience) fixed effects	No	Yes	Yes	Yes
(Education × experience × period) fixed effects	No	No	Yes	Yes
(State × education × period), (state × experience × period) fixed effects	No	No	No	Yes

The table reports the coefficient of the immigrant share variable from regressions where the dependent variable is the mean labor market outcome for a native state-education-experience group at a particular point in time. Standard errors are reported in parentheses and are adjusted for clustering within state-education-experience cells. All regressions are weighted by the sample size of the state-education-experience-period cell and include state, education, experience, and period fixed effects. The regressions on log annual earnings or log weekly earnings have 8153 observations; the regressions on the fraction of time worked have 8159 observations.

Source: Borjas 2003.

TABLE VIII

ESTIMATED FACTOR PRICE ELASTICITIES, BY SKILL GROUP

Education	Years of experience	Own elasticity	Cross elasticity (within education branch)	Cross elasticity (across education branches)
High school dropouts	1–5	−0.313	−0.028	0.002
	6–10	−0.330	−0.044	0.003
	11–15	−0.344	−0.059	0.004
	16–20	−0.341	−0.056	0.004
	21–25	−0.339	−0.053	0.004
	26–30	−0.352	−0.066	0.004
	31–35	−0.358	−0.072	0.005
	36–40	−0.361	−0.076	0.005
High school graduates	1–5	−0.316	−0.030	0.012
	6–10	−0.335	−0.050	0.020
	11–15	−0.343	−0.057	0.023
	16–20	−0.337	−0.051	0.020
	21–25	−0.333	−0.047	0.019
	26–30	−0.330	−0.044	0.017
	31–35	−0.323	−0.037	0.015
	36–40	−0.315	−0.029	0.012
Some college	1–5	−0.318	−0.032	0.012
	6–10	−0.339	−0.054	0.020
	11–15	−0.349	−0.063	0.024
	16–20	−0.348	−0.063	0.024
	21–25	−0.339	−0.054	0.020
	26–30	−0.324	−0.038	0.015
	31–35	−0.313	−0.028	0.010
	36–40	−0.305	−0.019	0.007
College graduates	1–5	−0.317	−0.031	0.017
	6–10	−0.335	−0.049	0.026
	11–15	−0.341	−0.056	0.030
	16–20	−0.348	−0.062	0.033
	21–25	−0.332	−0.046	0.025
	26–30	−0.318	−0.032	0.017
	31–35	−0.309	−0.023	0.013
	36–40	−0.302	−0.016	0.009

Equations (19)–(21) define the factor price elasticities in the three-level CES framework. For a 1 percent change in the number of workers of any specific group, the own factor price elasticity gives the percent change in that group's wage; the cross elasticity within an education branch gives the percent change in the wage of a group with the same education but with different experience; the cross elasticity across education branches gives the percent change in the wage of groups that have different educational attainment.

Source: Borjas 2003.

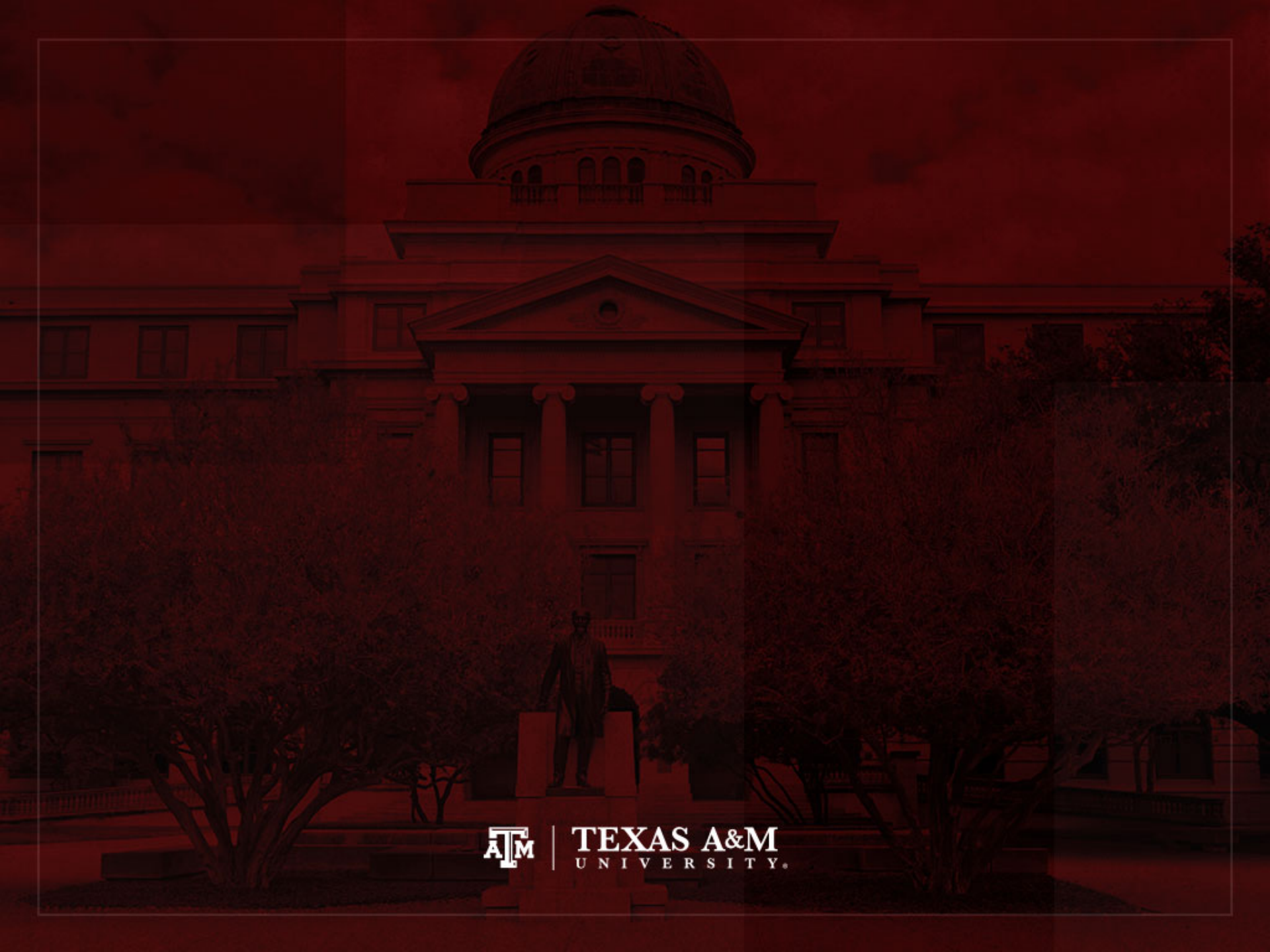
TABLE IX

WAGE CONSEQUENCES OF IMMIGRANT INFLUX OF THE 1980S AND 1990S
(PREDICTED CHANGE IN LOG WEEKLY WAGE)

	Education				
Years of experience	High school dropouts	High school graduates	Some college	College graduates	All workers
1–5	−0.065	−0.021	0.004	−0.035	−0.024
6–10	−0.101	−0.027	0.001	−0.042	−0.029
11–15	−0.128	−0.036	−0.009	−0.059	−0.041
16–20	−0.136	−0.033	−0.011	−0.055	−0.039
21–25	−0.108	−0.025	−0.008	−0.049	−0.033
26–30	−0.087	−0.023	0.000	−0.049	−0.029
31–35	−0.066	−0.022	0.001	−0.050	−0.027
36–40	−0.044	−0.013	0.008	−0.056	−0.022
All workers	−0.089	−0.026	−0.003	−0.049	−0.032

The simulation uses the factor price elasticities reported in Table VIII to predict the wage effects of the immigrant influx that arrived between 1980 and 2000. The calculations assume that the capital stock is constant. The variable measuring the group-specific immigrant supply shock is defined as the number of immigrants arriving between 1980 and 2000 divided by a baseline population equal to the average size of the native workforce (over 1980–2000) plus the number of immigrants in 1980. The last column and the last row report weighted averages, where the weight is the size of the native workforce in 2000.

Source: Borjas 2003.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Rethinking effects of migration on wages

- Immigration reduces the wage and labor supply of competing native workers (Borjas 2003, 2016)
  - Wages of natives decreased by almost 4% when there was a 10% increase in the labor supply of immigrants

- Immigration had a small effect on the wages of native workers with no high school degree between 1990 and 2006 (Ottaviano, Peri 2012)
  - Immigration had a small positive effect on average native wages
  - But had a substantial negative effect on wages of previous immigrants in the long run

Natives adapt to immigration

- Natives experience occupational upgrading and specialization, as an adjustment to immigration flows (Foged, Peri 2015)

- While immigrants tend to concentrate on manual jobs, due to language and cultural limitations, natives leave their previous occupations to work on more complex jobs

- This pattern generates improvements in natives' wages and mobility, without negative effects on unemployment for unskilled natives

Immigration policies and natives

- Countries with larger immigrant competition experience a move of native workers to more sophisticated skills with higher incomes, which require higher education levels (Cattaneo, Fiorio, Peri 2013)

- Natives engage in entrepreneurial activities in response to larger immigrant competition

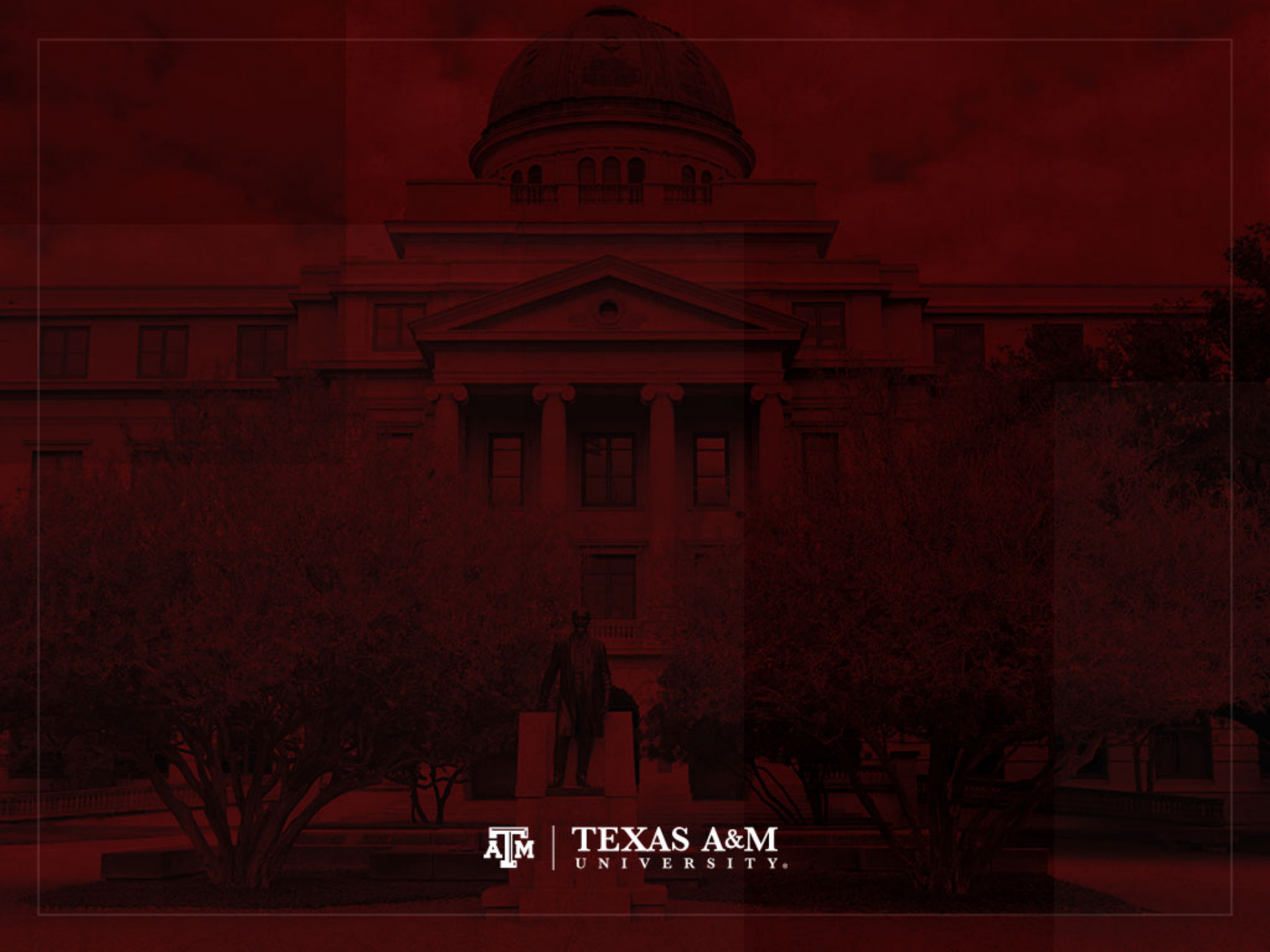
- Open immigration policies tend to generate better career opportunities for natives, when combined with flexible labor markets (Peri 2014)

Immigration models

- Models should take into account skills of workers and capital to assess the effect of immigration on the wages of native workers in the long run
  - Reduced-form (e.g., only skills) does not give complete information about the wage effect of immigration
  - These partial estimates are only the effect of direct competition
  - Total wage effect is also determined by indirect complementarities among different types of immigrants and natives

- Immigration to the U.S. had a modest negative long-run effect on real wages of the least educated natives in 1990–2006
  - Effect was between −2.1% and +1.7%

Source: Ottaviano, Peri 2012.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Immigration and inequality

(Card 2009)

- Interest on immigration studies increased over the last three decades, because flows have surged
  - **Size:** approximately 1.25 million people per year between 2000–2005
  - **Composition:** at least 30% of new arrivals are undocumented immigrants from Mexico and Central America with low education and limited English skills
- These immigrants presumably compete for the same jobs held by the least-skilled native workers
- Card presents an overview and synthesis of research on the connection between immigration and wage inequality

TABLE 1—IMMIGRANT PRESENCE, EDUCATION, AND EARNINGS IN LARGE US CITIES

	Working-age population (thousands)	Share of US population (percent)	Percent immigrants	Education distribution		Mean salary
				Less than high school	College or more	
All US	174,870	100.0	16	14	28	39,806
Larger cities (124)	116,748	66.8	21	14	31	43,102
Rest of country	58,122	33.2	7	15	21	32,988
Los Angeles	5,828	3.3	48	24	27	41,260
New York City	5,687	3.3	44	17	35	49,613
Chicago	5,114	2.9	25	14	34	46,522
Washington, DC	3,359	1.9	25	10	45	56,076
Atlanta	3,055	1.7	17	13	34	44,110
Philadelphia	3,017	1.7	11	11	33	46,149
Houston	2,904	1.7	31	22	27	41,688
Detroit	2,634	1.5	11	12	27	43,937
Dallas	2,516	1.4	26	20	30	42,545
Phoenix	2,348	1.3	22	17	26	40,949
Riverside County, CA	2,266	1.3	31	23	17	37,409
Boston	2,055	1.2	22	9	46	52,584

Notes: Based on tabulation of 2005 and 2006 American Community Surveys. Working-age population includes people age 18 or older with 1–45 years of potential experience. Cities are Primary Metropolitan Statistical Areas (PMSAs).

Source: Card 2009.

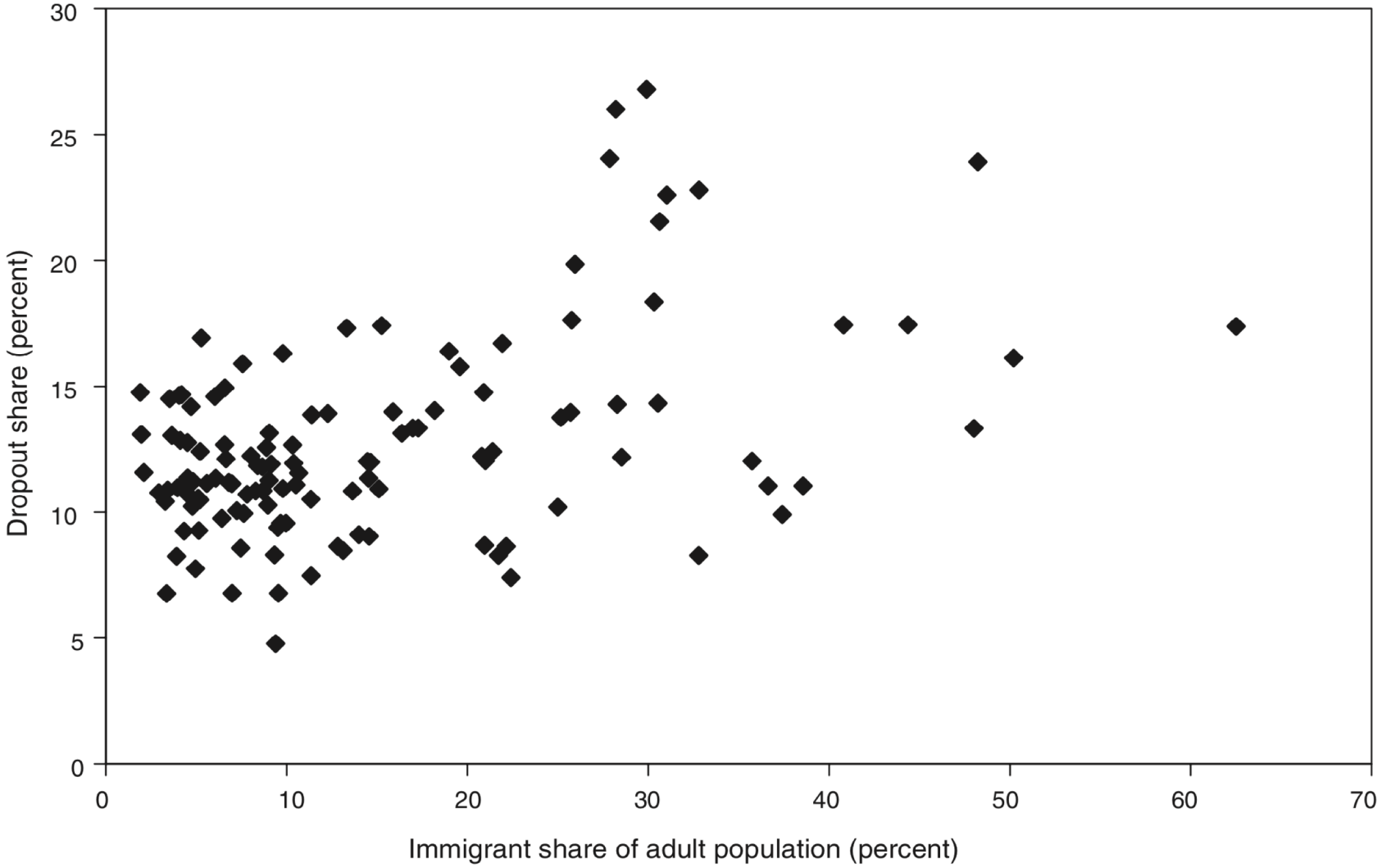


FIGURE 1. IMMIGRANT PRESENCE AND DROPOUT SHARE

On average, each percentage point rise in the immigrant share is associated with a 0.2 percent rise in the relative share of high school dropouts

Source: Card 2009.

TABLE 2—CHARACTERISTICS OF IMMIGRANTS IN 2000

	Working age population (thousands)	Share of all immigrants (percent)	Fraction arrived		Educational attainment			
			After 1980	After 1990	Mean years completed	Dropouts	12–15 years	College or more
Natives	141,272	—	—	—	13.3	14.2	60.6	25.2
Immigrants	23,627	100.0	70.5	39.9	11.6	37.4	38.8	23.8
By country of origin								
Mexico	7,267	30.8	75.1	43.8	8.6	69.8	26.5	3.7
Philippines	1,078	4.6	66.1	31.5	14.1	9.2	43.7	47.0
India	838	3.5	78.4	51.4	15.6	9.6	20.2	70.2
Vietnam	806	3.4	75.3	39.7	11.7	34.6	45.8	19.6
China	715	3.0	82.0	50.1	13.6	24.2	29.2	46.7
El Salvador	698	3.0	85.1	37.0	8.9	65.0	30.6	4.4
Korea	664	2.8	66.4	33.1	14.0	10.6	45.8	43.6
Cuba	586	2.5	52.3	29.1	12.5	30.0	48.3	21.7
Dominican Republic	536	2.3	74.2	38.1	10.8	48.8	41.9	9.3
Canada	517	2.2	47.6	31.9	14.3	8.9	49.8	41.3
Germany	455	1.9	32.6	21.0	13.9	8.3	59.3	32.4
Jamaica	429	1.8	66.7	27.3	12.6	23.8	57.8	18.4
Columbia	400	1.7	71.9	40.5	12.5	24.7	53.3	21.9
Guatemala	400	1.7	84.0	45.9	8.8	64.5	30.4	5.1
Haiti	333	1.4	75.1	34.5	11.8	35.2	51.3	13.5
Poland	310	1.3	74.5	42.3	13.3	16.3	58.2	25.6

Notes: Based on tabulation of 2000 Census. Working age population includes people age 18 or older with 1–45 years of experience.

Source: Card 2009.

TABLE 3—SUMMARY STATISTICS FOR SAMPLES FROM 1980, 1990, 2000 CENSUS AND 2005/2006 ACS

		Mean years of				Variance (log wage)	
		Education	Experience	Employment rate (%)	Mean wage	Overall	Residual
Native men	1980	12.5	18.8	90.1	25.07	0.385	0.288
	1990	12.9	18.7	88.5	23.72	0.462	0.322
	2000	13.2	20.4	86.8	25.86	0.487	0.353
	2005/6	13.4	21.4	86.2	25.35	0.522	0.361
Native women	1980	12.2	19.6	65.4	16.75	0.317	0.269
	1990	12.8	19.4	74.7	17.05	0.382	0.295
	2000	13.3	20.7	77.1	19.51	0.408	0.313
	2005/6	13.5	21.8	76.8	19.74	0.456	0.335
Immigrant men	1980	11.6	19.1	87.5	24.49	0.444	0.321
	1990	11.4	18.0	86.5	21.73	0.517	0.347
	2000	11.6	18.8	86.5	23.21	0.557	0.390
	2005/6	12.0	19.9	90.6	21.45	0.544	0.352
Immigrant women	1980	11.0	20.6	60.0	17.15	0.343	0.291
	1990	11.2	19.9	65.0	16.94	0.414	0.318
	2000	11.7	20.0	64.8	19.27	0.484	0.367
	2005/6	12.2	20.9	67.2	18.58	0.515	0.356

Notes: Samples include persons age 18 or older with 1–45 years of potential experience. Wages are reported in 2007 dollars. Residual wage variance is based on linear prediction models, fit separately by year, gender, and immigrant status.

Source: Card 2009.

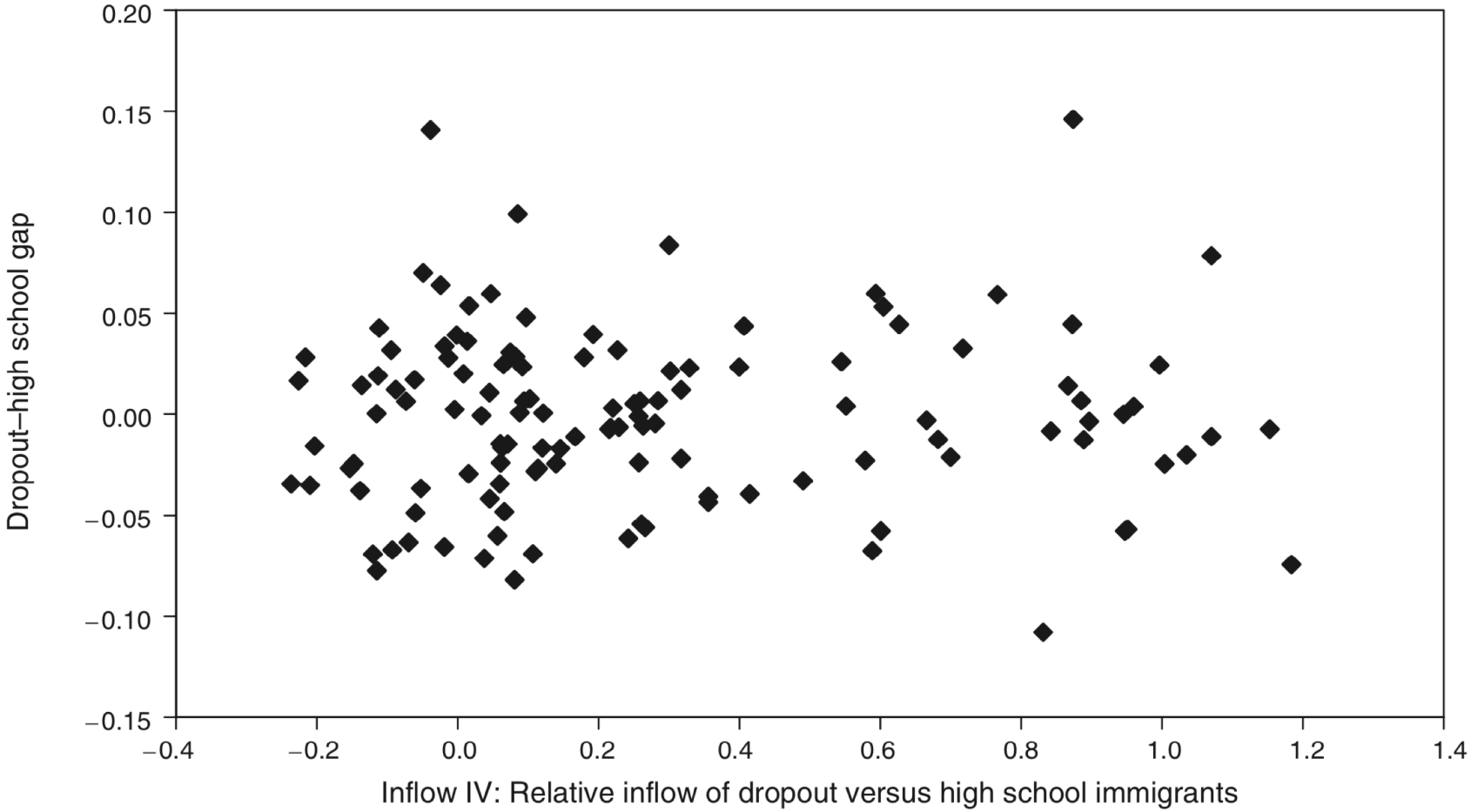


FIGURE 3. REDUCED-FORM RELATIONSHIP: INFLOW IV AND DROPOUT WAGE GAP

- Instrumental variable (IV) for the relative supply ratio of dropout to high school in 2000
  - Log of the ratio of predicted inflows of dropout and high school immigrants for each city in 1990–2000
- IV has wide variation across cities (x-axis)
- But this variation is uncorrelated with the residual wage gap for native dropouts (y-axis)

Source: Card 2009.

TABLE 4—ESTIMATED MODELS FOR THE RELATIVE WAGE GAP BETWEEN NATIVE MALE DROPOUTS AND HIGH SCHOOL GRADUATES

	Estimated by OLS				Estimated by IV		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log relative supply of dropout vs. high school	—	0.00 (0.01)	0.01 (0.01)	0.01 (0.01)	0.02 (0.01)	0.02 (0.01)	0.02 (0.01)
Lagged dependent variable	0.29 (0.09)	—	—	0.25 (0.08)	—	—	
Controls for log city size, college share, manufacturing share, and mean wage residuals for all workers in 1980 and 1990	No	No	Yes	Yes	No	Yes	Yes
R^2	0.09	0.01	0.24	0.29	0.01	0.24	0.29
First-stage *t*-statistic	—	—	—	—	14.82	14.03	14.16

Notes: Standard errors in parentheses. All models are estimated on cross section of 124 larger cities in 2000. Estimates are weighted OLS or IV, using the 1990 population of the city as weight. Dependent variable is the difference between the mean adjusted log wage of high school dropouts, and the mean adjusted wage of high school graduates. Log relative supply measure is based on annual hours of all dropouts and all high school graduates (men and women, natives and immigrants). Instrumental variable for models in columns 5–7 is the log of the ratio of predicted inflows of dropout immigrants and high school graduate immigrants over the 1990–2000 period, based on national inflows of 38 source country groups and shares of each group in a city in 1980.

- Workers with below high school education are perfect substitutes for those with a high school education

Source: Card 2009.

TABLE 5—ESTIMATED MODELS FOR THE RELATIVE WAGE GAP BETWEEN NATIVE MALE COLLEGE AND HIGH SCHOOL GRADUATES

	Estimated by OLS				Estimated by IV			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log relative supply of college vs. high school	—	0.08 (0.02)	−0.04 (0.05)	−0.01 (0.05)	−0.42 (0.28)	−0.41 (0.15)	−0.26 (0.12)	-0.28 (0.12)
Log relative supply lagged 10 years	—	—	0.12 (0.08)	0.01 (—)	—	0.60 (0.21)	0.34 (0.17)	0.28 (—)
Log relative supply lagged 20 years	—	—	0.01 (0.04)	—	—	-0.10 (0.07)	0.01 (0.07)	—
Relative wage gap lagged 10 years	0.66 (0.08)	—	0.66 (0.07)	0.68 (0.06)	—	0.46 (0.12)	0.51 (0.10)	0.56 (0.09)
Relative wage gap lagged 20 years	0.29 (0.06)	—	0.26 (0.06)	0.32 (—)	—	0.45 (0.10)	0.35 (0.09)	0.44 (—)
Controls for log city size and mfg. share in 1980 and 1990	No	No	No	Yes	No	No	Yes	No
R^2	0.59	0.09	0.68	0.37	0.02	0.60	0.71	0.24
First-stage *t*-statistic	—	—	—	—	1.98	4.73	4.87	4.66

Notes: Standard errors in parentheses. All models are estimated on cross section of 124 larger cities in 2000. Estimates are weighted OLS or IV, using the 1990 population of the city as weight. Dependent variable is the difference between the mean adjusted log wage of college graduates and the mean adjusted wage of high school graduates. Log relative supply measure is based on annual hours of all college equivalent and high school quivalent workers (men and women, natives and immigrants). Models in columns 4 and 8 are fit in first difference form. Instrumental variable for models in columns 5–8 is the log of the ratio of predicted inflows of college-equivalent and high school–equivalent immigrants over the 1990–2000 period, based on national inflows of 38 source countries and shares of each group in a city in 1980.

- High school-equivalent and college-equivalent workers are imperfect substitutes, with an elasticity of substitution on the order of 1.5–2.5

Source: Card 2009.

TABLE 6—ESTIMATED MODELS FOR THE RELATIVE WAGE GAP BETWEEN IMMIGRANTS AND NATIVES WITHIN SKILL GROUP

	High school equivalent workers				College equivalent workers			
	Estimated by OLS		Estimated by IV		Estimated by OLS		Estimated by IV	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log relative supply of immigrants/natives	−0.019 (0.006)	−0.019 (0.006)	−0.023 (0.008)	−0.022 (0.008)	−0.036 (0.011)	−0.029 (0.011)	−0.060 (0.014)	−0.055 (0.015)
Lagged dependent variable	—	0.159 (0.060)	—	0.159 (0.060)	—	0.200 (0.100)	—	0.128 (0.106)
Controls for log city size, college share, and mfg. share in 1980 and 1990, and mean wage residuals for all natives and all immigrants in 1980	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.308	0.349	0.301	0.338	0.444	0.463	0.455	0.471
First-stage *t*-statistic	—	—	11.67	11.68	—	—	13.76	12.85

Notes: Standard errors in parentheses. All models are estimated on cross section of 124 larger cities in 2000. Estimates are weighted OLS or IV, using the 1990 population of the city as weight. Dependent variable is the difference between the mean adjusted log wage of male immigrants and natives who are classified as "high school equivalent" workers (columns 1–4) or "college equivalent" workers (columns 5–8). Log relative supply measure is based on annual hours of all high school equivalent or college equivalent workers (men and women). Instrumental variable for models in columns 3–4 is the predicted inflow of high school equivalent immigrants between 1990 and 2000, divided by city population in 2000. Instrumental variable for models in columns 7–8 is the predicted inflow of college equivalent immigrants between 1990 and 2000, divided by city population in 2000.

- Within education groups, immigrants and natives are imperfect substitutes, with an elasticity of substitution on the order of 20

Source: Card 2009.

Two-group model

- Labor demand at the city or national level is consistent with labor inputs with only two skill groups (high school and college)
  - In a two-group model, what matters for the structure of wages is the relative fractions of immigrants and natives who are high school-equivalent and college-equivalent workers
  - Immigrants are only slightly under-represented in the college-equivalent group relative to natives (36% versus 41%)

- Immigrant arrivals have hardly distorted the relative fraction of college-equivalent workers and had little impact on the college-high school wage gap
  - Relative to the counterfactual of no immigrant presence in the economy

Source: Card 2009.

Wage inequality

- Wage inequality over all workers in the economy is higher than it would be in the absence of immigration (Table 8), because
  - Immigrants are clustered at the high and low ends of the education distribution
  - They also tend to have higher residual inequality than natives (Table 3)

- Over the past 25 years, the gap between the variance of wages in the entire workforce and among natives has widened
  - Immigration can be said to have contributed to the rise of inequality in the workforce
  - However, the effect is relatively small

Source: Card 2009.

TABLE 8—SUMMARY OF CHANGES IN VARIANCE OF LOG WAGES FOR ALL WORKERS AND NATIVES ONLY

	Variance of log hourly wages			
	All workers	Natives	Immigrants	Percent immigrants
Male workers				
1980	0.390	0.385	0.444	6.9
2005/2006	0.532	0.522	0.544	18.0
Change	0.142	0.137	0.100	11.1
Female workers				
1980	0.318	0.317	0.343	6.7
2005/2006	0.466	0.456	0.515	13.9
Change	0.148	0.139	0.172	7.2

Note: Samples include persons age 18 or older with 1–45 years of potential experience who have positive wage and salary earnings and no self-employment earnings.

Source: Card 2009.

No immigration effect on wages

- Overall, immigration has not had much effect on native wage inequality in the United States

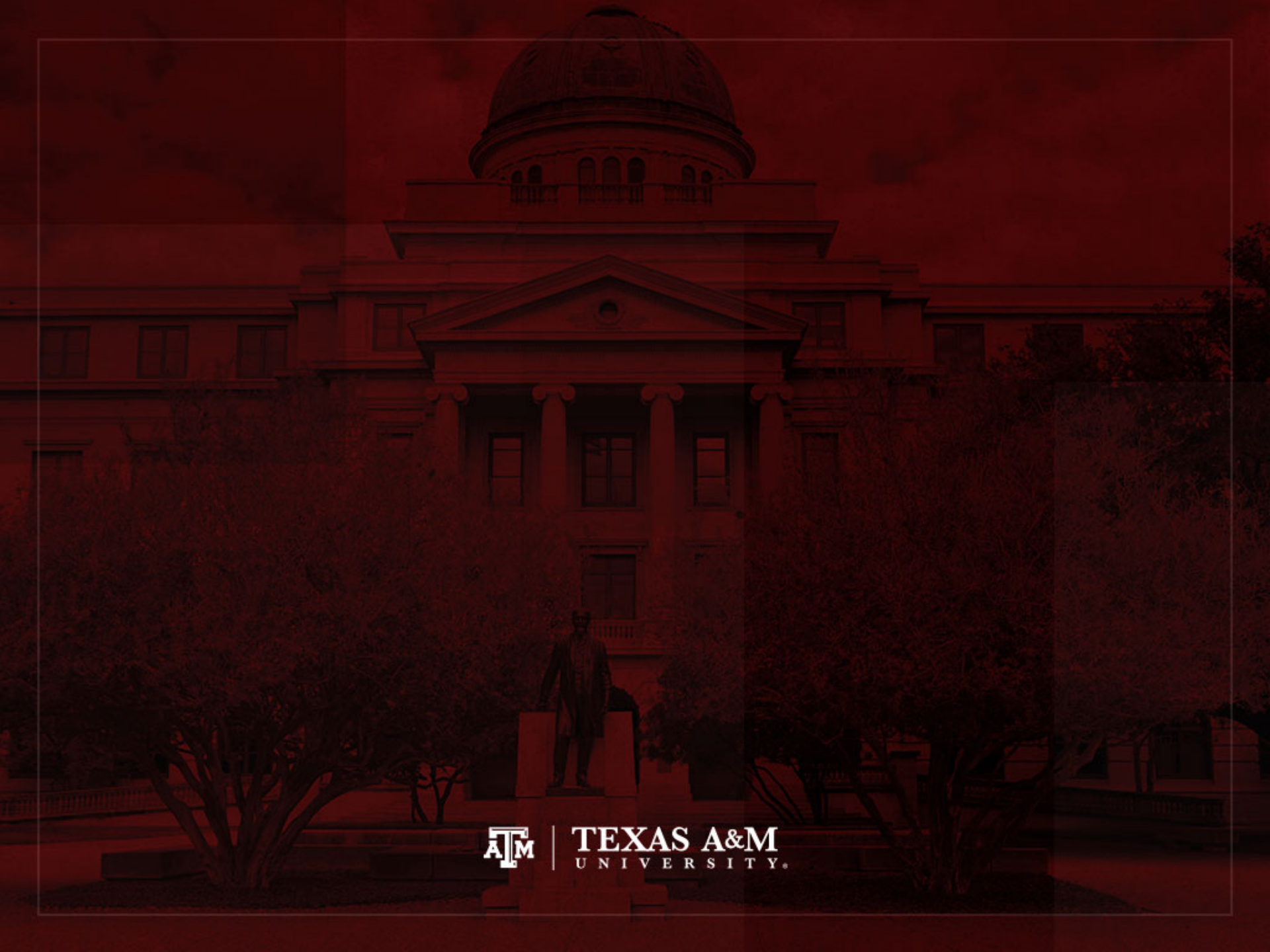
- Immigration over the past decades has had
  - Minor effects on the mean wage differences between natives in different skill groups
  - Negligible effect on between-skill group wage variability

Source: Card 2009.

Different approaches

(Card 2012)

- Assumption about capital
  - If **fixed**: negative effects of immigration on labor outcomes
  - If **adjusted** in the long run: effect of immigration is approximately zero
- Education groups
  - If **four groups** (dropouts, high school, some college, college)
    - Immigrant dropouts lower relative wages of native dropouts
  - If **two groups** (high-school equivalents, college equivalents)
    - Earnings have been largely unaffected by immigration
- Immigrants and natives with low levels of education
  - If **equal competition** is assumed: negative effects on wages
  - If **natives having advantages** is assumed (e.g. language proficiency, broader social networks): positive effects on outcomes of natives


TEXAS A&M
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Dealing with reverse causality

- Within the labor force (15–64 years of age)
  - Population is getting older and better educated in Mexico and Brazil with regional variation
  - Age and education increase earnings

- **Are there other effects of changing age and educational compositions on male earnings?**
  - Larger cohort-education size generally depresses earnings
  - There are less men with low education, but their earnings are not increasing
  - Secondary-school groups: increasing over time and experiencing negative correlations with earnings
  - Correlations are becoming less negative over the years

Source: Amaral et al. 2015, 2016.

Micro-data

Variables	Brazil
Years	1970, 1980, 1991, 2000, 2010
Minimum comparable areas	502 micro-regions
Earnings	Main occupation
Age	Youths (15–24) Young adults (25–34) Experienced adults (35–49) Older adults (50–64)
Education	Less than primary completed Primary completed Secondary completed University completed
Age-education	16 age-education groups

Source: Amaral et al. 2015.

Aggregate-level data

- **Data** is aggregated by year, area, and age-education groups
  - Brazil: 5 years * 502 micro-regions * 16 age-education groups
- Cells with less than 25 people receiving income were excluded
  - Brazil: 32,201 observations remained
- **Only male population**
  - Labor force participation is not driven by level of earnings, fertility decline, and changes in educational attainment

Source: Amaral et al. 2015.

Data setup

Year	Area	Age-education group G11–G44	Log of mean earnings $\log(Y_{git})$	Distr. of male pop. P11–P44	P11	P12	P13	P14	...	P44	Num. of obs.
1970	110006	15–24 years & < primary	5.80	0.221	0.221	0	0	0	...	0	2,016
1970	110006	15–24 years & primary	6.02	0.102	0	0.102	0	0	...	0	927
1970	110006	15–24 years & secondary	6.57	0.007	0	0	0.007	0	...	0	62
1970	110006	15–24 years & university	7.58	0.001	0	0	0	0.001	...	0	11
...	...	...	...	...	...	...	...	...	...	...	...
1970	110006	50–64 years & university	7.91	0.002	0	0	0	...	...	0.002	15
...	...	...	...	...	...	...	...		...	...	...

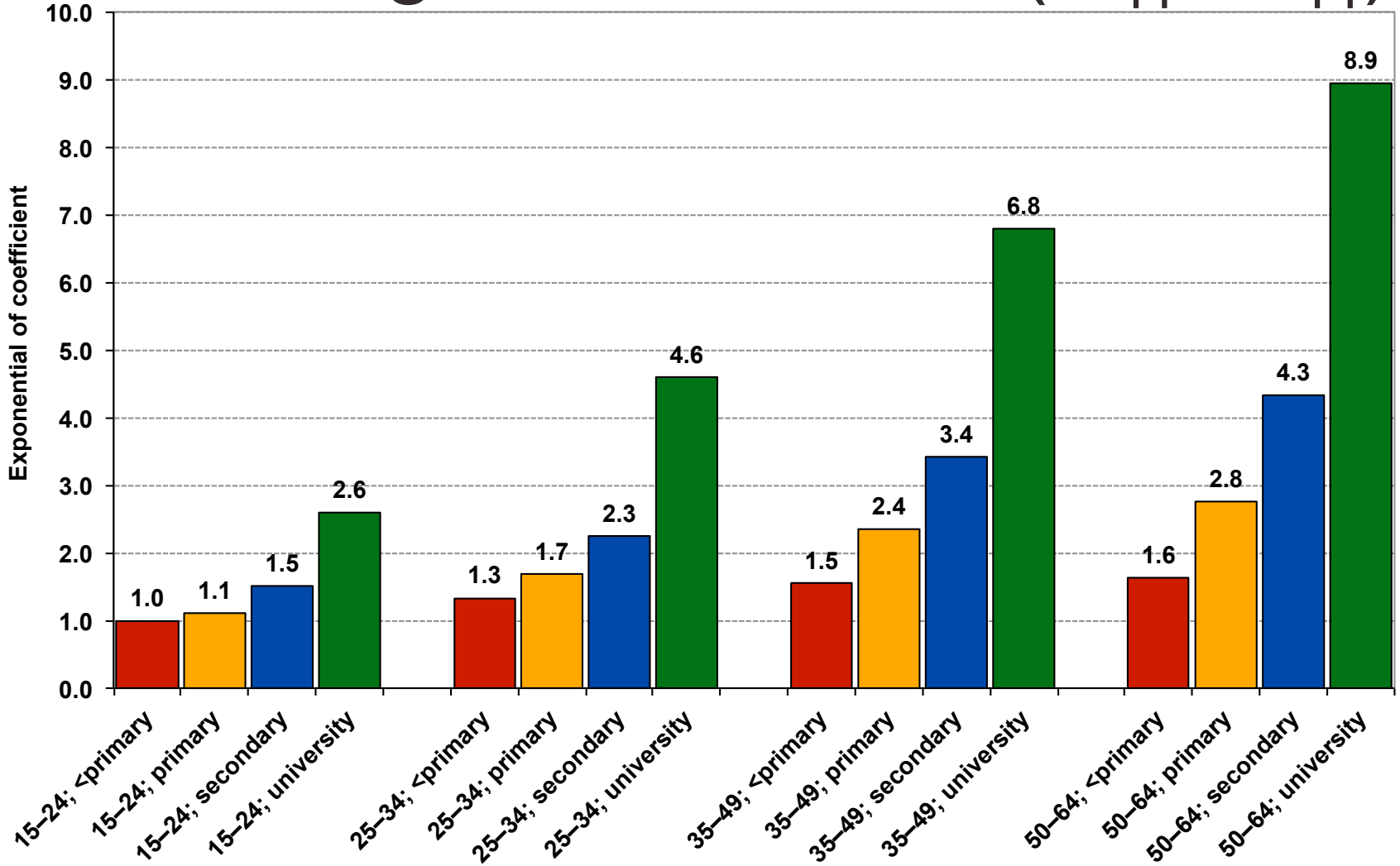
Source: Amaral et al. 2015.

Fixed effects models

	Baseline model	Composition model	Migration model
Dependent variable			
Logarithm of the mean real monthly earnings by age-education group, area, and time	$\log(Y_{git})$	$\log(Y_{git})$	$\log(Y_{git})$
Independent variables			
16 age-education indicators * time	$(G_{11}–G_{44}) * \theta_t$	$(G_{11}–G_{44}) * \theta_t$	$(G_{11}–G_{44}) * \theta_t$
Distribution of male population into 16 age-education groups * time		$(P_{11}–P_{44}) * \theta_t$	$(P_{11}–P_{44}) * \theta_t$
Migration rates by age-education groups * time			$(M_{11}–M_{44}) * \theta_t$
Area-time fixed effects	α_{it}	α_{it}	α_{it}

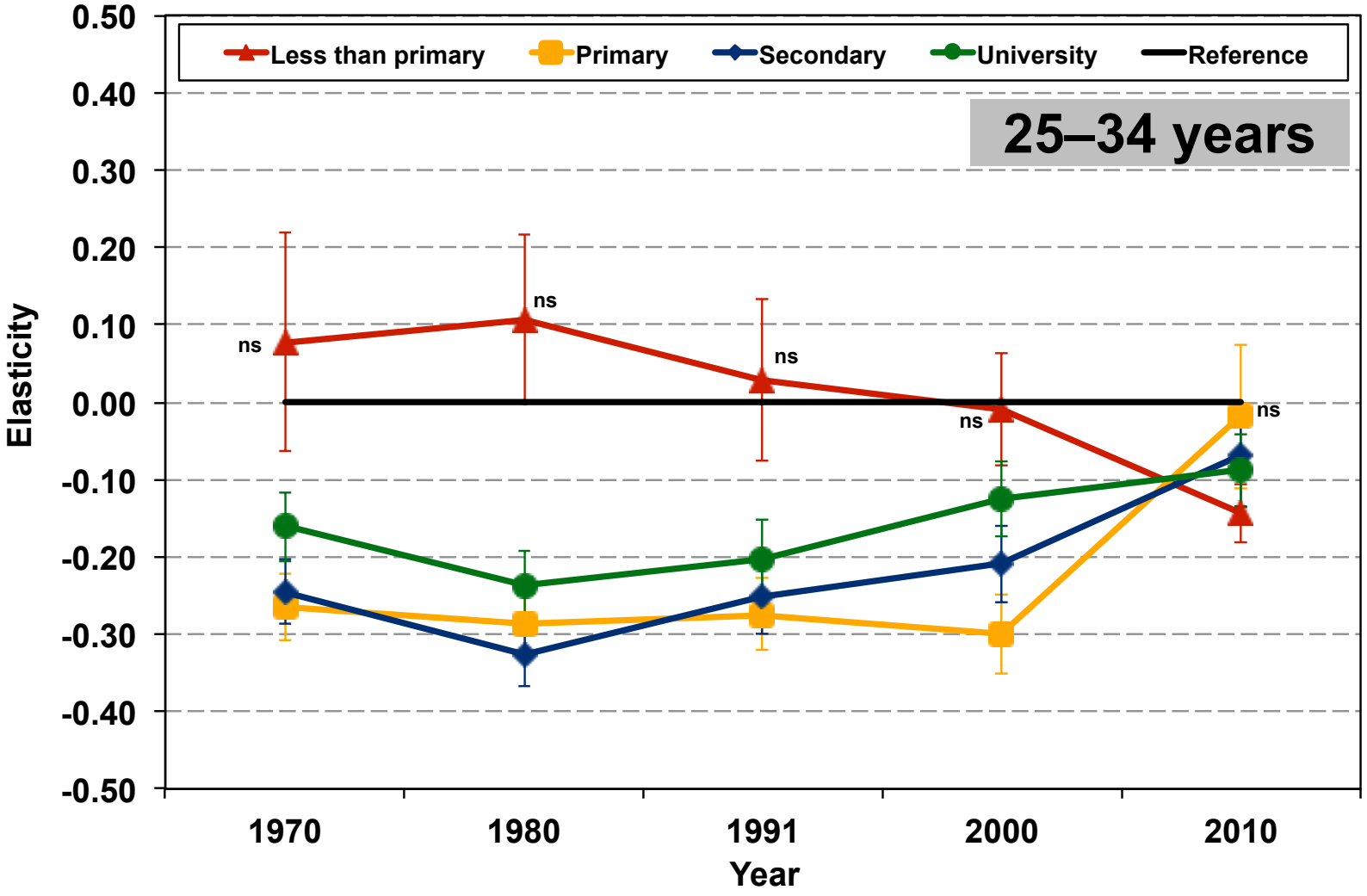
Source: Amaral et al. 2015, 2016.

Effects of age-education groups on earnings, Brazil, 2010 (G_{11}–G_{44})



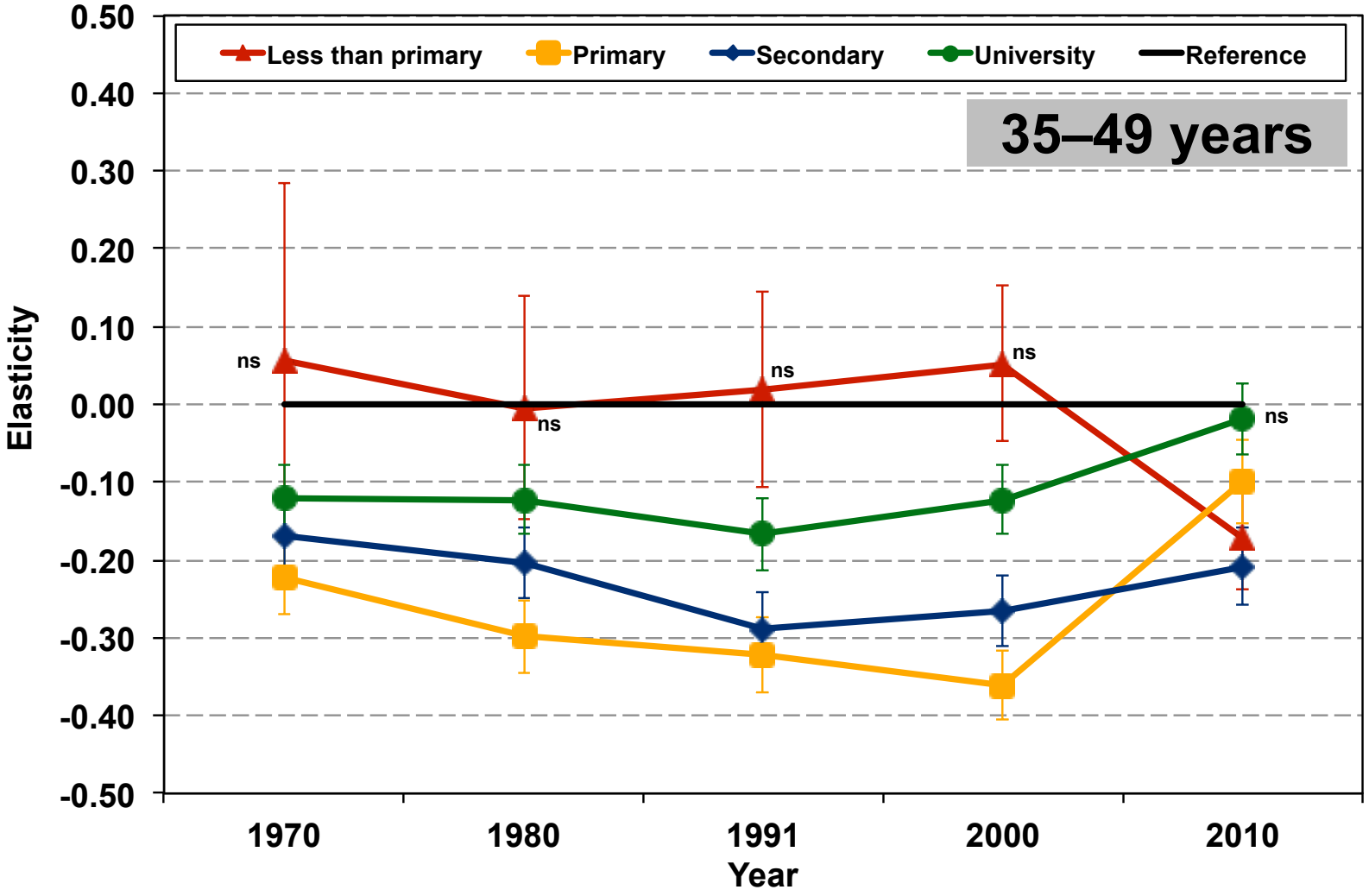
Source: 1970, 1980, 1991, 2000, and 2010 Brazi**Source: Amaral et al. 2015.**

Effects of group proportions on earnings, Brazil (P_{21}–P_{24})



Source: 1970, 1980, 1991, 2000, and 2010 Brazi**Source: Amaral et al. 2015.**

Effects of group proportions on earnings, Brazil (P_{31}–P_{34})



Source: 1970, 1980, 1991, 2000, and 2010 Brazi**Source: Amaral et al. 2015.**

Internal migration

- Analysis at the **local level**
  - Need to consider the effects of internal migration on earnings
- Migration generates **spatial-economic equilibrium**
- **Without migration**
  - Sending areas would have even lower earnings
  - Receiving areas would have even higher earnings
- **Hypothesis**
  - Negative associations of proportions on earnings would be more negative when controlling for migration

Source: Amaral et al. 2016.

Reverse causality

Migration ⟷ **Earnings**

- In-migration increases competition and affects earnings
- Availability of jobs and income levels influence migration
- An **exogenous measure of migration** was estimated
- **Migration data:** Brazil, 1991 and 2000
  - Municipality of residence five years before the census
- **Education data:** schooling groups divided into three categories
  - No further than the first phase of elementary school (0–4)
  - Second phase of elementary school (5–8)
  - At least some secondary school (9+)

Source: Amaral et al. 2016.

Gravity models to deal with reverse causality

- Gravity models can be used to estimate exogenous measures of migration
  - Example: reverse causality between migration and earnings

Migration ⟷ Earnings

  - Immigration increases competition and affects earnings
  - Availability of jobs and income levels influence migration

- Distances among areas
  - Used as an instrumental variable for predicting migration
  - Related to migration levels, but not to earnings

Distance → Migration → Earnings

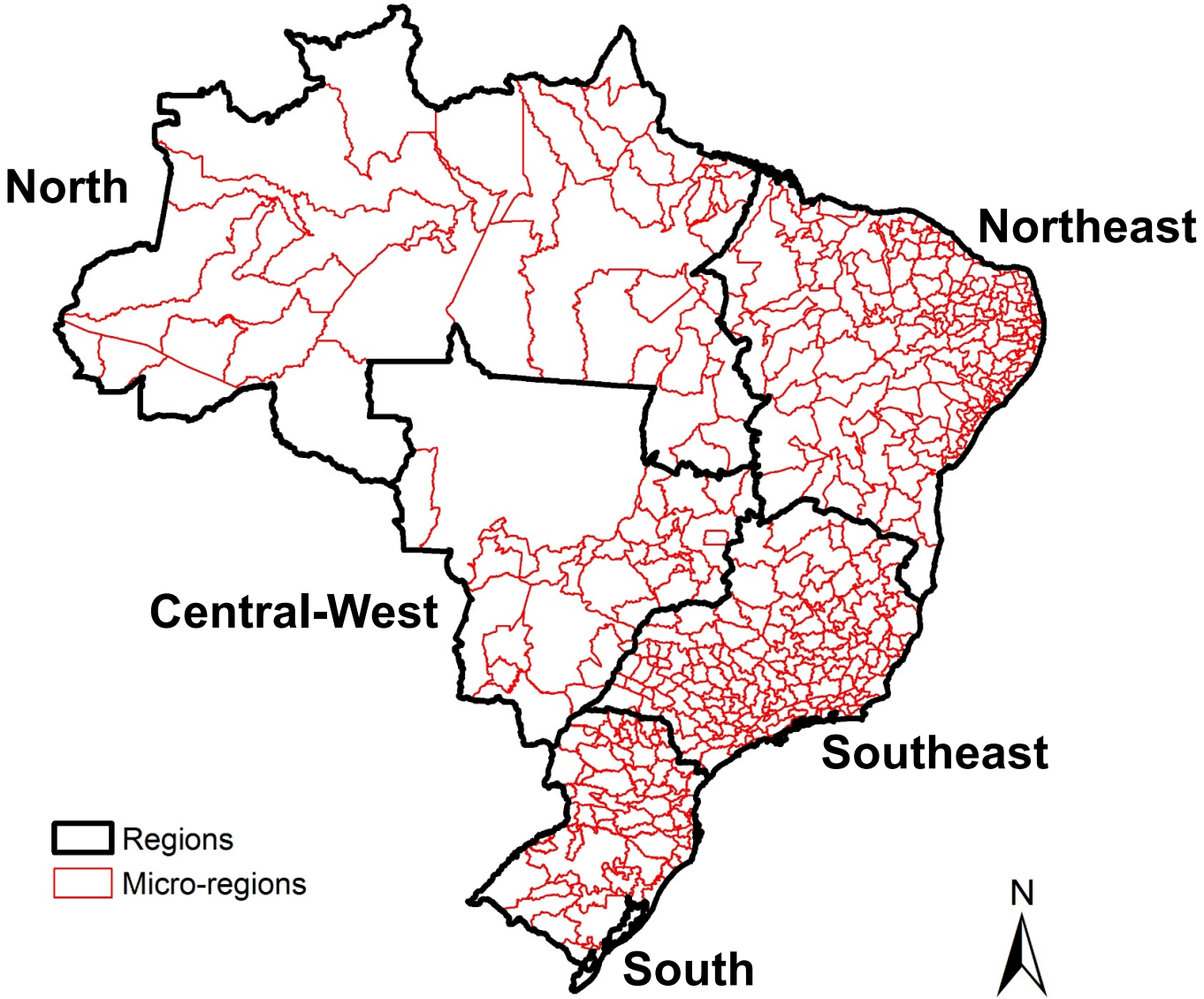
Source: Amaral et al. 2016.

Methodological steps for migration

1. **Level of migration:** between the 502 micro-regions
2. **Age pattern of migration:** between the five regions
3. **Modeling age pattern of migration:** smooth curves
4. **Integrating level and pattern**: exercise of standardization
5. **Force of migration:** a measure for each micro-region, year, and age-education group

Source: Amaral et al. 2016.

Five regions & 502 micro-regions



Source: Amaral et al. 2016.

1. Level of migration

- **Gravity models** take into account distances among areas as an instrumental variable for predicting migration
  - Distance is related to migration levels, but not to earnings

Distance ➔ Migration ➔ Earnings

- **Poisson regression** for each year and education group

$$M_{ij} = exp(b_0 + b_1 log\ P_i + b_2 log\ P_j + b_3 log\ d_{ij}) + \varepsilon_{ij}$$

  - M_{ij}: migrants at the end of the period with **20–24 years** of age between micro-regions of origin and destination: n=251,502 (502*501)
  - P_i: population at the beginning of the period with 15–19 years of age for micro-regions of origin
  - P_j: population at the end of the period with 20–24 years of age for micro-regions of destination
  - d_{ij}: distance between micro-regions

Source: Amaral et al. 2016.

2. Age pattern of migration

- Estimation of migration patterns for all combinations of micro-regions and years would generate low rates
  - Migration patterns were estimated among the five **regions** in each year (1991 and 2000): 5*5*2=50

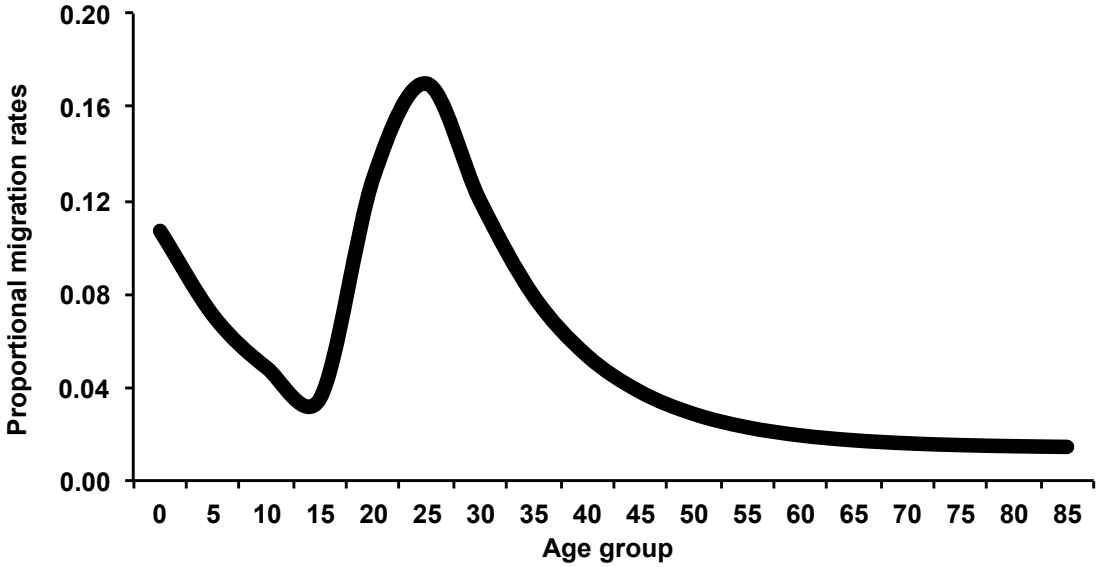
- **Age-specific in-migration rates (*ASIMR*$_{x,ij}$)** consider populations (*K*) in regions of origin (*i*) and destination (*j*)
  - Denominator is an approximation for period person-years lived
  - Average of the starting and ending populations, multiplied by the length of the period

$$ASIMR_{x,ij} = \frac{\sum\left(K_{ij}^{x}\right)}{t * \sum\left[\frac{\left(K_{j.}^{x} + K_{jj}^{x}\right) + \left(K_{j}^{x}\right)}{2}\right]}$$

Source: Amaral et al. 2016.

3. Modeling age pattern of migration

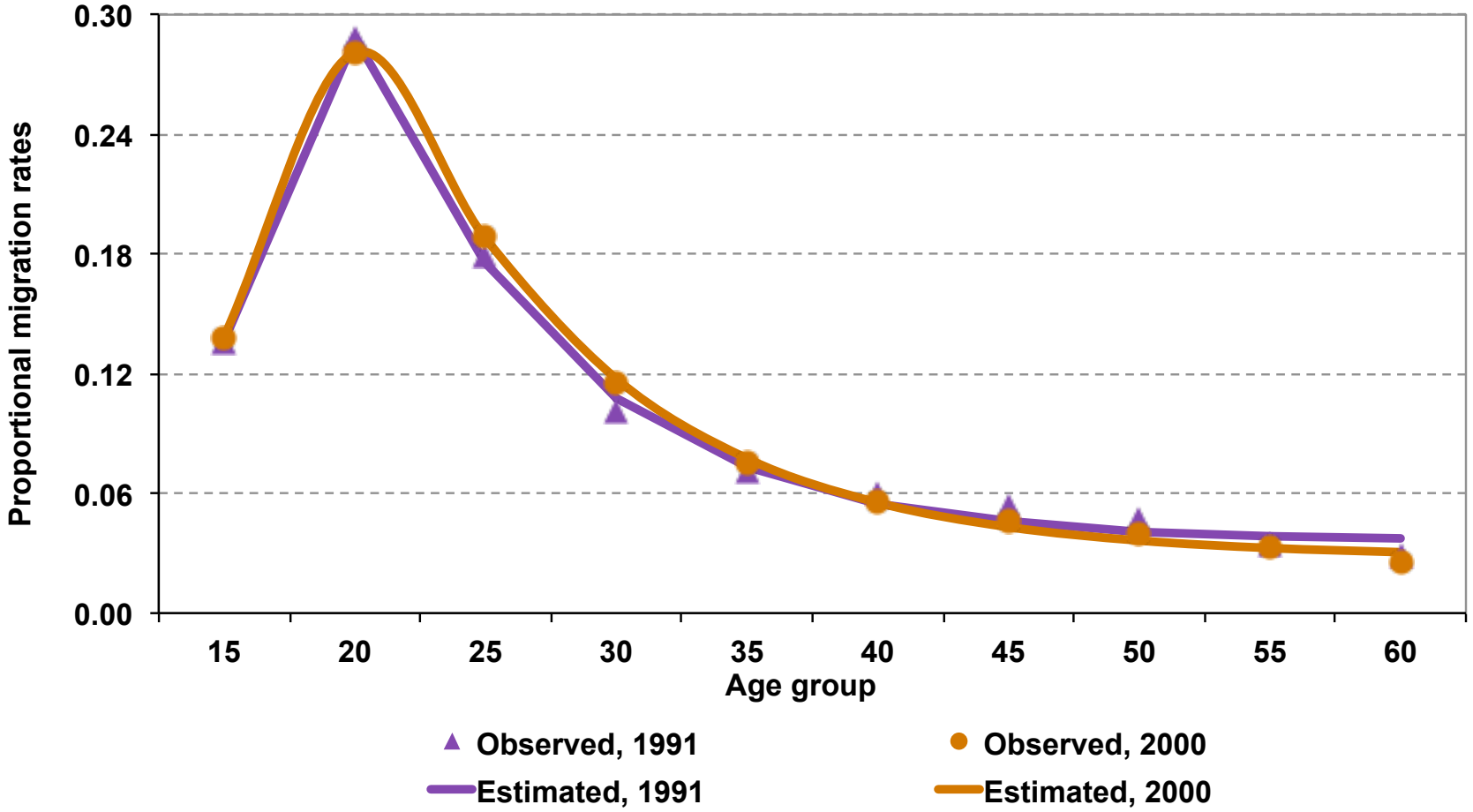
- Mathematical equation was used to smooth rates
  (Raymer, Rogers, 2007; Rogers, Castro, 1981; Rogers, Jordan, 2004)



  - Negative exponential curve in the first age groups
  - Parabola in labor ages
  - Constant term in post-labor ages
- Rates were modeled for men (15–64 years old)

Source: Amaral et al. 2016.

Observed and estimated proportional rates, Northeast to Southeast, 1991 and 2000

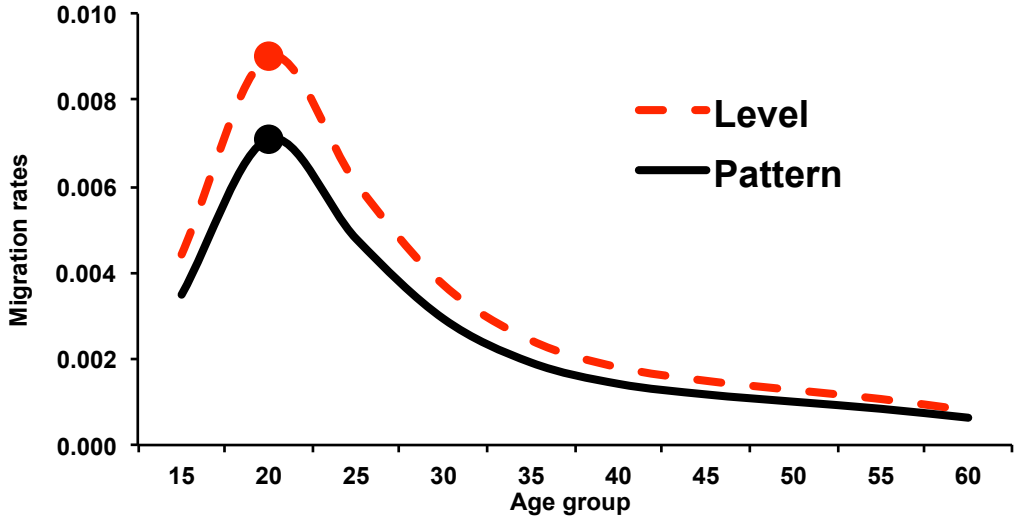


Source: 1991 and 2000 Brazilian Demographic C

Source: Amaral et al. 2016.

4. Integrating level and pattern

- **Micro-region levels:** applied to **regional patterns**
- **Assumption:** micro-regional flows have the same patterns as the regional flows
- **Ratio** of migration level to migration pattern was calculated (20–24 years of age) for flows between micro-regions by year and education group
- Rates of other age groups from migration pattern were multiplied by this ratio



Source: Amaral et al. 2016.

5. Force of migration

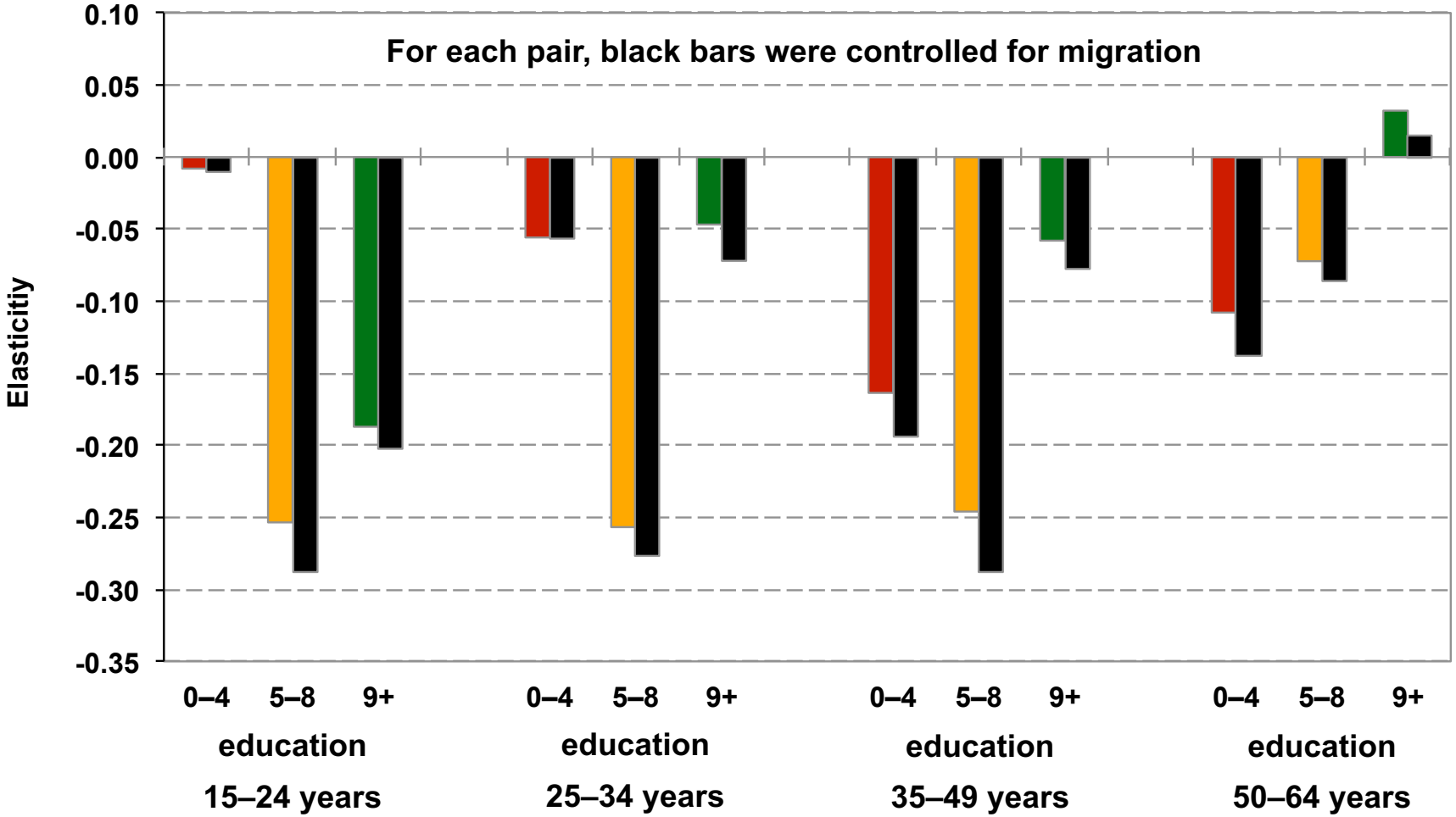
- An exogenous **force of migration** was estimated for each micro-region, year, and age-education group

- The exogenous measure of migration was included in the models as independent variables

- In general, the coefficients of group proportions became more negative than the previous estimates

Source: Amaral et al. 2016.

Effects of group proportions on earnings, Brazil, 2000 (G_{11}–G_{43})



Source: 1991 and 2000 Brazilian Demographic C

Source: Amaral et al. 2016.

Effects of migration rates on earnings

	Born in a different state		Less than five years in the municipality of residence		Residence five years before census		Adjusted migration (exogenous)	
Age-education groups	1991	2000	1991	2000	1991	2000	1991	2000
15–24 years 0–4 years of schooling	0.121	0.048	0.078	0.051	0.083	0.043	−0.095	−0.132
15–24 years 5–8 years of schooling	0.103	−0.007	−0.034	−0.145	−0.035	−0.157	−0.224	−0.222
15–24 years 9+ years of schooling	0.080	0.017	0.133	0.099	0.106	0.134	−0.203	−0.012
25–34 years 0–4 years of schooling	0.136	0.068	−0.057	0.012	−0.058	0.000	−0.087	−0.100
25–34 years 5–8 years of schooling	0.120	0.046	0.092	0.034	0.082	0.021	−0.141	−0.114
25–34 years 9+ years of schooling	0.087	0.032	0.041	0.168	0.051	0.178	0.005	−0.117
35–49 years 0–4 years of schooling	0.113	0.068	−0.082	−0.026	−0.083	−0.016	−0.120	−0.170
35–49 years 5–8 years of schooling	0.109	0.061	0.012	0.083	0.013	0.085	0.139	−0.257
35–49 years 9+ years of schooling	0.078	0.055	0.059	0.021	0.054	0.024	0.274	−0.041
50–64 years 0–4 years of schooling	0.090	0.074	−0.074	0.004	−0.089	0.010	−0.100	−0.114
50–64 years 5–8 years of schooling	0.014	0.031	0.057	0.036	0.048	0.029	−0.341	−0.091
50–64 years 9+ years of schooling	0.029	0.039	0.016	−0.021	0.016	−0.013	−0.012	0.074

Source: 1991 and 2000 Brazilian Demographic C

Source: Amaral et al. 2016.

Future studies

- Future studies could investigate the long-term effects of in-migration within the United States, which
  - Increases labor supply and competition in the labor markets
  - And raises demand for services and stimulates economic growth in receiving areas
- These analyses could also examine the economic adjustments experienced by labor markets with high levels of in-migration flows
  - Population streams affect economic opportunities, at the same time that businesses and workers adapt and take advantage of new labor configurations
- Short-term negative effects of migration flows on earnings might be overcome by investments for economic growth that would absorb the increasing working-age population

Job polarization & migration

- Job polarization, migration, and earnings in the U.S.
  - Job polarization, defined as the growth of employment at the tails of the occupational-skill distribution relative to the middle, has characterized the U.S. economy since around 1990
  - Increase in low-skill and high-skill jobs, which affects inequality
- Does job polarization in the United States, measured by levels of education and occupation, have an association with individual earnings of workers from a historical perspective?
- How have migration flows among local labor markets and commuting characteristics attenuated or exacerbated the national trends on income inequality?

Fertility & migration

- Opposite economic responses related to fertility could happen in areas with high out-migration rates
- This issue can be evaluated in terms of the connections between migration flows and fertility levels
- For instance, Brazil experienced a drop in total fertility rates from 6.28 children per women in 1960 to 1.90 in 2010, according to the Brazilian Census Bureau
- Fertility decline is happening even in rural areas and small municipalities

Fertility, migration & labor

- Migration flows from small to middle or big municipalities, conjugated with fertility decline in the U.S. and Brazil
  - Generate empty areas in different locations
  - Have negative socioeconomic consequences

- If migration flows adjust to the decline in fertility
  - Spatial distribution would move towards a faster stabilization process

- Spatial analyses could be performed to evaluate associations between migration, fertility and labor outcomes

References

Amaral EFL, Queiroz BL, Calazans JA. 2015. "Demographic changes, educational improvements, and earnings in Brazil and Mexico." IZA Journal of Labor & Development, 4(23): 1-21.

Amaral EFL, Rios-Neto ELG, Potter JE. 2016. “The influence of internal migration on male earnings in Brazil, 1970–2000.” Migration and Development 5(1): 55–78.

Blau FD, Mackie C (eds.). 2017. The Economic and Fiscal Consequences of Immigration. Washington, DC: The National Academies Press.

Borjas GJ. 2003. “The labor demand curve is downward sloping: Reexamining the impact of immigration on the labor market.” Quarterly Journal of Economics, 118(4): 1335–1374.

Borjas GJ. 2016. We Wanted Workers: Unraveling the Immigration Narrative. New York: W. W. Norton & Company.

Cadena BC, Kovak BK. 2016. “Immigrants equilibrate local labor markets: Evidence form the Great Recession.” American Economic Journal: Applied Economics, 8(1): 257–290.

Card D. 2009. “Immigration and inequality.” American Economic Review: Papers & Proceedings 99(2): 1–21.

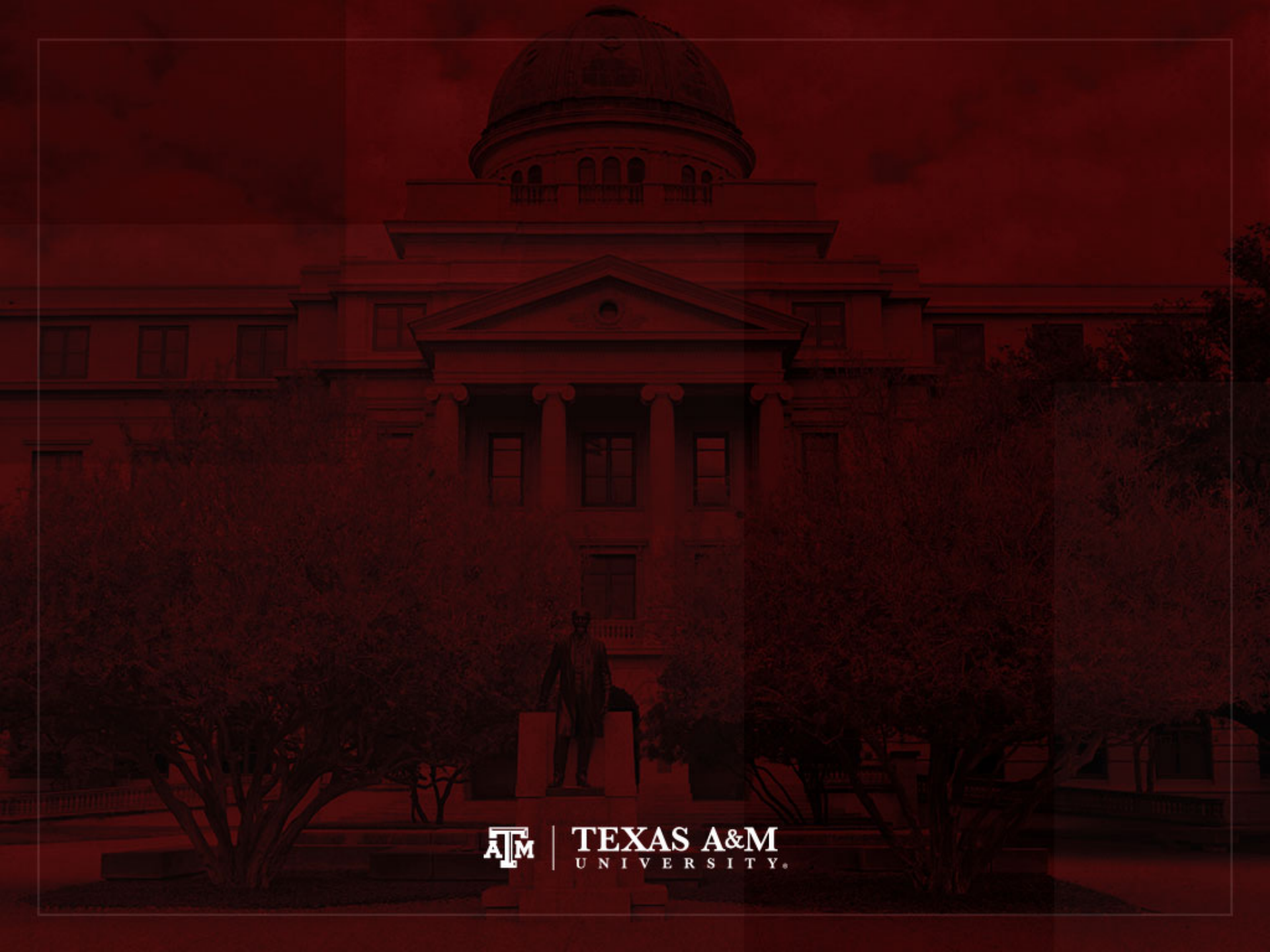
Card D. 2012. “Comment: The elusive search for negative wage impacts of immigration.” Journal of European Economics Association: 211–215.

Cattaneo C, Fiorio CV, Peri G. 2013. “Immigration and careers of European workers: Effects and the role of policies.” IZA Journal of European Labor Studies, 2(17): 1–26.

Foged M, Peri G. 2015. “Immigrants’ effect on native workers: New analysis on longitudinal data.” IZA Discussion Paper Series, 8961: 1–47.

Ottaviano GIP, Peri G. 2012. “Rethinking the effect of immigration on wages.” Journal of the European Economic Association, 10(1): 152–197.

Peri G. 2014. “Do immigrant workers depress the wages of native workers?” IZA World of Labor, 42: 1–10.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