Immigrants' Residential Choices and their Consequences

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September 2017

CEPR - CURE

Immigrants' choice of cities

A large literature on immigration compares high and low immigration cities:

- For example to learn about labor market effects
- Relatively high effort in dealing with the potentially endogenous location of immigrants

Yet, relatively little is known about how immigrants decide where to live, apart from:

- Immigrants probably move to locations in demand for labor
- Immigrants tend to settle where previous immigrants settled

This paper

Starts from a simple observation:

- An important part of immigrant consumption likely takes place in the country of origin:
  1. Remittances: Immigrants send more than 10% of disposable income back home (Dustmann and Mestres, 2010)
  2. Return migration: Savings for future in home country
  3. Time allocation: Considerable fraction of leisure time spent in home country

Builds on this observation to think about the incentives governing immigrant location choices:

- Relative to natives, immigrants may care less about local price indexes...
- ... if they consume a fraction of their income in their countries of origin.

This paper studies how this insight shapes immigrant location choices and their consequences

Contributions

1) Document strong empirical regularities:

1. Cities, wages, and immigrants
   - immigrants concentrate in large and more expensive cities
   - nominal incomes are highest in large and expensive cities

     (see Combes and Gobillon (2014) and a large literature on urban economics)
   - immigrant-native wage gap is largest in large and more expensive cities
   - these patterns are very robust:
     - robust to controlling for immigration networks
     - hold within education groups
   - patterns only attenuate for:
     - immigrants from countries of origin of price levels similar to the US
     - immigrants that have been for many years in the US
2. Immigrant consumption patterns
   - immigrants who remit, remit around 10 percent of their income
   - immigrants spend 5 percent less on local housing
   - immigrants' total expenditure on (local) consumption is 12 percent lower
   - immigrants' return migration patterns

Contributions

2) Build a spatial equilibrium model that:

- Takes into account that part of immigrant's consumption takes place at origin
- Derive the consequences that this has on location patterns and wages

3) Estimate the model using US data to quantify:

- Immigrants' contribution to the distribution of economic activity across locations
- Immigrants' contribution to total aggregate output
- Estimation of the model suggests home weight is 35 percent
- Thought experiment: Comparison to an economy where immigrants chose locations like natives

Main takeaways

Immigrants' location choices have two consequences:

1. **Distribution of economic activity**:
   - Move economic activity towards large and more expensive cities
   - Some natives are "priced out" from these large and more expensive cities
   - At current levels of immigration:
     - small cities decrease their size by around 3 percent
     - large cities increase their size by around 4 percent
2. **General equilibrium output gains from immigration**:
   - If large cities are more productive, immigrants make more productive cities larger
   - Results in overall output gains of around .15 percent, at current levels of immigration

Immigrants not only "grease the wheels" of the labor market, but systematically choose to locate in the most productive cities (Borjas, 2001)

Related Literature

Immigration literature using cross-location comparisons:

Studies of the labor market:

Card (1990), Altonji and Card (1991), Card (2001), Card (2005), Cortes (2008), Borjas et al. (1997), Lewis (2012), Monras (2015b), Lewis and Peri (2015), Borjas and Monras (Forthcoming), Dustmann et al. (2016)

Discussions of the networks instrument:

Borjas et al. (1996), Monras (2015b), Jaeger et al. (2016).

Quantitative spatial equilibrium models:

Redding and Sturm (2008), Ahlfeldt et al. (2014), Redding (2014), Albouy (2009), Notowidigdo (2013), Diamond (2015), Monras (2015a), Caliendo et al. (2015), Eeckhout and Guner (2014), Fajgelbaum et al. (2016), Fajgelbaum and Schaal (2017), Redding and Rossi-Hansberg (Forthcoming), Caliendo et al. (2017), and Monte et al. (2015)

General equilibrium and immigration:

Monras (2015b), Piyapromdee (2017)

Outline

1. Data
2. Empirical facts
3. Model
4. Estimation
5. Quantitative Results

Data

Data

- Wages and population data:
  - march supplement of CPS (1994-2011)
  - Census (1980, 1990, 2000)
  - ACS (2005-2011)

  All available at Ipums, Ruggles et al. (2016)
- MSA price data:
  - method of Moretti (2013a), extended to years 2005-2011
- GDP and price level data of origin countries from:
  - Penn World Tables
  - OECD

Descriptives

Table: List of top cities by immigrant share in 2000

MSA	*Immig. (%)*	*Size rank*	*Population*	*Weekly wage*	*Price index*	*Wage gap (%)*
Miami-Hialeah, FL	64	23	1,056,504	332	1.13	-20
Los Angeles-Long Beach, CA	48	2	6,003,886	395	1.20	-24
McAllen-Edinburg-Pharr-Mission, TX	44	88	229,812	258	0.88	-16
San Jose, CA	44	25	888,632	563	1.52	-8
Salinas-Sea Side-Monterey, CA	40	146	120,699	355	1.22	0
El Paso, TX	40	70	291,665	300	0.92	-14
Brownsville-Harlingen-San Benito, TX	38	134	137,429	275	0.90	-17
New York, NY-Northeastern NJ	36	1	8,552,276	454	1.22	-19
Visalia-Tulare-Porterville, CA	33	125	155,595	306	0.95	-7
San Francisco-Oakland-Vallejo, CA	33	6	2,417,558	494	1.38	-10
Fort Lauderdale-Hollywood-Pompano Beach, FL	33	28	799,040	393	1.17	-12
Fresno, CA	30	56	396,336	327	0.98	-8
San Diego, CA	29	15	1,306,175	411	1.19	-13
Santa Barbara-Santa Maria-Lompoc, CA	29	112	176,133	390	1.25	-8
Riverside-San Bernardino, CA	28	14	1,428,397	388	1.07	-11
Ventura-Oxnard-Simi Valley, CA	28	61	362,488	460	1.23	-17
Stockton, CA	27	83	246,980	386	1.04	-14
Houston-Brazoria, TX	26	8	2,191,391	427	1.04	-18
Honolulu, HI	26	55	397,469	393	1.23	-4
Modesto, CA	25	102	203,134	372	1.03	-3

Note: Statistics are based on the sample of prime age male workers (25-60) from the 2000 US Census.

Stylized Facts

Fact 1: Spatial distribution of immigrants

Fact 1: **Immigrants concentrate in large and expensive cities**

How to document it?

Fact 1: Spatial distribution of immigrants

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How to document it?

$$\ln\left(\frac{\text{Imm}_{c,t}}{\text{Imm}_t}/\frac{\text{Nat}_{c,t}}{\text{Nat}_t}\right) = \alpha + \beta \ln P_{c,t} + \delta_c + \delta_t + \varepsilon_{c,t} \quad (1)$$

$$\ln\left(\frac{\text{Imm}_{c,t}}{\text{Imm}_t}/\frac{\text{Nat}_{c,t}}{\text{Nat}_t}\right) = \alpha_t + \beta_t \ln P_{c,t} + \varepsilon_{c,t} \quad (2)$$

where $\ln P_{c,t}$ is either $\ln \text{Population}_{c,t}$ or $\ln \text{Price}_{c,t}$

- We can estimate cross-section coefficients for every year or run pooled regressions.

Immigrant share - size/price elasticity

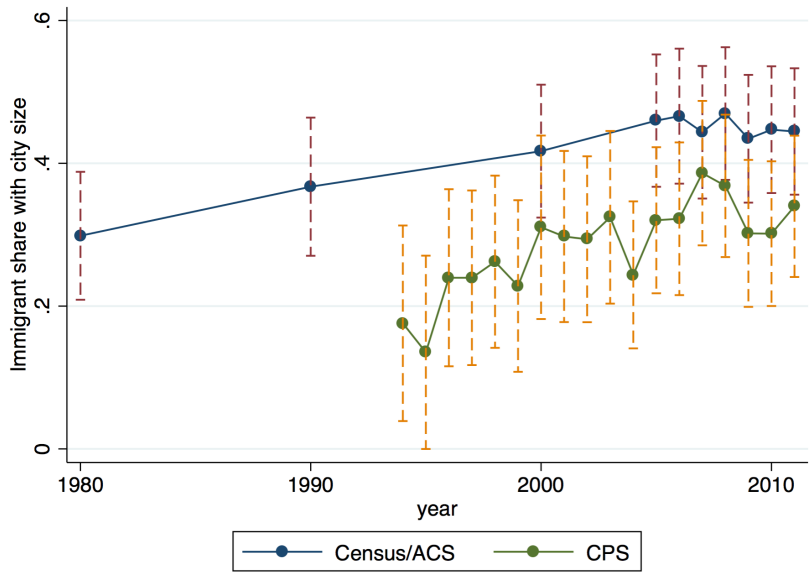
Figure: City size, price index, and immigrant share

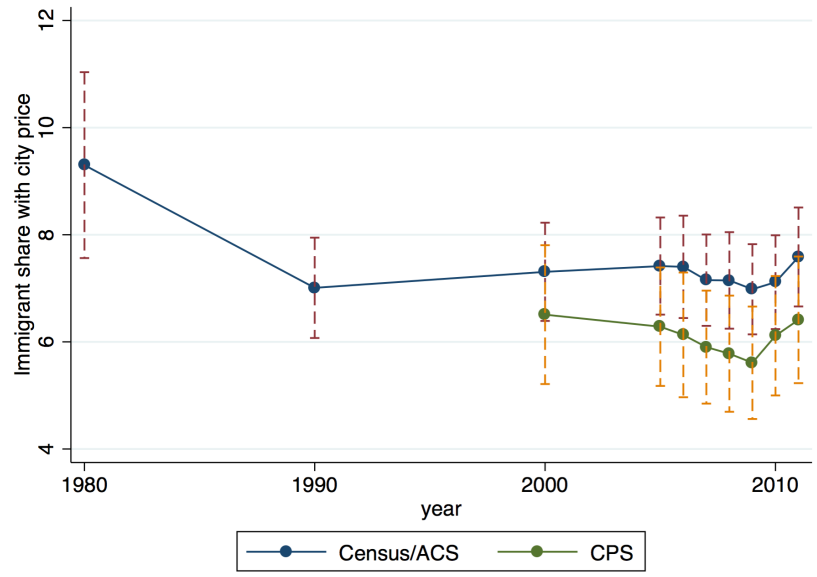
Notes: The figure is based on the sample of prime-age male workers (25-59) from Census 2000. The MSA price indexes are computed following Moretti (2013b). Each dot represents a different MSA. There are 219 different metropolitan areas in our sample.

Heterogeneity

Evolution of migrant - size/price elasticity

Figure: Evolution of city size, price index and immigrant share





Notes: This figure uses Census/ACS and CPS data from 1980 to 2011 to estimate the relationship between the share of immigrants and city size and city price. Price indexes can only be computed when Census/ACS data is available. Each dot represents the corresponding estimate of the elasticity of immigrant shares and city size and city prices for each corresponding year. Vertical lines represent 95 percent confidence intervals.

Fact 2: City Size/Price Wage Premium

Fact 2: Larger more expensive cities also pay higher nominal wages

How to document it?

$$\ln w_c = \alpha + \beta \ln P_c + \varepsilon_c \tag{3}$$

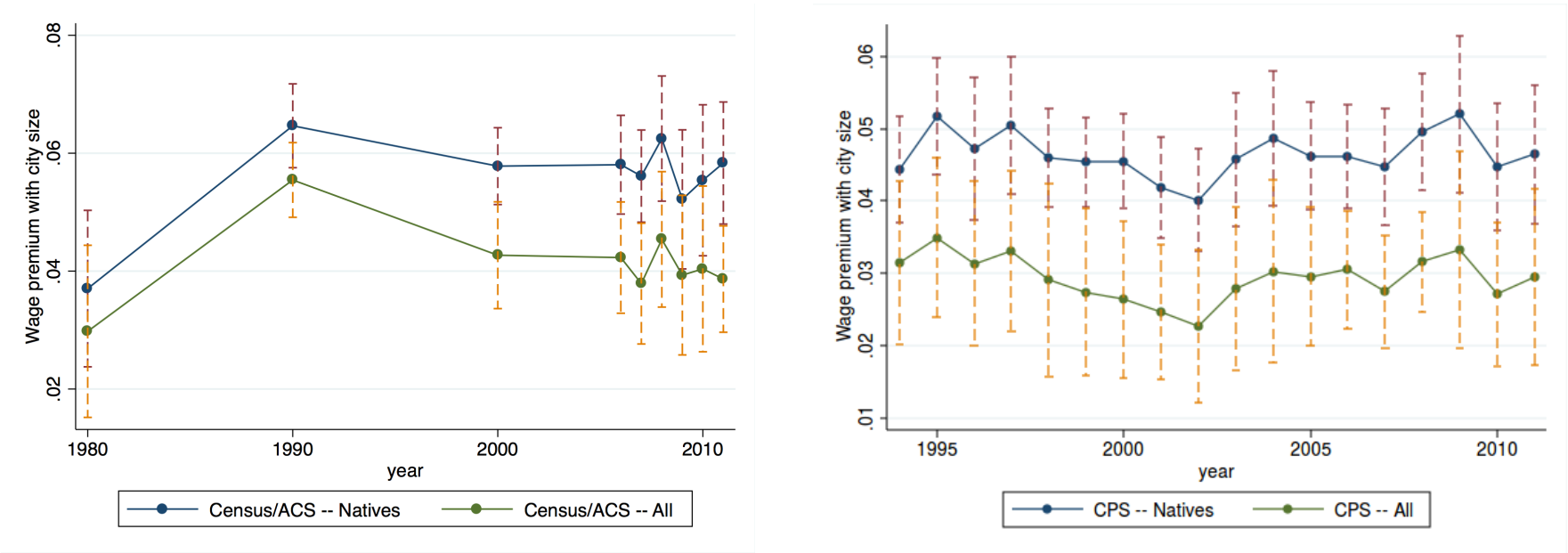
where w_c is either:

- The average wage (not reported)
- The average composition adjusted wage
- The average native composition adjusted wage

and where $\ln P_{c,t}$ is either $\ln \text{Population}_{c,t}$ or $\ln \text{Price}_{c,t}$

City Size Wage Premium

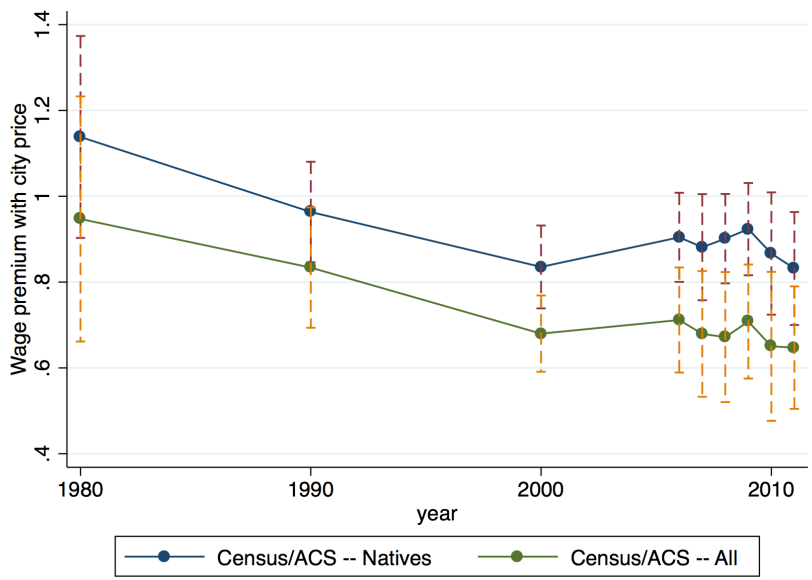
Figure: Evolution of city size premium

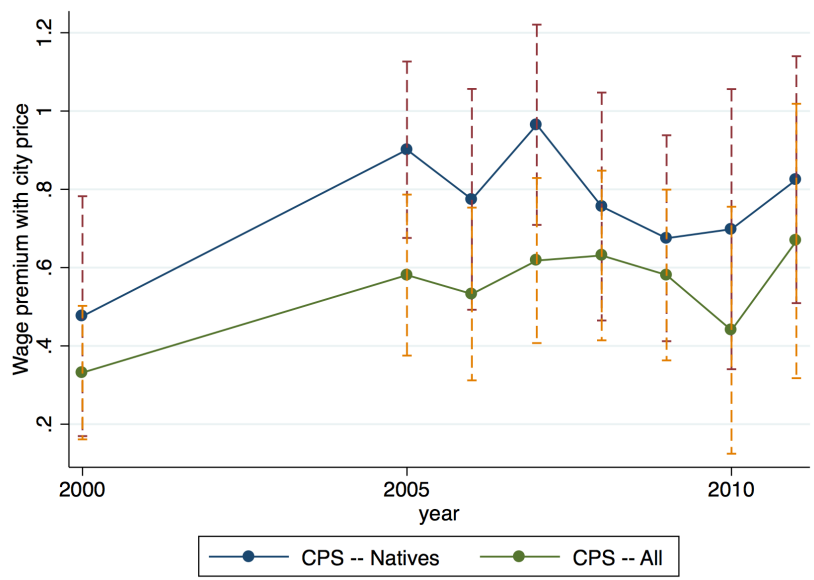


Notes: This figure uses Census/ACS and CPS data from 1980 to 2011 to estimate the relationship between wage levels and city size. Each dot represents the corresponding estimate of the elasticity of immigrant shares and city size and city prices for each corresponding year. CPS data only starts reporting the place of birth in 1994. Vertical lines represent 95 percent confidence intervals.

City Price Wage Premium

Figure: Evolution of city price level premium





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Fact 3: Native - immigrant wage gap

Fact 3: Natives earn more than immigrants, especially in large cities

How to document it?

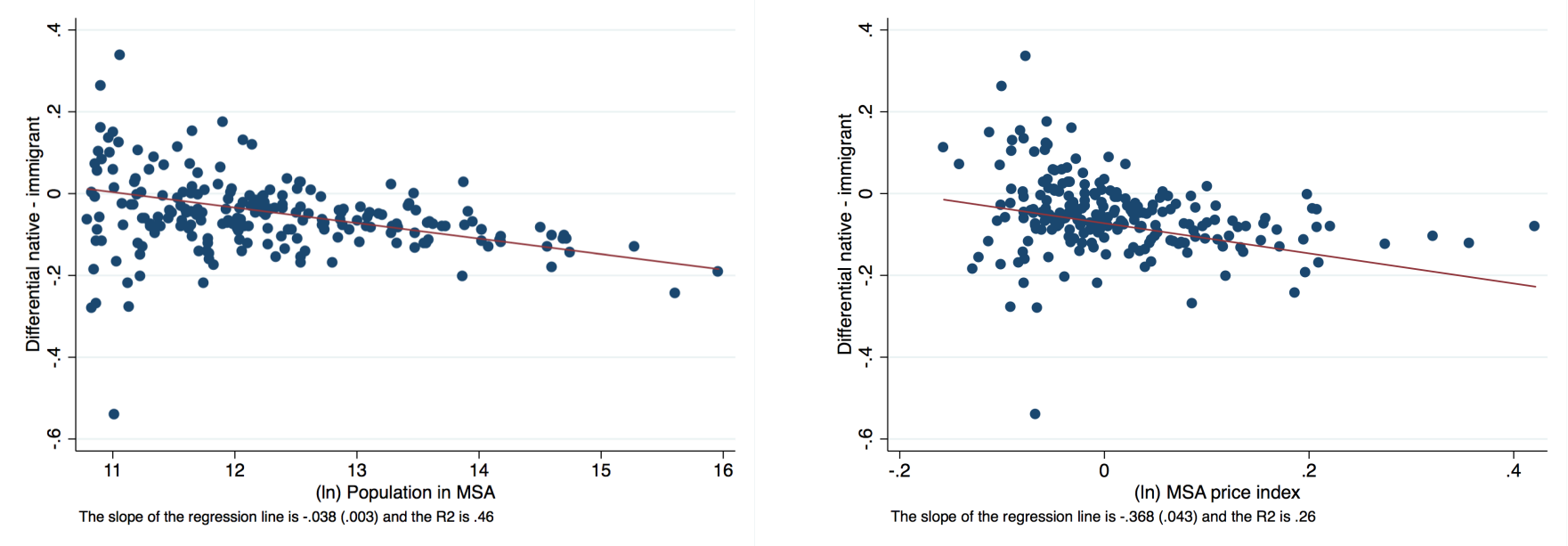
$$\ln w_{i,c,t} = \alpha + \beta Imm_{i,c,t} * \ln P_{c,t} + \gamma \ln P_{c,t} + \eta X_{i,c,t} + \delta_{ct} + \varepsilon_{i,c,t} \quad (4)$$

where $P_{c,t}$ is city population or price index.

- Mincerian wage regressions
- Controls: race, marital status, age, education, occupation
- Include immigrant and city size/price interaction

City Size/Price and Wage Gap

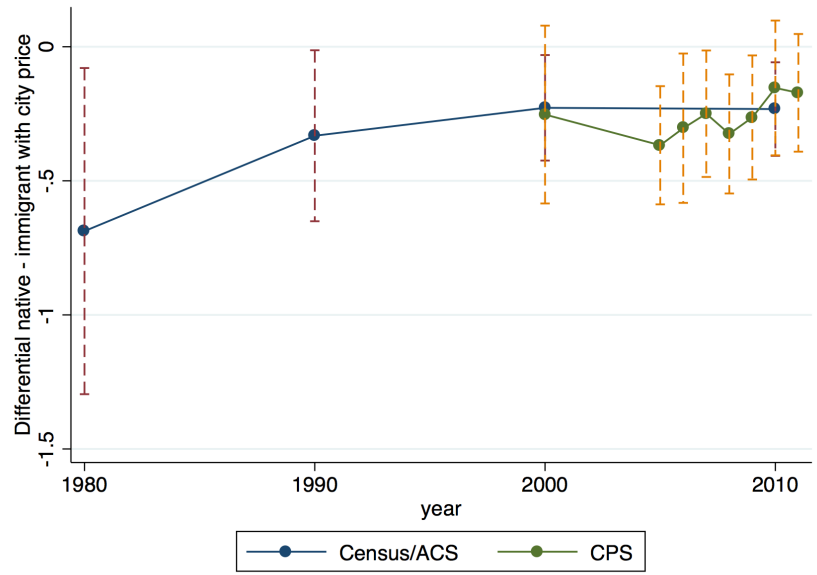
Figure: Wage gaps, city size, and price indexes



Notes: This figure uses 2000 US Census data to show the relationship between native-immigrant wage gaps and city sizes and prices. Each dot represents the gap in earnings between natives and immigrants in a metropolitan area. The red line is the fitted line of a linear regression.

Evolution of the City Size/Price and Wage Gap

Figure: Evolution of Wage gaps, city size, and price indices



Notes: This figure uses Census and CPS data from 1980 to 2011 to estimate the relationship between native-immigrant wage gaps and city size and prices for each year. Each dot represents an estimate of the native-immigrant wage gap elasticity with city size and city price index. Vertical lines represent 95 percent confidence intervals.

Native - immigrant wage gaps

Strong evidence suggesting that:

1. Native – immigrant wage gaps are decreasing in city size
2. Relatively stable over a long period of time

Are there any groups of immigrants for which this patterns dissipate?

1. Attenuates for immigrants from rich countries:
   - Figure of UK and GER – wage gaps: link
   - Figure of UK and GER – immigrant shares: link
   - Table on immigrant characteristics heterogeneity: link
   - Table on immigrant heterogeneity by coutnry of origin link
2. The relationship attenuates for immigrants who arrived a long time ago: Figure

Summary of empirical regularities

We have seen that:

1. Immigrants concentrate in large and expensive cities
2. Wages in large and expensive cities are higher
3. Wages of immigrants relative to natives are lower in large and expensive cities

Extremely robust empirical regularities:

- These relationships prevail when using various sources of variation:
  - Robust to various fixed effects: Link
  - Results hold within education groups: Link
  - Results hold for both documented and undocumented immigrants: Link
- Robust to controlling for immigration networks Details
- Robust to controlling for native-immigrant imperfect substitutability Details

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We argue that:

- Immigrants have more incentives than natives to live in larger more expensive cities
- They also have incentives to accept lower wages than natives in these cities
- **Driving force:** Part of what immigrants consume take as reference price levels at origin

Is there some direct evidence for this **driving force**?

Fact 4: Immigrant consumption patterns

Immigrants consume differently than natives:

1. Immigrants remit a large fraction of their income:
   - Dustmann and Mestres (2010) document that 10 percent of income is remitted
   - Confirmed using New Immigrant Survey data: Table
2. Immigrants spend between 2 to 5 percent less on housing:

$$\ln \text{Housing Expenditures}_i = \alpha + \beta \text{Immigrant}_i + \gamma \ln \text{Household Income}_i + \eta X_i + \varepsilon_i$$

   Two data sets, similar results: US Census Data for housing rent, US Consumer Expenditure Survey
3. Mexicans' expenditure on (local) consumption is 12 percent lower than natives, holding household characteristics fixed: Table
4. Return migration patterns exceed 10 percent for young cohorts: Figure
   - For younger cohorts who return the fraction of time spent at home country may be as large as 90 percent

Model

Model: Workers

Utility in location c for an individual i from country of origin j:

$$U_{ijc} = \rho + \ln A_c + \alpha_t \ln C_{jc}^T + (1-\alpha_t)\frac{\sigma}{\sigma-1}\ln\left(\frac{\alpha_l}{\alpha_l+\alpha_f}(C_{jc}^{NT})^{\frac{\sigma-1}{\sigma}} + \frac{\alpha_f}{\alpha_l+\alpha_f}(C_j^{NT})^{\frac{\sigma-1}{\sigma}}\right) + \varepsilon_{ijc}$$

s.t. $C_{jc}^T + p_c C_{jc}^{NT} + p_j C_j^{NT} \leq w_{jc}$

where ε is an extreme value distributed idiosyncratic taste parameter.

Difference between natives and immigrants:

- Natives only care about local price indices so that $\alpha_f = 0$ and $\alpha_l = 1$.
- Immigrants care about local and foreign price indices so that $\alpha_f \neq 0$

Simpler version: Cobb-Douglas preferences

Note: To simplify some algebra: $\bar{\alpha}_l = \frac{\alpha_l}{\alpha_l+\alpha_f}$ and $\bar{\alpha}_f = \frac{\alpha_f}{\alpha_l+\alpha_f}$

Location choice

Indirect utility:

$$\ln V_{ijc} = \ln V_{jc} + \varepsilon_{ijc} = \ln A_c + \ln w_{jc} + (1 - \alpha_t) \ln \bar{p}(\bar{\alpha}_l, \bar{\alpha}_f) + \varepsilon_{ijc}$$

with $\bar{p}(\bar{\alpha}_l, \bar{\alpha}_f) = (\bar{\alpha}_l{}^{\sigma} p_c^{1-\sigma} + \bar{\alpha}_f{}^{\sigma} p_j^{1-\sigma})^{\frac{1}{\sigma-1}}$

Location choices:

$$\pi_{jc} = \frac{V_{jc}^{1/\lambda}}{\sum_k V_{jk}^{1/\lambda}} = (\frac{V_{jc}}{V_j})^{1/\lambda}$$

where π_{jc} is the share of workers from country j that decide to live in city c.

Model: Labor and Housing Markets

- Production of tradables:
  - $Q_c^T = B_c L_c$
  - With agglomeration externalities: $B_c(L_c) = B_c L_c^a$, $a > 0$
- Labor markets not competitive (Becker (1957), Black (1995)):
  - Firm surplus: $S_{jc}^F = (B_c - w_{jc}) \approx \ln \tilde{B}_c - \ln w_{jc}$
  - Worker surplus: $S_{jc}^W = \ln V_{jc}$ Discussion
  - Wages are determined by Nash bargaining with workers' weight given by β:

$$\ln w_{jc} = -(1-\beta) \ln A_c + \beta \ln \tilde{B}_c - (1-\beta)(1-\alpha_t) \ln \bar{p}$$

- Inelastic housing supply: $\ln p_c = \eta \ln L_c$

Immigrants relative to natives

Proposition

There is a gap in wages between natives and immigrants. This gap is increasing in the local price index.

$$\ln w_{Nc} - \ln w_{jc} = (1-\beta)(1-\alpha_t)\ln p_c - (1-\beta)(1-\alpha_t)\ln \bar{p}_{jc} \tag{5}$$

Proposition

Migrants concentrate in expensive cities.

$$\ln \frac{\pi_{jc}}{\pi_{Nc}} = \frac{1}{\lambda}\left(\beta(1-\alpha_t)\ln p_c - \beta(1-\alpha_t)\ln \bar{p}_{jc}\right) + \ln \frac{\sum_k \left(A_k \tilde{B}_k / L_k^{\eta(1-\alpha_t)}\right)^{\frac{\beta}{\lambda}}}{\sum_k \left(A_k \tilde{B}_k / \bar{p}_{jk}^{(1-\alpha_t)}\right)^{\frac{\beta}{\lambda}}} \tag{6}$$

Distribution of population and total ouput

Proposition

The equilibrium size of a city is increasing in local productivity and amenities according to:

$$L_c = (A_c \tilde{B}_c)^{\frac{\beta}{\lambda}} \sum_j \frac{L_j / \bar{p}_{jc}^{(1-\alpha_t)\frac{\beta}{\lambda}}}{\sum_k (A_k \tilde{B}_k / \bar{p}_{jk}^{(1-\alpha_t)})^{\frac{\beta}{\lambda}}} + \frac{(A_c \tilde{B}_c / L_c^{\eta(1-\alpha_t)})^{\frac{\beta}{\lambda}}}{\sum_k (A_k \tilde{B}_k / L_k^{\eta(1-\alpha_t)})^{\frac{\beta}{\lambda}}} L_N \tag{7}$$

Proposition

Migrants increase the size of the larger metropolitan areas of the economy. Larger metropolitan areas are, on average, more productive, and thus immigrants increase output per capita:

$$q = \sum_c \left[(A_c \tilde{B}_c^{\frac{\beta+\lambda}{\beta}})^{\frac{\beta}{\lambda}} \sum_j \frac{\frac{L_j}{L} / \bar{p}_{jc}^{(1-\alpha_t)\frac{\beta}{\lambda}}}{\sum_k (A_k \tilde{B}_k / \bar{p}_{jk}^{(1-\alpha_t)})^{\frac{\beta}{\lambda}}} \right] + \frac{\sum_c (A_c \tilde{B}_c^{\frac{\beta+\lambda}{\beta}} / L_c^{\eta(1-\alpha_t)})^{\frac{\beta}{\lambda}}}{\sum_k (A_k \tilde{B}_k / L_k^{\eta(1-\alpha_t)})^{\frac{\beta}{\lambda}}} \frac{L_N}{L} \tag{8}$$

Two main results

1. *Distributional effect*:
   - Immigrants have a comparative advantage in living in most productive cities
   - Immigrant location choices moves economic activity towards more productive cities
   - Some natives are "priced out" from the most productive cities

2. *General equilibrium effect*:
   - Overall output increases

Estimation

Estimation

We estimate the model by the method of simulated moments using:

$$\ln w_{Nc} - \ln w_{jc} = (1-\beta)(1-\alpha_t)\ln p_c - (1-\beta)(1-\alpha_t)\ln \bar{p}_{jc} \tag{9}$$

$$\ln \frac{\pi_{jc}}{\pi_{Nc}} = \frac{1}{\lambda}\left(\beta(1-\alpha_t)\ln p_c - \beta(1-\alpha_t)\ln \bar{p}_{jc}\right) + \ln \frac{\sum_k \left(A_k \tilde{B}_k / p_k^{(1-\alpha_t)}\right)^{\frac{\beta}{\lambda}}}{\sum_k \left(A_k \tilde{B}_k / \bar{p}_{jk}^{(1-\alpha_t)}\right)^{\frac{\beta}{\lambda}}} \tag{10}$$

Note that:

- We use 2 moments for each country of origin
- We use these equations to estimate $\{\beta, \bar{\alpha}_f, \sigma, \lambda\}$.
- α_t cannot be separately identified. Calibrated to .3 (Mian et al., 2013).
- We take MSA productivities (B) and amenities (A) from Albouy (2016)
- We take MSA housing supply elasticities (η) from Saiz (2010)
- We take $a = 0.05$ from Combes and Gobillon (2014)

Estimation details

Summary of Estimation

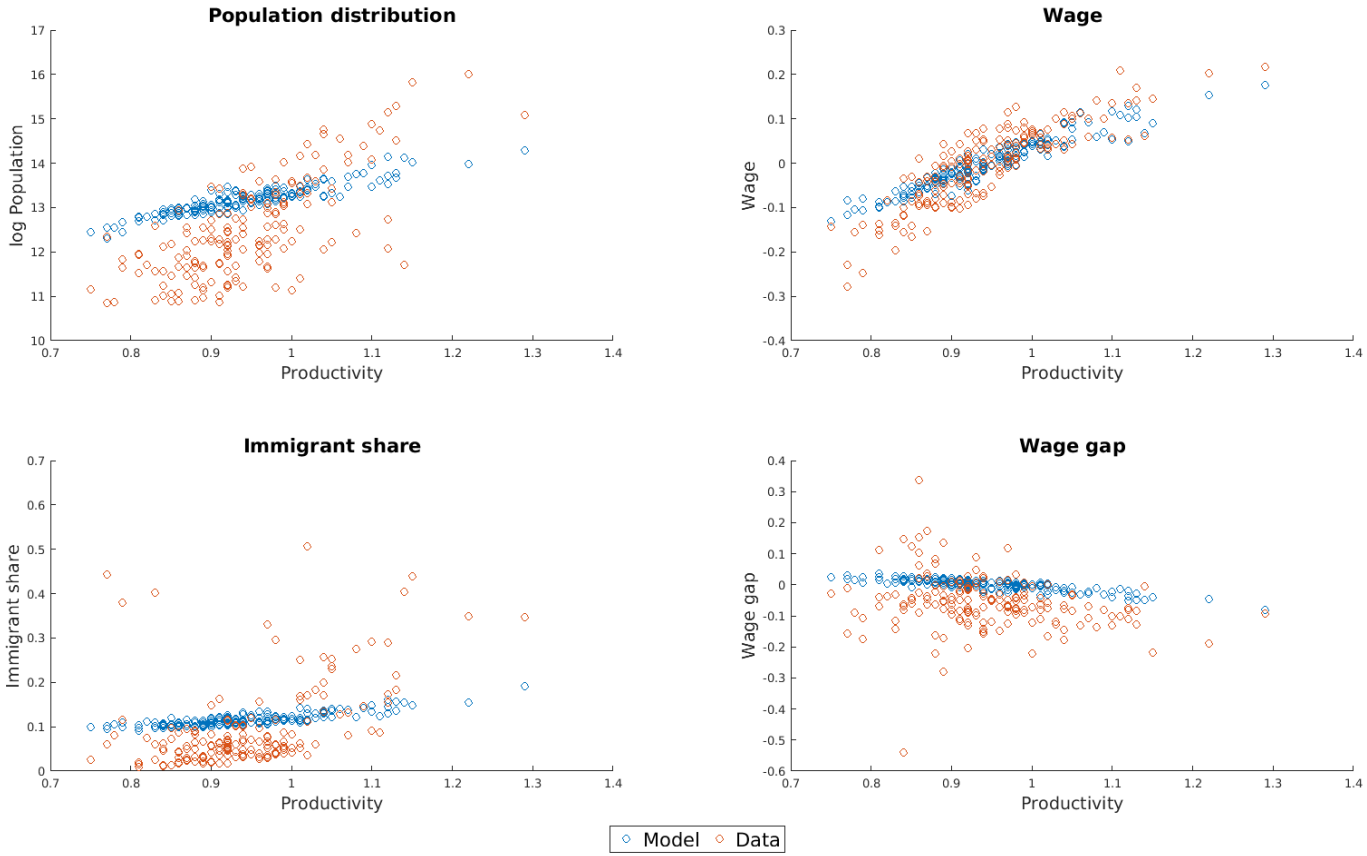
Table: Model estimates

Variable	Estimate	Source
Share of consumption on non-tradable goods	0.7	Mian et al. (2013)
Workers' bargaining weight	0.37	Estimated
Share of home goods consumption (among non-tradable gods)	0.52	Estimated
Sensitivity to local conditions	0.08	Estimated
Elasticity of substitution home-local goods	1.1	Estimated
Amenity levels		Albouy (2016)
Productivity levels		Albouy (2016)
House price supply elasticity		Saiz (2010)
Local agglomeration	0.05	Combes and Gobillon (2014)

Notes: This table shows the estimates of the parameters $\bar{\alpha}_f$, β, λ, and σ when using the stated parameters in the papers cited under "Source". The estimates are based on simulated method of moments.

Comparison with Data

Untargeted moments



Notes: This figure compares the data and the model. Each dot represents a city. We use the 168 consolidated metropolitan areas used in Albouy (2016). See the text for the details on the various parameters of the model. In this figure, we assume that the endogenous agglomeration forces are 5 percent (i.e., $a = 0.05$).

Quantitative Results

Counterfactual

Simulation of the following experiment:

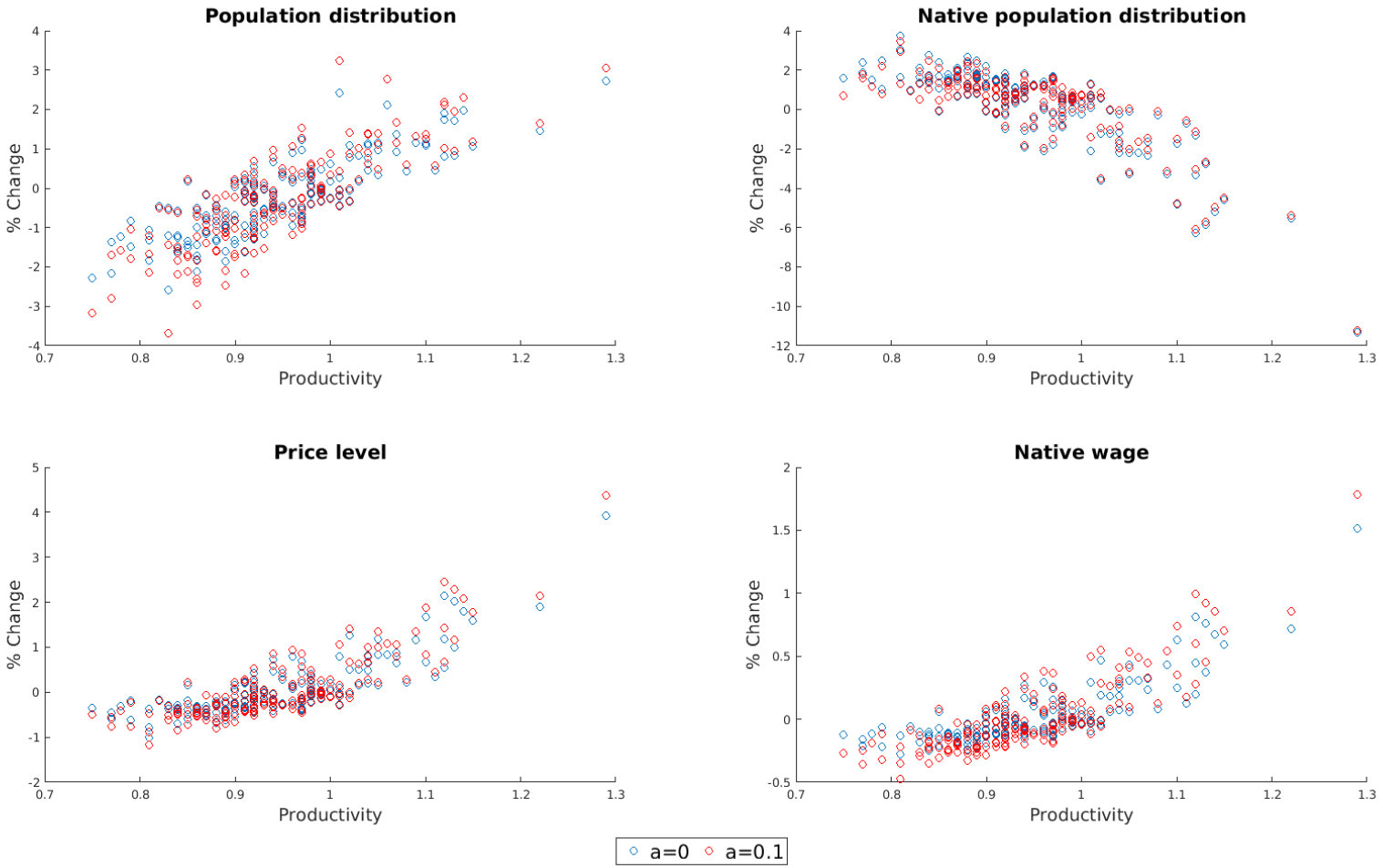
- Immigrant share from 1% to 20%
- Holding population constant

Thus, results come from

- The composition of population alone
- No scale effects

This exercise isolates the consequences of immigrant location choices

Population, native locations, and prices



Notes: This figure compares the model with and without agglomeration forces. Each dot represents a city. We use the 168 consolidated metropolitan areas used in Albouy (2016). See the text for the details on the various parameters of the model.

Distributional consequences

Immigration location choices:

1. Make large cities larger
2. Displace natives from large cities
3. The displacement comes from the increase in local price indexes in most productive cities
4. Increases the gap in wages between most and least productive cities

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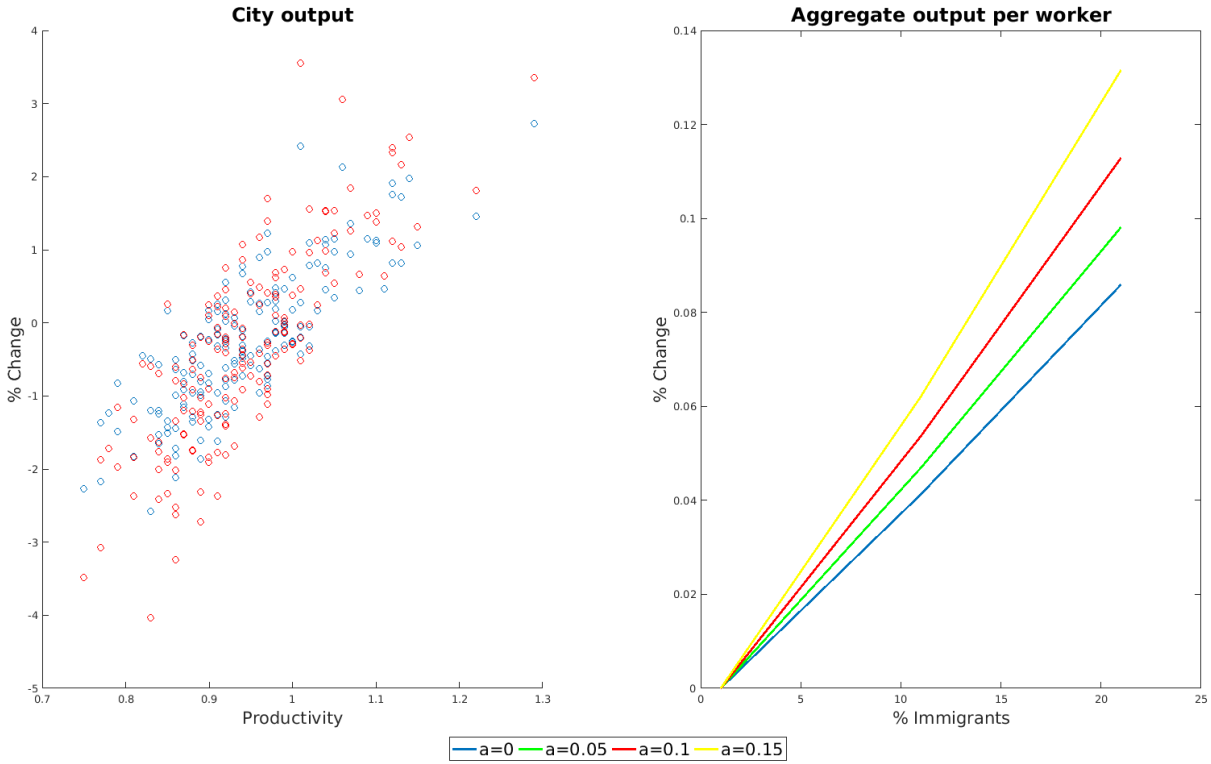
Do this distributional effects also impact aggregate economic activity?

Patterns of economic activity

Figure: Effect of immigrants on the distribution of output and on total output



Notes: This figure compares the model with and without agglomeration forces. Each dot, in the graph on the left, represents a city. We use the 168 consolidated metropolitan areas used in Albouy (2016). See the text for the details on the various parameters of the model. The graph on the right shows the relationship between total output and aggregate immigrant share predicted by the model.

Discussion of welfare consequences

- Native workers:
  - Congestion forces dominate agglomeration forces
  - Therefore, increases in prices larger than change in nominal wages
    $=>$ Welfare loss in productive cities
- Firm owners (not modeled)
  - Lower wages in productive cities (and higher productivity with agglomeration)
    $=>$ Welfare gain in productive cities
- Land owners (not modeled)
  - Higher housing prices in productive cities
    $=>$ Welfare gain in productive cities

Total welfare changes depend on assumptions on firm/land ownership

Conclusion

Conclusion

Simple observation:

- Part of what immigrants consume may be related to home country price indexes

This translates into:

- Immigrants concentrate in large and expensive cities
- Immigrant - native gap in wages is largest in large and expensive cities

Consequences:

- Immigrants move economic activity from low productivity to high productivity places, while displacing some natives from some of the most productive cities
- We estimate (per worker) output gains due to immigrants location choices in the order of 0.15 percent

Ahlfeldt, G., S. Redding, D. Sturm, and N. Wolf, "The Economics of Density: Evidence from the Berlin Wall," *RR Econometrica*, 2014.
Albouy, D., "The Unequal Geographic Burden of Federal Taxation," *Journal of Political Economy*, 2009.
___ , "What are Cities Worth? Land Rents, Local Productivity, and the Total Value of Amenities," *Review of Economics and Statistics*, 2016, *98(3)*, 477–487.
Altonji, J. and D. Card, "The Effects of Immigration on the Labor Market Outcomes of Less-Skilled Natives," *in John Abowd and Richard Freeman (eds.), Immigration, Trade, and the Labor Market, University of Chicago Press*, 1991.
Becker, G., *The Economics of Discrimination* 1957.
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Estimation results

Table: Baseline wage regression

VARIABLES	(1) Wage OLS	(2) Wage OLS	(3) Wage OLS	(4) Wage OLS
Immigrant premium	0.318	0.323**	0.320**	0.278***
	(0.249)	(0.144)	(0.145)	(0.102)
(ln) Population in MSA	0.0597***	0.0446***	0.0446***	0.0423***
	(0.00463)	(0.00308)	(0.00308)	(0.0156)
(ln) Population in MSA x Immigrant	-0.0474**	-0.0340***	-0.0338***	-0.0310***
	(0.0183)	(0.0106)	(0.0107)	(0.00770)
Observations	360,970	360,970	360,970	360,970
R-squared	0.051	0.407	0.408	0.417
Xs	no	yes	yes	yes
Year FE	no	no	yes	yes
MSA FE	no	no	no	yes

Notes: These regressions only report selected coefficients. Robust standard errors, clustered at the metropolitan area level, are reported. One star, two stars, and three stars represent statistical significance at .1, .05, and .001 confidence levels.

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Estimation results, heterogeneity 1

Table: Heterogeneity by subsample

VARIABLES	(1) Wage Men	(2) Wage Women	(3) Wage <HS	(4) Wage HS	(5) Wage SC	(6) Wage C
Immigrant premium	0.262*	0.145	0.115	0.239*	0.328***	0.186*
	(0.144)	(0.131)	(0.0765)	(0.128)	(0.0978)	(0.104)
(ln) Population in MSA	0.0438***	0.0256**	0.0371	0.0200	0.0338*	0.0644***
	(0.0167)	(0.0111)	(0.0262)	(0.0235)	(0.0179)	(0.0180)
(ln) Population in MSA x Immigrant	-0.0337***	-0.0183*	-0.0186***	-0.0305***	-0.0346***	-0.0201***
	(0.0110)	(0.0100)	(0.00544)	(0.00949)	(0.00726)	(0.00745)
Observations	360,970	345,734	39,537	101,885	94,124	125,424
R-squared	0.382	0.299	0.224	0.262	0.269	0.310
Xs	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
MSA FE	yes	yes	yes	yes	yes	yes

Notes: These regressions only report selected coefficients. Columns (3) to (6) show results by education group (high school dropout, high school graduate, some college, college). Robust standard errors, clustered at the metropolitan area level, are reported. One star, two stars, and three stars represent statistical significance at .1, .05, and .001 confidence levels.

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Estimation results, heterogeneity 2

Table: Heterogeneity by immigrant subsample

VARIABLES	(1) Wage P<US P	(2) Wage P>US P	(3) Wage GDP<US GDP	(4) Wage GDP>US GDP	(5) Wage German	(6) Wage UK	(7) Wage Doc.	(8) Wage Undoc.	(9) Wage New	(10) Wage Old
Immigrant premium	0.285**	0.0462	0.309***	0.0271	-0.309	0.117	0.236**	0.393***	0.297**	0.283***
	(0.126)	(0.0728)	(0.110)	(0.0842)	(0.363)	(0.212)	(0.0944)	(0.145)	(0.131)	(0.105)
(ln) Population in MSA	0.0353***	0.0402***	0.0359***	0.0377***	0.0310**	0.0316**	0.0417***	0.0339***	0.0416***	0.0336**
	(0.0129)	(0.0152)	(0.0132)	(0.0140)	(0.0123)	(0.0126)	(0.0155)	(0.0128)	(0.0153)	(0.0131)
(ln) Population in MSA x Immigrant	-0.0324***	-0.0104**	-0.0331***	-0.0139**	0.0219	-0.00276	-0.0271***	-0.0412***	-0.0349***	-0.0270***
	(0.00944)	(0.00474)	(0.00830)	(0.00555)	(0.0258)	(0.0150)	(0.00708)	(0.0108)	(0.00982)	(0.00783)
Observations	326,175	298,257	352,619	295,245	287,419	287,959	334,360	313,504	337,139	310,725
R-squared	0.413	0.385	0.416	0.386	0.382	0.382	0.391	0.416	0.417	0.387
Xs	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
MSA FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Notes: These regressions only report selected coefficients. The first four columns show results of regressions with the immigrant sample being restricted to immigrants from origin countries with a lower or higher average price level (P) or GDP than the US (average over the sample period 1994-2011). The last four columns show results of regressions with the immigrant sample being restricted to the indicated subgroup. Robust standard errors, clustered at the metropolitan area level, are reported. One star, two stars, and three stars represent statistical significance at .1, .05, and .001 confidence levels.

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Table: Heterogeneity by countries of origin

VARIABLES	(1) Wage OLS	(2) Wage OLS	(3) Wage OLS	(4) Wage OLS	(5) Wage OLS	(6) Wage OLS
(ln) GDP origin	0.0141***	-0.0488	-0.118***	0.0166***	-0.0334	-0.0936**
	(0.00480)	(0.0296)	(0.0395)	(0.00321)	(0.0265)	(0.0363)
(ln) Population in MSA		-0.0293	-0.0622***		0.0167	-0.0333
		(0.0202)	(0.0210)		(0.0279)	(0.0242)
(ln) Population in MSA x (ln) GDP origin		0.00436**	0.00805***		0.00342*	0.00712***
		(0.00196)	(0.00184)		(0.00178)	(0.00171)
Observations	74,076	74,076	74,076	74,076	74,076	74,076
R-squared	0.445	0.445	0.461	0.459	0.459	0.472
Xs	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
MSA FE	no	no	no	yes	yes	yes
Country origin FE	no	no	yes	no	no	yes
Sample	migrants	migrants	migrants	migrants	migrants	migrants

VARIABLES	(1) Wage OLS	(2) Wage OLS	(3) Wage OLS	(4) Wage OLS	(5) Wage OLS	(6) Wage OLS
(ln) GDP origin	0.0316***	0.0376***	-0.0375	0.0368***	0.0364***	-0.0331
	(0.00989)	(0.00996)	(0.0232)	(0.00949)	(0.00945)	(0.0220)
(ln) Population in MSA		0.0447***	0.0461***		0.0429***	0.0394***
		(0.00310)	(0.00324)		(0.0159)	(0.0130)
(ln) Population in MSA x Immigrant		-0.0859***	-0.111***		-0.0776***	-0.103***
		(0.0250)	(0.0235)		(0.0185)	(0.0195)
(ln) Population in MSA x (ln) GDP origin		0.00579**	0.00840***		0.00520***	0.00792***
		(0.00228)	(0.00204)		(0.00176)	(0.00179)
Observations	360,970	360,970	360,970	360,970	360,970	360,970
R-squared	0.402	0.408	0.413	0.417	0.418	0.422
Xs	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
MSA FE	no	no	no	yes	yes	yes
Country origin FE	no	no	yes	no	no	yes
Sample	All	All	All	All	All	All

Notes: This table shows the relationship between native–immigrant wage gaps and the per capita GDP in the country of origin.

Back 1 Back 2

Immigration networks

We can use the following estimation equation:

$$\begin{aligned}\ln w_{i,c,t} = \alpha + \beta_1 Imm_{i,c,t} * \ln Pop_{c,t} + \gamma_1 \ln Pop_{c,t} + \beta_2 \text{Immigrant Network}_{i,c,t} \\ + \gamma_1 \text{Immigrant Network}_{i,c,t} * \ln Pop_{c,t} + \eta X_{i,c,t} + \delta_{ct} + \varepsilon_{i,c,t}\end{aligned} \tag{11}$$

where we measure the size of the network with

$$\text{Immigrant Network}_{i,c,t} = \frac{Pop(i)_{c,t}}{Pop_{c,t}}$$

I.e. the share of people in the location of the same country of origin.

Immigration networks

Table: Wage gaps and immigration networks

VARIABLES	(1) Wage OLS	(2) Wage OLS	(3) Wage OLS	(4) Wage OLS	(5) Wage OLS
migrant network x (ln) Population, in MSA		-0.252***			-0.0944**
		(0.0699)			(0.0384)
migrant network in MSA	-0.976***	2.522***		-0.451***	0.865*
	(0.0802)	(0.884)		(0.0403)	(0.496)
(ln) Population in MSA	0.0306***	0.0342***	0.0423***	0.0397***	0.0399***
	(0.0117)	(0.0120)	(0.0156)	(0.0133)	(0.0132)
Immigrant premium			0.278***	0.356***	0.266***
			(0.102)	(0.0619)	(0.0731)
(ln) Population in MSA x Immigrant			-0.0310***	-0.0347***	-0.0283***
			(0.00770)	(0.00461)	(0.00548)
Observations	360,970	360,970	360,970	360,970	360,970
R-squared	0.413	0.414	0.417	0.418	0.418
Xs	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes
MSA FE	yes	yes	yes	yes	yes

Notes: This table shows estimates of the native - immigrant wage gap and how it changes with city size, controlling for immigration networks. Immigration networks are measured as the relative size of the immigrant population of each different country of origin, with respect to the host metropolitan area. GDP origin is GDP per capita in the country of origin. These estimates use CPS data from 1994 - 2011.

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Native - Immigrant substitutability

We can use the following estimation equation:

$$\begin{aligned} \ln w_{i,c,t} = \alpha + \beta_1 Imm_{i,c,t} * \ln Pop_{c,t} + \gamma_1 \ln Pop_{c,t} + \beta_2 \text{Immigrant share}_{e(i),c,t} \\ + \gamma_1 \text{Immigrant share}_{e(i),c,t} * \ln Pop_{c,t} + \eta X_{i,c,t} + \delta_{ct} + \varepsilon_{i,c,t} \end{aligned} \tag{12}$$

where we measure the immigrant share as:

$$\text{Immigrant Share}_{e(i),c,t} = \frac{Imm_{e(i),c,t}}{Pop_{e,c,t}}$$

I.e. the share of immigrants of education e in location c.

Native - Immigrant substitutability

Table: Wage gaps and imperfect native - immigrant substitutability

VARIABLES	(1) Wage OLS	(2) Wage OLS	(3) Wage OLS	(4) Wage OLS	(5) Wage OLS
Share of immigrants (by edcode) x (ln) Population, in MSA		-0.0763***			-0.0386***
		(0.0106)			(0.00842)
Share of immigrants (by edcode)	-0.249***	0.805***		-0.108***	0.427***
	(0.0384)	(0.137)		(0.0260)	(0.114)
(ln) Population in MSA	0.0360***	0.0500***	0.0423***	0.0416***	0.0478***
	(0.0128)	(0.0149)	(0.0156)	(0.0137)	(0.0145)
Immigrant premium			0.278***	0.302***	0.226**
			(0.102)	(0.0982)	(0.0913)
(ln) Population in MSA x Immigrant			-0.0310***	-0.0323***	-0.0270***
			(0.00770)	(0.00735)	(0.00685)
Observations	360,970	360,970	360,970	360,970	360,970
R-squared	0.411	0.411	0.417	0.418	0.418
Xs	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes
MSA FE	yes	yes	yes	yes	yes

Notes: This table shows estimates of the native–immigrant wage gap and how it changes with city size, controlling for immigrant supply. Immigrant supply shocks are measured as the relative size of the immigrant population in each metropolitan area and each of the four education codes previously reported. These estimates use CPS data from 1994 to 2011.

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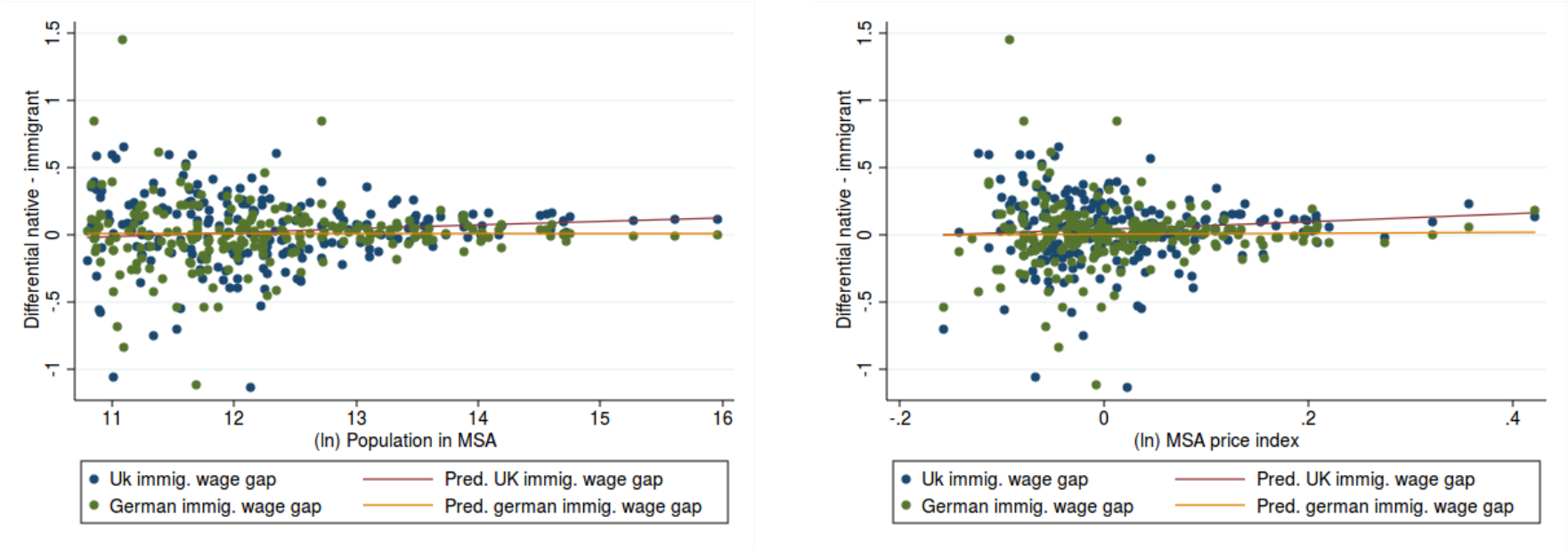
Price levels at origin

Figure: Wage gaps for UK and German immigrants (2000)



Notes: This figure uses 2000 US Census data to show the relationship between native-immigrant wage gaps and city sizes and prices for a selected set of countries of origin. Each dot represents the gap in earnings between natives and immigrants in a metropolitan area. The UK and Germany are selected on the basis of being countries of origin with high price levels and large immigrant populations in the United States.

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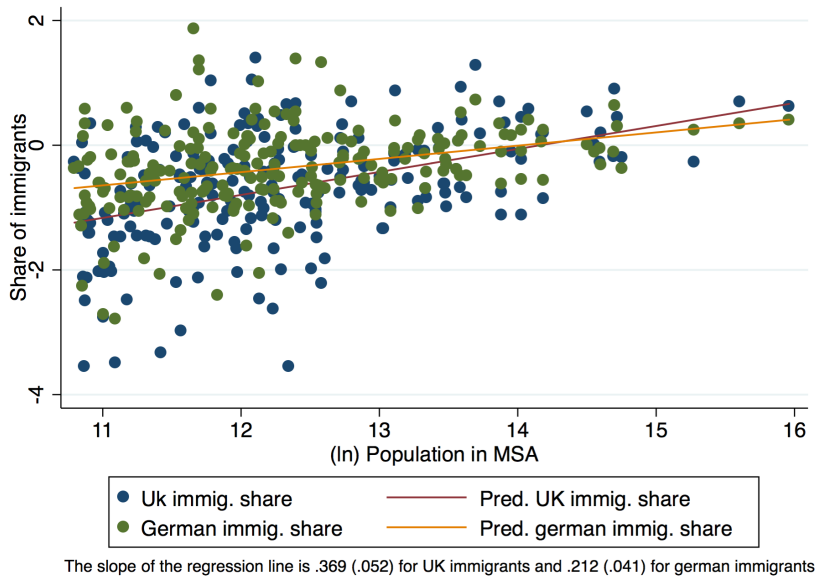
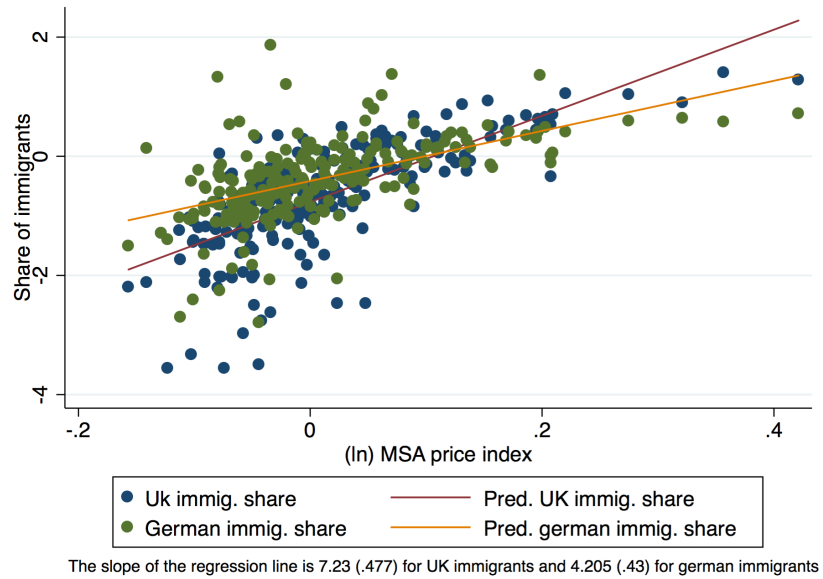
Immigrant shares by origin

Caveat: We do not control (yet) for education levels. High educated workers are usually more concentrated in larger cities.

Figure: Immigrant shares for UK and German immigrants (2000)





Notes: This figure uses 2000 US Census data to show the relationship between immigrant shares and city sizes and prices for a selected set of countries of origin. Each dot represents the gap in earnings between natives and immigrants in a metropolitan area. The UK and Germany are selected on the basis of being countries of origin with high price levels and large immigrant populations in the United States.

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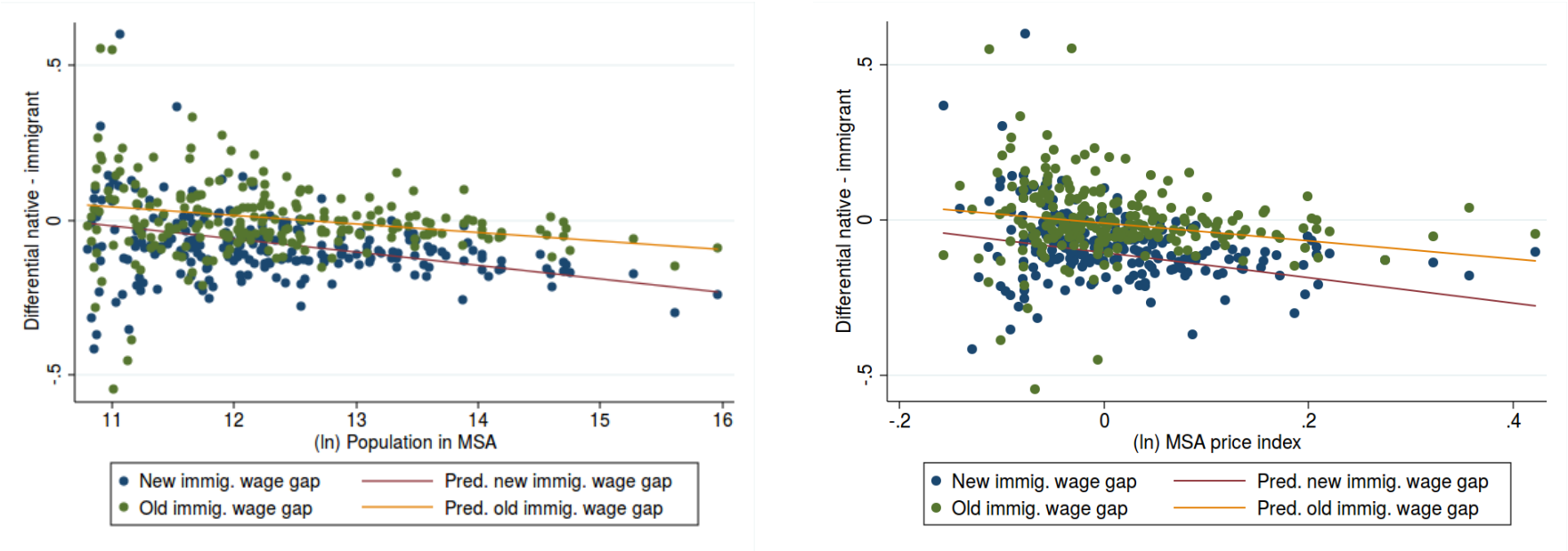
Immigrant attachment to origin

Figure: Wage gaps for new and old immigrants (2000)



Notes: This figure uses 2000 US Census data to show the relationship between the wage gaps of new ($\leq$ 20 years in the US) and old ($>$ 20 in the US) immigrants to natives and city sizes and prices. The fitted line for the relationship between new immigrants and city size or city price index is significantly more negative than for old immigrants.

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Immigrant Remittances

Table: Remittances

Origin region	*Frequency (%)*	*Income share (%)*	*Income share for remit>0 (%)*
Latin America	32.54	2.35	8.86
Africa	30.31	2.57	12.17
Asia	25.31	2.81	12.8
Mexico	20.55	2.57	14.02
Europe	12.93	1.25	10.73
Total	24.73	2.24	10.98

Notes: Data come from the 2003 NIS, a representative sample of newly admitted legal permanent residents. Statistics are based on a subsample of immigrants with positive income (from wages, self-employment, assets or real estate) and with a close relative (parent, spouse or children) living in the origin country. Income shares over 200% are dropped.

Immigrant housing expenditures

$$\ln \text{Monthly Rents}_i = \alpha + \beta \text{Immigrant}_i + \gamma \ln \text{Household Income}_i + \eta X_i + \varepsilon_i \quad (13)$$

Table: Immigrants' expenditure on housing

VARIABLES	(1) (ln) monhtly rent OLS	(2) (ln) monhtly rent OLS	(3) (ln) monhtly rent OLS	(4) (ln) monhtly rent OLS
Immigrant indicator	-0.0491***	-0.0438***	-0.0267**	-0.0202*
	(0.0133)	(0.0128)	(0.0120)	(0.0109)
Total household income	0.147***	0.179***	0.279***	0.386***
	(0.00303)	(0.00401)	(0.00485)	(0.00624)
Observations	2,869,862	2,089,411	2,716,515	2,416,819
Sample	Full	workers	rent<income	2*rent<income
Controls	yes	yes	yes	yes

Notes: This table shows regressions of (ln) monthly gross rents on (ln) total household income and observable characteristics which include race, occupation, metropolitan area of residence, family size, and marital status. Year fixed effects are also included. Data from US Census and ACS from 1980 to 2011 is used. Sample full uses all possible observations. Sample "workers" uses the observations used to estimate wages (in the last part of the paper). Sample "rent¡income" restricts sample to households whose total income is larger than total rent (i.e. 12 times the monthly rent). Sample "2*rent¡income" restricts the sample to workers earning twice as much as total rents. Standard errors clustered at the metropolitan area level.

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Immigrant housing expenditures, 2

$$\ln \text{Housing Expenditure}_i = \alpha + \beta \text{Mexican}_i + \sum_j \gamma_j \text{Household Income category } j_i + \eta X_i + \varepsilon_i \quad (14)$$

Table: Immigrants' expenditure on housing, Consumer Expenditure Survey

	(1)	(2)	(3)	(4)
	ln_Expenditure_Housing	ln_Expenditure_Housing	ln_Expenditure_Housing	ln_Expenditure_Housing
VARIABLES	OLS	OLS	OLS	OLS
Mexican	-0.174***	0.011	-0.108***	-0.044***
	(0.009)	(0.008)	(0.009)	(0.009)
Observations	133,469	133,469	133,469	133,469
R-squared	0.003	0.187	0.227	0.285
Controls	none	income	pers. characteristics	all

Notes: This table shows regressions of (ln) housing expenditure on a number of personal characteristics.

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Immigrant total expenditures

$$\text{ln Total Expenditure}_i = \alpha + \beta \text{Mexican}_i + \sum_j \gamma_j \text{Household Income category } j_i + \eta X_i + \varepsilon_i \quad (15)$$

Table: Immigrants' total expenditure, Consumer Expenditure Survey

	(1)	(2)	(3)	(4)
	(ln) Total Expenditure	(ln) Total Expenditure	(ln) Total Expenditure	(ln) Total Expenditure
VARIABLES	OLS	OLS	OLS	OLS
Mexican indicator	-0.325***	-0.091***	-0.198***	-0.115***
	(0.008)	(0.007)	(0.009)	(0.008)
Observations	105,975	105,975	105,975	105,975
R-squared	0.015	0.285	0.220	0.342
Controls	none	income	pers. characteristics	all

Notes: This table shows regressions of (ln) expenditure on a number of personal characteristics.

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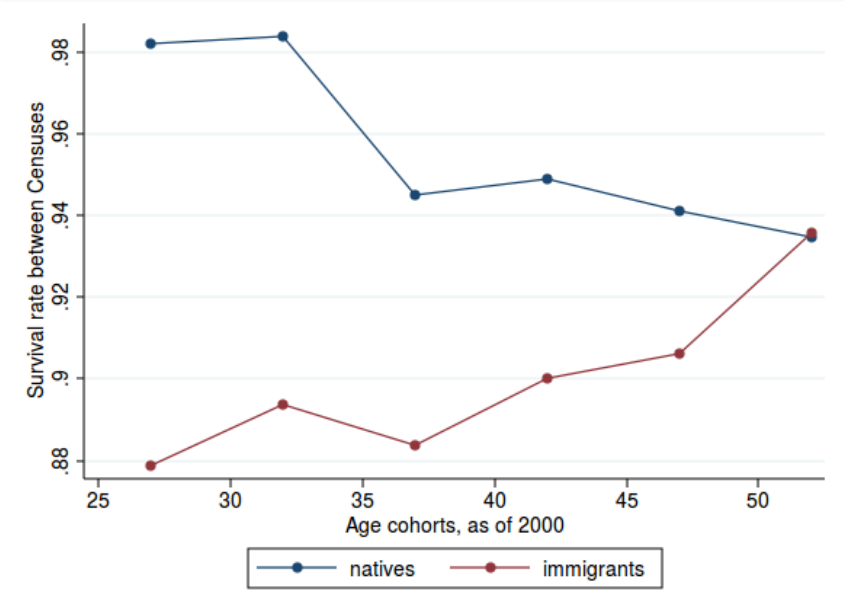
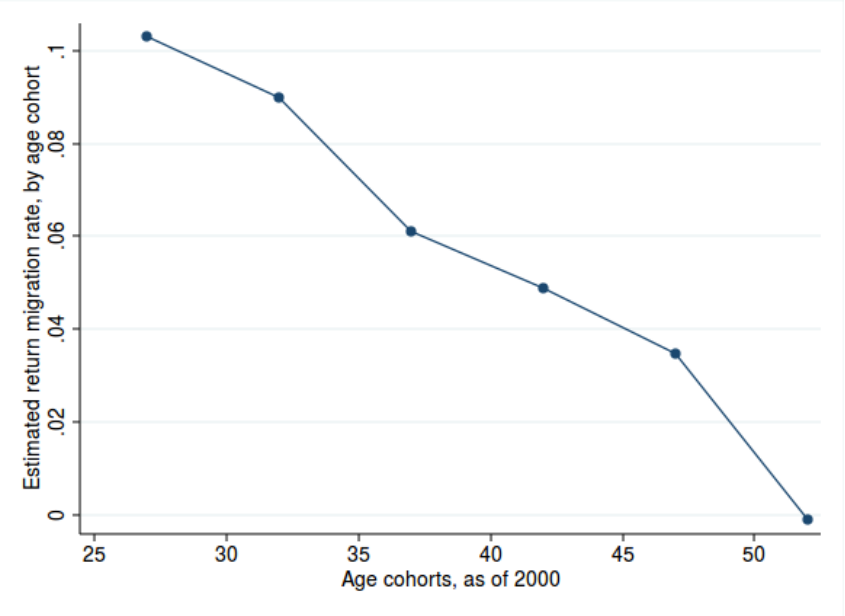
Return migration

Figure: Return migration





Notes: We compute survival rates by comparing the size of cohorts across Census years. In this Figure, we compare 2010 to 2000. We exclude immigrants who arrive after 2000 from the computations. We estimate return migration rates as the difference in suvival rates between natives and immigrants of the same age cohort.

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Worker Surplus

To determine worker's surplus what we assume can be interpreted as:

- Workers in a location would receive a new independent draw of ϵ in the following period
- Costs of moving once location is chosen are infinity

These assumptions are unrealistic but:

- Create a link between local conditions and the value of the worker
- Note that only in the EV distribution the selection term exactly cancels out the value of the location. This is an unrealistic feature of this particular distribution.

They can be relaxed by:

- Assuming only a fraction of workers relocate each period so that worker surplus is: $(1-\eta)\ln V_{jc} - \eta \ln V_j$.
- This dynamic model collapses to the static spatial equilibrium model as shown in Monras (2015a).

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Estimation Details

We estimate the model as follows:

1. Create a grid for $\bar{\alpha}_f$ and σ, the two parameters that enter non-linearly.
2. With each point in the grid, estimate equations 5 and 6 by OLS.
3. Compute the distance between the model and the data for each point in the grid and the estimates obtained in step 2.
4. Chose the set of parameters that better fits the data.

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