Rethinking the Economic Effects of Immigration

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Overview

- Issues
- Approaches
- Projects

General issue

- Immigration is an endogenous choice driven by economic and non-economic reasons …

- … causing economic and non-economic responses by firms and workers …

- … both in the country of origin and in the country of destination

Specific approach

- Economic responses in the country of destination

- Immigration as 'exogenous shock' due to non-economic reasons

- Preexistent 'foreign-born' workers do not react in terms of relocation

- Preexistent 'home-born' workers react in terms of relocation

Research themes

- From immigration to productivity:
  - 'aggregate approach': national labor market
  - demand response, no native supply relocation

  → Ottaviano and Peri (NBER 2005)
  → Ottaviano and Peri (NBER 2006)

Research themes

- From immigration to productivity through "cultural diversity":
  - 'urban approach': local labor markets
  - demand response, native supply relocation

  →Ottaviano and Peri (J.Econ.Geo. 2005)
  →Ottaviano and Peri (J.Urb.Econ. 2005)

Data

- Everything so far on:
  - US Census data
- On-going projects on:
  - EU regional data (NUTS3)
  - German individual data (IAB)

Projects

Fondazione Eni Enrico Mattei (FEEM, Milan)

- *SUS.DIV*: EU FP6-2002-CITIZENS-3
- *EURODIV*: EU FP6-2002-MOBILITY-4
- *Diversity, Integration and the Economy*: Volkswagen Foundation

Aggregate approach

- Revisiting an Important and well explored Question:
  - what is the effect of immigration on individual wages and on average wage of U.S.-born workers in the short and in the long run?

Academic debate

- Traditionally dominated by labor economists and divided between one "school" that finds a significant negative effect of immigration on wages (George Borjas and coauthors) and another that does not find significant effects (David Card and coauthors).

- Recently the Borjas approach, based on national (rather than local) data and focusing on increasingly detailed analysis by skills seems to prevail and with it the message of a significant negative effect on wages (Borjas 2003, Borjas and Katz 2005, Borjas 2006).

Our research agenda

- We introduce some considerations inspired by the literature on gains from trade.

- The labor literature increasingly focused on partial and static analysis often summarizing gains/losses from immigration with just one elasticity.

- Considerations of increased number of varieties, skill complementarities, increased competition, business creation need to be important parts of evaluating the gains/losses from immigration.

- Our papers are simple steps in that direction, easy to compare to the labor literature, they find very different results.
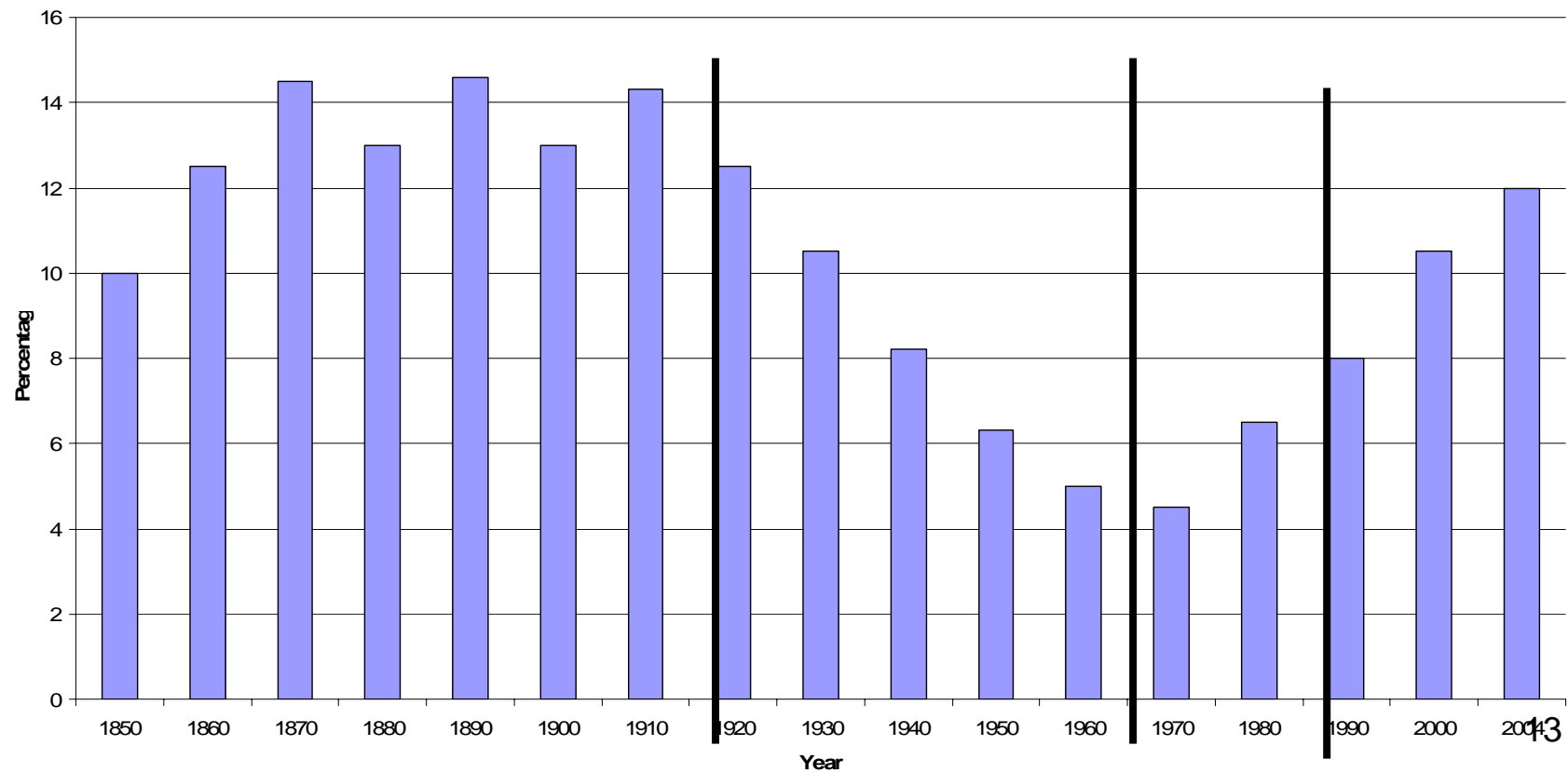
Today

- Background: Some facts about US Immigration

- Framework: Complementarities and capital response to immigration

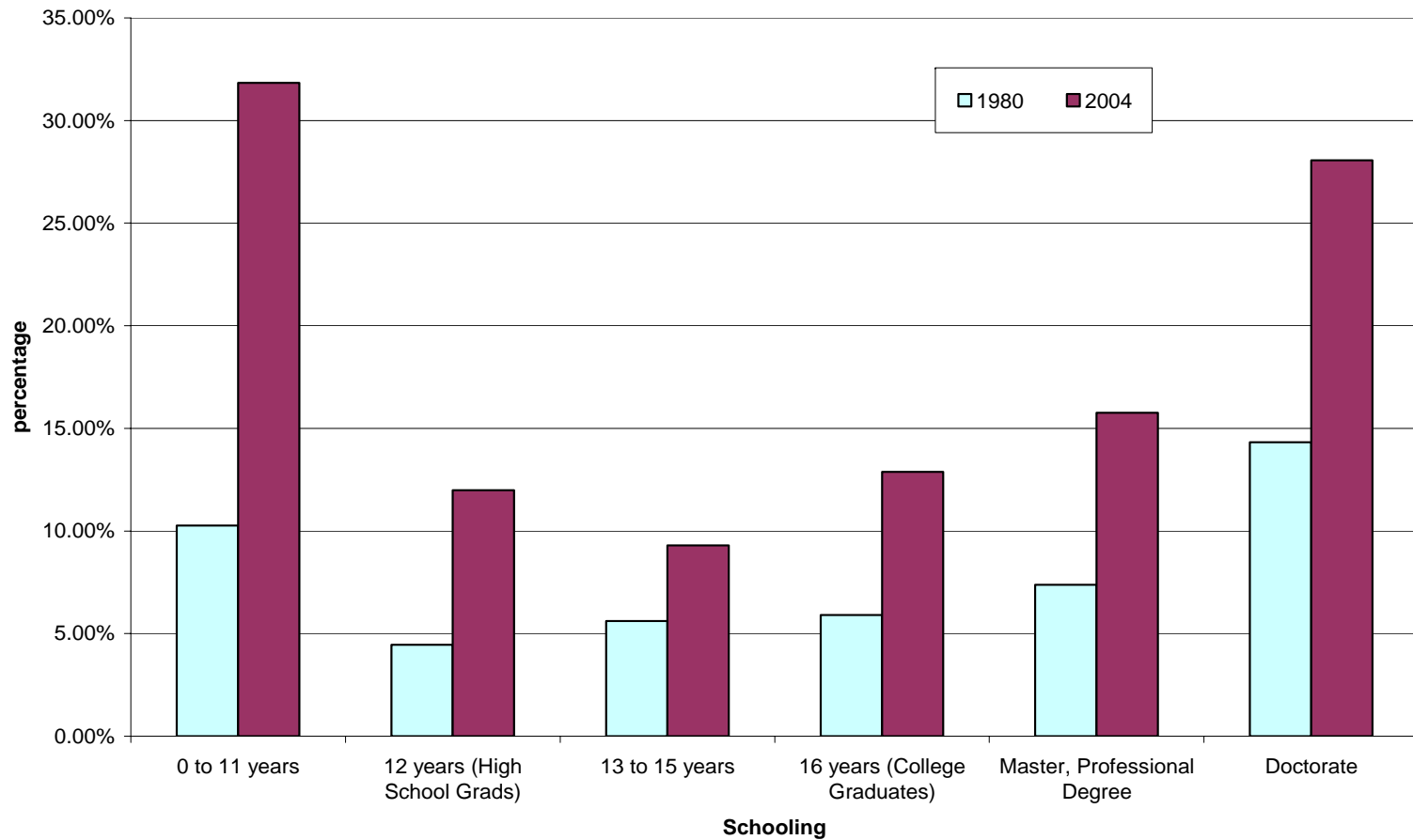- Findings: Effects of immigration on wages

In Historical perspectives

USA Bureau of Census

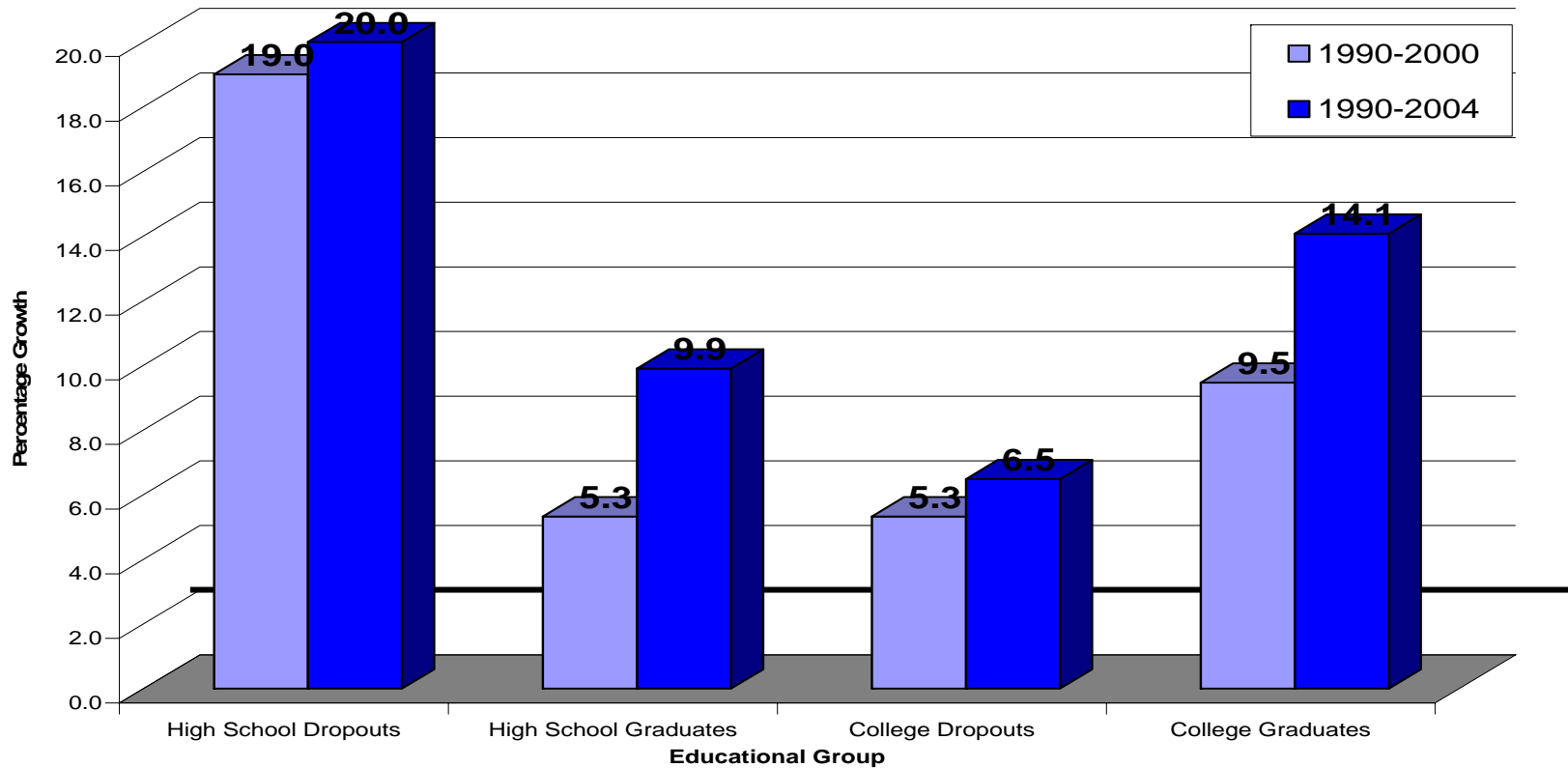**Percentage of foreign-born in US Population (1850-2004)**

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What Kind of foreign-born? USA 1980, 2004

Share of foreign-born by Education, USA employment

What Kind of recent immigrants?: USA 1990-2004

Immigrants during the period as percentage of initial Employment, by Education Group

In the background

- US workers with an high school degree or less have experienced much smaller increases in their real wage than workers with a College degree or More, during the period 1990-2004.

Beyond the raw data

- <u>We need a framework</u> to identify the channels and quantify the effects of immigration on productivity/wages.

- Our framework is very simple but a bit more complicated than simple demand-supply. *Labor is not a homogeneous factor and Capital responds to immigration.*

Model of the production side

$$Y_t = A_t L_t^{\alpha} K_t^{1-\alpha}$$

Production Function A may be growing at exogenous rate

$$L_t = \left[\sum_{k=1}^{4} \theta_{kt} L_{kt}^{\frac{\delta-1}{\delta}} \right]^{\frac{\delta}{\delta-1}}$$

CES labor Composite *k education groups* =HSD,HSG,COD, COG

δ= elast. Of substitution between schooling groups

$$L_{kt} = \left[\sum_{j=1}^{8} \theta_{kj} L_{kjt}^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}}$$

j=experience groups, 8 of them for experience 0 to 40 years in intervals of 5 years

Key-Parameters

- Values found in the literature:

  δ=1.5-2 (Katz and Murphy QJE1992, Angrist AER1995, Ciccone and Peri, ReStat, 2005) We estimate it to be close to 2.

  η= 3-5 (F. Welch JPE 1979, Card and Lemieux AER 2001, Borjas QJE 2003) We estimate it to be around 4.

Complementarities US-Foreign Born (gains from variety)

Key 1: Within Education-Experience group Home born H_{kj} and Foreign-born F_{kj} may be imperfect substitutes

Our Assumption:

Usual Assumption:

$$L_{kjt} = \left[\theta_{Hkjt} H_{kjt}^{\frac{\sigma_k-1}{\sigma_k}} + \theta_{Fkjt} F_{kjt}^{\frac{\sigma_k-1}{\sigma_k}} \right]^{\frac{\sigma_k}{\sigma_k-1}}$$

$$C_{kj} = H_{kj} + F_{kj}$$

Need to estimate σ_k

Capital response

Key 2: capital responds to immigration. In the
long-run it adjusts so that its marginal
productivity equates r (interest rate),
constant. In the short run we can estimate
empirically its response

Effects of increased Immigration on wages

- ↓↓ Direct effect (partial effect, supply effect, Borjas effect). Higher supply of workers with certain skills puts downward pressure on their wages (productivity), other things equal .

- ↑ Indirect (complementarities) effect. Higher availability of low-high skills increases demand for intermediate skills (enlarged operation and more business are created) increases their wages.

- ↑ Response of investment (Medium-run). More workers means more business opportunities (higher marginal productivity of capital). Entrepreneurs provide more physical capital increasing production and wages.

Estimates of σ_κ: They are between 5 and 10

	All Workers,		Male only		Not weighted		Omitting 1960, 2004	
Specification	1	2	3	4	5	6	7	8
Dependent variable	Yearly Wages	Weekly Wages	Yearly Wages	Weekly Wages	Yearly Wages	Weekly Wages	Yearly Wages	Weekly Wages
$1/\bar\sigma$	0.17**	0.11**	0.18**	0.10**	0.15**	0.13**	0.20**	0.11**
	(0.04)	(0.04)	(0.06)	(0.04)	(0.05)	(0.03)	(0.05)	(0.04)
$1/\sigma_{HSi}$	0.19**	0.11**	0.18**	0.08**	0.15**	0.10**	0.27**	0.10**
	(0.06)	(0.04)	(0.07)	(0.04)	(0.07)	(0.04)	(0.06)	(0.04)
$1/\sigma_{HSc}$	0.17**	0.14**	0.17**	0.09**	0.14**	0.12**	0.15**	0.08**
	(0.04)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.05)	(0.04)
$1/\sigma_{COi}$	0.19**	0.12**	0.23**	0.16**	0.19**	0.15**	0.18**	0.13**
	(0.05)	(0.05)	(0.06)	(0.07)	(0.07)	(0.06)	(0.07)	(0.06)
$1/\sigma_{COc}$	0.10**	0.08**	0.12**	0.09	0.19**	0.13**	0.10**	0.08**
	(0.04)	(0.04)	(0.06)	(0.06)	(0.07)	(0.06)	(0.04)	(0.04)
Observations	192	192	192	192	192	192	128	128
Test F, All σ are equal (p-value)	0.98	1.47	0.89	1.88	0.61	0.48	5.4	1.36
	(41%)	(24%)	(45%)	(15%)	(67%)	(69%)	(1%)	(27%)

Use those parameters

- Calculate effect on real wages of US born workers by education and compare our results with previous ones. 1990-2004

Effects of IMMIGRATION 1990-2004: comparison of ours and old estimates

Assumptions:	**Fully Adjusted Capital**, Estimated Elasticity Between U.S.- Foreign-Born, σ			**Fully Adjusted Capital**; Perfect Substitutability U.S.- Foreign-Born	**Estimated short-run adjustment of Capital**; Perfect Substitutability U.S.- Foreign-Born	**Fixed Capital;** Perfect Substitutability U.S.- Foreign- Born
Specification	1	2	3	4	5	6
Estimates of σ	Low σ=5	Median σ=6.6	High σ=10	σ, imposed = ∝	σ, imposed = ∝	σ, imposed = ∝
% Real Wage Change of Us Born Workers due to immigration, 1990-2004						
HS dropouts US-born	-0.2%	-1.1%	-2.1%	-4.2%	-4.5%	-8.0%
HS graduates, US-born	+2.9%	+2.4%	+2.0%	+1.0%	+0.7%	-2.8%
CO dropouts, US-born	+3.7%	+3.4	+3.1%	+2.4%	+2.1%	-1.4%
CO graduates, US-born	+1.4%	+0.7%	0.0%	-1.5%	-1.8%	-5.4%
Average, US-born	**+2.3%**	**+1.8%**	**+1.2%**	**+0.1%**	**-0.19%**	**-3.7%**
% Real Wage Change of Foreign Born Workers due to immigration, 1990-2004						
HS dropouts Foreign-born	-20%	-16.2%	-12.3%	-4.4%	-4.7%	-8.3%
HS graduates, Foreign-born	-31%	-23%	-15%	+1.0%	+0.7%	-2.8%
CO dropouts, Foreign-born	-17%	-12%	-7.3%	+2.4%	+2.1%	-1.4%
CO graduates, Foreign-born	-31%	-24%	-16%	-1.6%	-1.9%	-5.5%
Average Foreign-born	**-26%**	**-19%**	**-13.3%**	**-0.9%**	**-1.1%**	**-4.7%**
Overall Average: Native and US Born	**0%**	**0%**	**0%**	**0%**	**-0.28%**	**-3.8%**

Aggregate approach: Summary

- Accounting carefully for complementarities and empirical capital adjustment we find an aggregate positive and significant effect of immigration on overall productivity/wages of US born in the short and long run (+1.8% between 1990 and 2004).

- Only focusing on the least educated group (equal to 10% of native employment in 2004) even including illegal immigration one finds negative effects, but they are small -1.1% (versus the previously estimated -8%).

- All other groups gain between 0.7 and 3.4% from immigration.

Urban approach

Main Question

- What is the Economic Value to the Average US-Born citizen, in production and in consumption, of "Cultural Diversity"?

- "Cultural Diversity" is meant as the interaction with foreign born workers/people. Measured with "Index of Fractionalization" and with "share of foreign" born. We control but never focus on black-white issues.

New Approach

- Within the US there is a "menu" of choices for US born citizens and firms in the "amount of diversity" they want. Different Cities (MSA) have very different level of diversity and people may choose among them.

- Once adjustments are made (in the long run) people and firms must reach an equilibrium in which value and price of diversity to the average U.S. born are equal.

Main Findings

- Diversity seems to have a significant positive value to the average US-born person in Production and (possibly) in Consumption.

- The positive production value is dominant.

Measures of Diversity

$$div(CoB)_{ct} = 1 - \sum_{1}^{M} (sh.CoB_{ct}^{i})^2$$
Diversity Index

Probability that two persons randomly chosen in a city are born in different countries. Also called fractionalization index. Very much used in cross-country analysis (Alesina, Easterly, Baqir… Mauro)

$$F_{ct} = \sum_{i \neq US} (sh.CoB_{ct}^{i})$$
Share of foreign born

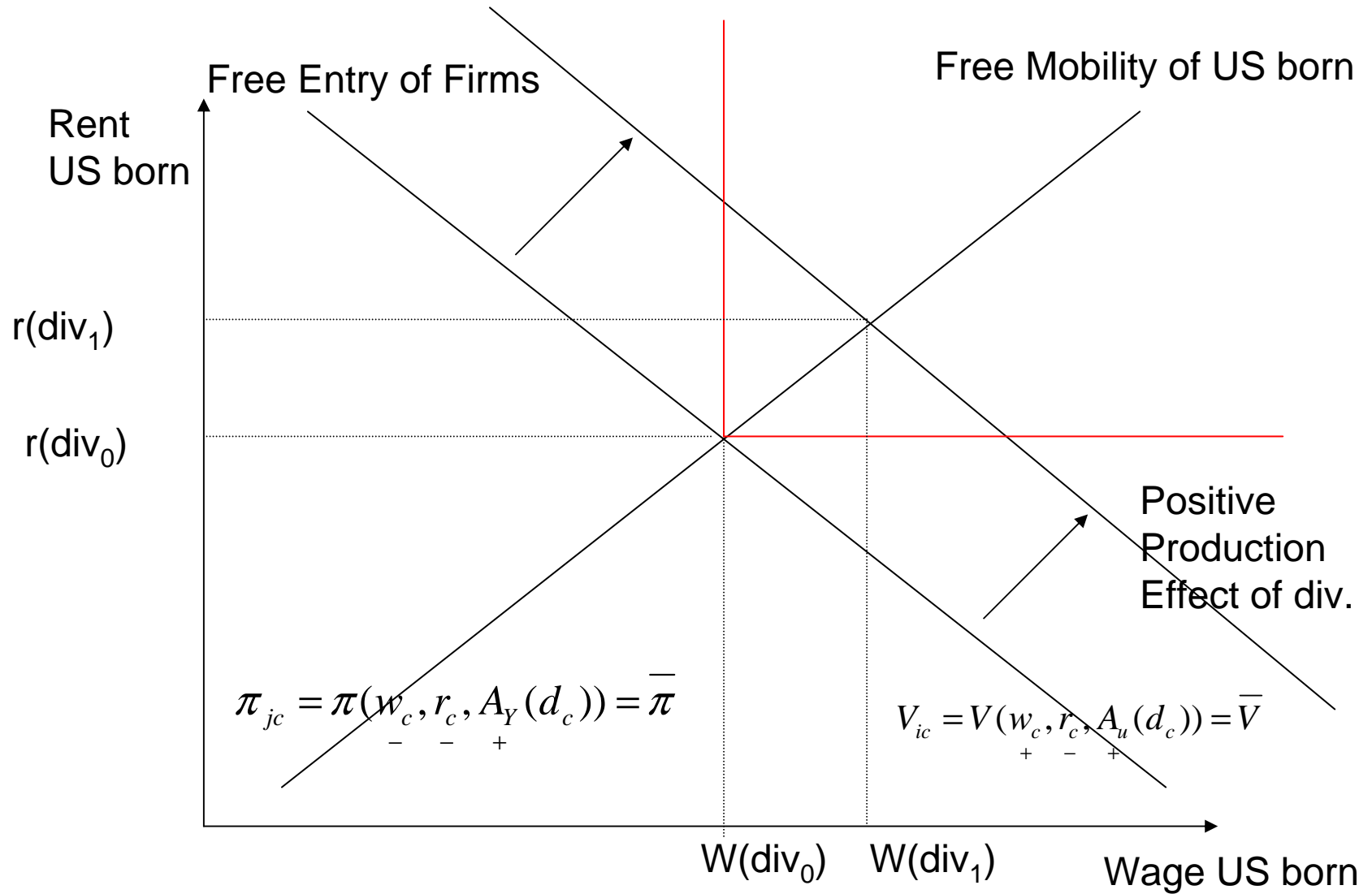$$div(F)_{ct} = 1 - \sum_{1}^{M} (\frac{sh.CoB_{ct}^{i}}{F_{ct}})^2$$
Diversity of Foreign Born

Diversity index can be decomposed in share of foreign and diversity of foreign as follows:

div(CoB)=F[1-F(1-div(F)]

Correlation 0.87 between F and *div(CoB).* Most of the action come from the different shares F across cities. Show Table 2, The range of diversity to choose from across US cities is huge.

Equilibrium in a City

Rent
US born

Free Entry of Firms

Free Mobility of US born

$r(div_1)$

$r(div_0)$

Positive
Production
Effect of div.

$$\pi_{jc} = \pi(\underset{-}{w_c}, \underset{-}{r_c}, \underset{+}{A_Y(d_c)}) = \overline{\pi}$$

$$V_{ic} = V(\underset{+}{w_c}, \underset{-}{r_c}, \underset{+}{A_u(d_c)}) = \overline{V}$$

$W(div_0)$ $W(div_1)$

Wage US born

Facts from 70-90 Census

Figure 1 - Wages and Diversity

Slope: 0.70, std error (0.12)

Facts from 70-90 Census

Figure 2 - Rents and Diversity

160 U.S. Metropolitan Areas

Slope: 1.14 std. error (0.37)
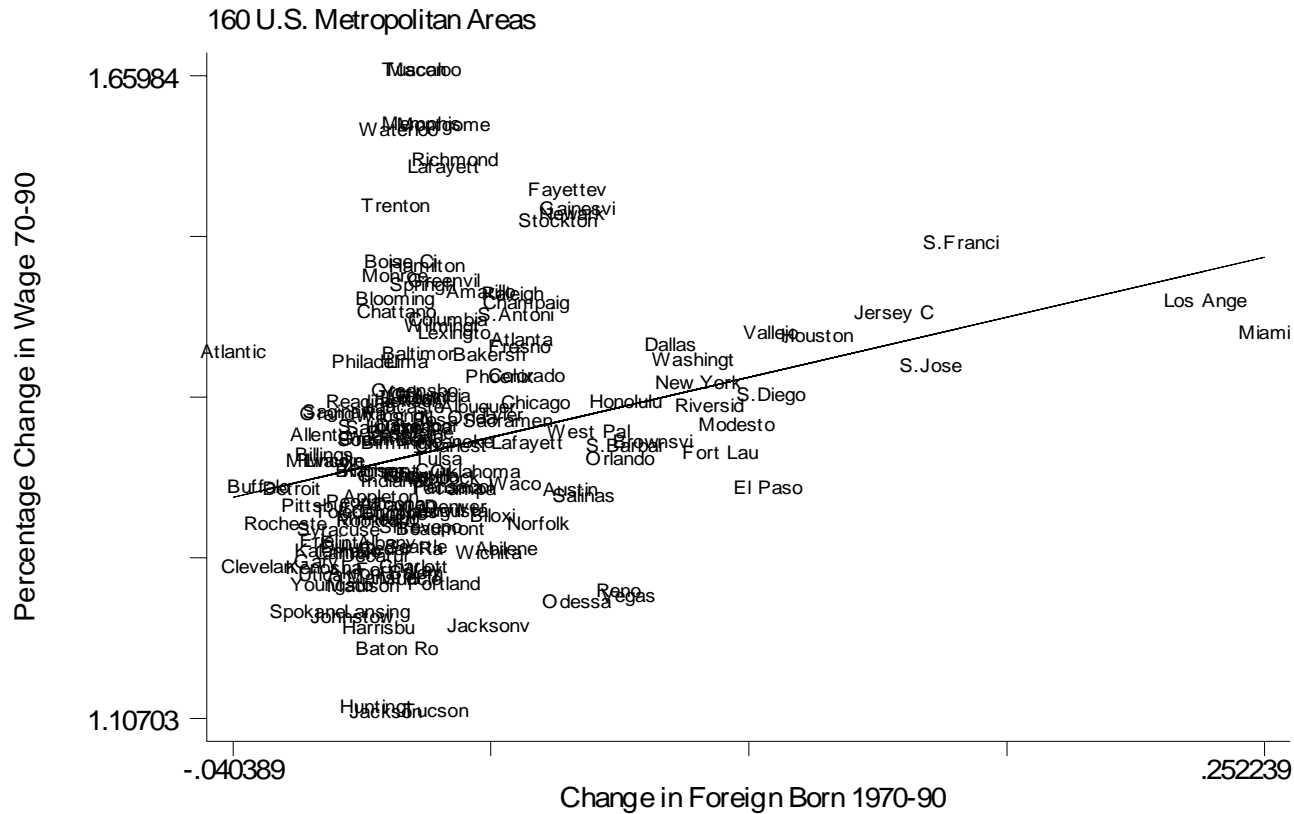
Estimating Panel

$$\ln(w_{ct}) = \beta_1(s_{ct}) + \beta_2 \ln(Empl_{ct}) + \beta_3(Diversity_{ct}) + e_c + e_t + e_{ct}$$

$$\ln(r_{ct}) = \gamma_1(y_{ct}) + \gamma_2 \ln(Pop_{ct}) + \gamma_3(Diversity_{ct}) + \varepsilon_c + \varepsilon_t + \varepsilon_{ct}$$

- w_{ct}: average yearly wage of US born white, males, 40-50 years old in city c and year t in 1990 US $.
- r_{ct}: average monthly rent per room of white, US born white males in city c and year t in 1990 US $.
- s_{ct} average schooling of the group
- Y_{ct} average income per capita in the city

- Data: 160 US Metropolitan Areas, period 1970-1990, sources PUMS census 1970,1990 and county and city data-book 1970-1990.
- We consider 1970-1990 as "long run", Notice that about **30% of US born changed state of residence in 85-90**

Basic Wage Regression

Explanatory Variables:	1: Dependent Variable: ln(Wage)	2: Dependent Variable: ln(Wage)	3: Dependent Variable: ln(Income)	4: Dependent Variable: ln(Income)
Average Schooling	0.10** (0.01)	0.10** (0.01)	0.07* (0.01)	0.07* (0.01)
Ln(Employment)	0.02 (0.02)	0.01 (0.02)	0.14* (0.03)	0.10** (0.03)
Diversity Index	1.29** (0.29)		1.55** (0.70)	
Share of Foreign Born		0.58** (0.11)		0.82* (0.27)
Diversity Index Among Foreign Born		0.14* (0.08)		0.05 (0.10)
City Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.99	0.99	0.99	0.99
Observations	320	320	320	320

Basic Rent Regression

Explanatory Variables:	1: Dependent Variable: ln(Rent)	2: Dependent Variable: ln(Rent)	3: Dependent Variable: ln(Rent)	4: Dependent Variable: ln(Rent)
Ln(Income per Capita)			0.67** (0.08)	0.66** (0.08)
Ln(Population)	0.10** (0.04)	0.02 (0.04)	0.03 (0.04)	0.06 (0.04)
Diversity Index	1.80** (0.60)		0.95** (0.50)	
Share of Foreign Born		1.06** (0.27)		0.53** (0.20)
Diversity Index Among Foreign Born		0.11 (0.16)		0.16 (0.13)
City Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.97	0.99	0.98	0.99
Observations	320	320	320	320

Preferred Instruments for the change of foreign born in cities: Shift-Share Method

- New foreign-born tend to move where other people from the same country already live. Using the composition of foreign born by country of birth in 1970 in each city and the total immigration rate from each country in the US we can "impute" an increase in share of foreign born (or diversity) to each city.

- Such increase is not correlated to any shock to the city in 1970-1990 assuming that total migration from a country is exogenous to what happens in a particular city.

$$\overline{Share\,(CoB\,)}_{c,1990} = Share\,(CoB\,)_{c,1970}\,(1 + g_{\,j70-90})$$

g_{j70-90} is the growth of the group of people from country j relative to total US population growth 1970-1990

We then calculate share of foreign born and Diversity using this imputed shares for 1990

Wage Regression: IV obtained from Shift-Share method

Dependent Variable : Δln(Wage) 1970-1990	1 OLS Diversity Index	2 OLS, Share of Foreign Born	3 IV, Diversity Index	4 IV, Share of Foreign Born	5 IV Without CA-FL-NY	6 IV Without CA-FL-NY
ΔSchooling	0.11** (0.01)	0.10** (0.01)	0.11** (0.01)	0.11** (0.01)	0.10** (0.02)	0.10** (0.01)
Δln(Empl)	0.02 (0.02)	0.01 (0.02)	0.04 (0.03)	0.04 (0.03)	0.03 (0.03)	0.04 (0.03)
Δ(Foreign Born)		0.51** (0.10)		0.30 (0.41)		0.22 (0.22)
Δ(Diversity)	1.27** (0.27)		0.95** (0.50)		0.92 (0.65)	
R^2	0.36	0.35	0.35	0.24	0.34	0.22
Observations	160	160	160	160	145	145
First Stage Regression, for the IV estimation						
Shift-Share Constructed Diversity	n.a.	n.a.	0.51** (0.05)	0.32** (0.03)	0.21** (0.04)	0.23** (0.03)
R^2	n.a.	n.a.	0.34	0.37	0.15	0.31

Rent Regression: IV obtained from Shift-Share method

Dependent Variable : Δln(Rent) 1970-1990	1 OLS, Diversity Index	2 OLS, Share of Foreign Born	3 IV, Diversity Index	4 Share of Foreign Born	5 Without CA-FL-NY	6 Without CA-FL-NY
Δln(Population)	0.03 (0.04)	0.06 (0.04)	0.04 (0.04)	0.08** (0.04)	0.04 (0.06)	0.09 (0.06)
Δln(Income)	0.67* (0.09)	0.64* (0.09)	0.61* (0.10)	0.59** (0.09)	0.48** (0.09)	0.51* (0.08)
Δ(Foreign Born)		0.58** (0.29)		0.98** (0.36)		0.74 (0.50)
Δ(Diversity)	1.10* (0.70)		2.60** (1.02)		4.21** (1.60)	
R^2	0.38	0.37	0.33	0.36	0.28	0.28
Observations	160	160	160	160	145	145
First Stage						
Shift-Share Constructed Diversity	n.a.	n.a.	0.51** (0.05)	0.32** (0.03)	0.21** (0.04)	0.23** (0.03)
R^2	n.a.	n.a.	0.34	0.37	0.15	0.31

Urban approach: Summary

- Diversity seems to have positive production value, as revealed by the long-run behavior of US workers and firms in the long-run (1970-1990).

- An increase in 1% of foreign born is associated with an increase of 0.5% in the wage of US born and with an increase between 0.5 and 1% of their rents.

Urban approach: Summary

- Using two types of instruments to control for endogeneity of foreign born the revealed correlation seems to stand and is still in the range 0.5-1.00 in most of the estimates

- Ongoing research: Channel through which this effect works? (preliminary evidence) complementarities of skills, pecuniary externality due to non-tradable service provided, and taste for variety

Why should Foreign-born workers be imperfect substitutes of U.S. born workers?

- Within an education/experience new immigrants concentrate and specialize in <u>occupations-sectors-jobs</u> already disproportionately staffed by foreign-born. Examples:
  - **Construction worker/railroad operators**
  - **Farm Laborer/Farm manager**
  - **Scientists/Lawyers.**

- Within the same occupation US-born and foreign Born often provide <u>differentiated goods/services</u>. Think of professions as tailor, cook, hair dresser, musician, baker, architect.... Style, design, taste differentiate foreign from US counterparts. Gains from Diversity ('love of variety').

- Among high educated often "<u>creative professions</u>" such as researcher, university professors, managers benefit from differences in problem-solving, approach. Matching talents may generate large complementarities.