Exploring the Impact of Large Immigrant Inflows on Regional Inequality in the United States

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Overview

Research Question

How do large immigrant inflows affect regional inequality in the United States?

Methodological Approach

This study uses U.S. census data from 1980 and 2007 to evaluate the impact of changes in immigrant inflows on native wages and employment across Commuting Zones (CZs).
To address potential endogeneity in immigrant inflows, a Two-Step Least Squares (2SLS) approach was implemented, with the instrumental variable chosen between the Standard Card Instrument (SCI) and the Predicted Immigration Growth Rate.

Key Findings

The results indicate that changes in immigrant inflows do not significantly affect wages but have a notable negative impact on employment and labor force participation.

Data Description
Sources

The two main data sources used in this study are:

- **Data I:** The 1980 Census and "2007" data from the ACS (i.e., 2006-2008 3-year ACS)
  - `https://usa.ipums.org/usa/`
- **Data II:** Commuting zones (CZ) from David Dorn's website
  - `http://www.ddorn.net/data.html`

- **Step I:** By CZ c and year y: Construct native average wages, native unemployment and labor force participation rates
- **Step II:** Construct immigrant inflow:
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$$x_c = \frac{1}{N_{c,1980}} \left(I_{c,2007} - I_{c,1980} \right)$$

Where:

- $N_{c,1980}$ is the total population of c in year 1980
- $I_{c,y}$ is the population of immigrants in c in year y

- **Step III:** Construct instrument I (*Standard Card instrument*):

$$z_c = \frac{1}{N_{c,1980}} \sum_s f^s_{c,1980} \left(I^s_{2007} - I^s_{1980} \right)$$

- $I^s_y =$ number of immigrants from source region s in the US in year y
- $f^s_{c,1980} = \frac{I^s_{c,1980}}{I^s_{1980}}$ share of immigrants from s who are in c in year 1980
- **Step IIIa:** Construct instrument II (*Predicted Immigration Growth Rate*):

$$z^{\text{alt}}_c = \frac{1}{I_{c,1980}} \sum_s f^s_{c,1980} \left(I^s_{2007} - I^s_{1980} \right)$$

Data Description
Dependent Variables

The analysis examines the following dependent variables in response to changes in immigrant inflows:

- Growth Rate of Wages: The percentage change in native wages between 1980 and 2007.
- Growth Rate of Unemployment: The change in then unemployment rate of the native population, measured in percentage points, between 1980 and 2007.
- Growth Rate of NILF: The change in the rate of the native population who do not participate in the labor force (Not in Labor Force, NILF), between 1980 and 2007.

We define the random variable Y as the change in a specific outcome for U.S. natives, X as the Immigrant Inflow, and Z as the instrument for X. The sample $\{Y_c, X_c, Z_c\}_{c=1}^{722}$ consists of 722 CZs across the United States.

Due to the potential endogeneity of X, the structural model is proposed as follows:

$$Y_c = \alpha + \beta X_c + \boldsymbol{W_c'}\gamma + u_c \tag{1}$$

$$X_c = \phi + \xi Z_c + \boldsymbol{W_c'}\boldsymbol{\theta} + \nu_c \tag{2}$$

$$\tag{3}$$

$$\mathbb{E}\left[u_c | X_c\right] \neq 0 \tag{4}$$

$$\text{Cov}\left(X_c, Z_c\right) \neq 0 \tag{5}$$

$$\mathbb{E}\left[u_c | Z_c\right] = \mathbb{E}\left[\nu_c | Z_c\right] = 0 \tag{6}$$

Where W is a vector of controls.

This model is estimated using 2SLS, correcting inference for heteroskedasticity and autocorrelation with clustered robust standard errors, grouped by state.

We are interested in evaluating the relationship between the instrument Z and the endogenous variable X, specifically $\text{Cov}(X_c, Z_c) \neq 0$, given the control variables W. To do so, we use the auxiliary regression:

$$r_{X,c} = \psi r_{Z,c} + \omega_c \tag{7}$$

where $r_{X,c}$ and $r_{Z,c}$ are the orthogonal components of X and Z, respectively, defined as:

$$X_c = a_0 + \boldsymbol{W_c'a_1} + r_{X,c} \tag{8}$$

$$Z_c = b_0 + \boldsymbol{W_c'b_1} + r_{Z,c} \tag{9}$$

The null hypothesis that the instrument is irrelevant ($\psi = 0$) is rejected if the $F_{partial}$ statistic exceeds 10[1]. Alternatively, this can be tested using a χ^2 distribution with one degree of freedom[2], as we have a single endogenous variable and a single instrument.

The $F_{partial}$ statistic is defined as:

$$F_{partial} = \frac{R^2}{\frac{1-R^2}{n-1}} \tag{10}$$

where R^2 is the coefficient of determination from the auxiliary regression 7, and n is the number of observations, which in this case is 722.

[1] Staiger & Stock (1997)
[2] Montiel Olea & Pflueger (2013)

Table 1: First-Stage 2SLS Results Comparing Instruments (Standard Card Instrument vs. Predicted Immigrant Growth Rate)

	Endogenous Variable: Immigrant Inflow (1980-2008)					
	(1)	(2)	(3)	(4)	(5)	(6)
Partial F Statistic	8.9984	1.0693	0.1735	18.369	2.1906	9.9777
P-value	0.0027	0.3011	0.6770	0.0000	0.1389	0.0016
Constant	0.0504***	0.0206***	-0.3796***	-0.0057	-0.0027	-0.4928***
	(0.0099)	(0.0069)	(0.1408)	(0.0201)	(0.0225)	(0.1571)
Share of employment among the foreign-born population in 1980		2.3616***	1.2458**		1.6483***	1.1985***
		(0.5444)	(0.6288)		(0.3625)	(0.3144)
Share of employment in manufacturing in 1980			-0.2307*			-0.2105
			(0.1301)			(0.1329)
Share of employment among women in 1980			0.6430			0.7937*
			(0.3986)			(0.3962)
Share of the college-educated population in 1980			0.0599			0.0939
			(0.3496)			(0.3207)
Logarithm of total population in 1980			0.0181***			0.0182***
			(0.0058)			(0.0071)
Standard Card Instrument	0.3602***	-0.1460	0.0555			
	(0.1201)	(0.1412)	(0.1333)			
Predicted Immigrant Growth Rate				0.0391***	0.0129	0.0226***
				(0.0091)	(0.0087)	(0.0071)
R^2	0.2347	0.3296	0.3977	0.1131	0.3331	0.4242
Partial R^2	0.2347	0.0097	0.0012	0.1131	0.0148	0.0452

Notes: $N = 741$. Robust standard errors (in parentheses) are clustered at the state level. A Partial F-statistic below 10 is typically considered weak evidence of instrument relevance. The p-value is calculated using a $\chi^2(1)$ distribution.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

The results in Table 1 compare the performance of two instruments: the *Standard Card Instrument* and the *Predicted Immigrant Growth Rate Instrument* (alternative instrument). To determine their relevance, we examine the p-values and apply the commonly accepted rule of thumb, as outlined in the methodology section.

- Including all controls, the Partial *F*-Statistics in columns (3) and (6) are 0.1735 and 9.9777, respectively.
- The Standard Card Instrument in column (3) is critically below 10, providing weak evidence of instrumental relevance.
- The Predicted Immigrant Growth Rate Instrument is a relevant instrument, as it approximates the *F*-statistic threshold and is highly significant according to the criteria set by Montiel Olea & Pflueger (2013).

Main Results
Causal Effect on Native Population Outcomes

Table 2: 2SLS Results for Various Native Population Outcomes Using the *Predicted Immigrant Growth Rate* as an Instrument

Native Population Outcome	Growth Rate of Wages			Growth Rate of Unemployment			Growth Rate of NILF		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Immigrant Inflow (1980-2008)	-0.4294*	-1.7339	-0.5402	0.2260***	0.7200	0.5059***	0.1127***	0.3164	0.4517**
	(0.2326)	(1.4898)	(0.4442)	(0.0570)	(0.4748)	(0.1547)	(0.0568)	(0.2721)	(0.1942)
Share of employment among the foreign-born population in 1980		3.2125	0.6921		-1.2165	-0.6535***		-0.5015	-0.5164*
		(2.6615)	(0.7209)		(0.7735)	(0.2469)		(0.4959)	(0.3047)
Share of employment in manufacturing in 1980			-0.4735**			0.1141			0.1963**
			(0.1949)			(0.0774)			(0.0961)
Share of employment among women in 1980			2.4377***			-0.1535			0.0652
			(0.7215)			(0.2538)			(0.3051)
Share of the college-educated population in 1980			-0.1724			0.0028			-0.1147
			(0.4267)			(0.1527)			(0.1445)
Logarithm of total population in 1980			0.0143			-0.0108**			-0.0067
			(0.0140)			(0.004)			(0.0053)
Constant Term	1.1695***	1.1783***	0.1352	-0.0222***	-0.0256	0.1297	-0.0693***	-0.0707***	-0.0578
	(0.0264)	(0.0551)	(0.2751)	(0.0044)	(0.0167)	(0.019)	(0.0073)	(0.0091)	(0.1360)

Notes: $N = 741$. Robust standard errors (in parentheses) are clustered at the state level.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Main Results

Causal Effect on Native Population Outcomes

To contextualize these results, we compare two commuting zones (CZs) based on the level of immigrant inflow between 1980 and 2007—one representing the 25th percentile and the other the 75th percentile.

We predict that the CZ with higher immigrant exposure will experience the following differentials:

- A 4.12 percent larger decrease in log wages (not statistically significant),
- A 0.04 percentage point larger increase in the unemployment rate,
- A 0.03 percentage point larger increase in the 'Not-in-the-labor-force' (NILF) rate.

[2] The coefficients for NILF and the unemployment rate are statistically significant at the 5% and 1% levels, respectively. However, the coefficient for wages is not statistically significant at the 10% level, so it cannot be interpreted.

Conclusions

- This study examined the impact of large immigrant inflows on native labor market outcomes across U.S. regions using 2SLS regression and two instrumental variables: the Standard Card Instrument and Predicted Immigrant Growth Rate.
- **Instrumental Relevance:** The Predicted Immigrant Growth Rate outperformed the Standard Card Instrument in robustness and statistical significance, meeting the Partial F-statistic threshold of 10 with all controls included.
- **Labor Market Outcomes:**
  - Immigrant inflows had no significant effect on native wage growth, alleviating concerns about wage depression.
  - A positive and significant relationship was observed between immigrant inflows and native unemployment, suggesting potential labor market frictions in specific regions.
  - A similar, positive and significant impact was found on labor force participation (LFP).
- The findings highlight the importance of robust instruments in immigration research and suggest that while wages remain unaffected, rising unemployment rates in certain regions require further investigation.
- Reducing regional disparities and addressing labor market adjustments caused by immigration warranst further discussion.


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