Impact of Education Level Changes on Inequality

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Overview

Research Question

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Methodological Approach

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Key Findings

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Data Description

Sources

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Data Description
Dependent Variables

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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

Endogenous Variable: Measure change in share with less than 12 years of schooling		
	(1)	(2)
Partial F Statistic	22.376	44.856
P-value	0.0000	0.0000
Constant	-0.0362***	-0.2737***
	(0.0027)	(0.0311)
Share of the college-educated population in 1990		0.0130
		(0.0229)
Share of employment among the foreign-born population 1990		0.0607***
		(0.0119)
Share of employment among women in 1990		0.0353
		(0.0775)
Share of population with high school education in 1990		0.2617***
		(0.0170)
Logarithm of total population in 1990		0.0000
		(0.0013)
Share of employment in manufacturing in 1990		-0.0431***
		(0.0139)
Instrument	0.2015***	0.2276***
	(0.0426)	(0.0340)
R^2	0.1834	0.7092
Partial R^2	0.1834	0.2424

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. Weighted regression based on the population size in each "CONSPUMA."
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Main Results

Instrumental Relevance

The results in Table 1 present the partial *F*-statistic corresponding to the first stage of the 2SLS regression. According to the commonly accepted rule by Staiger and Stock (1997), and considering that the value of the partial *F*-statistic exceeds 10 in both exercises, it is concluded that the instrument is relevant for the measurement of the change in the proportion of individuals with less than 12 years of schooling.

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

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Conclusions

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