Shift-Share Instruments and the Impact of Immigration

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Motivation

- Long-standing controversy about impact of immigration
- (One of) the fundamental identification strategies is to exploit geographic variation in the concentration of immigrants
- If labor markets matter for immigrant locations, this will hardly be exogenous
- Much of the recent literature exploits some variation of Card's (2001) "past settlement" instrument that interacts the geographic distribution by country of origin at some point in the past with current national inflows (putatively) to identify a causal effect.

What We Do

- Show that if
  - labor markets adjust slowly, and
  - country-of-origin flows are highly correlated over time

  then estimates based on the "shift-share" instrument will be asymptotically biased, possibly severely

- Examine empirical estimates using US Census and ACS data

- Propose a simple "double instrumentation" procedure that addresses the bias of the traditional a "past settlement" instrument

Immigrant Location Choices

Assume immigrants choose locations on the basis of past settlements and local wage premia:

$$U_{ojt} = U\left(\frac{M_{ojt-1}}{M_{ot-1}}, \frac{w_{jt}}{\overline{w_t}}\right)$$

where o indexes country of origin, j indexes location, and t indexes period and $\overline{w}_t = \sum_j w_{jt}$.

Assume $U_1 > 0$ and $U_2 > 0$.

Immigrant Impact on Labor Supply

Assuming native and previous immigrant populations are fixed (no internal migration, no outmigration, no death) then the impact of new immigrants is given by

$$m_{jt} \equiv \Delta \log\left(\frac{L_{jt}}{N_{jt}}\right) = \log(\Delta M_{jt} + L_{jt-1}) - \log(L_{jt-1}) \approx \frac{\Delta M_{jt}}{L_{jt-1}}$$

where N_{jt} are natives, N_{jt} are migrants and $L_{jt} = M_{jt} + N_{jt}$

Past Settlement and Labor Market Pulls

If arguments of immigrant utility function are separable, we can write

$$m_{jt} \approx (1-\lambda) \underbrace{\sum_o \frac{M_{ojt-1}}{M_{ot-1}} \frac{\Delta M_{ot}}{L_{jt-1}}}_{\text{past settlements pull}} + \lambda \underbrace{\frac{w_{jt}}{\overline{w_t}} \frac{1}{J} \frac{\Delta M_t}{L_{t-1}}}_{\text{labor market pull}}$$

where λ measures the relative importance of labor markets in determining immigrant flows.

Adjustments to Immigration

Production function: $Y_{jt} = \theta_{jt} K_{jt}^{\alpha} L_{jt}^{1-\alpha}$

Wages: $\log w_{jt} = \log(1-\alpha) + \log \theta_{jt} + \alpha \log k_{jt}$

Optimal K/L: $\log k_{jt}^{*} = \frac{1}{1-\alpha} \log\left(\frac{\alpha}{r}\right) + \frac{1}{1-\alpha} \log \theta_{jt}.$

If K/L adjusts slowly, then

$$\log k_{jt} = \log k_{jt-1} - m_{jt} + \gamma\left(\log k_{jt-1}^{*} - \log k_{jt-1}\right)$$

where γ measures the speed of adjustment with $0 < \gamma \ll 1$

Impact of Immigrants on Wages

Substituting K/L evolution into a first-differenced version of the wage equation and adding constant and disturbance terms gives

$$\Delta \log w_{jt} = \beta_0 + \beta_1 m_{jt} + [\Delta \log \theta_{jt} - \beta_1 \gamma \left(\log k^*_{jt-1} - \log k_{jt-1} \right) + \epsilon_{jt}]$$

where the expression in brackets is unobserved. Note that $\beta_1 = -\alpha$

m_{jt} is clearly endogenous because immigrant flows are affected by $\Delta \log \theta_{jt}$ (through demand shock effect on wages).

But we show that second term is also correlated with m_{jt}

Past Settlement Instrument

To address this problem, Card (2001) proposes a shift-share instrument

$$\widetilde{m}_{jt} = \sum_{o} \frac{M_{ojt^0}}{M_{ot^0}} \frac{\Delta M_{ot}}{L_{jt-1}}$$

as an instrument for m_{jt} where M_{ojt^0}/M_{ot^0} measures the share of immigrants from origin o living in location j in some base period t^0.

- It is obvious why this is correlated with local immigrant inflows.
- Addresses endogeneity caused by $\Delta \log \theta_{jt}$ if θ_{jt} is not serially correlated.

Dynamic Adjustment and the Instrument

Imagine an inflow of immigrants a $t = 1$ into an economy in spatial and dynamic equilibrium:

$$\Delta \log w_{j1} = \beta_0 + \beta_1 m_{j1} + [\Delta \log \theta_{j1} + \epsilon_{j1}]$$

in the subsequent period, wages evolve according to

$$\Delta \log w_{j2} = \beta_0 + \beta_1 m_{j2} + [\Delta \log \theta_{j2} - \beta_1 \gamma \left(\log k^*_{j1} - \log k_{j1} \right) + \epsilon_{j2}]$$

If we use $\tilde{m}_{jt}$ to instrument for m_{j2} in this equation then we get

$$\text{plim}\, \tilde{\beta}^{IV}_{1|t=2} = \beta_1 - \underbrace{\beta_1 \frac{\gamma}{1+\beta_1} \frac{\text{Cov}\left(\tilde{m}_{j2}, \Delta \log \theta_{j1}\right)}{\text{Cov}\left(\tilde{m}_{j2}, m_{j2}\right)}}_{\text{adjustment to lagged demand shocks}} - \underbrace{\beta_1 \gamma \frac{\text{Cov}\left(\tilde{m}_{j2}, m_{j1}\right)}{\text{Cov}\left(\tilde{m}_{j2}, m_{j2}\right)}}_{\text{adjustment to lagged supply shocks}}$$

Serial Correlation in θ_{jt}

- If θ_{jt} is serially correlated, can be addressed by lagging t^0.
- Serial correlation in external processes is not our concern.

We will assume that θ_{jt} is not serially correlated, so that

$$\mathrm{Cov}\left(\tilde{m}_{j2}, \Delta \log \theta_{j1}\right) = 0$$

giving

$$\mathrm{plim}\ \tilde{\beta}^{IV}_{1|t=2} = \beta_1 - \underbrace{\beta_1 \gamma \frac{\mathrm{Cov}\left(\tilde{m}_{j2}, m_{j1}\right)}{\mathrm{Cov}\left(\tilde{m}_{j2}, m_{j2}\right)}}_{\text{adjustment to lagged supply shocks}}$$

Asymptotic Bias of IV using $\widetilde{m}_{jt}$

In a generic period therefore

$$\operatorname{plim} \tilde{\beta}_{1|t}^{IV} = \beta_1 \left[1 - \gamma \sum_{s=0}^{\infty} (1-\gamma)^s \frac{\operatorname{Cov}\left(\widetilde{m}_{jt}, m_{jt-1-s}\right)}{\operatorname{Cov}\left(\widetilde{m}_{jt}, m_{jt}\right)} \right]$$

If $\operatorname{Cov}\left(\widetilde{m}_{jt}, m_{jt-1-s}\right) = \operatorname{Cov}\left(\widetilde{m}_{jt}, m_{jt-1}\right)$ for all periods $t-s$ for $s \geq 1$ then

$$\operatorname{plim} \tilde{\beta}_{1|t}^{IV} = \beta_1 \left[\frac{\operatorname{Cov}\left(\widetilde{m}_{jt}, m_{jt}\right) - \operatorname{Cov}\left(\widetilde{m}_{jt}, m_{jt-1}\right)}{\operatorname{Cov}\left(\widetilde{m}_{jt}, m_{jt}\right)} \right]$$

which does not depend on the speed of convergence γ.

Easy to see that the sign on the estimate could flip even if the true effect is strongly negative.

Why This Is Likely To Be So in the U.S.

- Past settlement IV likely violates instrument exogeneity because of the interaction of two factors
  - Local shocks trigger a prolonged adjustment process
  - Local immigrant inflows are highly serially correlated.
    Stocks at time t^0 are just cumulative flows to that point.
- This is independent of the speed of adjustment or whether θ_{jt} is serially correlated.
- Without changes in country-of-origin mix, the instrument is in some sense "too strong".

Data

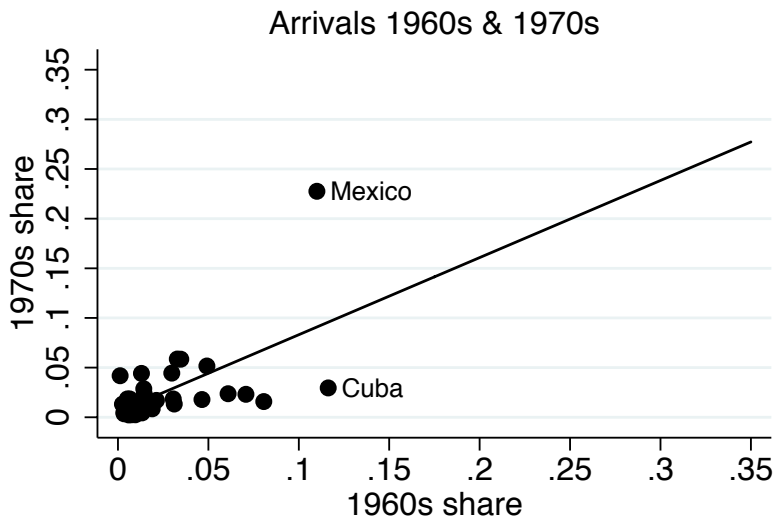
- 1960-2000 U.S. Censuses and the merged 2007-2011 American Community Surveys (ACS), obtained through IPUMS.
- 109 MSAs (started with 124 largest, as in Card 2009)
- Immigrant definition: foreign-born, arrived in previous decade. Distinguish 41 countries/regions of origin
- Outcome: Mean native residual wage
  - Residual from yearly regression of non-self-employed workers, age 18-64, 1-40 years potential experience. Control for six education, 40 potential experience levels, gender, marital status, three races, nine US regions.

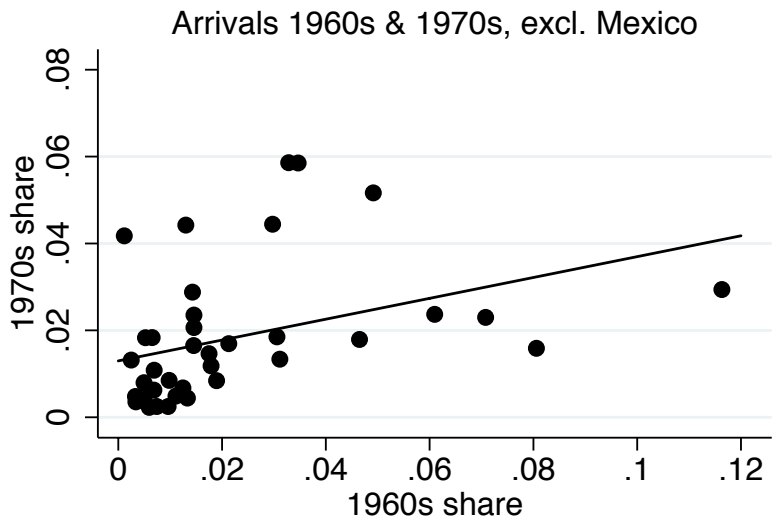
Immigrant Flow Characteristics

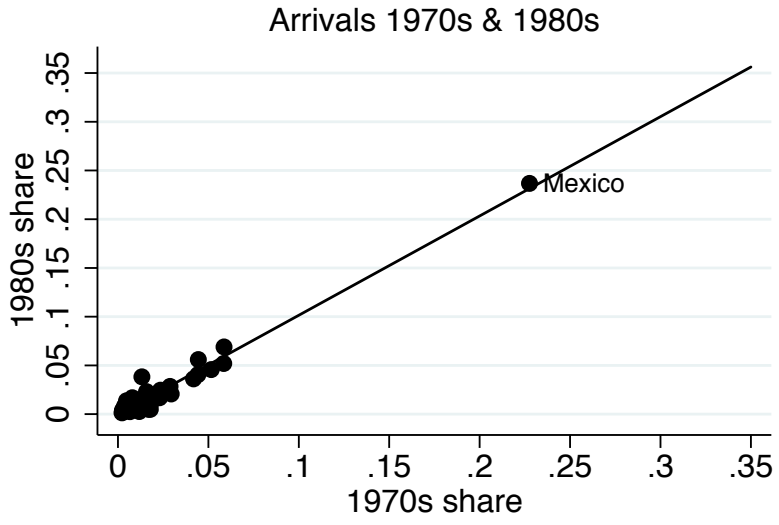
Variable	1950	1960	1970	1980	1990	2000	2010
National Immigrant Share	0.076	0.056	0.052	0.067	0.087	0.117	0.136
Panel A: Share of Recent Arrivals							
Nation			0.016	0.025	0.037	0.044	0.032
Average MSA			0.014	0.020	0.029	0.037	0.028
Standard deviation across MSAs			0.018	0.022	0.034	0.030	0.019
Coefficient of variation across MSAs			1.31	1.11	1.17	0.81	0.66
Panel B: Share of Recent Arrivals From							
Canada and Europe			0.414	0.173	0.131	0.164	0.117
Mexico			0.110	0.228	0.237	0.326	0.278
Other Latin America			0.258	0.196	0.236	0.207	0.234
Asia			0.168	0.319	0.319	0.261	0.307
Africa/Other			0.049	0.084	0.077	0.042	0.064
Panel C: Serial Correlation in National Composition							
Recent arrivals, 38 origins (excl. Other)				0.59	0.99	0.96	0.98
Recent arrivals, excluding Mexico				0.37	0.95	0.90	0.95
Immigrant stocks, 16 origins (excl. Other)	0.99	0.99	0.94	0.65	0.90	0.97	>0.99

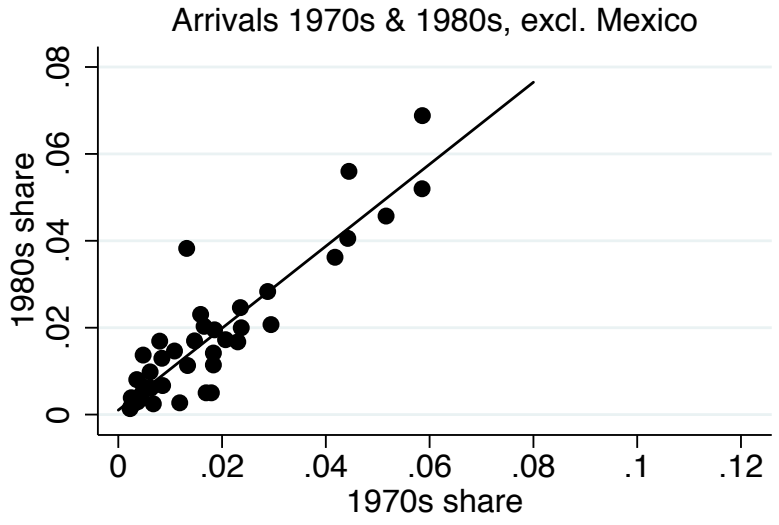
Note: Authors' calculations using U.S. Census (1950-2000) and ACS (2010) data based on 109 MSAs. The column headings refer to the Census year from which the data were taken. Recent arrivals are immigrants who arrived in the decade prior to the Census year.

Interdecadal Correlation of Immigrant Shares

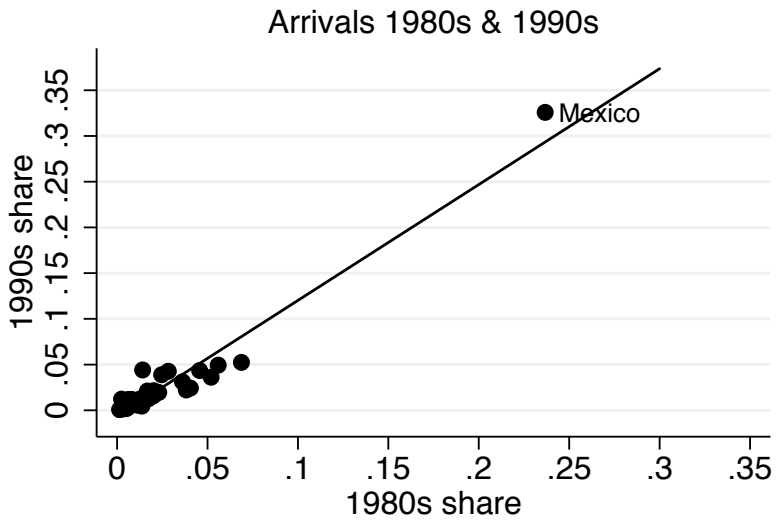


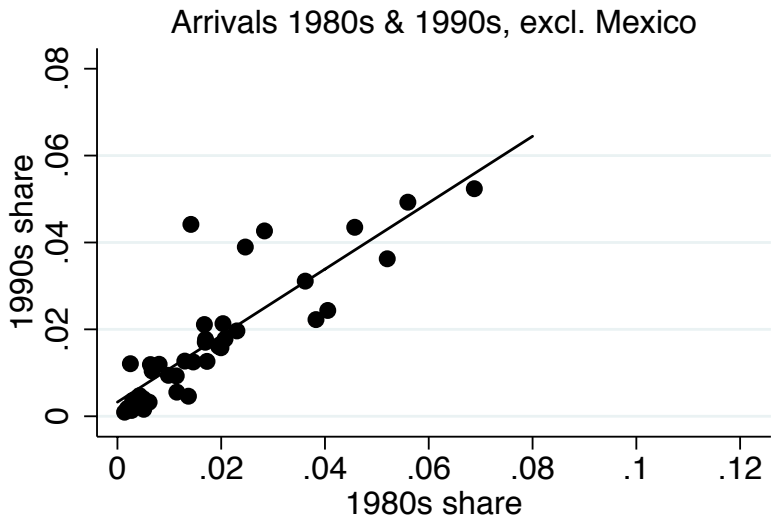


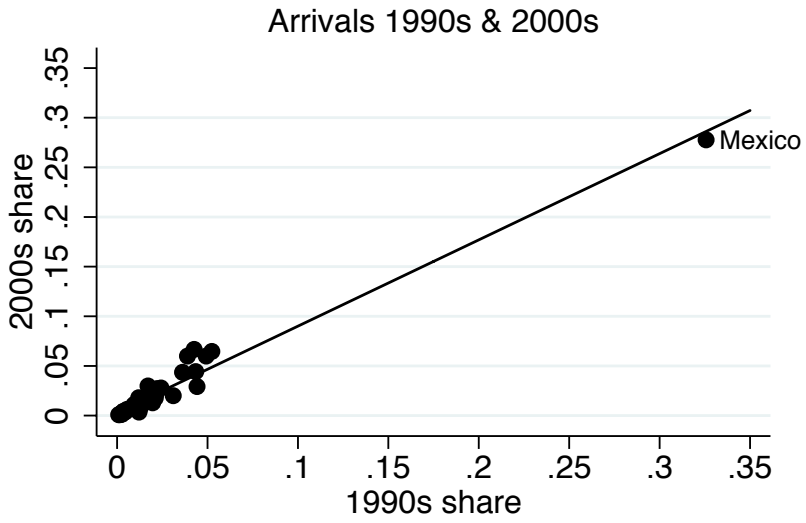


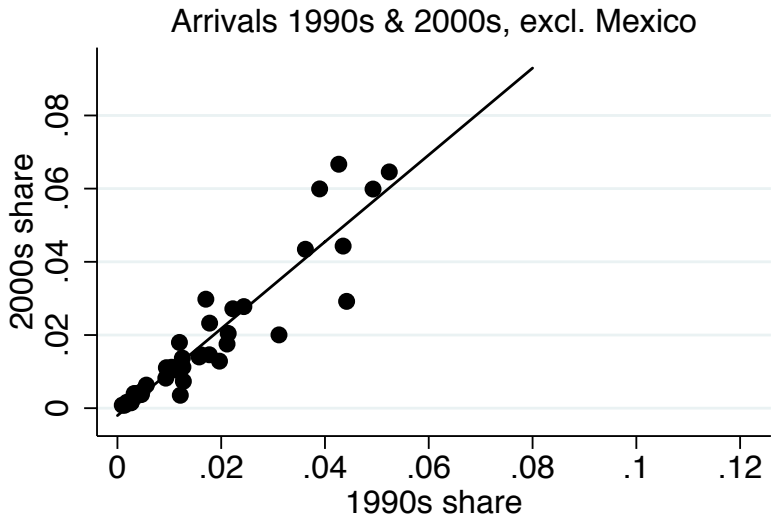


Interdecadal Correlation of Immigrant Shares









OLS and Conventional IV Estimates

	1970	1980	1990	2000	2010
Panel A: OLS					
Immigrant Inflow Rate	0.120	-0.156	0.452 **	0.173	0.027
	(0.155)	(0.139)	(0.140)	(0.129)	(0.149)
Panel B: 2SLS					
Second stage					
Predicted Immigrant	0.183	-0.342	0.398 **	-0.045	0.017
Inflow Rate	(0.211)	(0.184)	(0.114)	(0.113)	(0.144)
First stage					
Past Settlement	1.121 **	0.686 **	0.976 **	0.629 **	0.749 **
Instrument	(0.216)	(0.132)	(0.175)	(0.114)	(0.058)
First stage R^2	0.819	0.674	0.775	0.655	0.832

Note: Authors' calculations using U.S. Census and ACS data based on 109 MSAs. The column headings refer to the Census year from which the data were taken. The table reports the slope coefficient in a regression of the change in residual log wage on the immigrant inflow rate in the decade preceding each census year. The reference year for past settlement instrument is beginning of the relevant decade. Robust standard errors in parentheses. ** indicates $p<0.01$, * indicates $p<0.05$.

OLS and Conventional IV Results

Point estimates differ substantially across decades. Estimate for is negative for 1970s, positive (and large) for 1980s.

IV estimates are more negative, but difference with OLS estimates is modest.

Interpretations:

- IV does not address the selection problem?
- IV does address selection, but conventional estimates conflate short- and longer-term response to immigration.

"Double Instrumentation" Solution

$$\Delta \log w_{jt} = \beta_0 + \beta_1 m_{jt} + \beta_2 m_{jt-1} + \eta_{jt}$$

β_2 measures response to past shocks and should be positive. m_{jt-1} is almost surely endogenous, however.

Solution: use

$$\widetilde{m}_{jt} = \sum_o \frac{M_{ojt^0}}{M_{ot^0}} \frac{\Delta M_{ot}}{L_{jt-1}} \quad \text{and} \quad \widetilde{m}_{jt-1} = \sum_o \frac{M_{ojt^0}}{M_{ot^0}} \frac{\Delta M_{ot-1}}{L_{jt-2}}$$

as instruments for m_{jt} and m_{jt-1}

- Instrumenting m_{jt} with $\widetilde{m}_{jt}$ addresses endogeneity from current shocks
- Instrumenting m_{jt-1} with $\widetilde{m}_{jt-1}$ addresses endogeneity from adjustment process.

First Stages Equations

$$m_{jt} = \pi_{10} + \pi_{11}\tilde{m}_{jt} + \pi_{12}\tilde{m}_{jt-1} + u_{jt}$$

and

$$m_{jt-1} = \pi_{20} + \pi_{21}\tilde{m}_{jt} + \pi_{22}\tilde{m}_{jt-1} + v_{jt}$$

Theoretically, we should have $\pi_{12} = 0$ and $\pi_{21} = 0$. Use 2SLS without imposing restrictions, however.

Instruments are highly collinear. We test for weak instruments in model with multiple endogenous variables using Sanderson-Windmeijer (2016) *F*-statistic.

That is, is there enough independent variation in the instruments to identify both first stage equations)

Source of Identification

If the same base year is used for each instrument, identification comes only from changes over time in the national country-of-origin mix.

Our proposed solution isolates that part of immigrants inflows that

- do not correlate with contemporaneous and past demand shocks
- are predictable from past stocks
- are uncorrelated with inflows in past period…

by using only variation in the aggregate (national) component of the shift-share instruments.

Correlations

	1980	1990	2000	2010
Panel A: Serial Correlation				
Acutal Inflows	0.82	0.96	0.92	0.96
Past Settlement Instrument	0.70	0.99	0.96	0.99
Panel B: Cross-Sectional Correlation of Immigrant Inflows and Instruments				
Correlation of Inflow with				
Instrument base period t -1	0.82	0.88	0.81	0.91
Instrument base period t -2	0.73	0.69	0.68	0.78
Correlation of Past inflow with:				
Instrument base period t -1	0.62	0.96	0.93	0.95
Instrument base period t -2	0.51	0.81	0.81	0.83

Correlations by Skill Group

	1980	1990	2000	2010
Panel C: Serial Correlation by Skill Group				
Actual inflows				
High skilled	0.79	0.95	0.94	0.97
Low skilled	0.81	0.95	0.88	0.93
log(High skilled/Low skilled)	0.62	0.80	0.76	0.73
Past Settlement Instrument				
High skilled	0.70	0.97	0.98	0.99
Low skilled	0.72	0.98	0.98	0.99
log(High skilled/Low skilled)	0.88	0.95	0.99	0.99

Double Instrumentation: First Stages

	(1)	(2)	(3)	(4)
Census Year:	1980	1990	2000	2010
IV base period:	1970	1980	1990	2000
First stage for immigrant inflows				
Past settlement instrument	0.415 **	-0.190	-0.557	1.049 *
	0.115	0.456	0.288	0.400
Lagged past settlement instrument	0.325 **	1.221 *	1.211 **	-0.303
	0.048	0.510	0.265	0.415
F-statistic	166.2	15.2	107.9	103.7
Sanderson-Windmeijer *F*-statistic	47.7	6.1	1.1	0.9
First stage for lagged immigrant inflows				
Past settlement instrument	-0.098 *	0.268	-0.502	1.339 *
	0.047	0.163	0.279	0.513
Lagged past settlment instrument	0.719 **	0.376 *	1.430 **	-0.157
	0.017	0.173	0.241	0.534
F-statistic	5261.0	53.3	532.5	175.7
Sanderson-Windmeijer *F*-statistic	153.5	6.4	1.1	0.9

First Stage Results

- Only in the 1970s is there enough independent information in the instruments to identify both equations.

- 1970s saw changes in country-of-origin composition after the enactment in June 1968 of the Immigration and Nationality Act of 1965.

- One of our general points: you can't get something for nothing. Innovations in the country-of-origin mix are essential for identification.

Double Instrumentation: Second Stage, 1970s

	(1)	(2)
IV base period	1970	1960
Panel A: 2SLS		
Immigrant Inflows	-0.342	-0.430 *
	(0.184)	(0.199)
Panel B: 2SLS using Double Instrument Procedure		
Immigrant Inflows	-0.719 *	-0.898 **
	(0.291)	(0.314)
Lagged Immigrant Inflows	0.515 *	0.687 **
	(0.202)	(0.239)
Panel C: Reduced Form		
Past settlement instrument	-0.349 **	-0.382 **
	(0.116)	(0.107)
Lagged past settlement instrument	0.207 **	0.323 **
	(0.089)	(0.117)

Robustness Checks

	(3)	(4)	(5)	(6)	(7)
IV base period	1960	1960	1960	1960	1960
Notes:	Trim Bottom 5% of Wages	Weight: Population	Weight: log(Pop.)	Bartik Control Var.	Division Fixed Effects
Panel A: 2SLS					
Immigrant Inflows	-0.440 *	-0.193	-0.407 *	-0.454 *	-0.684 *
	(0.180)	(0.117)	(0.195)	(0.205)	(0.279)
Panel B: 2SLS using Double Instrument Procedure					
Immigrant Inflows	-0.850 **	-0.406	-0.869 **	-0.941 **	-1.591 **
	(0.271)	(0.263)	(0.315)	(0.330)	(0.518)
Lagged Immigrant Inflows	0.602 **	0.308	0.669 **	0.714 **	1.123 **
	(0.199)	(0.232)	(0.240)	(0.260)	(0.356)
Panel C: Reduced Form					
Past settlement instrument	-0.346 **	-0.316 *	-0.381 **	-0.400 **	-0.517 **
	(0.093)	(0.128)	(0.108)	(0.116)	(0.187)
Lagged past settlement instrument	0.320 **	0.233	0.325 **	0.331 *	0.385 **
	(0.105)	(0.157)	(0.116)	(0.128)	(0.176)

Double Instrumentation: Subgroups

	Imm. Inflows		Lagged Imm. Inflows	
Subgroup	Coeff.	Std. Err.	Coeff.	Std. Err.
All	-0.898 **	0.314	0.687 **	0.239
Male	-0.754	0.394	0.516	0.297
Education				
High School or Less	-0.980 **	0.350	0.705 **	0.268
More than High School	-0.618	0.422	0.615	0.431
Age				
30 or Younger	-1.146 **	0.436	1.026 **	0.325
31-50	-0.615 *	0.278	0.412	0.213
51-64	-0.743	0.644	0.532	0.462
30 or Younger and Low Skilled	-1.313 *	0.561	1.042 *	0.412

Implications for the Immigration Literature

Spatial correlation estimates conflate short- and long-run response:

- Prolonged adjustment to local shocks.
- Serial correlation in past settlement instrument up to 0.99, predicts past as well as current inflows – "too strong"?
- This may help to explain "confusing set of results" (Borjas 1999), positive coefficient estimates, time dependence.

Proposed solution:

- Exploit changes in national compositions to isolate innovations in local immigrant inflows ("double IV").
- Card (2001) decomposition by country-of-origin is key
- Yields more negative impact estimate, and positive coefficient on past inflow (local recovery).

Implications for Shift-Share Instruments in General

- Past settlement IV is a typical shift-share instrument combines aggregate shifts with local composition of economy

$$IV_{jt} = share_{jt^0} \times shift_t$$

- In many other contexts, shares (industries, population shares, etc) are highly persistent.
- In presence of longer-lasting dynamic adjustment processes, innovation at the aggregate level is necessary to overcome bias due to correlation of the instrument with adjustment.
- In some settings, the aggregate variable is an innovation (e.g. rising import competition from China, Autor *et al.*, 2013), and should be ok.
- If not, our procedure should extend to other context.

Bonus Slides

Publications Using Instrument

Authors	Year	Journal	Outcome
Altonji and Card	1991	Book chapter	Native labor market outcomes
Card and DiNardo	2000	AER: P&P	Internal migration
Card	2001	JOLE	Internal migration, labor market
Fairlie and Meyer	2003	JOLE	Native self-employment
Dustmann, Fabbri and Preston	2005	Economic Journal	Native labor market outcomes
Hatton and Tani	2005	Economic Journal	Internal migration
Ottaviano and Peri	2005	JoUE	Native wages and employment
Ottaviano and Peri	2006	J. of Econ. Geography	Native wages and housing
Reed and Danziger	2007	Am. Econ. Review	Native labor market outcomes
Saiz	2007	JoUE	Housing market
Cortes	2008	J. Political Econ.	Prices (goods and services)
Frattini	2008	mimeo	Prices (goods and services)
Kugler and Yuksel	2008	mimeo	Native labor market outcomes
Peri and Sparber	2009	AEJ: Applied	Task specialization
Card	2009	AER: P&P	Native labor market outcomes
Iranzo and Peri	2009	REStat	Schooling externalities and
Hunt and Gauthier-Loiselle	2010	AEJ: Macro	Innovation
Furtado and Hock	2010	AER: P&P	Fertility
Boustan	2010	Quarterly J. of Econ.	Residential segregation
Kerr and Lincoln	2010	JOLE	Science and engineering,
Cortes and Tessada	2011	AEJ: Applied Econ.	Labor supply, household work
Lewis	2011	Quarterly J. of Econ.	Investment in automation
Gonzalez and Ortega	2011	Labour Econ.	Labor market outcomes
Farré, Libertad and Francesc	2011	B.E. J. Econ. A&P	Female labor supply
Cortes and Tessada	2011	AEJ: Applied	Female labor supply
Cascio and Lewis	2012	AEJ: Policy	Residential and school
Beaudry and Green	2012	Econometrica	Wage determination
Bianchi, Buonanno, and Pinotti	2012	J. Eur. Econ. Ass.	Crime
Smith	2012	JOLE	Youth employment
Wozniak and Murray	2012	JoUE	Population, internal migration
Hunt	2012	Working Paper	Educational attainment
Peri	2012	REStat	Productivity (TFP)
Malcho-Moller, Munch and	2012	Scan. J. Econ.	Firm-level wages
Dustmann, Frattini and Preston	2013	ReStud	Native labor market outcomes
Lafortune	2013	AEJ: Applied	Marriage market
Ottaviano, Peri and Wright	2013	Am. Econ. Review	Native labor market outcomes
Monras	2013	Working Paper	Native labor market outcomes
Bell, Fasani and Machin	2013	REStat	Crime
Facchini, Mayda and Mendola	2013	Working Paper	Native labor market outcomes
Amuedo-Dorantes, Sevilla	2014	J. Human Res.	Parental time investment
Cortes and Pan	2014	J. Health Econ.	Supply of native nurses
Aydemir and Kirdar	2014	Working Paper	Native labor market outcomes
Llull	2014	Working Paper	Native labor market outcomes
Piyapromdee	2014	Working Paper	Native labor market outcomes,
Ganguli	2015	JOLE	Knowledge diffusion
Orrenius and Zavodny	2015	JOLE	Educational choices
Amior	2015	Working Paper	Native labor market outcomes
Del Carpio, Özden,	2015	Scan. J. Econ.	Native labor market outcomes
Dustmann and Glitz	2015	JOLE	Firm adjustment
Özden and Wagner	2015	Working Paper	Native labor market outcomes
Machin and Muprhy	2015	Working Paper	Higher education
Chalfin	2015	AER: P&P	Crime
Ottaviano, Peri and Wright	2015	Working Paper	Firm-level trade of services
Forlani, Lodigiani and	2015	Scan. J. Econ.	Female labor supply
Cattaneo, Fiori and Peri	2015	J. Human Res.	Native labor market outcomes
Kasy	2015	JoUE	Location choices with social
Sharpe	2015	PhD Thesis	Housing market
Ransom and Winters	2016	Working Paper	STEM education and
Fernandez-Huertas, Ferrer and	2016	Working Paper	Residential segregation
Fassio, Kalantaryan and	2016	Working Paper	Productivity
Foged and Peri	2016	AEJ: Applied	Native labor market outcomes
Fulford, Petkov and	2017	Working Paper	Ancestry composition and county

Speed of Adjustment

Existing evidence points to prolonged adjustment processes:

- Eberts and Stone (1992) argue that adjustment to local demand and supply shocks takes more than a decade
- Blanchard and Katz (1992) find that wages reach minimum six years after an adverse demand shock and then recover slowly
- Autor, Dorn and Hanson (2016) argue that wages remain depressed for at least a decade after trade-induced local shocks

Second Stage Results, 1970 Base Period

	(3)	(4)	(5)	(6)	(7)
IV base period	1970	1970	1970	1970	1970
Notes:	Trim Bottom 5% of Wages	Weight: Population	Weight: log(Pop)	Bartik Control Var.	Division Fixed Effects
Panel A: 2SLS					
Immigrant Inflows	-0.355*	-0.130	-0.318	-0.360	-0.541*
	(0.168)	(0.104)	(0.178)	(0.188)	(0.249)
Panel B: 2SLS using Double Instrument Procedure					
Immigrant Inflows	-0.678**	-0.299	-0.688*	-0.734*	-1.391**
	(0.262)	(0.202)	(0.287)	(0.307)	(0.392)
Lagged Immigrant Inflows	0.441*	0.254	0.502*	0.510*	0.984**
	(0.189)	(0.151)	(0.198)	(0.212)	(0.269)
Panel C: Reduced Form					
Past settlement instrument	-0.325**	-0.255*	-0.347**	-0.355**	-0.566**
	(0.106)	(0.128)	(0.116)	(0.125)	(0.196)
Lagged past settlement instrume	0.146	0.192*	0.215*	0.193*	0.352**
	(0.103)	(0.0847)	(0.0845)	(0.0870)	(0.132)

OLS and Traditional IV: Commuting Zones

Panel A: OLS	1980	1990	2000	2010
Imm. inflow rate	-0.210**	0.605**	-0.0138	0.0599
	(0.077)	(0.094)	(0.107)	(0.115)
Panel B: 2SLS	1980	1990	2000	2010
Imm. inflow rate	-0.315**	0.595**	-0.222	0.0597
	(0.095)	(0.089)	(0.170)	(0.091)
First stage	0.782**	1.017**	0.602**	0.678**
	(0.166)	(0.057)	(0.115)	(0.082)
R-squared	0.663	0.891	0.714	0.823
F-statistic	22.28	318.4	27.28	68.53

Note: Based on U.S. Census data and 741 Commuting Zones. The table reports the slope coefficient in a regression of the change in residual log wage on the immigrant inflow rate in the decade preceding each census year. Reference year for past settlement instrument is beginning of decade. Observations weighted by lagged total population. Robust standard errors in

Double IV: Commuting Zones

	(1)	(3)	(6)	(7)
IV base period	1970	1970 trim 5%	1970 Bartik	1970 region FE
Panel A: 2SLS				
Imm(t)	-0.294*	-0.312**	-0.318*	-0.520**
	(0.134)	(0.118)	(0.140)	(0.192)
Panel B: 2SLS w/ Double IV				
Imm(t)	-0.416	-0.388*	-0.447	-0.889*
	(0.219)	(0.178)	(0.240)	(0.371)
Imm(t-1)	0.197	0.123	0.208	0.471
	(0.164)	(0.123)	(0.194)	(0.267)
Panel C: Reduced Form				
Imm(t)	-0.196**	-0.183**	-0.212**	-0.291**
	(0.0588)	(0.0541)	(0.0609)	(0.0695)
Imm(t-1)	0.0382	-0.0265	0.0380	0.0649
	(0.0666)	(0.0849)	(0.0642)	(0.0935)

Note: Based on U.S. Census data and 741 Commuting Zones. The dependent variable
change in residual log wages by commuting zone between the 1970 and 1980 Censu
regressions include lag log population as control variable and are weighted by lagged
population. Bottom 5% of wages trimmed in column (2). Columns (3) and (4) include
Bartik IV or Census Division fixed effects as control variables. Robust standard errors
parentheses, ** p<0.01, * p<0.05.