The China Syndrome: Local Labor Market Effects of Import Competition in the US

David Autor — MIT and NBER
David Dorn — CEMFI and IZA
Gordon Hanson — UCSD and NBER

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How has import competition affected US labor markets?

Trade and labor market, round one:

- Literature on rising wage inequality in the early 1990s
  - Skill biased technical change is more important than trade
  - Global outsourcing affects demand for skill but only modestly
  - Trade with low income countries is too small to have major effects

Trade and labor market, round two:

- Since 1990, trade with low wage countries has grown dramatically
  - Low-wage country share in US imports: 3% in 1991, 12% in 2007
  - China accounts for 92% of this growth
  - The literature is just beginning to assess the consequences

Ratio of Chinese imports to U.S. domestic consumption

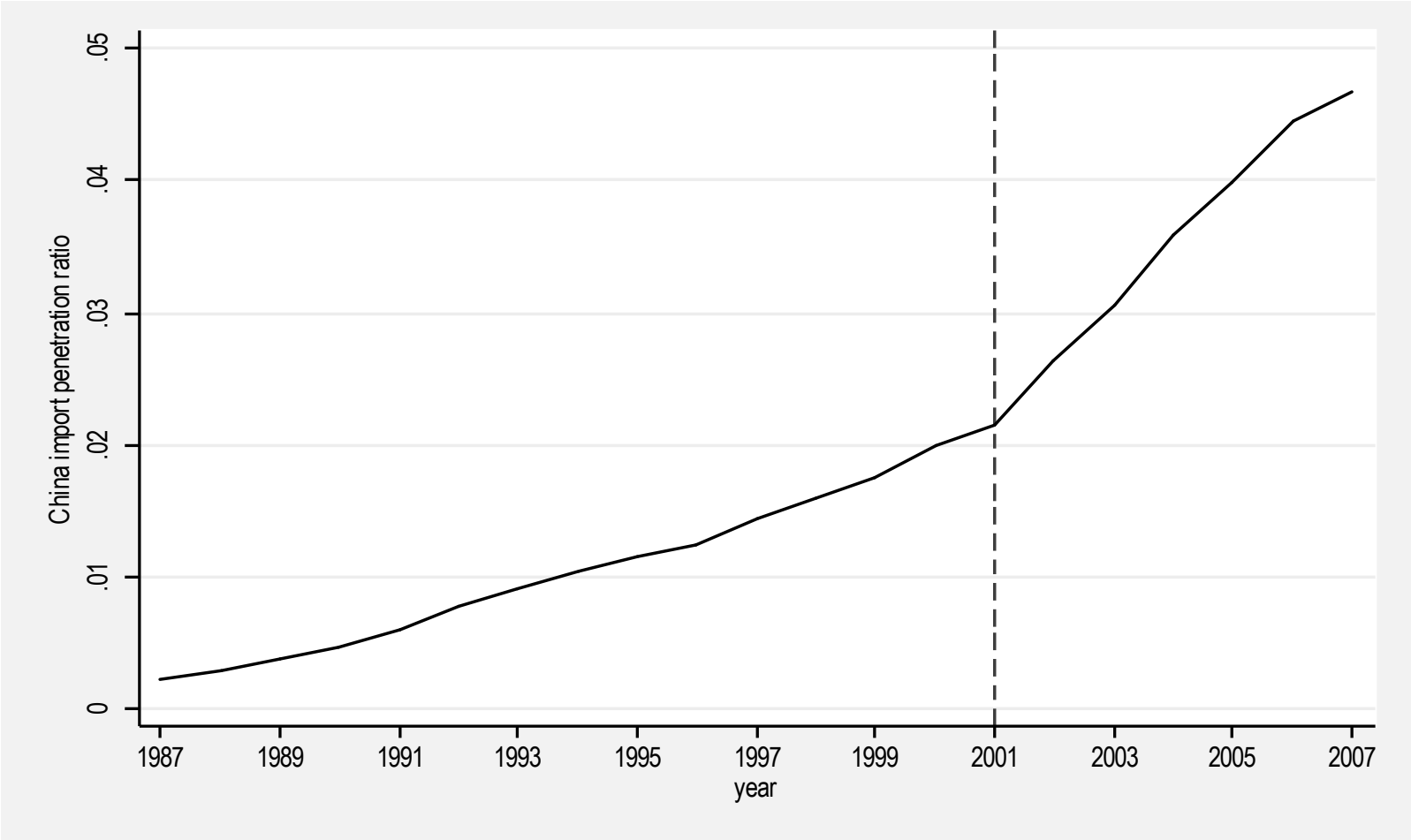

Figure 1.
Import Penetration Ratio for U.S. Imports from China.

Value of trade with China

Table 1. Value of Trade with China for the U.S. and Other Selected High-Income Countries and Value of Imports from all other Source Countries, 1991/1992-2007.

	I. Trade with China (in BN 2007 US$)		II. Imports from Other Countries (in BN 2007 US$)		
	Imports from China (1)	Exports to China (2)	Imports from Other Low-Inc. (3)	Imports from Mexico/Cafta (4)	Imports from Rest of World (5)
			A. United States		
1991/92	26.3	7.5	7.7	38.5	905.8
2000	121.6	23.0	22.8	151.6	1865.5
2007	330.0	57.4	45.4	183.0	2365.9
Growth 1991-07	1156%	663%	491%	375%	161%
			B. 8 Other Developed Countries		
1991/92	28.2	19.4	9.2	2.8	1708.8
2000	94.3	68.2	13.7	5.3	1979.8
2007	262.8	196.9	31.0	11.6	3339.3
Growth 1991-07	832%	914%	236%	316%	95%

Notes: Trade data is reported for the years 1991, 2000, and 2007, except for exports to China which are first available in 1992. The set of "Other Developed Countries" in Panel B comprises Australia, Denmark, Finland, Germany, Japan, New Zealand, Spain, and Switzerland. Column 3 covers imports from all countries that have been classified as low-income by the World Bank in 1989, except for China. Column 4 covers imports from Mexico and the Central American and Carribean countries covered by the CAFTA-DR free trade agreement. Column 5 covers imports from all other countries (primarily from developed countries).

Recent literature on the effect of trade shocks

- **Plants**: Bernard, Jensen & Schott '06; Bloom, Draca & Van Reenen '10; Holmes & Stevens '11: Import exposure affects plant growth, size distribution, productivity
- **Industries**: Artuc, Chaudhuri & McLaren '10; McLaren & Hakobyan '11: Adjustment costs for workers in exposed industries
- **Occupations**: Ebenstein, Harrison, McMillian & Phillips, '10: Slower wage growth in occupations more exposed to imports
- **Factor content of trade**: Burstein & Vogel '11 (Deardorff & Staiger '88, Borjas, Freeman & Katz '97, Krugman v. Leamer '00)

This paper complements existing literature:

- Examines the effects of trade shocks on local labor markets
- Antecedents: Borjas & Ramey '95, Topalova '10, Kovak '11

Agenda

1. Theoretical motivation
2. Empirical strategy
   - Defining local labor markets, data sources
   - Regression specification, IV strategy
3. Manufacturing employment results
   - IV estimates
   - Gravity-based estimates, other results
4. Beyond manufacturing
   - Population, unemployment, labor force status
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   - Net imports, gravity (again), factor content of trade
5. Comparing gains from trade with trade-induced DWL

Consider a commuting zone (CZ) as a small open economy

Each CZ supplies the broader US market (and rest of the world)

- Suppose China has productivity growth or a fall in trade costs
- What is the impact on the demand for goods produced by a CZ?

Motivate trade shocks using Eaton and Kortum '02

- $X_{nij} = \frac{T_{ij}(w_{ij}\tau_{nij})^{-\theta}}{\Phi_{nj}} X_{nj}, \qquad \Phi_{nj} \equiv \sum_h T_{hj}(w_{hj}\tau_{nhj})^{-\theta}$
  - CZ i's sales in industry j to destination market n are
  - T_{ij} is productivity of industry j in CZ i
  - w_{ij} is unit production cost of industry j in CZ i
  - τ_{nij} is trade cost between CZ i and market n
  - Φ_{nj} captures productivity, unit costs, trade costs of suppliers to market n (incl. China)
  - X_{nj} is "toughness" of industry j in market n
  - θ is productivity dispersion parameter

Effect of China's ΔTFP or $\Delta\tau$ on CZ's product demand

- **Impact of China imports on CZ's output**
  - Productivity growth in China or a reduction in US trade barriers on Chinese goods increases market toughness facing CZ i
  - Derive the log change in demand for goods produced by CZ i that is due to China is given by

$$\hat{Q}_i = -\sum_j \frac{X_{uij}}{X_{uj}} \frac{X_{ucj}(\hat{A}_{cj} - \theta\hat{\tau}_{cj})}{Q_i}$$

    - X_{uij}/X_{uj} is CZ i's sales as a share of US purchases in industry j
    - Q_i is total output in CZ i
    - $X_{ucj}(\hat{A}_{cj} - \theta\hat{\tau}_{cj})$ is growth in US imports from China due to China's productivity growth and change in trade costs facing China

- **$\hat{Q}_i$ is an exposure index**
  - Allocates exogenous component of ΔChina goods imports to CZ's according to their output of those goods

Proxying for Δ Chinese import exposure at CZ level

- **Empirical proxy for Δ CZ's import exposure:**

$$\Delta IPW_{uit} = \sum_j \frac{E_{ijt}}{E_{jt}} \frac{\Delta M_{ucjt}}{E_{it}}$$

  - Allocates to each CZ a share of total national import growth
  - Divides this import value by a CZ's total employment
  - Yields measure of "import growth per worker" (in $1,000's of USD)

- **Note two sources of variation in this measure:**
  - Variation in CZ's manufacturing industry *mix*
  - Overall manufacturing employment *share* in CZ
    (By controlling for initial manufacturing employment in CZs, identification comes from variation in industry mix)

IV strategy: Exogenous variation in Chinese import shocks

- **Concern:**
  - U.S imports from China may be affected by U.S. demand shocks rather than just China's growing productivity and falling trade costs
- **Approach:**
  - Instrument for ΔIPW_{it} using other high-income countries' imports from China (and lagged CZ employment)

$$\Delta IPW_{oit} = -\sum_j \frac{E_{uijt-10}}{E_{ujt-10}} \left[\frac{\Delta M_{ocjt}}{E_{it-10}} \right]$$

- **Rationale: China's export growth driven by...**
  - Rural to urban migration (over 150m migrants moved to cities)
  - Opening to foreign investments, technology, imported inputs
  - WTO accession in 2001 (reduction in trade barriers)

China's opening allowed it to realize its latent comparative advantage with result being similar export bundles going to high income markets

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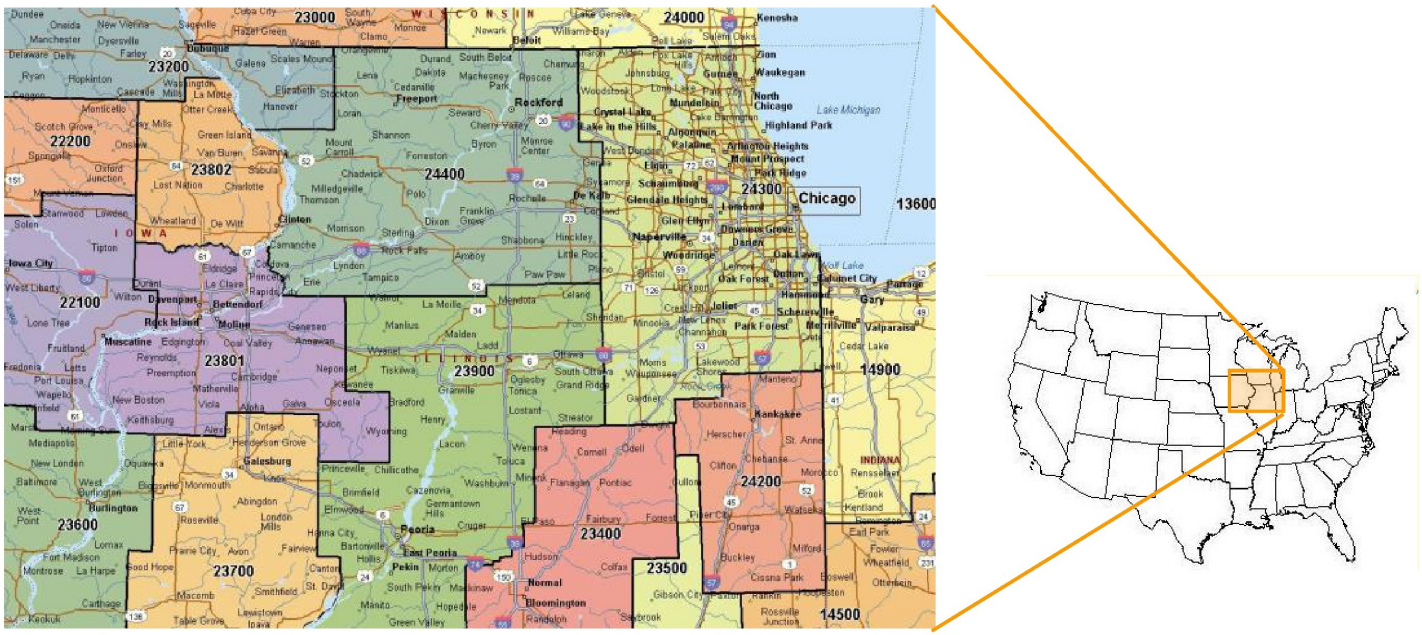
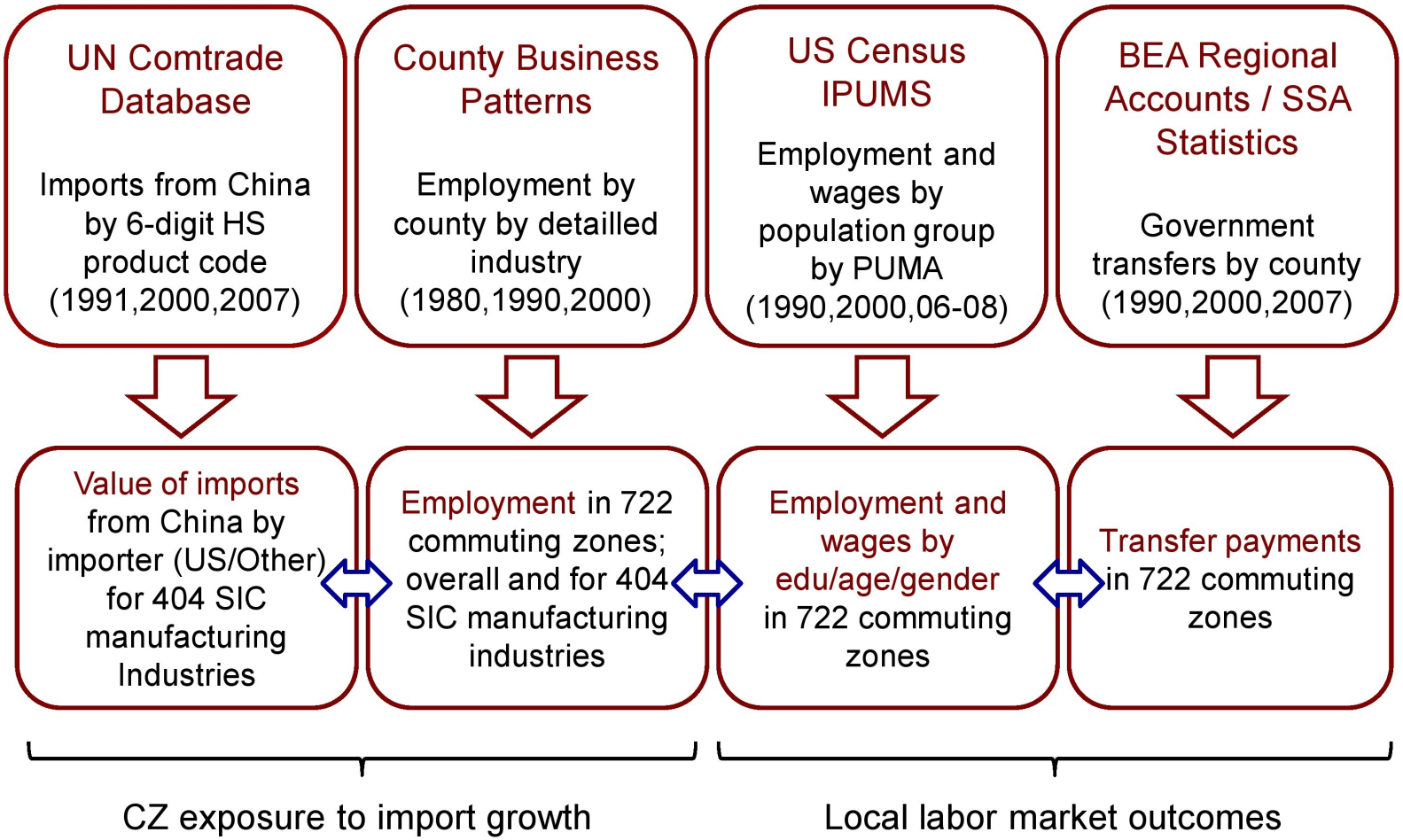
Definition of commuting zones (Tolbert and Sizer 1996)

Based on commuting patterns among countries in 1990

- Cluster all mainland U.S. counties in 722 commuting zones (CZ), characterized by strong commuting ties within a CZ and weak commuting across CZs
- Can map Census Public Use Micro Areas to CZs



Data sources (time periods 1990-2000, 2000-2007)



Chinese import exposure by CZ

Δ China imports per worker (in 1,000s of US$) across CZs

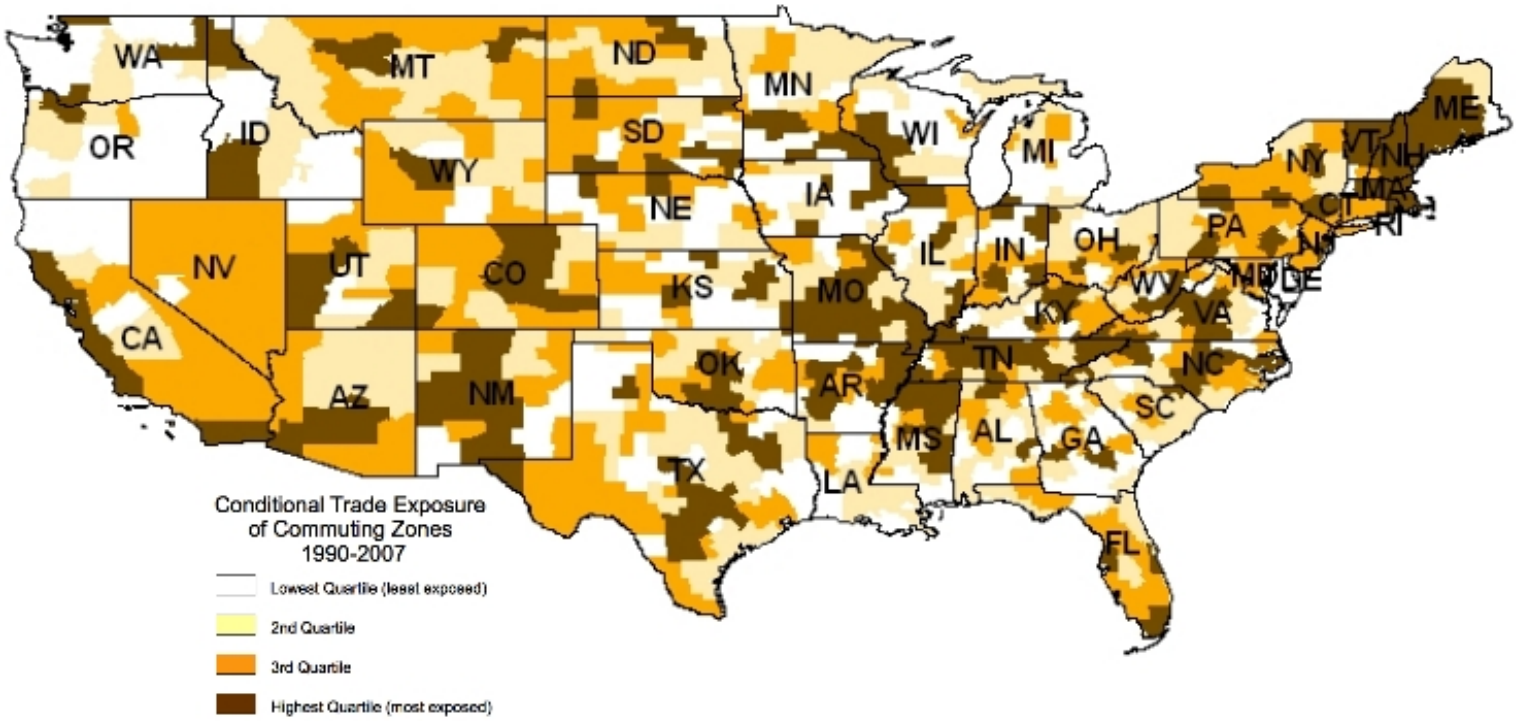
Appendix Table 1. Descriptive Statistics for Growth of Imports Exposure per Worker across C'Zones

I. 1990-2000		II. 2000-2007	
A. Percentiles			
90th percentile	2.05	90th percentile	4.30
75th percentile	1.32	75th percentile	3.11
50th percentile	0.89	50th percentile	2.11
25th percentile	0.62	25th percentile	1.60
10th percentile	0.38	10th percentile	1.03

Over all CZ's:

- 75/25 pctile Δ: $1,510 in 2000-2007 (over 10 yrs)
- 75/25 pctile Δ: $700 in 1990-2000
- Average per decade over 1990-2007: $1,105

Import exposure 1990-07 (cond'l on manufacturing emp)



Among 50 Largest Commuting Zones

(A) Largest Increase in Exposure

1. San Jose, CA
2. Raleigh, NC
3. Providence, RI

(B) Smallest Increase in Exposure

1. Detroit, MI
2. Grand Rapids, MI
3. Seattle, WA

Estimation

- **Regression model:**

$$\Delta y_{it} = \gamma_t + \beta_0 \Delta IPW_{uit} + X_{it}' \beta_1 + e_{it}$$

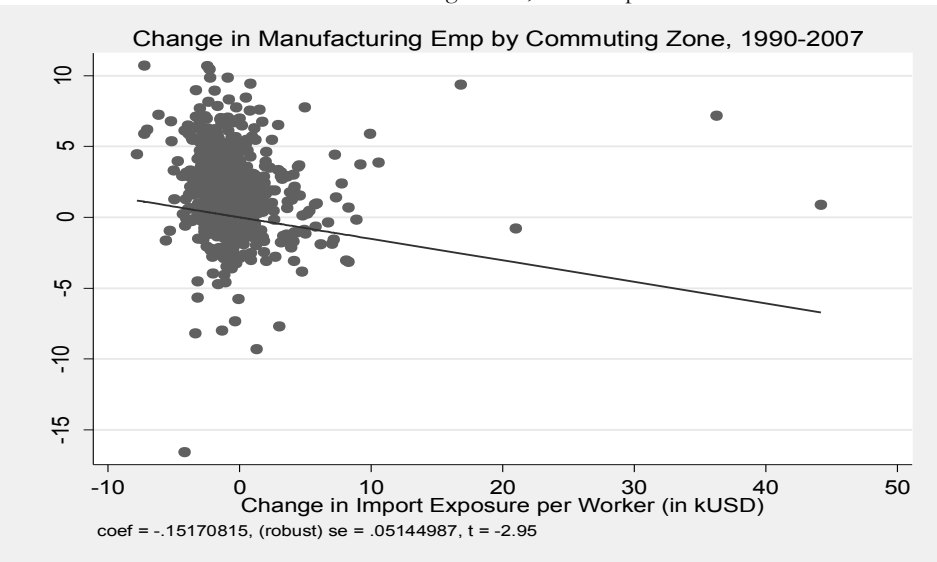
where:

  - Δy_{it} is 10-year equivalent change of emp, pop, wages, or transfers
  - γ_t is a period effect (time periods 1990–2000, 2000–2007)
  - ΔIPW_{uit} is import exposure
  - X_{it} contains start of period CZ manufacturing employment share and CZ demographics
  - Observations weighted by CZ population; SEs clustered by state

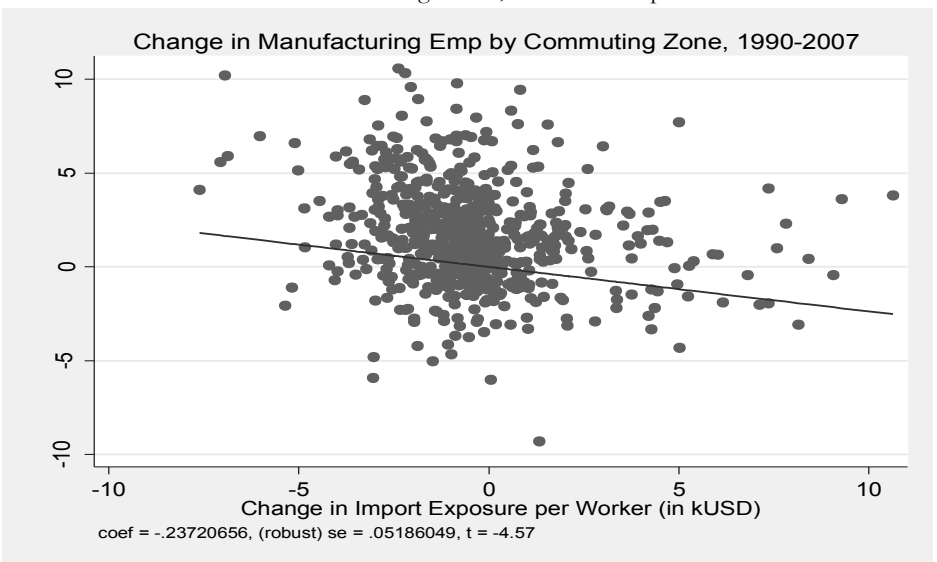
- **Instrumental variable:**
  - ΔIPW_{uit} instrumented by ΔIPW_{oit}

Effect of import exposure on mfg emp/pop: OLS

Panel A: OLS Regression, Full Sample



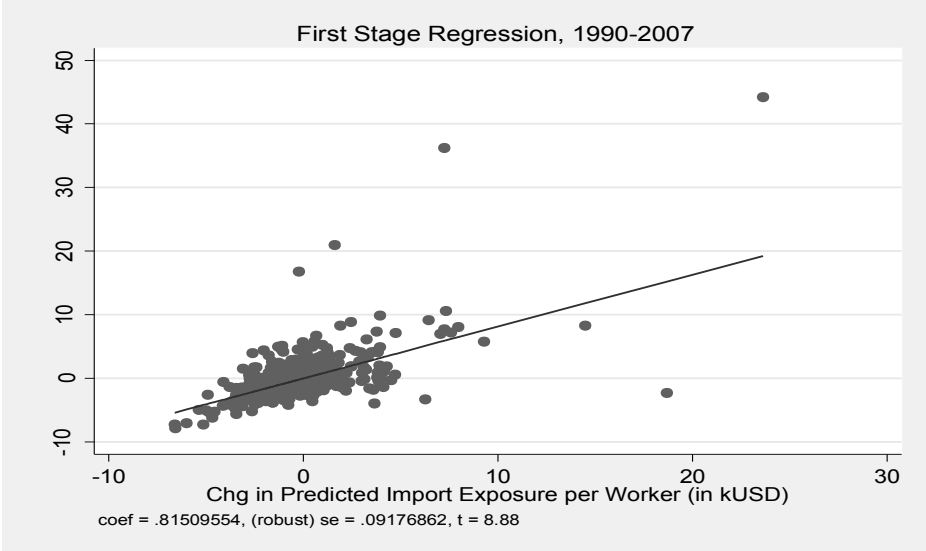
Panel B: OLS Regression, Trimmed Sample



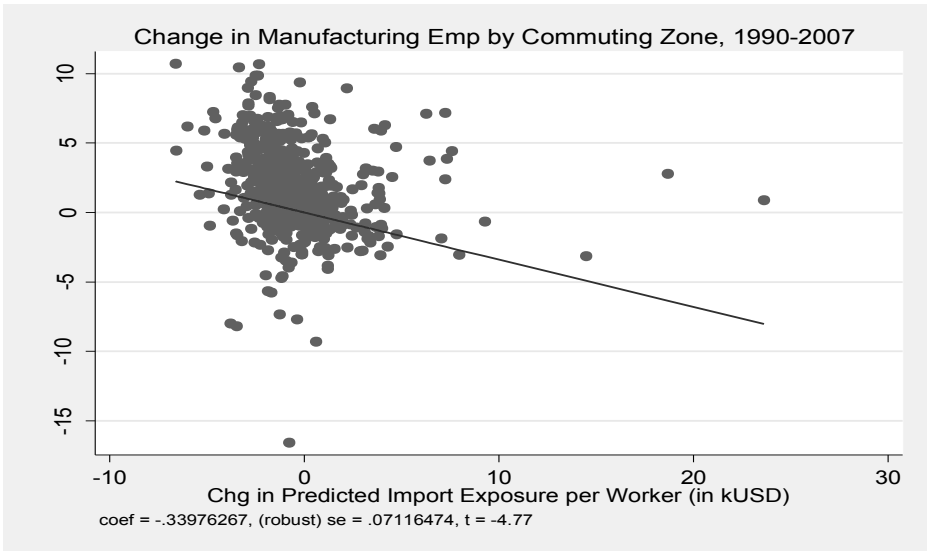
- Increase in Chinese import exposure related to decline in working age pop in manufacturing
  - Outliers in $\Delta IPW_{ui\tau}$ (small CZ's) appear to attenuate estimates
  - 2nd graph drops 15 CZs $>$ 5 SDs from median $\Delta IPW_{ui\tau}$ ($<$ 1% of pop)

2SLS first stage and reduced form estimates

Panel A: 2SLS 1st Stage Regression, Full Sample



Panel B: OLS Reduced Form Regression, Full Sample



Note: Plot controls for CZ's initial manufacturing employment share

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2SLS estimates for 1990–2007 and *prior decades*

Table 2. Imports from China and Change of Manufacturing Employment in Commuting Zones, 1970-2007: 2SLS Estimates.
Dependent Variable: 10 x Annual Change in Manufacturing Emp/Working Age Pop (in %pts)

	I. 1990-2007			II. 1970-1990 (Pre-Exposure)		
	1990-2000	2000-2007	1990-2007	1970-1980	1980-1990	1970-1990
	(1)	(2)	(3)	(4)	(5)	(6)
(Δ Current Period Imports from China to US)/Worker	-0.89 **	-0.72 **	-0.75 **			
	(0.18)	(0.06)	(0.07)			
(Δ Future Period Imports from China to US)/Worker				0.43 **	-0.13	0.15
				(0.15)	(0.13)	(0.09)

Notes: N=722, except N=1444 in stacked first difference models of columns 3 and 6. The variable 'future period imports' is defined as the average of the growth of a CZ's import exposure during the periods 1990-2000 and 2000-2007. All regressions include a constant and the models in columns 3 and 6 include a time dummy. Robust standard errors in parentheses are clustered on state. Models are weighted by start of period commuting zone share of national population. ~ $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$.

2SLS: Stacked first differences, 1990–2007

Table 3. Imports from China and Change of Manufacturing Employment in CZs 1990-2007
Dependent Var: 10 x Annual Change in Manufacturing Emp/Working Age Pop (in %pts)

	(1)		(2)		(3)		(4)		(5)		(6)	
(Δ Imports from China to US)/Worker	-0.746	**	-0.610	**	-0.538	**	-0.508	**	-0.562	**	-0.596	**
	(0.068)		(0.094)		(0.091)		(0.081)		(0.096)		(0.099)	
Percentage of employment in manufacturing$_{-1}$			-0.035		-0.052	**	-0.061	**	-0.056	**	-0.040	**
			(0.022)		(0.020)		(0.017)		(0.016)		(0.013)	
Percentage of college-educated population$_{-1}$							-0.008				0.013	
							(0.016)				(0.012)	
Percentage of foreign-born population$_{-1}$							-0.007				0.030	**
							(0.008)				(0.011)	
Percentage of employment among women$_{-1}$							-0.054	*			-0.006	
							(0.025)				(0.024)	
Percentage of employment in routine occupations$_{-1}$									-0.230	**	-0.245	**
									(0.063)		(0.064)	
Average offshorability index of occupations$_{-1}$									0.244		-0.059	
									(0.252)		(0.237)	
Census division dummies	No		No		Yes		Yes		Yes		Yes	
R^2	0.54		0.57		0.58		0.58		0.58		0.58	

Notes: N=1444 (722 commuting zones x 2 time periods). Robust standard errors in parentheses are clustered on state. Models are weighted by start of period commuting zone share of national population. ~ p ≤ 0.10, * p ≤ 0.05, ** p ≤ 0.01.

Alternative to 2SLS: Gravity residual approach

- **Gravity equation:**

$$\ln(X_{cnj}) - \ln(X_{unj}) = \ln(z_{cj}) - \ln(z_{uj}) - \theta[\ln(\tau_{cnj}) - \ln(\tau_{unj})$$

- **OLS counterpart:**

$$\ln(X_{cnjt}) - \ln(X_{unjt}) = \alpha_j + \alpha_n + \epsilon_{njt}$$

where:

- α_j is an industry fixed effect
- α_n is an importer fixed effect
- $\epsilon_{njt} \approx \left[\ln\left(\frac{z_{cjt}}{z_{ujt}}\right) - \alpha_j\right] + \left[-\theta \ln\left(\frac{\tau_{cnjt}}{\tau_{unjt}}\right) - \alpha_n\right]$
- $[\ln\left(\frac{z_{cjt}}{z_{ujt}}\right) - \alpha_j]$ is China's relative TFP in industry j year t
- $[-\theta \ln\left(\frac{\tau_{cnjt}}{\tau_{unjt}}\right) - \alpha_n]$ is China's rel. trade cost for ind j, country n, yr t

Alternative to 2SLS: Gravity residual approach

Applying gravity residual to create CZ import exposure measure:

- CZ import exposure measure same as instrument ΔIPW_{oit}

$$\Delta IPW_{git} = \sum_j \frac{E_{ijt-1}}{E_{ujt-1}} \cdot \frac{\Delta \bar{\epsilon}_{jt} M_{ucjt-1}}{E_{it-1}}$$

- **Except** replaces ΔM_{ocjt} with $\bar{\epsilon}_{jt} M_{ucjt-1}$ in exposure measure
- Hence gravity-measure, import exposure measure use same units

Reduced form using gravity residual

Gravity Residuals and Change of Manufacturing Employment in CZs: OLS Estimates.
Dependent Variable: 10 x Annual Change in Manufacturing Emp/Working Age Pop (in %pts)

	(1)		(2)		(3)		(4)		(5)		(6)	
Δ Comparative Advantage China (Gravity Residual)	-0.468	**	-0.319	**	-0.285	**	-0.266	**	-0.280	**	-0.289	**
	(0.075)		(0.054)		(0.044)		(0.041)		(0.043)		(0.043)	
Percentage of employment in manufacturing$_{-1}$			-0.072	**	-0.084	**	-0.098	**	-0.094	**	-0.085	**
			(0.015)		(0.015)		(0.013)		(0.012)		(0.010)	
Percentage of college-educated population$_{-1}$							-0.016				0.005	
							(0.013)				(0.008)	
Percentage of foreign-born population$_{-1}$							-0.014	~			0.022	*
							(0.008)				(0.010)	
Percentage of employment among women$_{-1}$							-0.057	**			-0.009	
							(0.022)				(0.023)	
Percentage of employment in routine occupations$_{-1}$									-0.202	**	-0.211	**
									(0.051)		(0.053)	
Average offshorability index of occupations$_{-1}$									-0.057		-0.233	
									(0.228)		(0.221)	
Census division dummies	No		No		Yes		Yes		Yes		Yes	
R^2	0.20		0.29		0.39		0.43		0.47		0.48	

Notes: N=1444 (722 commuting zones x 2 time periods). The mean (and standard deviation) of the change in gravity residual is 1.402 (1.788). Robust standard errors in parentheses are clustered on state. Models are weighted by start of period commuting zone share of national population. ~ $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$.

Magnitudes: Impact on manufacturing employment

- Δ U.S. manufacturing Emp/Pop fell by 33% between 1990 and 2007:
  - 1990 - 2000: -2.07%. 2000 - 2007: -2.73%
- Δ Chinese imports per U.S. worker:
  - 1990 - 2000: \$1,140
  - 2000 - 2007: \$2,630
  - Estimate $\sim$ 48% of Δ Chinese imports driven by *supply shock*
- Δ Chinese imports $\rightarrow$ ΔU.S. manufacturing Emp/Pop (pct points):

	1990-00	2000-07
OLS	-0.33%	-0.75%
Gravity	-0.18%	-0.42%

- **Pct of Δ U.S. Manuf Emp/Pop caused by ΔChina exposure:**
  - **1990 - 2000:** 8% to 16%
  - **2000 - 2007:** 14% to 28%
  - **1990 - 2007:** 11% to 23%

Other results

1. **Falsification exercise**
   - Regress past change in manuf emp/pop on future import exposure
2. **Expanding measure of imports**
   - Imports from China plus other low income countries
   - Imports from China plus Mexico and DR/CAFTA
3. **Excluding industries**
   - Drop computer industry
   - Drop apparel, textiles, and footwear
   - Drop industries used as inputs in construction

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Migration responses?

- **Does decline in manufacturing employment cause fall in working-age pop?**

$$\Delta \ln Pop_{i\tau} = \gamma_\tau + \beta_1 \Delta IPW_{ui\tau} + X'_{it}\beta_2 + e_{c\tau}$$

- Local effects of import shocks may partly diffuse through migration between CZs
- Literature suggests that migration responses are sluggish (Blanchard and Katz, 1991; Bound and Holzer, 2000; Notowidigdo, 2010)

Effect of import exposure on CZ working age pop

Table 4. Imports from China and Change of Working Age Population within Commuting Zones, 1990-2007
Dependent Variables: 10-Year Equivalent Log Changes in Headcounts (in log pts)

	I. By Education Level			II. By Age Group		
	All	College	Non-College	Age 16-34	Age 35-49	Age 50-64
	(1)	(2)	(3)	(4)	(5)	(6)
A. No Census Division Dummies or Other Controls						
(Δ Imports from China to US)/Worker	-0.815 *	-0.276	-0.855 *	-1.038 ~	-0.492	-0.871 **
	(0.381)	(0.511)	(0.371)	(0.591)	(0.436)	(0.315)
R^2	0.05	0.25	0.00	0.15	0.68	.
B. Full Controls						
(Δ Imports from China to US)/Worker	0.091	0.006	0.106	0.015	0.426	0.040
	(0.561)	(0.512)	(0.630)	(0.879)	(0.429)	(0.513)
R^2	0.46	0.49	0.51	0.43	0.81	0.47

Notes: N=1444 (722 commuting zones x 2 time periods). Robust standard errors in parentheses are clustered on state. Models are weighted by start of period commuting zone share of national population. ~ $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$.

Effect of import exposure on emp status by education

Table 5. Imports from China and Employment Status of Working Age Pop, 1990-2007: 2SLS Estimates
Dep Var: 10-Year Equivalent Changes in Pop Shares by Emp Status (%pts)

	Mfg Emp/ Pop		Non-Mfg Emp/Pop		Unemp/ Pop		NILF/ Pop		SSDI/ Pop	
All Education Levels										
(Δ Imports from China to US)/Worker	-0.596	**	-0.178		0.221	**	0.553	**	0.076	**
	(0.099)		(0.137)		(0.058)		(0.150)		(0.028)	
College Education										
(Δ Imports from China to US)/Worker	-0.592	**	0.168		0.119	**	0.304	**	n/a	
	(0.125)		(0.122)		(0.039)		(0.113)			
No College Education										
(Δ Imports from China to US)/Worker	-0.581	**	-0.531	**	0.282	**	0.831	**	n/a	
	(0.095)		(0.203)		(0.085)		(0.211)			

Notes: N=1444 (722 commuting zones x 2 time periods). All statistics are based on working age individuals (age 16 to 64). Robust standard errors in parentheses are clustered on state. Models are weighted by start of period commuting zone share of national population. ~ $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$.

Emp and earnings Δ's: Manufacturing and non-manuf

Table 7. Employment and Wage Changes in Manufacturing and outside Manufacturing, 1990-2007
Dep Vars: 10-Year Equiv. Changes in Log Workers (in Log Pts) and Avg Log Weekly Wages (in %)

	I. Manufacturing Sector			II. Other Sectors		
	All Workers	College	Non-College	All Workers	College	Non-College
	A. Log Change in Number of Workers					
(Δ Imports from China to US)/Worker	-3.129 **	-3.045 **	-3.329 **	-0.184	0.172	-0.747
	(0.827)	(1.011)	(0.883)	(0.482)	(0.442)	(0.567)
R^2	0.29	0.31	0.34	0.33	0.43	0.49
	B. Change in Average Log Wage					
(Δ Imports from China to US)/Worker	0.150	0.458	-0.101	-0.761 **	-0.743 *	-0.822 **
	(0.482)	(0.340)	(0.369)	(0.260)	(0.297)	(0.246)
R^2	0.22	0.21	0.33	0.60	0.54	0.51

Notes: N=1444 (722 commuting zones x 2 time periods). Models are weighted by start of period commuting zone share of national population. ~ $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$.

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Effect of import exposure on government transfers

Table 8. Imports from China and Change of Government Transfer Receipts in Commuting Zones, 1990-2007
Dep Vars: 10-Year Equivalent Log and Dollar Change of Annual Transfer Receipts per Capita (in log pts and US$)

	Total Xfers (1)		TAA Benefits (2)		Unemp-loyment Insure (3)		SSA Re-tirement (4)		SSA Dis-ability (5)		Medical Benefits (6)		Federal Income Assist (7)		Other Income Assist (8)		Educ/ Training Assist (9)	
A. Log Change of Transfer Receipts per Capita																		
Δ Chinese Imports/ Worker	0.66	**	10.20	~	2.28	~	0.41		1.45	**	0.21		2.38	**	0.75		1.98	*
	(0.25)		(5.72)		(1.32)		(0.29)		(0.54)		(0.37)		(0.82)		(1.90)		(1.00)	
R^2	0.28		0.29		0.48		0.34		0.42		0.43		0.51		0.59		0.23	
B. Dollar Change of Transfer Receipts per Capita																		
Δ Chinese Imports/ Worker	57.73	**	0.23		3.42		10.00	~	8.40	**	18.27		7.20	**	4.13		3.71	**
	(18.41)		(0.17)		(2.26)		(5.45)		(2.21)		(11.84)		(2.35)		(4.44)		(1.44)	
R^2	0.75		0.28		0.41		0.47		0.63		0.66		0.53		0.30		0.37	

Notes: N=1444 (722 commuting zones x 2 time periods), except N=1436 in column 2, panel A. Models are weighted by start of period commuting zone share of national population. ~ $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$.

Effect of import exposure on household income

Table 9. Dependent Variable: 10-Year Equivalent Change in Average and Median Annual Household Income per Working-Age Adult (in %pts and US$)

	Average HH Income/Adult by Source				Inc./Ad.	
	Total	Wage-Salary	Business Invest	SocSec +AFDC	Total	Wage-Salary
	(1)	(2)	(3)	(4)	(5)	(6)
A. Relative Growth (%pts)						
Δ Chinese Imports/ Worker	-1.10 **	-1.57 **	-0.40	1.47 **	-1.33 **	-1.76 **
	(0.29)	(0.45)	(0.55)	(0.46)	(0.32)	(0.44)
R^2	0.75	0.57	0.75	0.48	0.59	0.56
B. Dollar Change						
Δ Chinese Imports/ Worker	-492.6 **	-549.3 **	40.1	17.3 **	-439.9 **	-476.5 **
	(160.4)	(169.4)	(116.7)	(4.3)	(112.7)	(122.2)
R^2	0.63	0.40	0.72	0.51	0.49	0.48

Notes: N=1444 (722 commuting zones x 2 time periods). Per capita household income is defined as the sum of individual incomes of all working age household members (age 16-64), divided by the number of household members of that age group. Robust standard errors in parentheses are clustered on state. Models are weighted by start of period commuting zone share of national population. ~ $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$.

Net imports

We have so far ignored exports to China

- Examine three measures of net imports
  1. Net imports per worker in USD (2SLS)
     - US imports from China – US exports to China
  2. Gravity residual (OLS)
     - Change in China export productivity and trade costs relative to US
  3. Net factor content of trade (2SLS)
     - (US imports from China – US exports to China) $\times$ (US labor used per dollar of gross output)

Alternative measures of net imports

Table 10. Key Estimates: Net $ Imports, Net Factor Content of Imports, and Gravity Residual
Dependent Variables: 10-Year Equivalent Changes of Indicated Variables

	I. Emp/Pop		II. Log Wages		III. Transfers, Wage Inc	
	Mfg	Non-Mfg	Mfg	Non-Mfg	Ln Xfers	Ln HH Wage Inc
A. Reduced Form OLS: Change in China-US Gravity Residual						
Δ Chinese Comparative Advantage (Gravity Resid)	-0.29 **	-0.03	0.04	-0.26 ~	0.33 **	-0.66 **
	(0.04)	(0.08)	(0.28)	(0.15)	(0.12)	(0.20)
B. 2SLS: Net Imports (Imports-Exports) per Worker (in $1,000s USD)						
Δ Net Imports from China/ Worker	-0.45 **	-0.12	0.43	-0.50 ~	0.42	-1.23 *
	(0.10)	(0.15)	(0.42)	(0.27)	(0.26)	(0.49)
C. 2SLS: Net Factor Content per Worker (in Workers Equivalents)						
Δ Factor Content Net Chinese Imports/ Worker	-1.03 **	-0.57 ~	0.95	-1.45 **	1.18 *	-2.71 **
	(0.21)	(0.31)	(0.83)	(0.41)	(0.54)	(0.85)

Notes: N=1444 (722 commuting zones x 2 time periods). Models are weighted by start of period commuting zone share of national population. ~ $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$.

Agenda

1. Theoretical motivation
2. Empirical strategy
   - Defining local labor markets, data sources
   - Regression specification, IV strategy
3. Manufacturing employment results
   - IV estimates
   - Gravity-based estimates, other results
4. Beyond manufacturing
   - Population, unemployment, labor force status
   - Employment and earnings in non-manufacturing
   - Government transfers
   - Net imports, gravity (again), factor content of trade
5. **Comparing gains from trade with trade-induced DWL**

Gains from trade versus trade-induced DWLs

Welfare gains from trade in large set of modern trade models:

- Arkolakis, Costinot, Rodriguez-Clare (*AER* forthcoming):

$$\frac{W^T - W^A}{W^A} = \left(\frac{\lambda_T}{\lambda_A}\right)^{-1/\varepsilon} - 1$$

- λ_T is expenditure share on domestic goods; $\lambda_T = 0.9385$ in 2007
- China accounted for 10.3% of U.S. manufacturing imports in 2007
- λ_A is domestic expenditure share if Chinese imports replaced by domestic goods ($\lambda_A = 0.9448$ in 2007 w/o trade with China)
- $\varepsilon \in [-2.5, -10]$ is trade cost elasticity (Simonovska and Waugh '11)

Implied U.S. welfare gains from trade with China in 2007 are:

- 0.07% to 0.13% of GDP $\leftrightarrow$ \$32-\$125 per capita

Consumer gains from trade versus trade-induced DWL's

Compare to DWL from import-induced government transfers:

- Δ \$1K imports per worker $+\Delta$ govt xfers by \$58 (s.e. \$18) per capita
- Δ Chinese imports \$3,770 per worker (2007 level)
- Scale by the fraction of China trade due to supply shock: $\sim 48\%$
  - Δ govt transfers \$55-105 per capita
  - *DWL* $\approx$ *\$22-\$42 per capita* $(0.4 * \Delta$ *Xfer*$)$

Losses (\$22-\$42 pc) $\sim 1/3^{rd}$ **to** $2/3^{rds}$ **size of gains (\$32-\$125 pc)**

- A *medium-run* calculation
- Adjustment costs should diminish with time
- Ignores dynamic gains from trade (Schmitz '05; Bloom et al. '2011)
- Also ignores DWLs of involuntary labor force exit

Conclusions

Rising import competition has large local labor market effects:

- **Reduced manufacturing employment**
- **Migration responses weak → Regional transmission slow**
- **Consequences for local labor markets:**
  - Unemployment and NILF rise
  - Job losses in manufacturing, wage reductions in non-manufacturing
  - Declining household incomes
- **Large effect on transfers: $\Delta\$1,000$ China exposure per worker:**
  - $\Delta\$58$ per capita xfer benes (disability, Medicare/Medicaid, cash xfers)

Key implications:

- DWLs one to two-thirds as large as estimated (static) gains from trade
- Adjustment costs larger than previously appreciated