The Impact of Chinese Trade on U.S. Employment: The Good, The Bad and The Apocryphal

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This Paper

Our Question

- How does local exposure to the "China Shock" affect the operations, organization and employment of U.S. establishments and firms?

What We Do

- Use micro-data from the U.S. Census Bureau along with an identification strategy developed by Autor et al. 2013 (hereafter ADH) to study the effects of Chinese import penetration on the U.S. economy from 1990-2015
- By tracking employment and activities of establishments and firms over time we are able to identify large-scale reorganization

What We Find

Significant firm- and establishment-level reorganization, specifically:

(1) Positive effect on non-manufacturing employment

  (i) Concentrated in high human capital areas, $\approx$75% of gains within firms not active in mfg, $\approx$25% firms contracting in mfg

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(1) Positive effect on non-manufacturing employment

  (i) Concentrated in high human capital areas, ≈75% of gains within firms not active in mfg, ≈25% firms contracting in mfg

(2) Negative effect on manufacturing employment was driven by reorganization by large international firms that are expanding in non-manufacturing

  (i) firms expanding employment in non-mfg sector (≈70% losses)

  (ii) firms that are large, and stable importers (≈100% losses)

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(3) Industry switching responsible for significant portion of manufacturing employment losses and is geographically concentrated

  (i) establishments switching out of mfg into non-mfg (≈30% losses)

  (ii) switching concentrated in high human capital areas, accounting for majority of employment losses (≈70% losses)

Big Picture

To summarize in the unlikely event that I am rushing later...

(1) Job losses due to large expanding multinational so looks very much like offshoring. But firms expand not where jobs are lost.

(2) Reorganization of establishments is large driver of manufacturing employment loss. In skill-intensive areas establishments repurposed to R&D, design, management, wholesale, etc.

(3) Due to (1) and (2) import penetration had very different impact by geography, important for regional inequality and polarization.

Census micro-data

- Employment, payroll and average earning information is derived from the Longitudinal Business Database (LBD)
  - non-farm, private sector employer universe, 5m+ firms & more than 6m+ establishments per year
  - Employee # by physical location of the establishment (jobs not employment)
- Industry affiliation is encoded at establishment-level using time consistent NAICS codes developed by Fort and Klimek 2016 (FK codes hereafter)
  - designed to improve the accuracy of industry codes, provide a consistent industry code for entire dataset, and minimize spurious "industry switching"
- Firm-level trade flows derived from the Longitudinal Firm Trade Transaction Database (LFTTD)
  - investigate response by firm trade status (importer v.s non-importer)

Measuring the China Shock

- Following Acemoglu et al. 2016, local measure of import penetration ($\Delta IP_{j\tau}$) is calculated as industry $j's$ absorption of Chinese imports over period τ

$$\Delta IP_{j\tau} = \frac{\Delta M^{UC}_{j\tau}}{Y_{j,91} + M_{j,91} - EX_{j,91}},$$

- instrumenting for supply driven change in imports using Chinese exports to a set of other developed countries

$$\Delta IPO_{j\tau} = \frac{\Delta M^{OC}_{j\tau}}{Y_{j,89} + M_{j,89} - EX_{j,89}},$$

- local exposure to Chinese import penetration is constructed using beginning of period industry employment shares (IV emp shares lagged 10 yrs)

$$\Delta IP_{c\tau} = \sum_j \frac{L_{jct}}{L_{ct}} \Delta IP_{j\tau}, \quad \textit{and} \quad \Delta IP^{IV}_{c\tau} = \sum_j \frac{L_{jct-10}}{L_{ct-10}} \Delta IPO_{j\tau}$$

Empirical strategy

For each of our measures of employment dynamics (y_{ic}) we estimate the following

$$\Delta y_{ic\tau} = \alpha_{i\tau} + \beta_i \Delta IP_{c\tau} + \mathbf{X}'_{ct}\gamma_i + \epsilon_{ic\tau}$$

- $\Delta y_{ic\tau}$ = DHS growth rate or components for sector i and CZ c over time interval τ
  - components: job creation, destruction, entry exit, and industry switching
- $\Delta IP_{c\tau}$ = change in Chinese import penetration for CZ c over time interval τ
- $\mathbf{X}_{c\tau}$ = vector of beginning of interval τ controls for CZ c, from NBER-CES, ACS, and Decennial Census
- τ = Economic Censuses (EC) years (1992, 1997, 2002, 2007, 2012)
  - industry coding more accurate in EC years → Industry Classification Report
  - 1990-2002 $\approx$ 5$\times$ as many estabs switch from mfg to non-mfg in EC yrs

Decomposing employment growth effects of China Shock

- Confirm negative employment effect of IP using LBD and DHS growth rates

2SLS ESTIMATES OF CHANGE IN CZ SECTORAL EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average sectoral employment

	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Switch In from Other Sector	Switch Out to Other Sector
Panel A: *Effect on CZ employment growth component in Manufacturing sector*							
Annual Δ in China IP	-3.696**						
	(1.674)						

Notes: Import penetration measure in all regressions is the five year change in Chinese imports / absorption. Estimation is performed for stacked five-year long differences spanning 1992-2012 (i.e. 1992-1997, 1997-2002, 2002-2007, and 2007-2012). All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Decomposing employment growth effects of China Shock

- 30% employment losses due to job destruction within continuing estabs

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Annual Δ in China IP	-3.696**	0.504	**-1.122**	0.392	-2.292*	0.459**	-1.640***
	(1.674)	*(0.667)*	***(0.846)***	*(0.742)*	*(1.256)*	*(0.186)*	*(0.596)*

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Decomposing employment growth effects of China Shock

- 60% employment losses due to estab exit, 85% within continuing firms Results

2SLS ESTIMATES OF CHANGE IN CZ SECTORAL EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

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Decomposing employment growth effects of China Shock

- 30% employment losses from estab industry switching, 70% of which into R&D, design, management; and 30% into wholesale. Results

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Decomposing employment growth effects of China Shock

- Growth in non-mfg employment caused by decrease in job destruction and exit as well as increased entry and switch in from manufacturing.

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Panel B: *Effect on CZ employment growth component in Non-Manufacturing sector*							
Annual Δ in China IP	2.291**	-0.018	0.681**	0.949	0.525	0.192***	-0.037
	(0.945)	*(0.327)*	*(0.289)*	*(0.681)*	*(0.425)*	*(0.061)*	*(0.034)*

Notes: Import penetration measure in all regressions is the five year change in Chinese imports / absorption. Estimation is performed for stacked five-year long differences spanning 1992-2012 (i.e. 1992-1997, 1997-2002, 2002-2007, and 2007-2012). All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

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Firm and geographic employment reorganization

Next analyze other ways establishments and firms may be reorganizing:

(1) Employment decomposition by firm characteristics:
- firms expanding in non-manufacturing
- firms importing both at beginning and end of period
- firms who are large employers ($emp > 1,000$)

(2) Employment decomposition by geographic characteristics:
- high human capital CZ's vs.
- low human capital CZ's

Employment decomposition by firm characteristics

- Manufacturing employment losses occurs in large international firms expanding in non-manufacturing (76%, 119%, 82% of losses respectively)

2SLS ESTIMATES OF CHANGE IN CZ MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average manufacturing employment

	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Switch In of Establishments from Non-Mfg.	Switch Out of Establishments to Non-Mfg
Panel A: *Effect on CZ employment growth component in Manufacturing sector*							
Annual Δ in China IP	-3.696**						
	(1.674)						
Panel B: *Contribution by firms expanding in Non-Manufacturing sector*							
Annual Δ in China IP	-2.833***						
	(1.027)						
Panel C: *Contribution by importing firms*							
Annual Δ in China IP	-4.425***						
	(1.443)						
Panel D: *Contribution by firms with more than 1000 employees*							
Annual Δ in China IP	-3.067**						
	(1.470)						

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

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Employment decomposition by firm characteristics

- Employment reorganization (JD + Exit + Switch-out by firms expanding in non-man) accounts for 90% of employment losses in mfg and only 5% in non-mfg Reorg
- ≈ all JD, Exit and Switching done by large importers expanding in non-manu. Not the case within non-manu. Non-mfg full Non-mfg expand

2SLS ESTIMATES OF CHANGE IN CZ MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

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Panel B: *Contribution by firms expanding in Non-Manufacturing sector*							
Annual Δ in China IP	-2.833***	0.345	-1.156**	0.152	-1.107**	0.011	-1.078**
	(1.027)	*(0.327)*	*(0.539)*	*(0.406)*	*(0.534)*	*(0.058)*	*(0.498)*
Panel C: *Contribution by importing firms*							
Annual Δ in China IP	-4.425***	0.257	-1.885**	0.213	-1.755**	0.195	-1.450***
	(1.443)	*(0.514)*	*(0.810)*	*(0.463)*	*(0.808)*	*(0.150)*	*(0.554)*
Panel D: *Contribution by firms with more than 1000 employees*							
Annual Δ in China IP	-3.067**	0.937	-1.374	-0.187	-1.265	0.227	-1.404**
	(1.470)	*(0.602)*	*(0.850)*	*(0.474)*	*(0.890)*	*(0.140)*	*(0.569)*

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

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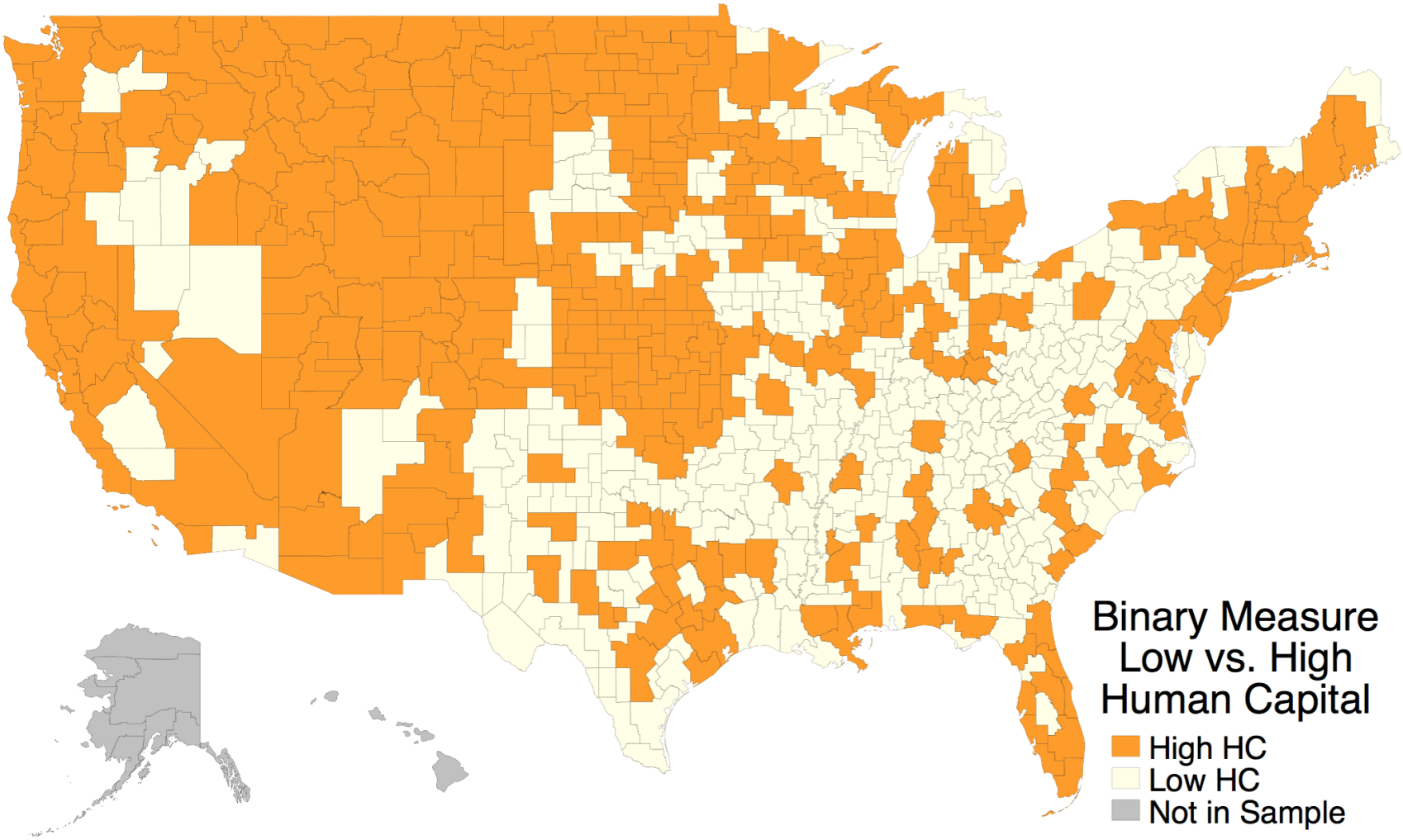
Employment decomposition by geographic characteristics

- Compare employment dynamics across local economies, grouping CZ's by above vs. below median share of population with a college degree in 1990



Employment Decomposition by Geographic Characteristics

- HHC CZ's only account for 35% of employment losses but 80% of switching
- Removing switching, HHC CZ's account for $<$ 20% of losses despite having 80% of total employment.

2SLS ESTIMATES OF CHANGE IN CZ MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

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Panel B: *Contribution by establishments in High Human Capital CZ's*							
Annual Δ in China IP	-1.329	0.770	-0.347	-0.082	-0.730	0.403**	-1.342**
	(1.428)	(0.662)	(0.766)	(0.630)	(1.168)	(0.160)	(0.573)

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

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Employment Decomposition by Geographic Characteristics

- LHC CZ's account for 65% of employment losses and 20% of employment
- losses in LHC CZ's are due to job destruction and exit, not switching

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	(1.428)	(0.662)	(0.766)	(0.630)	(1.168)	(0.160)	(0.573)
Panel C: *Contribution by establishments in Low Human Capital CZ's*							
Annual Δ in China IP	-2.368**	-0.264	-0.776**	0.468	-1.556**	0.056	-0.297
	(0.928)	(0.280)	(0.372)	(0.473)	(0.723)	(0.116)	(0.202)

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

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In Summary

(1) Manufacturing employment losses occurred in large international firms that are expanding in non-manufacturing (consistent with offshoring)

  (i) firms expanding employment in non-mfg sector ($\approx$ 70% losses)

  (ii) continuing, large, and stable importers ($\approx$ 100% of losses)

(2) Employment losses occur in low human-capital areas (South and Mid-West) – high human capital areas saw more than offsetting gains in non-manufacturing

  (i) industry switching highly concentrated in HHC areas and into R&D, design, management, wholesale etc

  (i) establishments switching out of mfg $\approx$ 30% total mfg employment losses and $\approx$70% of losses in HHC areas

Thank You

Extensions & Additional Results

- 60% Positive non-manufacturing effect is concentrated in activities related to manufacturing and tradable services (NAICS 42, 54-55, 48-49, 51-53) Results
- Large (negative) effects on local earnings within non-manufacturing Results
  - strongest within non-tradable sectors and in low human capital CZ's
- Manufacturing industry results robust to modeling choices including industry switching results Results

Switching transition sub-sector to sub-sector

2SLS ESTIMATES OF CHANGE IN CZ EMPLOYMENT GROWTH CAUSED BY INDUSTRY SWITCHING

Dependent variables: growth contribution of component relative to average sectoral employment

			Non-Manufacturing Switching-In Industry			
				Non-Manufacturing subsectors		
			All Non-Manufacturing	54 (professional services) & 55 (management)	42 (wholesale)	Other Non-Manufacturing
Manufacturing Switching-Out Industry	Manufacturing subsectors	All Manufacturing	1.640*** (0.596)	1.131* (0.586)	0.460** (0.186)	0.049 (0.157)
		31 (food & bev, textile mills, apparel, leather)	0.103 (0.155)	0.024 (0.050)	0.085 (0.085)	-0.006 (0.113)
		32 (wood, paper, petro & coal, chemical, plastics & rubber, nonmetallic)	-0.083 (0.115)	-0.110 (0.077)	0.026 (0.033)	0.001 (0.057)
		33 (metal, machinery, computer & electronic, electrical, transportation equm, furniture)	1.620** (0.639)	1.217** (0.603)	0.349** (0.149)	0.054 (0.081)

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Investigate firm and establishment reorganization

To investigate how import penetration impacts reorganization we narrow our focus on JD, Exit and Switch out. Back

$$g_{ict,t-k} = \frac{(JC_{ict}^{cont}) - \left(JD_{ict}^{cont,ne-i} + JD_{ict}^{cont,e-i}\right)}{0.5(E_{ict} + E_{ict-k})} + \frac{\left(E_{ict}^{entry}\right) - \left(E_{ict-k}^{exit,ne-i} + E_{ict-k}^{exit,e-i}\right) + (S_{ict}^{in} - S_{ict}^{out})}{0.5(E_{ict} + E_{ict-k})}$$

- $JD_{ict}^{cont,e-i}$: JD at continuing i sector estabs within firms expanding in $-i$.
- $E_{ict-k}^{exit,e-i}$: Exit of i sector estabs within firms expanding in $-i$.
- S_{ict}^{out}: Switching from i to $-i$ for continuing establishments.
- $i \in \{\text{manufacturing, non-manufacturing}\}$

Effect of China Shock on reorganization

- More than 100% of total employment losses in manufacturing are due to these three channels. Back
  - JD expanding firms (31%)

2SLS ESTIMATES OF CHANGE IN CZ SECTORAL EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

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	Net Employment Growth (NEG)	Employment Growth From Reorginization (a+b+c)	Job Destruction in Firms Expanding in Other Sector (a)	Establishment Exit in Firms Expanding in Other Sector (b)	Establishments Switching Out to Other Sector (c)	Employment Growth From All Other Sources (NEG -a-b-c)
Panel A: *Effect on CZ employment growth component in Manufacturing sector*						
Annual Δ in China IP	-3.696**	-3.903***	-1.156**	-1.107**	-1.640***	0.206
	(1.674)	(1.092)	(0.539)	(0.534)	*(0.596)*	-
Panel B: *Effect on CZ employment growth component in Non-Manufacturing sector*						
Annual Δ in China IP	2.291**	0.092	0.067	0.012	-0.037	2.157
	(0.945)	(0.159)	(0.093)	(0.076)	*(0.034)*	-

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

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Effect of China Shock on reorganization

- More that 100% of total employment losses in manufacturing are due to these three channels. Back
  - JD expanding firms (31%), Exit expanding firms (30%)

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Effect of China Shock on reorganization

- More that 100% of total employment losses in manufacturing are due to these three channels. Back
  - JD expanding firms (31%), Exit expanding firms (30%), Switch out (44%)

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Panel A: *Effect on CZ employment growth component in Manufacturing sector*						
Annual Δ in China IP	-3.696**	-3.903***	-1.156**	-1.107**	-1.640***	0.206
	(1.674)	(1.092)	(0.539)	(0.534)	*(0.596)*	-
Panel B: *Effect on CZ employment growth component in Non-Manufacturing sector*						
Annual Δ in China IP	2.291**	0.092	0.067	0.012	-0.037	2.157
	(0.945)	(0.159)	(0.093)	(0.076)	*(0.034)*	-

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Effect of China Shock on reorganization

- More that 100% of total employment losses in manufacturing are due to these three channels. Back
  - JD expanding firms (31%), Exit expanding firms (30%), Switch out (44%)
  - 70% of mfg switch out within firms expanding in non-mfg

2SLS ESTIMATES OF CHANGE IN CZ SECTORAL EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average sectoral employment

	Net Employment Growth (NEG)	Employment Growth From Reorginization (a+b+c)	Job Destruction in Firms Expanding in Other Sector (a)	Establishment Exit in Firms Expanding in Other Sector (b)	Establishments Switching Out to Other Sector (c)	Employment Growth From All Other Sources (NEG -a-b-c)
Panel A: *Effect on CZ employment growth component in Manufacturing sector*						
Annual Δ in China IP	-3.696**	-3.903***	-1.156**	-1.107**	-1.640***	0.206
	(1.674)	(1.092)	(0.539)	(0.534)	*(0.596)*	-
Panel B: *Effect on CZ employment growth component in Non-Manufacturing sector*						
Annual Δ in China IP	2.291**	0.092	0.067	0.012	-0.037	2.157
	(0.945)	(0.159)	(0.093)	(0.076)	*(0.034)*	-

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Effect of China Shock on reorganization

- More that 100% of mfg employment losses due to:
  - JD expanding firms (31%), Exit expanding firms (30%), Switch out (44%)
- Conversely, only 5% of non-mfg employment gains due to these three channels. Back

2SLS ESTIMATES OF CHANGE IN CZ SECTORAL EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average sectoral employment

	Net Employment Growth (NEG)	Employment Growth From Reorginization (a+b+c)	Job Destruction in Firms Expanding in Other Sector (a)	Establishment Exit in Firms Expanding in Other Sector (b)	Establishments Switching Out to Other Sector (c)	Employment Growth From All Other Sources (NEG -a-b-c)
Panel A: *Effect on CZ employment growth component in Manufacturing sector*						
Annual Δ in China IP	-3.696**	-3.903***	-1.156**	-1.107**	-1.640***	0.206
	(1.674)	(1.092)	(0.539)	(0.534)	*(0.596)*	-
Panel B: *Effect on CZ employment growth component in Non-Manufacturing sector*						
Annual Δ in China IP	2.291**	0.092	0.067	0.012	-0.037	2.157
	(0.945)	(0.159)	(0.093)	(0.076)	*(0.034)*	-

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Effect of IP on Non-mfg Emp by Subsectors

- 60% Positive non-manufacturing effect is concentrated in activities related to manufacturing and tradable services (NAICS 42, 54-55, 48-49, 51-53)
- 99% of net switching into non-manufacturing caused by IP within NAICS 42 (wholesale), 54 (professional services) & 55 (management). Back

2SLS ESTIMATES OF CHANGE IN CZ NON-MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average non-manufacturing employment

	Share of total non-manufacturing	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Net Switching from/to Mfg
Effect on CZ employment growth component in Non-Manufacturing sector							
Annual Δ in China IP	*100%*	2.291**	-0.018	-0.681**	0.949	-0.525	0.155**
		(0.945)	*(0.327)*	*(0.289)*	*(0.681)*	*(0.425)*	*(0.077)*
Contribution by Non-Manufacturing subsectors 42 (wholesale), 54 (professional services) & 55 (management)							
Annual Δ in China IP	*16%*	0.744**	-0.090	-0.269	0.399**	-0.012	0.153**
		(0.302)	*(0.198)*	*(0.207)*	*(0.201)*	*(0.236)*	*(0.076)*
Contribution by Non-Manufacturing subsectors 48-49 (transportation & warehousing), 51 (information) & 52-53 (FIRE)							
Annual Δ in China IP	*16%*	0.733***	0.054	-0.474***	-0.062	-0.262	0.005
		(0.277)	*(0.161)*	*(0.128)*	*(0.173)*	*(0.169)*	*(0.016)*
Contribution by other Non-Manufacturing subsectors (mining, utilities, construction, retail, education, health, entertainment, accomodation & food)							
Annual Δ in China IP	*68%*	0.815	0.018	0.063	0.612	-0.250	-0.003
		(0.730)	*(0.338)*	*(0.206)*	*(0.499)*	*(0.330)*	*(0.021)*

Notes: Employment shares are calculated for 2002 from County Business Pattern data. Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in
* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Effect of IP on mfg Emp by Subsectors

- All mfg employment losses within NAICS 33, caused by JD, exit and switching. Back

2SLS ESTIMATES OF CHANGE IN CZ MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average manufacturing employment

	Share of total manufacturing employment	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Net Switching from/to Non-Mfg
Effect on CZ employment growth component in Manufacturing sector							
Annual Δ in China IP	*100%*	-3.696**	0.504	1.122	0.392	2.292*	-1.181**
		(1.674)	*(0.667)*	*(0.846)*	*(0.742)*	*(1.256)*	*(0.595)*
Contribution by Manufacturing subsector 31 (food & bev, textile mills, apparel, leather)							
Annual Δ in China IP	*17%*	-0.906	-0.451	-0.193	-0.009	0.592	-0.048
		(0.709)	*(0.367)*	*(0.399)*	*(0.390)*	*(0.796)*	*(0.176)*
Contribution by Manufacturing subsector 32 (wood, paper, petro & coal, chemical, plastics & rubber, nonmetallic)							
Annual Δ in China IP	*28%*	2.001***	-0.712**	-1.668***	-0.346	-1.254**	0.134
		(0.760)	*(0.344)*	*(0.430)*	*(0.282)*	*(0.518)*	*(0.119)*
Contribution by Manufacturing subsector 33 (metal, machinery, computer & electronic, electrical, transportation equm, furniture)							
Annual Δ in China IP	*55%*	-4.793***	1.668*	2.982***	0.746	2.955**	-1.267**
		(1.769)	*(0.853)*	*(1.012)*	*(0.658)*	*(1.421)*	*(0.625)*

Notes: Employment shares are calculated for 2002 from County Business Pattern data. Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in
* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Effect of IP on mfg Emp by Firm Non-mfg Growth

- Positive non-mfg effect is concentrated in firms contracting in mfg and firms with no presence in mfg Back

2SLS ESTIMATES OF CHANGE IN CZ NON-MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average non-manufacturing employment

	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Net Switching from/to Mfg
Effect on CZ employment growth component in Non-Manufacturing sector						
Annual Δ in China IP	2.291**	-0.018	-0.681**	0.949	-0.525	0.155**
	(0.945)	*(0.327)*	*(0.289)*	*(0.681)*	*(0.425)*	*(0.077)*
Contribution by firms expanding in Manufacturing sector						
Annual Δ in China IP	0.003	0.066	0.067	0.012	-0.012	-0.020
	(0.123)	*(0.101)*	*(0.093)*	*(0.093)*	*(0.076)*	*(0.031)*
Contribution by firms contracting in Manufacturing sector						
Annual Δ in China IP	0.564**	-0.053	-0.167	0.281**	0.006	0.175**
	(0.225)	*(0.106)*	*(0.127)*	*(0.126)*	*(0.134)*	*(0.078)*
Contribution by firms with no presence in Manufacturing sector						
Annual Δ in China IP	1.723**	-0.032	-0.581**	0.656	-0.518	–
	(0.827)	*(0.333)*	*(0.250)*	*(0.614)*	*(0.365)*	

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.
* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

The Effect of the China Shock on Earnings

2SLS ESTIMATES OF CHANGE IN SECTORAL CZ AVERAGE EARNINGS

Dependent variables: annualized log change in sectoral average earnings

	LBD Average Earnings
Panel A. Manufacturing average earnings	
Annual Δ in China IP	1.581
	(1.402)
Panel B. Non-manufacturing average earnings	
Annual Δ in China IP	-3.330***
	(1.377)
Panel C. Total CZ average earnings	
Annual Δ in China IP	-2.541**
	(1.141)
Stacked long differences	92-97, 97-02
	02-07, 07-12

Notes: Each stack contains (rounded) 700 CZs. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.
* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

The Effect of the China Shock on Earnings

2SLS ESTIMATES OF CHANGE IN CZ EMPLOYMENT, PAYROLL, AND EARNINGS

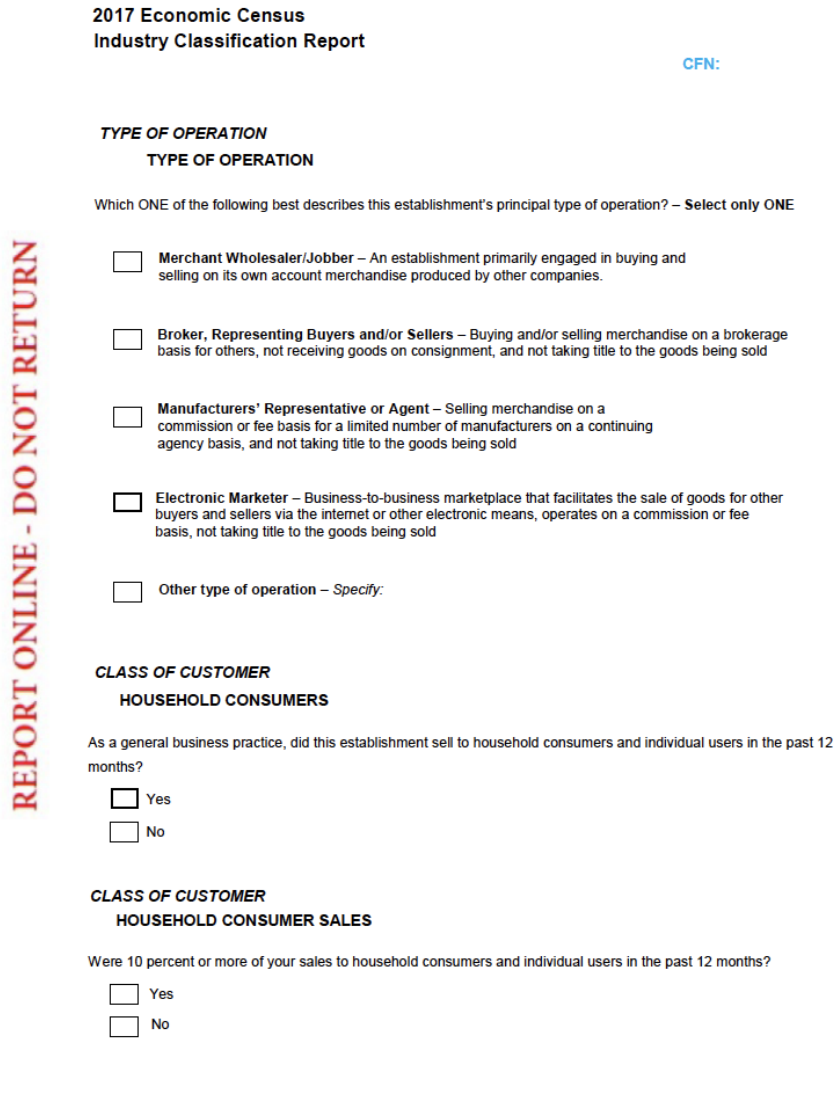
Dependent variables: DHS growth rate of commuting zone employment, payroll and earnings

	Manufacturing Subsectors			Non-Manufacturing subsectors		
	NAICS 31	NAICS 32	NAICS 33	NAICS 42, 54 & 55	NAICS 48-49, 51 & 52-53	All Other
Effect on CZ employment growth by Sector						
Annual **Δ** in China IP	-5.137*	0.721	-5.753**	4.393*	4.284***	1.097
	(3.086)	(2.366)	(2.550)	(2.273)	(1.647)	(1.145)
Effect on CZ payroll growth by Sector						
Annual **Δ** in China IP	-5.185	-0.723	-3.761	2.734	5.986**	-5.559**
	(3.206)	(3.427)	(3.136)	(2.666)	(2.491)	(2.614)
Effect on CZ eanrings growth by Sector						
Annual **Δ** in China IP	0.044	-1.489	1.845	-1.631	1.819	-6.758***
	(1.651)	(1.868)	(1.858)	(1.975)	(1.671)	(2.364)
N	2900	2900	2900	2900	2900	2900

Notes: Each stack contains (rounded) 700 CZs. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. All estimates are reported as DHS changes in the left hand side variable. Estimated marginal effects in logs very similar but are not reported in order to keep the sample of commuting zones consistant across specificaitions. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Data: Industry Classification Report



2017 Economic Census
Industry Classification Report

CFN:

REPORT ONLINE - DO NOT RETURN

TYPE OF OPERATION

TYPE OF OPERATION

Which ONE of the following best describes this establishment's principal type of operation? – **Select only ONE**

☐ **Merchant Wholesaler/Jobber** – An establishment primarily engaged in buying and selling on its own account merchandise produced by other companies.

☐ **Broker, Representing Buyers and/or Sellers** – Buying and/or selling merchandise on a brokerage basis for others, not receiving goods on consignment, and not taking title to the goods being sold

☐ **Manufacturers' Representative or Agent** – Selling merchandise on a commission or fee basis for a limited number of manufacturers on a continuing agency basis, and not taking title to the goods being sold

☐ **Electronic Marketer** – Business-to-business marketplace that facilitates the sale of goods for other buyers and sellers via the internet or other electronic means, operates on a commission or fee basis, not taking title to the goods being sold

☐ **Other type of operation** – *Specify:*

CLASS OF CUSTOMER

HOUSEHOLD CONSUMERS

As a general business practice, did this establishment sell to household consumers and individual users in the past 12 months?

☐ Yes
☐ No

CLASS OF CUSTOMER

HOUSEHOLD CONSUMER SALES

Were 10 percent or more of your sales to household consumers and individual users in the past 12 months?

☐ Yes
☐ No

4

2017 Economic Census
Industry Classification Report

CFN:

Timing – Importance of Census Years

- Census obtains industry codes from multiple sources: IRS, SSA, BLS and Economic Census (EC).
- IRS and SSA industry information derived from tax files, for obtaining EINs. This is self-reported and is considered low quality by Census.
- EC requires all domestic non-farm establishments to fill out an Industry Classification Report (ICR) questionnaire
  - *"brief inquiry requesting information necessary to assign a kind-of-business code"* – Commerce Bureau
- ICR questionnaire collects information on the physical location and principal business or activity, including class of customer and detail of sales, shipments, receipts, or revenues in order to assign a complete NAICS code.

Effect of IP on Non-mfg by Firm Characteristics

2SLS ESTIMATES OF CHANGE IN CZ NON-MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average non-manufacturing employment

	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Switch In of Establishments from Non-Mfg.	Switch Out of Establishments to Non-Mfg
Panel A: *Effect on CZ employment growth component in Non-Manufacturing sector*							
Annual Δ in China IP	2.291**	-0.018	0.681**	0.949	0.525	0.192***	-0.037
	(0.945)	*(0.327)*	*(0.289)*	*(0.681)*	*(0.425)*	*(0.061)*	*(0.034)*
Panel B: *Contribution by firms contracting in Manufacturing sector*							
Annual Δ in China IP	0.564**	-0.053	0.167	0.281**	-0.006	0.195***	-0.020
	(0.225)	*(0.106)*	*(0.127)*	*(0.126)*	*(0.134)*	*(0.062)*	*(0.026)*
Panel C: *Contribution by importing firms*							
Annual Δ in China IP	1.243***	0.051	0.480**	0.239	0.363*	0.143***	-0.034
	(0.372)	*(0.287)*	*(0.224)*	*(0.208)*	*(0.214)*	*(0.052)*	*(0.032)*
Panel D: *Contribution by firms with more than 1000 employees*							
Annual Δ in China IP	2.163***	0.166	0.522**	0.542*	0.831**	0.140***	-0.039
	(0.548)	*(0.364)*	*(0.266)*	*(0.313)*	*(0.368)*	*(0.052)*	*(0.033)*

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Establishment Entry & Exit by Firm Survival

2SLS ESTIMATES OF CHANGE IN CZ SECTORAL EMPLOYMENT GROWTH

Dependent variables: growth contribution of component relative to average sectoral employment

	Total Establishement Entry		Establishement Exit	
	Establishment Entry at Continuing Firm	Firm Birth	Establishment Exit at Continuing Firm	Firm Death
Panel A: *Effect on CZ employment growth component in Manufacturing sector*				
Annual Δ in China IP	-0.152	0.543	-1.978**	-0.314
	(0.535)	(0.518)	(0.831)	(0.802)
Panel B: *Effect on CZ employment growth component in Non-Manufacturing sector*				
Annual Δ in China IP	0.566	0.383	0.447	0.078
	(0.355)	(0.497)	(0.273)	(0.325)

Notes: Import penetration measure in all regressions is the five year change in Chinese imports / absorption. Estimation is performed for stacked five-year long differences spanning 1992-2012 (i.e. 1992-1997, 1997-2002, 2002-2007, and 2007-2012). All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Reassessing local labor market effects of China Shock

- Begin by assessing the effect of IP on total employment, moving from ADH's specification to our preferred specification. Back Main

$$\Delta ln(emp_{ic\tau}) = \alpha_{i\tau} + \beta_i \Delta IP_{c\tau} + \mathbf{X}'_{ct}\gamma_i + \epsilon_{ic\tau}$$

2SLS ESTIMATES OF CHANGE IN SECTORAL CZ EMPLOYMENT ON CHANGE IN CZ IP, INSTRUMENTED BY CHANGE IN CZ IP (OTHER COUNTRIES)

Dependent variables: annualized log change in sectoral employment

	Autor, Dorn and Hanson (2013)	ADH Replication with LBD data	Change LHS Industry Def to NAICS	Change RHS Industry Def to NAICS & IP Def to Acemoglu et al.	Change to Census 5-year intervals	Extend to 2012 with Post-2007 Interaction	Extend to 2012 without Post-2007 Interaction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. Manufacturing employment							
Annual Δ in China IP	-4.231***	-5.584***	-5.229***	-6.694***	-4.256***	-4.402**	-3.687***
	(1.047)	*(1.384)*	*(1.481)*	*(1.845)*	*(1.406)*	*(1.346)*	*(1.690)*
Annual Δ in China IP * Post 2007						12.20	
						(14.87)	
Stacked long differences	90-00	90-00	91-00	91-00	92-97, 97-02	92-97, 97-02	92-97, 97-02
	00-07	00-07	00-07	00-07	02-07	02-07, 07-12	02-07, 07-12

Notes: Each stack contains (rounded) 700 CZs. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Reassessing local labor market effects of China Shock

- Begin by assessing the effect of IP on total employment, moving from ADH's specification to our preferred specification. Back Main

$$\Delta ln(emp_{ic\tau}) = \alpha_{i\tau} + \beta_i \Delta IP_{c\tau} + \mathbf{X}'_{ct}\gamma_i + \epsilon_{ic\tau}$$

2SLS ESTIMATES OF CHANGE IN SECTORAL CZ EMPLOYMENT ON CHANGE IN CZ IP, INSTRUMENTED BY CHANGE IN CZ IP (OTHER COUNTRIES)

Dependent variables: annualized log change in sectoral employment

	Autor, Dorn and Hanson (2013)	ADH Replication with LBD data	Change LHS Industry Def to NAICS	Change RHS Industry Def to NAICS & IP Def to Acemoglu et al.	Change to Census. 5-year intervals	Extend to 2012 with Post-2007 Interaction	Extend to 2012 without Post-2007 Interaction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. Manufacturing employment							
Annual Δ in China IP	-4.231***	-5.584***	-5.229***	-6.694***	-4.256***	-4.402**	-3.687***
	(1.047)	*(1.384)*	*(1.481)*	*(1.845)*	*(1.406)*	*(1.346)*	*(1.690)*
Annual Δ in China IP * Post 2007						12.20	
						(14.87)	
Panel B. Non-manufacturing employment							
Annual Δ in China IP	-0.274	-0.230	0.053	0.977	2.201**	2.048**	2.304**
	(0.651)	*(0.878)*	*(0.865)*	*(1.074)*	*(0.383)*	*(0.927)*	*(0.955)*
Annual Δ in China IP * Post 2007						4.365	
						(6.249)	
Stacked long differences	90-00	90-00	91-00	91-00	92-97, 97-02	92-97, 97-02	92-97, 97-02
	00-07	00-07	00-07	00-07	02-07	02-07, 07-12	02-07, 07-12

Notes: Each stack contains (rounded) 700 CZs. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Replication Robustness

- Using ADH long difference periods we find same patterns or results in mfg including industry switching effect
- Effect in non-mfg not robust to alternative sample window Back Main

2SLS ESTIMATES OF CHANGE IN CZ SECTORAL EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average sectoral employment

	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Switch Outs to Other Sector	Switch Ins from Other Sector
Effect on CZ employment growth component in Manufacturing sector							
Annual **Δ** in China IP	-6.031***	-0.116	1.223*	-0.578	2.240**	-0.578***	1.296**
	(1.612)	(0.503)	(0.637)	(0.582)	(0.923)	(0.205)	(0.578)
Effect on CZ employment growth component in Non-Manufacturing sector							
Annual **Δ** in China IP	0.935	0.060	-0.475**	-0.066	-0.305	0.175**	0.014
	(0.798)	(0.291)	(0.205)	(0.636)	(0.224)	(0.083)	(0.020)

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked two long differences periods employed by AADHP (1991-2000, 2000-2007). All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Employment growth decomposition

Investigate impact of import penetration on different margins of employment growth within manufacturing and non-manufacturing industries.

$$
\begin{aligned}
g_{ict,t-k} &\equiv \frac{E_{ict} - E_{ict-k}}{1/2(E_{ict} + E_{ict-k})} \\
&= \frac{(JC^{cont}_{ict}) - (JD^{cont}_{ict}) + \left(E^{entry}_{ict}\right) - \left(E^{exit}_{ict-k}\right) + \left(S^{in}_{ict} - S^{out}_{ict}\right)}{0.5(E_{ict} + E_{ict-k})}
\end{aligned}
$$

- **Job Creation and Job Destruction** from continuing establishments
- **Entry and Exit** of establishments
- **Industry Switching** of establishments from / to other sector(s)
  - S^{in}_{ict} is year t employment of estabs that switched in to sector i from sector $-i$ between $t-k$ and t
  - S^{out}_{ict} is year $t-k$ employment of establishments that switched out of sector i to sector $-i$ between $t-k$ and t
  - $i \in \{\text{manufacturing, non-manufacturing}\}$ unless otherwise specified.

Our Motivation

- Developed economies have seen a large reorganization of production and employment. (Autor and Dorn 2013, Bernard et al. 2017, Fort et al. 2018)
- Coincident with increase in imports from China reducing in manufacturing employment (Autor et al. 2013, Pierce and Schott 2016, Thewissen and van Vliet, 2017) and increased reallocation (Asquith et al. 2017)
- Evidence that imports impact employment and production through not only increased competition but also production fragmentation (Acemoglu et al. 2016, Bernard el al. 2018)