Graduate Labor Economics

Lecture 19: Import Competition

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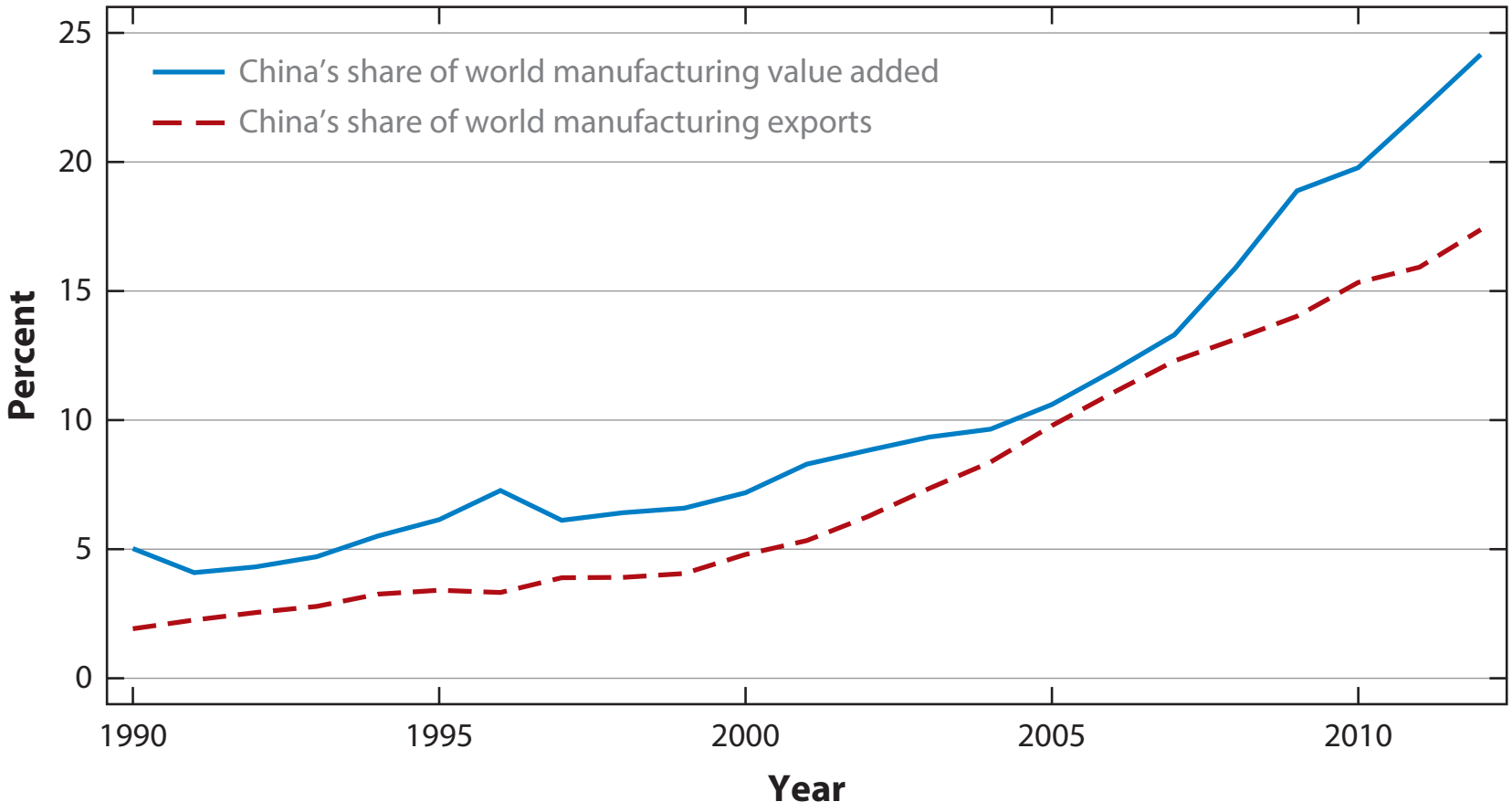
Today's lecture

- China's economic rise
- The decline of US manufacturing
- Effects of Chinese import competition on US labor market
  - Autor, Dorn, and Hanson (2013)
  - Successor papers
- Local labor market adjustment more generally
  - Defining local labor markets
  - Bartik-style shocks
  - Margins of adjustment

China's economic rise

- Some milestones:
  - 1978: Deng Xiaoping launches "reform and opening"
  - 1980: first Special Economic Zone opened in Shenzhen
  - 1990: (re)opening of the Shanghai Stock Exchange
  - 2001: China joins the World Trade Organization
  - 2009: China becomes world's largest exporter
- Underlying drivers:
  - Market reforms, closures of state-owned enterprises
  - Massive rural-to-urban migration
  - Foreign direct investment, technology transfer
  - Declining trade barriers
- Three notable features:
  - Quantitatively massive
  - Concentrated in labor-intensive industries
  - Lots of "processing trade", but rising Chinese value-added in exports

2013: China accounts for 18.8% of global mfg exports

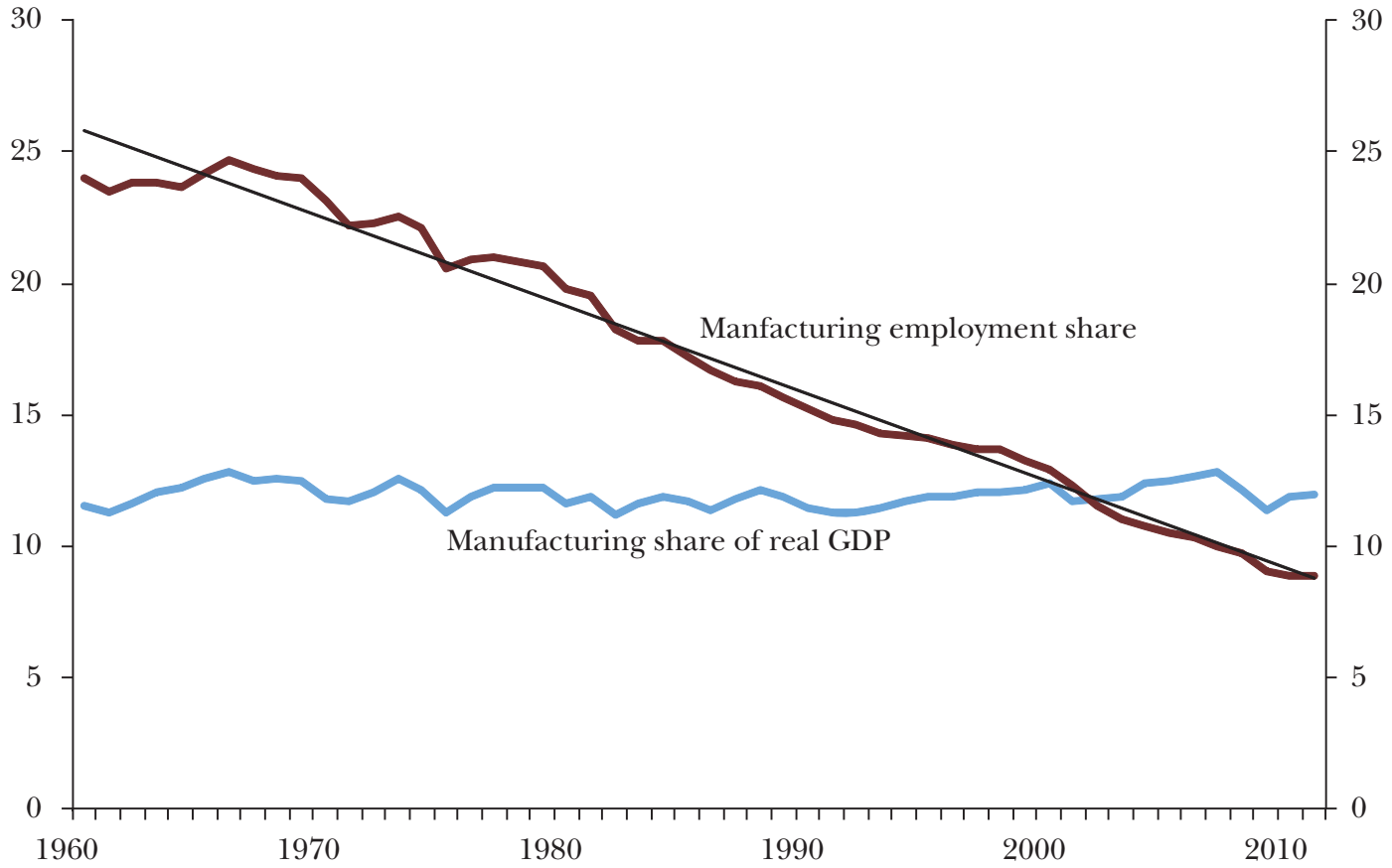


(Autor, Dorn, and Hanson 2016, Fig. 2)

Long-term decline in manufacturing share of US emp

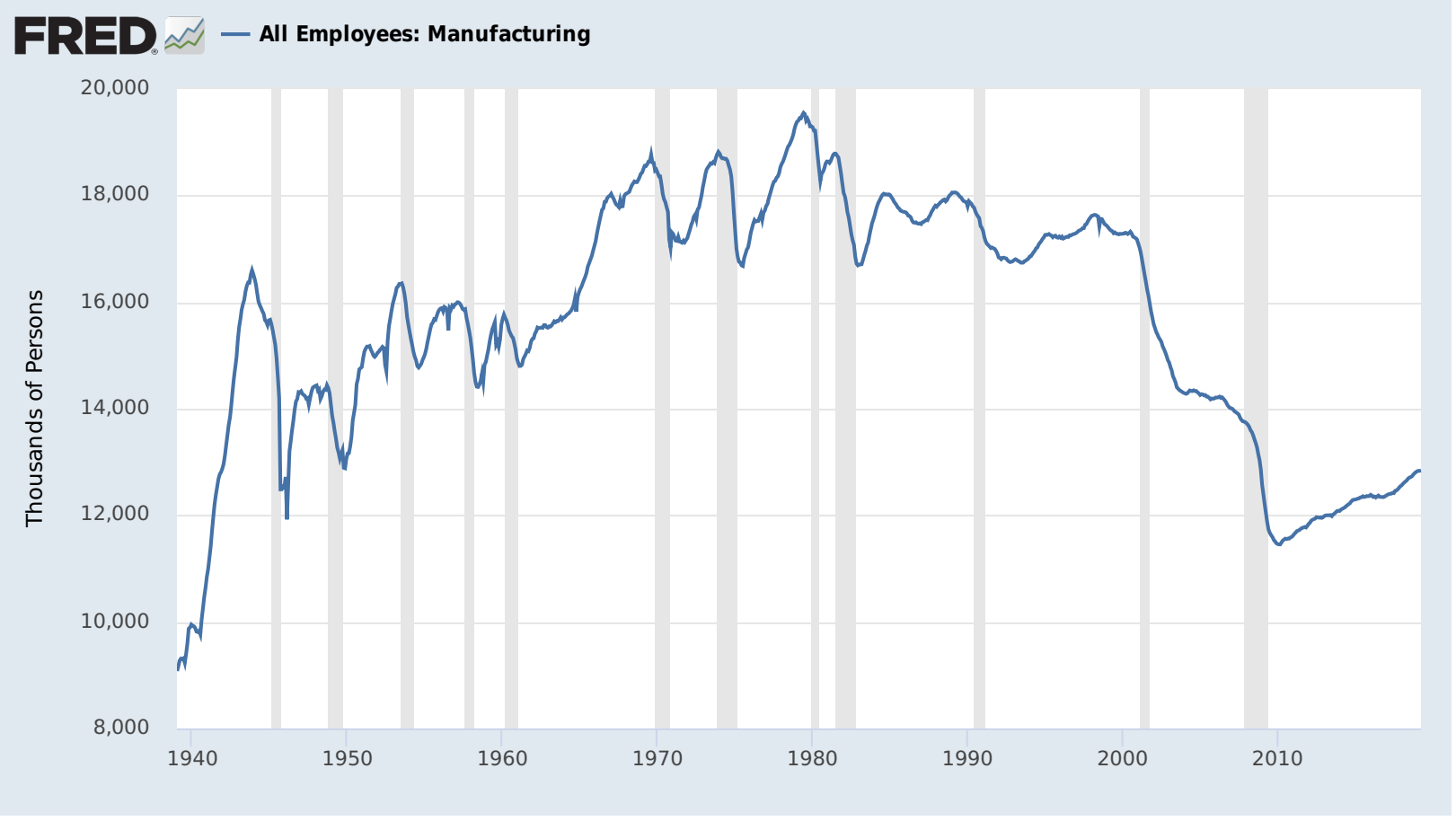
Manufacturing Value Added and Employment as a Share of the Total US Economy, 1960–2011

(in 2005 prices)



(Baily and Bosworth 2014, Fig. 1)

Shrinking emp *levels* in 2000s (even pre-Great Recession)

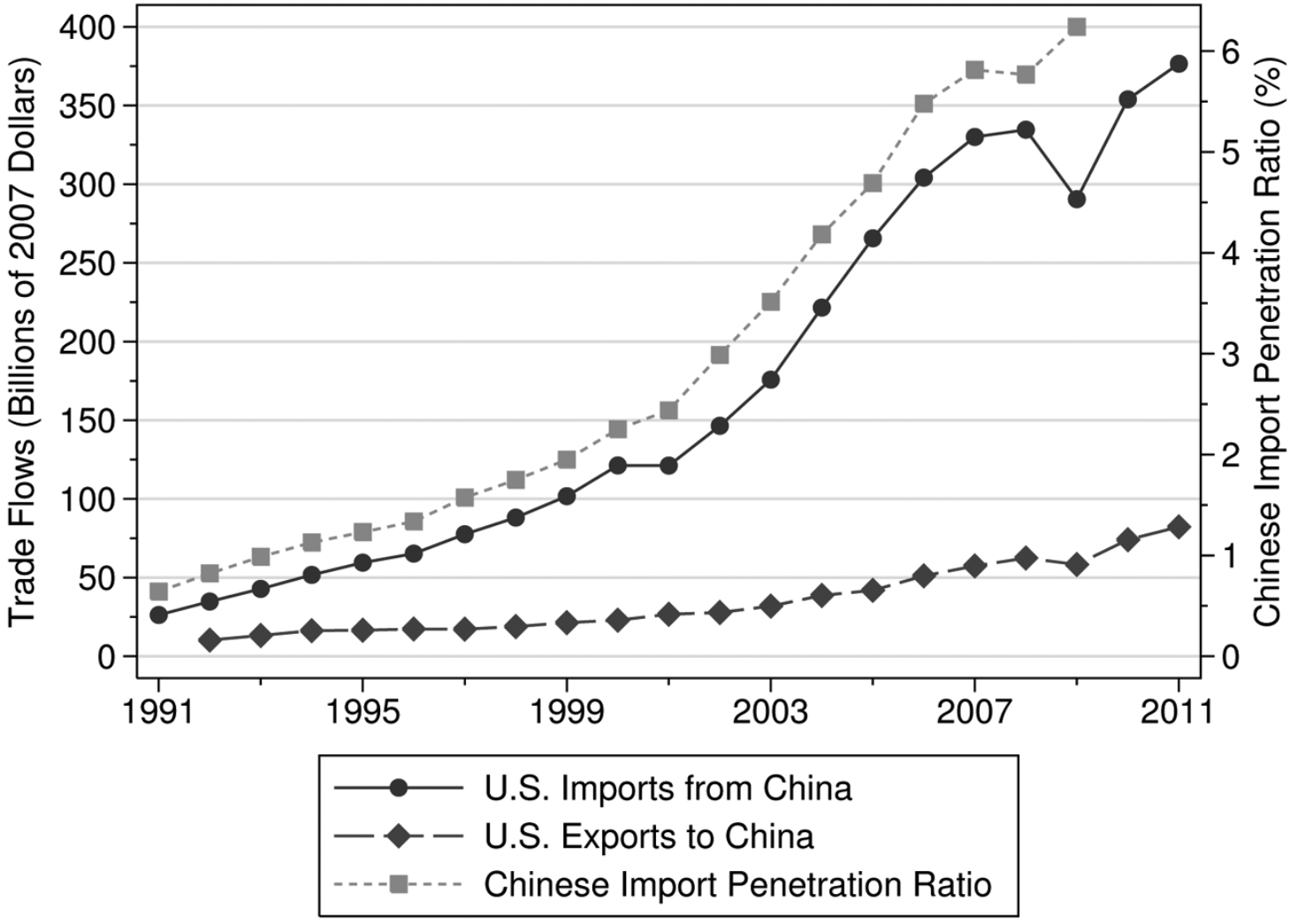


(FRED Economic Data, Federal Reserve Bank of St. Louis, 2019)

Why has the US lost so many manufacturing jobs?

- Overall patterns:
  - Secular decline in share since late 1960s
  - Declining levels in 2000s
  - Modest gains post-Great Recession
- Broadly similar trends in many advanced economies
- Candidate explanations:
  - Rising incomes + non-homothetic tastes
  - Labor-saving technological change
  - Competition from low-income countries

Growth in US imports from China ≫ growth in exports



(Acemoglu, Autor, Dorn, Hanson, and Price 2016, Fig. 2)

Autor, Dorn, and Hanson (AER 2013)

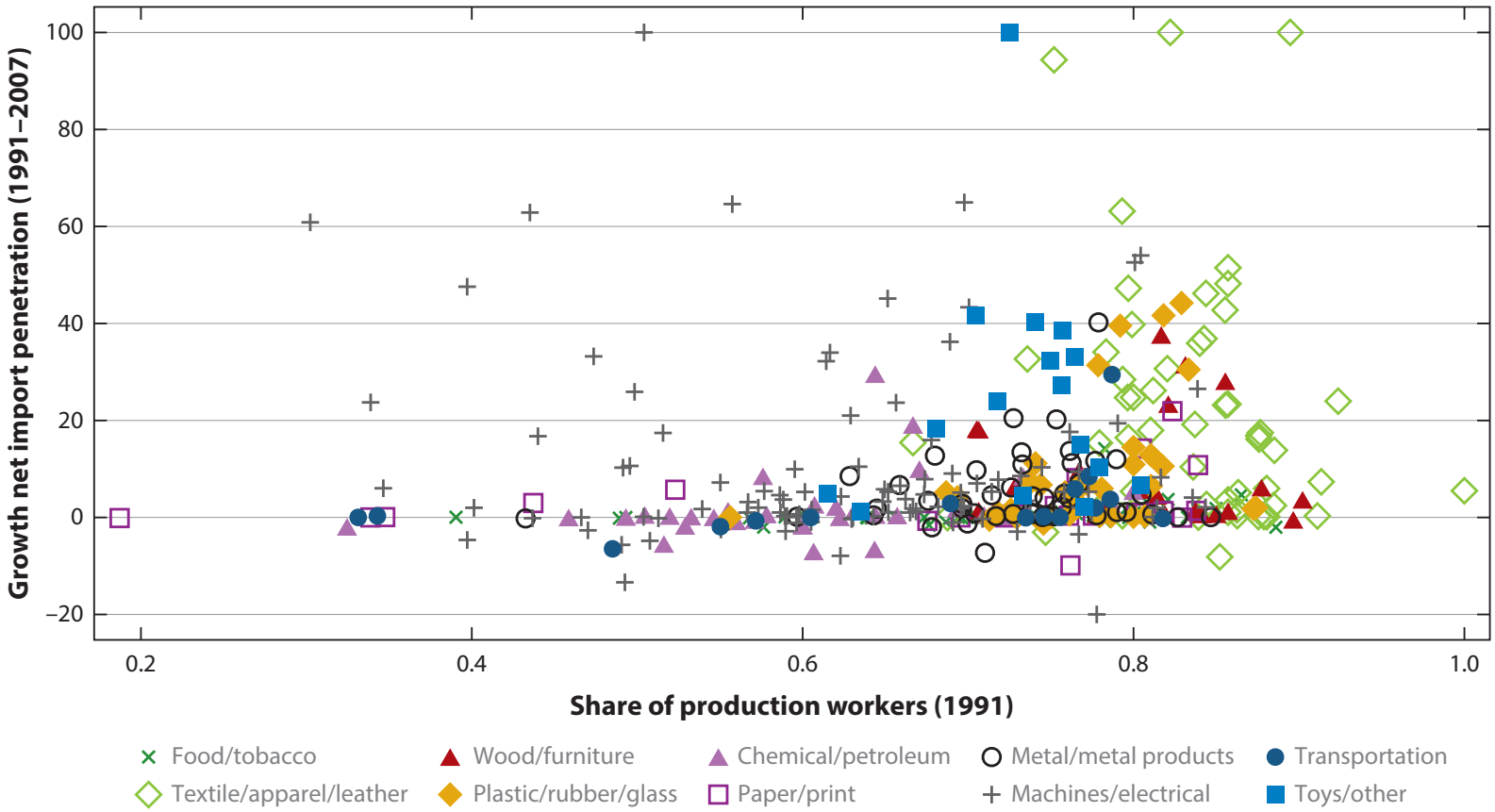
- How has China's economic rise affected local US labor markets?
  - Competition from China in domestic US market
  - Competition from China in foreign markets
  - Growth in Chinese demand for US-made goods
- Four key ingredients:
  1. Tractable definition of local labor markets
  2. Cross-industry variation in exposure to Chinese imports
  3. Cross-location variation in industry structure
  4. Credible instrument for industry-level import flows

Ingredient #1: commuting zones

- Define local labor markets as *commuting zones* (CZs)
  - Introduced by Tolbert and Sizer (1996), popularized by ADH
  - Built by "gluing" counties together (so: requires county-level data)
  - Dense commuting flows within CZs, sparse flows between CZs
- Nice conceptual and empirical properties:
  - Autor: "a revealed preference measure of local labor markets"
  - Cover the mainland United States (MSAs exclude rural areas)
  - Geographical boundaries remain consistent over time
- Emerging literature on how to define local labor markets:
  - Manning & Petrongolo (2017): structural model based on job search
  - Nimczik (2018): partition *firms* into markets based on job mobility
  - Foote et al. (2018): robustness of CZ definitions to sampling error

Ingredient #2: cross-ind variation in import penetration

(Import penetration ≡ ratio of imports to domestic market volume)



(Autor, Dorn, Hanson 2016, Fig. 4)

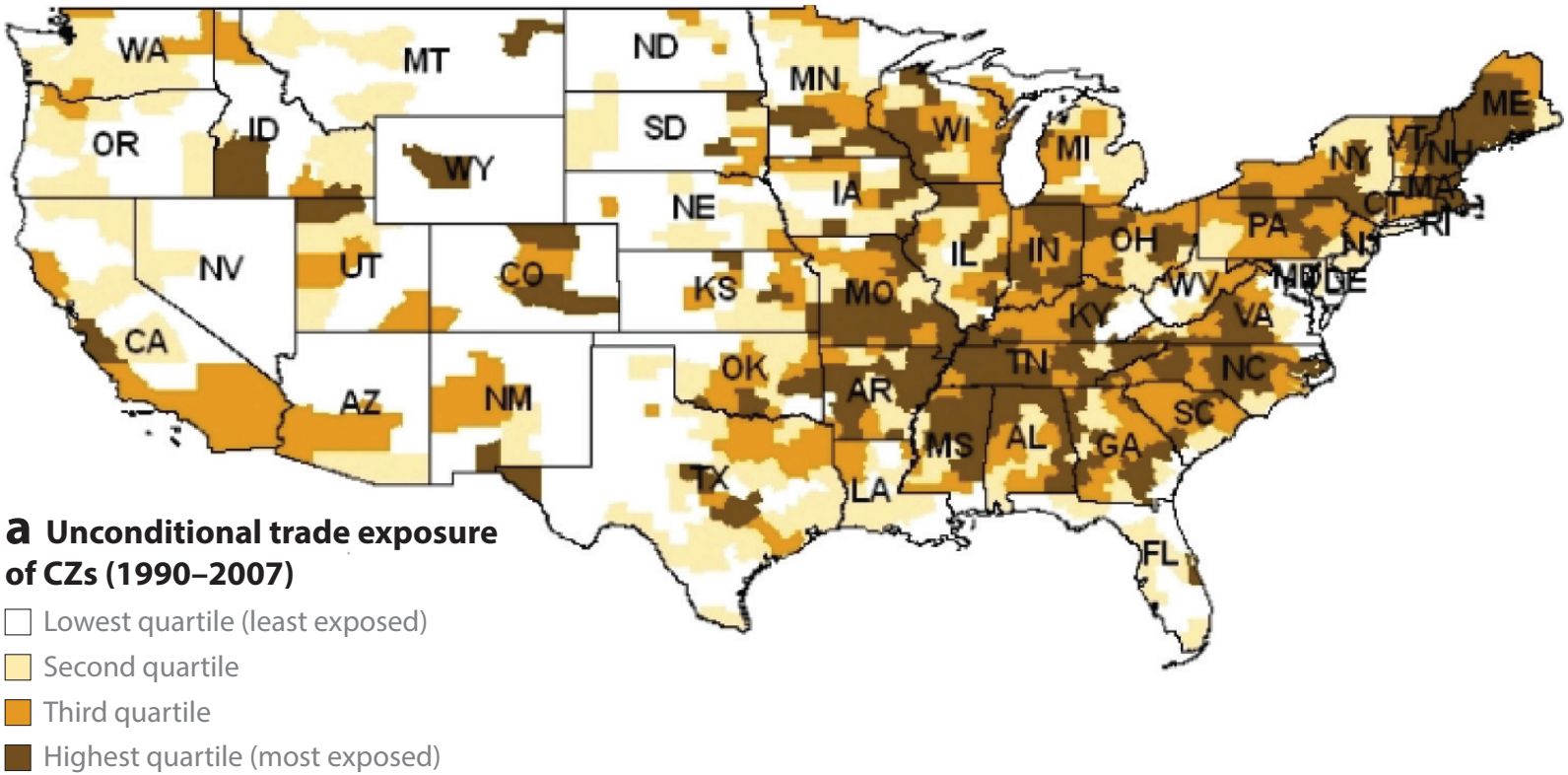
Ingredient #3: cross-CZ variation in industry structure

- Industries' employment shares differ widely across places
  - Traded goods $\Longrightarrow$ can be located anywhere
  - Natural advantages, built infrastructure
  - Economies of scale $\Longrightarrow$ big factories
  - Knowledge spillovers, supplier networks, thick labor markets (Ellison, Glaeser, and Kerr AER 2010)
- Local exposure is a share-weighted average of industry exposure:

$$\Delta IPW_{uit} = \sum_j \frac{L_{ijt}}{L_{ujt}} \frac{\Delta M_{ucjt}}{L_{it}} = \sum_j \underbrace{\frac{L_{ijt}}{L_{it}}}_{\text{share}} \underbrace{\frac{\Delta M_{ucjt}}{L_{ujt}}}_{\text{shock}}$$

- Allows us to convert national shocks into local ones
  - Geography generates degrees of freedom
  - But still important to have "enough" industry-level variation

Geographic variation in exposure to Chinese imports



(Autor, Dorn, Hanson 2016, Fig. 6a)

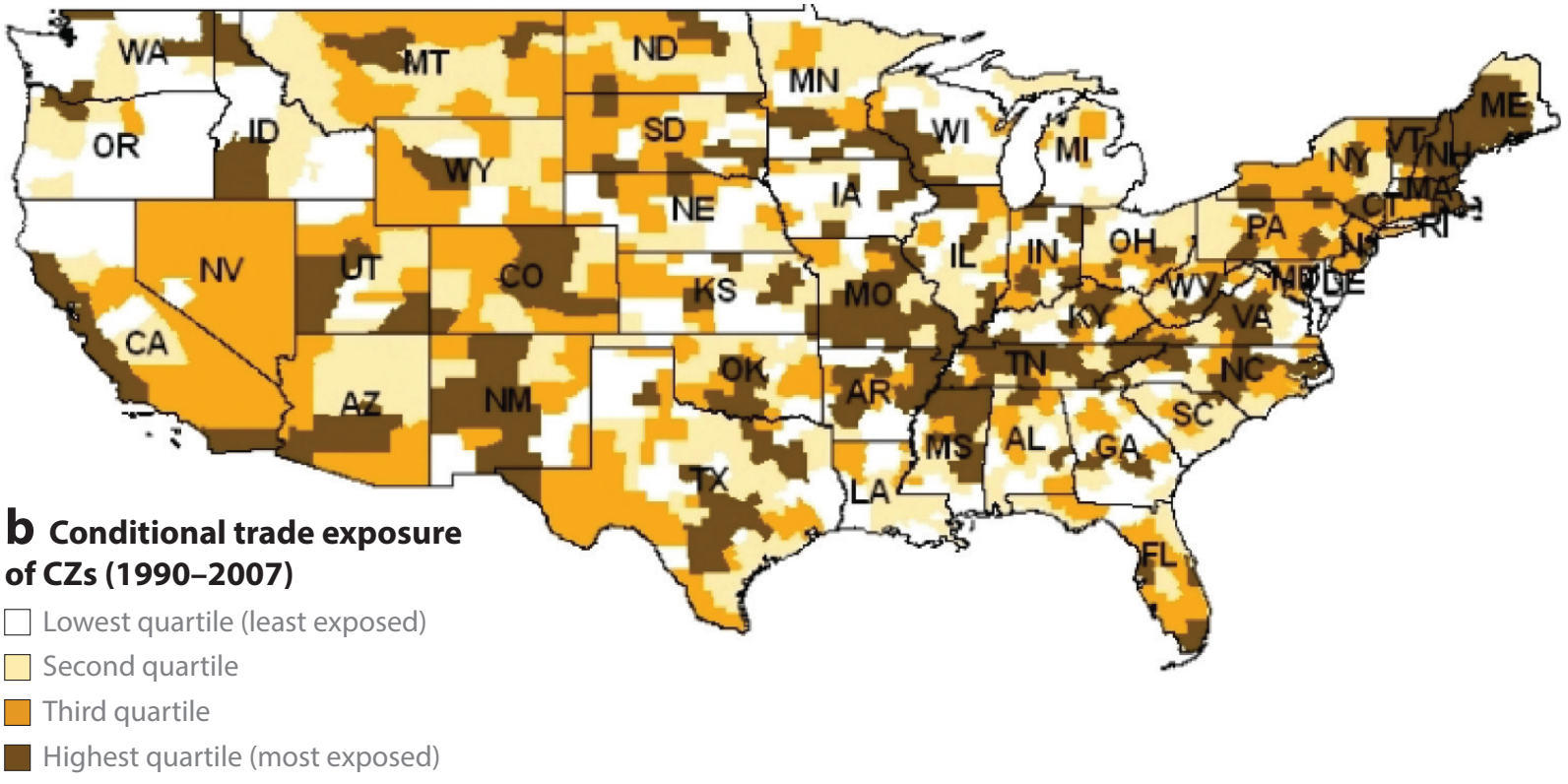
Decompositions: they come in handy

- Some new notation:
  - Let $S_{jt} \equiv \frac{\Delta M_{ucjt}}{L_{ujt}}$ denote the shock to industry j
  - Let $\overline{S}_t \equiv \sum_{j \in \text{mfg}} \frac{L_{ujt}}{L_{\text{u,mfg},t}} S_{jt}$ denote mean shock to manufacturing
  - ADH assume Chinese imports ≈ 0 outside of manufacturing
- Implies that we can rewrite local import exposure as

$$IPW_{uit} = \frac{L_{i,\text{mfg},t}}{L_{it}} \overline{S}_t + \sum_{j \in \text{mfg}} \frac{L_{ijt}}{L_{it}} (S_{jt} - \overline{S}_t)$$

- The local import shock consists of two parts:
  - First term: variation in manufacturing share of local employment
  - Second term: within-manufacturing variation in exposure to China
- Logic of identification strategy suggests isolating the second term

Residuals after conditioning on local manufacturing share



(Autor, Dorn, Hanson 2016, Fig. 6b)

Ingredient #4: plausibly exogenous variation

- Problem: ΔM_{ucjt} contains a mix of "good" and "bad" variation
  - Good: productivity growth in China
  - Good: declining bilateral trade costs (physical costs, tariffs)
  - Bad: shifts in US demand for Chinese products
  - Bad: productivity shocks within the US or other exporting nations
- Solution: instrument using other rich nations' imports from China
  - Idea is to isolate supply-side shifts in China
  - Vulnerable to correlated demand shocks throughout OECD
  - Vulnerable to productivity shocks within US manufacturing
  - ADH and successors address these and other threats
- Also use *lagged* industry shares to mitigate endogeneity concerns

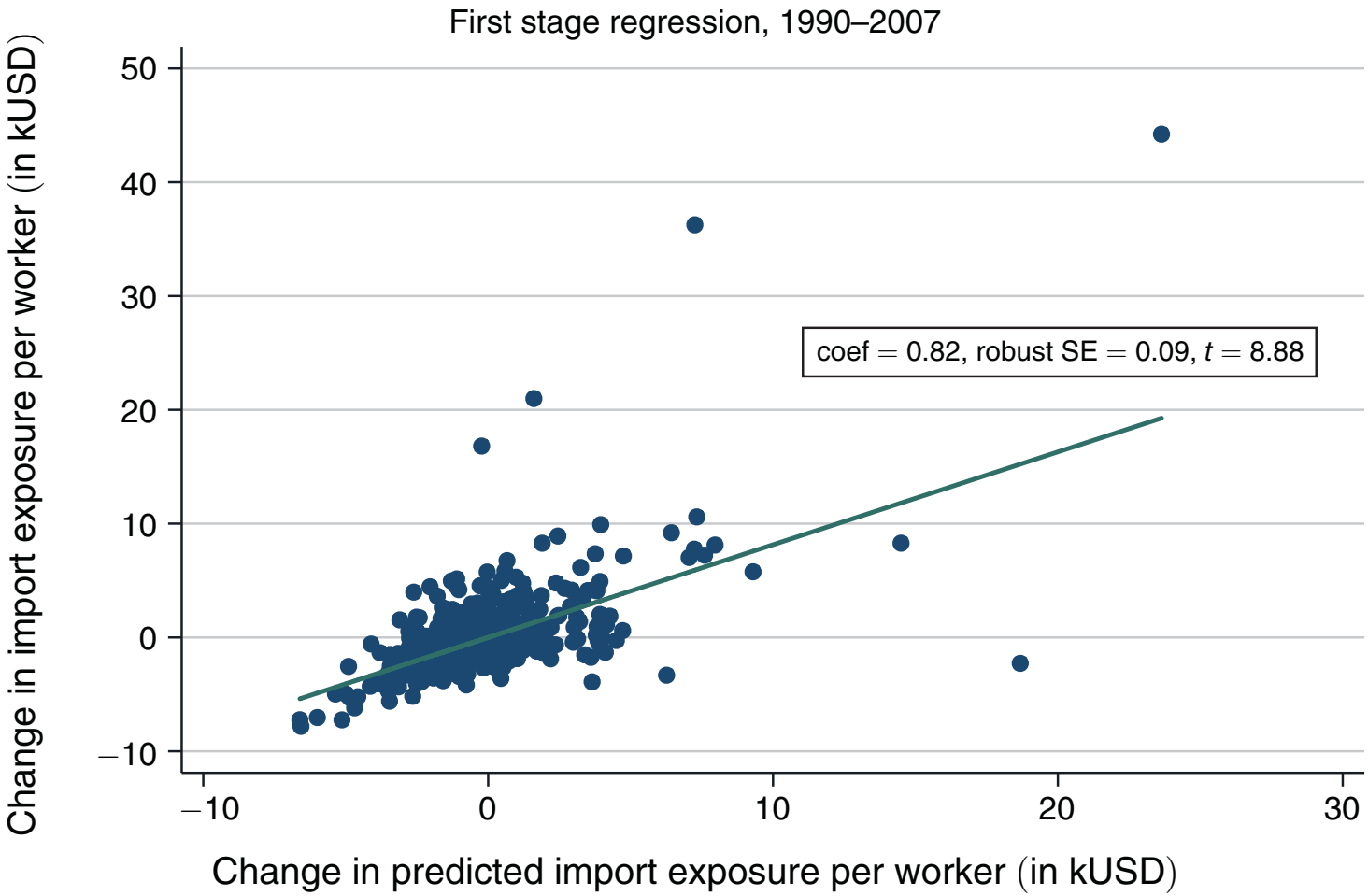
$$\Delta IPW_{oit} = \sum_j \frac{L_{ijt-1}}{L_{ujt-1}} \frac{\Delta M_{ocjt}}{L_{it-1}} = \sum_j \underbrace{\frac{L_{ijt-1}}{L_{it-1}}}_{\text{share}} \underbrace{\frac{\Delta M_{ocjt}}{L_{ujt-1}}}_{\text{shock}}$$

Booming Chinese imports in US and other rich countries

	I. Trade with China (in billions 2007 US$)		II. Imports from other countries (in billions 2007 US$)		
	Imports from China	Exports to China	Imports from other low-inc.	Imports from Mexico/ CAFTA	Imports from rest of world
	(1)	(2)	(3)	(4)	(5)
Panel A. United States					
1991/1992	26.3	10.3	7.7	38.5	322.4
2000	121.6	23.0	22.8	151.6	650.0
2007	330.0	57.4	45.4	183.0	763.1
Growth 1991–2007	1,156%	456%	491%	375%	137%
Panel B. Eight other developed countries					
1991/1992	28.2	26.6	9.2	2.8	723.6
2000	94.3	68.2	13.7	5.3	822.6
2007	262.8	196.9	31.0	11.6	1329.8
Growth 1991–2007	832%	639%	236%	316%	84%

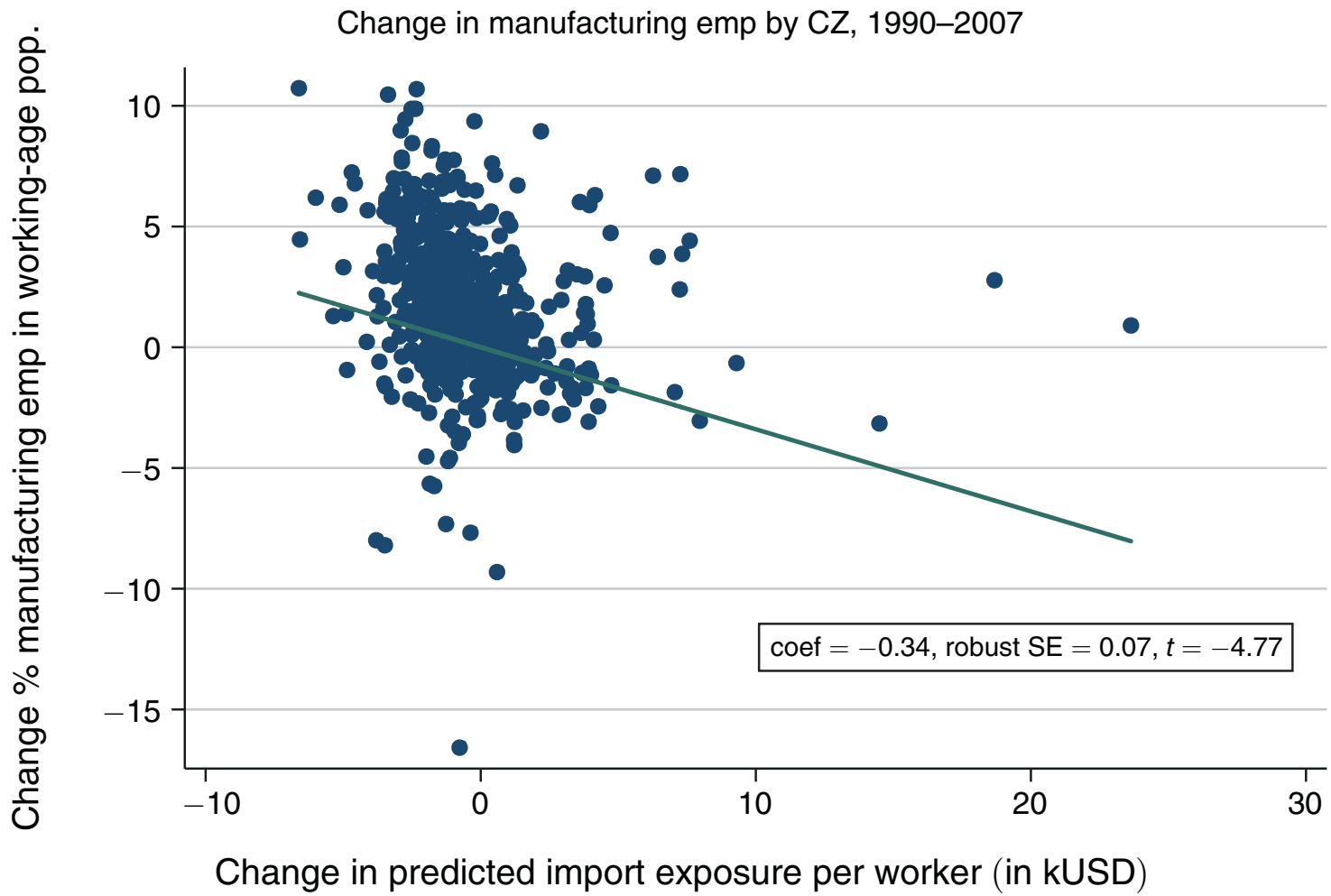
(Autor, Dorn, Hanson 2013, Table 1)

The first stage



(Autor, Dorn, Hanson 2013, Figure 2a)

The reduced form



(Autor, Dorn, Hanson 2013, Figure 2b)

Impacts on manufacturing emp, separately by period

TABLE 2—IMPORTS FROM CHINA AND CHANGE OF MANUFACTURING EMPLOYMENT IN CZS, 1970–2007: 2SLS ESTIMATES

Dependent variable: 10 × 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 $N = 1{,}444$ 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 CZ share of national population.

(Autor, Dorn, Hanson 2013, Table 2)

Main result robust to inclusion of controls

TABLE 3—IMPORTS FROM CHINA AND CHANGE OF MANUFACTURING EMPLOYMENT IN CZS, 1990–2007: 2SLS ESTIMATES

Dependent variable: 10 × annual change in manufacturing emp/working-age pop (in % pts)

	I. 1990–2007 stacked first differences					
	(1)	(2)	(3)	(4)	(5)	(6)
(Δ imports from China to US)/ worker	−0.746*** (0.068)	−0.610*** (0.094)	−0.538*** (0.091)	−0.508*** (0.081)	−0.562*** (0.096)	−0.596*** (0.099)
Percentage of employment in manufacturing$_{-1}$		−0.035 (0.022)	−0.052*** (0.020)	−0.061*** (0.017)	−0.056*** (0.016)	−0.040*** (0.013)
Percentage of college-educated population$_{-1}$				−0.008 (0.016)		0.013 (0.012)
Percentage of foreign-born population$_{-1}$				−0.007 (0.008)		0.030*** (0.011)
Percentage of employment among women$_{-1}$				−0.054** (0.025)		−0.006 (0.024)
Percentage of employment in routine occupations$_{-1}$					−0.230*** (0.063)	−0.245*** (0.064)
Average offshorability index of occupations$_{-1}$					0.244 (0.252)	−0.059 (0.237)
Census division dummies	No	No	Yes	Yes	Yes	Yes
	II. 2SLS first stage estimates					
(Δ imports from China to OTH)/ worker	0.792*** (0.079)	0.664*** (0.086)	0.652*** (0.090)	0.635*** (0.090)	0.638*** (0.087)	0.631*** (0.087)
R^2	0.54	0.57	0.58	0.58	0.58	0.58

(Autor, Dorn, Hanson 2013, Table 3)

No statistically significant effect on local population

TABLE 4—IMPORTS FROM CHINA AND CHANGE OF WORKING-AGE POPULATION IN CZ, 1990–2007: 2SLS ESTIMATES

Dependent variables: Ten-year equivalent changes in log population counts (in log pts)

	I. By education level			II. By age group		
	All	College	Noncollege	Age 16–34	Age 35–49	Age 50–64
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. No census division dummies or other controls						
(Δ imports from China to US)/worker	−1.031**	−0.360	−1.097**	−1.299	−0.615	−1.127***
	(0.503)	(0.660)	(0.488)	(0.826)	(0.572)	(0.422)
R^2	—	0.03	0.00	0.17	0.59	0.22
Panel B. Controlling for census division dummies						
(Δ imports from China to US)/worker	−0.355	0.147	−0.240	−0.408	−0.045	−0.549
	(0.513)	(0.619)	(0.519)	(0.953)	(0.474)	(0.450)
R^2	0.36	0.29	0.45	0.42	0.68	0.46
Panel C. Full controls						
(Δ imports from China to US)/worker	−0.050	−0.026	−0.047	−0.138	0.367	−0.138
	(0.746)	(0.685)	(0.823)	(1.190)	(0.560)	(0.651)
R^2	0.42	0.35	0.52	0.44	0.75	0.60

(Autor, Dorn, Hanson 2013, Table 4)

No gains in non-mfg; rise in unemployment and NILF

TABLE 5—IMPORTS FROM CHINA AND EMPLOYMENT STATUS OF WORKING-AGE POPULATION WITHIN CZS, 1990–2007: 2SLS ESTIMATES

Dependent variables: Ten-year equivalent changes in log population counts and population shares by employment status

	Mfg emp (1)	Non-mfg emp (2)	Unemp (3)	NILF (4)	SSDI receipt (5)
Panel A. 100 × log change in population counts					
(Δ imports from China to US)/worker	−4.231***	−0.274	4.921***	2.058*	1.466***
	(1.047)	(0.651)	(1.128)	(1.080)	(0.557)
Panel B. Change in population shares					
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***	—
	(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***	—
	(0.095)	(0.203)	(0.085)	(0.211)	

(Autor, Dorn, Hanson 2013, Table 5)

Negative effects on wages, but . . .

TABLE 6—IMPORTS FROM CHINA AND WAGE CHANGES WITHIN CZs, 1990–2007: 2SLS ESTIMATES

Dependent variable: Ten-year equivalent change in average log weekly wage (in log pts)

	All workers (1)	Males (2)	Females (3)
Panel A. All education levels			
(Δ imports from China to US)/worker	−0.759***	−0.892***	−0.614***
	(0.253)	(0.294)	(0.237)
R^2	0.56	0.44	0.69
Panel B. College education			
(Δ imports from China to US)/worker	−0.757**	−0.991***	−0.525*
	(0.308)	(0.374)	(0.279)
R^2	0.52	0.39	0.63
Panel C. No college education			
(Δ imports from China to US)/worker	−0.814***	−0.703***	−1.116***
	(0.236)	(0.250)	(0.278)
R^2	0.52	0.45	0.59

(Autor, Dorn, Hanson 2013, Table 6)

. . . true wage changes are probably even bigger

Because the outcome is only available for the employed, and bearing in mind that we have already established that import exposure shocks reduce employment, the wage estimates must be interpreted with caution. If, plausibly, workers with lower ability and earnings are more likely to lose employment in the face of an adverse shock, the observed change in wages in a CZ will understate the composition-constant change in wages. This concern is likely to be relevant for workers with lower education levels, among whom job losses are concentrated.

Increased transfer receipt (notably including SSDI)

TABLE 8—IMPORTS FROM CHINA AND CHANGE OF GOVERNMENT TRANSFER RECEIPTS IN CZs, 1990–2007: 2SLS ESTIMATES

Dep vars: Ten-year equivalent log and dollar change of annual transfer receipts per capita (in log pts and US$)

	Total individual transfers (1)	TAA benefits (2)	Unemployment benefits (3)	SSA retirement benefits (4)	SSA disability benefits (5)	Medical benefits (6)	Federal income assist (7)	Educ/ training assist (8)
Panel A. Log change of transfer receipts per capita								
(Δ imports from China	1.01***	14.41*	3.46*	0.72*	1.96***	0.54	3.04***	2.78**
to US)/worker	(0.33)	(7.59)	(1.87)	(0.38)	(0.69)	(0.49)	(0.96)	(1.32)
R^2	0.57	0.28	0.48	0.36	0.32	0.27	0.54	0.33
Panel B. Dollar change of transfer receipts per capita								
(Δ imports from China	57.73***	0.23	3.42	10.00*	8.40***	18.27	7.20***	3.71***
to US)/worker	(18.41)	(0.17)	(2.26)	(5.45)	(2.21)	(11.84)	(2.35)	(1.44)
R^2	0.75	0.28	0.41	0.47	0.63	0.66	0.53	0.37

(Autor, Dorn, Hanson 2013, Table 8)

On net, substantial drops in household income

TABLE 9—IMPORTS FROM CHINA AND CHANGE IN HOUSEHOLD INCOME, 1990–2007: 2SLS ESTIMATES
Dependent variable: Ten-year equivalent percentage and real dollar change in average and median annual household income per working-age adult (in %pts and US$)

	Average HH income/adult by source				Median HH income/adult	
	Total (1)	Wage-salary (2)	Business invest (3)	SocSec + AFDC (4)	Total (5)	Wage-salary (6)
Panel A. Percent change						
(Δ imports from China to US)/worker	−1.48***	−2.14***	−0.51	2.12***	−1.73***	−2.32***
	(0.36)	(0.59)	(0.74)	(0.58)	(0.38)	(0.51)
R^2	0.69	0.43	0.76	0.52	0.53	0.52
Panel B. Dollar change						
(Δ imports from China to US)/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

(Autor, Dorn, Hanson 2013, Table 9)

Sequencing results

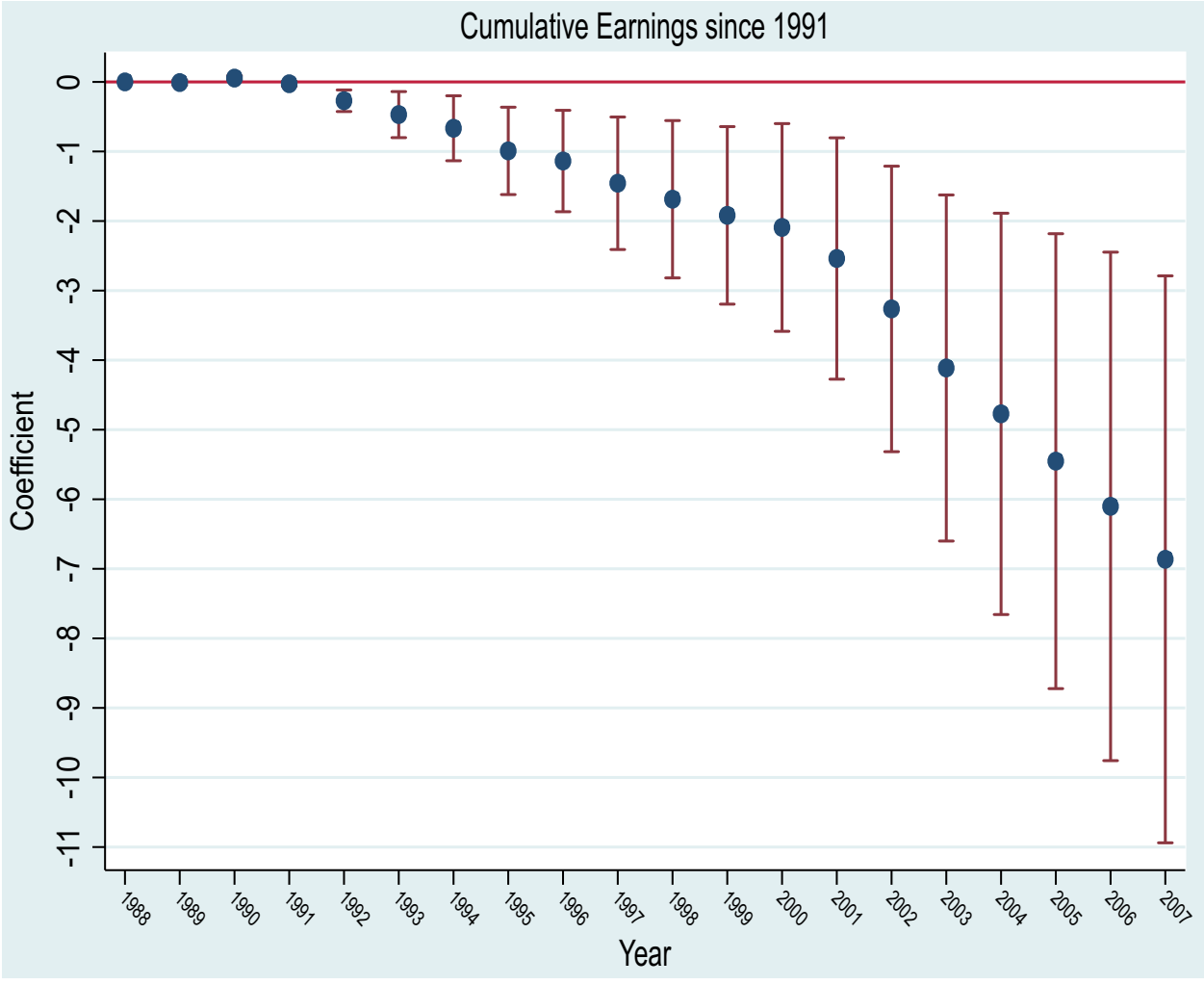
- Note the order in which ADH examine outcomes:
  1. Manufacturing employment
  2. Working-age population
  3. Population shares in emp, unemp., and NILF
  4. Wages
  5. Transfers
  6. Income
- Each outcome builds on what came before
  1. Manufacturing employment is a natural place to start
  2. Null effect on population justifies putting pop in denominator
  3. Decline in emp-pop helps us guess likely bias in wages
  4. Declines in employment + wages $\Longrightarrow$ lower earnings
  5. Increased transfers partly offset drop in earnings
  6. But income still falls on net
- Broader point: think carefully about how to sequence your results

The subsequent literature

- ADH 2013 spawned a lot of successor papers
  - Many by ADH themselves + various coauthors
  - Other authors using ADH strategy for other countries, outcomes
- Pierce and Schott (2016) offer another source of identification
  - China entered the WTO in 2001
  - Automatically got Permanent Normal Trade Relations w/USA
  - Eliminated risk of potential US tariffs against China
  - Exploit cross-industry variation in size of avoided tariffs

Autor, Dorn, Hanson, Song (2014): ADH meets JLS

Workers employed at baseline in import-exposed industries go on to lose earnings



(Autor, Dorn, Hanson, and Song 2014, Fig. 3)

Acemoglu, Autor, Dorn, Hanson, and Price (2016)

- Estimate effects of Chinese imports on industry-level employment
  - Specification: $\Delta L_{jt} = \alpha_t + \beta \Delta IP_{jt} + \gamma X_{j0} + e_{jt}$
  - Instrument ΔIP_{jt} using import penetration in comparison countries
- Then incorporate indirect effects due to input-output linkages
  - Consider how Chinese imports affect US electronics makers
  - Direct effect: Chinese electronics displace US-made electronics
  - Upstream effect: imported Chinese PCs lower demand for US parts
  - Downstream effect: US electronic firms can import Chinese metals

Other literature on effects of Chinese import competition

- Effects on innovation
  - Autor, Dorn, Hanson, Pisano, Shu (forthcoming)
  - Bloom, Draca, Van Reenen (2016)
- Demographic effects
  - Fertility: Autor, Dorn, Hanson (forthcoming)
  - Mortality: Pierce and Schott (2018)
- Effects on political outcomes
  - Autor, Dorn, Hanson, Majlesi (2017)
  - Che, Lu, Pierce, Schott, Tao (2017)
- Offsetting effects of export opportunities
  - Feenstra and Sasahara (2018)
  - Feenstra, Ma, and Xu (2019)
- Product cycles: Eriksson, Russ, Shambaugh, Xu (2019)