The China Syndrome

Chinese Imports and U.S. Manufacturing Employment

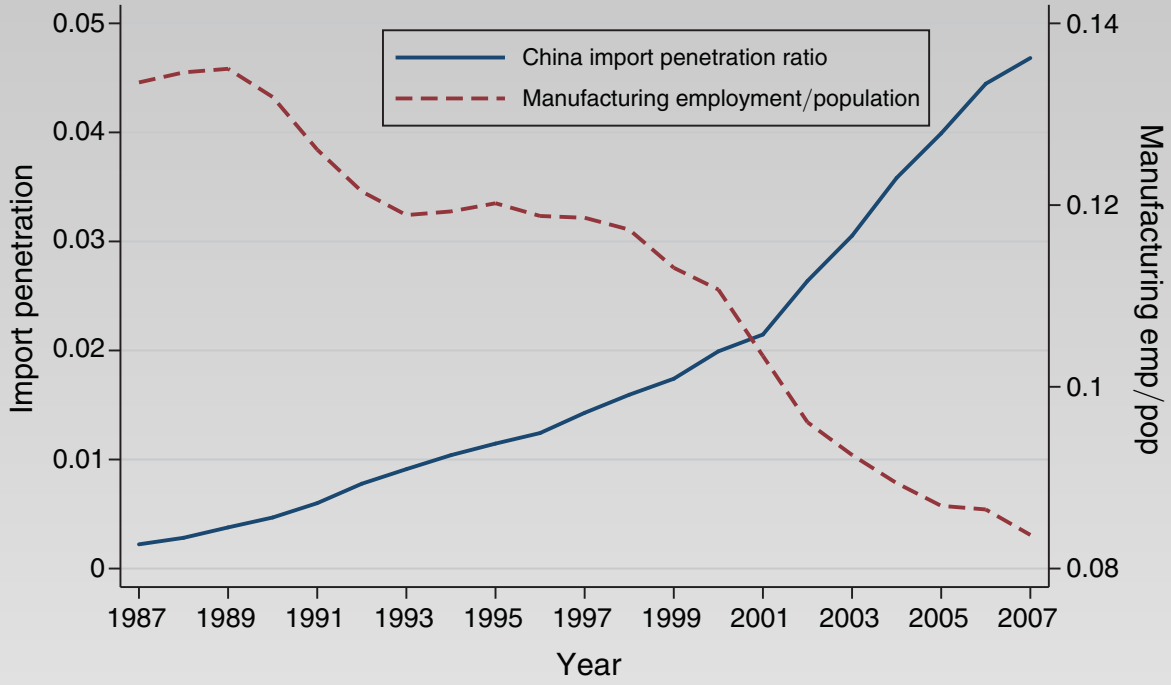


FIGURE 1. IMPORT PENETRATION RATIO FOR US IMPORTS FROM CHINA (*left scale*), AND SHARE OF US WORKING-AGE POPULATION EMPLOYED IN MANUFACTURING (*right scale*)

- Source: Autor, Dorn, and Hanson (2013), "The China Syndrome: Local Labor Market Effects of Import Competition in the United States."

Local Labor Markets

- Time-series correlation is not causation
- Difference-in-difference estimation that exploits variations in Chinese imports across countries over time is unlikely to be credible
- Autor, Dorn, and Hanson (2013) look at variation in impacts across local labor markets in the U.S.
- The unit of analysis is a commuting zone
  - locations are grouped into 722 clusters of counties in mainland U.S. that are characterized by strong commuting ties within the zone and weak commuting ties across zones
  - one potential issue of this approach is that it ignores general equilibrium effects working through migration—if workers move from adversely affected CZ to favorably affected CZ, the direct effects would be underestimated
  - another feature of this approach is that it only assesses the effects of imports on employment in one CZ relative to another; it doesn't estimate the effects on aggregate employment in the U.S.

Variations in Treatment

- Why would imports affect different local labor markets differently?
- Maybe some CZs use more imports from China
  - but you can't measure amount of Chinese imports going into different CZs
  - this is a wrong measure even if you could
- The Effects on local labor markets primarily works through import competition
  - there is a lot of furniture imports from China and not so much automobile imports
  - increased Chinese imports reduce the demand for furniture workers more than they reduce the demand for auto workers
  - some CZs employ lots of furniture workers but few automobile workers; others have the opposite employment pattern
- The extent of treatment for different CZs is different, even though all CZs are exposed to Chinese imports

Measure of Exposure

- Measure of local labor market exposure to import competition per worker in commuting zone i in period t is:

$$\Delta IPW_{it} = \sum_j \frac{L_{ijt}}{L_{jt}} \frac{\Delta M_{jt}}{L_{it}}$$

  - ΔM_{jt} is change in Chinese imports in industry j during period t
  - (L_{ijt}/L_{jt}) is fraction of industry j workers in the US in (the beginning of) period t who works in CZ i
  - L_{it} is total employment in CZ i in (the beginning of) period t (because we want to measure exposure on the per capita basis)

Regressions

- Run a regression of the form:

$$\Delta L_{it}^{m} = \gamma_t + \beta_1 \Delta IPW_{it} + \beta_2 X_{it} + e_{it}$$

  - ΔL_{it}^{m} is change in manufacturing employment
  - γ_t is time fixed effects—this is a difference-in-difference estimation because CZ fixed effects are already differenced out
  - X_{it} is a set of control variables that captures demographic composition of the local labor force

OLS Bias

- Unobserved shocks to product demand
  - suppose demand for furniture increases
  - US imports more furniture from China
  - demand for workers in CZ i (which employs a lot of furniture workers) also increases because people also demand more furniture from the US
  - this induces a positive correlation between ΔIPW_{it} and ΔL_{it}^{m}
  - the magnitude of the direct negative effect of import competition on local employment will be underestimated
- Difference-in-difference strategy requires the time effect γ_t to be the same for all CZs. The above concern suggests the same demand shock for furniture may affect different CZs differently, making ordinary least squares estimation problematic

IV Strategy

- Much of the growth in Chinese imports stems from the rising competitiveness of Chinese manufacturing and China's accession to the WTO (which are uncorrelated to US domestic factors)
- Autor, Dorn and Hanson use the following as their instrument

$$\Delta IPW_{it}^{o} = \sum_{j} \frac{L_{ijt-1}}{L_{jt-1}} \frac{\Delta M_{jt}^{o}}{L_{it-1}}$$

  - ΔM_{jt}^{o} is other countries' imports of industry j products from China
  - the employment weights uses employment levels from the prior decade
- Supply factors in China drive Chinese exports to both US and other countries (i.e., both ΔM_{jt} and ΔM_{jt}^{o})—relevance condition
- Exclusion condition
  - ΔM_{jt}^{o} is relatively less likely to be related to demand shocks in the US
  - using employment levels ten years ago because L_{it} and L_{ijt} (used to compute ΔIPW_{it}) are correlated with L_{it}^{m}

Threats to Causal Inference

- The IV is not perfect
- Product demand shocks may be correlated between US and other countries (high demand shock for furniture drives up ΔM^o_{jt} and demand for US furniture workers)
  - but still the IV bias will be smaller than the OLS bias
- Negative US productivity shock in furniture may drive down L^m_{it} directly, and also drives up ΔM^o_{jt} because US furniture become less competitive in Europe compared to Chinese furniture
  - but growth in Chinese productivity has been much faster than anywhere else in the developed world during the period
- Common technological shocks in US and other developed countries (e.g., automation) drives down demand for labor in labor-intensive industries and raises Chinese imports everywhere
  - again such shocks seem to be small compared to productivity change within China

China-Specific Productivity Change

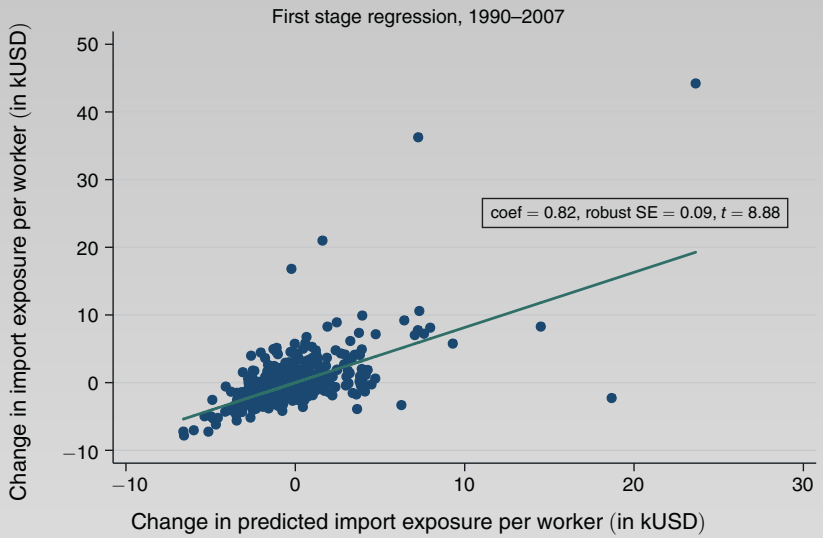
TABLE 1—VALUE OF TRADE WITH CHINA FOR THE US AND OTHER SELECTED HIGH-INCOME COUNTRIES AND VALUE OF IMPORTS FROM ALL OTHER SOURCE COUNTRIES, 1991/1992–2007

	I. Trade with China (in billions 2007 US$)		II. Imports from other countries (in billions 2007 US$)		
	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)
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%

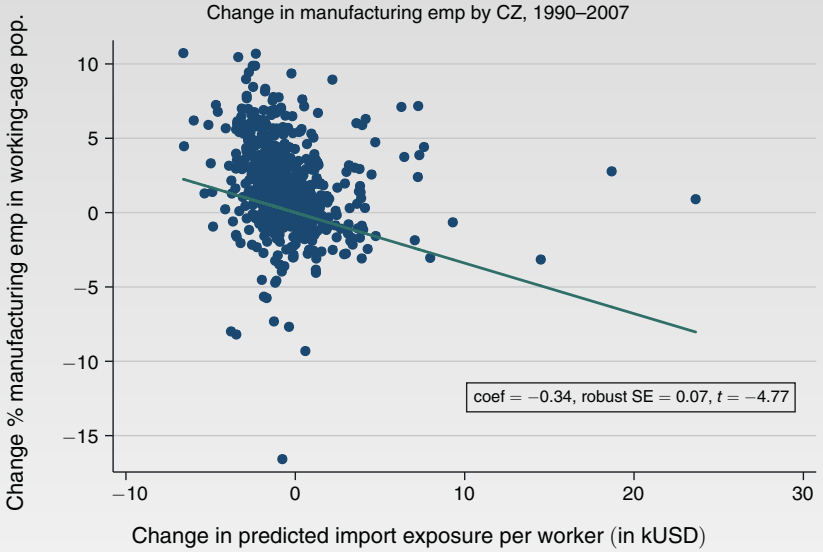
- Growth in imports from China dwarfs growth in imports from rest of the world

Data Plots

Panel A. 2SLS first stage regression, full sample



Panel B. OLS reduced form regression, full sample



2SLS Estimates

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

2SLS Estimates, Continued

- Manufacturing employment growth is weaker in CZs with lots of "routine occupations"
- CZs with lots of "offshorable occupations" do not exhibit weaker manufacturing employment growth
- OLS estimate of column (6) is −0.171 (compared to 2SLS estimate of −0.596). This is consistent with the expectation that OLS estimates are downward biased when there is unobserved product demand shock
- Placebo tests (using L_{it}^{m} in 1970–1990 as dependent variable) gives either insignificant or positive coefficients for ΔIPW_{it}

Magnitudes

- A \$1,000 increase in import exposure per worker reduces manufacturing employment per working population by 0.596 pp.
- ΔIPW_{it} rose by about \$3,000 during 1990–2007
- "Predicted" decrease in manufacturing employment due to import exposure is 1.8 pp.
  - actual decrease was about 4 pp. (from about 12% to 8%)
  - I use "predicted" in quotation marks because this is projecting cross-sectional differences into time-series changes

Migration is Limited

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 (1)	College (2)	Noncollege (3)	Age 16–34 (4)	Age 35–49 (5)	Age 50–64 (6)
Panel A. No census division dummies or other controls						
(Δ imports from China to US)/worker	−1.031** (0.503)	−0.360 (0.660)	−1.097** (0.488)	−1.299 (0.826)	−0.615 (0.572)	−1.127*** (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 (0.513)	0.147 (0.619)	−0.240 (0.519)	−0.408 (0.953)	−0.045 (0.474)	−0.549 (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 (0.746)	−0.026 (0.685)	−0.047 (0.823)	−0.138 (1.190)	0.367 (0.560)	−0.138 (0.651)
R^2	0.42	0.35	0.52	0.44	0.75	0.60

Effects on Other Employment Variables

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)	

- Higher import exposure:
  - increases unemployment
  - increases “Not In Labor Force”
  - increases receipients of Social Security Disability Insurance
- Effects are stronger for non-college graduates

Effects on Wages

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

- A $1,000 increase in import exposure reduces wages of employed workers by less than 1 percent
- This could be an underestimate of the true negative effect if those who lost employment were low-wage workers

Effects on Non-Manufacturing Workers

TABLE 7—COMPARING EMPLOYMENT AND WAGE CHANGES IN MANUFACTURING AND OUTSIDE MANUFACTURING, 1990–2007: 2SLS ESTIMATES

Dependent variables: Ten-year equivalent changes in log workers and average log weekly wages

	I. Manufacturing sector			II. Nonmanufacturing		
	All workers (1)	College (2)	Noncollege (3)	All workers (4)	College (5)	Noncollege (6)
Panel A. Log change in number of workers						
(Δ imports from China to US)/worker	−4.231*** (1.047)	−3.992*** (1.181)	−4.493*** (1.243)	−0.274 (0.651)	0.291 (0.590)	−1.037 (0.764)
R^2	0.31	0.30	0.34	0.35	0.29	0.53
Panel B. Change in average log wage						
(Δ imports from China to US)/worker	0.150 (0.482)	0.458 (0.340)	−0.101 (0.369)	−0.761*** (0.260)	−0.743** (0.297)	−0.822*** (0.246)
R^2	0.22	0.21	0.33	0.60	0.54	0.51

- Insignificant effects of wages of manufacturing workers
- Large negative effects on wages of non-manufacturing workers, indicating possibly significant spillovers to local economy

Government Transfers

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

- Large proportionate increase in Trade Adjustment Assistance (targeted at individuals who lose employment due to foreign competition)

Effects of 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*** (0.36)	−2.14*** (0.59)	−0.51 (0.74)	2.12*** (0.58)	−1.73*** (0.38)	−2.32*** (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*** (160.4)	−549.3*** (169.4)	40.1 (116.7)	17.3*** (4.3)	−439.9*** (112.7)	−476.5*** (122.2)
R^2	0.63	0.40	0.72	0.51	0.49	0.48

- A $1,000 increase in import exposure reduces household income per adult by $492 on average

Other Measures of Import Exposure

TABLE 10—ADDING EXPOSURE TO INDIRECT IMPORT COMPETITION OR EXPOSURE TO NET IMPORTS, 1990–2007: 2SLS AND OLS ESTIMATES
Dependent variables: Ten-year equivalent changes of indicated variables

	I. Employment/pop		II. Log wages		III. Transfers, wage inc	
	Mfg (1)	Nonmfg (2)	Mfg (3)	Nonmfg (4)	log transfers (5)	Avg log HH wage inc (6)
Panel A. Baseline results: Gross Chinese imports per worker (2SLS)						
(Δ imports from China to US)/ worker	−0.60*** (0.10)	−0.18 (0.14)	0.15 (0.48)	−0.76*** (0.26)	1.01*** (0.33)	−2.14*** (0.59)
Panel B. Domestic plus international exposure to Chinese exports (2SLS)						
(Δ domestic + intn'l exposure to Chinese imports)/worker	−0.51*** (0.08)	−0.12 (0.12)	0.16 (0.42)	−0.60*** (0.23)	0.87*** (0.27)	−1.77*** (0.49)
Panel C. Exposure to final goods and intermediate inputs (2SLS)						
(Δ imports from China to US net of i'med inputs)/worker	−0.49*** (0.12)	−0.01 (0.20)	0.71 (0.52)	−0.41 (0.37)	0.84** (0.36)	−1.23 (0.82)
Panel D. Net Chinese imports per worker (2SLS)						
(Δ net imports of US from China)/ worker	−0.45*** (0.10)	−0.09 (0.15)	0.46 (0.42)	−0.47* (0.27)	0.73** (0.35)	−1.39** (0.58)
Panel E. Change in China-US productivity differential (OLS gravity residual)						
Δ comparative advantage China (gravity residual)	−0.29*** (0.04)	−0.03 (0.08)	0.04 (0.28)	−0.26* (0.15)	0.53*** (0.14)	−0.78*** (0.25)
Panel F. Factor content of net Chinese imports per worker (2SLS)						
(Δ factor content of net imports from China)/worker	−0.57*** (0.10)	−0.12 (0.15)	0.59 (0.50)	−0.66** (0.26)	0.81** (0.36)	−1.70*** (0.54)

Is Trade with China Good for the US?

- Impossible to answer this question using variations in outcomes across local labor markets
- But the paper highlights the importance of the distributional effects of trade—even if total gains from trade exceed total losses, the loss to losers can be very significant