# Magnification of the 'China Shock' Through the U.S. Housing Market

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Motivation

- The past decade in the 21 century is characterized by:
  - Continuing drop in US manufacturing employment: 'roaring nineties' (Krueger and Solow, 2002), 'great US employment sag' (Acemoglu et al, 2016), 'surprisingly swift decline' (Pierce and Schott, 2016).
  - Rising emerging economies in the global trading system, particularly China.

Source: Reproduced from ADH(2013).
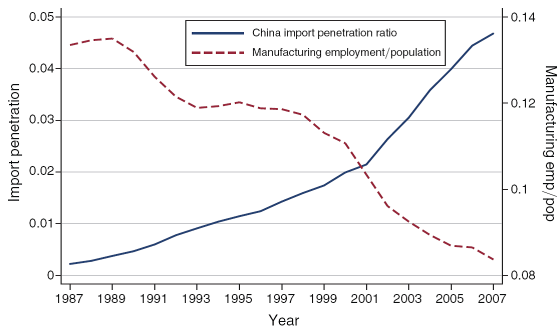
Motivation

- A growing body of literature has pointed to Chinese imports for:
  - declining employment and wage (ADH, 2013; AADHP, 2016; Pierce and Schott, 2016)
  - marriage (ADH, 2017), politics (ADHM, 2016), innovation (ADHPS, 2016), and local public services (Feler and Senses, 2016), etc.
  - moderate "−" effects in Europe (Dauth et al., 2014; Badinger and Reuter, 2017)

- What if we take into account the concurrent housing boom?
- Housing boom and bust have lasted from the late 1990s to the late 2000s, which also vary across regions.
  - **The housing net worth channel**: expand or suppress consumer demand through a direct wealth effect or tighter borrowing constraints (Mian and Sufi, 2016).
  - **The collateral channel**: firms own real estate increase their investment in response to rising housing prices (Chaney et al. 2012).
  - **The "masking" effect of housing bubble**: the decline in manufacturing was "masked" by positive employment effects from housing boom and "unmasked" when housing market collapsed (Charles et al., 2016).

- These regions hit harder by import penetration also experienced smaller "+" changes in housing prices.

Changes in Housing Prices Matter

Import Exposure and Housing Price
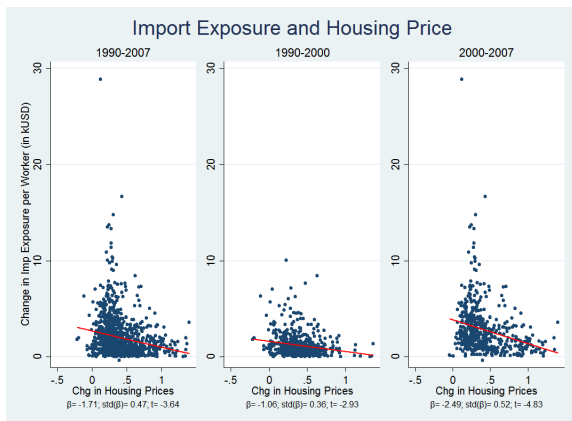
- negative correlation between local import exposure from China and changes in the local housing price
- much stronger in the 2000-2007 period
- omitting housing variable would bias up the estimated effect of import exposure

The ADH (2013) Framework

- US regions (commuting zones) that have a larger exposure to import competition from China suffer more in its labor market outcome. Benchmark specification:

$$\Delta L_{it} = \gamma_t + \beta_1 \Delta IPW_{it} + X_{it}\beta_2 + \delta_r + e_{it} \qquad (1)$$

- ΔL_{it} is the decadal change in the employment share of the working-age population in commuting zone i.

- ΔIPW_{it} measures the change in US imports from China in each industry, weighted by a Bartik type employment share of industry j in commuting zone i's initial employment.

$$\Delta IPW_{it} = \sum_j \frac{L_{ijt_0}}{L_{jt_0}} \frac{\Delta M_{jt}}{L_{it_0}}$$

  - Instrumented by China's total exports to eight other high-income countries, similar Bartik weights

- Sample: 722 commuting zones, stacked first difference over two subperiods (1990-2000, & 2000-2007)

The FMX Specification

▶ HYPO: Changes in housing prices **magnified** the employment effect of 'China shock'.

$$\Delta L_{it} = \gamma_t + \beta_1 \Delta IPW_{it} + \beta_2 \Delta HPI_{it} + X_{it}\beta_3 + \delta_r + e_{it} \quad (2)$$

▶ Changes in local housing prices may be a result of import competition (Feler and Senses, 2016).

▶ Two sets of IVs
  (1) Estimated structural break in housing price changes (Charles et al. 2016)
  (2) Land topology-based measure of housing supply elasticity (Saiz, 2010)

▶ Sample: 250-291 commuting zones, stacked first difference over two subperiods (1990-2000, & 2000-2007)

Matched Sample

- Table 1: Summary Statistics Full vs. Matched Sample with housing data

Variable	Obs	Mean	Std.Dev
ADH Sample (722 CZ)			
Δ Imports from China/workers	1444	1.884	1.752
Δ manuf. employment/working-age pop	1444	-2.401	1.746
Δ non-manuf. employment/working-age pop	1444	2.496	2.819
Matched Sample with Structural Break IV data (291 CZ, Pop Share=90%)			
Δ Imports from China/workers	582	1.837	1.609
Δ manuf. employment/working-age pop	582	-2.460	1.601
Δ non-manuf. employment/working-age pop	582	2.448	2.819
Matched Sample with Supply Elasticity IV data (250 CZ, Pop Share=85%)			
Δ Imports from China/workers	500	1.835	1.597
Δ manuf. employment/working-age pop	500	-2.481	1.566
Δ non-manuf. employment/working-age pop	500	2.444	2.835

Benchmark: ADH Specification

$$\Delta L_{it} = \gamma_t + \beta_1 \Delta IPW_{it} + X_{it}\beta_2 + \delta_r + e_{it},$$

	(1) Mfg emp	(2) Non-mfg emp	(3) Total Emp	(4) Unemp	(5) NILF
			Panel I: ADH Sample, 722 CZ		
All education levels					
(Δ imports from China) /worker	-0.596***	-0.178	-0.774***	0.221***	0.553***
	(0.099)	(0.137)	(0.176)	(0.058)	(0.150)
College education					
(Δ imports from China) /worker	-0.592***	0.168	-0.424***	0.119***	0.304***
	(0.125)	(0.122)	(0.123)	(0.039)	(0.113)
No college education					
(Δ imports from China) /worker	-0.581***	-0.531***	-1.112***	0.282***	0.831***
	(0.095)	(0.203)	(0.252)	(0.085)	(0.211)
			Panel II: Matched Sample, 291 CZ		
All education levels					
(Δ imports from China) /worker	-0.705***	-0.218	-0.923***	0.278***	0.646***
	(0.103)	(0.215)	(0.252)	(0.073)	(0.227)
College education					
(Δ imports from China) /worker	-0.704***	0.202	-0.502***	0.173***	0.329**
	(0.147)	(0.169)	(0.176)	(0.048)	(0.159)
No college education					
(Δ imports from China) /worker	-0.686***	-0.624**	-1.310***	0.330***	0.979***
	(0.108)	(0.310)	(0.364)	(0.115)	(0.322)

▶ with a dummy for the 2000-2007 period, a set of census division dummies, and the full set of control variables for the start of period economic and demographic conditions.

Will housing play a role?

$$\Delta L_{it} = \gamma_t + \beta_1 \Delta IPW_{it} + \beta_2 \Delta HPI_{it} + X_{it}\beta_3 + \delta_r + e_{it}$$

- Concerns in identification: endogeneity
  - Unobserved local conditions may affect employment and housing prices simultaneously.
  - Local job opportunities can also reversely affect housing prices.
  - Changes in local housing price may be caused by import exposure (Feler and Senses, 2016).
- Instrument: estimated structural breaks (Ferreira and Gyourko, 2011; Charles et al., 2016).
  - Much of the variation in housing prices comes from factors specific to the housing market (speculative activity):
    - irrational exuberance and bubbles (Shiller 2009, Mayer 2011, Chinco and Mayer 2014)
    - the introduction of market products e.g. interest-only mortgages (Barlevy and Fisher 2010)
  - Fundamental changes are likely smoothly incorporated into price changes.
  - Treat "sharp" structural breaks as exogenous.

Housing Structural Breaks as IV

- ▶ We estimate for each MSA an OLS regression with a structural break, and search for the break date that maximizes the R^2 of the regression:

$$lnP_{it} = \omega_i + \tau_i t + \lambda_i(t - t_i^*)D_{it} + \epsilon_{it}, \qquad (3)$$

  - ▶ lnP_{it} is the log value of quarterly housing price index for each area i.
  - ▶ D_{it} is a dummy variable which equals 1 for periods after the date of structural break t_i^*.
  - ▶ τ_i is the time trend before structural break and λ_i is the size of the break.

- ▶ Our estimation is run for each MSA with quarterly housing price data available, and over period 1990-2000 and 2000-2007.

Structural Breaks across MSAs: Examples
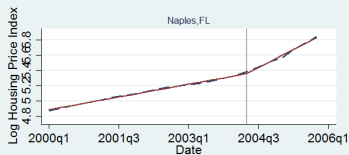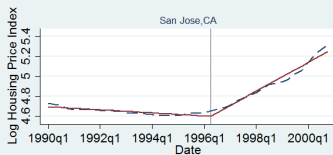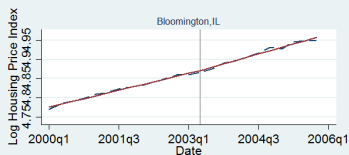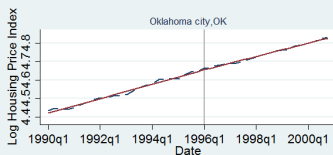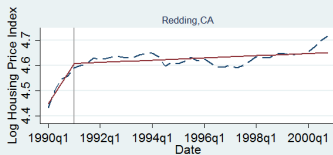
Distribution of Structural Break Dates and Sizes

Will housing play a role?

$$\Delta L_{it} = \gamma_t + \beta_1 \Delta IPW_{it} + \beta_2 \Delta HPI_{it} + X_{it}\beta_3 + \delta_r + e_{it}$$

	(1) Mfg emp	(2) Non-mfg emp	(3) Total Emp	(4) Unemp	(5) NILF
Panel III: Matched Sample, controlling housing with Structural Break IV					
All education levels					
(Δ imports from China)/worker	-0.595***	0.165	-0.430	0.189***	0.241
	(0.093)	(0.257)	(0.272)	(0.073)	(0.259)
Δ housing price index	1.550***	5.403***	6.953***	-1.243**	-5.710***
	0.480)	(1.202)	(1.549)	(0.510)	(1.255)
College education					
(Δ imports from China)/worker	-0.595***	0.451***	-0.145	0.113**	0.032
	(0.143)	(0.174)	(0.170)	(0.051)	(0.155)
Δ housing price index	1.534***	3.504***	5.037***	-0.845**	-4.192***
	0.495)	(0.348)	(0.600)	(0.364)	(0.446)
No college education					
(Δ imports from China)/worker	-0.557***	-0.082	-0.640	0.208*	0.431
	(0.105)	(0.377)	(0.421)	(0.115)	(0.393)
Δ housing price index	1.815***	7.634***	9.449***	-1.720**	-7.729***
	(0.562)	(2.151)	(2.573)	(0.710)	(2.105)
Reduction in Estimated Import Coefficient Magnitude					
All education levels	16%	/	53%	32%	63%
College education	15%	/	71%	35%	90%
No College education	19%	87%	51%	37%	56%

▶ Including housing reduces the impact of import exposure.

Housing Supply Elasticity as IV

- ▶ Housing development is constrained by geographic situation (Saiz, 2010).
- ▶ Areas with more elastic housing supply experience less housing price changes w.r.t demand shock.
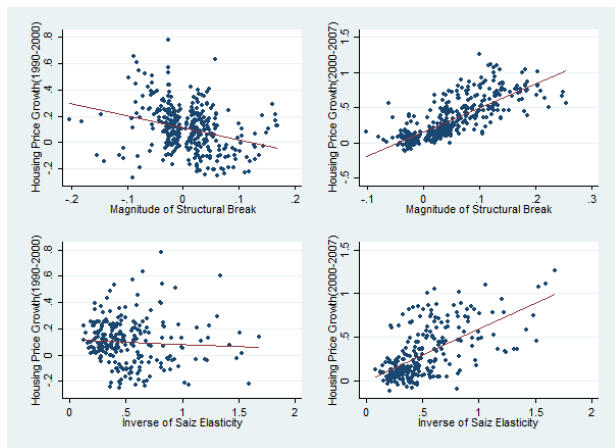
Saiz's Elasticity Across MSAs: Examples

- Housing supply elasticity for major metropolitan areas, with population $> 1,000,000$

Rank	MSA name	Supply elasticity	Rank	MSA name	Supply elasticity
1	Miami, FL	0.60	29	Rochester, NY	1.40
2	Los Angeles-Long Beach, CA	0.63	30	Minneapolis-St. Paul, MN-WI	1.45
3	Fort Lauderdale, FL	0.65	31	Hartford, CT	1.50
4	San Francisco, CA	0.66	32	Denver, CO	1.53
5	San Diego, CA	0.67	33	Washington, DC-MD-VA-WV	1.61
6	Oakland, CA	0.70	34	Phoenix-Mesa, AZ	1.61
7	Salt Lake City-Ogden, UT	0.75	35	Philadelphia, PA-NJ	1.65
8	New York, NY	0.76	36	Memphis, TN-AR-MS	1.76
9	San Jose, CA	0.76	37	Buffalo-Niagara Falls, NY	1.83
10	New Orleans, LA	0.81	38	Raleigh-Durham-Chapel Hill, NC	2.11
11	Chicago, IL	0.81	39	Dallas, TX	2.18
12	Norfolk-Virginia Beach-Newport News, VA-NC	0.82	40	Nashville, TN	2.24
13	West Palm Beach-Boca Raton, FL	0.83	41	Houston, TX	2.30
14	Boston-Worcester-Lawrence-Lowell-Brocktn, MA-NH	0.86	42	Louisville, KY-IN	2.34
15	Seattle-Bellevue-Everett, WA	0.88	43	St. Louis, MO-IL	2.36
16	Riverside-San Bernardino, CA	0.94	44	Grand Rapids-Muskegon-Holland, MI	2.39
17	New Haven-Bridgprt-Stamfrd-Danbry-Wtrbry, CT	0.98	45	Cincinnati, OH-KY-IN	2.46
18	Tampa-St. Petersburg-Clearwater, FL	1.00	46	Atlanta, GA	2.55
19	Cleveland-Lorain-Elyria, OH	1.02	47	Columbus, OH	2.71
20	Milwaukee-Waukesha, WI	1.03	48	Fort Worth-Arlington, TX	2.80
21	Jacksonville, FL	1.06	49	San Antonio, TX	2.98
22	Portland-Vancouver, OR-WA	1.07	50	Austin-San Marcos, TX	3.00
23	Orlando, FL	1.12	51	Charlotte-Gastonia-Rock Hill, NC-SC	3.09
24	Newark, NJ	1.16	52	Greensboro-Winston-Salem-High Point, NC	3.10
25	Pittsburgh, PA	1.20	53	Kansas City, MO-KS	3.19
26	Baltimore, MD	1.23	54	Oklahoma City, OK	3.29
27	Detroit, MI	1.24	55	Indianapolis, IN	4.00
28	Las Vegas, NV-AZ	1.39			

Will housing play a role?

$$\Delta L_{it} = \gamma_t + \beta_1 \Delta IPW_{it} + \beta_2 \Delta HPI_{it} + X_{it}\beta_3 + \delta_r + e_{it}$$

	(1) Mfg emp	(2) Non-mfg emp	(3) Total Emp	(4) Unemp	(5) NILF
Panel II: Matched Sample, controlling housing with Supply Elasticity IV					
All education levels					
(Δ imports from China)/worker	-0.568***	0.245	-0.323	0.183**	0.140
	(0.098)	(0.264)	(0.286)	(0.073)	(0.283)
Δ housing price index	2.322***	6.090***	8.412***	-1.172**	-7.240***
	(0.575)	(1.331)	(1.683)	(0.565)	(1.395)
College education					
(Δ imports from China)/worker	-0.566***	0.457**	-0.109	0.117**	-0.008
	(0.147)	(0.189)	(0.182)	(0.054)	(0.178)
Δ housing price index	2.509***	3.271***	5.781***	-0.411	-5.369***
	(0.588)	(0.731)	(0.782)	(0.388)	(0.746)
No college education					
(Δ imports from China)/worker	-0.521***	0.111	-0.410	0.179	0.231
	(0.108)	(0.386)	(0.435)	(0.119)	(0.415)
Δ housing price index	2.524***	9.889***	12.413***	-2.201**	-10.211***
	(0.674)	(2.071)	(2.528)	(0.861)	(2.067)
Reduction in Estimated Import Coefficient Magnitude					
All education levels	23%	/	65%	31 %	79 %
College education	24%	/	79%	20 %	/
No College education	26%	/	68%	47 %	76 %

▶ Including housing reduces the impact of import exposure.

Using both IVs for HPI

	(1) Mfg emp	(2) Non-mfg emp	(3) Total Emp	(4) Unemp	(5) NILF
Panel II: Matched Sample, controlling housing with both IVs					
All education levels					
(Δ imports from China)/worker	-0.628***	0.189	-0.439	0.175**	0.264
	(0.104)	(0.269)	(0.293)	(0.078)	(0.278)
Δ housing price index	1.662***	5.467***	7.129***	-1.255***	-5.873***
	(0.425)	(1.032)	(1.351)	(0.430)	(1.113)
Hansen J p-value	0.13	0.42	0.18	0.85	0.10
College education					
(Δ imports from China)/worker	-0.644***	0.469***	-0.175	0.085	0.091
	(0.149)	(0.178)	(0.190)	(0.053)	(0.178)
Δ housing price index	1.651***	3.399***	5.049***	-0.764***	-4.285***
	(0.435)	(0.361)	(0.526)	(0.296)	(0.414)
Hansen J p-value	0.09	0.79	0.23	0.25	0.07
No college education					
(Δ imports from China)/worker	-0.574***	-0.061	-0.635	0.210*	0.425
	(0.114)	(0.399)	(0.441)	(0.123) (0.408)	
Δ housing price index	1.937***	7.974***	9.911***	-1.860***	-8.050***
	(0.489)	(1.855)	(2.217)	(0.606)	(1.844)
Hansen J p-value	0.22	0.10	0.07	0.56	0.06
Reduction in Estimated Import Coefficient Magnitude					
All education levels	14%	/	52%	34%	60%
College education	13%	/	66%	42%	76%
No College education	18%	90%	51%	37%	55%

First Stages

	(1)	(2)
	(Δ imports from China)/worker	Δ housing price index
Panel I: Table 2 Structural Break IV		
(Δ Other's imports from China) /worker	0.570***	-0.023**
	(0.096)	(0.010)
Structural break in housing price	-0.644	3.014**
	(1.196)	(0.225)
First Stage F Statistics	17.71	90.71
Kleibergen-Paap Wald F Statistics	16.03	
Panel II: Table 3 Elasticity IV		
(Δ Other's imports from China) /worker	0.567***	-0.027**
	(0.105)	(0.012)
Supply Elasticity	0.045	-0.124***
	(0.066)	(0.026)
First Stage F Statistics	16.11	14.37
Kleibergen-Paap Wald F Statistics	10.37	
Panel III: Table 4 Both IV		
(Δ Other's imports from China) /worker	0.568***	-0.018*
	(0.104)	(0.011)
Structural break in housing price	0.192	2.688***
	(1.004)	(0.246)
Supply Elasticity	0.050	-0.057***
	(0.066)	(0.015)
First Stage F Statistics	11.98	90.41
Kleibergen-Paap Wald F Statistics	9.983	

▶ Changes in local housing price may be caused by import exposure (Feler and Senses, 2016).

Reduced Form Results

- Use *predicted* housing price growth using only the housing IVs

$$\Delta HPI_{it} = \gamma_t + \alpha_1 \Delta IPW_{it} + \alpha_2 IV_{it} + \delta_r + e_{it},$$

- i.e. $\widehat{\Delta HPI_{it}} = \widehat{\alpha_2} IV_{it}$

$$\Delta L_{it} = \gamma_t + \beta_1 \Delta IPW_{it} + \beta_2 \widehat{\Delta HPI_{it}} + X_{it}\beta_3 + \delta_r + e_{it}$$

	(1) Mfg emp	(2) Non-mfg emp	(3) Total Emp	(4) Unemp	(5) NILF
All education levels					
Δ imports from China)/worker	-0.658***	-0.055	-0.713***	0.240***	0.473**
	(0.102)	(0.187)	(0.214)	(0.075)	(0.194)
Δ housing price Predicted	1.536***	5.356***	6.892***	-1.232**	-5.661***
	(0.542)	(1.277)	(1.712)	(0.538)	(1.366)
College education					
Δ imports from China)/worker	-0.658***	0.308**	-0.350**	0.147***	0.202
	(0.150)	(0.143)	(0.152)	(0.050)	(0.134)
Δ housing price Predicted	1.520***	3.473***	4.994***	-0.838**	-4.156***
	(0.559)	(0.393)	(0.799)	(0.387)	(0.578)
No college education					
(Δ imports from China)/worker	-0.631***	-0.393	-1.024***	0.278**	0.745***
	(0.100)	(0.278)	(0.313)	(0.114)	(0.283)
Δ housing price Predicted	1.799***	7.568***	9.367***	-1.705**	-7.662***
	(0.620)	(2.254)	(2.749)	(0.742)	(2.229)
Reduction in Estimated Import Coefficient Magnitude					
Comparing with Table 2 Panel II:					
All education levels	7%	75%	23%	14%	27%
College education	7%	/	30%	15%	39%
No College education	8%	37%	22%	16%	24%

Reduced Form Results

▶ Robustness 1: Using Supply Elasticity

	(1) Mfg emp	(2) Non-mfg emp	(3) Total Emp	(4) Unemp	(5) NILF
All education levels					
(Δ imports from China)/worker	-0.677***	-0.041	-0.718***	0.238***	0.480**
	(0.101)	(0.220)	(0.245)	(0.075)	(0.227)
Δ housing price Predicted	2.282***	5.986***	8.268***	-1.152*	-7.116***
	(0.778)	(2.126)	(2.767)	(0.633)	(2.354)
College education					
(Δ imports from China)/worker	-0.684***	0.303*	-0.380**	0.136***	0.244
	(0.143)	(0.180)	(0.179)	(0.052)	(0.161)
Δ housing price Predicted	2.466***	3.215***	5.681***	-0.404	-5.277***
	(0.826)	(1.102)	(1.621)	(0.429)	(1.386)
No college education					
(Δ imports from China)/worker	-0.639***	-0.354	-0.993***	0.283**	0.710**
	(0.113)	(0.304)	(0.350)	(0.115)	(0.321)
Δ housing price Predicted	2.480***	9.719***	12.200***	-2.164**	-10.036***
	(0.864)	(3.223)	(3.940)	(0.924)	(3.343)
Reduction in Estimated Import Coefficient Magnitude					
Comparing with Table 3 Panel I:					
All education levels	8%	78%	22%	11%	26%
College education	8%	/	27%	7%	35%
No College education	9%	40%	23%	16%	26%

Reduced Form Results

- Robustness 2: Using Both IVs

	(1) Mfg emp	(2) Non-mfg emp	(3) Total Emp	(4) Unemp	(5) NILF
All education levels					
(Δ imports from China)/worker	-0.668***	0.025	-0.643***	0.217***	0.426**
	(0.107)	(0.196)	(0.222)	(0.080)	(0.203)
Δ housing price Predicted	1.666***	5.454***	7.120***	-1.248***	-5.871***
	(0.477)	(1.190)	(1.578)	(0.456)	(1.292)
College education					
(Δ imports from China)/worker	-0.680***	0.357**	-0.324**	0.116**	0.207
	(0.152)	(0.151)	(0.164)	(0.054)	(0.145)
Δ housing price Predicted	1.658***	3.382***	5.040***	-0.755**	-4.284***
	(0.485)	(0.439)	(0.721)	(0.314)	(0.556)
No college education					
(Δ imports from China)/worker	-0.624***	-0.279	-0.903***	0.262**	0.641**
	(0.106)	(0.290)	(0.316)	(0.121)	(0.286)
Δ housing price Predicted	1.938***	7.972***	9.910***	-1.858***	-8.052***
	(0.545)	(2.055)	(2.489)	(0.638)	(2.063)
Reduction in Estimated Import Coefficient Magnitude					
Comparing with Table 4 Panel I:					
All education levels	9%	/	30%	18%	35%
College education	9%	/	38%	21%	45%
No College education	11%	53%	30%	22%	33%

Reduced Form Results

▶ Robustness 3: Using IVs directly in second stage

	(1) Mfg emp	(2) Non-mfg emp	(3) Total Emp	(4) Unemp	(5) NILF
Panel I: Reduced Form without Housing					
All education levels					
Δ Other's imports from China)/worker	-0.405***	-0.125	-0.530***	0.159***	0.370***
	(0.047)	(0.120)	(0.114)	(0.034)	(0.115)
College education					
Δ Other's imports from China)/worker	-0.404***	0.116	-0.288***	0.099***	0.189**
	(0.059)	(0.099)	(0.090)	(0.029)	(0.083)
No college education					
Δ Other's imports from China)/worker	-0.393***	-0.358**	-0.751***	0.189***	0.562***
	(0.074)	(0.155)	(0.172)	(0.052)	(0.171)
Panel II: Reduced Form with Housing					
All education levels					
Δ Other's imports from China)/worker	-0.375***	0.018	-0.357***	0.124***	0.233**
	(0.051)	(0.115)	(0.100)	(0.039)	(0.105)
Structural break in housing price	2.865**	13.316***	16.181***	-3.504**	-12.677***
	(1.377)	(3.369)	(4.022)	(1.614)	(3.110)
Supply Elasticity	-0.242***	-0.412**	-0.654**	0.067	0.587
	(0.079)	(0.204)	(0.256)	(0.079)	(0.217)
College education					
Δ Other's imports from China)/worker	-0.381***	0.202**	-0.179**	0.068**	0.111
	(0.057)	(0.090)	(0.082)	(0.031)	(0.075)
Structural break in housing price	2.397	9.519***	11.916***	-2.804**	-9.111***
	(1.555)	(1.397)	(2.389)	(1.319)	(1.565)
Supply Elasticity	-0.277***	-0.146	-0.423**	-0.013	0.435***
	(0.099)	(0.122)	(0.169)	(0.056)	(0.150)
No college education					
Δ Other's imports from China)/worker	-0.351***	-0.146	-0.497***	0.147**	0.350**
	(0.076)	(0.154)	(0.150)	(0.057)	(0.157)
Structural break in housing price	3.769**	17.104***	20.872***	-4.174*	-16.699***
	(1.595)	(5.565)	(6.359)	(2.149)	(5.156)
Supply Elasticity	-0.243***	-0.795***	-1.038***	0.178	0.860***
	(0.080)	(0.288)	(0.342)	(0.119)	(0.282)
Reduction in Estimated Import Coefficient Magnitude					
All education levels	7 %	/	33%	22%	37%
College education	6 %	/	38%	31%	41%
No College education	11 %	59%	34%	22%	38%

Predicted Employment Changes

- ▶ Biggest difference comes from non-manufacturing industries.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		All Education			College Education			No College Education	
	Manuf.	Non-manuf.	Total	Manuf.	Non-manuf.	Total	Manuf.	Non-manuf.	Total
			Panel I: ADH Sample, 722 CZ						
Predicted Changes	-1.530	-0.457	-1.987	-0.820	0.233	-0.587	-0.687	-0.628	-1.315
			Panel II: Matched Sample, 249 CZ						
Predicted Changes	-1.882	-0.478	-2.359	-1.030	0.311	-0.718	-0.827	-0.696	-1.524
			Panel III: Matched Sample, with Break and Elasticity IVs						
Predicted Changes	-1.612	0.485	-1.127	-0.892	0.649	-0.242	-0.627	-0.072	-0.751
			Panel IV: Matched Sample, Predicted Housing using Break and Elasticity						
Predicted Changes	-1.715	0.064	-1.651	-0.941	0.494	-0.449	-0.738	-0.330	-1.068

Robustness: Interacting Boom Area with Import Exposure

Impact on Wages

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		All Education			College Education			No College Education	
	Manuf.	Non-manuf.	Total	Manuf.	Non-manuf.	Total	Manuf.	Non-manuf.	Total
				Panel I: ADH Sample					
(Δ imports from China)/worker	0.151	-0.761***	-0.759***	0.458	-0.743**	-0.757***	-0.101	-0.822***	-0.814***
	(0.482)	(0.261)	(0.253)	(0.340)	(0.297)	(0.308)	(0.369)	(0.246)	(0.236)
				Panel II: Matched Sample					
(Δ imports from China)/worker	0.077	-0.932**	-0.947**	0.560	-1.117**	-1.116**	-0.243	-0.648	-0.734*
	(0.734)	(0.418)	(0.394)	(0.475)	(0.451)	(0.450)	(0.581)	(0.430)	(0.412)
			Panel III: Matched Sample, with Break and Elasticity IVs						
(Δ imports from China)/worker	0.566	-0.233	-0.289	0.814*	-0.508	-0.550	0.578	0.386	0.258
	(0.773)	(0.341)	(0.362)	(0.468)	(0.407)	(0.439)	(0.664)	(0.432)	(0.435)
Δ housing price index	9.008***	9.735***	9.432***	5.200***	8.543***	8.136***	12.714***	14.518***	14.172***
	(1.570)	(1.145)	(1.188)	(1.399)	(1.337)	(1.415)	(1.894)	(1.301)	(1.382)
Reduction in Coefficient	/	75%	69%	/	55%	51%	/	/	/
			Panel IV: Matched Sample, Predicted Housing using Break and Elasticity						
(Δ imports from China)/worker	0.430	-0.556*	-0.582*	0.765*	-0.788**	-0.801**	0.251	-0.087	-0.186
	(0.672)	(0.306)	(0.314)	(0.432)	(0.366)	(0.391)	(0.507)	(0.300)	(0.301)
Δ housing price Predicted	9.098***	9.685***	9.401***	5.277***	8.503***	8.110***	12.728***	14.451***	14.121***
	(1.688)	(1.290)	(1.355)	(1.368)	(1.400)	(1.474)	(2.277)	(1.708)	(1.825)
Reduction in Coefficient	/	40%	39%	/	29%	28%	/	87%	75%

- Controlling for housing price changes,
  - college workers saw pay rise in manuf. sector, and pay drop in non-manuf. sector
  - noncollege workers: impacts are insignificant

Extending to 2000-2011

- China import penetration becomes phenomenal after 2000
- US housing boom and bust also happened after 2000
- Two periods: 2000-2007; 2007-2011

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		All Education			College Education			No College Education	
	Manuf.	Non-manuf.	Total	Manuf.	Non-manuf.	Total	Manuf.	Non-manuf.	Total
Panel I: Boom and Bust Sample, 2000-2011									
(Δ imports from China)/worker	-0.473***	0.757**	0.283	-0.349**	0.609**	0.260	-0.503**	0.812	0.309
	(0.168)	(0.370)	(0.436)	(0.167)	(0.275)	(0.289)	(0.225)	(0.517)	(0.585)
Panel II: Boom and Bust Sample, with Break and Elasticity IVs									
(Δ imports from China)/worker	-0.415**	0.609**	0.195	-0.299	0.477**	0.177	-0.443	0.635	0.192
	(0.210)	(0.252)	(0.359)	(0.194)	(0.206)	(0.245)	(0.276)	(0.395)	(0.456)
Δ housing price index	-0.739	4.011***	3.271***	-0.770*	2.994***	2.224***	-0.763	5.966***	5.203***
	(0.570)	(0.736)	(0.843)	(0.427)	(0.604)	(0.699)	(0.951)	(1.230)	(1.207)
Reduction in Coefficient	12%	20%	31%	14%	22%	32%	12%	22%	38%
Panel III: Boom and Bust Sample, Predicted Housing using Break and Elasticity									
(Δ imports from China)/worker	-0.452**	0.635*	0.183	-0.326*	0.519**	0.192	-0.481**	0.630	0.149
	(0.177)	(0.334)	(0.417)	(0.173)	(0.256)	(0.277)	(0.238)	(0.475)	(0.554)
Δ housing price Predicted	-0.710	4.024***	3.314***	-0.751**	2.982***	2.231**	-0.733	6.028***	5.295***
	(0.503)	(0.967)	(1.117)	(0.374)	(0.869)	(0.929)	(0.885)	(1.266)	(1.460)
Reduction in Coefficient	4%	16%	35%	7%	15%	26%	4%	22%	49%

Conclusion

- The *omitted housing boom* matters in understanding the large negative employment effect of China imports
  - Including the local housing price changes reduces the effect of import exposure on employment by more than one-half.
  - The reduction is still substantial (30%) even when we take into account the response of housing prices to imports.
- Job loss due to Chinese import competition was partly offset by the job gains in the non-manuf. sector for college educated workers
  - Wang, Wei, Yu & Zhu (2018) found job gain in services outnumber the loss in manuf., using an Input-Output approach.

Interacting Boom Area with Import Exposure

- Boom Area $= 1$ if the czone is one of the top $1/3$ in housing price increases.

	(1) Manuf. emp	(2) Non-mfg emp	(3) Total emp	(4) Unemp	(5) NILF
Panel I: All education level					
(Δ imports from China)/worker	-0.714***	-0.368**	-1.082***	0.288***	0.794***
	(0.128)	(0.170)	(0.273)	(0.084)	(0.213)
Δ import exposure $\times$ top $1/3$ housing boom	0.194*	0.690***	0.884***	-0.173*	-0.711***
	(0.104)	(0.234)	(0.295)	(0.099)	(0.233)
Panel II: College education					
(Δ imports from China)/worker	-0.695***	0.097	-0.598***	0.160***	0.439***
	(0.155)	(0.097)	(0.184)	(0.052)	(0.161)
Δ import exposure $\times$ top $1/3$ housing boom	0.156	0.447***	0.604***	-0.111	-0.493***
	(0.106)	(0.134)	(0.159)	(0.073)	(0.113)
Panel III: No college education					
(Δ imports from China)/worker	-0.715***	-0.853***	-1.568***	0.373***	1.194***
	(0.120)	(0.294)	(0.373)	(0.121)	(0.284)
Δ import exposure $\times$ top $1/3$ housing boom	0.246**	0.980***	1.226***	-0.245*	-0.981***
	(0.122)	(0.349)	(0.445)	(0.135)	(0.359)

- In housing boom areas, import competition reduces manuf. employment, but to a lesser extent than areas w/o boom.

Back to Quantify