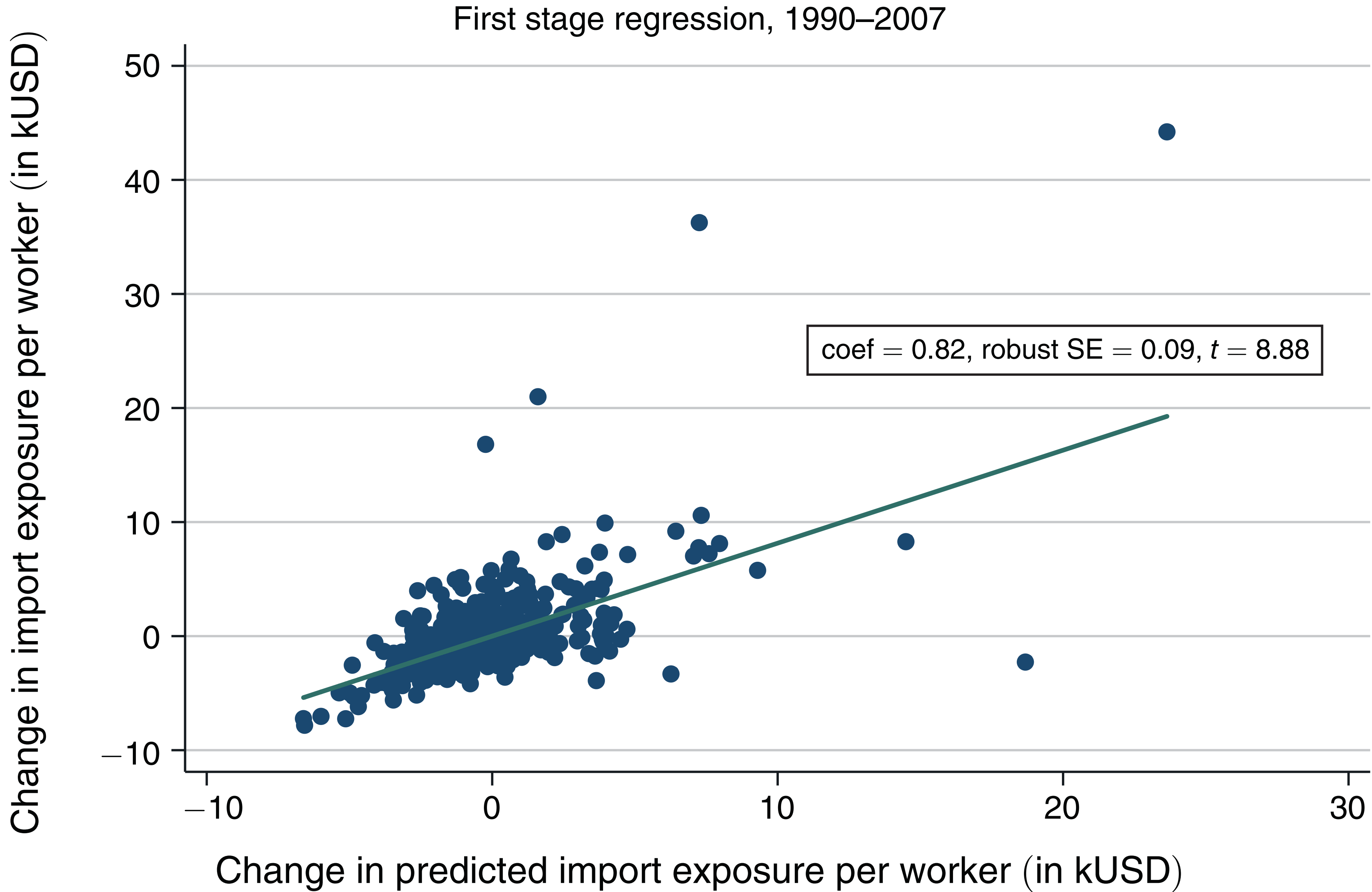FIGURE 1. IMPORT PENETRATION RATIO FOR US IMPORTS FROM CHINA (*left scale*), AND SHARE OF US WORKING-AGE POPULATION EMPLOYED IN MANUFACTURING (*right scale*)

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	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%

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

Panel A. 2SLS first stage regression, full sample

First stage regression, 1990–2007

coef = 0.82, robust SE = 0.09, t = 8.88

Panel B. OLS reduced form regression, full sample

Change in manufacturing emp by CZ, 1990–2007

coef = −0.34, robust SE = 0.07, t = −4.77

Change % manufacturing emp in working-age pop.

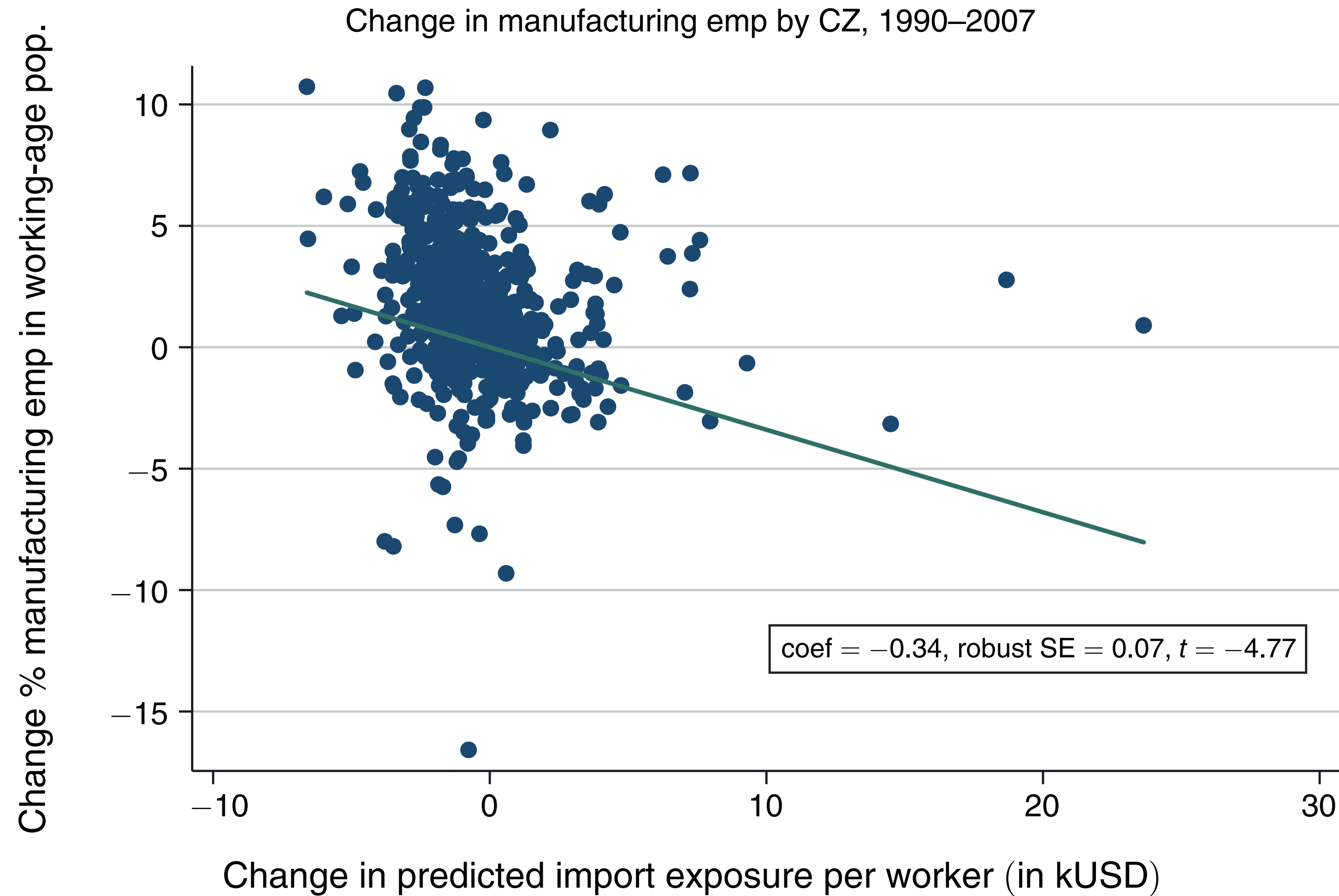Change in predicted import exposure per worker (in kUSD)

FIGURE 2. CHANGE IN IMPORT EXPOSURE PER WORKER AND DECLINE OF MANUFACTURING EMPLOYMENT:
ADDED VARIABLE PLOTS OF FIRST STAGE AND REDUCED FORM ESTIMATES

Notes: $N = 722$. The added variable plots control for the start of period share of employment in manufacturing industries. Regression models are weighted by start of period CZ share of national population.

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 (1)	2000–2007 (2)	1990–2007 (3)	1970–1980 (4)	1980–1990 (5)	1970–1990 (6)
(Δ current period imports from China to US)/worker	−0.89*** (0.18)	−0.72*** (0.06)	−0.75*** (0.07)			
(Δ future period imports from China to US)/worker				0.43*** (0.15)	−0.13 (0.13)	0.15 (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.

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

Notes: $N = 1{,}444$ (722 commuting zones × 2 time periods). All regressions include a constant and a dummy for the 2000–2007 period. First stage estimates in panel II also include the control variables that are indicated in the corresponding columns of panel I. Routine occupations are defined such that they account for 1/3 of US employment in 1980. The offshorability index variable is standardized to mean of 0 and standard deviation of 10 in 1980. Robust standard errors in parentheses are clustered on state. Models are weighted by start of period CZ share of national 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 (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

Notes: $N = 1,444$ (722 CZs × two time periods). All regressions include a constant and a dummy for the 2000–2007 period. Models in panel B and C also include census division dummies while panel C adds the full vector of control variables from column 6 of Table 3. Robust standard errors in parentheses are clustered on state. Models are weighted by start of period commuting zone share of national population.

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)	

Notes: N = 1,444 (722 CZs × two time periods). All statistics are based on working age individuals (age 16 to 64). The effect of import exposure on the overall employment/population ratio can be computed as the sum of the coefficients for manufacturing and nonmanufacturing employment; this effect is highly statistically significant ($p \leq 0.01$) in the full sample and in all reported subsamples. All regressions include the full vector of control variables from column 6 of Table 3. Robust standard errors in parentheses are clustered on state. Models are weighted by start of period CZ share of national population.

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

Notes: $N = 1{,}444$ (722 CZs × two time periods). All regressions include the full vector of control variables from column 6 of Table 3. Robust standard errors in parentheses are clustered on state. Models are weighted by start of period CZ share of national population.

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	−4.231***	−3.992***	−4.493***	−0.274	0.291	−1.037
to US)/worker	(1.047)	(1.181)	(1.243)	(0.651)	(0.590)	(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	0.150	0.458	−0.101	−0.761***	−0.743**	−0.822***
to US)/worker	(0.482)	(0.340)	(0.369)	(0.260)	(0.297)	(0.246)
R^2	0.22	0.21	0.33	0.60	0.54	0.51

Notes: $N = 1,444$ (722 CZs × two time periods). All regressions include the full vector of control variables from column 6 of Table 3. Robust standard errors in parentheses are clustered on state. Models are weighted by start of period CZ share of national population.

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

Notes: $N = 1{,}444$ (722 CZs × two time periods), except $N = 1{,}436$ in column 2, panel A. Results for TAA benefits in column 2 are based on state-level data that is allocated to CZs in proportion to unemployment benefits. Unemployment benefits in column 3 include state benefits and federal unemployment benefits for civilian federal employees, railroad employees, and veterans. Medical benefits in column 6 consist mainly of Medicare and Medicaid. Federal income assistance in column 7 comprises the SSI, AFDC/TANF, and SNAP programs while education and training assistance in column 8 includes such benefits as interest payments on guaranteed student loans, Pell grants, and Job Corps benefits. The transfer categories displayed in columns 2 to 8 account for over 85 percent of total individual transfer receipts. All regressions include the full vector of control variables from column 6 of Table 3. Robust standard errors in parentheses are clustered on state. Models are weighted by start of period CZ share of national population.

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$)
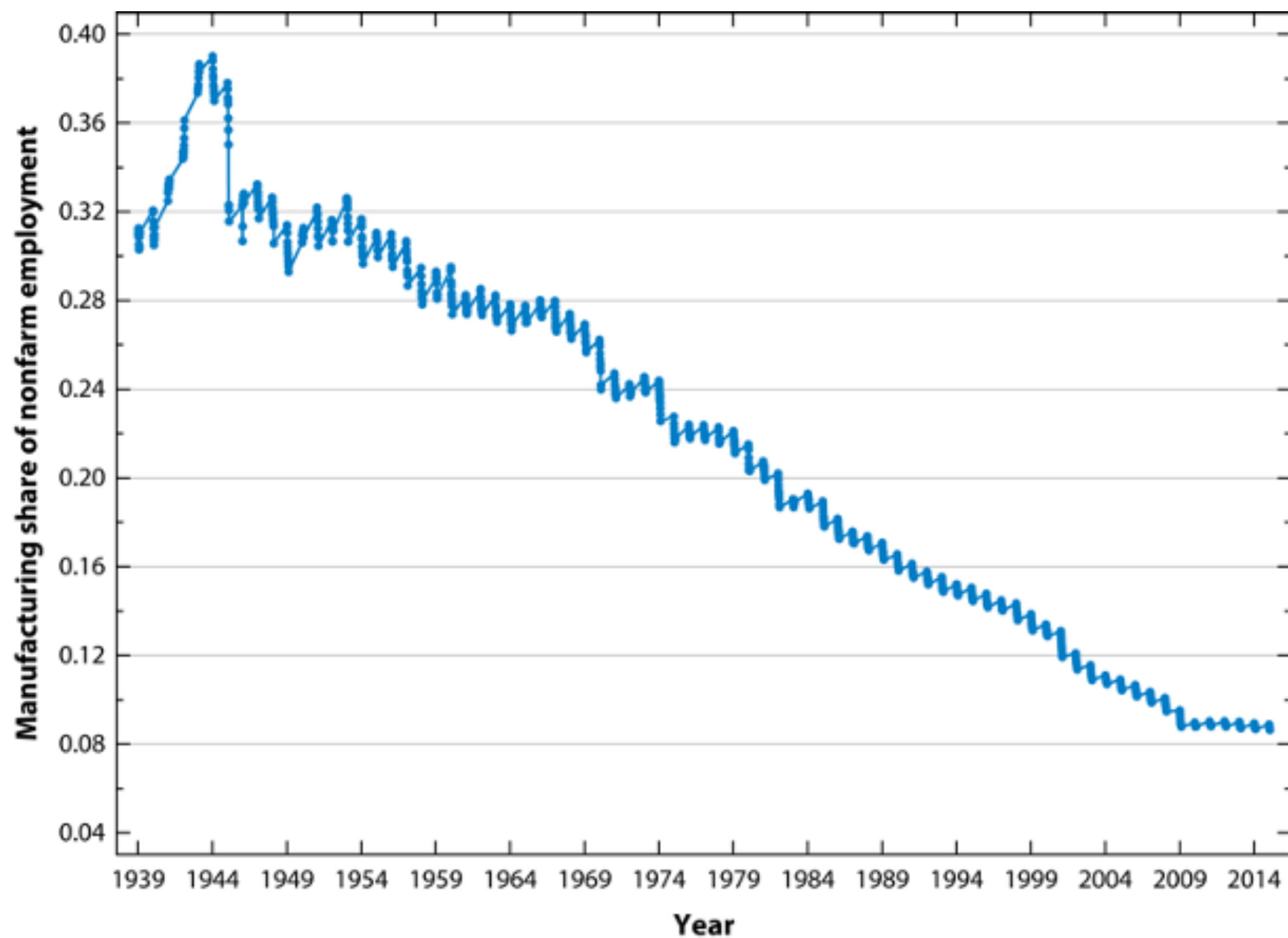
| | Average HH income/adult by source | | | | Median HH income/adult | |
| | Total | Wage-salary | Business invest | SocSec + AFDC | Total | Wage-salary |
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Percent change						
(Δ imports from China	−1.48***	−2.14***	−0.51	2.12***	−1.73***	−2.32***
to US)/worker	(0.36)	(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	−492.6***	−549.3***	40.1	17.3***	−439.9***	−476.5***
to US)/worker	(160.4)	(169.4)	(116.7)	(4.3)	(112.7)	(122.2)
R^2	0.63	0.40	0.72	0.51	0.49	0.48

Notes: $N = 1,444$ (722 CZs × 2 time periods). Per capita household income is defined as the sum of individual incomes of all working-age household members (age 16–64), divided by the number of household members of that age group. Total income comprises wage and salary income; self-employment, business, and investment income; social security and welfare income; and income from other nonspecified sources. Social security and welfare income in column 4 includes social security retirement, disability, and supplementary income, aid to families with dependent children (AFDC), and general assistance. All regressions include the full vector of control variables from column 6 of Table 3. Robust standard errors in parentheses are clustered on state. Models are weighted by start of period CZ share of national population.
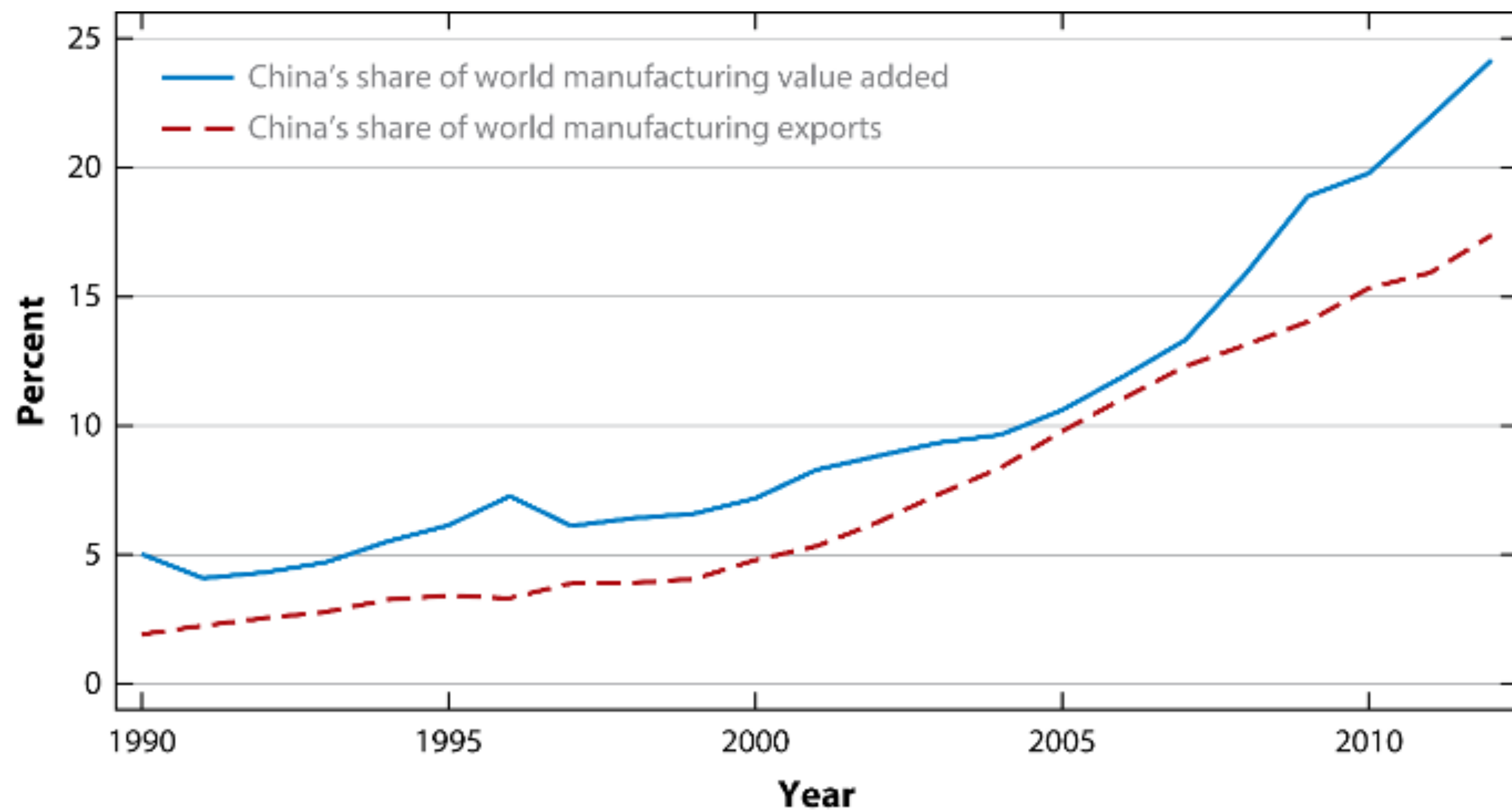
TABLE 10—ADDING EXPOSURE TO INDIRECT IMPORT COMPETITION
OR EXPOSURE TO NET IMPORTS, 1990–2007: 2SLS AND OLS ESTIMATES
Dependent variables: Ten-year equivalent changes of indicated variables

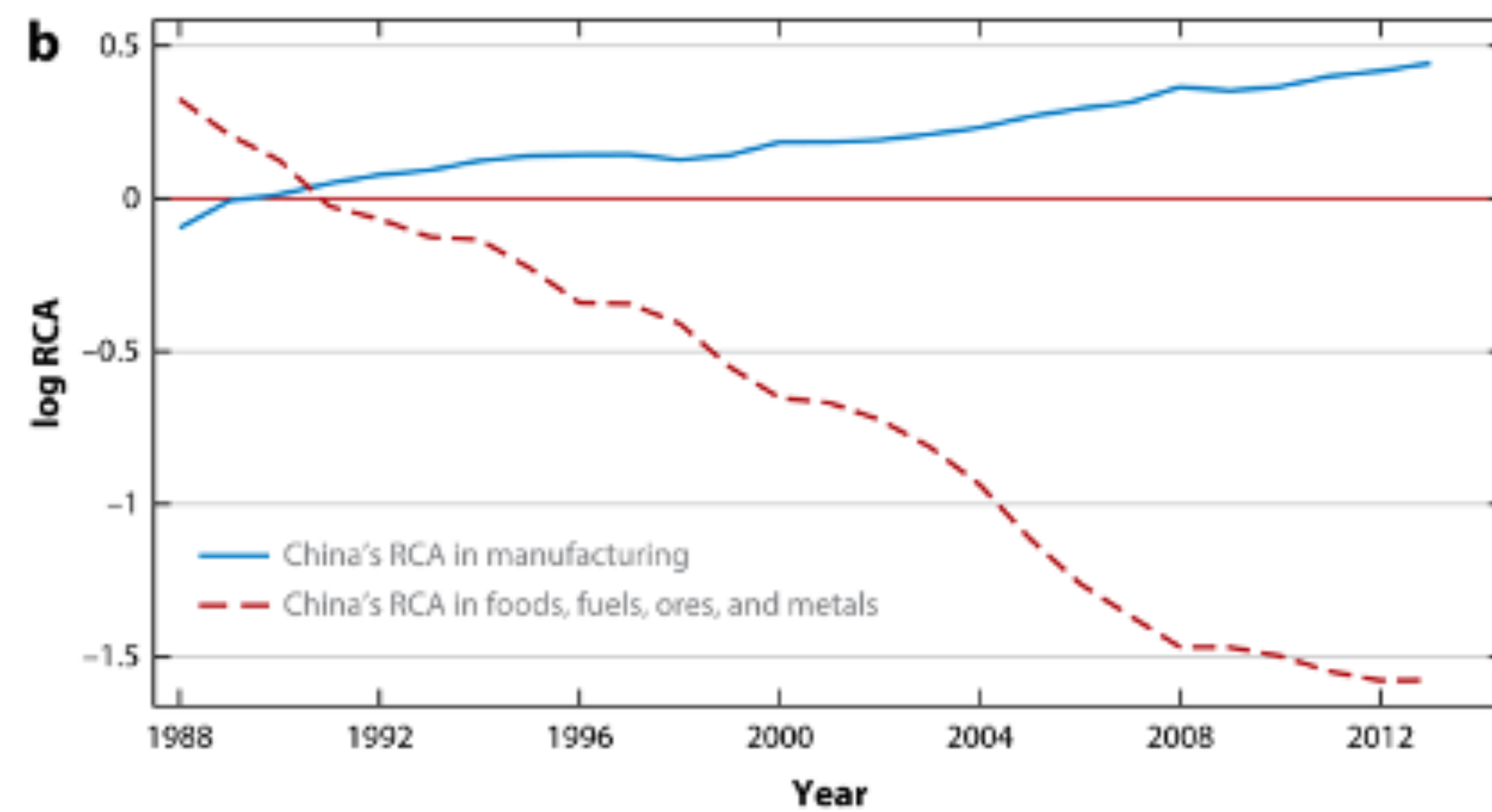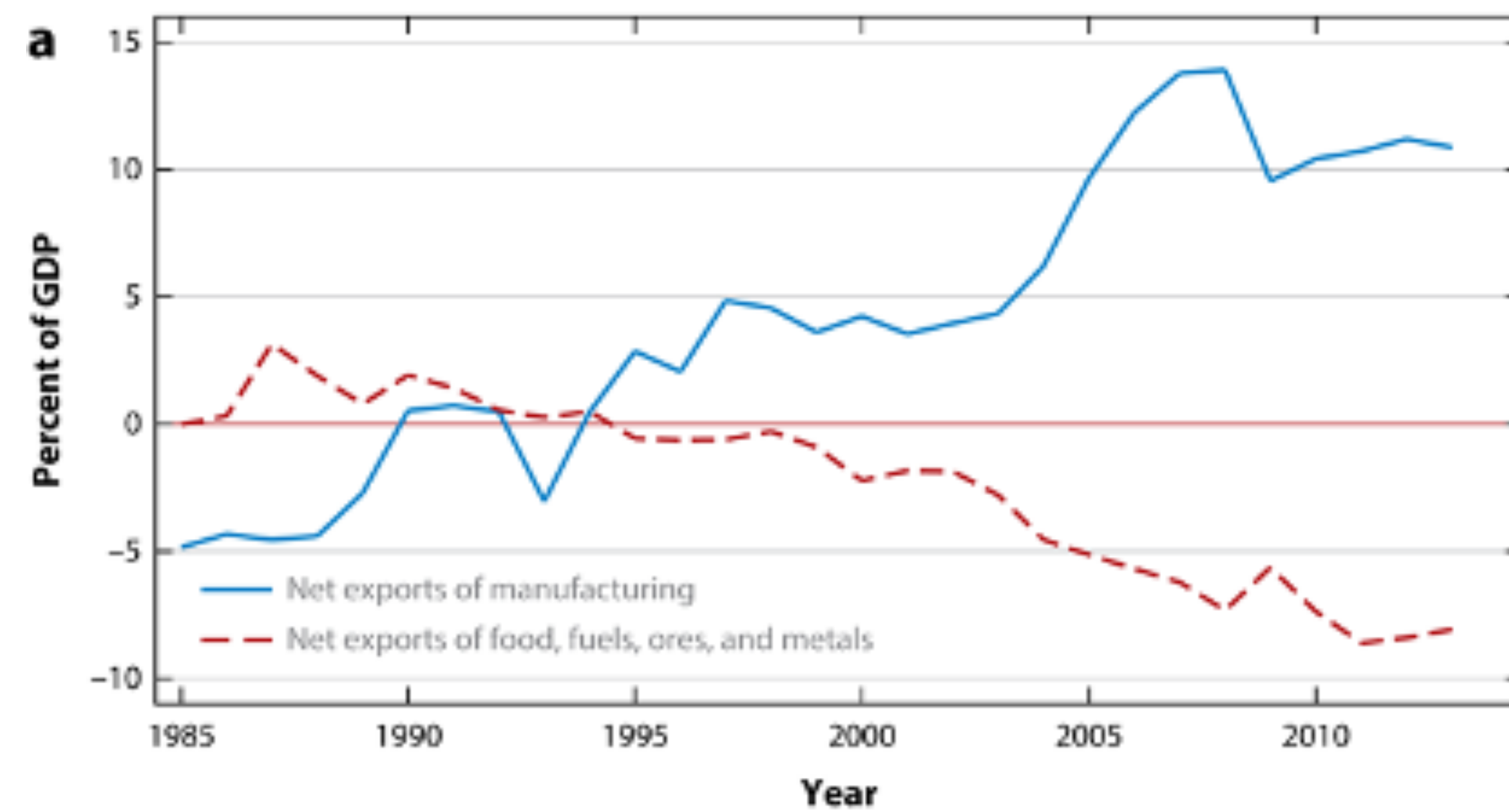|	I. Employment/pop		II. Log wages		III. Transfers, wage inc	
	Mfg (1)	Nonmfg (2)	Mfg (3)	Nonmfg (4)	log transfers (5)	Avg log HH wage inc (6)
Panel A. Baseline results: Gross Chinese imports per worker (2SLS)						
(Δ imports from China to US)/	−0.60***	−0.18	0.15	−0.76***	1.01***	−2.14***
worker	(0.10)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

Notes: $N = 1{,}444$ (722 CZs × 2 time periods). The estimates in panel A correspond to the main results of the preceding Tables 5, 7, 8, and 9. The mean (and standard deviation) of the trade exposure variables is 1.88 (1.75) in panel A; 2.28 (2.17) in panel B; 1.46 (1.48) in panel C; 1.58 (1.66) in panel D; 1.40 (1.79) in panel E; and 1.50 (1.48) in panel F. The first stage coefficient estimate is 0.61 (s.e. 0.07) for the models in panel B; 0.72 (0.09) for the final goods import instrument and −1.05 (0.25) for the intermediate inputs import instrument in panel C; 0.70 (0.10) for the import instrument and −0.32 (0.08) for the export instrument in panel D; and 0.72 (0.07) for the import instrument and −0.28 (0.06) for the export instrument in panel F. All regressions include the full vector of control variables from column 6 of Table 3. Robust standard errors in parentheses are clustered on state. Models are weighted by start of period CZ share of national population.
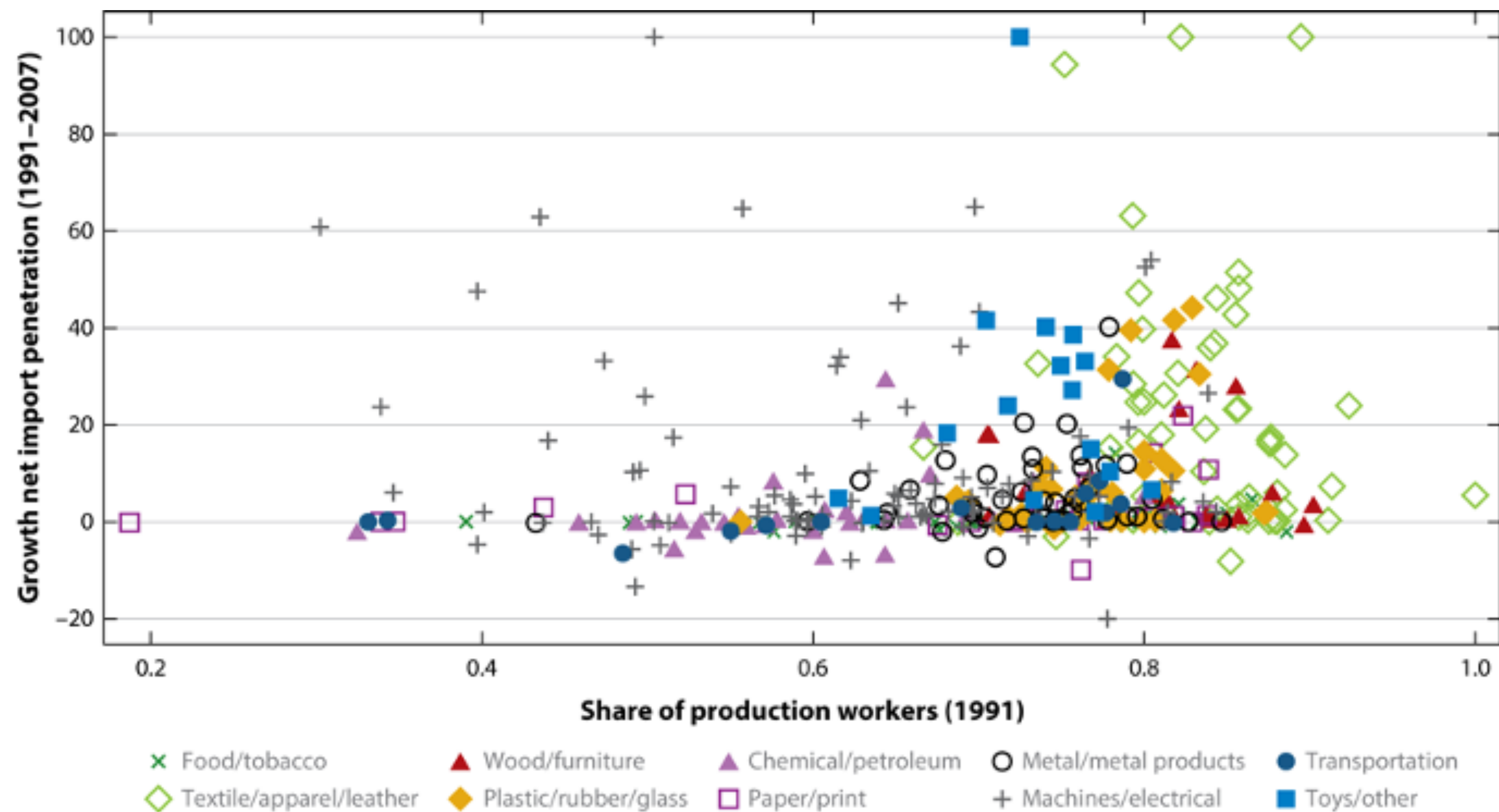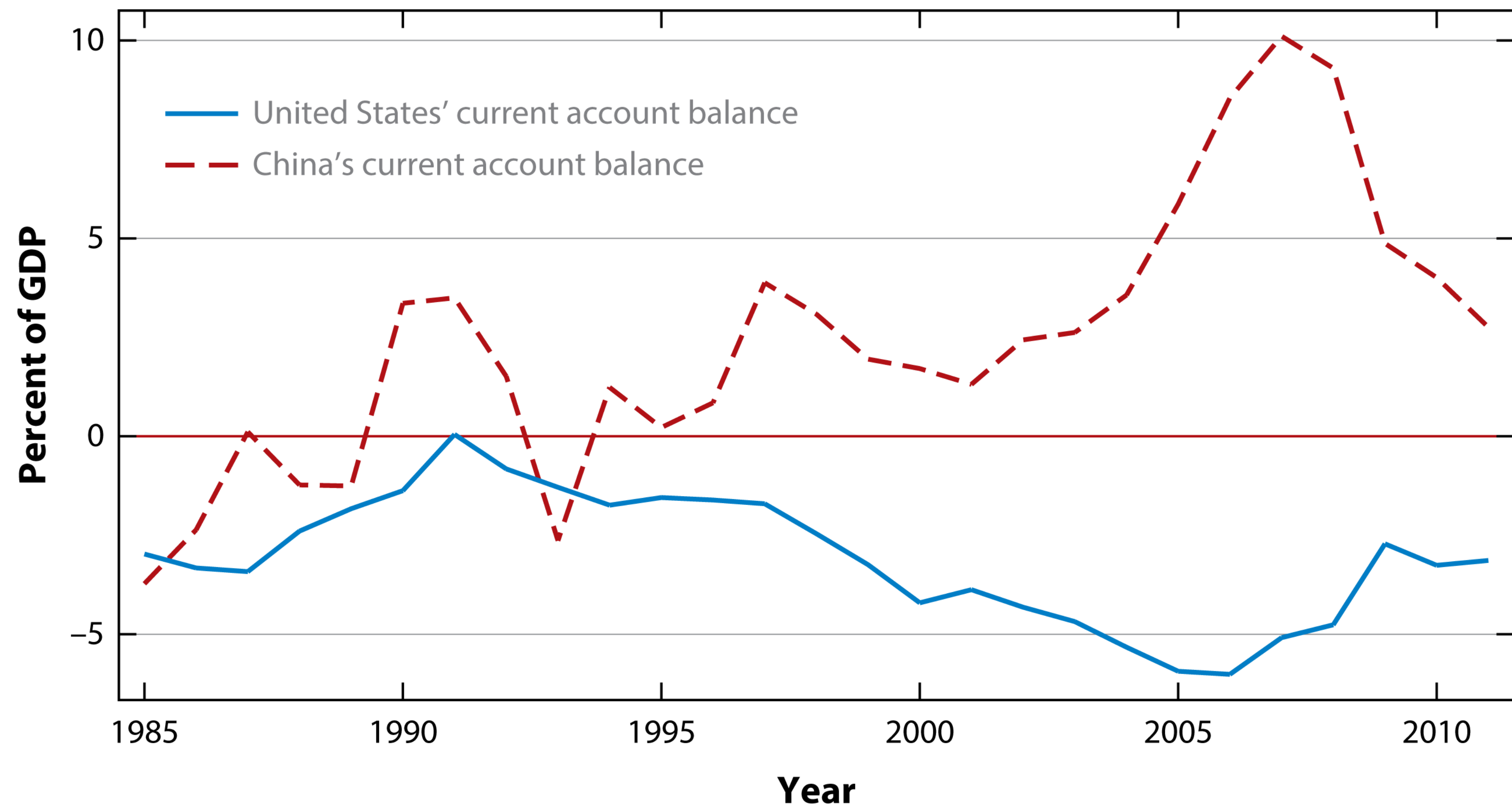
Autor DH, et al. 2016.
Annu. Rev. Econ. 8:205–40

China's share of world manufacturing value added

China's share of world manufacturing exports

Autor DH, et al. 2016.
Annu. Rev. Econ. 8:205–40

a

Net exports of manufacturing
Net exports of food, fuels, ores, and metals

b

China's RCA in manufacturing
China's RCA in foods, fuels, ores, and metals

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Y-axis: Growth net import penetration (1991–2007)

X-axis: Share of production workers (1991)

Legend:
- × Food/tobacco
- ◇ Textile/apparel/leather
- ▲ Wood/furniture
- ◆ Plastic/rubber/glass
- ▲ Chemical/petroleum
- □ Paper/print
- ○ Metal/metal products
- + Machines/electrical
- ● Transportation
- ■ Toys/other

United States' current account balance
China's current account balance

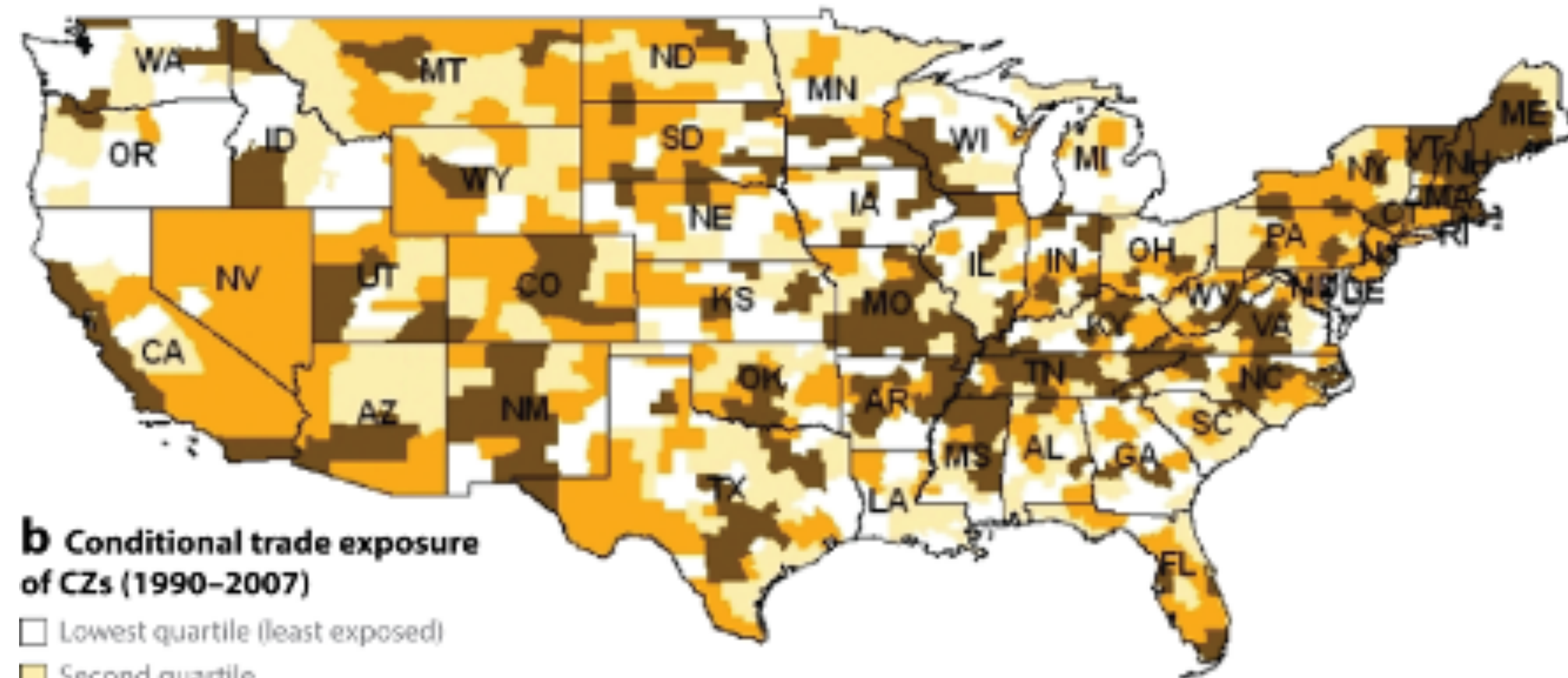Percent of GDP

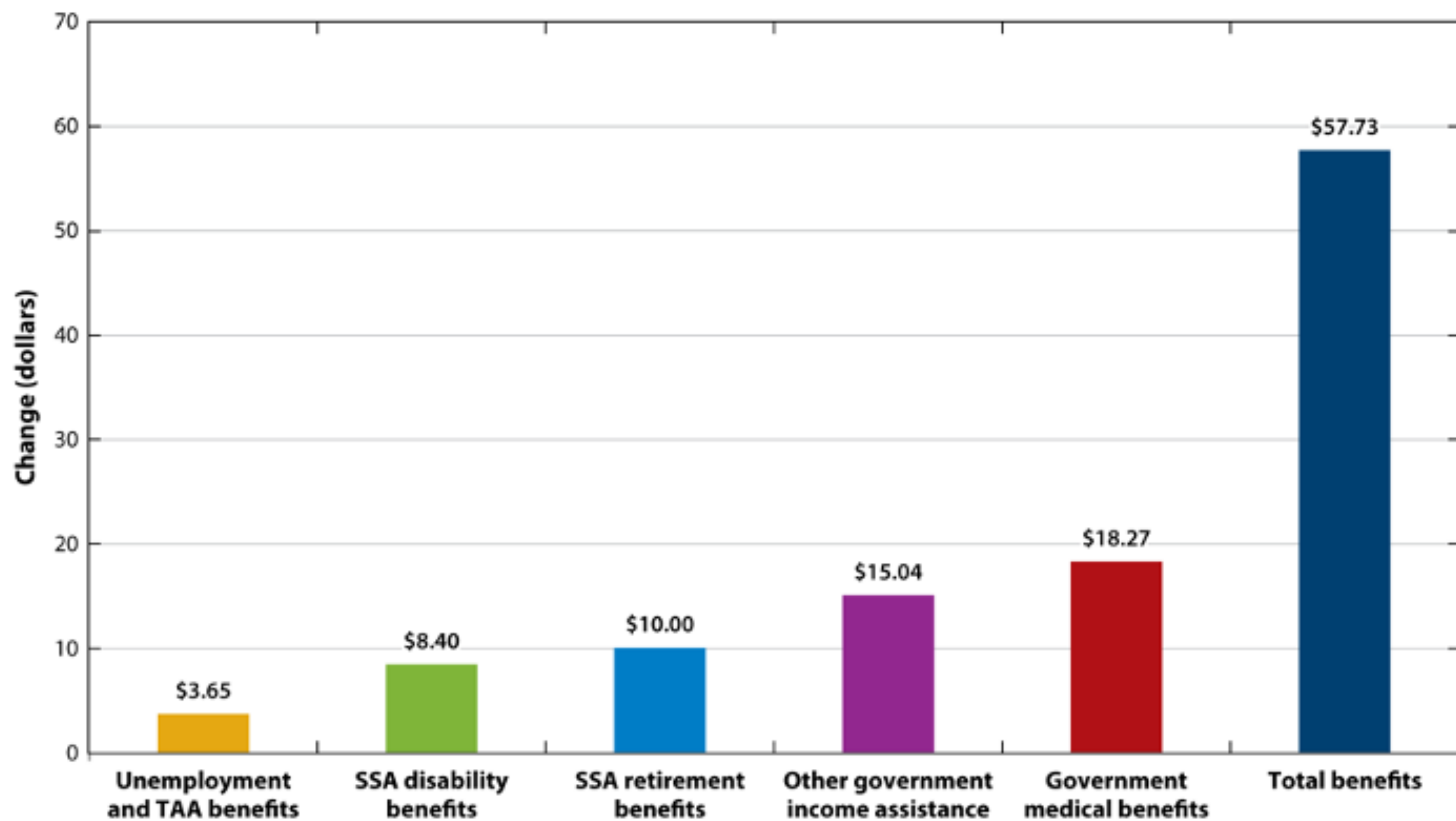Year

Autor DH, et al. 2016.
Annu. Rev. Econ. 8:205–40

a Unconditional trade exposure of CZs (1990–2007)

☐ Lowest quartile (least exposed)
☐ Second quartile
☐ Third quartile
☐ Highest quartile (most exposed)

b Conditional trade exposure of CZs (1990–2007)

☐ Lowest quartile (least exposed)
☐ Second quartile
☐ Third quartile
☐ Highest quartile (most exposed)

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Legend:
- ● Conditional correlation in trade exposure between 1991 firm and firm in indicated year
- ■ Counterfactual with zero trade exposure in all firms except 1991 firm

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