The Secular Stagnation of Investment?

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Investment and Operating Profits

- Net investment rate

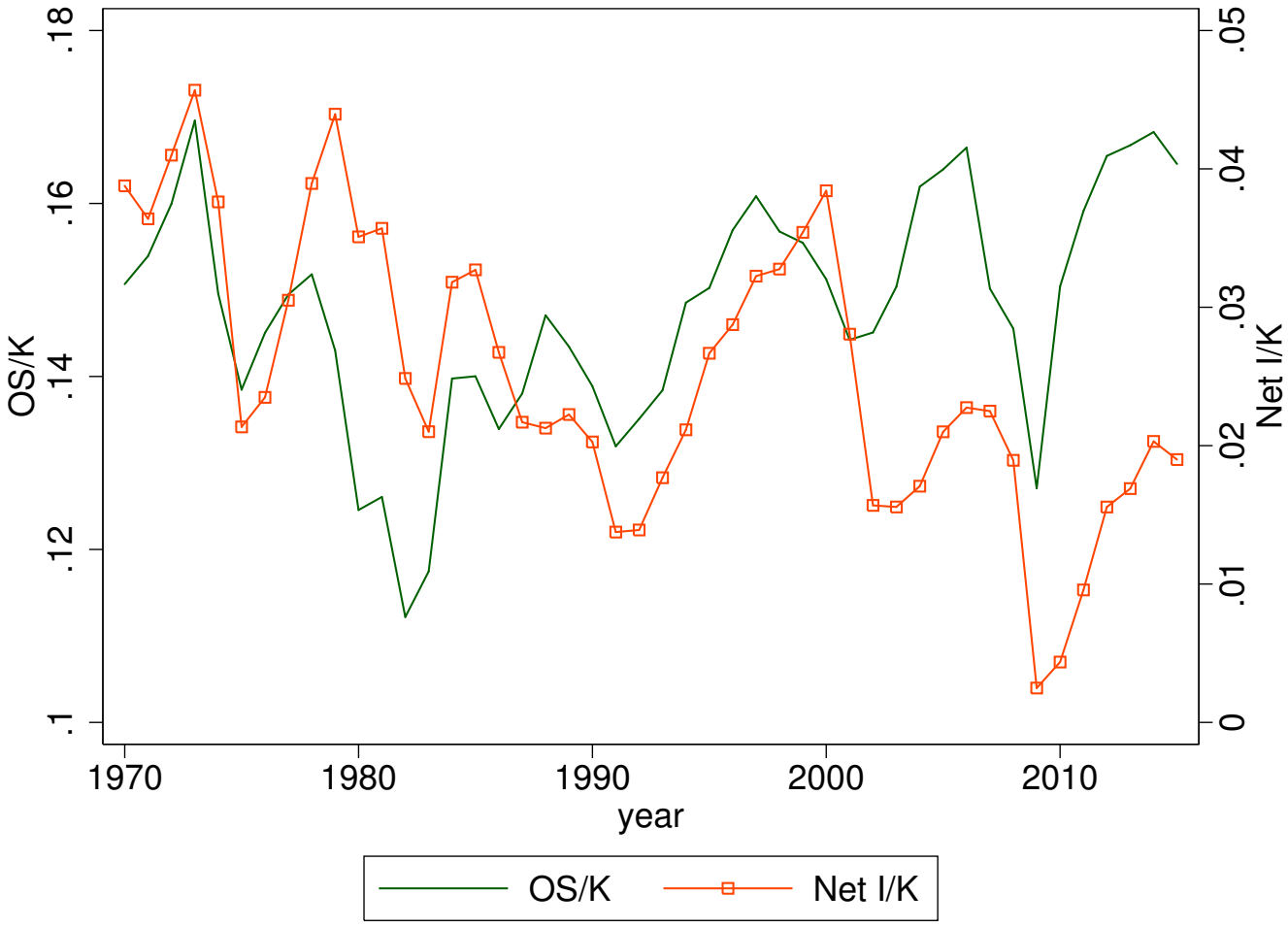
$$x_t \equiv \frac{I_t}{K_t} - \delta_t = \frac{K_{t+1} - K_t}{K_t}$$

- Net operating return

$$\frac{P_t Y_t - \delta_t P_t^k K_t - W_t N_t - T_t^y}{P_t^k K_t}$$

Fact #1: Business is Profitable but does not Invest

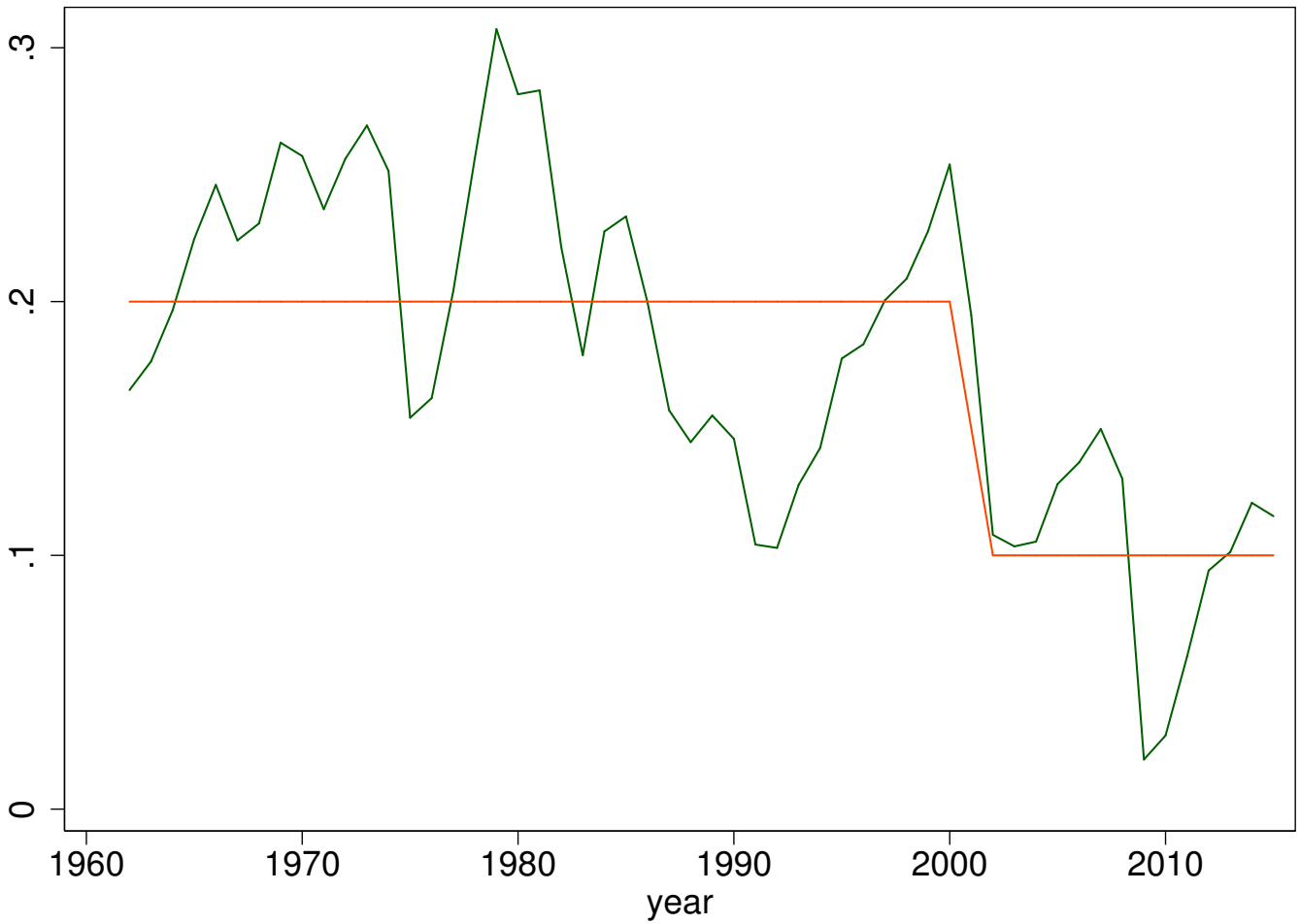
Figure: x_t and operating return



Notes: Annual data for Non financial Business sector (Corporate and Non corporate).

Fact #1: Business is Profitable but does not Invest

Figure: x_t / Operating Surplus



Notes: Annual data for Non financial Business sector (Corporate and Non corporate).

Q-Theory

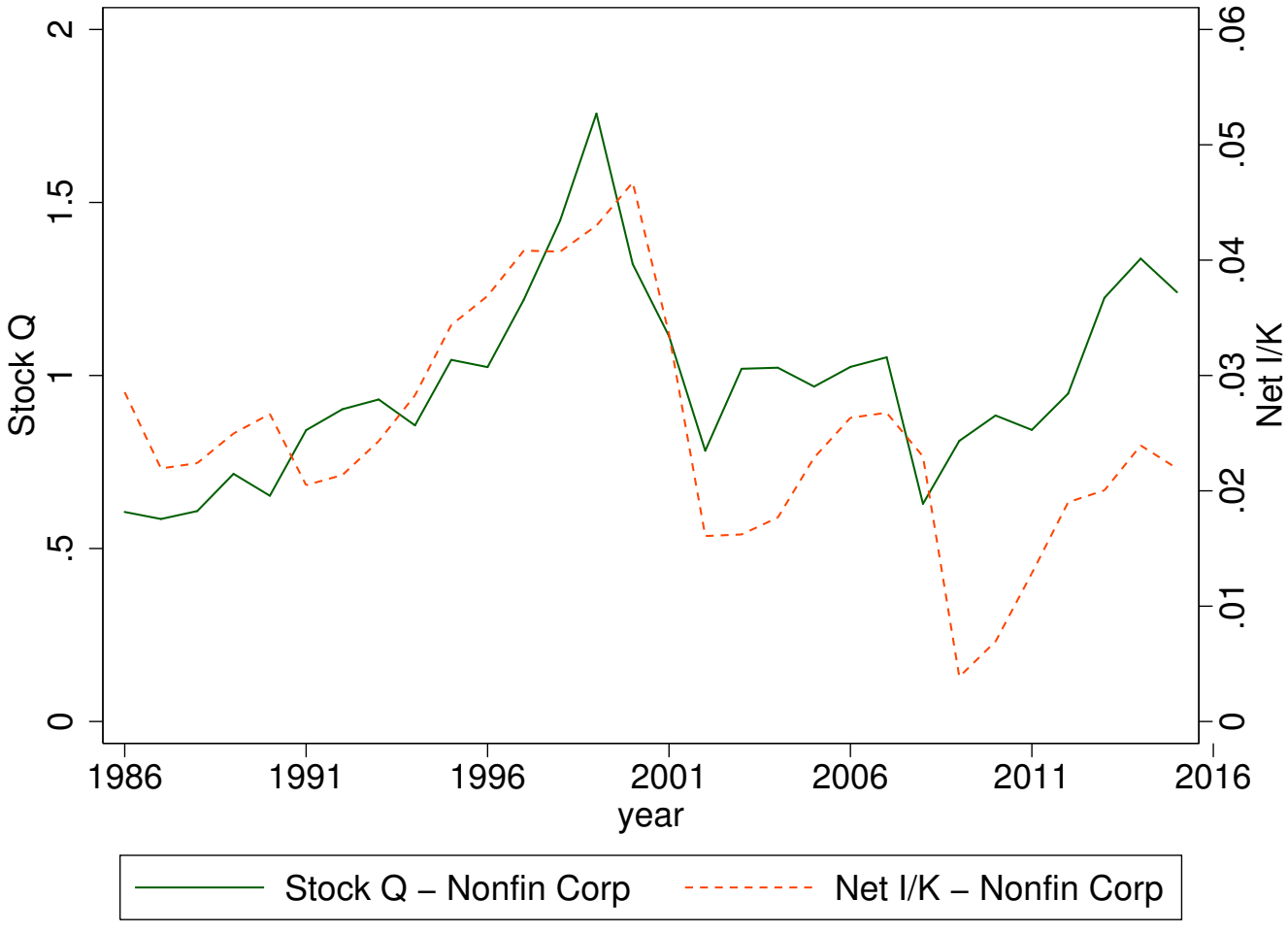
- FOC

$$x_t = \frac{1}{\gamma}(Q_t - 1)$$

- Tobin's Q

$$Q_t \equiv \frac{\mathbb{E}_t\left[\Lambda_{t+1} V_{t+1}\right]}{P_t^k K_{t+1}}$$

Fact #2: I/K is low while Q is High



Note: Annual data. Q for Non Financial Corporate sector from Financial Accounts.

Theory

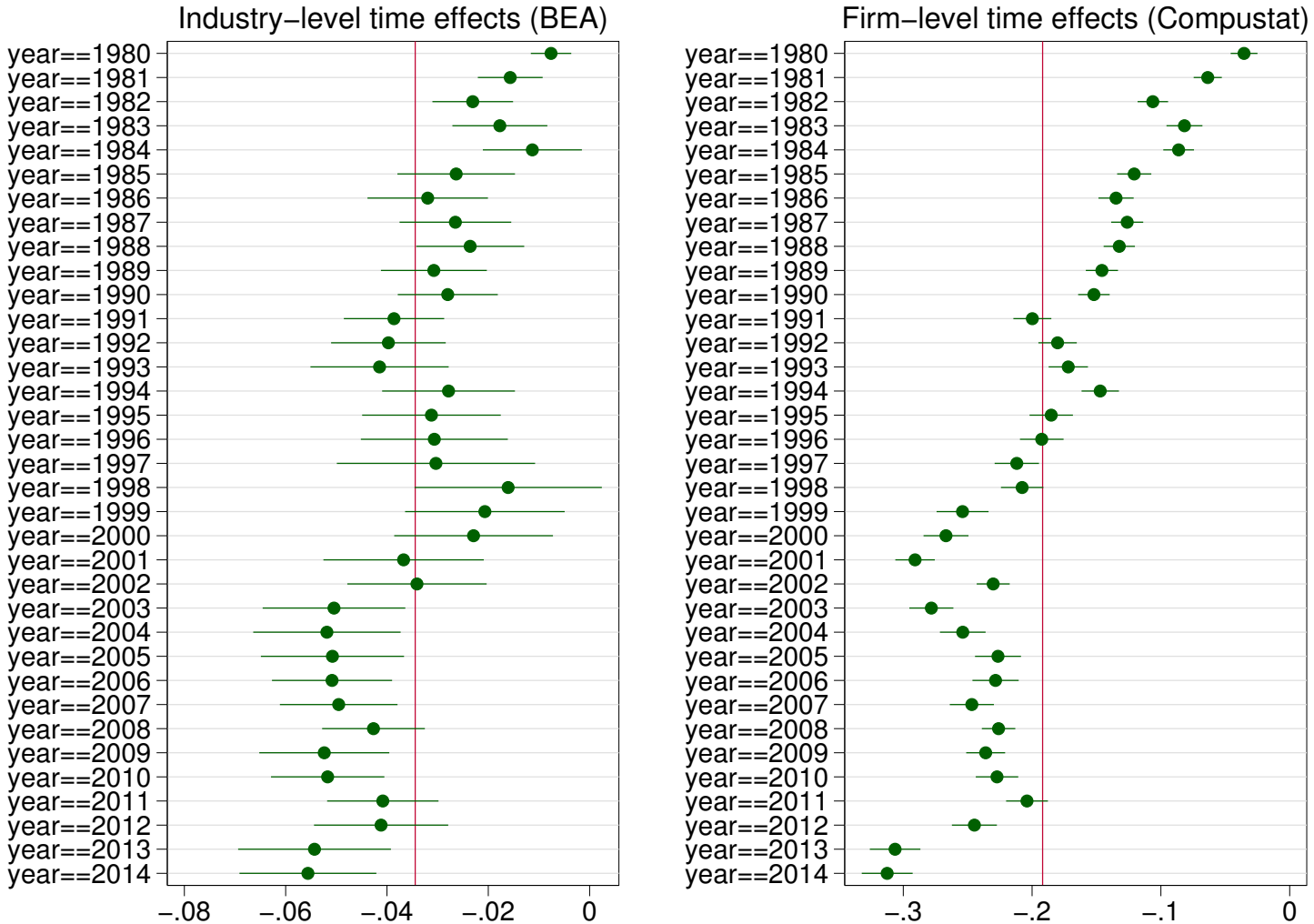
- Theories that predict low I/K *because* they predict low Q
  - E.g.: spreads & risk premia, low expected growth, low profits, regulatory uncertainty...
  - Solve the wrong puzzle: Q is high, but I/K is low.

- Theories that predict a *gap* between Q and I/K
  - gap between average Q and marginal Q
  - gap between Q and manager's objective function

Gutiérrez & Philippon (2016)

- Use industry and firm level data

Fact #3: Gap Starts around 2000



Note: Time fixed effects from errors-in-variables panel regressions of de-meaned net investment on median/firm-level Q. Industry investment data from BEA; Q and firm investment from Compustat.

Fact #4: What Does (Not) Explain Investment Gap in Micro Data

- Gutiérrez & Philippon (2016a): industry and firm level data
- Investment gap *NOT* explained by:
  - credit constraints, safety premium, globalization, regulation,...
  - Intangibles relevant, but not main explanation
- But gap well explained by:
  - Competition (lack of)
  - Governance

Two measures of concentration

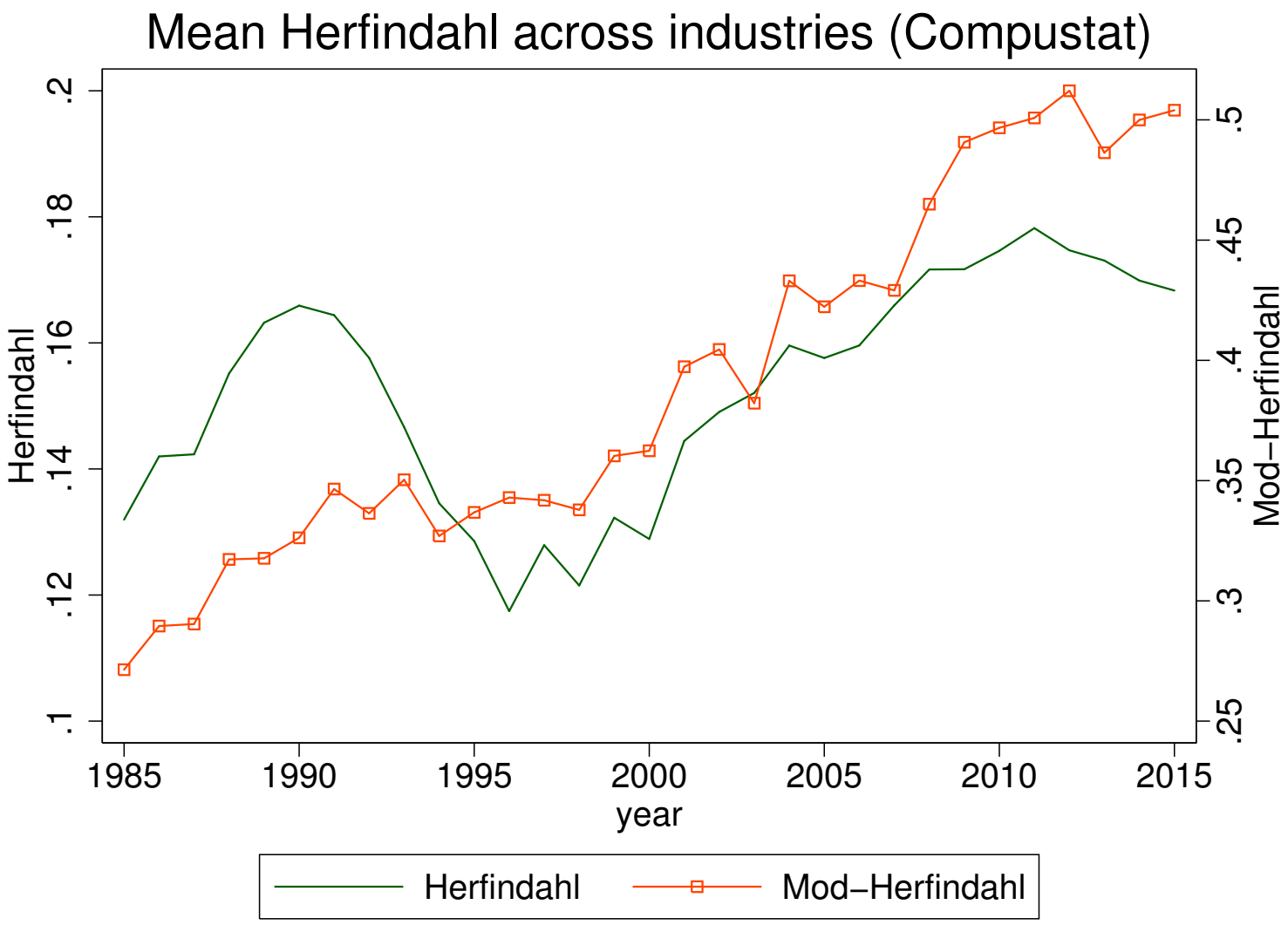
- Traditional Herfindahl + Common ownership adjustment (Azar, et. al. (2016))

$$Mod - HHI = \sum_j s_j^2 + \sum_j \sum_{k \neq j} s_j s_k \frac{\sum_i \beta_{ij} \beta_{ik}}{\sum_i \beta_{ij}^2}$$

$$= HHI + HHI^{adj}$$

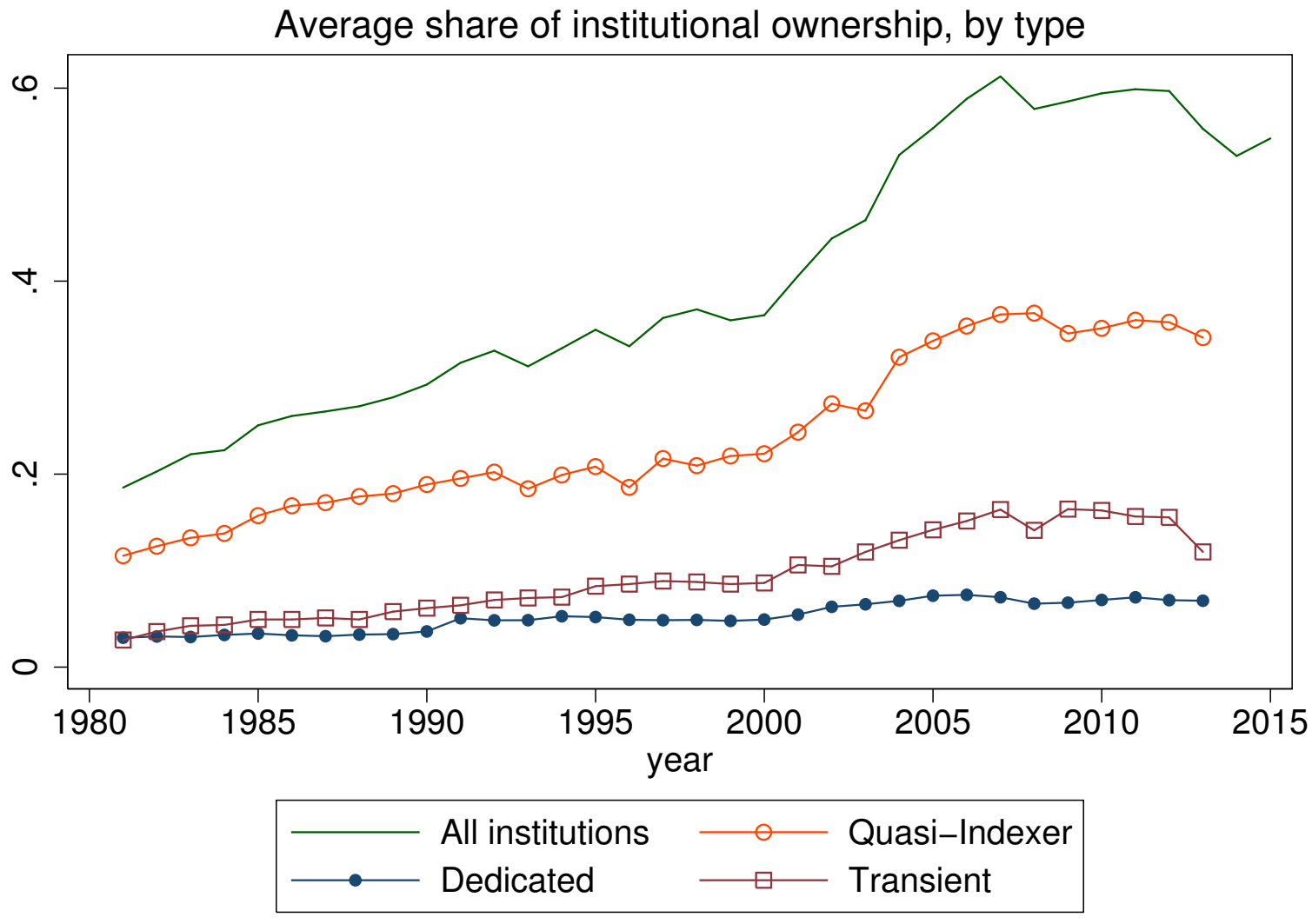
- Other measures including entry, share of sales by top #10 firms, etc. also significant

Fact Concentration has Increased



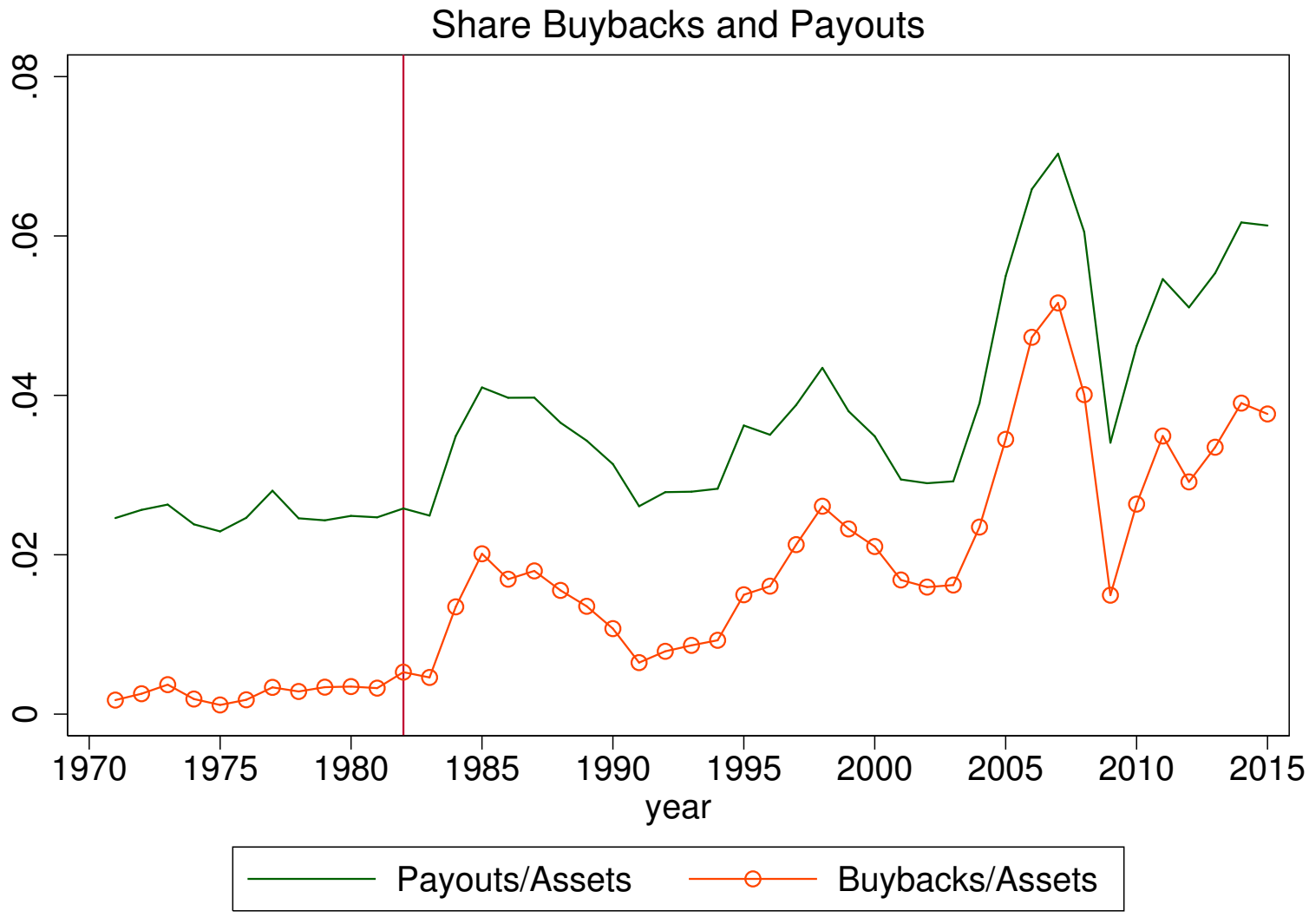
Notes: Annual data from Compustat

Institutional Ownership has Increased



Notes: Annual data from Thomson Reuters 13F.

Share Buybacks have Increased



Note: Annual data from Compustat

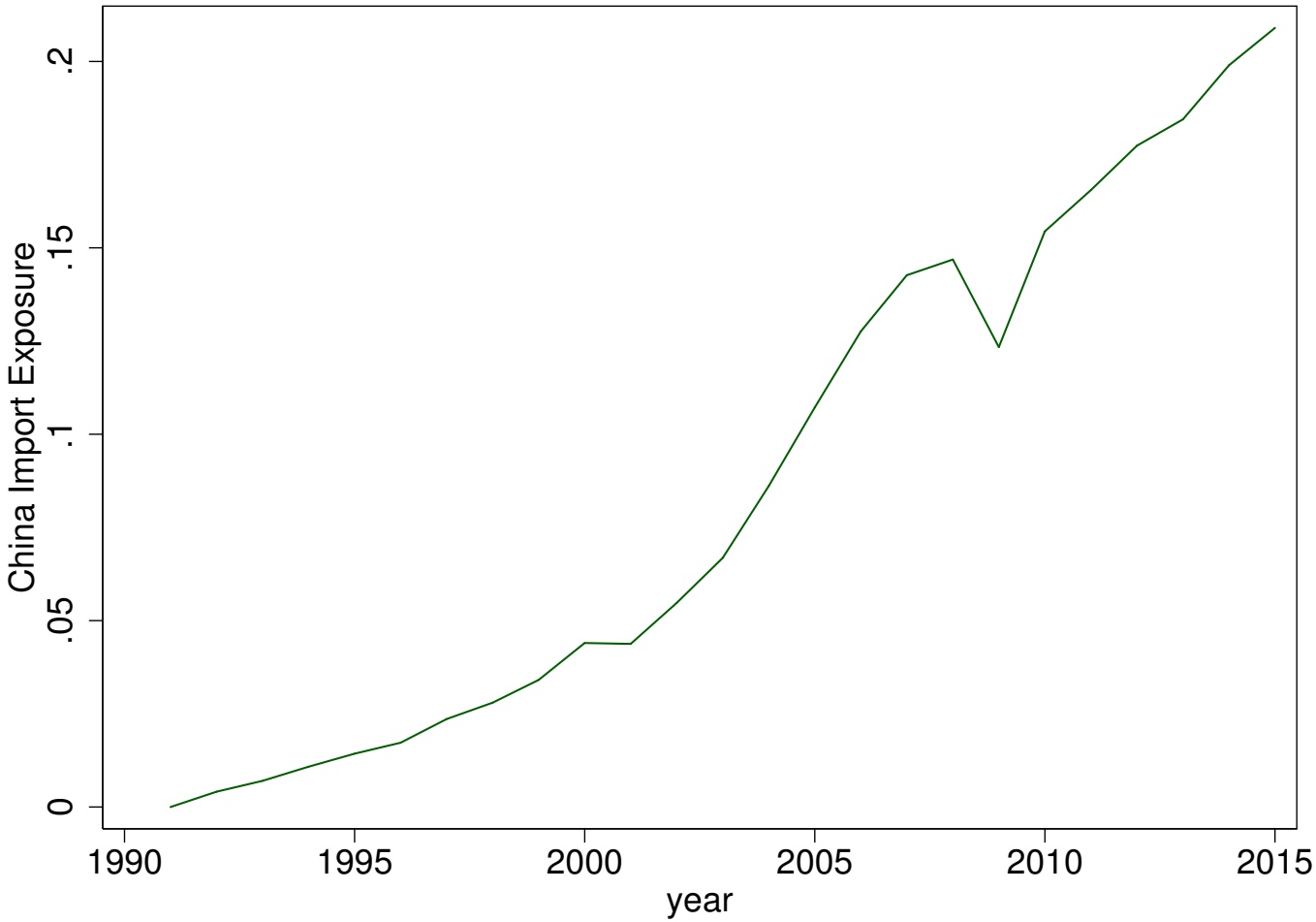
Causality?

- Gutiérrez & Philippon (2016b)
  - Competition: Dynamic Oligopoly with Leaders/Followers/Entrants
- **Key predictions of increased competition by entrants**
  - More investment by leaders (escape competition effect)
  - Exit and/or lower investment by laggards (Schumpeterian effect)
- Positive aggregate impact in *closed* economy/industry.

Causality

- Identification & External validity
  - Natural experiment: China
  - Instrumental variable: excess entry in the 1990s
- Closed economy
  - followers become more competitive –> industry investment increases
- Open economy: foreign entrants
  - Domestic leaders *increase* investment
  - Impact on industry investment ambiguous

Average China Import Competition

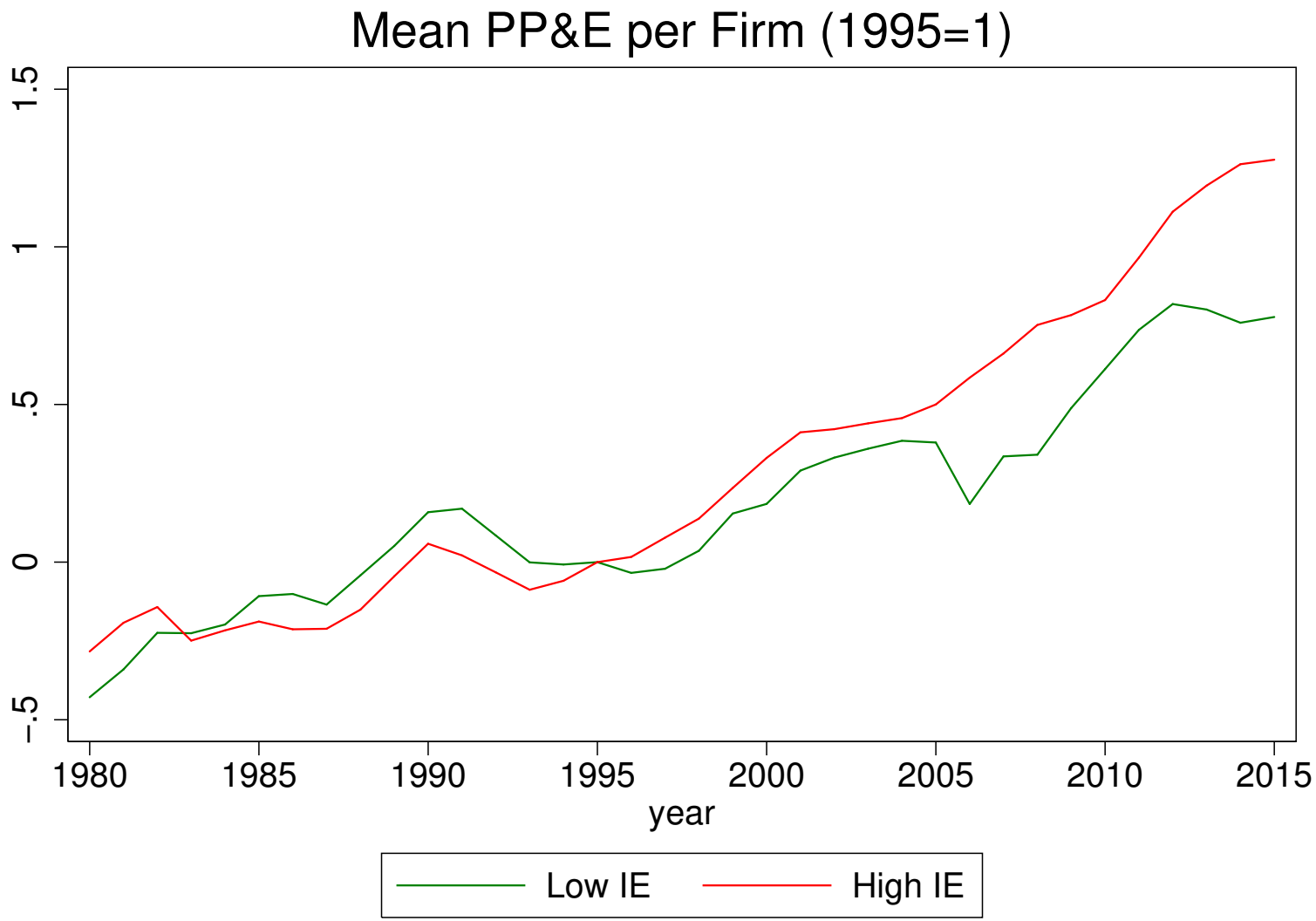


Note: Annual data. Import competition defined as $\Delta IP_{j\tau} = \frac{\Delta M_{j\tau}}{Y_{j,\mathbf{91}} + M_{j,\mathbf{91}} - E_{j,\mathbf{91}}}$.

Number of US Firms, by Exposure to China

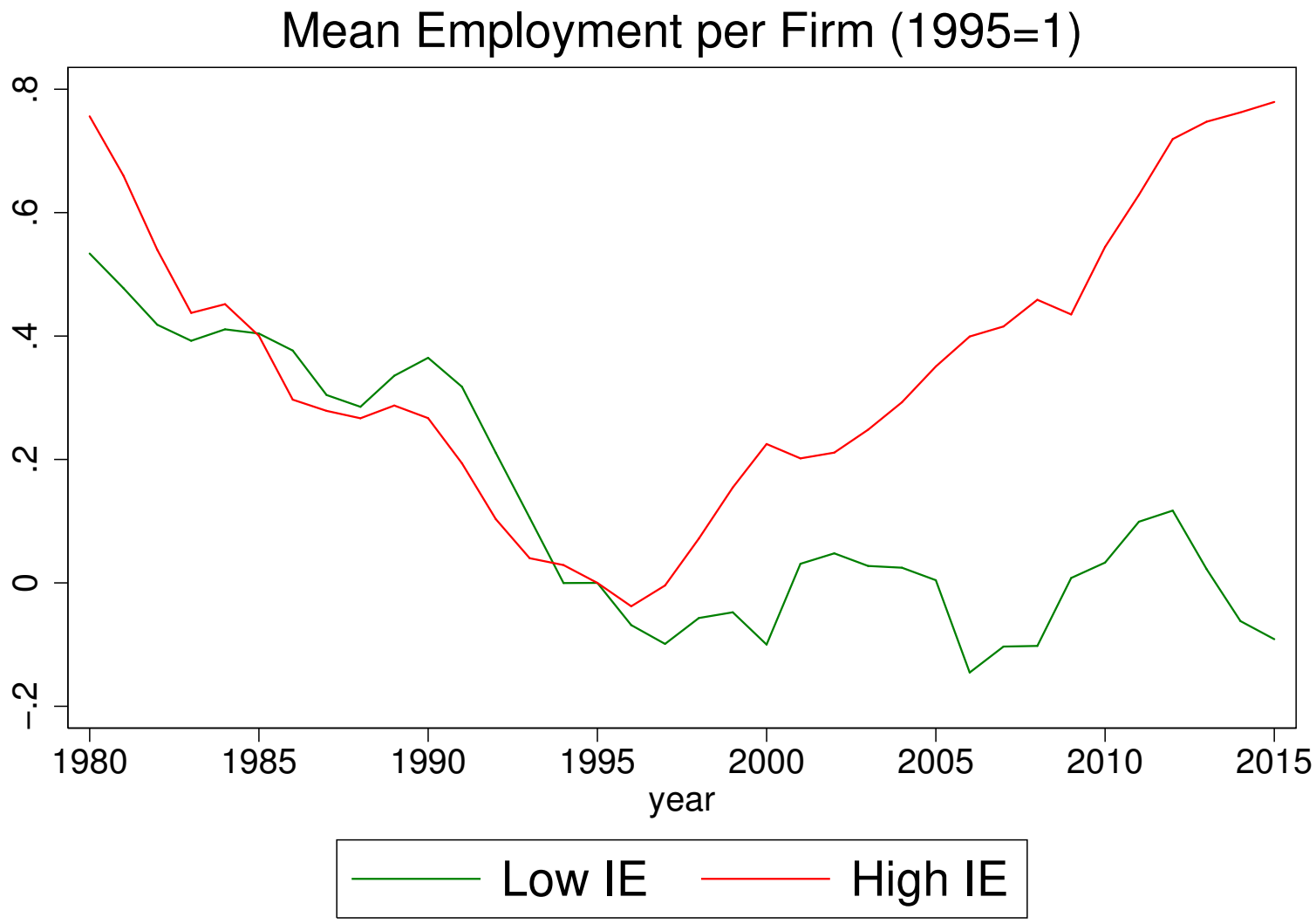
Notes: Annual data. US incorporated firms in manufacturing industries only. Industries assigned to exposure based on median 91-11 exposure. (1995 = 1)

PP&E of *Surviving* Firms



Notes: Annual data. US incorporated firms in manufacturing industries only. Industries assigned to exposure based on median 91-11 exposure. Similar patterns for

Employment of *Surviving* Firms



Notes: Annual data. US incorporated firms in manufacturing industries only. Industries assigned to exposure based on median 91-11 exposure.

Regressions results

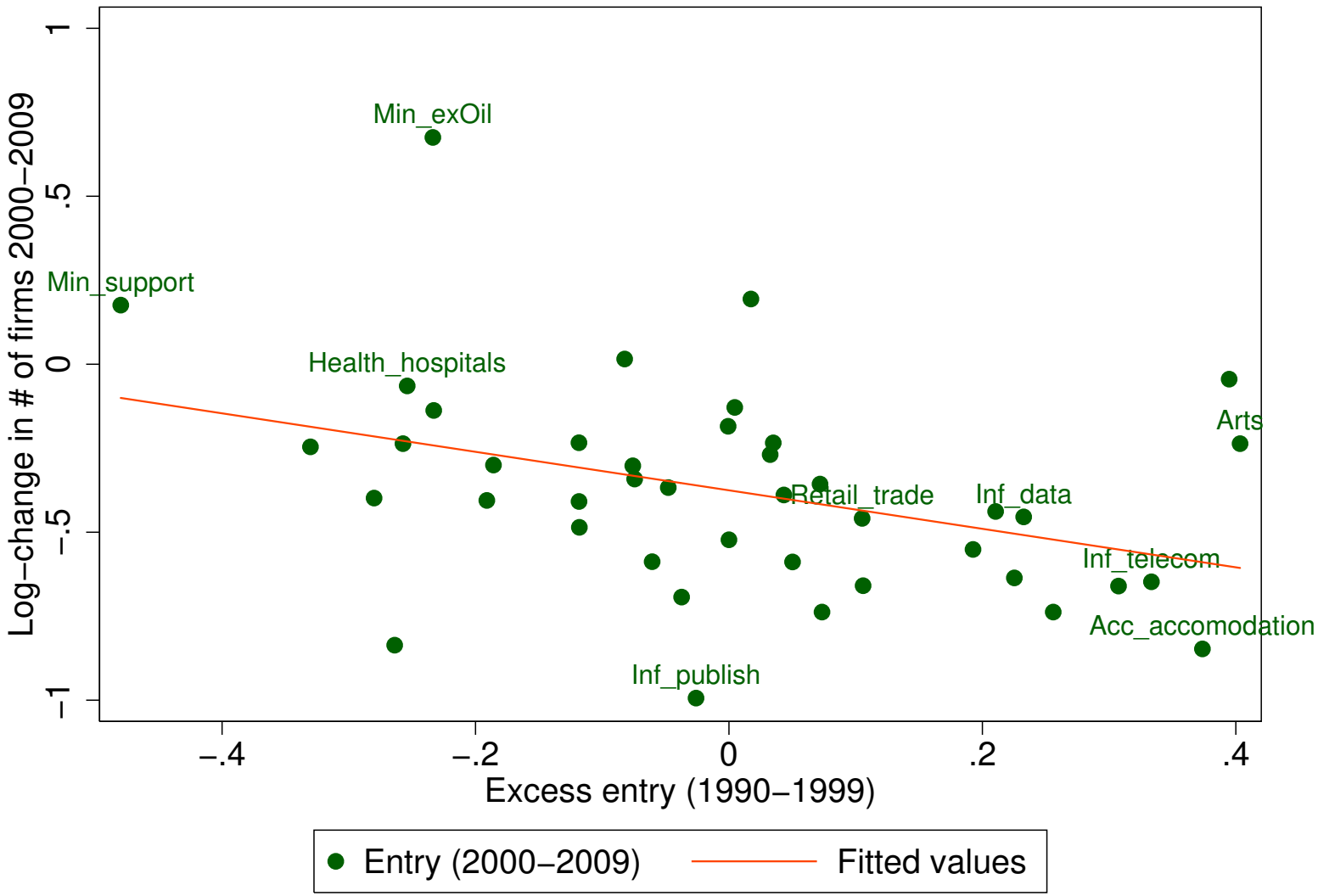
	(1) $\log(AT_t)$	(2) $\log(PPE_t)$	(3) $\log(Intan_t)$	(4) $\log(AT_t)$	(5) $\log(PPE_t)$	(6) $\log(Intan_t)$
$Post95 \times \Delta IP_{j,99,11}$	-0.210*	-0.228*	-0.218	-0.414**	-0.468**	-0.445+
	[-2.42]	[-2.29]	[-1.01]	[-3.92]	[-4.00]	[-1.79]
$Post95 \times \Delta IP_{j,99,11} \times Lead$§				**0.658****	**0.765****	**0.860***
				[4.32]	**[4.67]**	**[2.06]**
$\log(Age_{t-1})$	0.240**	0.331**	0.018	0.235**	0.325**	0.017
	[7.70]	[9.22]	[0.24]	[7.59]	[9.12]	[0.23]
Observations	50376	50235	29925	50376	50235	29925
Within R^2	0.45	0.22	0.35	0.46	0.22	0.35
Overall R^2	0.09	0.07	0.10	0.09	0.07	0.10
Industry controls†	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Sample	All firms			All firms		

Notes: T-stats in brackets. + p<0.10, * p<0.05, ** p<.01. Standard errors clustered at the firm-level. Results robust to clustering at industry-level or instrumenting for ΔIP with ΔIP_{oc}.
§ Leaders defined as firms with above-median Q as of 1995 within each NAICS Level 4 industry
† Industry controls include measures of industry-level production structure (e.g.,K/Emp) as of 1991

Competition & Investment: Beyond Manufacturing

- Chinese import competition
  - clean identification
  - but limited scope (only manufacturing)
- Broader approach
  - excess entry in 1990s
  - identification issue: entry at t depends on expected demand at $t+\tau$, so low concentration would predict future investment even under constant competition
  - Need instrument that predicts concentration but not future demand
  - We use excess entry in the 1990s
    - we can show it varies a lot across sectors, and it is orthogonal to future demand
    - we do not know exactly why (although we can tell stories: VCs, entry costs, etc.)

IV: Entry post-2000 vs. Excess entry in 1990s



IV: Regression Results

	(1) 1st St. $HHI_{i,t-1}$ $\geq$2000	(2) 2nd St. Net I/K $\geq$2000	(3) 1st St. $HHI_{i,t-1}$ $\geq$2000	(4) 2nd St. Net I/K $\geq$2000
Mean Stock Q (t-1)	0.016**	0.029**	0.022**	0.033**
	[2.61]	[10.40]	[3.89]	[7.42]
Excess Inv$_{90-99}$	-0.569	-0.589*		
	[-1.08]	[-2.41]		
Excess Entry$_{90-99}(i)$	**-0.153****			
	[-4.76]			
Excess Entry$_{90-99}(i) \times$ *Med HHI*$_t$			**1.295+**	
			[1.66]	
$HHI_{i,t-1}$	-0.246**	**-0.249****		**-0.539****
	[-6.96]	**[-5.06]**		**[-5.41]**
Comm. Own. adj. (t-1)		**-0.063****	-0.120**	**-0.080****
		[-3.80]	[-3.34]	**[-2.71]**
Age and size controls	Yes		Yes	
Year FE	No		Yes	
Industry FE	No		Yes	
Observations	672	672	672	672
R^2		0.078		0.045

Notes: T-stats in brackets. + p<0.10, * p<0.05, ** p<.01.

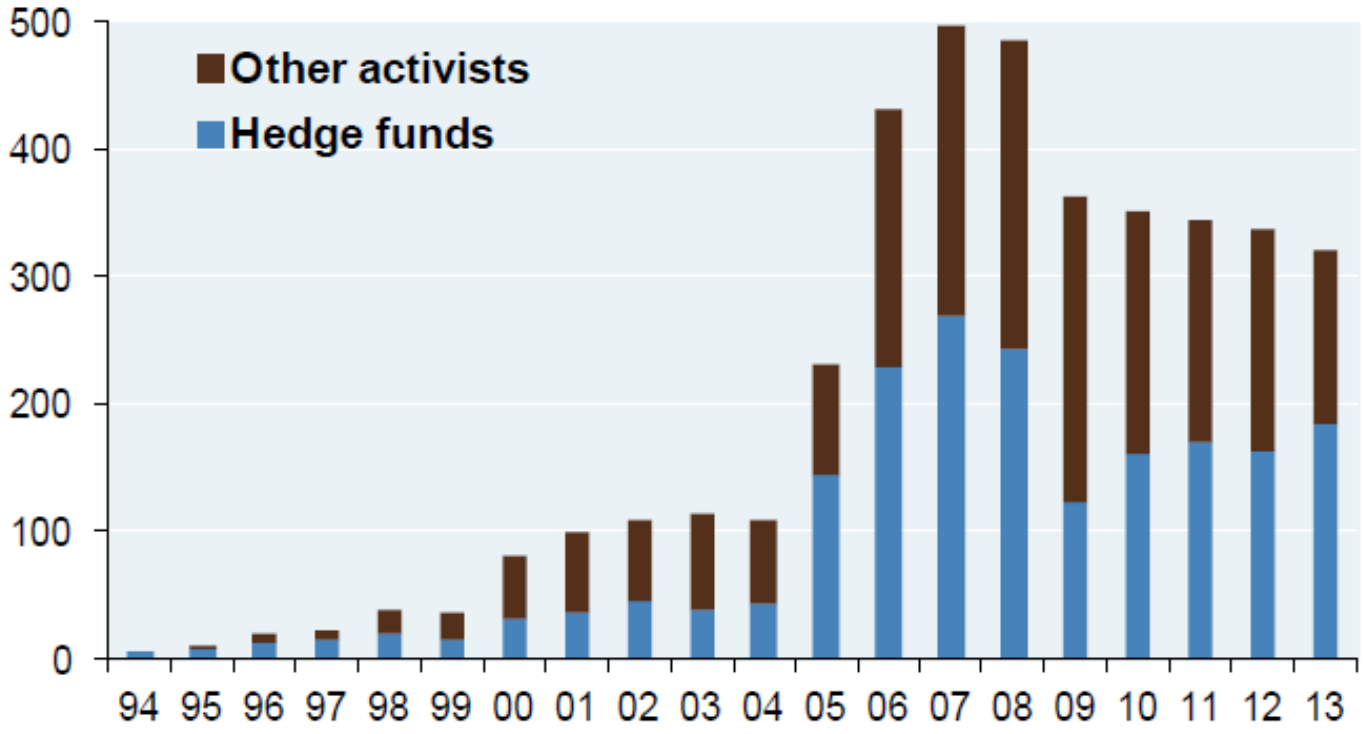
Competition and Investment: Summary

- Most domestic industries have become MORE concentrated
  - Lower competition/entry means less investment by leaders and less investment at the industry level
- Some manufacturing industries have seen increased competition from China
  - Domestic leaders have increased investment, R&D, and employment
  - But much less entry, so overall effect on domestic investment somewhat negative
- Next: Governance

Governance & Investment: Causality

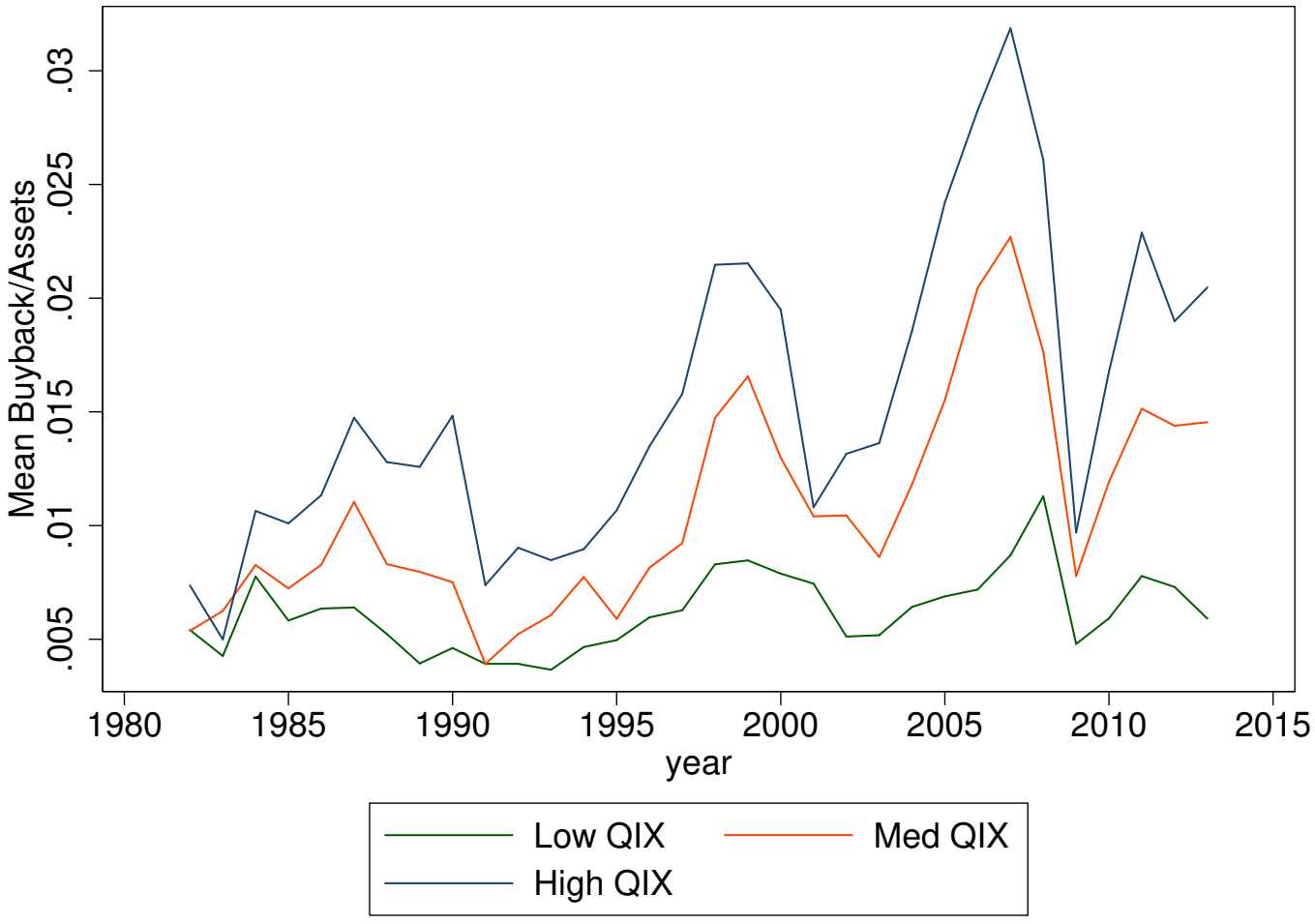
- Problem:
  - Buybacks should depend on investment opportunities, ownership as well.
  - Need to isolate buybacks driven by ownership, but exogenous to financial performance
- Solution 1: natural experiment
  - Russel index rebalancing, Crane-Micheneau-Weston (2016)
- Solution 2: instrument variables
  - Excess QIX ownership pre-2000: QIX ownership is highly persistent: $t-5Y$ ownership predicts 0.9x ownership at t
  - Activism increased after 2004 –> unforeseen in 2000; but QIX predicts activism (Appel et. al. 2016)
  - Coefficients consistent with solution 1.

Activism



Source: JP Morgan (February 12,2014)

Buyback rate by ownership type



Notes: Annual data for all US incorporated firms in Compustat. Firm financials from Compustat; ownership from Thomson Reuters and Brian Bushee's website.

Governance: Firm *IV* Estimates

	1st Stage		2nd	1st Stage		2nd
	(1) Stock Q ≥2000	(2) Buyb/Ass ≥2000	(3) Net I/K ≥2000	(7) Stock Q ≥2000	(8) Buyb/Ass ≥2000	(9) Net I/K ≥2000
Industry Median Q (t-1)	0.650**	-0.001		0.732**	0.000	
	[21.46]	[-0.56]		[25.47]	[-0.33]	
% QIX owners(96-99)	0.279**	**0.013****				
	[3.03]	**[4.32]**				
$QIX_{96-99}(i) \times B\bar{B}A(t)$				-20.949*	**3.969****	
				[-2.36]	**[14.85]**	
Stock Q (t-1)			0.048**			0.046**
			[2.99]			[2.86]
Buyback/Assets (t-1)			**-4.740***			**-5.570****
			[-1.98]			**[-6.08]**
Pre-2000 firm-level controls	Yes			No†		
Year FE	Yes			Yes		
Industry FE	Yes			No		
Firm FE	No			Yes		
Observations	20841			29973		
Between/Overall R^2	19.5% / 4.6%			8.1% / 4.0%		

Notes: T-stats in brackets. + p<0.10, * p<0.05, ** p<.01. Firm-level controls include include market capitalization, leverage, sales growth, dividends, profitability, size, etc.
† Only log-age is included as control.

Aggregate Implications

- Preferences

$$\mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t \left(\frac{C_t^{1-\gamma}}{1-\gamma} - \frac{N_t^{1+\varphi}}{1+\varphi} \right) \right],$$

- $C_t = \left(\int_0^1 C_{j,t}^{\frac{\varepsilon-1}{\varepsilon}} dj \right)^{\frac{\varepsilon}{\varepsilon-1}}$
- Wages set à la Calvo
- Kernel

$$\mathbb{E}_t \left[\Lambda_{t+1} \frac{P_t}{P_{t+1}} \tilde{R}_{t+1} \right] = 1$$

Model: Capital Producers

- Firm Value

$$V_t = \sum_{j=0}^{\infty} \Lambda_{t,t+j} Div_{t+j}$$

- Accumulation

$$K_{t+1} = (1 - \delta_t) K_t + I_t$$

- Payments

$$Div_t = R_{k,t} K_t - P_{k,t} I_t - \frac{\varphi_k}{2} P_{k,t} K_t \left(\frac{I_t}{K_t} - \delta_t \right)^2 .$$

Model: Final Producers

- Objective

$$\min^{W/P} N + R_k K$$
$$s.t.$$
$$Y = AK^{\alpha} N^{1-\alpha}$$

- Price setting à la Calvo, desired markup

$$\mu_t = \frac{\varepsilon_t}{\varepsilon_t - 1}$$

- Market Value of Producers

$$V_t^{\varepsilon} = P_t Y_t (1 - \mathtt{MC}_t) - \Phi_t + \mathbb{E}_t \left[\Lambda_{t+1} V_{t+1}^{\varepsilon} \right]$$

Micro Calibration

- Firm i in industry j

$$C_{j,t} = \left(\int_0^j C_{i,j,t}^{\frac{\varepsilon_{j,t}-1}{\varepsilon_{j,t}}} \, di \right)^{\frac{\varepsilon_{j,t}}{\varepsilon_{j,t}-1}}$$

  - Desired markup: $\frac{P_{j,t}}{\bar{P}_t} = \mu_{j,t} \mathtt{MC}_t$ where $\mu_{j,t} = \frac{\varepsilon_{j,t}}{\varepsilon_{j,t}-1}$

- Capital demand in cross section

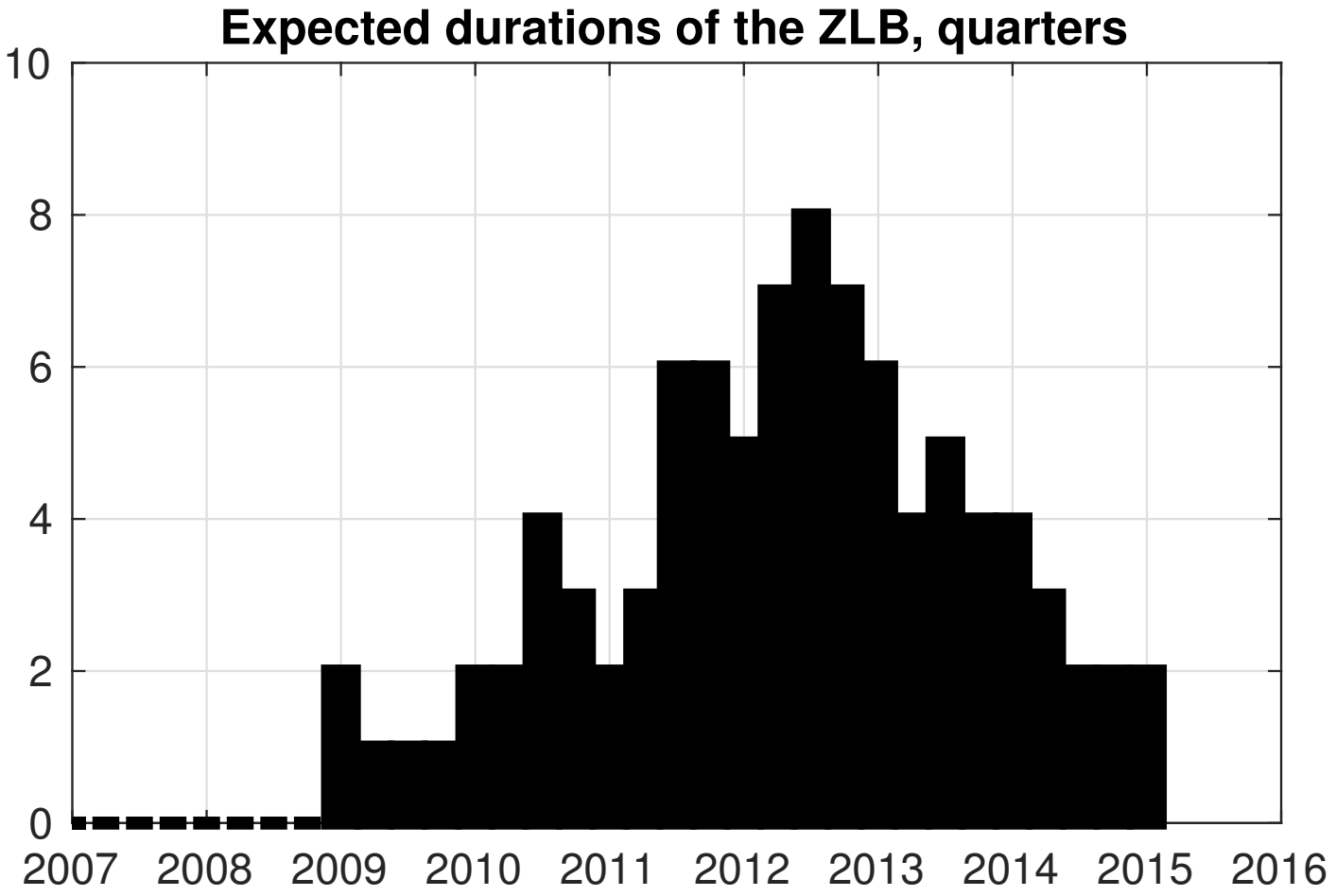
$$\log K_{j,t} = A_t - \varepsilon \log \mu_{j,t}$$

  - Estimate in panel of industries $\log K_{j,t} = ... - 1.3\chi_{j,t}$ where $\chi_{j,t}$ is concentration ratio
  - Set cross-industry elasticity to $\varepsilon = 1$

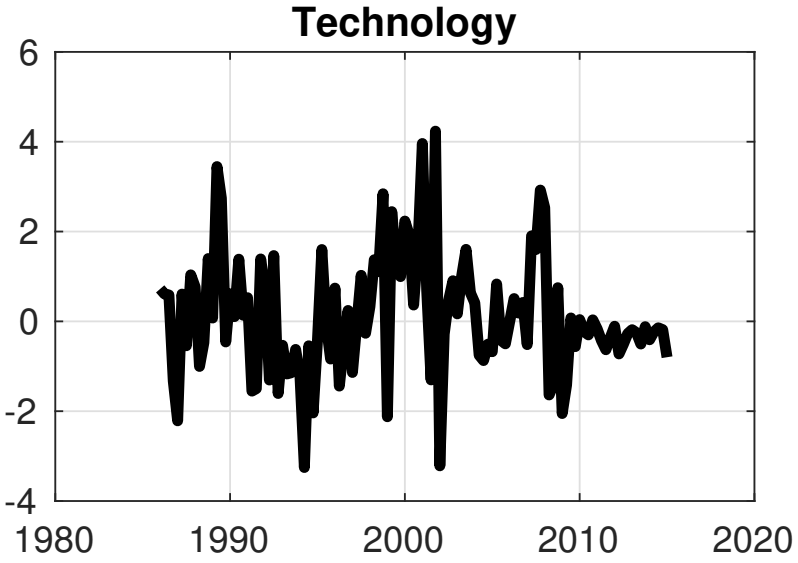
- then construct a measure of "average" markup based on the "average" concentration ratio

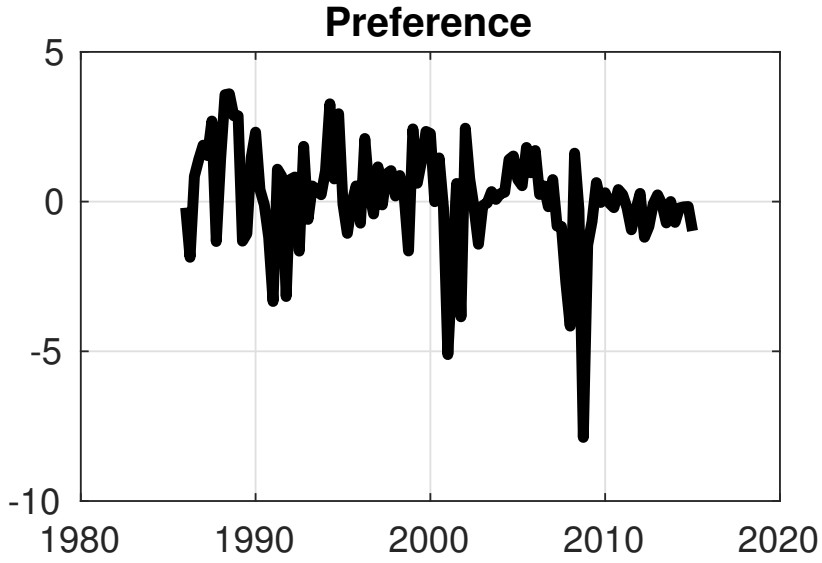
$$\log \bar{\mu}_t \approx 1.3\bar{\chi}_t$$

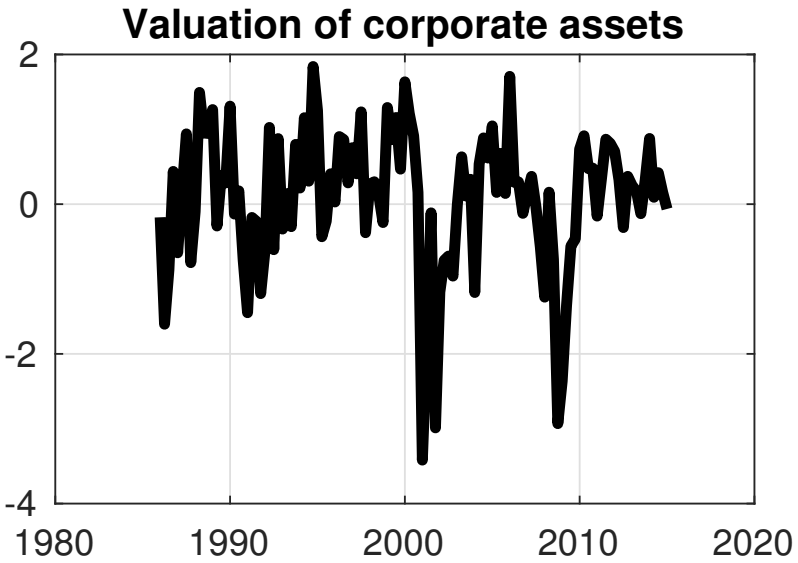
ZLB

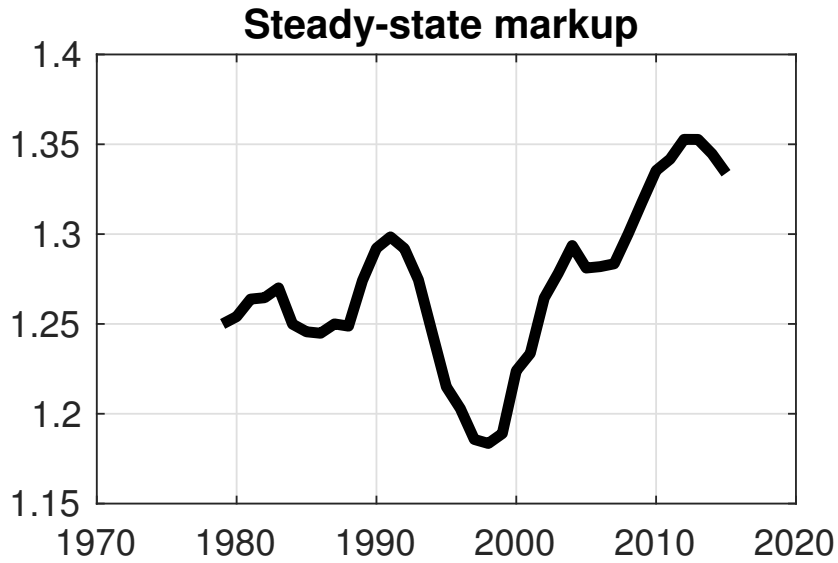

Expected durations of the ZLB, quarters
10
8
6
4
2
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016

Shocks

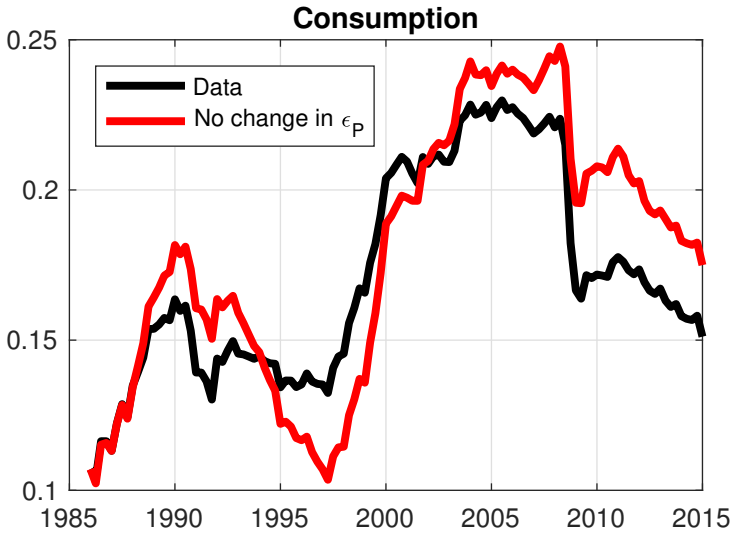

Technology
6
4
2
0
-2
-4
1980
1990
2000
2010
2020

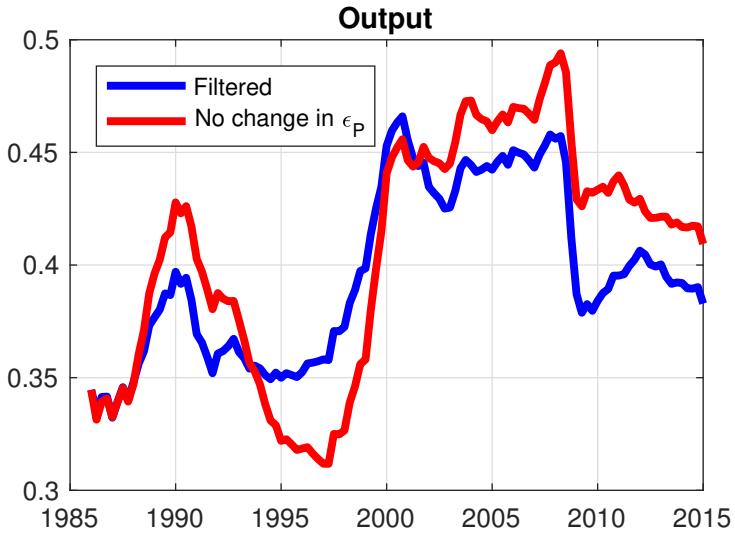

Preference
5
0
-5
-10
1980
1990
2000
2010
2020

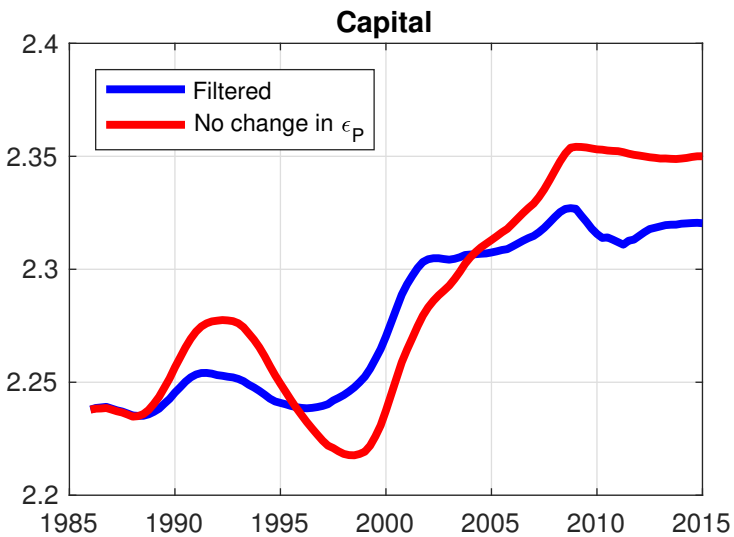

Valuation of corporate assets
2
0
-2
-4
1980
1990
2000
2010
2020


Steady-state markup
1.4
1.35
1.3
1.25
1.2
1.15
1970
1980
1990
2000
2010
2020

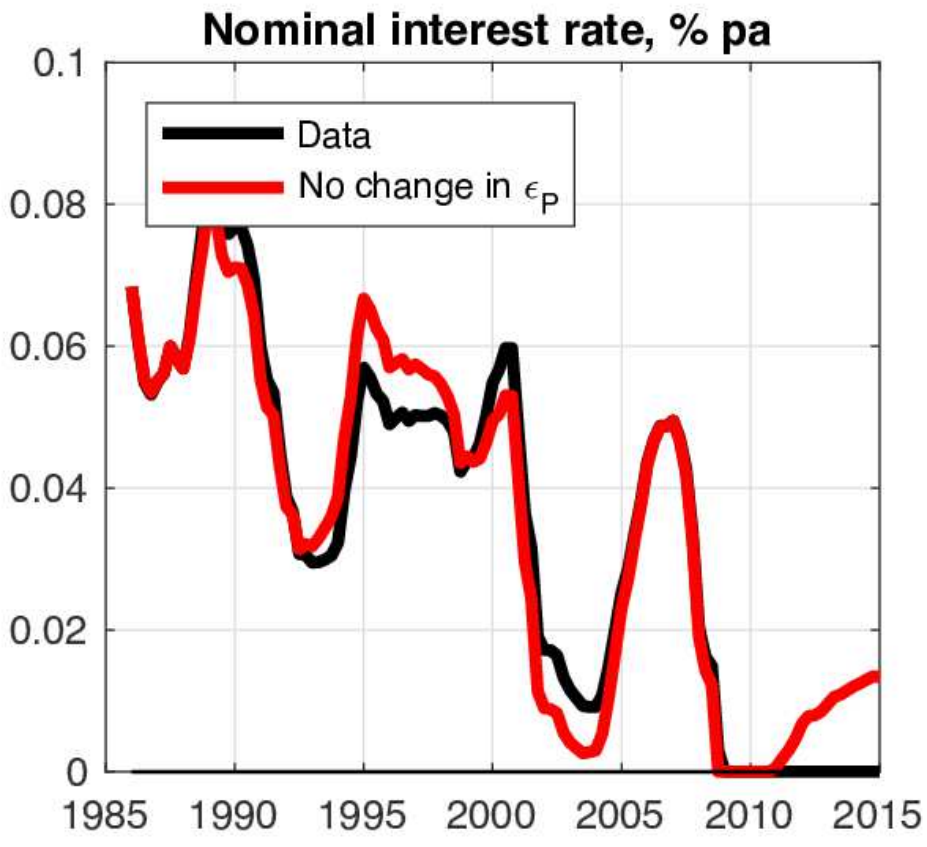
Counter-Factual



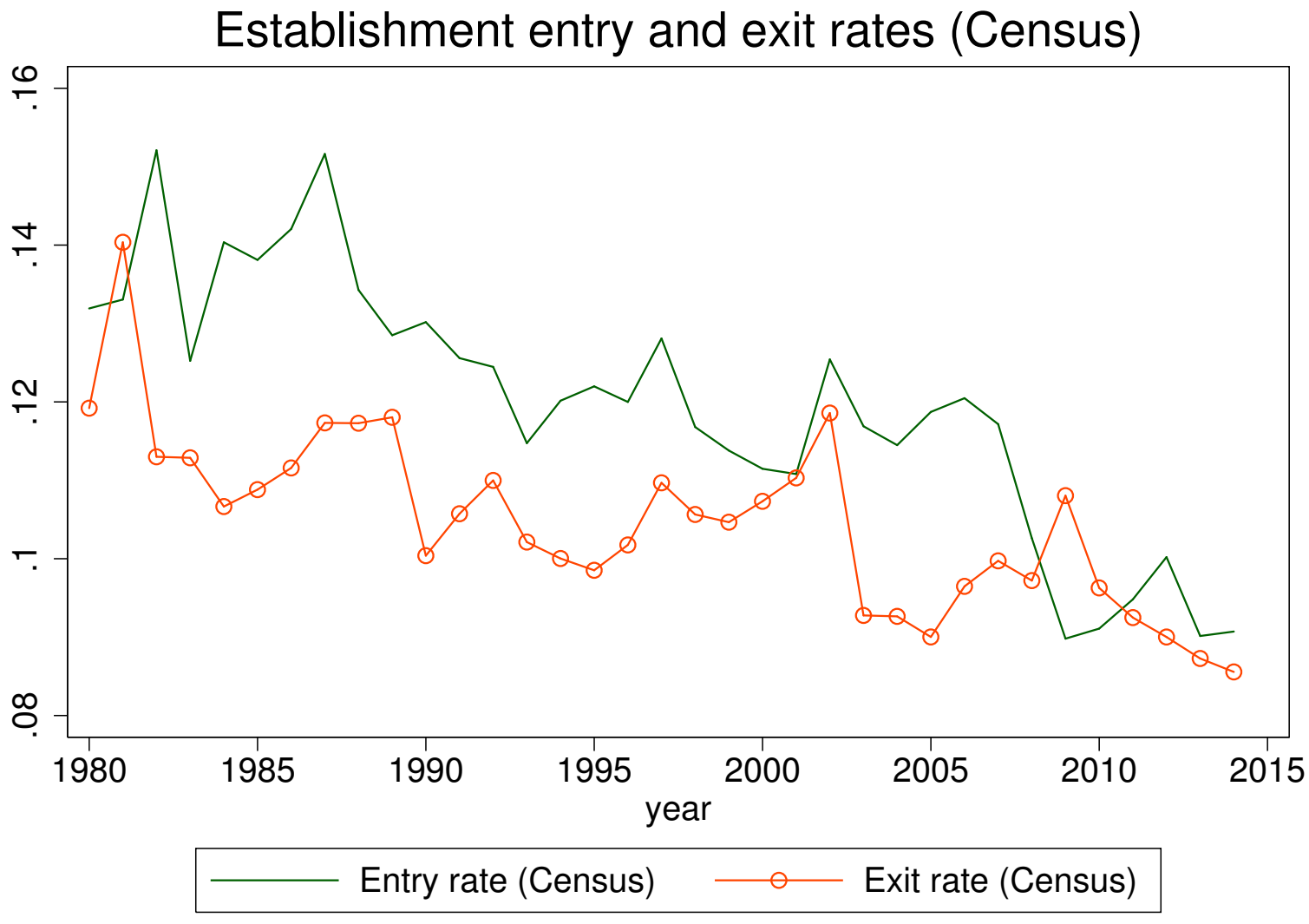




Counter-Factual

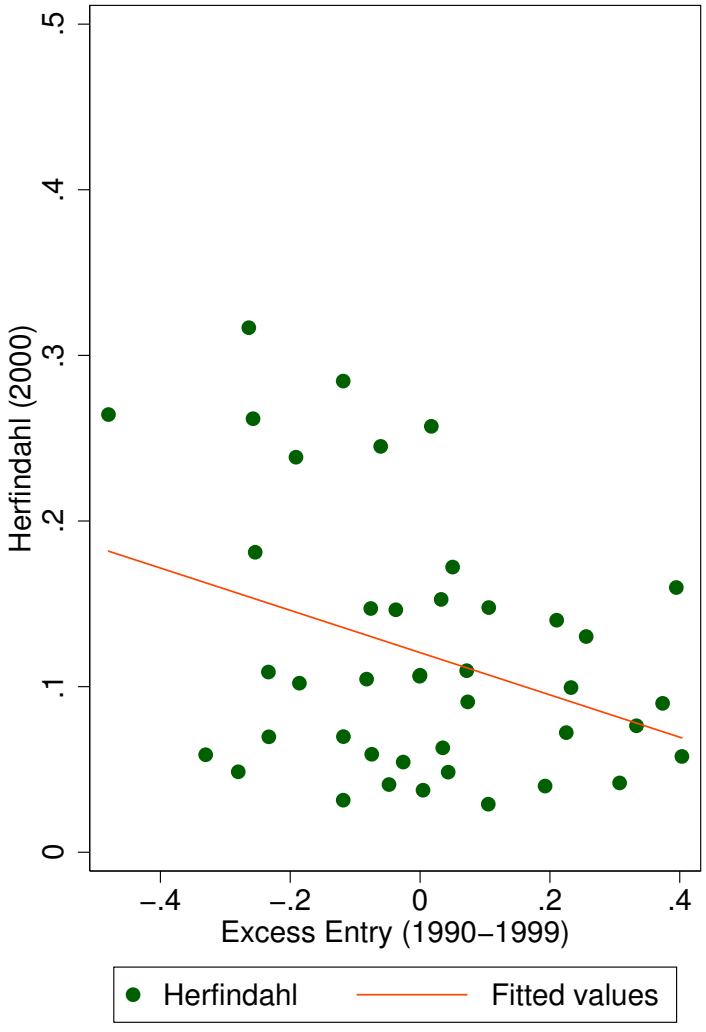


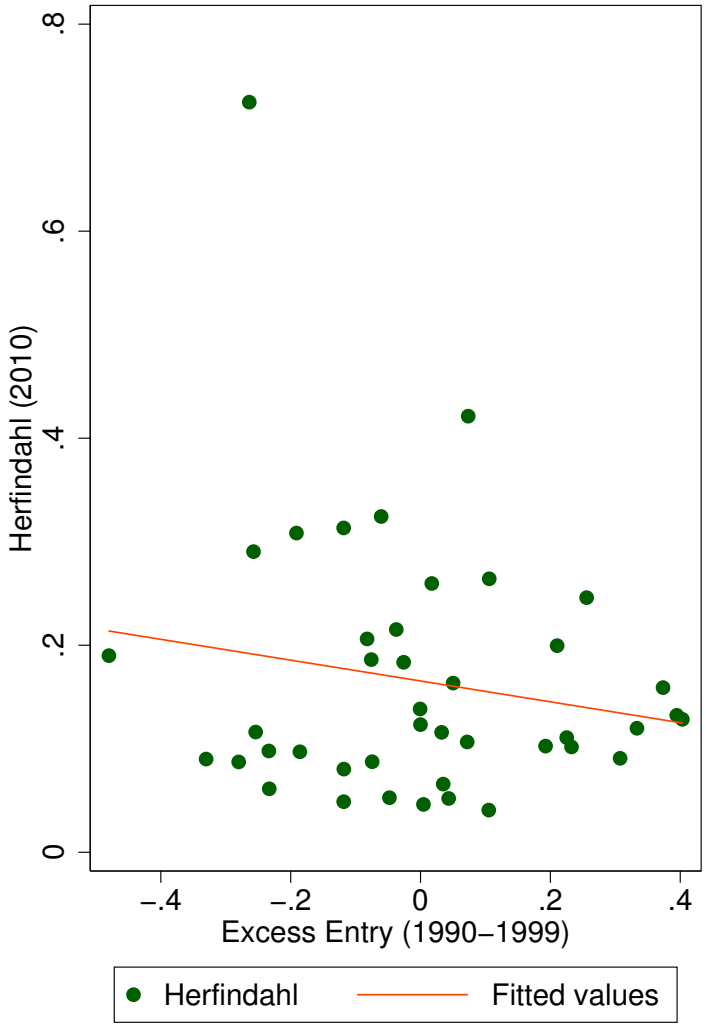
EXTRA: Entry has Decreased



Notes: Annual data from Census BDS

IV: Concentration as of 2000/2010 vs. Excess entry in 1990s





EXTRA: Shocks

- TFP

$$a_t = \rho_a a_{t-1} + \varepsilon_{a,t}$$

- Discount rate shock to the pricing kernel

$$\lambda_{t+1} = \log\beta - \gamma(c_{t+1} - c_t) + \zeta_t^d$$
$$\zeta_t^d = \rho_d \zeta_{t-1}^d + \varepsilon_t^d$$

- Risk premium on corporate assets

$$q_t^k = \mathbb{E}_t\left[\lambda_{t+1} + \log\left(r_{t+1}^k + q_{t+1} + 1 - \delta + \frac{1}{2\gamma}q_{t+1}^2\right)\right] + \zeta_t^q$$

- Time-varying elasticity of substitution between goods

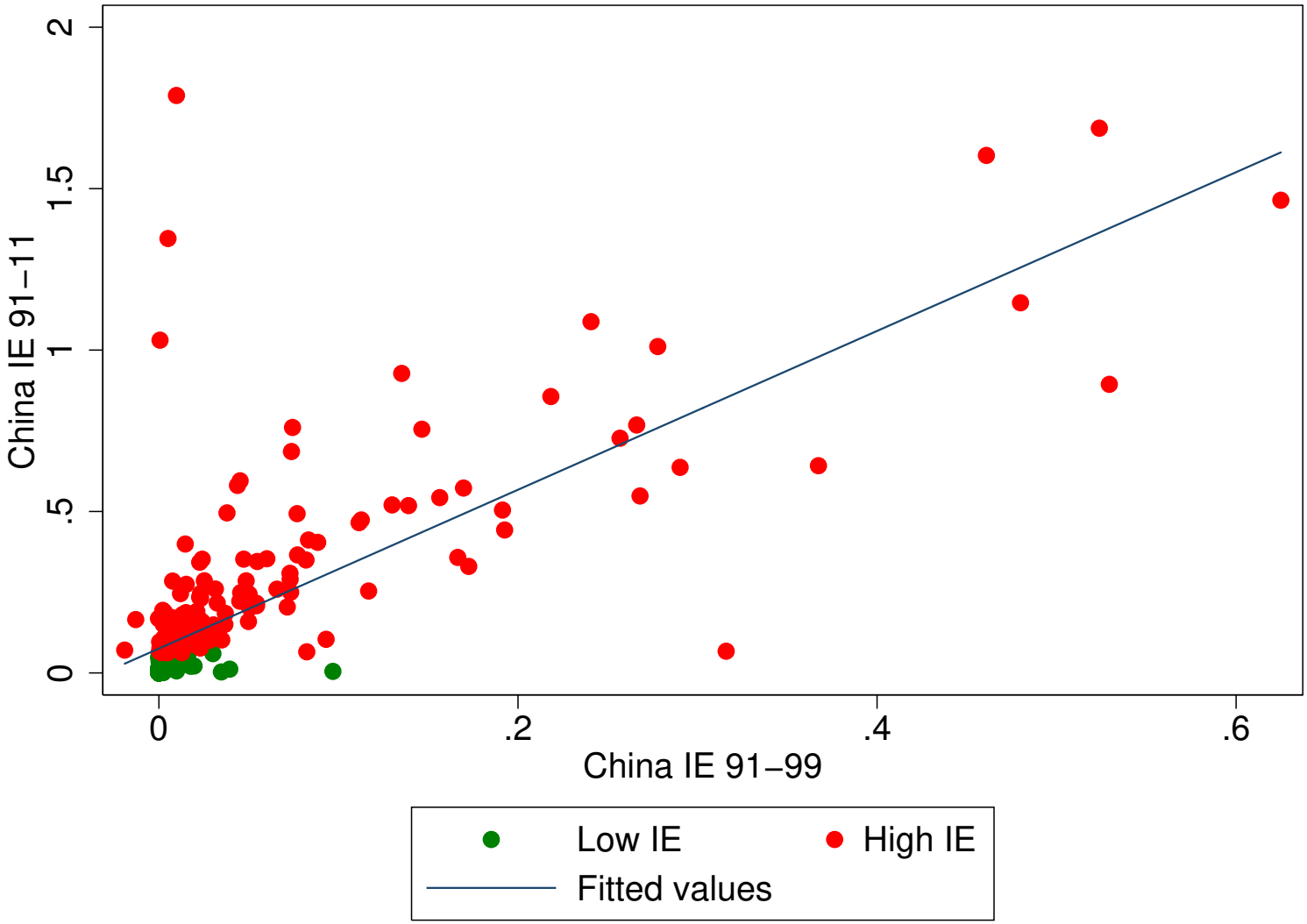
$$\varepsilon_t = \varepsilon_{t-1} + \varepsilon_t^{\varepsilon}$$

Regressions results: continuing firms only

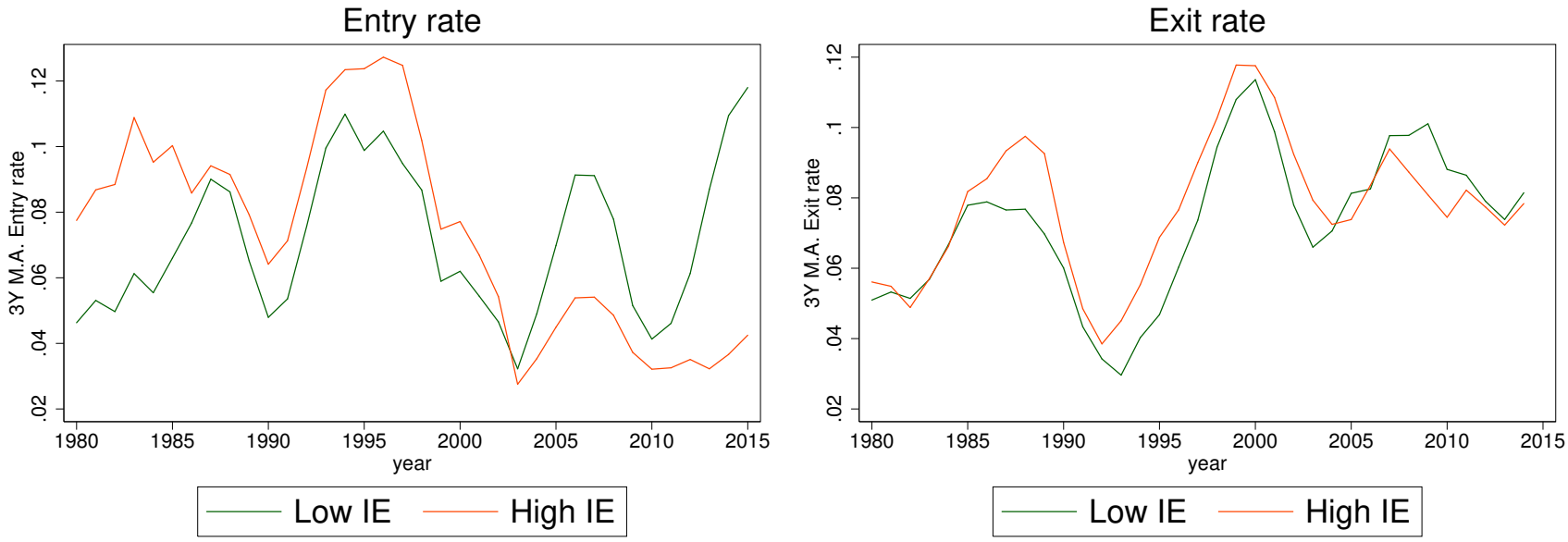
	(1) $\log(AT_t)$	(2) $\log(PPE_t)$	(3) $\log(Intan_t)$
$Post95 \times \Delta IP_{j,99-11}$	-0.592**	-0.476**	-0.414
	[-2.97]	[-2.69]	[-0.88]
$Post95 \times \Delta IP_{j,99-11} \times Lead$§	**0.808***	**0.729+**	**0.992**
	[2.18]	**[1.89]**	**[1.01]**
$\log(Age_{t-1})$	0.548**	0.457**	0.219
	[8.37]	[7.81]	[1.60]
Observations	17633	17659	11847
Within R^2	0.33	0.57	0.46
Overall R^2	0.14	0.15	0.12
Industry controls†	YES	YES	YES
Year FE	YES	YES	YES
Firm FE	YES	YES	YES
Sample	Continuing firms		

Notes: T-stats in brackets. + p<0.10, * p<0.05, ** p<.01. Standard errors clustered at the firm-level. Results robust to clustering at industry-level or instrumenting for ΔIP with ΔIP_{oc}.
§ Leaders defined as firms with above-median Q as of 1995 within each NAICS Level 4 industry
† Industry controls include measures of industry-level production structure (e.g.,K/Emp) as of 1991

China import exposure was predictable in 1999



Firm entry and exit rate, by Chinese exposure



Notes: Annual data. US incorporated firms in manufacturing industries only. Industries assigned to exposure based on median 91-11 exposure.

Regressions results: K, Emp and K/Emp

	(1) $\log(PPE_t)$	(2) $\log(Emp_t)$	(3) $\log(\frac{PPE_t}{Emp_t})$	(4) $\log(PPE_t)$	(5) $\log(Emp_t)$	(6) $\log(\frac{PPE_t}{Emp_t})$
$Post95 \times \Delta IP_{j,99,11}$	-0.228*	-0.195*	-0.051	-0.468**	-0.363**	-0.128+
	[-2.29]	[-2.28]	[-0.91]	[-4.00]	[-3.72]	[-1.87]
$Post95 \times \Delta IP_{j,99,11} \times Lead$§				**0.765****	**0.548****	**0.249****
				[4.67]	**[3.81]**	**[2.99]**
$\log(Age_{t-1})$	0.331**	0.409**	-0.084**	0.325**	0.405**	-0.086**
	[9.22]	[13.45]	[-4.05]	[9.12]	[13.38]	[-4.16]
Observations	50235	49649	49543	50235	49649	49543
Within R^2	0.22	0.109	0.216	0.224	0.113	0.217
Overall R^2	0.07	0.19	0.10	0.07	0.18	0.10
Industry controls†	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Sample	All firms			All firms		

Notes: T-stats in brackets. + p<0.10, * p<0.05, ** p<.01. Standard errors clustered at the firm-level. Results robust to clustering at industry-level or instrumenting for ΔIP with ΔIP_{oc}.
§ Leaders defined as firms with above-median Q as of 1995 within each NAICS Level 4 industry
† Industry controls include measures of industry-level production structure (e.g.,K/Emp) as of 1991

Interaction between Ownership and Competition

	1st Stage		2nd	1st Stage		2nd
	(1)	(2)	(3)	(4)	(5)	(6)
	Stock Q $\geq$2000	Buyb/Ass $\geq$2000	Net I/K $\geq$2000	Stock Q $\geq$2000	Buyb/Ass $\geq$2000	Net I/K $\geq$2000
Industry Median Q (t-1)	0.581**	-0.001		0.744**	0.000	
	[33.51]	[-1.03]		[44.42]	[-0.35]	
% QIX owners(96-99)	0.733**	0.003				
	[4.64]	[0.52]				
$QIX_{96-99}(i) \times MHHI$	-1.305**	**0.026****				
	[-4.36]	**[2.85]**				
$QIX_{96-99}(i) \times B\bar{B}A(t)$				-24.316	5.085**	
				[-0.99]	[7.96]	
$QIX_{96-99}(i) \times MHHI \times B\bar{B}A(t)$				-225.2**	**2.025+**	
				[-4.75]	**[1.65]**	
Stock Q (t-1)			0.105**			0.147**
			[11.79]			[20.51]
Buyback/Assets (t-1)			**-3.134+**			**-2.024***
			[-1.68]			**[-2.57]**
Pre-2000 firm-level controls	Yes			No†		
Year FE	Yes			Yes		
Other FE	Industry			Firm		
Observations	20841			29973		
Between/Overall R^2	11.3% / 4.7%			16.5% / 9.0%		

Notes: T-stats in brackets. + p<0.10, * p<0.05, ** p<.01. Firm-level controls as above.
† Only log-age is included as control.