The Global Rise of Corporate Saving

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January 2017

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    - reflects decline in labor share and stability of dividend share

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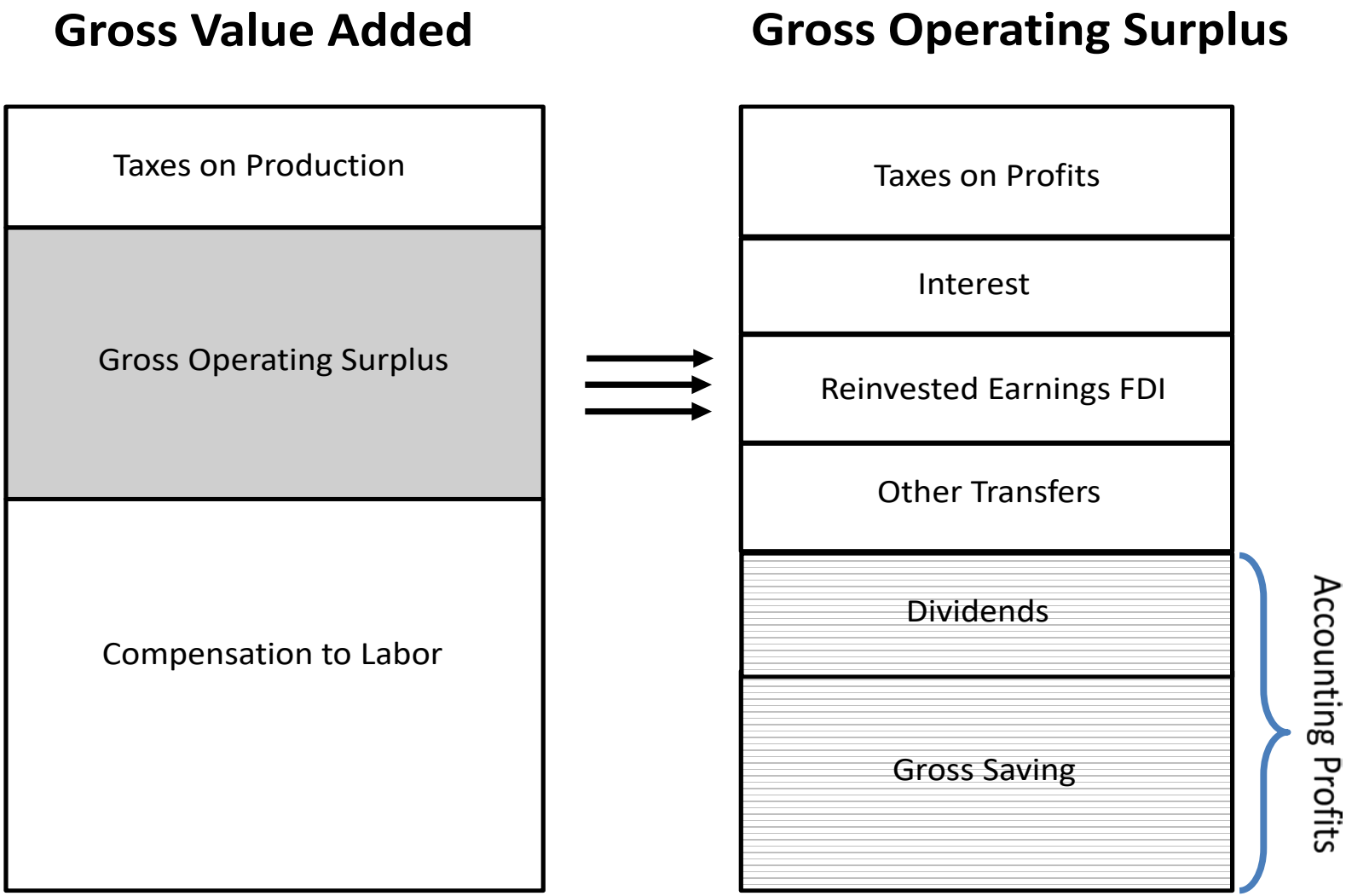
    - reflects decline in labor share and stability of dividend share
2. Increase observed within many countries, industries, and firms.
    - global common and not idiosyncratic country or industry factors
3. Model assigns important role to decline in cost of capital.
    - global declines in interest rate, investment prices, corporate taxes

National Accounts Data

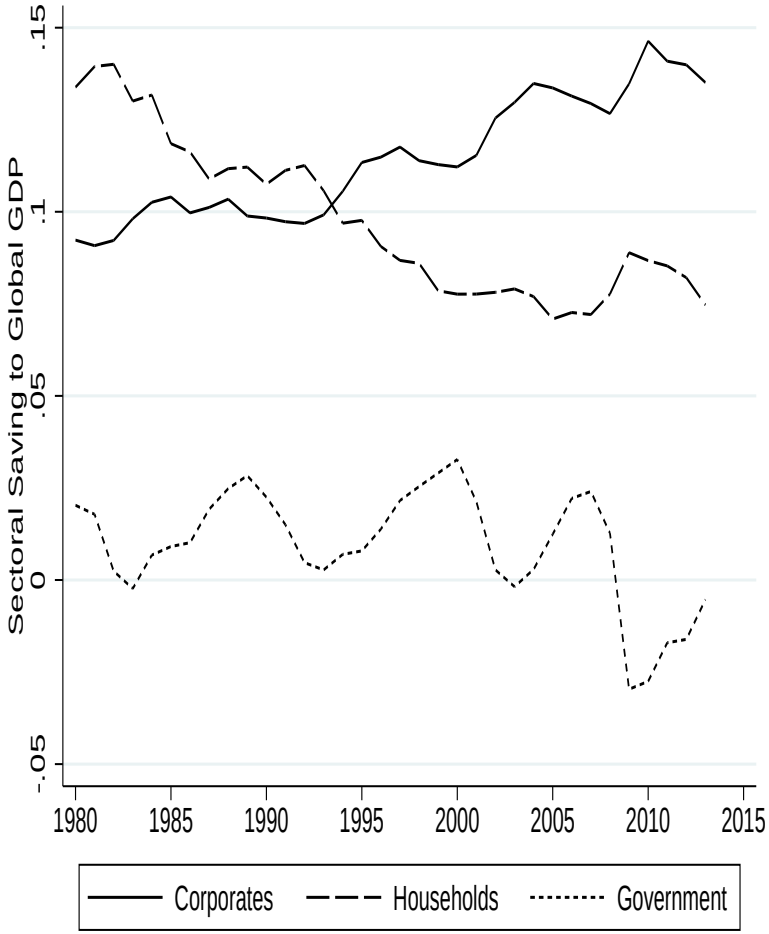
Data from national accounts

- Sources: UN and OECD.
- Sectors: corporate, household, government.
- Sample starts in 1980 with 8 countries.
- By 2007 we have over 60 countries and 85% of global GDP.

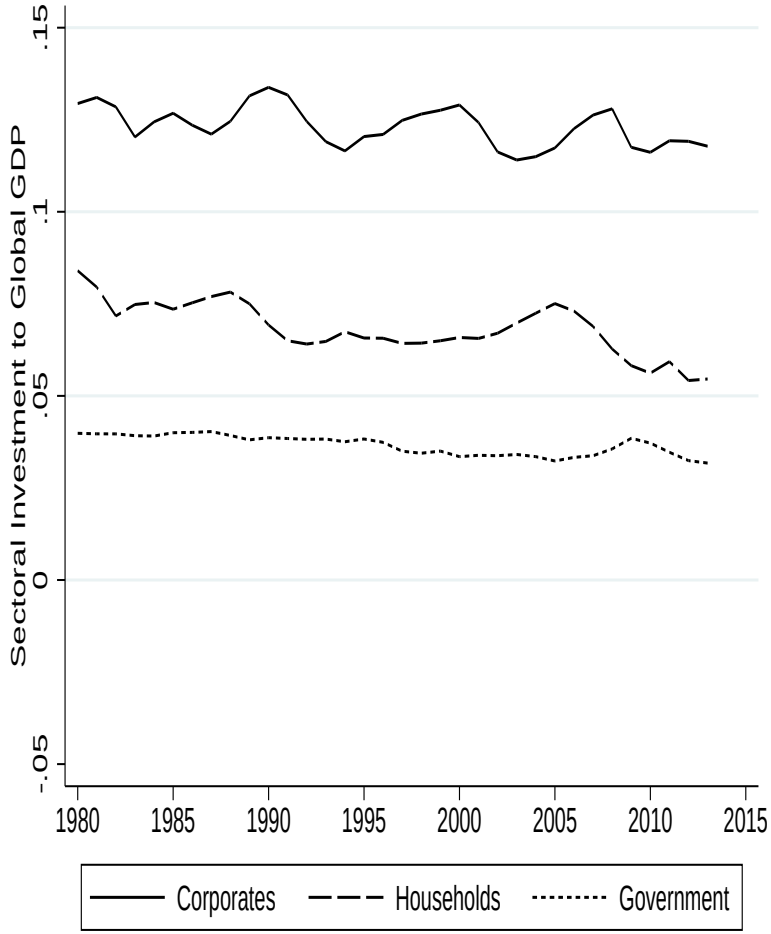
Key identities



Global saving and investment



(a) Saving to GDP

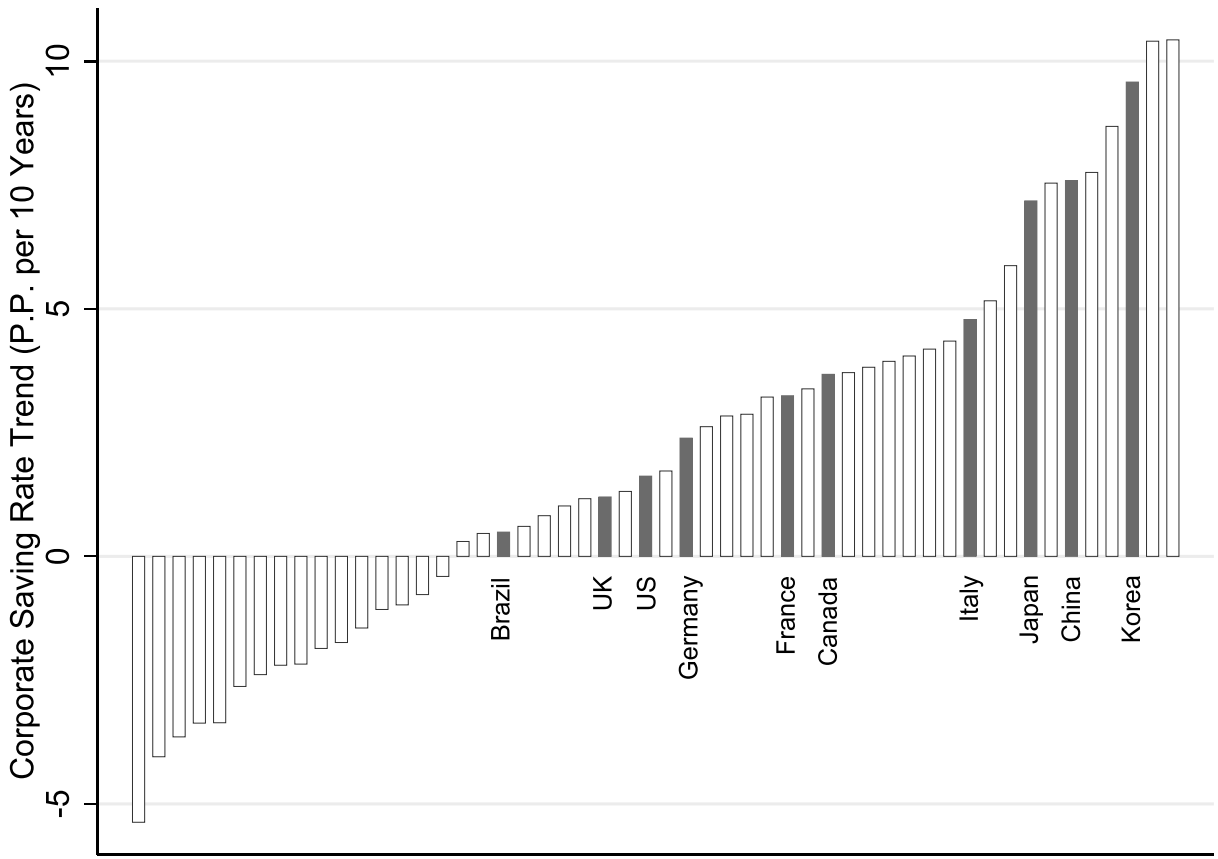


(b) Investment to GDP

Saving rates by sector

Trend in corporate saving rate by country

plots

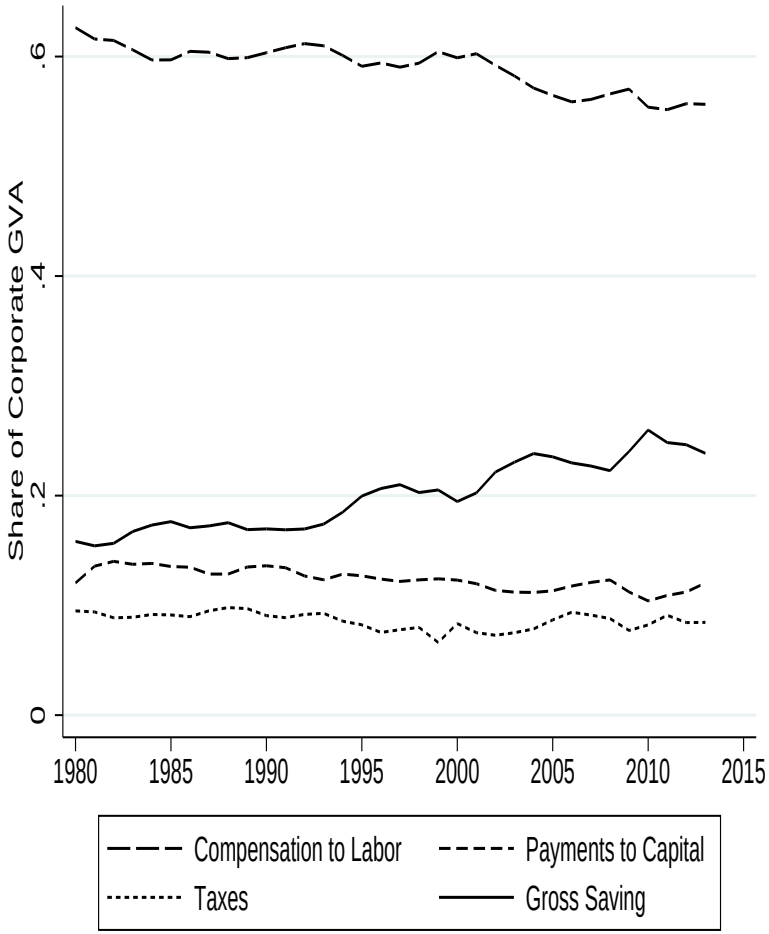


Decomposition of corporate gross value added

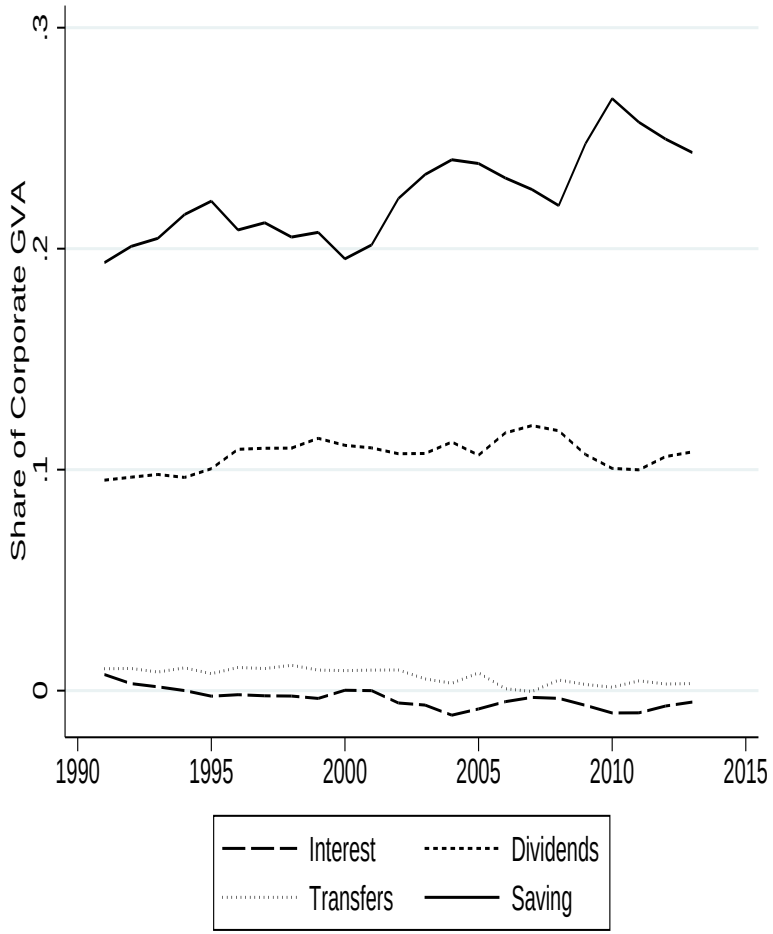
$$\begin{aligned} \text{Gross Value Added} &= \text{Compensation to Labor} \\ &+ \text{Taxes} \\ &+ \text{Payments to Capital} \\ &+ \text{Gross Saving.} \end{aligned} \tag{1}$$

- "Taxes" equals taxes on production and taxes on profits.
- "Payments to capital" equals dividends, interest, and transfers.

Components of corporate value added



(a) Components of GVA



(b) Saving, Dividends, and Interest

Summary of macro facts

1. Corporate saving rise relative to GDP, total saving, corporate GVA.
2. Corporate sector has become net lender of funds.
3. Rise of corporate saving broad-based across countries.
4. Proximate cause is decline in labor share.

Firm-Level Data

Data at the firm level

- Sources: Compustat Global and North America.
- Differences from national accounts:
  1. Focus on non-financial firms. go
  2. Activity by country of headquarters instead of operation.
  3. Listed firms.

Gross Value Added = Sales − Intermediates: Imputation

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$$\begin{aligned} \text{Intermediates}_{f,c,i,t} &= \underbrace{\text{Oper. Exp.}_{f,c,i,t} - \text{Depr.}_{f,c,i,t} - \text{R\&D}_{f,c,i,t}}_{\text{Available in Compustat}} \\ &- \underbrace{\text{Compensation}_{f,c,i,t} - \text{Production Taxes}_{f,c,i,t}}_{\text{Not Available in Compustat}}. \end{aligned} \tag{2}$$

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$$\pi_{c,i,t} = \frac{\text{Intermediates}_{c,i,t}}{\text{Intermediates}_{c,i,t} + \text{Not Available}_{c,i,t}}. \tag{3}$$

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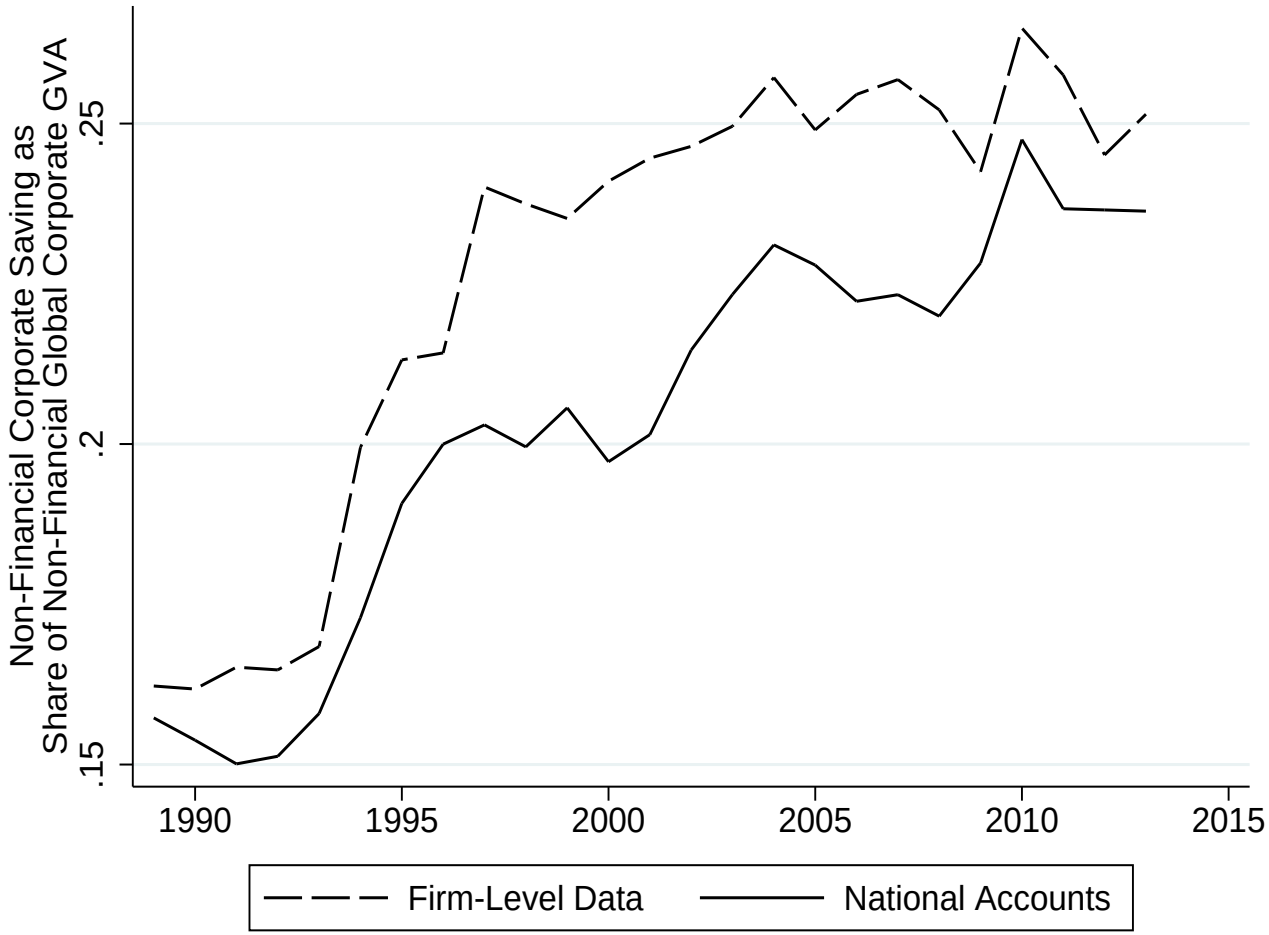
$$\pi_{c,i,t} = \frac{\text{Intermediates}_{c,i,t}}{\text{Intermediates}_{c,i,t} + \text{Not Available}_{c,i,t}}. \tag{3}$$

$$\text{GVA}_{f,c,i,t} = \text{Sales}_{f,c,i,t} - \pi_{c,i,t} \times \text{Available}_{f,c,i,t}. \tag{4}$$

▸ other variables

Corporate saving rates (non-financials)



- firm data includes 60% of global non-financial corporate GVA

Trends in saving rates by industry (p.p. per 10 years)

Industry	Saving Rate	Net Lending Rate
Agriculture and Mining	3.20	-1.00
Construction	0.41	0.70
Information and Communications	-3.40	1.80
Total Manufacturing	1.95	1.49
Chemical, Petro, and Coal	1.01	0.24
Electronics and Electrical	2.79	4.53
Transportation Equipment	1.94	0.60
Rubber, Plastic, Glass, Metal	0.77	0.30
Other Manufacturing	2.12	1.78
Services	2.43	4.44
Transportation	-1.83	-1.65
Utilities	-6.06	-9.14
Wholesale/Retail Trade	0.60	0.96

Decomposition into within and between components

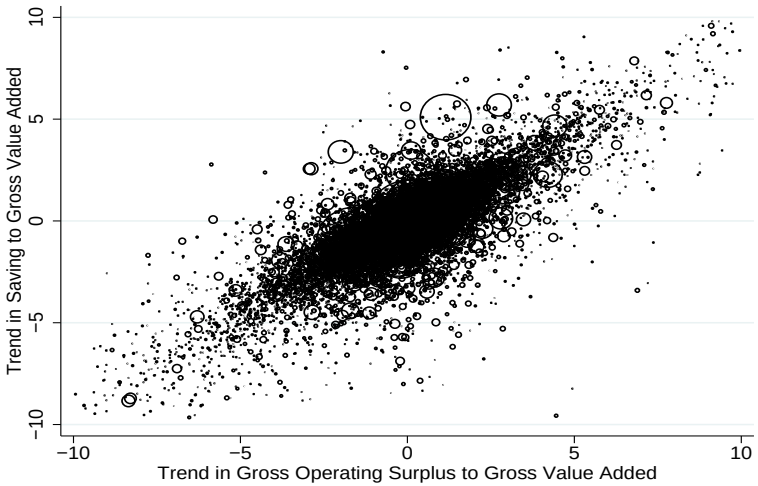
For value added weights:

$$\omega_{i,t} = \frac{\text{GVA}_{i,t}}{\text{GVA}_t},$$

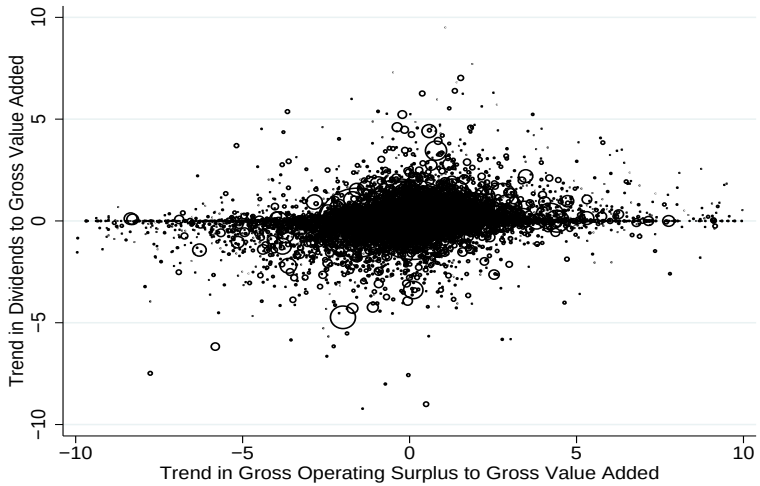
we have:

$$\Delta\left(\frac{\text{GS}_t}{\text{GVA}_t}\right) = \overbrace{\frac{1}{2}\sum_i (\omega_{i,t} + \omega_{i,t-1})\,\Delta\left(\frac{\text{GS}_{i,t}}{\text{GVA}_{i,t}}\right)}^{\text{Within-Industry Component} = 7.6 \text{ p.p.}} + \underbrace{\frac{1}{2}\sum_i \left(\frac{\text{GS}_{i,t}}{\text{GVA}_{i,t}} + \frac{\text{GS}_{i,t-1}}{\text{GVA}_{i,t-1}}\right)\Delta\omega_{i,t}}_{\text{Between-Industry Component} = 1.1 \text{ p.p.}}. \quad (5)$$

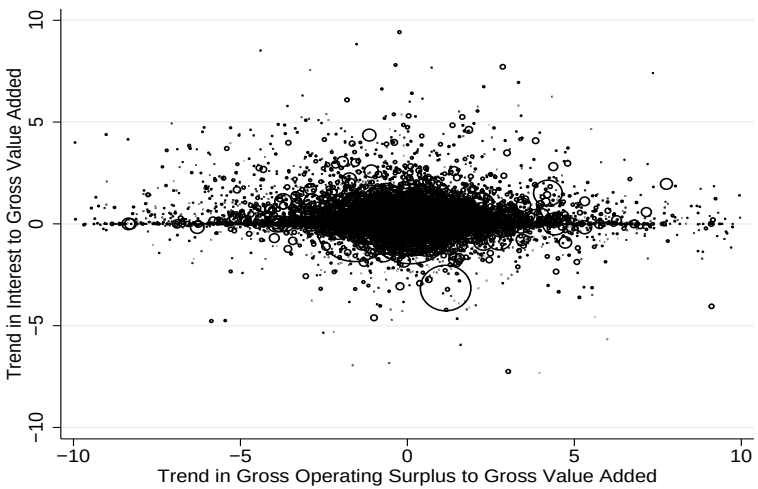
Components of gross operating surplus at the firm level



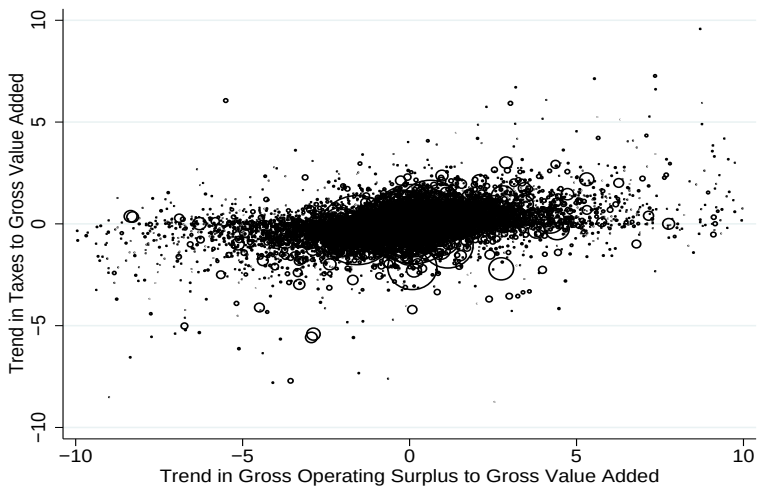
(a) Saving



(b) Dividends

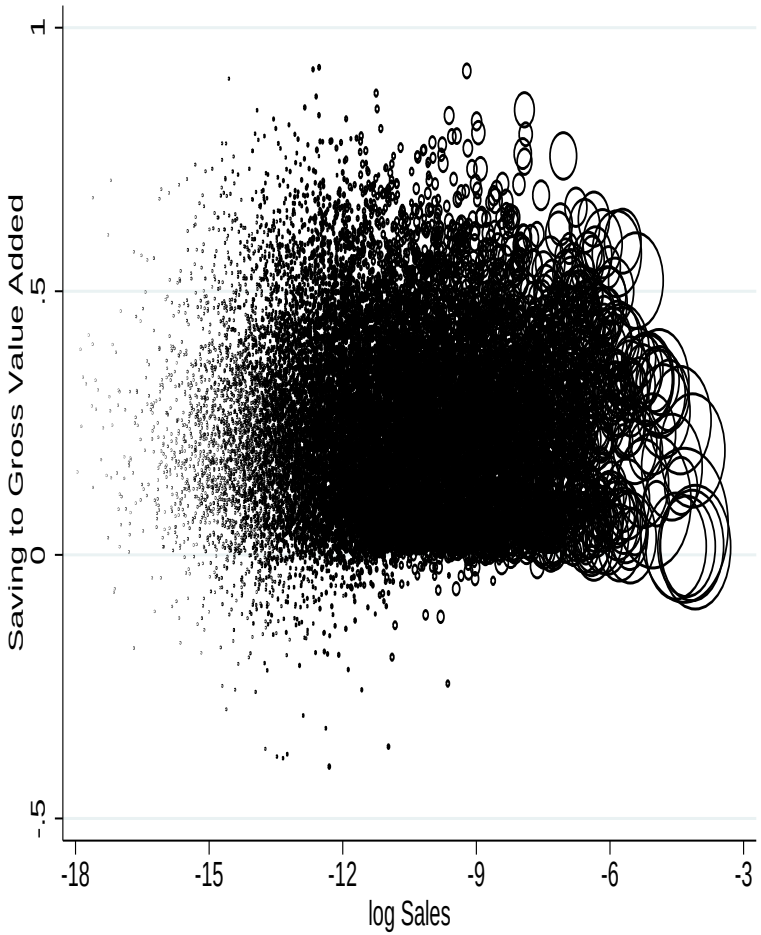


(c) Interest

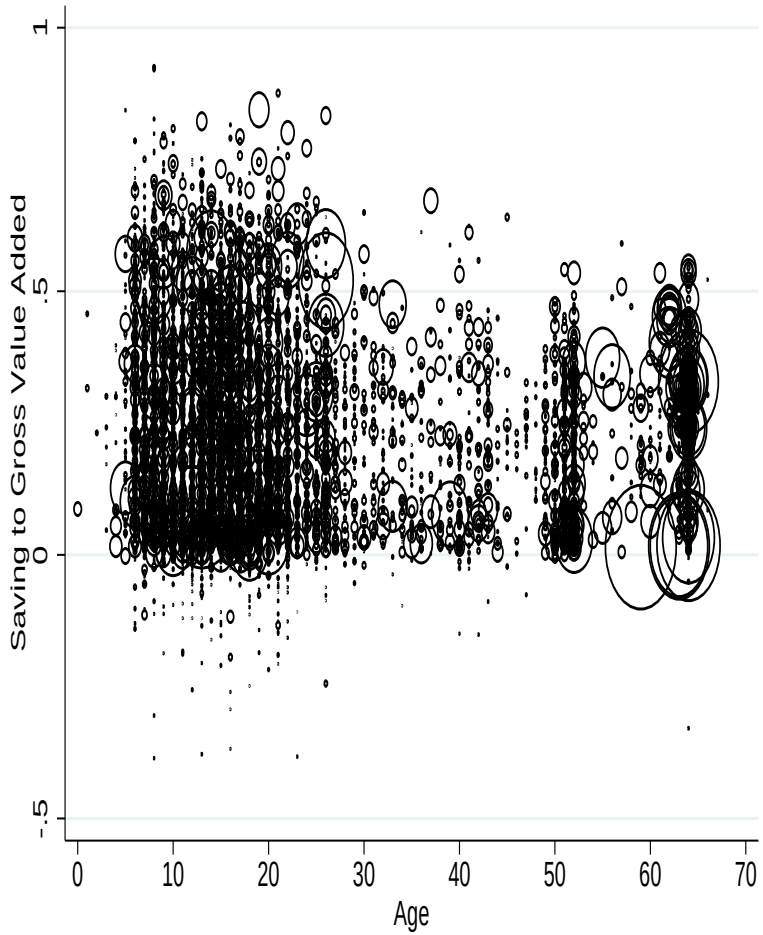


(d) Taxes

Saving rates and firm characteristics



(a) Firm Size

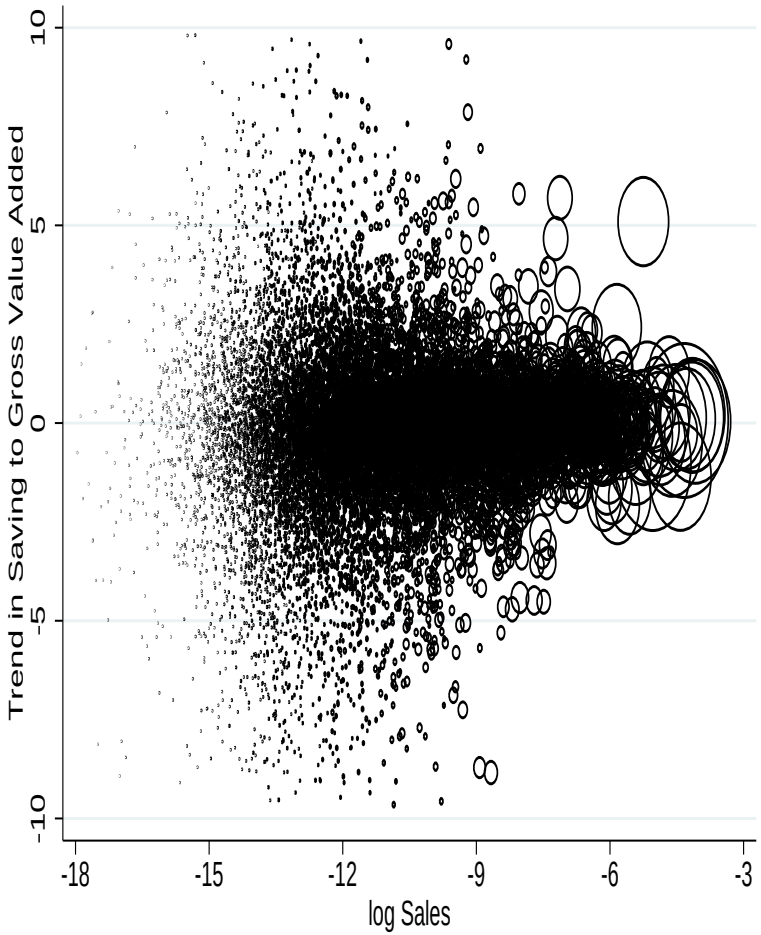


(b) Firm Age

Decomposition of changes in saving rate across firm types

(p.p.)	Beginning to End		Annual Changes	
	Within	Between	Within	Between
Groups	(1)	(2)	(3)	(4)
Size	12.11	0.29	12.10	0.29
Age	10.17	2.23	7.61	4.79
Size and Age	10.39	2.01	7.38	5.01

Trends in saving rates and firm characteristics



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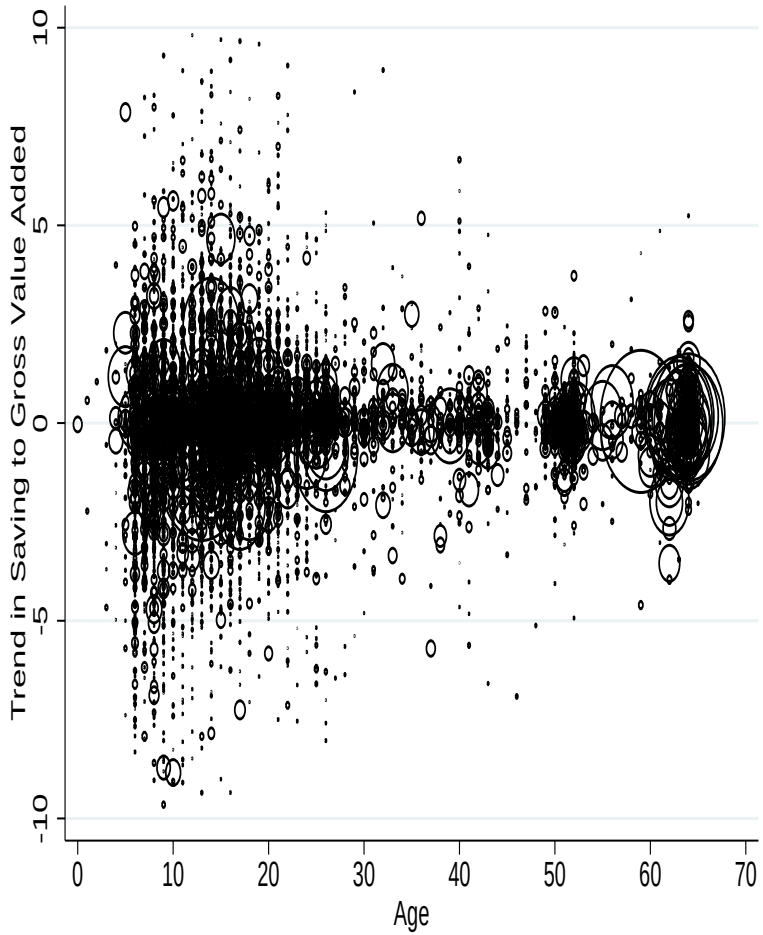

(b) Firm Age

Multinational production

- Mismatch between production and profit realization: ▸ example
  - U.S. GVA reduced when company produces through foreign affiliate.
  - U.S. GS not affected because it is associated with headquarters.
- Opposite movements in foreign countries $\Longrightarrow$ no mismatch globally.
- Rise of global corporate saving does not reflect cross-country reshuffling of profits and production.

Are firms with significant foreign income different?

	Foreign income above 1%			
(p.p.)	Levels		Trends	
Saving / GVA	3.84	6.23	0.34	0.30
Dividend / GVA	-0.61	-0.66	0.05	-0.01
Taxes / GVA	0.68	0.42	0.03	0.00
Interest / GVA	-0.83	-1.33	-0.04	-0.04
GOS / GVA	3.07	4.77	0.39	0.26
GVA Weighted	Yes	No	Yes	No

How was corporate saving used?

$$\underbrace{\text{Saving} - \text{Investment}}_{\text{Net Lending}} = \text{Net Buybacks} + \Delta \text{ Net Financial Assets.}$$

	Net Buybacks		Debt Repayment		Cash Holdings	
	0.267	0.277	0.397	0.343	0.322	0.057
	(0.064)	(0.071)	(0.051)	(0.048)	(0.142)	(0.054)
GVA Weighted	Yes	No	Yes	No	Yes	No

Uses of corporate saving by subperiod

	Net Buybacks		Debt Repayment		Cash Holdings	
1989-2000	0.174	0.326	0.516	0.346	0.053	-0.075
	(0.098)	(0.075)	(0.149)	(0.067)	(0.074)	(0.028)
2001-2013	0.130	0.129	0.346	0.337	0.312	0.050
	(0.029)	(0.026)	(0.067)	(0.051)	(0.127)	(0.049)
1989-2006	0.275	0.292	0.481	0.393	0.172	-0.042
	(0.090)	(0.076)	(0.050)	(0.050)	(0.063)	(0.058)
2007-2013	0.098	0.074	0.446	0.435	0.218	0.050
	(0.028)	(0.018)	(0.082)	(0.051)	(0.053)	(0.031)
GVA Weighted	Yes	No	Yes	No	Yes	No

Summary of micro facts

1. Rise of corporate saving pervasive across industries.
2. Rise of corporate saving within industries and types of firms.
3. Proximate cause is increase in corporate profits (even for multinationals).
4. Allocated to buybacks, cash, and repayment of debt (time-varying).

Model

What we do with the model

- Workhorse GE model with capital market imperfections.
- Focus on "global shocks" rather than idiosyncratic factors.
- Quantify how parameter changes affected cost of capital, profits, financial policies, investment, and saving.
- Significant role of real interest rate, price of investment goods, corporate income taxes, and markups.

Households

- Population grows at rate g.
- Households maximize:

$$\sum_{t=0}^{\infty} \beta^t \log\left(C_t\right), \tag{6}$$

$$\begin{aligned} C_t + \sum_i v_{it} s_{it+1} &= w_t L + T_t^h \\ &+ (1 + r_t) B_t - (1 + g) B_{t+1} \\ &+ \sum_i \left((1 - \tau_t^d) d_{it} - e_{it} + v_{it} \right) s_{it}. \end{aligned} \tag{7}$$

Final goods

- Final good CES aggregate of varieties:

$$Y_t = \left(\sum_i y_{it}^{\frac{\varepsilon}{\varepsilon-1}} \right)^{\frac{\varepsilon}{\varepsilon-1}}. \tag{8}$$

- Final good uses:

$$Y_t = C_t + \xi_t X_t + \mathrm{RC}_t. \tag{9}$$

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- Markup and economic profit share:

$$\mu = \frac{\epsilon}{\epsilon - 1} \quad \text{and} \quad s_\pi = \frac{\mu - 1}{\mu}. \tag{10}$$

Corporate sector

- Firms choose:
  1. prices and output (monopolistic competition)
  2. labor and capital (investment)
  3. dividends, net equity issuance, and debt

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- Objective function:

$$\max_{\{d_{it},e_{it},b_{it+1},x_{it},\ell_{it},p_{it}\}_{t=0}^{\infty}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left\{ (1-\tau_t^d) d_{it} - e_{it} \right\}. \tag{11}$$

Dividend policy

- Whenever $\tau_t^d > 0$, repurchases preferred to dividends.
- Postulate dividend policy function:

$$d_{it} = \kappa \left(p_{it} y_{it}\right)^{\kappa_r} \left(\xi_t k_{it}\right)^{\kappa_k}, \tag{12}$$

where:

κ_r : revenue elasticity of dividends,

κ_k : (fixed) assets elasticity of dividends.

Financing frictions

- Equity flotation costs:

$$\mathrm{EC}_{it} = \lambda e_{it} \mathbb{I}\left(e_{it} \geq 0\right). \tag{13}$$

- Collateral constraint:

$$b_{it+1} \leq \theta \xi_{t+1} k_{it+1}. \tag{14}$$

Production and capital accumulation

- Production function:

$$y_{it} = \exp(A_{it}) \left(\alpha k_{it}^{\frac{\sigma-1}{\sigma}} + (1-\alpha) \ell_{it}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}, \tag{15}$$

$$A_{it} = -\frac{\sigma_A^2}{2(1+\rho_A)} + \rho_A A_{it-1} + \sigma_A u_{it} \text{ with } u_{it} \sim \mathbb{N}(0,1). \tag{16}$$

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- Capital accumulation:

$$(1+g) k_{it+1} = (1-\delta) k_{it} + x_{it}. \tag{17}$$

- Convex adjustment costs: $\text{CC}_{it} = \frac{\psi (k_{it+1} - k_{it})^2}{2 k_{it}}$.

Corporate flow of funds

- Profits (operating):

$$\pi_{it}(k_{it}, A_{it}; Y_t, w_t) = p_{it} y_{it} - w_t \ell_{it}. \tag{18}$$

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- Budget constraint:

$$\begin{aligned} d_{it} + (1 + \tau_t^x)\,\xi_t x_{it} &= (1 - \tau_t^c)\pi_{it} + \tau_t^f - \overbrace{\mathrm{RC}_{it}}^{\mathrm{EC}_{it}+\mathrm{CC}_{it}} \\ &+ \tau_t^c\,(\delta \xi_t k_{it} + r_t b_{it}) \\ &+ (1 + g) b_{it+1} - (1 + r_t) b_{it} + e_{it}. \end{aligned} \tag{19}$$

General equilibrium and flow of funds

- Equilibrium:
  - household and firms maximize values
  - labor, capital, and goods markets clear
  - government budgets balance

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- Equilibrium:
  - household and firms maximize values
  - labor, capital, and goods markets clear
  - government budgets balance
- Saving flows:

$$S_t = Y_t - C_t - \mathrm{RC}_t = \xi_t X_t. \tag{20}$$

$$S_t^f = B_t - B_{t+1} - E_t + \xi_t X_t. \tag{21}$$

Plan

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   - external parameters from various sources go
   - internal parameters to match macro and micro moments go

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   - external parameters from various sources go
   - internal parameters to match macro and micro moments go
2. Introduce parameters changes from end of sample (2009-2013).
3. Compare key aggregates between new and old BGP.

Changes in parameters across BGPs

Parameter	From	To	Rationale
ξ	1.000	0.800	Karabarbounis and Neiman (2014).
τ^c	0.480	0.250	OECD Corporate Income Tax.
τ^x	0.117	0.147	McDaniel (updated).
r	0.043	0.009	King and Low (2014).
g	0.023	0.000	Slowdown of growth.
δ	0.074	0.093	U.S. National Accounts.
s_π	0.050	0.062	Generate observed decline in labor share.
T^f/Y	0.037	0.059	Stabilize tax payments to value added.

Quantifying the rise of corporate saving

Start of Sample	$\frac{S^f}{Y}$	$\frac{wL}{Y}$	$\frac{D}{Y}$	$\frac{I}{Y}$	R
1. Data	0.162	0.612	0.101	0.215	
2. Model	0.162	0.612	0.101	0.215	0.153
End of Sample (Δ)	$\frac{S^f}{Y}$	$\frac{wL}{Y}$	$\frac{D}{Y}$	$\frac{I}{Y}$	R
3. Data	0.085	-0.054	0.005	-0.006	
4. Model	0.081	-0.054	-0.001	0.019	-0.031

- Cost of capital $R := \frac{(1-s_L-s_\pi)Y}{K}$.

Mechanisms

- Corporate saving rate:

$$\frac{S^f}{Y} = 1 - \underbrace{\frac{wL}{Y}}_{\text{labor share}} - \underbrace{\frac{D}{Y}}_{\text{dividends}} - \text{Taxes \& Payments to Capital.} \quad (22)$$

- Labor share:

$$\frac{wL}{Y} = \left(\frac{1}{\mu}\right)\left(1 - \alpha^{\sigma}\left(\frac{\exp(A)}{\mu R}\right)^{\sigma-1}\right). \quad (23)$$

- Dividend share:

$$\frac{D}{Y} = \kappa\left(\frac{\xi K}{Y}\right)^{\kappa_k}\left(\frac{1}{Y}\right)^{1-\kappa_r-\kappa_k}. \quad (24)$$

Counterfactuals

Changes across BGPs	$\frac{S^f}{Y}$	$\frac{wL}{Y}$	$\frac{D}{Y}$	$\frac{I}{Y}$	R
1. Model	0.081	-0.054	-0.001	0.019	-0.031
2. No ξ	0.057	-0.029	-0.003	-0.005	0.005
3. No τ^c	0.048	-0.045	0.001	0.006	-0.028
4. No r	-0.015	-0.026	-0.005	-0.051	0.007
5. No s_π	0.055	-0.026	-0.002	0.001	-0.027

CES vs. CD production function

End of Sample (Δ)	$\frac{S^f}{Y}$	$\frac{wL}{Y}$	$\frac{D}{Y}$	$\frac{I}{Y}$	R
1. Data	0.085	-0.054	0.005	-0.006	
2. Model CES ($\sigma = 1.25$)	0.081	-0.054	-0.001	0.019	-0.031
3. Model C-D ($\sigma = 1.00$)	0.054	-0.008	-0.007	-0.011	-0.030

Conclusion

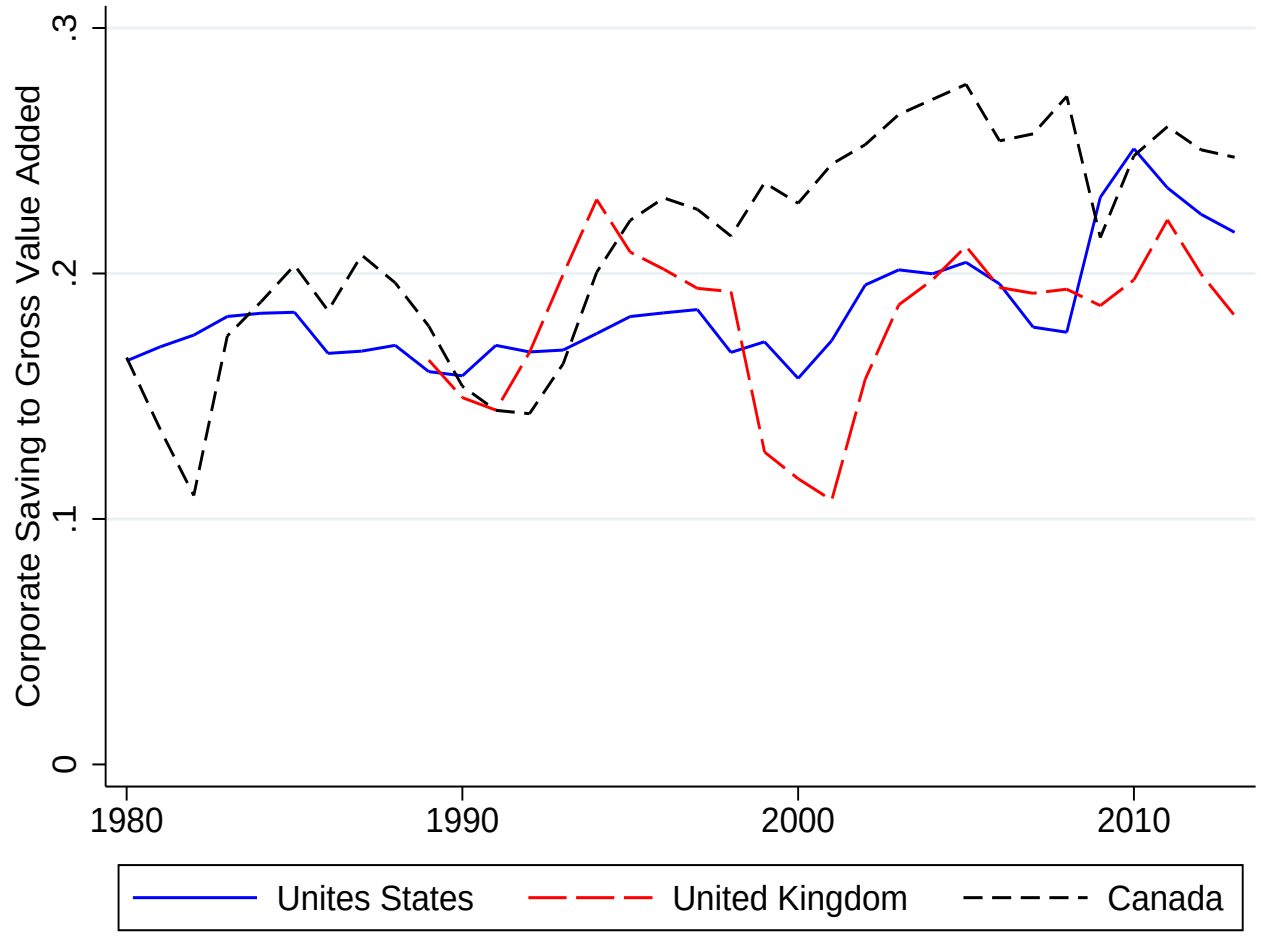
Takeaways

1. Global rise of corporate saving and net lending.
2. Reflects decline in labor share and sticky dividends.
3. Increase observed within many countries, industries, and firms.
4. Quantitatively important role of decline in cost of capital.

EXTRA SLIDES

Corporate saving rates by country

back



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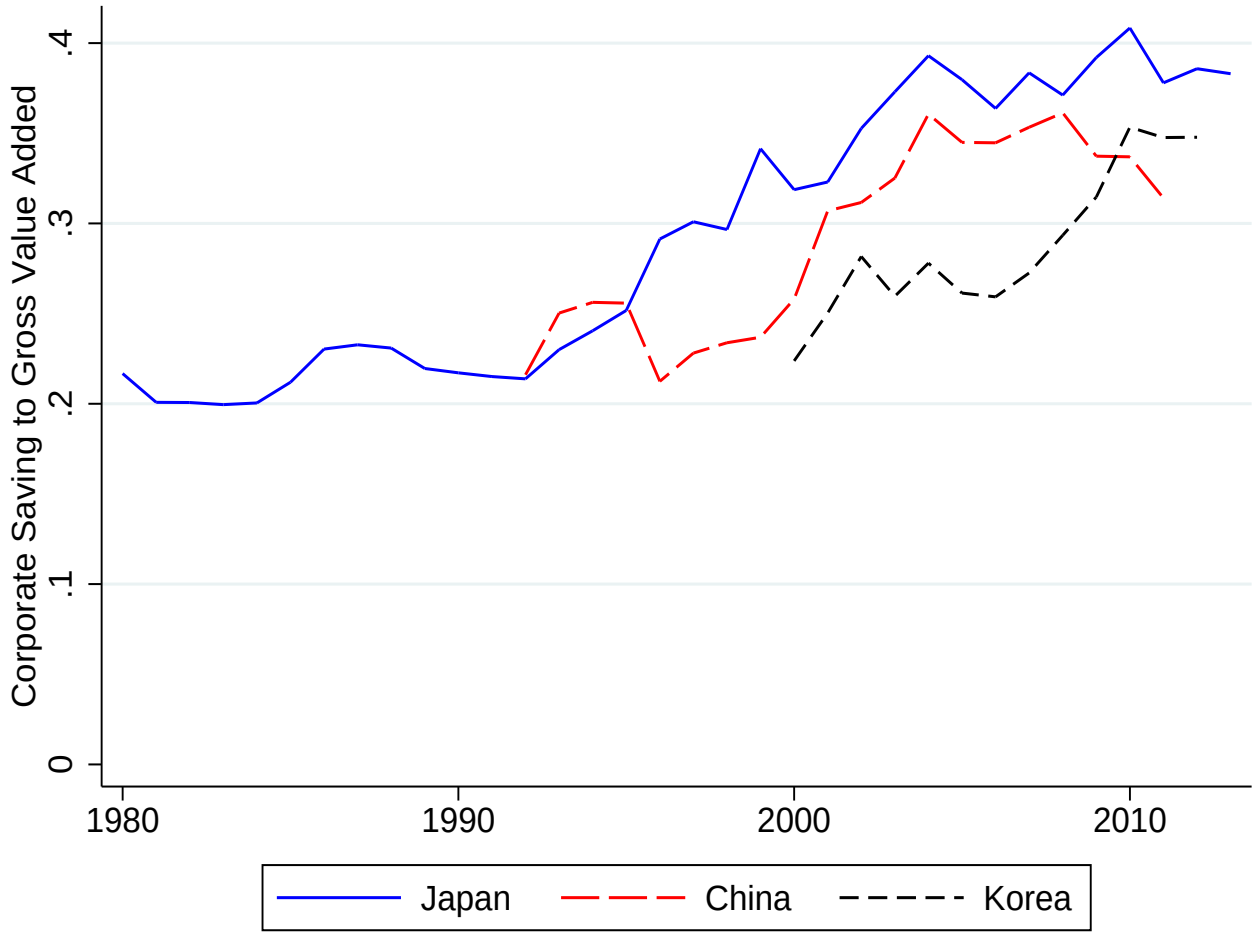

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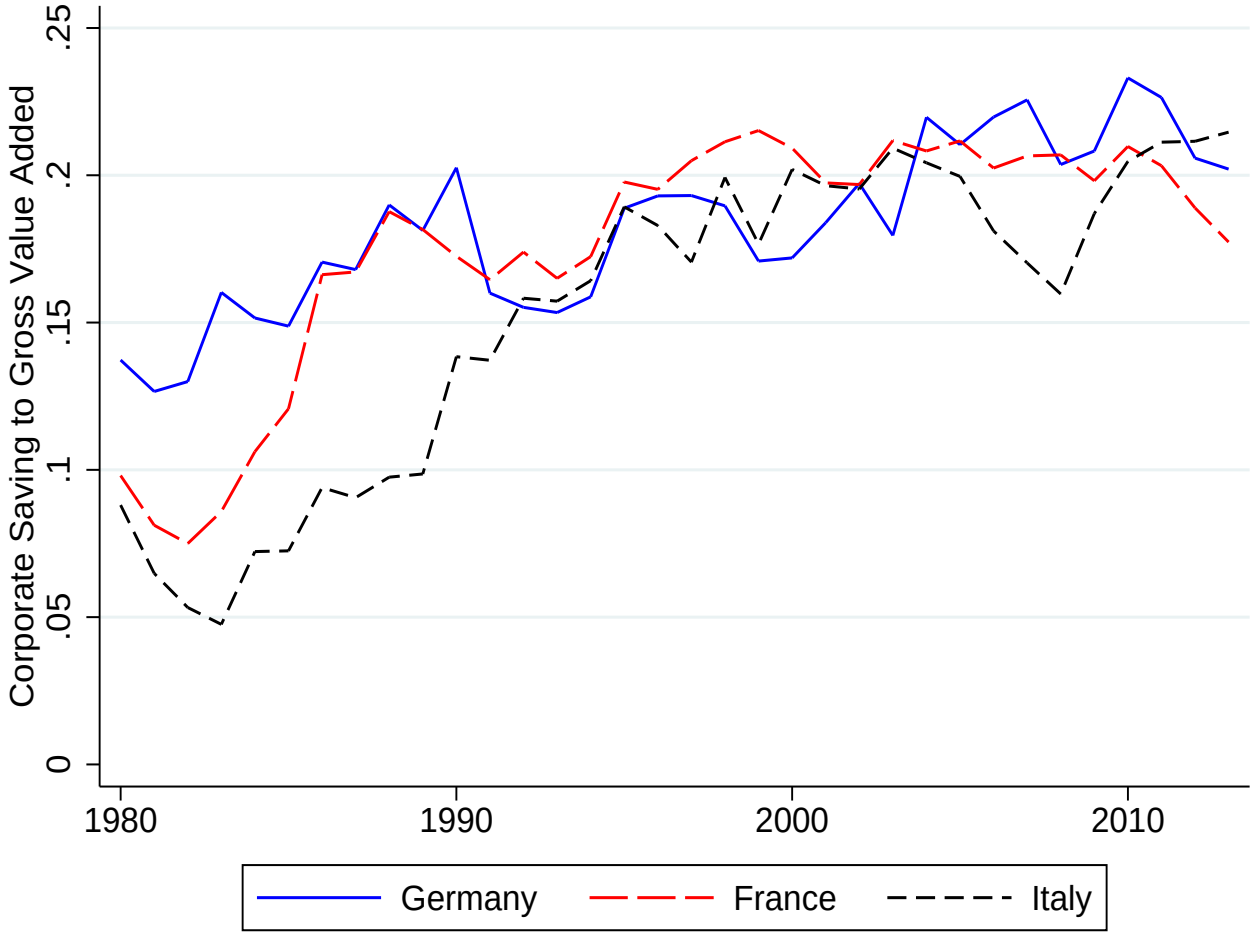
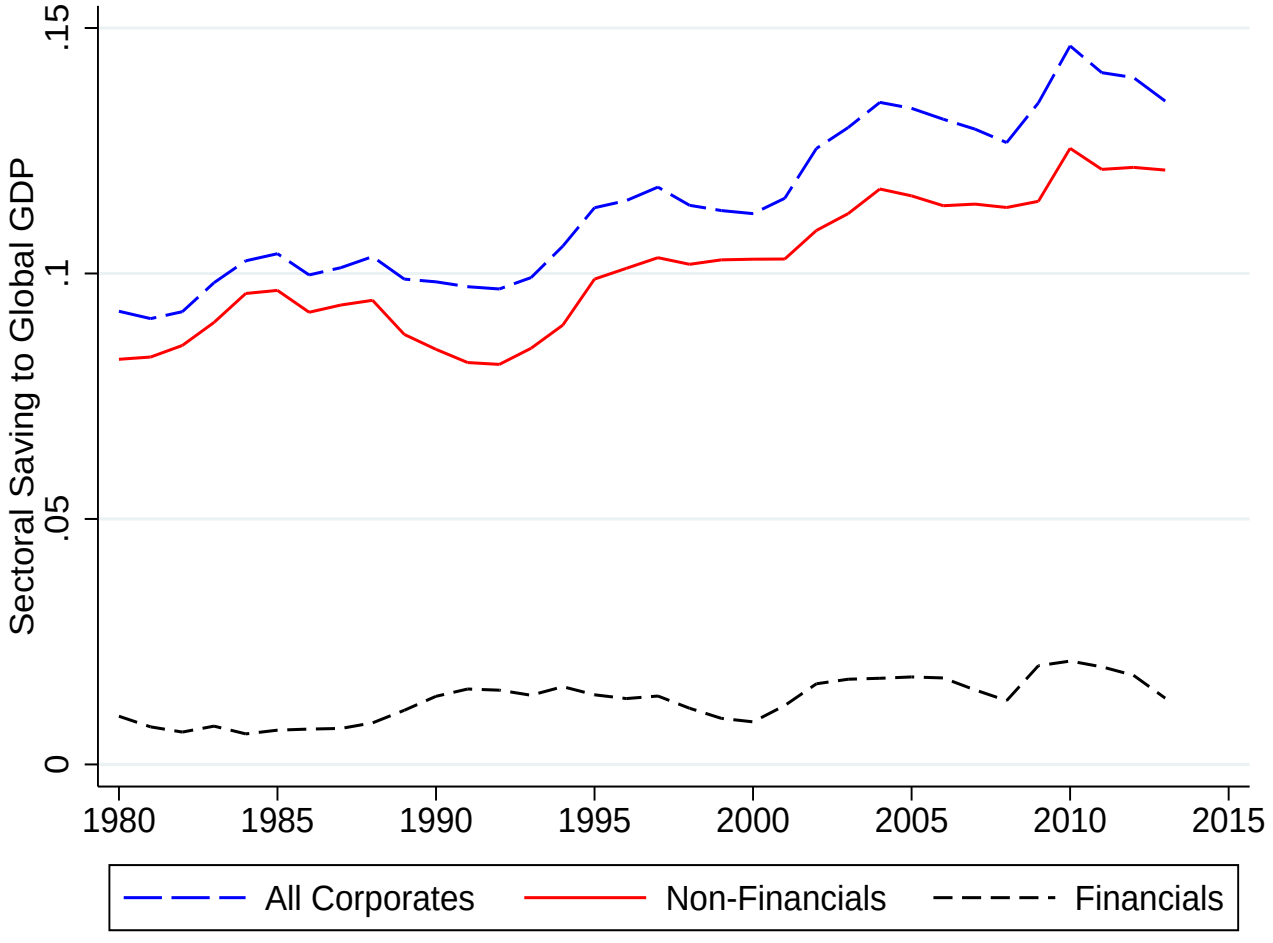


Corporate saving in non-financials vs. financials

back



Variable definitions at the firm level

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$$\text{GVA}_{f,c,i,t} = \text{Sales}_{f,c,i,t} - \pi_{c,i,t} \times \text{Available}_{f,c,i,t}. \tag{25}$$

$$\text{GOS}_{f,c,i,t} = \underbrace{\text{Sales}_{f,c,i,t} - \text{Oper. Exp.}_{f,c,i,t} + \text{Depr.}_{f,c,i,t}}_{\text{Operating Income Before Depreciation and Amortization}} + \text{R\&D}_{f,c,i,t}. \tag{26}$$

$$\text{GS}_{f,c,i,t} = \text{GOS}_{f,c,i,t} - \text{Interest}_{f,c,i,t} - \text{Corp. Taxes}_{f,c,i,t} - \text{Dividends}_{f,c,i,t}. \tag{27}$$

Multinational production example

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U.S. HQ company earns 1$ produced in:		United States	Foreign	
Repatriation of 1$ in U.S.?		–	No	Yes
United States	GVA and GOS	1	0	0
	Saving	1	1	1
	Reinvested Earnings	0	-1	0
	Net Dividends	0	0	-1
Foreign	GVA and GOS	0	1	1
	Saving	0	0	0
	Reinvested Earnings	0	1	0
	Net Dividends	0	0	1

External parameters

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Parameter	Value	Source
g	0.023	World Bank.
r	0.043	King and Low (2014).
σ	1.25	Karabarbounis and Neiman (2014).
δ	0.074	U.S. National Accounts.
ξ	1.00	Normalization.
s_π	0.05	Basu and Fernald (1997).
θ	1.70	Ratio of debt to fixed assets (Compustat).
λ	0.028	Gomes (2001).
τ^d	0.17	OECD Dividend Tax.
τ^c	0.48	OECD Corporate Income Tax.
κ_r	0.63	Estimation of dividend policy function.
κ_k	0.05	Estimation of dividend policy function.

Internal parameters

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Parameter	Value	Source
α	0.292	Labor share of 0.612.
κ	0.170	Dividend to output of 0.101.
T^f/Y	0.037	Corporate saving rate of 0.162.
τ^x	0.117	Investment rate of 0.215.
ψ	5.500	Firm-level revenue elasticity of investment of 0.36.
ρ_A	0.800	Autocorrelation log revenues of 0.79.
σ_A	0.480	Standard deviation log revenues of 1.79.