Rise of Superstar Firms and Fall of the Price Mechanism

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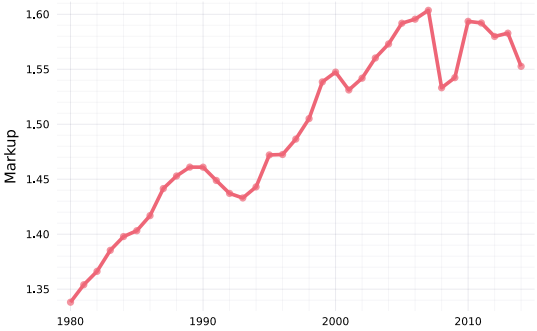
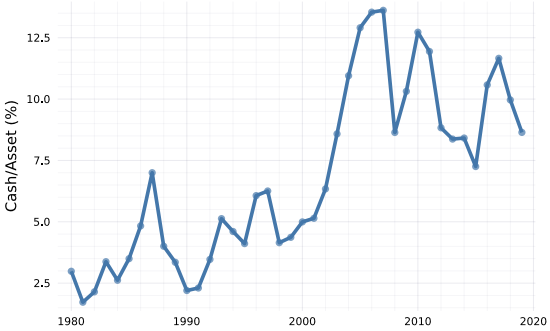
Rise of the Superstar Economy

De Loecker, Eeckhout, and Unger (2020, QJE)



Bates, Kahle, and Stulz (2009, JF)



- increasing **corporate market power**
- increasing **corporate internal financing**

Research Questions

- **Macro-finance implications of the new Superstar Economy**

  1. **what is its origin?**
  2. **why do firms hold excessive cash?**
  3. **how does the rise of Superstar Economy affect capital misallocation?**

Main Story

- **Primitive shocks**: economic fundamental changes from both demand and supply sides
  - **demand side**: customers care more about product quality than quantity
  - **supply side**: digitization allows firms to increase operating scale
- **Consequences**: income and **risk** redistribution towards right-tail firms
  - earnings/markup as a **convex** function of product quality ▸ figure
- **Changes in corporate risk management policy**: rely more on internal financing
  - **external financing costs** + precautionary saving incentive
- **Aggregate impacts**: increasing capital allocation inefficiency
  - unequalized marginal cost of capital within internal financing region ▸ figure
  - Coase (1937): market is being replaced by firms for allocating resources

This Paper

- **Punchline**: increasing inefficiency of capital allocation in Superstar Economy
- **Underlying mechanism**: fundamental changes ⇒ earnings level and risk ⇒ risk management policy ⇒ capital allocation efficiency
- **Roadmap**

1. **Motivating Facts**
2. **Theory**
3. **Reduced-form Evidence**
4. **Quantitative Results**

Related Literature

- **Superstar firms**: Autor et al. (2020); De Ridder (2019); Korinek and Ng (2017); ...
- **Misallocation**: Hsieh and Klenow (2009); Gopinath et al. (2017); Asker, Collard-Wexler and De Loecker (2014); ...
- **Corporate liquidity management**: Bolton, Chen and Wang (2011); Wang, Wang and Yang (2012); Bates, Kahle and Stulz (2009); ...
- **Declining number of public firms**: Decker et al. (2016); Doidge et al. (2018); ...
- **Distributional macro**: Moll (2014); Kaplan, Moll and Violante (2018); ...

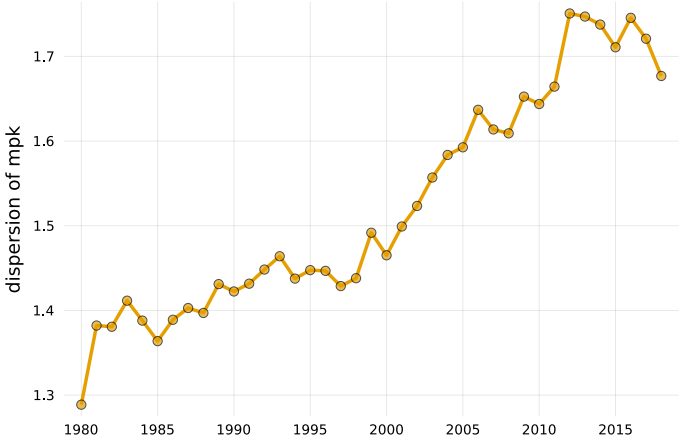
- **Firm-market boundary**: Coase (1937); Williamson (1975); ...

  - production side v.s. **financing side**
  - institutional quality v.s. **economic fundamental changes**

▸ contributions

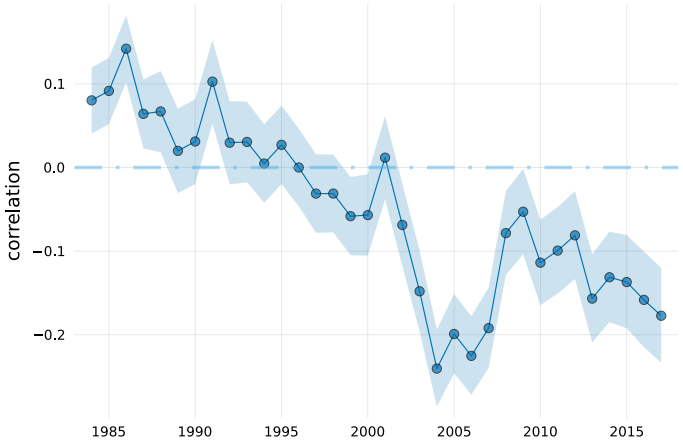
Three Facts

- **Fact I: increasing dispersion of firm-level marginal revenue return to capital**



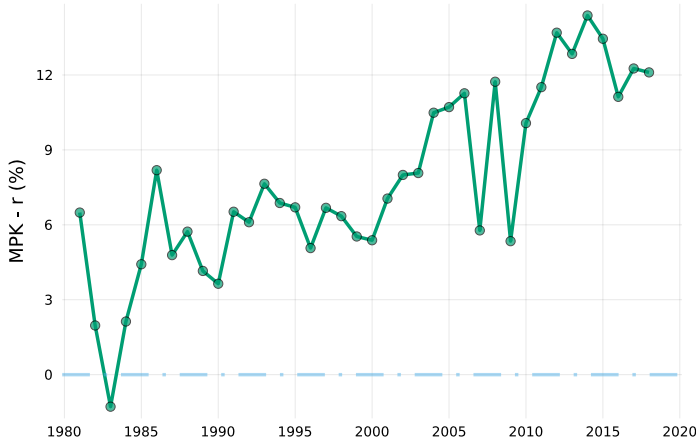
Three Facts

- **Fact II: negative correlation between firm-level TFP and net finance dependence**



Three Facts

- **Fact III: increasing gap between MPK and r**



Facts and Interpretation

- **Three Facts**
  - increasing dispersion of firm-level marginal revenue return to capital
  - negative correlation between firm-level TFP and net finance dependence
  - increasing gap between MPK and r
- **Interpretation**: capital allocation efficiency has been declining in the U.S.
- **Conjecture**: related to this new Superstar Economy and its origin
- **Next**: a theoretical model to explain why

Model Setup – Agents

- An infinite-horizon continuous-time economy with $[0, 1]$ entrepreneurs
- Stochastic differential utility with standard normalized aggregator $f(c, J)$
- (Two-layer) optimization problem
  1. optimal consumption c and savings
  2. optimal savings portfolio: capital ζ, cash ω, debt b
- State of the economy: $\Lambda_t(\zeta, \omega, b)$

Model Setup – Earnings

- Each entrepreneur can sell a product with quality ζ
  - demand: $p(\zeta) = \zeta^{\phi}$
    - ϕ: taste for quality
  - supply: $\Theta(y) = f_0 + \xi_0 y^{\frac{1}{\eta}}$
    - $\frac{1}{\eta}$: curvature of the supply curve, i.e., how costly for firms to expand operating scale
    - fixed cost assumption: De Ridder (2019)
  - earnings (and also markup) as a function of underlying capital quality

$$\pi(\zeta) = (1-\eta)\left(\frac{\eta}{\xi_0}\right)^{\frac{\eta}{1-\eta}} \zeta^{\frac{\phi}{1-\eta}} - f_0 \tag{1}$$

- Stochastic capital quality process

$$d\zeta_t = \left(\bar{\mu} + \iota_t^{\zeta} - \delta\zeta_t\right)dt + \sigma\sqrt{\zeta_t}d\mathcal{Z}_t \tag{2}$$

Model Setup – Risk Management

- **External financing**: credit risk-free debt
  - timeline adjustment and earnings-based borrowing constraint
  - **transaction costs** of using the external financial market

$$\mathbb{1}_{b \neq 0} \left(\chi_0 + \chi_1 |b| \right)$$

- **Internal financing**: completely risk-free cash
  - predetermined cash carry cost: λ
  - non-negativity condition: $\omega_{i,t} \geq 0; \ \forall i, t$

  - cash is **not** a publicly traded asset: no specific cash market clearance condition
  - classical cash inventory approach

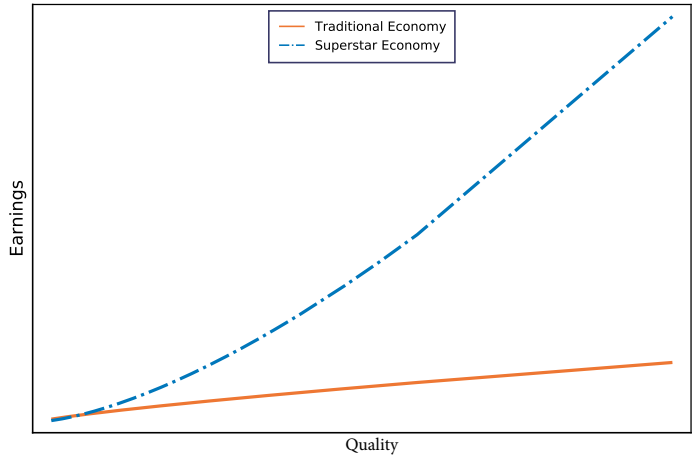
Economic Fundamental Shocks ⇒ Risky Superstar Economy

- **Quality-based non-homogeneous earnings process**

$$d\pi_t = \underbrace{\left[\pi'(\zeta_t)\left(\bar{\mu} + \iota_t^{\zeta} - \delta\zeta_t\right) + \frac{\sigma^2\zeta_t}{2}\pi''(\zeta_t)\right]dt}_{\text{drift component}} + \underbrace{\pi'(\zeta_t)\,\sigma\sqrt{\zeta_t}}_{\text{volatility component}}\, d\mathcal{Z}_t \tag{3}$$

  - shifts in supply and demand curves: $\uparrow \phi$ and $\uparrow \eta \Rightarrow \pi$ convex in $\zeta \Rightarrow \pi'$ increasing in ζ
  - π' : rise of superstars
  - π' : superstars are inherently riskier

Risky Superstar Economy with Income and Risk Redistribution



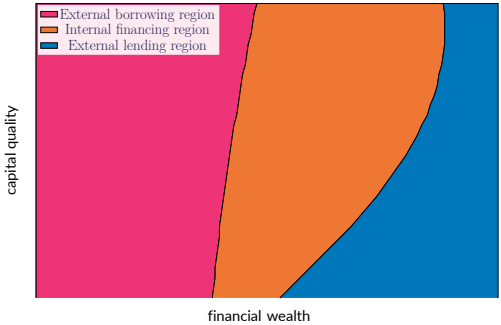
- **Generality**: convexity + Ito's lemma

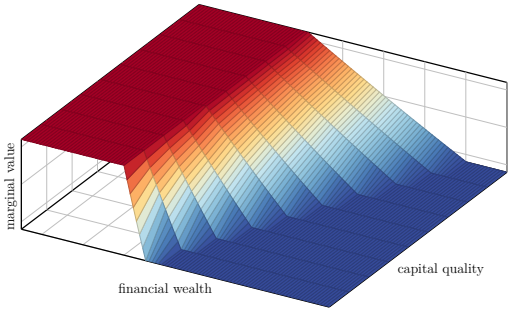
intro

Dynamic Risk Management ⇒ Firm-Market Boundary

- **Optimal cash holdings policy**: $\left[\underline{\Omega}^{\zeta}, \overline{\Omega}^{\zeta}\right]$
  - upper boundary $\overline{\Omega}^{\zeta}$: cash carry cost
  - lower boundary $\underline{\Omega}^{\zeta}$: external financing cost
  - depend on capital quality ζ
- **Unintended outcome**: three sub-economies
  1. **external lending region**: $\omega = \overline{\Omega}^{\zeta}$ and $b < 0$
  2. **external borrowing region**: $\omega = \underline{\Omega}^{\zeta}$ and $b > 0$
  3. **internal financing region**: $\underline{\Omega}^{\zeta} < \omega < \overline{\Omega}^{\zeta}$ and $b = 0$

Endogenous Firm-Market Boundary





- self-financing (through safe assets) *increases* misallocation
- firm-market *boundary* is exactly the Neumann *boundary* conditions of certain PDEs
- these PDEs come from optimal decisions made by individual entrepreneurs

▸ intro

A Tale of Two Allocation Systems

- **Firm-market boundary**: a set of downward and upward control boundaries $\left\{\overline{\Omega}^i, \underline{\Omega}^i\right\}_{i\in[0,1]}$.

  1. **area governed by the price mechanism**

$$\Psi_t = \iiint \left(1 - \mathbb{1}_{\overline{\Omega}^\zeta < \omega < \underline{\Omega}^\zeta}\right) \Lambda_t(\zeta, \omega, b)\, d\zeta d\omega db$$

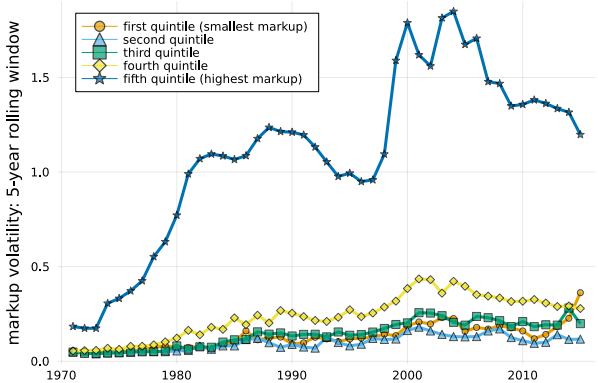
  2. **area governed by entrepreneurs**

$$\Psi_t^E = 1 - \Psi_t$$

- **Why do we need this?**

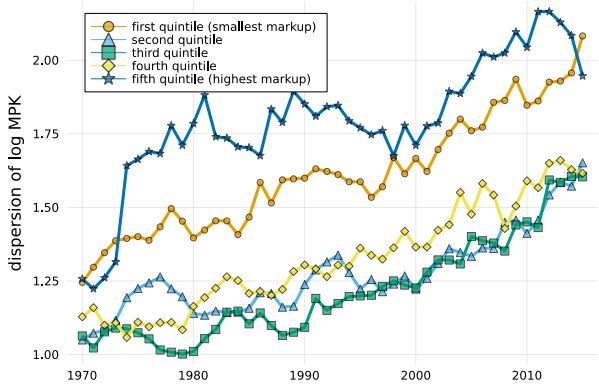
  - invisible hand is invisible by nature, so is its boundary
  - formally establish Coase (1937)'s idea in GE with a well-defined firm-market boundary

Reduced-Form Evidence I: Risky Superstars



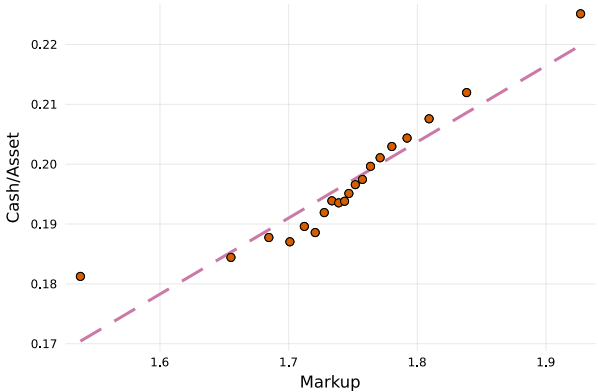
- **discussion on Herskovic et al. (2016)**
  - different definitions
  - size premium & profitability premium
  - "realized" outcomes

Reduced-Form Evidence II: Markup and Misallocation



- left-tail firms: borrowing constraint story
- right-tail firms: risk management story

Reduced-Form Evidence III: Markup and Cash holdings



- a **positive** and **significant** association

Parameterization

- **Two subsamples** (Farhi and Gourio, 2018):
  - traditional economy (1980-1999)
  - superstar economy (2000-2015)
- Standard calibration + estimation (SMM-MCMC) ▸ calibration ▸ estimation
- Changes in parameters
  - an increase in taste for quality ϕ: 0.43 → 0.56
  - an increase in fixed production costs f_0: 0.11 → 0.32
  - an increase in operating scale η: 0.48 → 0.64
  - a reduction in marginal cost ζ_0: 0.94 → 0.26

Quantitative Results

Macro-Finance Indicators	Trends	
	Data	Model
degree of "misallocation"	+0.22	+0.31
correlation between TFP and net finance	-0.164	-0.131
MPK - r	+5.00%	+5.15%
area disciplined by the price mechanism	-	-10.88%

- Ψ: wealth-weighted share of firms using external financial market
- Market system effectiveness: **11%** decline
- Bils, Klenow and Ruane (2021): **15%** decline in capital allocation efficiency
  - specific government policies
  - capital/labor market frictions

Decomposition

	Data	Fix ϕ	Fix η	Fix f_0	Fix ξ_0	Fix η, f_0, & ξ_0	Fix ϕ, η, f_0, & ξ_0	Fix β
degree of "misallocation"	+0.22	+0.18	+0.25	+0.26	+0.14	+0.10	+0.08	+0.28
(% of the full model)	-	(58.06%)	(80.65%)	(83.87%)	(45.16%)	(32.26%)	(25.81%)	(90.32%)
correlation between TFP and net finance	-0.164	-0.071	-0.116	-0.113	-0.087	-0.040	+0.023	-0.129
(% of the full model)	-	(54.43%)	(88.55%)	(86.26%)	(66.26%)	(30.84%)	(-17.56%)	(98.47%)
MPK - r	+5.00%	+3.33%	+3.91%	+3.85%	+2.80%	+1.60%	+1.04%	+4.72%
(% of the full model)	-	(64.66%)	(75.92%)	(74.76%)	(54.37%)	(31.07%)	(20.19%)	(91.65%)
area disciplined by the price mechanism	N/A	-7.28%	-9.34%	-9.26%	-5.50%	-3.25%	-3.17%	-10.68%
(% of the full model)	-	(66.91%)	(85.85%)	(85.11%)	(50.55%)	(29.87%)	(29.14%)	(98.17%)

- **demand side story**: 35%
- **supply side story**: 50%
- **borrowing constraint story**: 10%

Conclusion

- **Fundamental changes lead to rising superstars but falling price mechanism.**
- **Policy implication**: increasing inefficiency
  - not on the production side: more productive producers serve more customers
  - on the financing side: increasing internal financing ⇒ inefficient use of resources

Appendix

Model Contributions

Back

1. **Superstar Firms** literature

   - Autor et al. (2020), De Ridder (2019): earnings/markup **level** redistribution channel
   - this paper: earnings/markup **risk** redistribution channel ⇒ corporate risk management policy ⇒ allocation efficiency

2. **Finance & Misallocation** literature

   - Buera, Kaboski and Shin (2011), Midrigan and Xu (2014), Moll (2014) ...
     - firms are **exogenously** assumed to be borrowers and face borrowing constraints
     - self-financing can **reduce** misallocation due to (wealth-based) borrowing constraint
   - this paper
     - firms **endogenously** choose between internal financing and external financing
     - self-financing can **increase** misallocation due to the unequalized cash value

Calibration

Back

Parameter	Description	Traditional Economy 1980-1999	Superstar Economy 2000-2015	Source/Reference
ρ	rate of time preference	0.046		
γ	risk aversion	4.0		Wang, Wang and Yang (2012)
θ	EIS reciprocal	2.0		
λ	cash carry cost	1%		Bolton, Chen and Wang (2011)
δ	capital depreciation rate	0.053	0.056	BEA-FAT
η	operating scale	0.48	0.64	
f_0	fixed production cost	0.11	0.32	Compustat
$\overline{\mu}$	capital quality: long-run mean	1.48		
σ	capital quality: volatility	0.76		

- **two subsamples** (Farhi and Gourio, 2018): traditional economy (1980-1999) and superstar economy (2000-2015)
- **capital quality**: (normalized) mean and s.d. of sales in *Compustat*
- **production technology**: De Ridder (2019)

Estimation: SMM-MCMC approach

Back

Parameter	Description	Traditional Economy 1980-1999	Superstar Economy 2000-2015	Difference
ϕ	taste for quality	0.43	0.56	+ 0.13
ξ_0	variable production cost	0.94	0.26	-0.68
κ_0	investment adjustment cost	1.20	1.30	+0.10
χ_0	fixed external financing cost	0.37	0.55	+0.18
χ_1	variable external financing cost	0.053	0.088	+0.035
β	tightness of borrowing constraint	0.22	0.29	+0.07

Coase (1937) Revisited intro

"The price mechanism might be superseded if the relationship which replaced it was desired for its own sake."

— Coase (1937), "The Nature of the Firm"

- **Intuition**: Market v.s. Firms
  - market system eliminates misallocation through the price mechanism
  - but using market system incurs transaction costs
- **This paper**:
  - **trend** of this competition in the new Superstar Economy
  - key conclusion: increasing inefficiency of capital allocation in Superstar Economy
- **Underlying mechanism**:
  - transaction costs: external financing costs
  - main driver: increasing earnings **risk** arising from some economic fundamental shocks

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