

When Competition Compels Change: Trade, Management, and Productivity

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Gains from Trade “Inside the Firm”

“The idea that international trade increases competition goes back to Adam Smith, and is one of the reasons why economists believe that the gains from trade and the costs from protection are larger than what their own models suggest.” —Helpman and Krugman (1989)

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- **Selection:** competition drives out laggard firms (Melitz, 2003)

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- **Selection:** competition drives out laggard firms (Melitz, 2003)
- Within-firm “Slack” or “X-inefficiency”
 - *“Absent competitive pressure, firms may not use their resources efficiently”* (Leibenstein, 1966)
- **This paper:** competition compels firms to improve management quality and firm organization
→ accompanied by within-firm productivity growth

Management Quality and Firm Organization

Management Quality and Firm Organization



Shri George Jacob Muthoot
Group Chairman
The Muthoot Group of Companies



V.A. George
Independent Director
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George Alexander
Deputy Managing Director
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George Muthoot Jacob
Deputy Managing Director
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George Muthoot George
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Managing Director
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Management Quality and Firm Organization: The House of Georges

- Why do firms organize this way?
 - Owners derive **non-monetary private benefits** from family management
- Trade and competition can be a powerful force that motivates such firms to professionalize
 - Competition eliminates the luxury of prioritizing non-monetary private benefits over monetary gains from firm efficiency
 - These organizational changes occur without deeper cultural or institutional shifts

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Within-firm Channel Accounts for 30% of Aggregate Productivity Gains from Trade

1. **First-time access to confidential admin data** on 6M company executives in India
2. **Natural Experiment:** large, product-specific import competition shock
3. **Quantitative Framework:** embed management choice in a model of monopolistic competition with heterogeneous firms

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 - Event-study design: competition induces family firms to **professionalize management**
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3. **Quantitative Framework**: embed management choice in a model of monopolistic competition with heterogeneous firms
 - i. Why do firms only professionalize after competition? A key trade-off helps answer:
 - a. Family management: Non-monetary **private benefits**
 - b. Professional Management: **higher productivity** and monetary profits
 - When profits fall, marginal family firms give up private benefits and professionalize rather than exit
 - ii. Within-firm gains from professionalizing are **30% of total productivity gains** from trade

Contribution to the Literature

- **Competition and Firm Productivity:** Hicks (1935); Leibenstein (1966); Nalebuff and Stiglitz (1983); Hart (1983); Schmidt (1997); Raith (2003); Nickell (1996); Schmitz (2005); Holmes & Schmitz (2010); Backus (2020)
→ Open the black box of “X-inefficiency”: managerial upgrading
- **Pro-competitive Gains From Trade:**
Across-firm resource reallocation: Melitz (2003); ACR (2012); Edmond et al. (2014); Arkolakis et al. (2019)
Within-firm productivity gains: Caliendo and Rossi-Hansberg (2012); Caliendo et al. (2015, 2020); Bustos (2011); Akcigit Melitz (2022); Bloom et al. (2016); Topalova Khandelwal (2011); Amiti and Konings (2007); Bernard et al. (2011); Dhingra (2013) Atkin Khandelwal (2017); Alfaro-Urena et al. (2022) Autor et al. (2020); Chen Steinwender (2021)
→ Organizational channel (talent of managers) of within-firm productivity gains from trade
- **Family Firms:** Akcigit et al. (2021); Caselli Gennaioli (2013); Bertrand Schoar (2006); Burkart et al. (2003); Bennedsen et al. (2007); Pérez-González (2006); Villalonga Amit (2007), Bertrand et al. (2008); Bloom et al. (2013); Bandiera et al. (2018); Lemos Scur (2018)
→ Response of family firms to globalization

Outline

1. Introduction
2. Natural Experiment
3. Data
4. Empirical Results
5. Model
6. Estimation & Counterfactuals

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Removal of Quantitative Restrictions (QRs): Large, Product-Specific Trade Shock

1950s- India used **Quantitative Restrictions (QRs)** to protect domestic firms

1990s: First-generation reforms in 1991 removed some QRs; many remained

- Mostly final consumer goods
- 3000 HS 8-digit products, almost 30% of all tariff lines
- QRs continued by exploiting GATT Article XVIII:B (QRs on weak BoP grounds)

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1997: Second-generation WTO-imposed reforms: removal of all remaining QRs

- After complaints to WTO by the US and EU

2000s: Imports of liberalized products soared after the reform. No impact on exports.

Unusually Narrow Scope of India's Second-Generation Trade Reforms

- Variation in import competition across the **product space** and time
- **Externally imposed**: hinged on IMF technical assessment of India's BoP
- Unlike first-gen reforms, no concurrent domestic deregulation → **isolate trade reform** impact
- No change in export policy → **isolate import competition** impact
- Affected mostly **consumer goods**: limited impact on firms' input costs

HS Product Code Example

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Data Construction

1. QR removal: Identify affected products
 - More precise treatment assignment
 - ~ 200 industries in past work vs. 10k+ products

Digitized > 1,000 pages of
Customs Notifications

प्राचीन दर्शक नं. ३३०४-९८

REGD. NO. D. L. 3304/98



असाधारण
EXTRAORDINARY
MINISTRY OF COMMERCE

NOTIFICATION NO. 3 (RE-98)97-02

New Delhi, the 13th April, 1998

S.O. 321(E).—In exercise of the powers conferred by section 5 of the Foreign Trade (Development and Regulation) Act, 1992 (No. 22 of 1992) read with paragraph 4.1 of Export and Import Policy, 1997-2002, the Central Government hereby makes the following amendments in the ITC (HS) Classifications of Export and Import Items, 1997-2002, published on 31st March, 1997 and as amended from time to time. In respect of following Exim Code Nos., policy indicated in columns 3, 4 and 5 shall be amended to read as under.

Exim Code	Item Description	Policy	Conditions relating to the Policy	Import under SII/Public Notice
03061301	Shrimp (scampi) macrobrachium frozen	Free		
03061302	A/F shrimp frozen	Free		
03061303	Prawns frozen	Free		
03061400	Crabs	Free		
03061900	Others, including flours, meals and pellets of crustaceans, fit for human	Free		

Source: Archives, Ministry of Commerce, Government of India

Data Construction

1. QR removal: Identify affected **products**
 - More precise treatment assignment
 - ~ 200 industries in past work vs. 10k+ products
2. QR removal: Identify affected **firms**

Novel Product Concordance

Firm Data		Customs Notifications (HS-8)	
3008040800	Sunflower seed oil		
3008040804	Sunflower seed oil, refined	15121910	Sunflower oil edible grade
4012080400	Suitcases	42021204	Plastic moulded suit-cases
5024200404	Distempers	32100001	Distempers
		84501100	Fully - automatic washing machines (upto 10kg)
6308361216	Washing Machines/Laundry Mach	84501200	Other washing machines with built-in centrifugal drier (upto 10kg)
		84501300	Other washing machines (up to 10kg)

6,000 products reported by Prowess firms



10,000 8-digit HS products in customs notifications

Data Construction

1. QR removal: Identify affected **products**
 - More precise treatment assignment
 - ~ 200 industries in past work vs. 10k+ products
2. QR removal: Identify affected **firms**
3. **Firm panel data** (CMIE Prowess):
 - Product scope
 - Balance sheet + financial statements Summary Stats

Data Construction

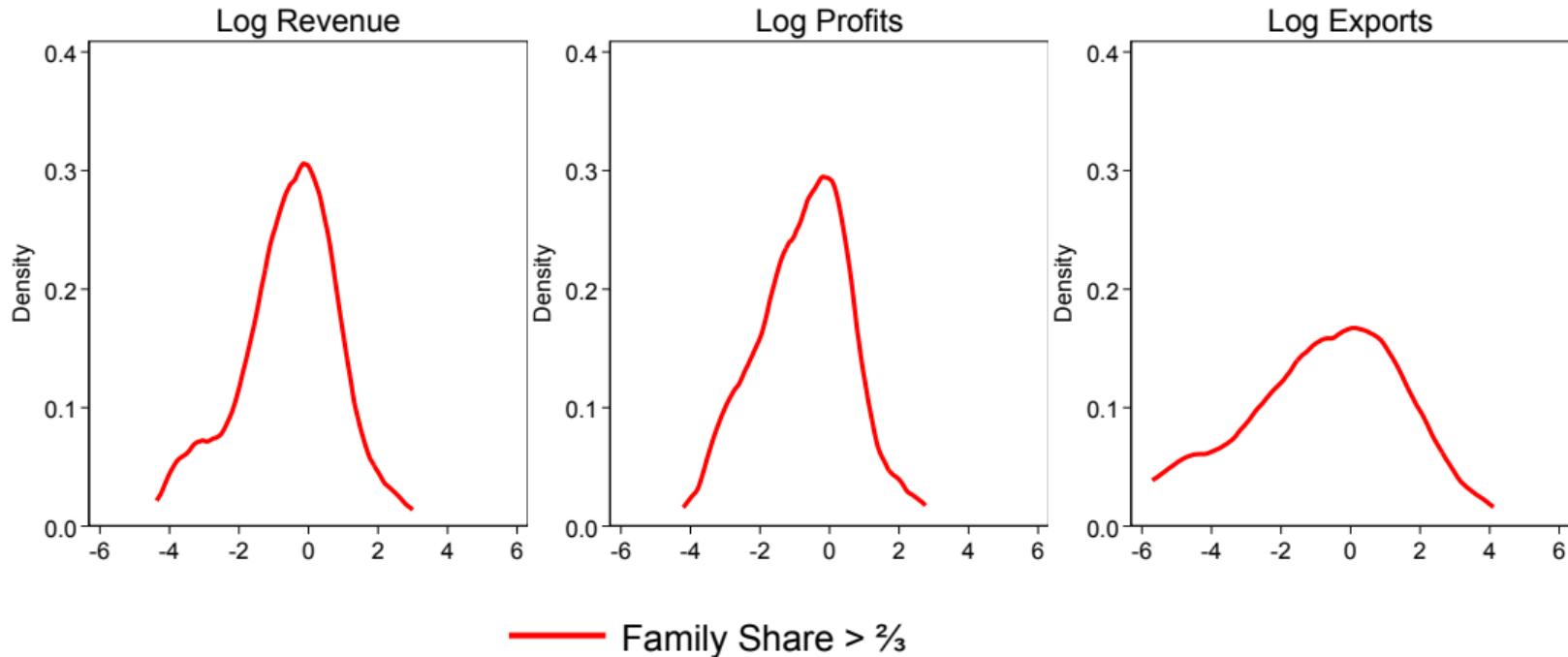
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 - More precise treatment assignment
 - ~ 200 industries in past work vs. 10k+ products
2. QR removal: Identify affected firms
3. Firm panel data (CMIE Prowess):
 - Product scope
 - Balance sheet + financial statements Summary Stats
4. Internal organization of firms
 - Family ties among top execs/directors
 - Tenure history from 1980s
 - > 6 million directors

Family Ties Among Top Executives

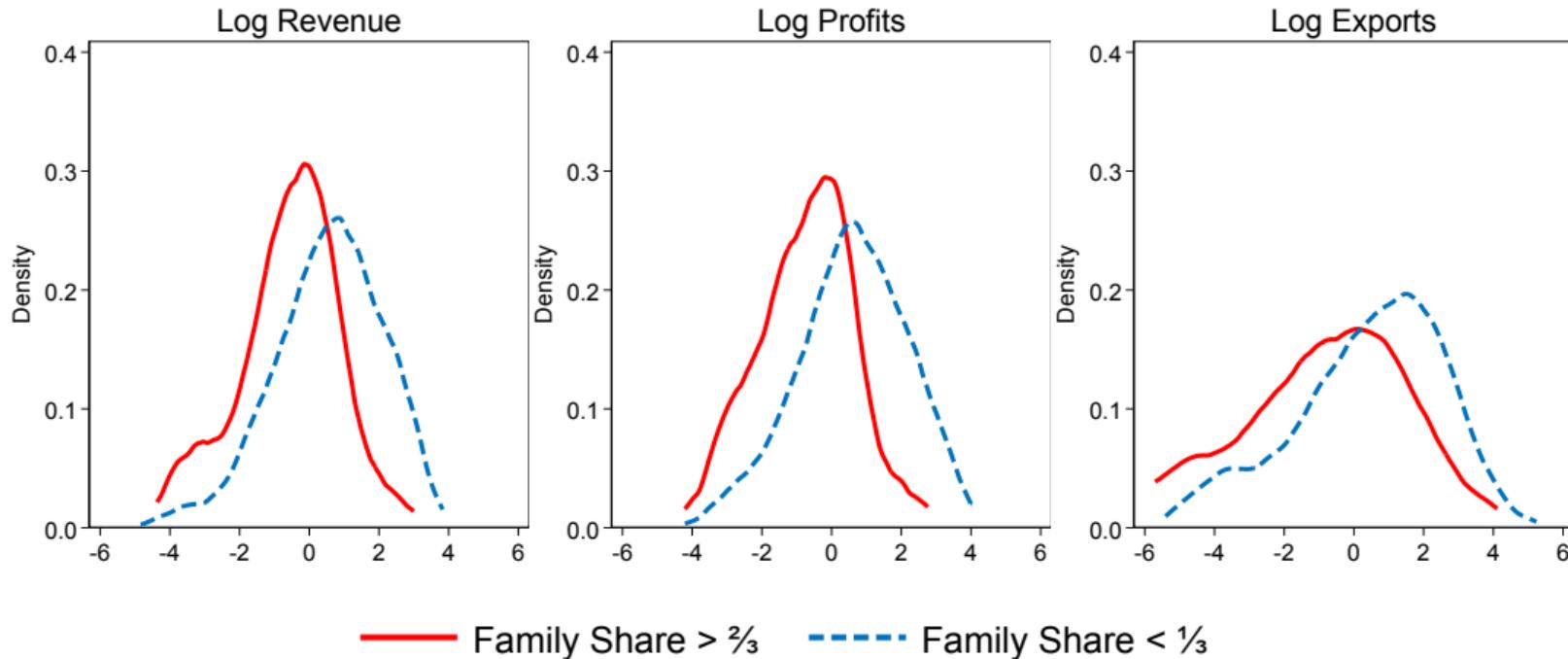
Name	Father's Name	Executive Director	Sex	Age	Place of Birth
A Khosla	D K Khosla	Yes	M	44	Delhi
M Khosla	D K Khosla	Yes	M	40	Delhi
P Khosla	D K Khosla	Yes	M	39	Delhi
N Khosla	N K Khosla	Yes	M	38	Delhi
D K Khosla	K L Khosla	Yes	M	72	Delhi
N K Khosla	K L Khosla	Yes	M	69	Jhelum
M P Gupta	P D Gupta	No	M	70	Delhi
V K Sood	H R Sood	No	M	67	Lahore
M L Mangla	T Chand	No	M	70	Sangrur

Note: Names abbreviated and anonymized. Based on a real firm.
Source: Confidential administrative records, Corporate Affairs Ministry

Baseline Descriptive Statistics: Family Firms are Smaller and Less Profitable



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5. Model

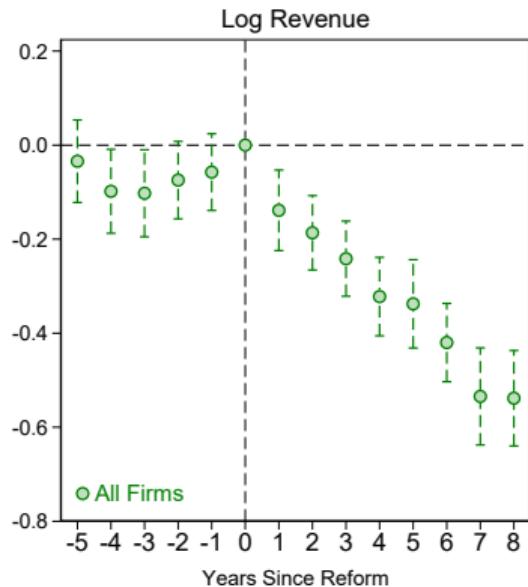
6. Estimation & Counterfactuals

Event-study Design

$$Y_{it} = \sum_{k=\underline{T}}^{\bar{T}} \theta_k D_{it}^k + \delta_i + \lambda_{jt} + \varepsilon_{it}$$

- $D_{it}^k := \mathbb{1}[t = s_i + k]$ are event-time dummies
 - s_i : first year in which QRs are removed on firm i 's highest-revenue (8-digit) product
 - Robust to alternate treatment assignment rules
 - δ_i : firm FE
 - λ_{jt} : year \times 3-digit industry FE
-
- Sun and Abraham (2021) estimator. Only using never-treated firms as controls

① First Stage: Firms Contract



Treated vs. Control Group

Wage Bill and Inputs

Alternative Specifications

Family/Professional Firms Separately

Lee Bounds: Financial

Lee Bounds: Management

Number of Managers

Family Majority

Place and State of Birth

Directors' Age Distribution

Ownership

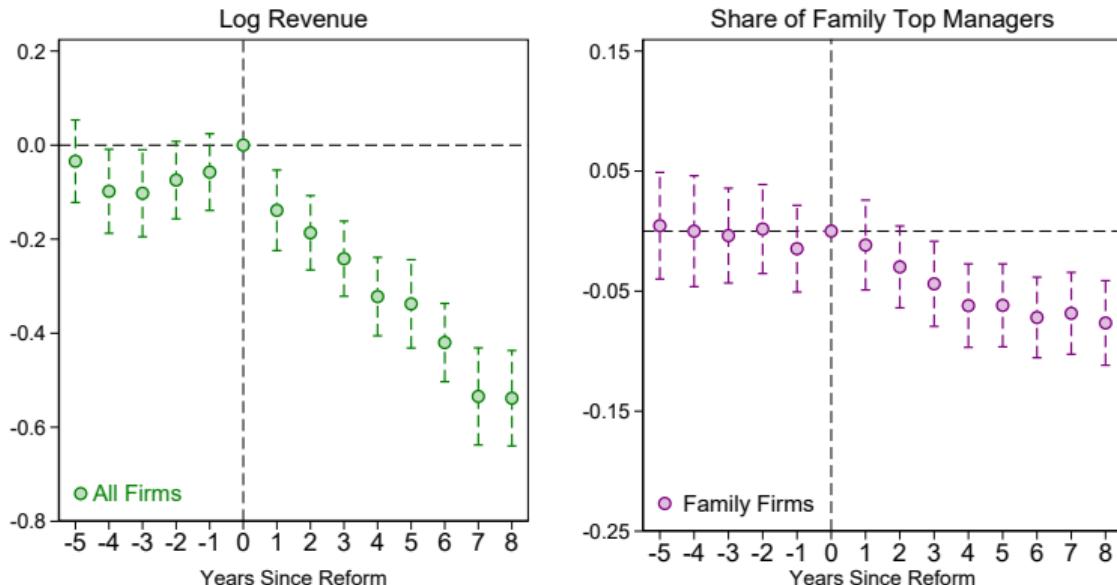
Exit

Model: Baseline Equilibrium

Model: Comparative Statics

① First Stage: Firms Contract

② Laggards Professionalize



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Wage Bill and Inputs

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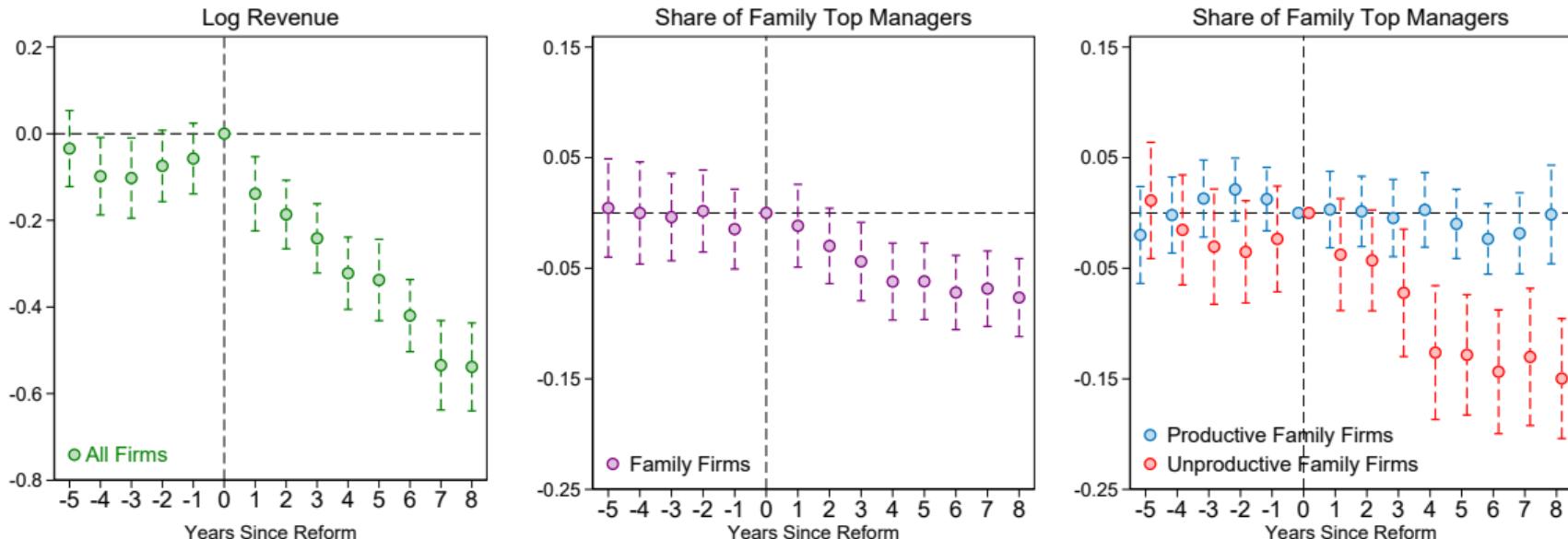
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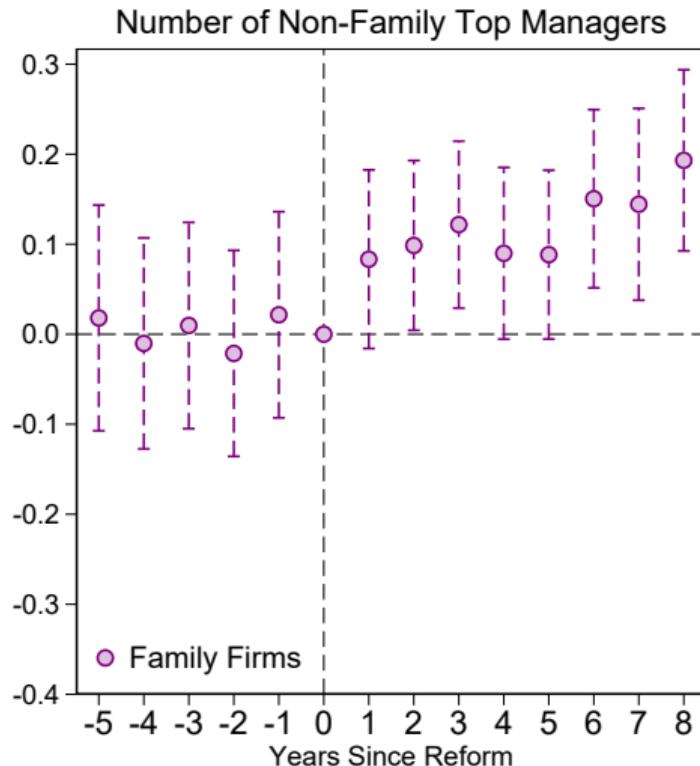
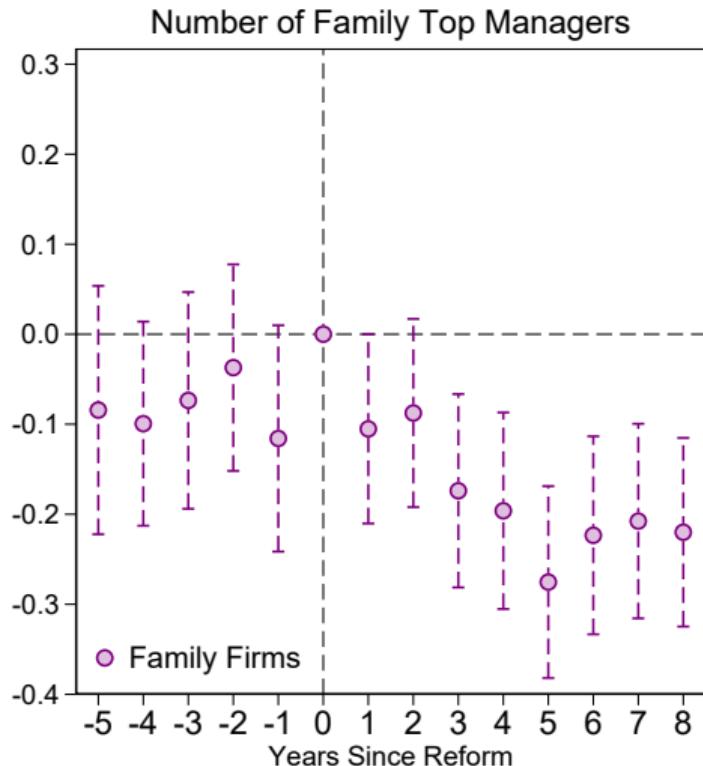
Ownership

Exit

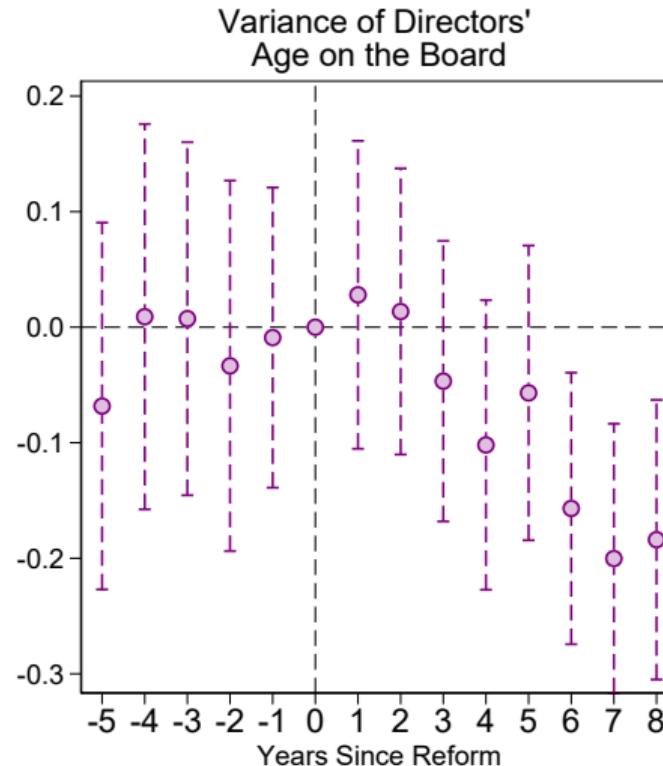
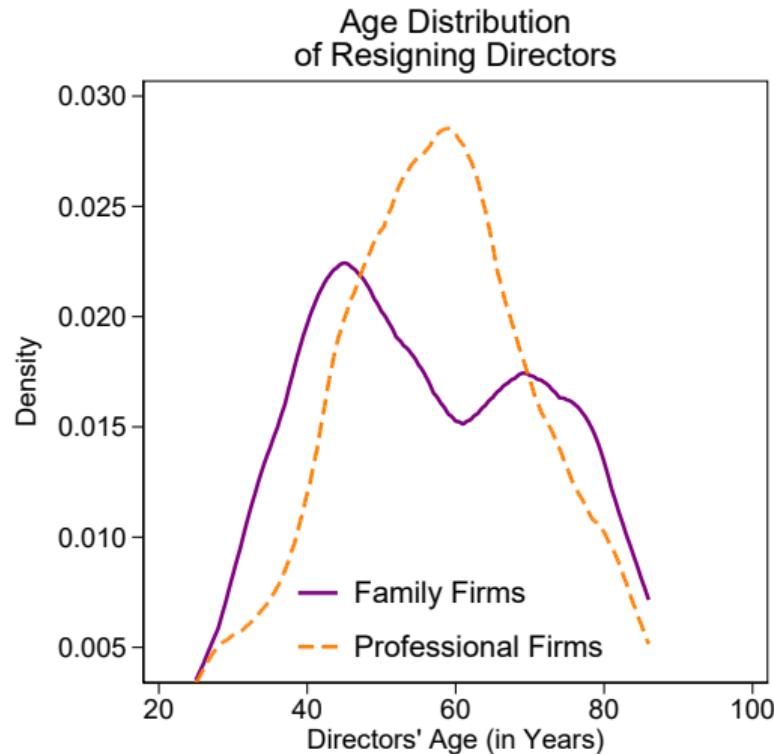
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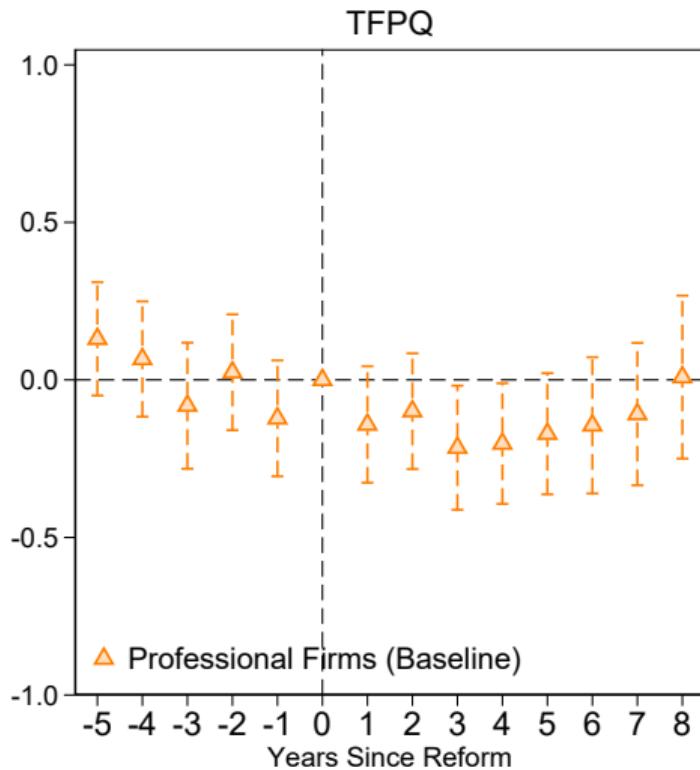
② Laggards Professionalize: Number of Family and Professional Executives



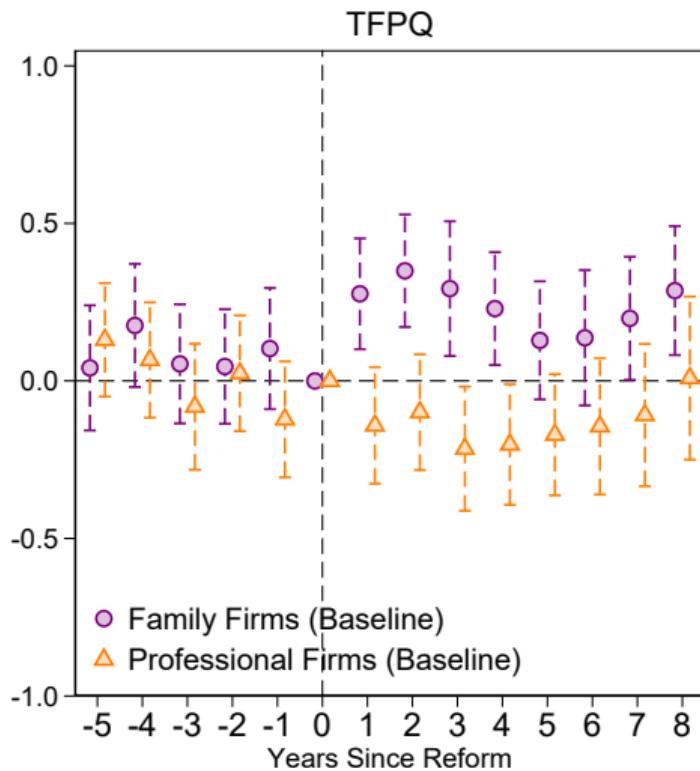
② Laggards Professionalize: Compression of the Executives' Age Distribution



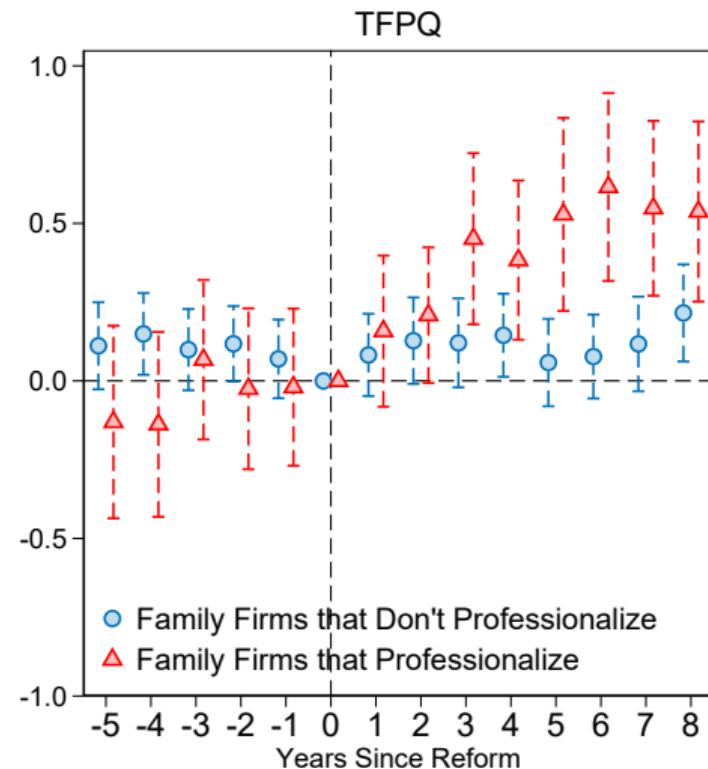
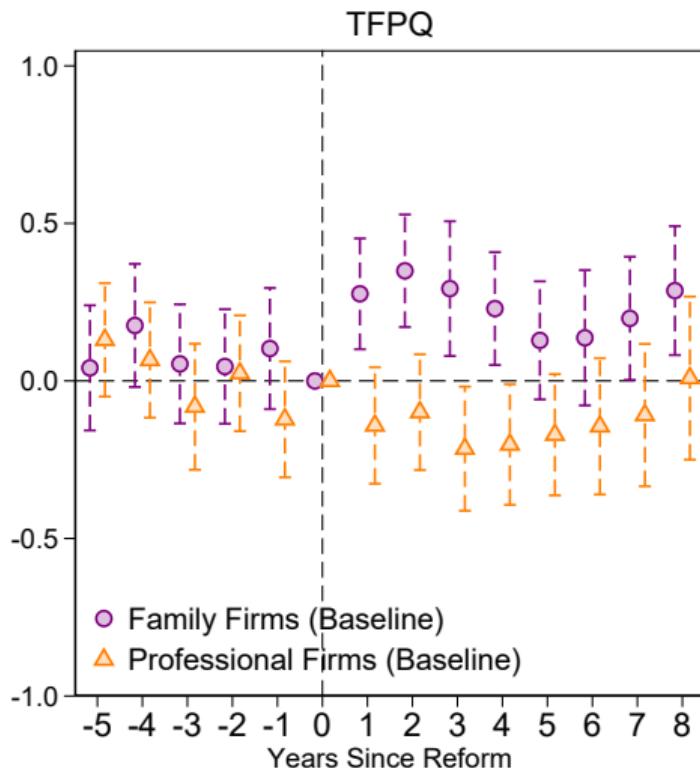
③ Firms that Professionalize Report Higher Quantity Productivity



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③ Firms that Professionalize Report Higher Quantity Productivity



Note: A family firm is defined as having professionalized if its share of family top managers was lower in $t = 8$ as compared to $t = 0$.

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Preferences

- Representative consumer

$$\mathcal{U} = X^{1-\alpha}Y^\alpha \quad (0 < \alpha < 1)$$

- X : freely-traded homogeneous good, with unit labor requirement
- Y is a CES aggregate of differentiated varieties with elasticity of substitution $\sigma > 1$
- The mass of foreign varieties is M_F
- Consumers spend share α of total expenditure E on good Y
- Demand for each variety y is given by $y = \alpha EP^{\sigma-1}p^{-\sigma}$

Management Choice

- Firms differ in productivity z and produce differentiated varieties using labor ℓ .
- Constant marginal cost with a fixed overhead cost: $\ell(z) = f + \frac{y}{z}$
- Prices are a markup over marginal cost: $p(z) = \frac{\sigma}{\sigma-1} \cdot \frac{w}{z}$
- Profits: $\pi(z) = Az^{\sigma-1} - wf$ $\left(\text{where } A = \frac{1}{\sigma} \left(\frac{\sigma-1}{\sigma}\right)^{\sigma-1} EP^{\sigma-1} w^{1-\sigma} = \text{market demand} \right)$

Management Choice

Management Choice

- Monopolistic competition with CES demand, heterogeneous firm productivity, z

Preferences

Technology

Entrants draw $z \sim G(z)$ —> Firm's payoff =
$$\begin{cases} \pi(z) + \beta & \text{if firm stays family} \\ \pi(\gamma z) & \text{if firm professionalizes} \\ 0 & \text{if firm exits} \end{cases}$$

- β : owners derive non-monetary private benefits from running a firm as a family firm
(Demsetz and Lehn, 1985; Burkart, Panunzi, and Shleifer, 2003; Bertrand and Schoar, 2006; Hurst and Pugsley, 2015)
- $\gamma > 1$: gains from professionalizing firm management. Absorbing state
- Firm owners are hand-to-mouth: \Rightarrow exit if $\pi(z) < 0$

Reputation Cost

Equilibrium

Management Choice

- Monopolistic competition with CES demand, heterogeneous firm productivity, z

Preferences

Technology

Entrants draw $z \sim G(z)$ \longrightarrow Firm's payoff =
$$\begin{cases} \pi(z) + \mathcal{B} & \text{if firm stays family} \\ (1 - \tau) \cdot \pi(\gamma z) - f_d & \text{if firm professionalizes} \\ 0 & \text{if firm exits} \end{cases}$$

- \mathcal{B} : owners derive non-monetary private benefits from running a firm as a family firm
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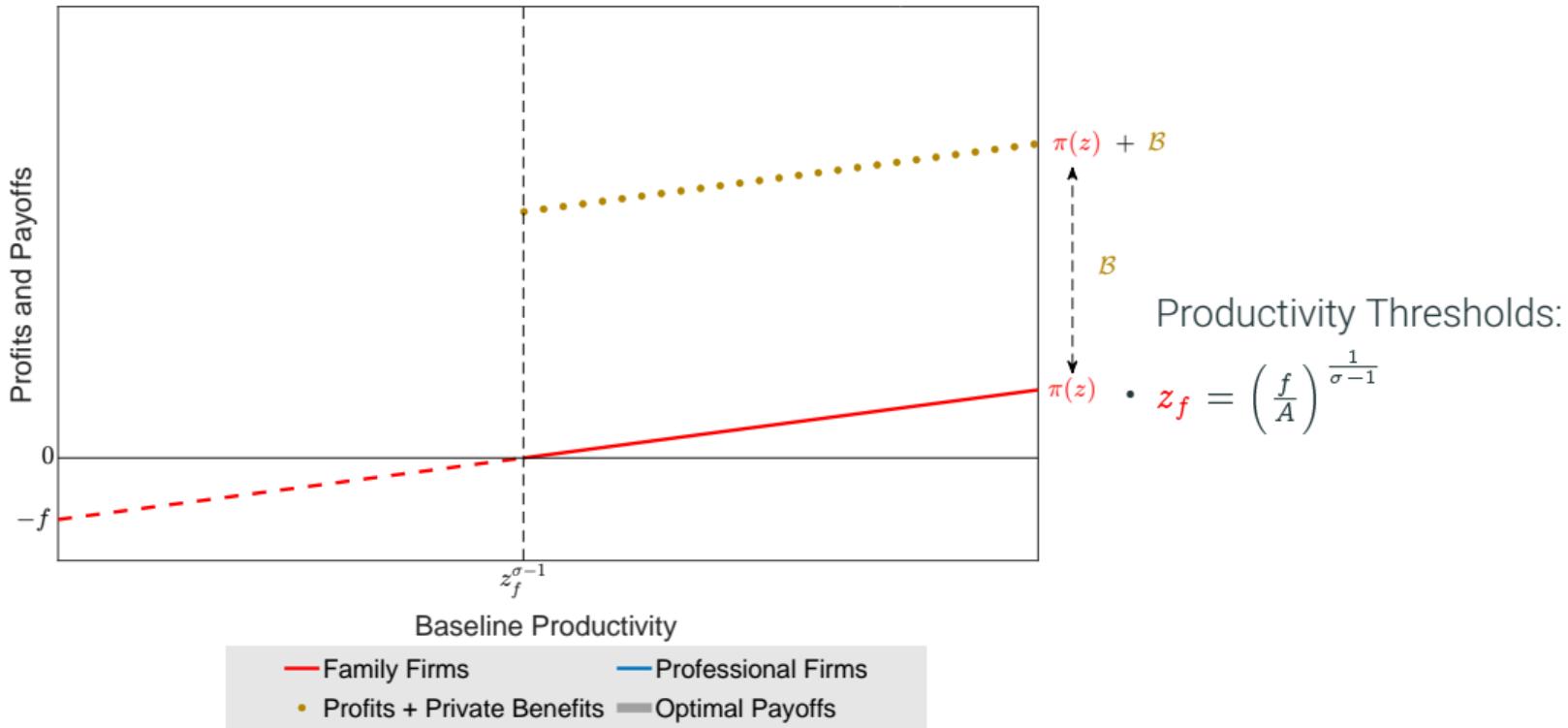
Reputation Cost

Equilibrium

Firm Profits and Management Choice:



Firm Profits and Management Choice: Family Firms



Note: Baseline productivity: before decision to professionalize.

Exit

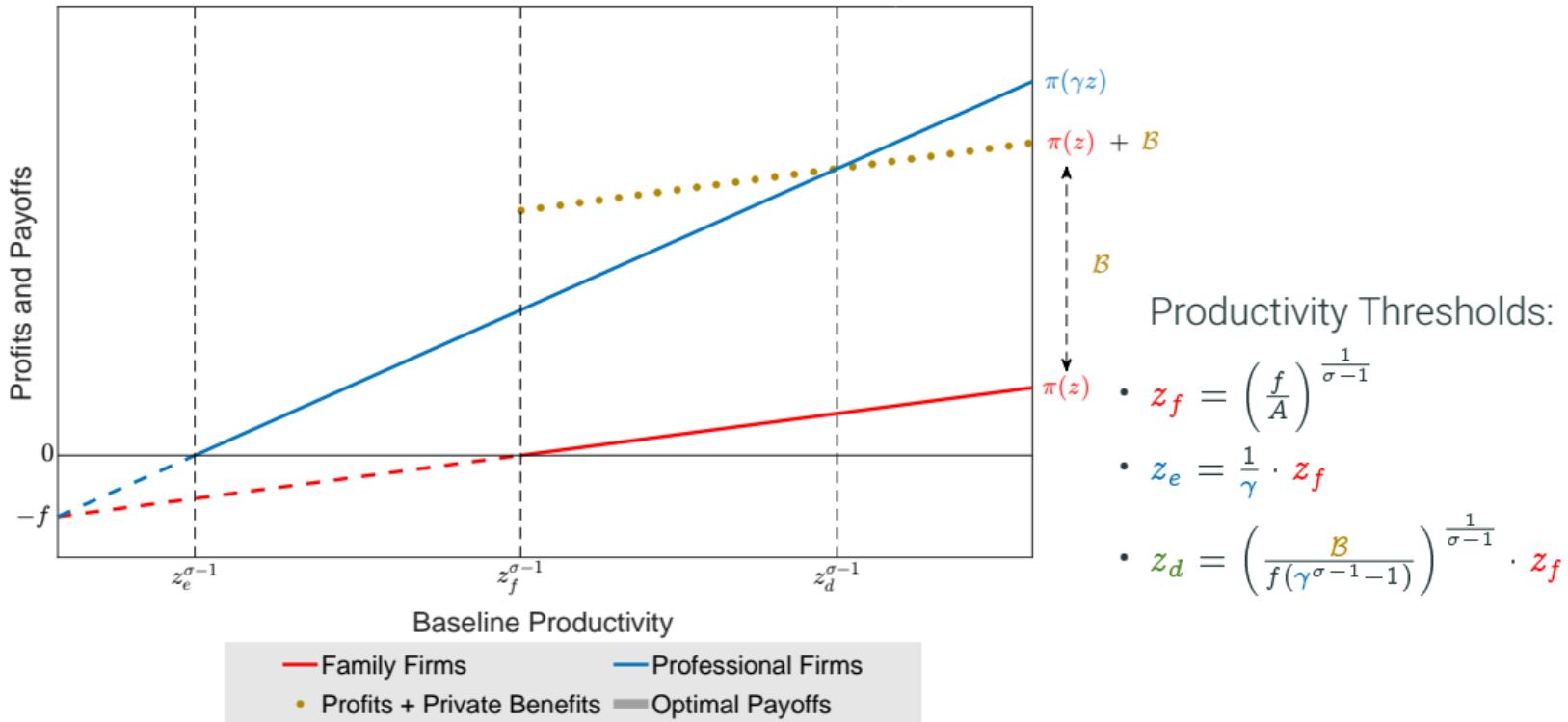
Contracting Frictions

Productivity Distribution

Data

Event Studies

Firm Profits and Management Choice: Professional Firms



Note: Baseline productivity: before decision to professionalize.

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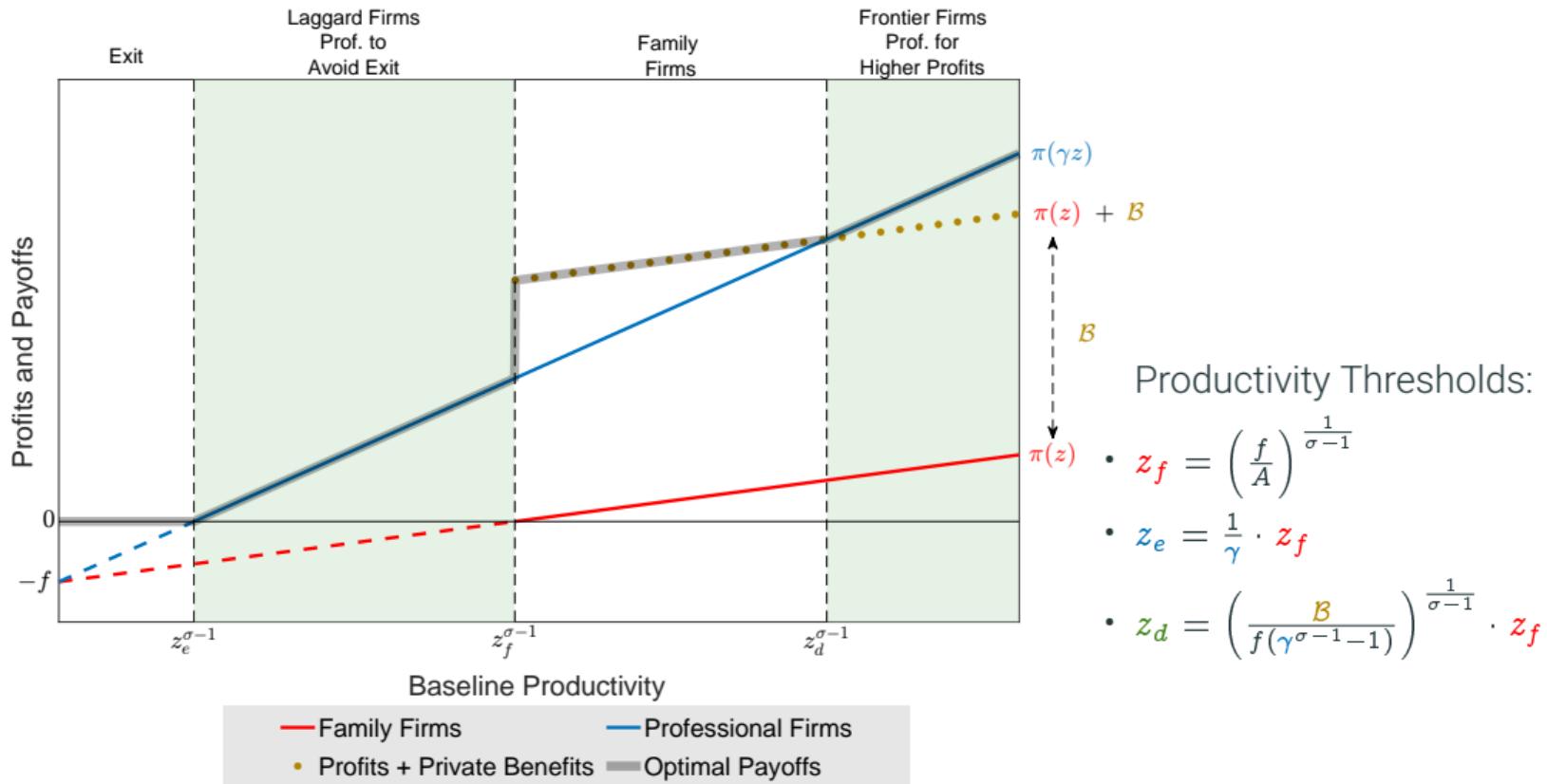
Contracting Frictions

Productivity Distribution

Data

Event Studies

Firm Profits and Management Choice: Optimal Payoff



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Exit

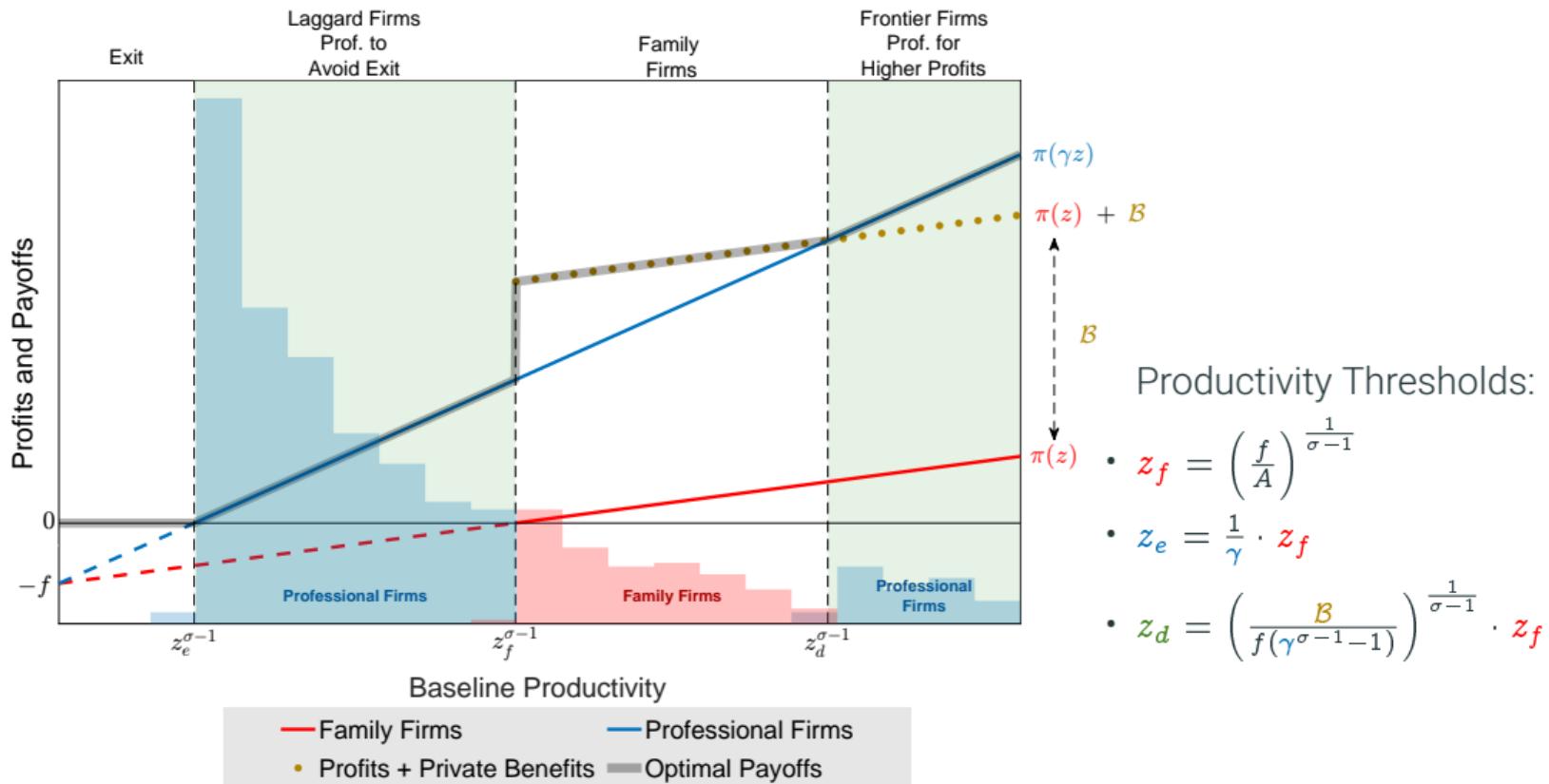
Contracting Frictions

Productivity Distribution

Data

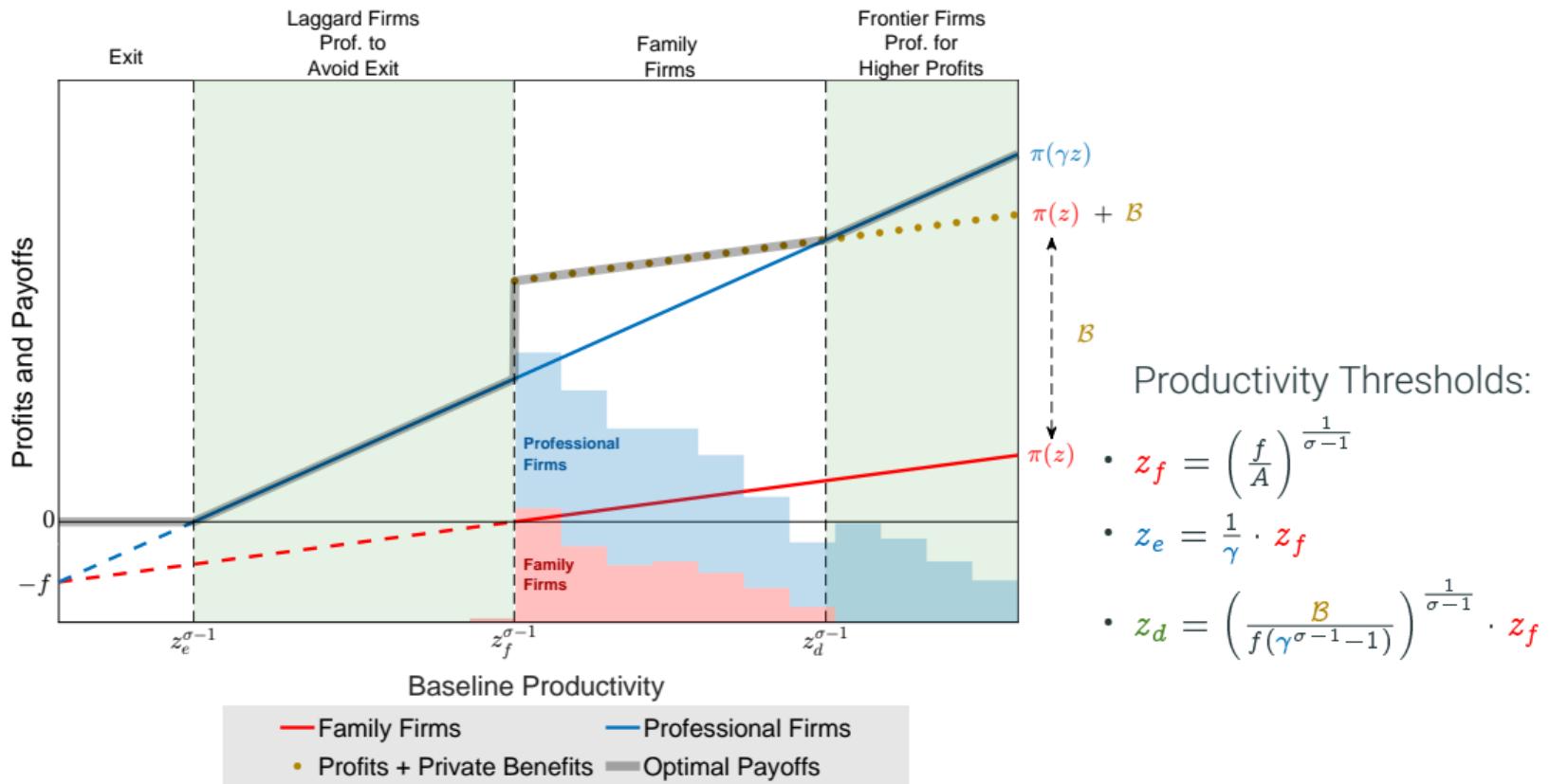
Event Studies

Firm Profits and Management Choice: Baseline Productivity Distribution



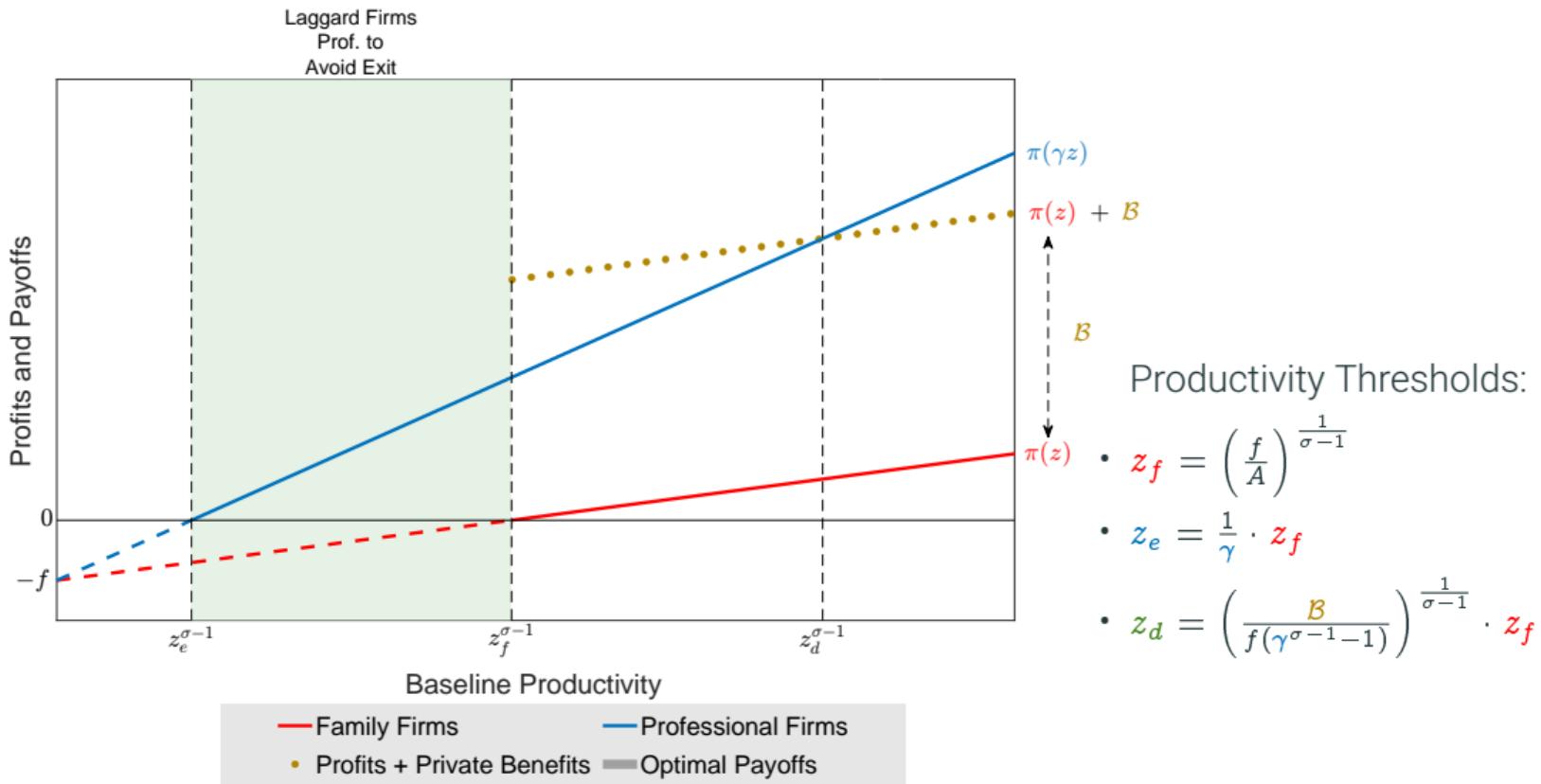
Note: Baseline productivity: before the decision to professionalize. Model: Baseline Equilibrium

Firm Profits and Management Choice: Observed Productivity Distribution



Note: Baseline productivity: before the decision to professionalize. Model: Baseline Equilibrium

Family Firms: Response to ↑ Import Competition, ↓ Market Demand



Note: Baseline productivity: before the decision to professionalize.

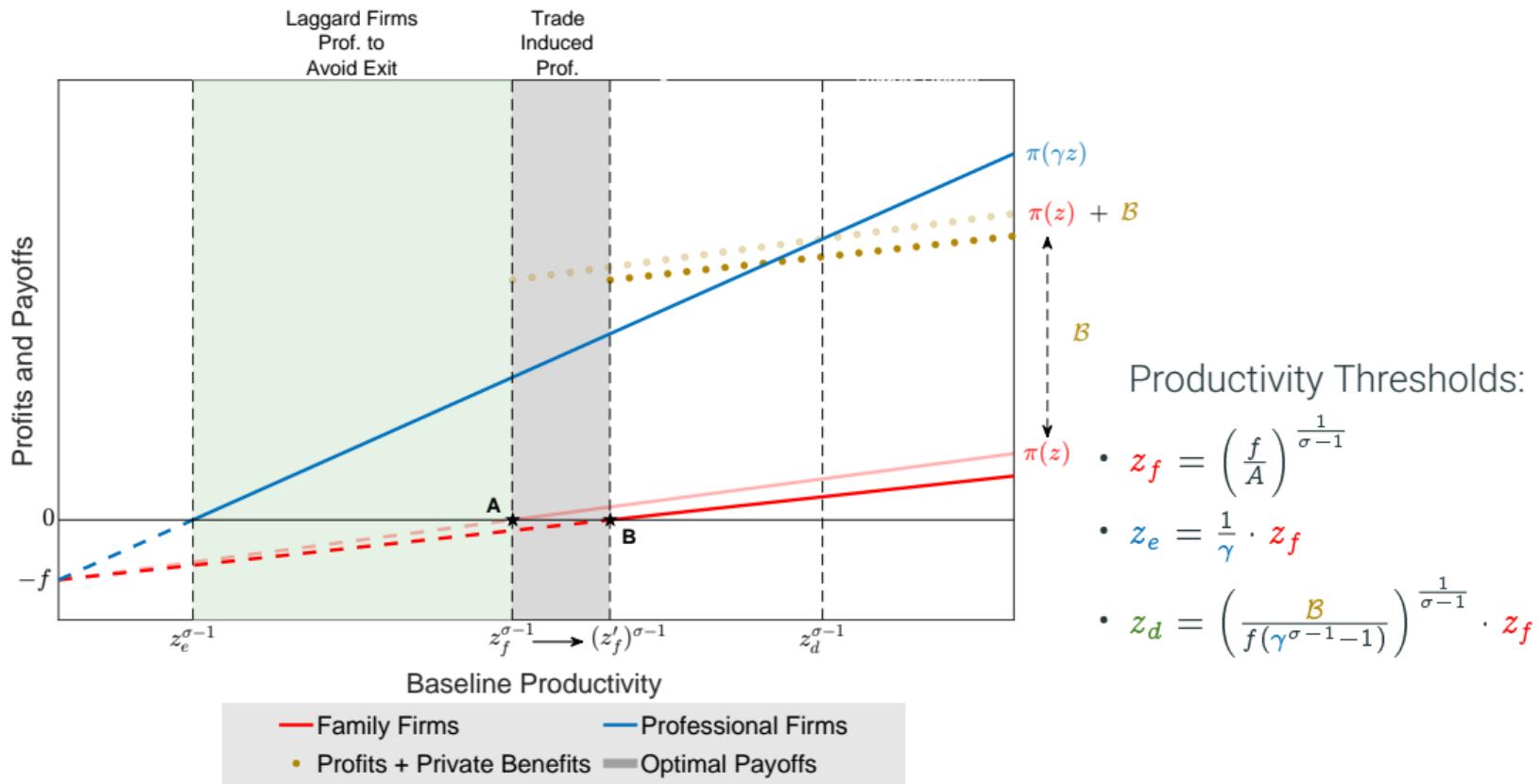
Import Competition

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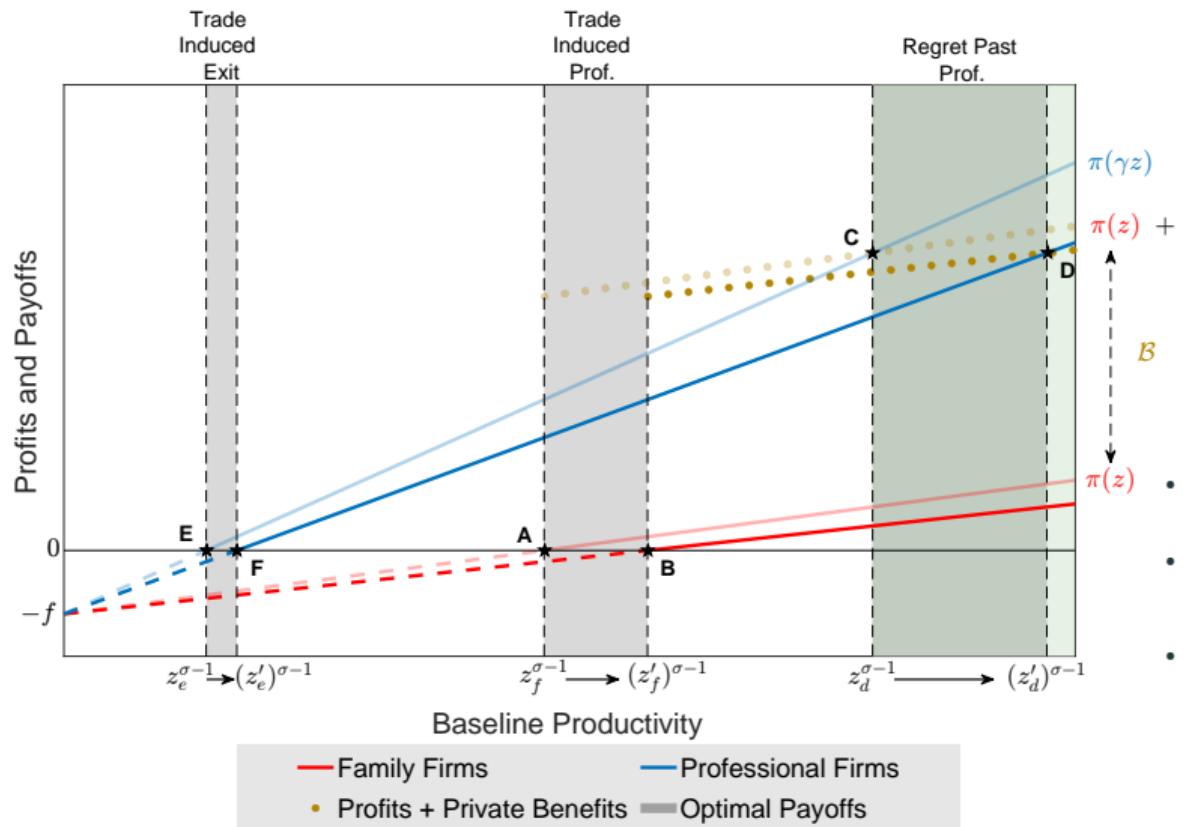
Import Competition

Contracting Frictions

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Event Studies

Professional Firms: Response to \uparrow Import Competition, \downarrow Market Demand



Note: Baseline productivity: before the decision to professionalize.

Import Competition

Contracting Frictions

Reputation Cost

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Identification and Key Estimates

$$\Theta = \{\sigma, k, f, \gamma, \mathcal{B}\}$$

- $\sigma = 4$
- $k = 3.5 \rightarrow$ upper-tail slope in a log-rank vs. log-productivity QQ plot Head, Mayer, Thoenig (2014)
- \mathcal{B}, γ, f jointly determine management choice and exit Moment Conditions
 - $f \rightarrow$ Share of firms with negative profits
 - ◊ $\mathcal{B} \rightarrow$ Share of firms with family share in management $> \frac{2}{3}$
 - ◊ $\gamma \rightarrow$ Difference in mean log revenue of family and professional firms Data

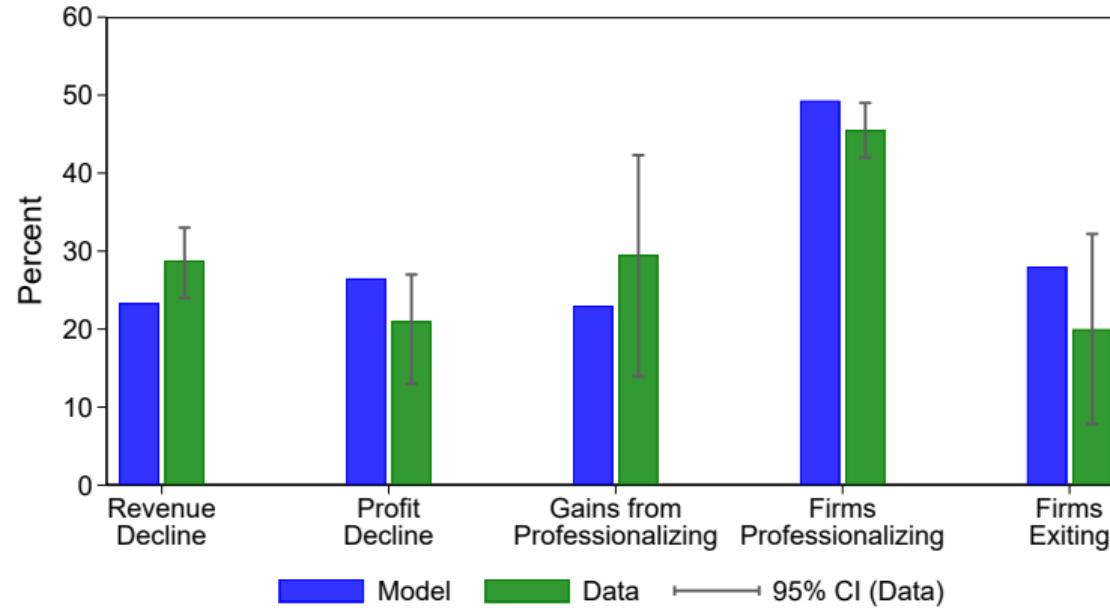
Key Estimates

$$\mathcal{B} = 0.08 \quad \gamma = 1.23 \quad f = 0.05$$

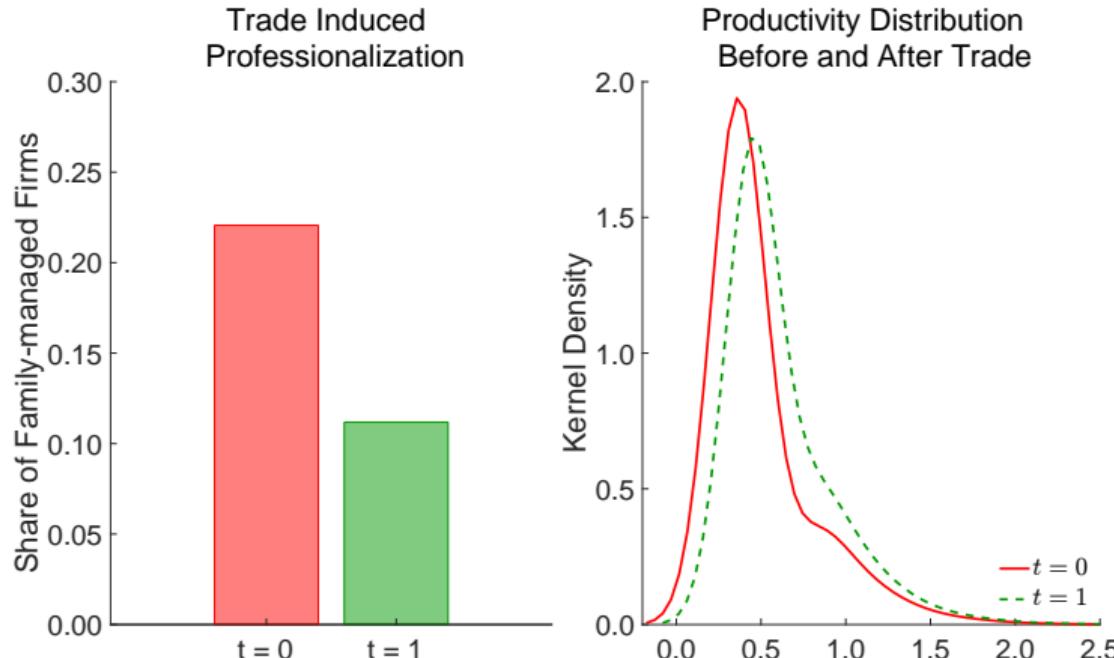
(Profits: 10 $p = 0.0029$; 25 $p = 0.0081$; Median = 0.0201; Mean = 0.2584; 75 $p = 0.0392$; 90 $p = 0.2920$)

Comparison of Model and Data Estimates

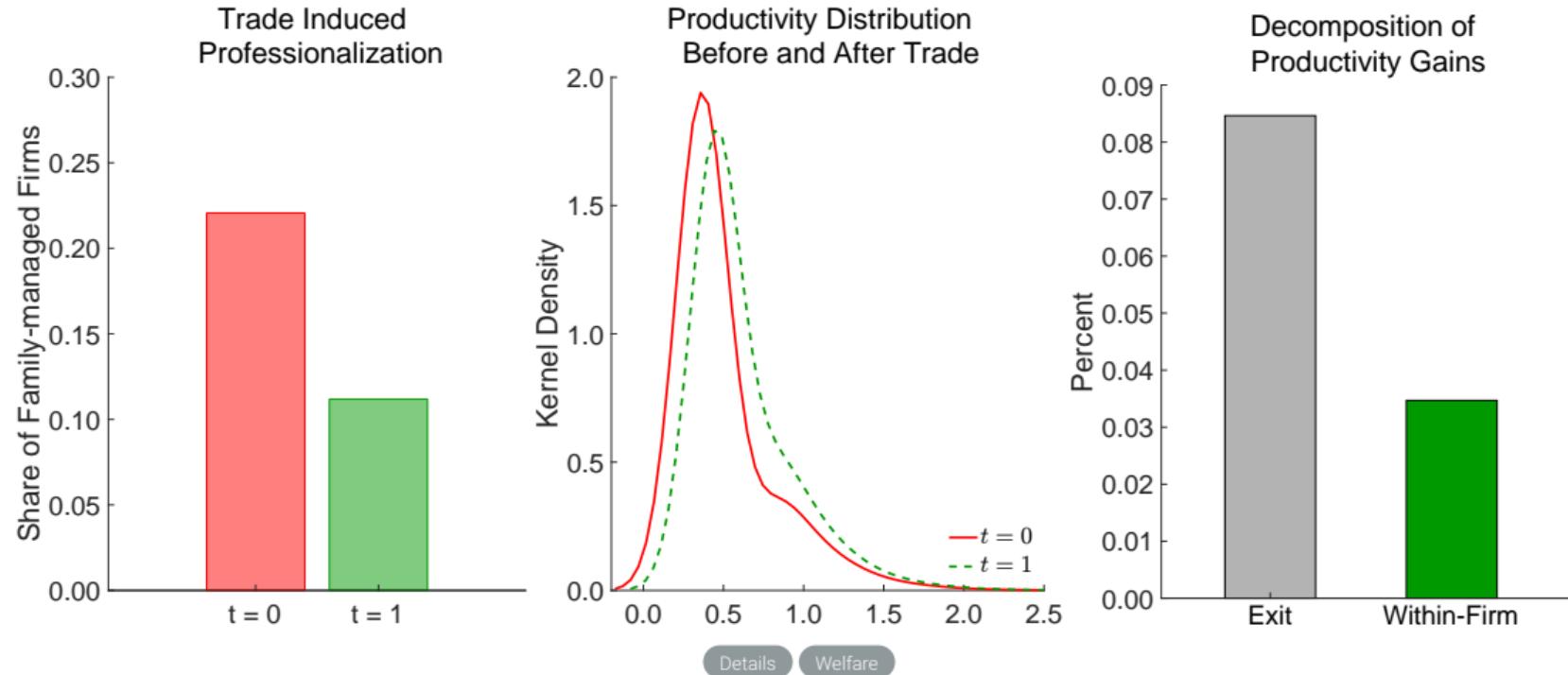
- $\uparrow M_F$ to match the increase in import penetration after the reform
- Re-solve the post-shock allocation
- Compare model-implied changes in untargeted moments to event-study results



Import Competition \implies 12% \uparrow **Productivity**; 30% from Within-Firm Channel



Import Competition \implies 12% \uparrow **Productivity; 30% from Within-Firm Channel**



Conclusion and Research Agenda

- **Conclusion**

- Trade drives aggregate growth by improving laggard firms' productivity
- Protection permits taste-based deviations; competition restores meritocracy
- These organizational changes occur without deeper institutional shifts

- **Research Agenda: growth and productivity in developing countries**

- **Core Mechanisms:** (1) organization of firms (2) market-level frictions, and (3) Technology (AI)
 - **Strand I:** Combines rich admin data + structural estimation to quantify aggregate effects
 - **Strand II:** How can AI improve judicial state capacity? RCTs with 1,500+ Indian courts, 500+ tax officials
- **Infrastructure:** Launched the India Data Lab Initiative (IDLI): www.idli.dev



> 50 Surveys



40 Years



1M HH-year obs



2M firm-year obs



4M worker-year obs



Code

Conclusion and Research Agenda

- Conclusion

- Trade drives aggregate growth by improving laggard firms' productivity
- Protection permits taste-based deviations; competition restores meritocracy
- These organizational changes occur without deeper institutional shifts

- Research Agenda: growth and productivity in developing countries

- Core Mechanisms: (1) organization of firms (2) market-level frictions, and (3) Technology (AI)
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Code

Thank you!

Ananya Kotia

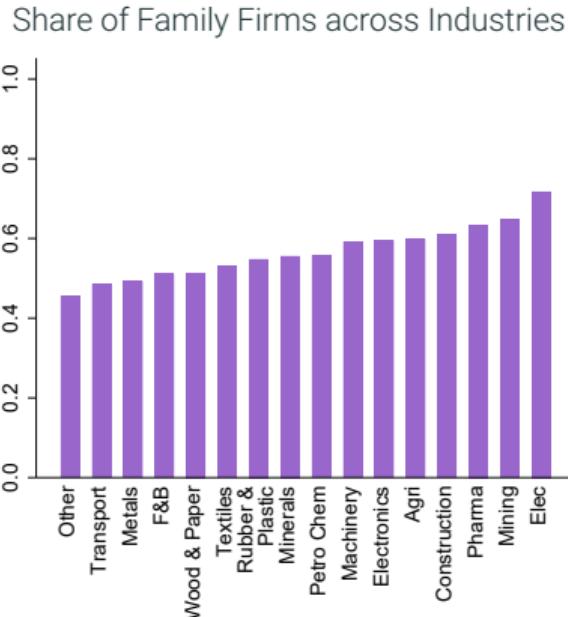
London School of Economics



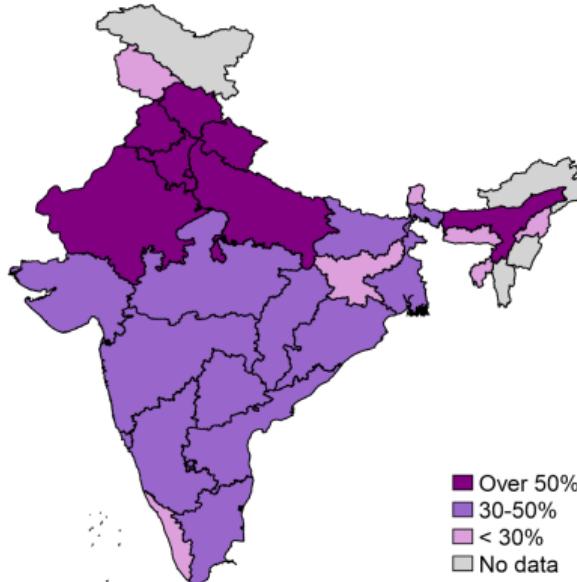
ananyakotia.com

Family Firms are Widespread in India

Family Firms: at least two family members on board

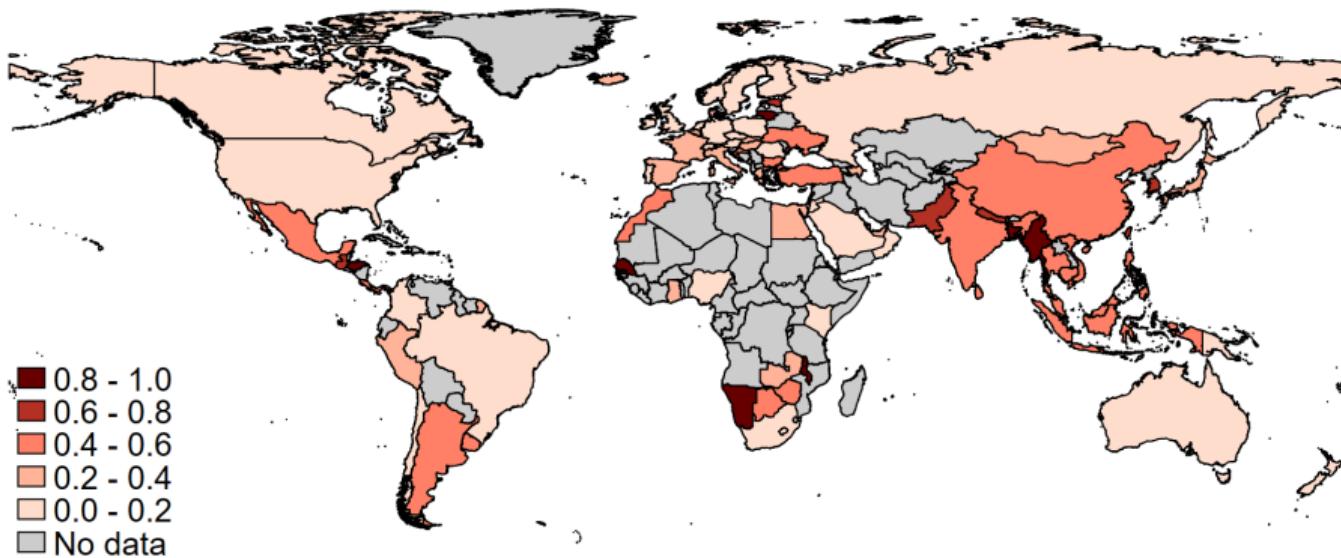


Share of Family Firms across States



Family Firms are Widespread in Developing Countries

Share of Directors Sharing a Surname



Source: BoardEx, Wharton Research Data Service (WRDS)

[Back](#)

Indian Response to WTO's QR Ruling

"The commerce secretary had written to me to say that they intended to make a case for continuing with QRs on consumer goods for BoP reasons, and he wanted confirmation of support from the Ministry of Finance. I promptly wrote back to say that it would be against our national interest because it painted a picture of helplessness that was completely contrary to what we in the Ministry of Finance were projecting to foreign investors"

—Montek Singh Ahluwalia, Former Indian Finance Secretary and Deputy Chairman of the Planning Commission

Policy response by India:

- Tariffs maintained : limited room to raise beyond WTO bindings
- Canalization of Grains
- "War Room" & sensitive list: DGFT monitored ~300 consumer goods
- Some anti-dumping (esp. chemicals, steel, consumer goods)

HS Codes Example: Electrical machinery

- **8517:** Telephone sets and other apparatus for voice transmission
 - **861711:** Line telephone sets
 - **85171110:** Push button type
 - **85171120:** Rotary dial type
 - **85171130:** Cordless Telephones
 - **861712:** Cellular network sets
 - **85171210:** Push button type
- **8525:** Transmission apparatus and cameras
 - **852550:** Transmission apparatus
 - **85255010:** Radio broadcast transmitter
 - **85255020:** TV broadcast transmitter
 - **85255040:** Jamming equipment
 - **852580:** Cameras
 - **85258010:** Television Cameras
 - **85258020:** Digital cameras
 - **85258030:** Video cameras recorders

Removal of quantitative restrictions on all imports to transform Indian market

Removal of quantitative restrictions on all imports will transform the Indian market like never before.



PROFUSION OF CHOICE: Shelves like these in a Chennai super store are getting stacked with an array of foreign products

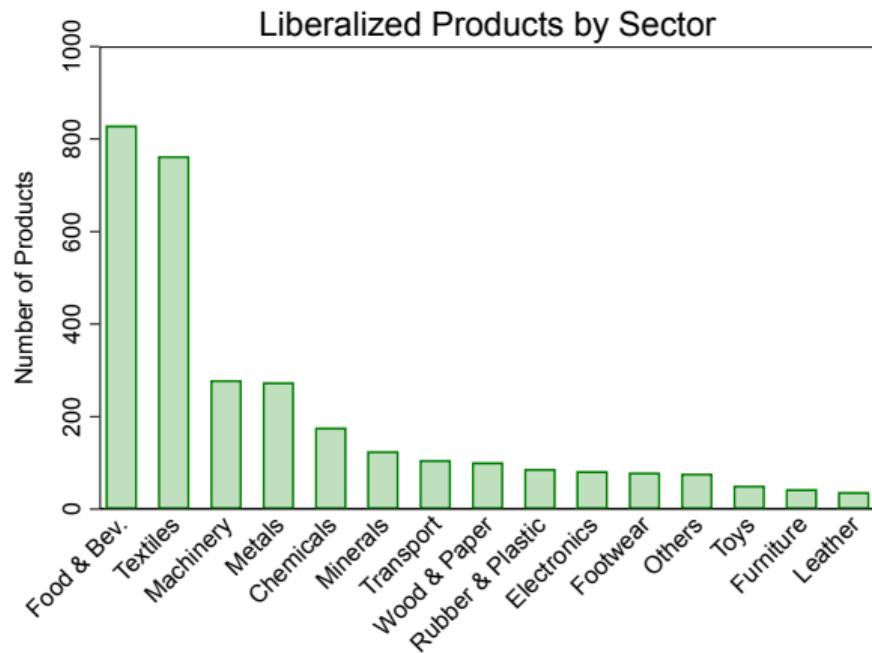
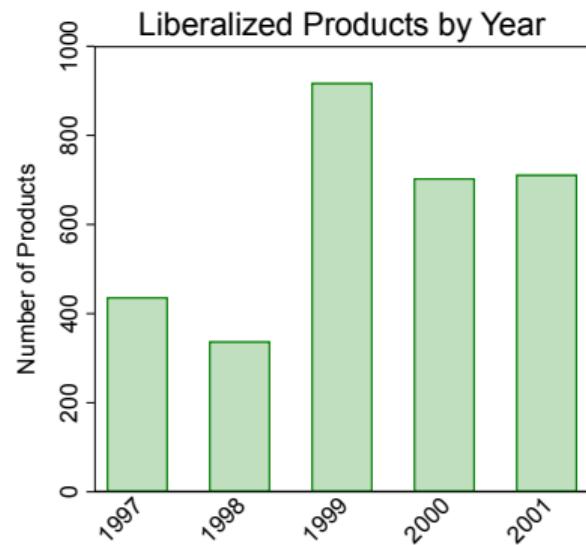
Amma Naana Super Store, TTK Road, Chennai: Heinz spaghetti with sausages in tomato sauce, 220 g for Rs 155; H-Vollmilch low-fat milk with one-year shelf life, 1 litre for Rs 66; Sugar-free chocolate biscuits, 184 g for Rs 98...

Rustom Stores, Colaba, Mumbai: Blue Bunny ice cream, 1.5 litre for Rs 425; St Martin's iced tea, 240 ml for Rs 25; Langnese honey, 500 g for Rs 165

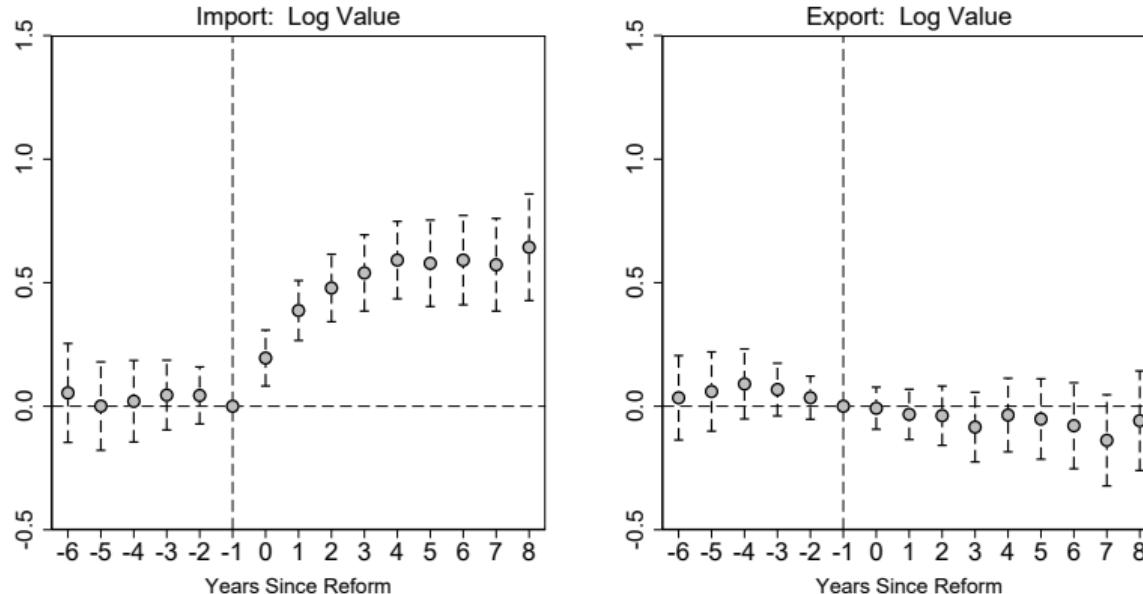
Steak House, Jor Bagh, Delhi: Lake land mayonnaise, 450 g for Rs 98; Laughing Cow cheese, 180 g for Rs 45...

A sample of goodies on the shelves of stores in the three metros on April 3, two days after India abolished all quantitative restrictions (QRs) on imports. On payment of customs duty, anybody can now import any amount of any product. A freedom of economic choice that comes a full 54 years after the freedom of political choice the country attained in 1947.

QR-Removal: Timeline and Sectoral Scope



QR-Removal: Imports Soar, No Effect on Exports



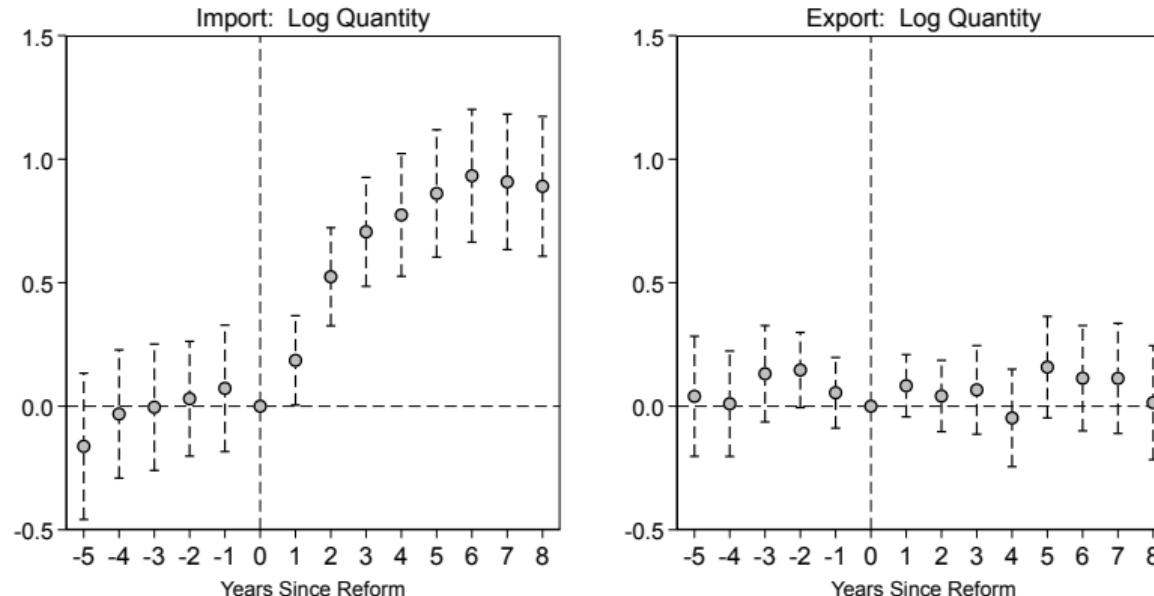
$$y_{pt} = \sum_{k=\underline{T}}^{\bar{T}} \beta_k D_{pt}^k + \delta_p + \lambda_{qt} + \varepsilon_{pt}$$

p : 6-digit HS product, q : 4-digit HS product, D_{pt}^k : event-time dummies

Quantities

Back

QR-Removal: Imports Soar, No Effect on Exports



$$y_{pt} = \sum_{k=\underline{T}}^{\bar{T}} \beta_k D_{pt}^k + \delta_p + \lambda_{qt} + \varepsilon_{pt}$$

p : 6-digit HS product, q : 4-digit HS product, D_{pt}^k : event-time dummies

Timeline

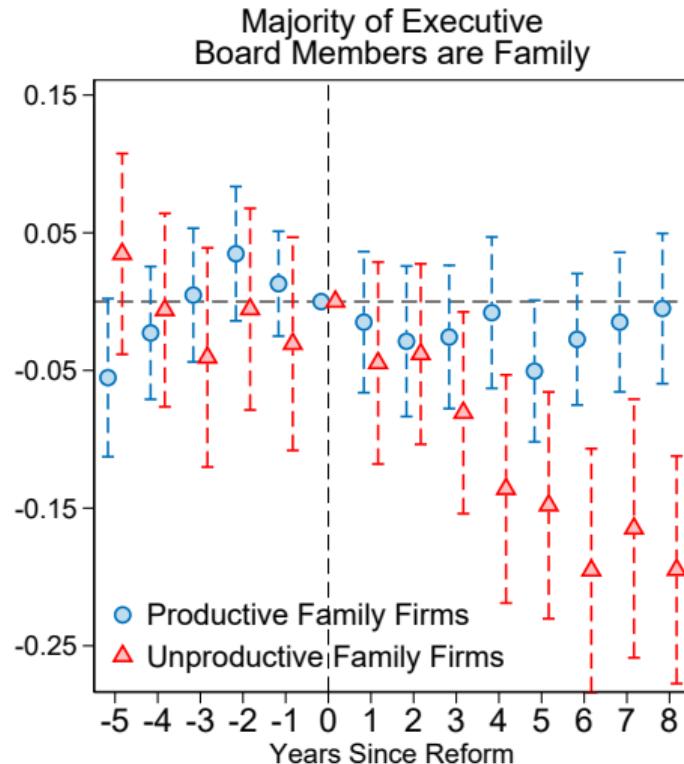
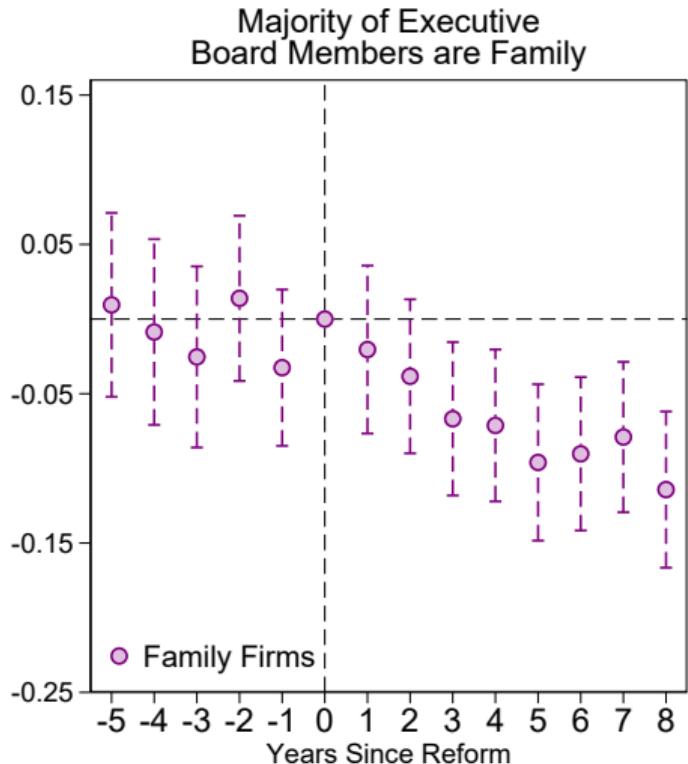
Values

Summary Statistics

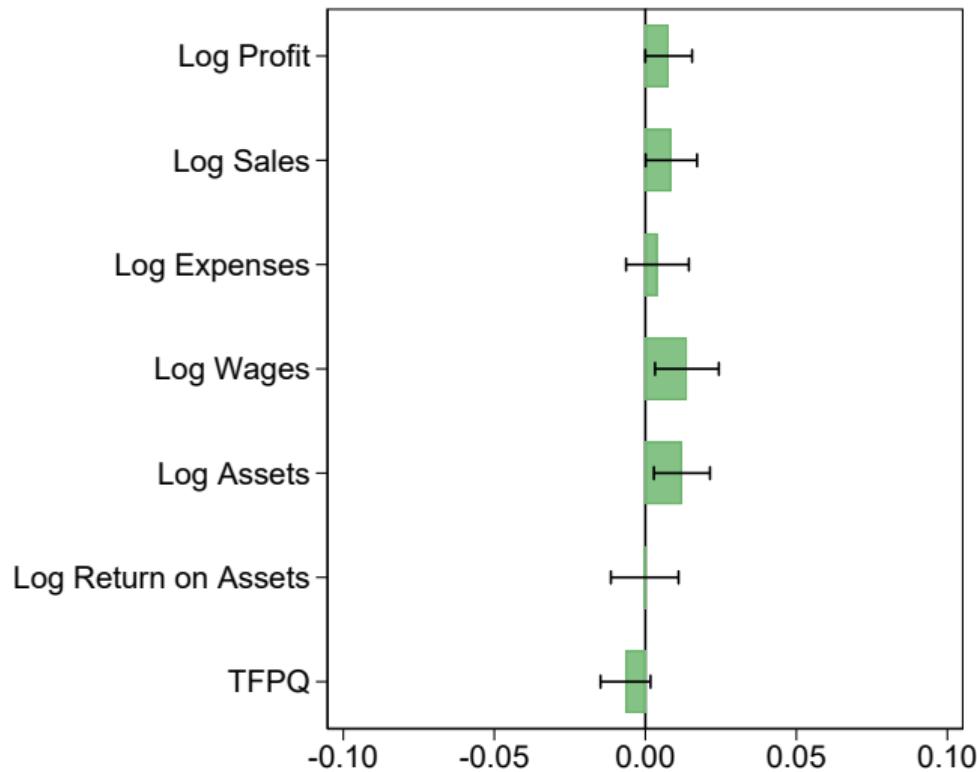
	Obs	p10	Mean	p50	SD
Treated Firms (%)	4,996	0	0	1	0
Firm Age (Years)	83,726	7	26	56	20
Wages	77,724	1	220	326	1,382
Total Assets	82,465	46	4,083	4,983	31,652
Revenues	76,552	19	3,674	4,785	36,687
Expenses on Raw Materials	67,944	13	1,687	2,227	17,783
At least 2 Family Members on Board	4,852	0.00	0.45	1.00	0.50
Family Share on Board	39,644	0.10	0.38	0.75	0.25
Family Share on Executive Board	39,644	0.00	0.64	1.00	0.42

Note: All nominal variables are reported in INR million and are deflated to 2005 prices using the GDP deflator.

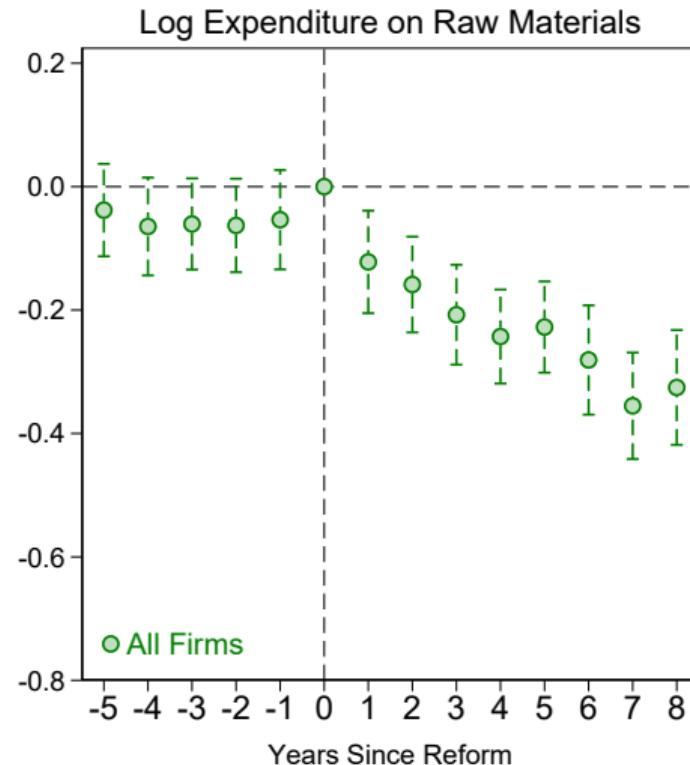
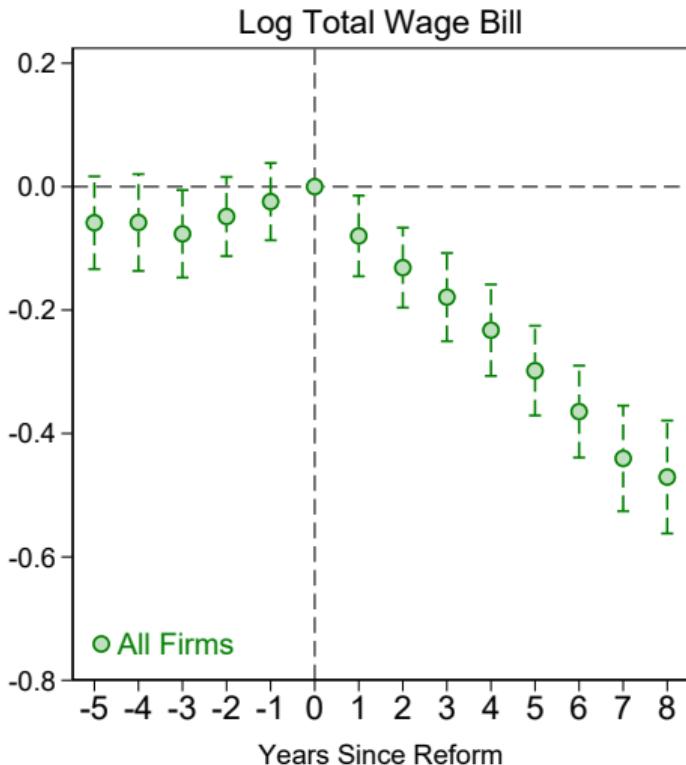
Family Majority on the Executive Board



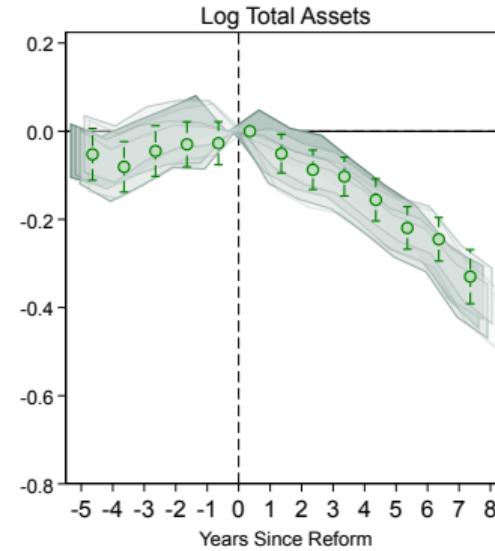
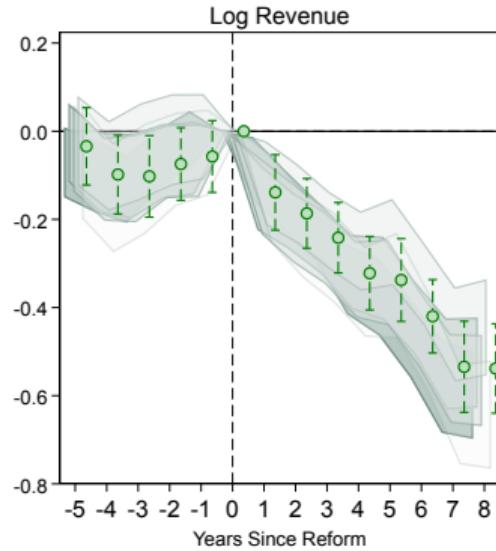
Treated and Control Firms are Similar



① All Firms Contract: Total Wage Bill and Expenses



① All Firms Contract: Robustness to Alternative Specifications

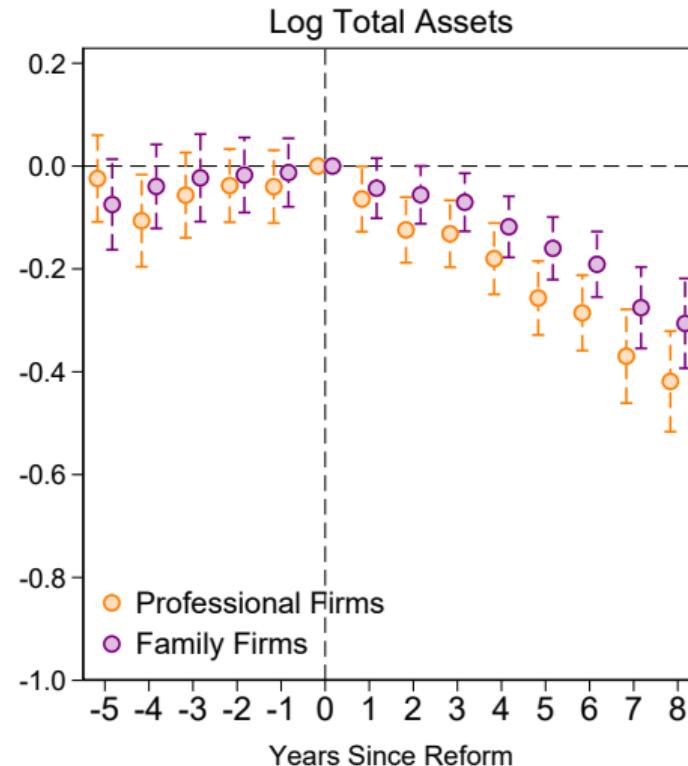
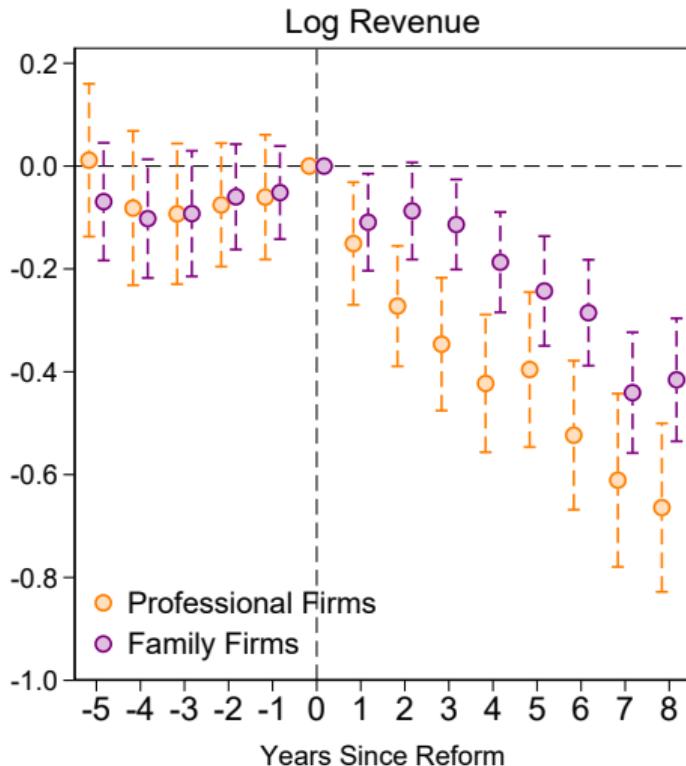


Alternative Fixed Effects:

- | | |
|---|--|
| (1) Firm + Year | (4) Firm + (Industry \times Year) + (District \times Year) |
| (2) Firm + (Industry \times Year) | (5) Firm + (Industry \times Year \times State) |
| (3) Firm + (Industry \times Year) + (State \times Year) | (6) Firm + (Industry \times Year \times District) |

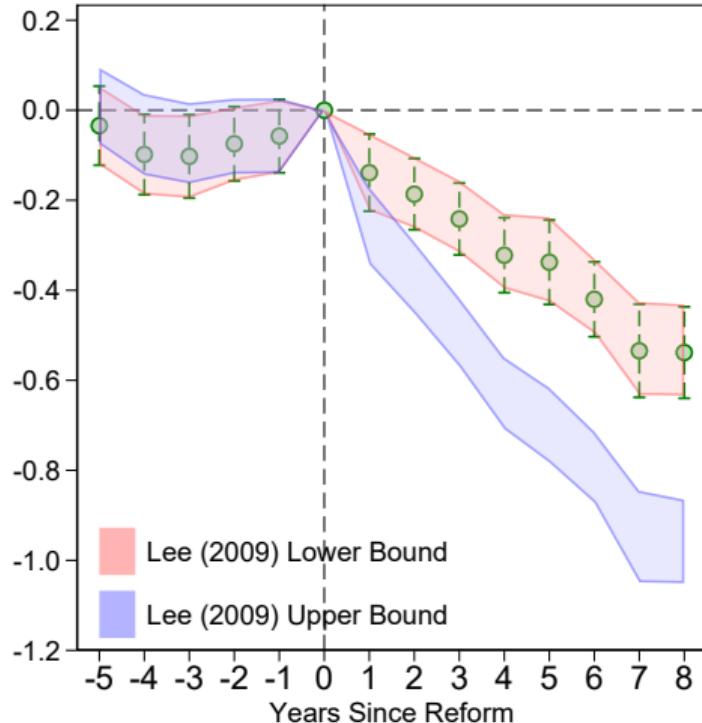
Back

① All Firms Contract

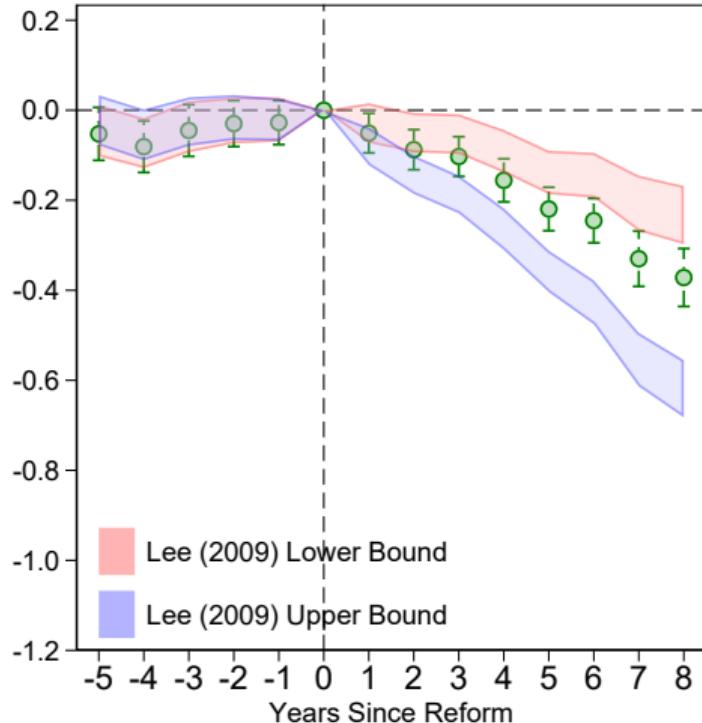


Lee Bounds

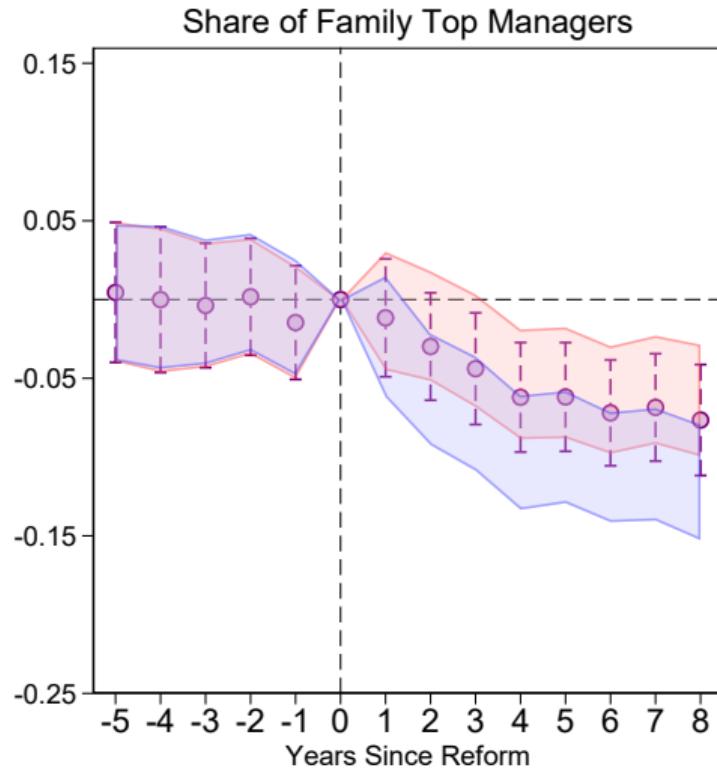
Log Revenue



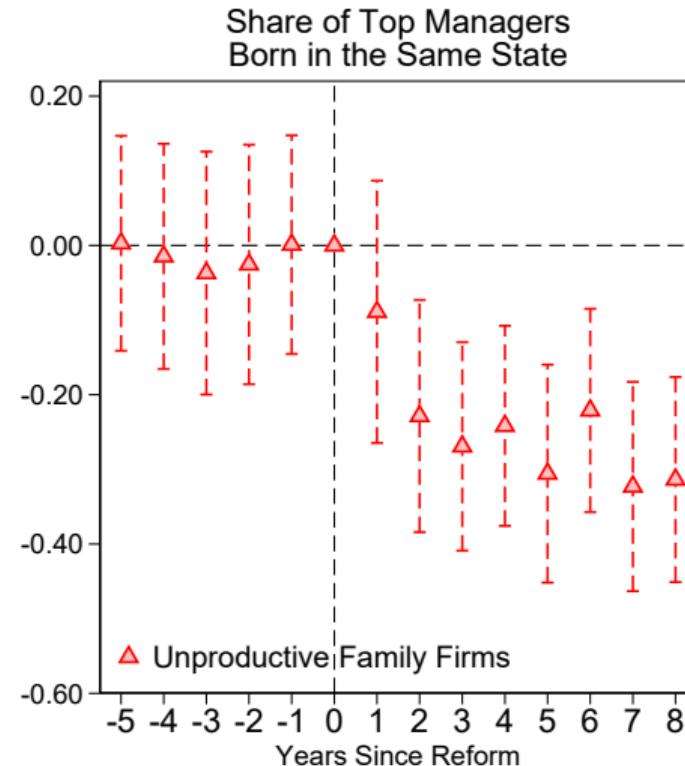
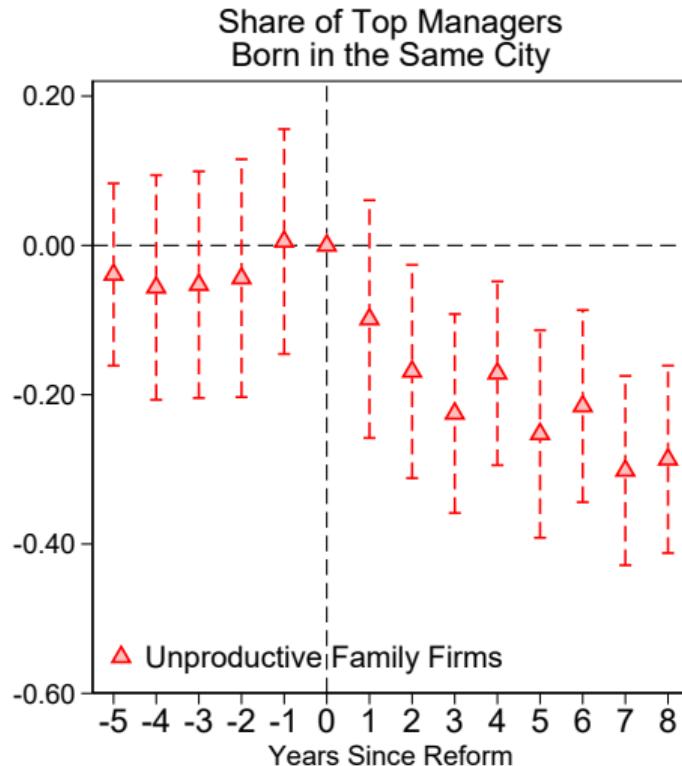
Log Total Assets



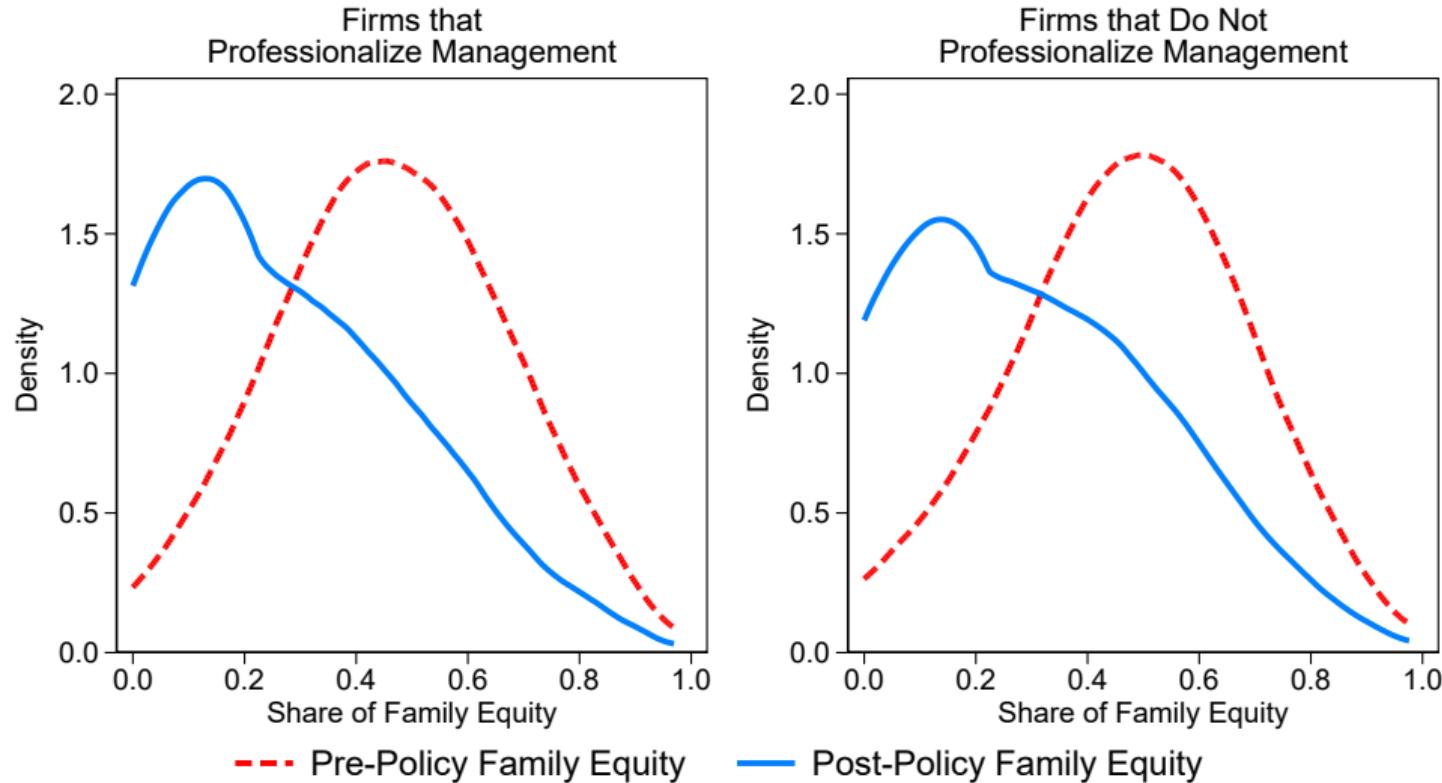
Lee Bounds



② Laggards Professionalize: City and State of Birth

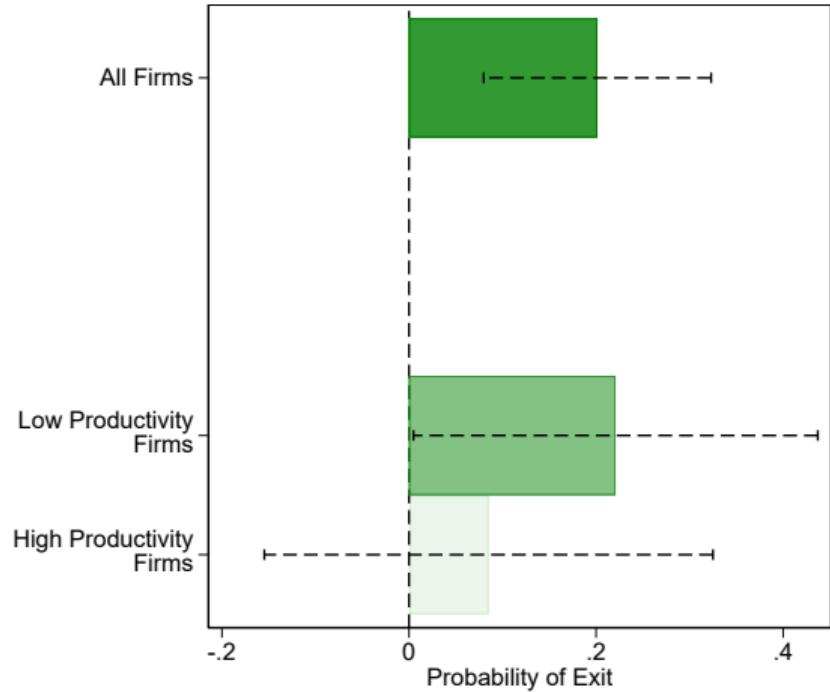


Family Ownership

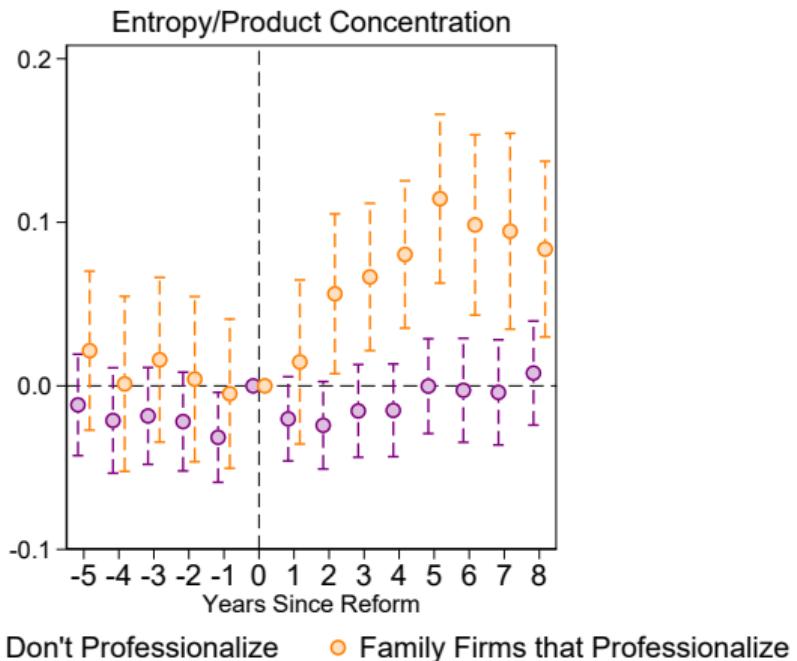


Exit (in the Long Run)

- Cannot confirm exit status or exit year in Prowess data
- Verify exit status by matching firms that drop out of Prowess to MCA admin data
- Long-difference: measure whether firm exits in any year from 2001–2021



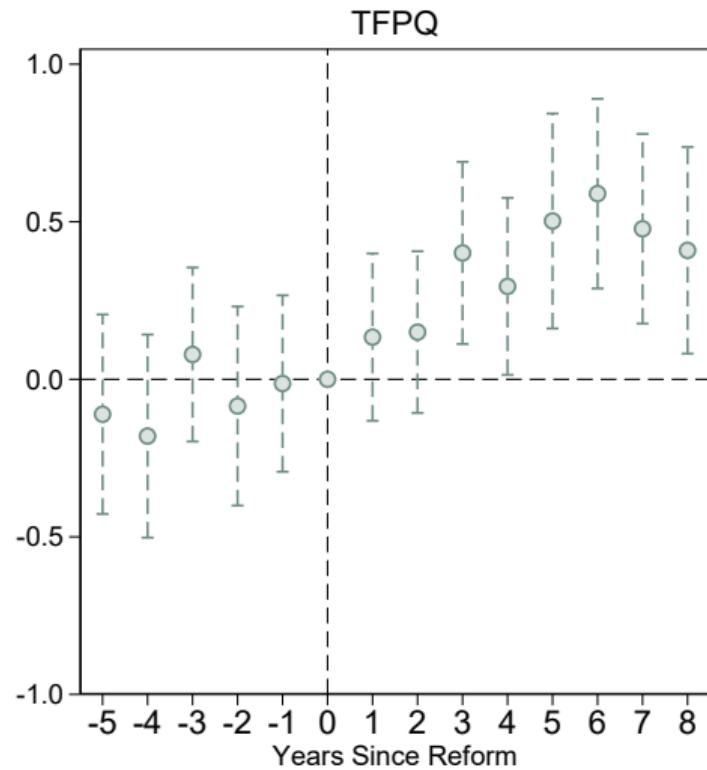
③ Firms that Professionalize Report Higher Product Concentration



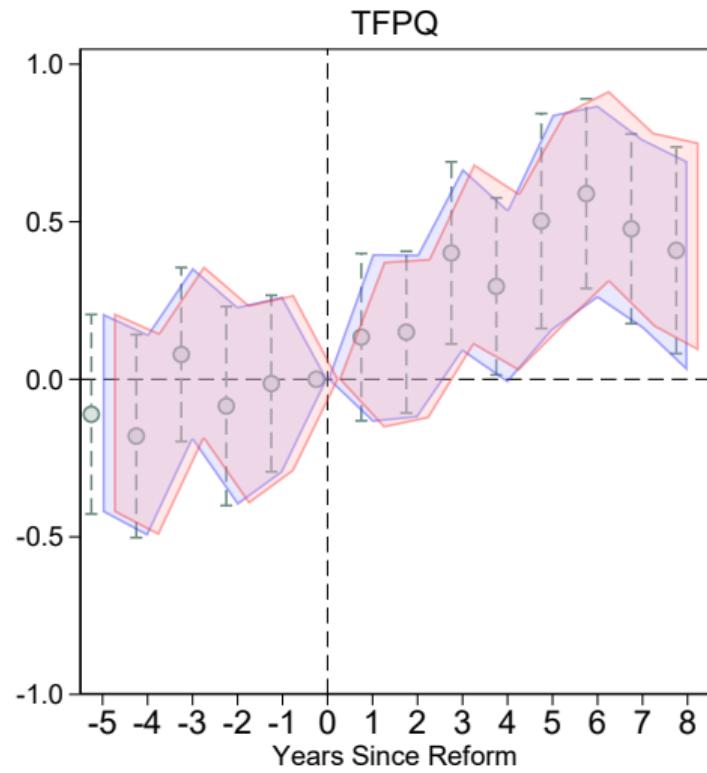
Note: A family firm is defined as having professionalized if its share of family top managers was lower in $t = 8$ as compared to $t = 0$.

Back

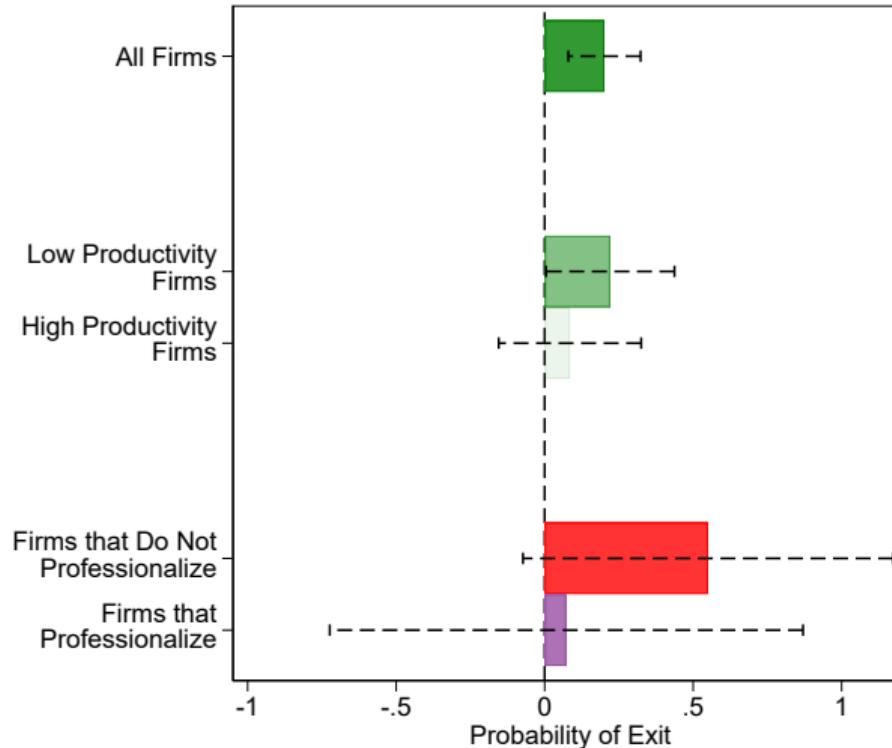
Firms that Professionalize Report Higher Productivity (Triple Difference)



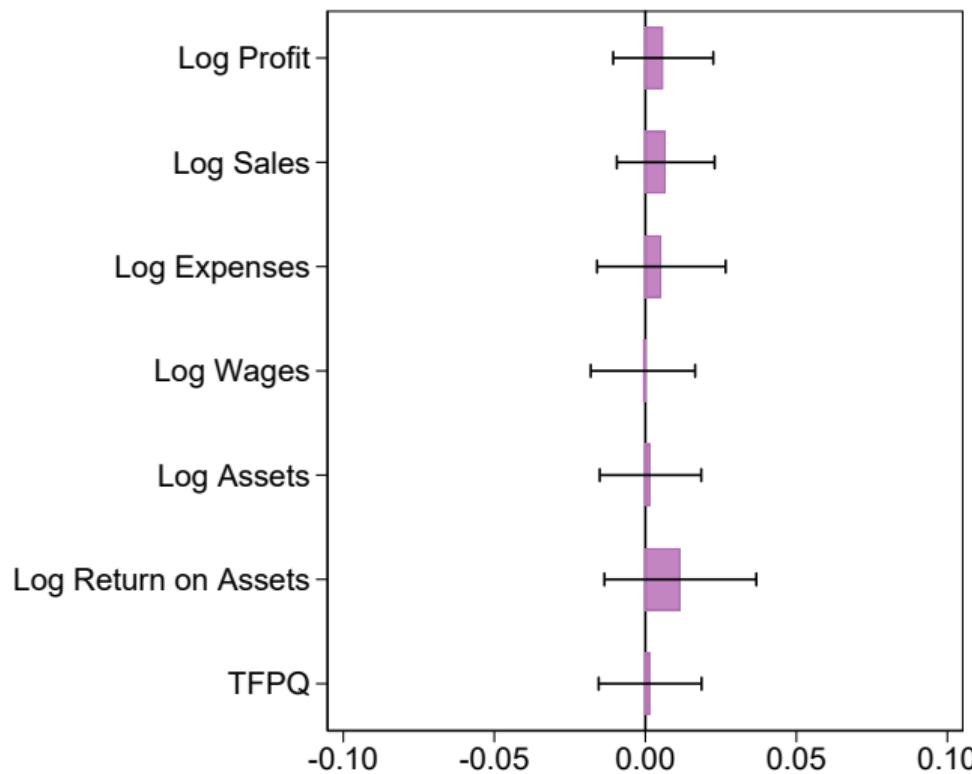
Lee Bounds



Exit



Selection Into Professionalizing Management



Reputational Cost of Switching Back to Family Management



World ▾ Business ▾ Markets ▾ Sustainability ▾ Legal ▾ Breakingviews ▾ Technology ▾ Investigations More ▾

Infosys CEO resigns after long-running feud with founders

By Samantha Karen Nair and Sankalp Phartiyal

August 18, 2017 3:58 PM GMT+1 · Updated 8 years ago

Aa



BENGALURU/MUMBAI (Reuters) - Vishal Sikka, the chief executive brought in to turn around India's Infosys three years ago, resigned on Friday, blaming a "continuous drumbeat of distractions" and a long-running row with the founders over company strategy.

Sikka's resignation spooked investors in India's second-biggest IT services company and sent its shares down nearly 10 percent, wiping \$3.45 billion off its market value. The stock touched its lowest level since the start of Sikka's tenure.

Model: Management Choice

Model: Comparative Statics

Profits After Trade

Profits After Trade Liberalization ($t = 1$)

- Switching from professional to family management incurs (reputational) cost κ Example

$$\text{Payoff}(z, \mathcal{P}_0, \mathcal{P}_1) = \mathcal{P}_1 \pi(\gamma z) + (1 - \mathcal{P}_1) [\pi(z) + B - \kappa \mathcal{P}_0]$$

- When $\mathcal{P}_1 = 1$ (the firm upgrades management in $t = 1$), the payoff is $\pi(\gamma z)$ regardless of the past choice
- When $\mathcal{P}_1 = 0$ (the firm is family-managed in $t = 1$), the payoff is:
 - $\pi(z) + B$ if it was family in $t = 0$ (i.e., $\mathcal{P}_0 = 0$)
 - $\pi(z) + B - \kappa$ if it was professionally-managed in $t = 0$ (i.e., $\mathcal{P}_0 = 1$)

[Model: Baseline Equilibrium](#)

[Model: Comparative Statics](#)

[Model: Management Choice](#)

Equilibrium: Free Entry, Exit, and Equilibrium Price Index

- **Free entry:**

$$[1 - G(z_e)] \cdot \frac{1}{\delta} \pi - f_E = 0$$

- **Average profits among surviving firms:**

$$\pi = \frac{\sigma - 1}{k - \sigma + 1} f \cdot \Delta, \quad \Delta \equiv 1 + \frac{k}{\sigma - 1} (\gamma^{\sigma-1} - 1) \gamma^{-k} \left(\left(\frac{\mathcal{B}}{f(\gamma^{\sigma-1} - 1)} \right)^{\frac{\sigma-k-1}{\sigma-1}} - 1 \right)$$

- **Exit cutoff:**

$$z_e = \left(\frac{1}{\delta f_E} \cdot \frac{\sigma - 1}{k - \sigma + 1} f \Delta \right)^{1/k}$$

- **Price index (domestic varieties):**

$$P = \frac{1}{\rho \gamma} (\sigma f_E)^{\frac{1}{\sigma-1}} \left(\frac{\sigma - 1}{k - \sigma + 1} \cdot \frac{f}{\delta f_E} \cdot \Delta \right)^{-1/k}, \quad \rho \equiv \frac{\sigma - 1}{\sigma}$$

Equilibrium: Market Clearing and Aggregates

- **Masses of firms.** Let M_E be the mass of entrants and M the mass of active firms:

$$M = \frac{1 - G(z_e)}{\delta} M_E$$

- **Labor demand in differentiated sector.** With revenue R and aggregate operating profits Π :

$$L_Y = \frac{R - \Pi}{w} + M_E f_E$$

Free entry implies $\Pi = w M_E f_E$

- **Goods-market clearing.** Revenue equals expenditure on differentiated goods:

$$R = E, \quad E = \alpha I$$

- **Numeraire and income.** Homogeneous good pins down $w = 1$ and total income is the wage bill:

$$I = wL = L \quad \Rightarrow \quad E = \alpha L, \quad L_Y = \alpha L, \quad L_X = (1 - \alpha)L$$

Import Competition: Fall in Aggregate Demand

- Model import competition as an exogenous increase in foreign varieties M_F

⇒ Lowers the price index

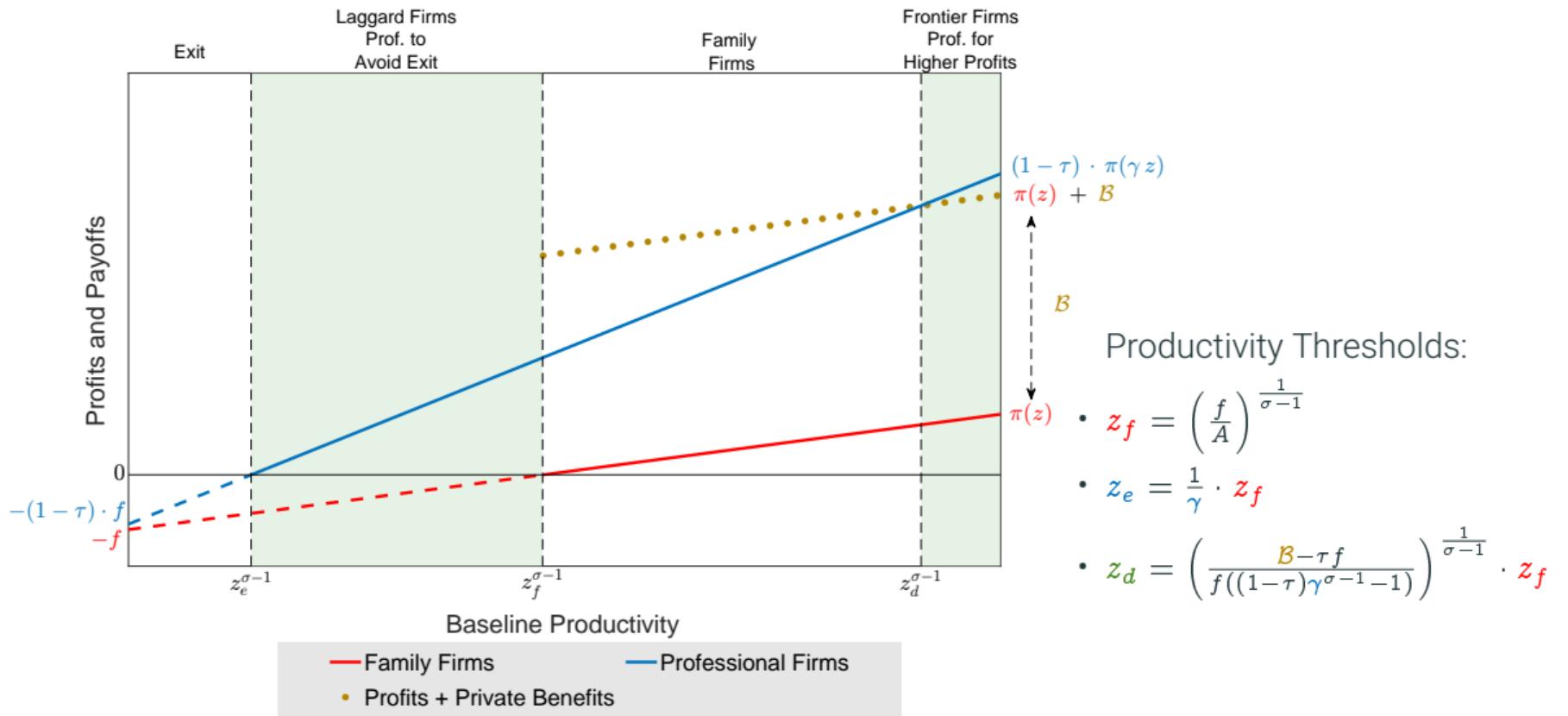
$$P = \left[M_H \int_{z_e}^{\infty} p(z)^{1-\sigma} \frac{g(z)}{[1 - G(z_e)]} dz + M_F \uparrow \int_{z_F}^{\infty} p_F(z)^{1-\sigma} \frac{g(z)}{[1 - G(z_F)]} dz \right]^{1/(1-\sigma)}$$

⇒ Lower aggregate demand for Indian varieties $A = \frac{1}{\sigma} \left(\frac{\sigma-1}{\sigma} \right)^{\sigma-1} EP^{\sigma-1} w^{1-\sigma}$

⇒ Reduces profits for all domestic firms

⇒ Thresholds (z_e, z_f, z_d) shift up (more exit, more professionalization)

Contracting Frictions

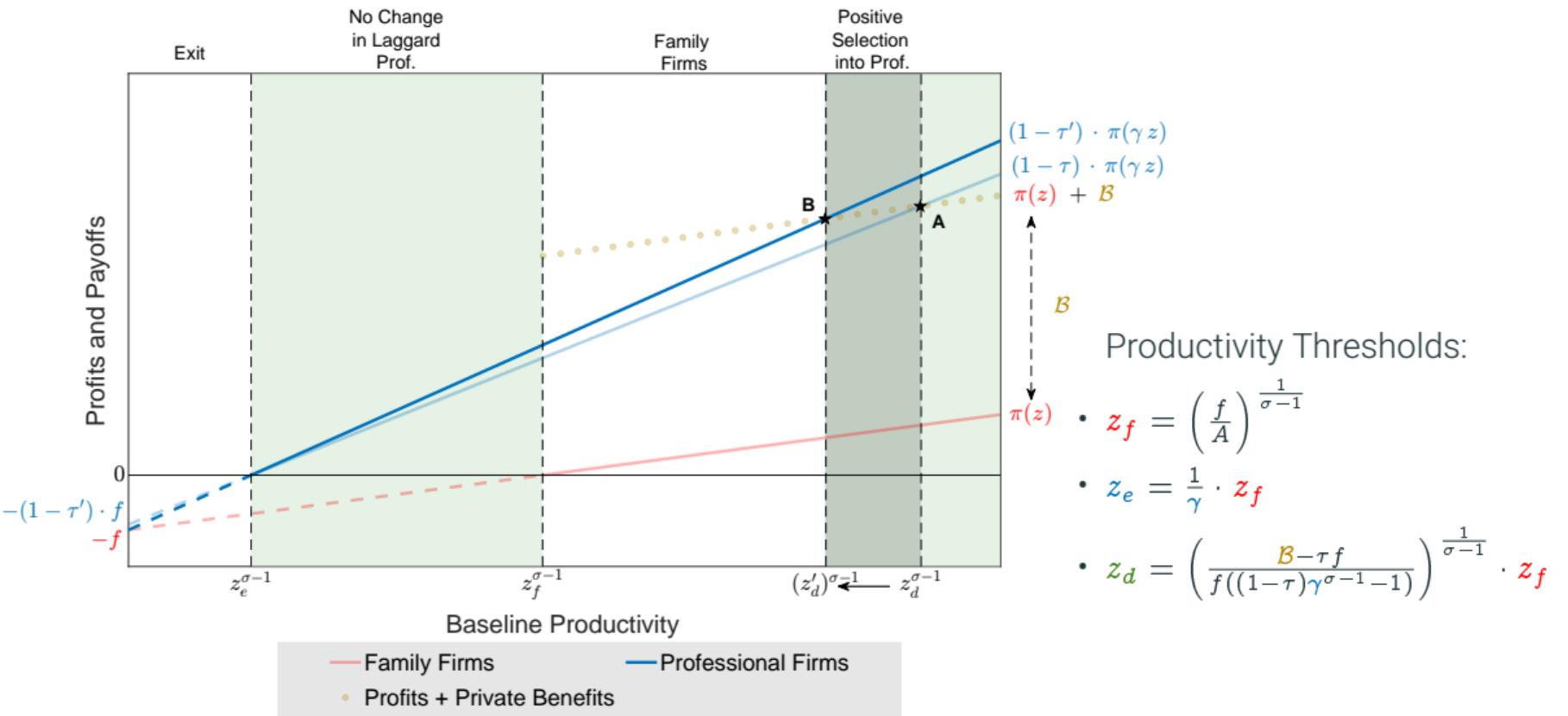


Note: Baseline productivity: before decision to professionalize.

Model: Baseline Equilibrium

Model: Comparative Statics

Contracting Frictions

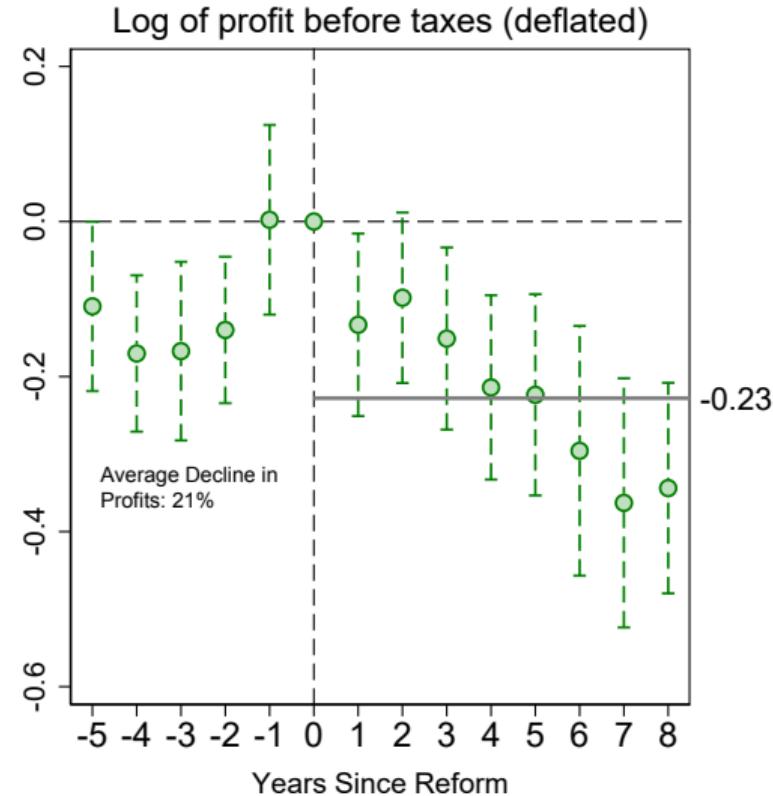
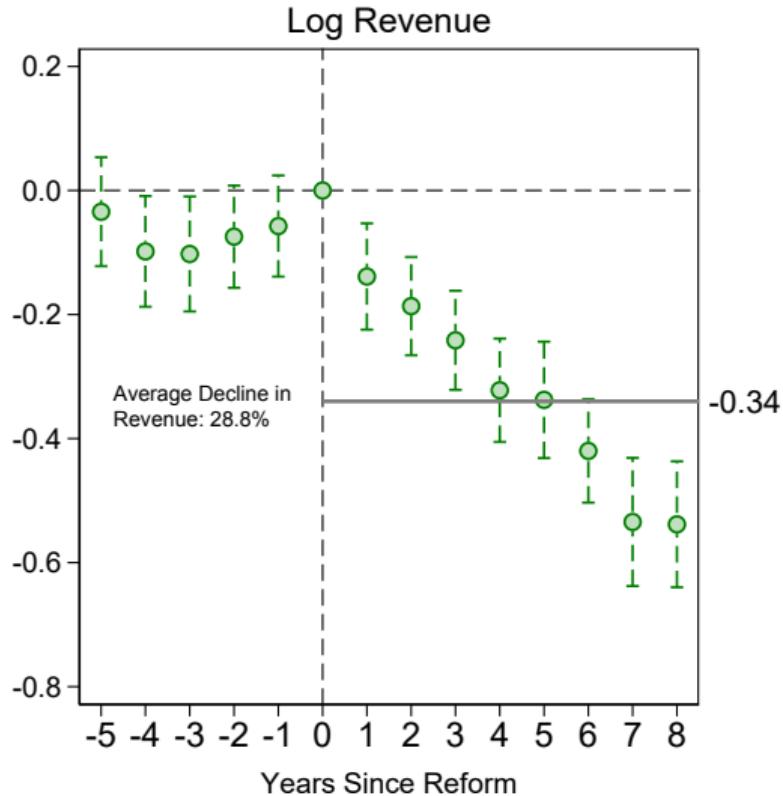


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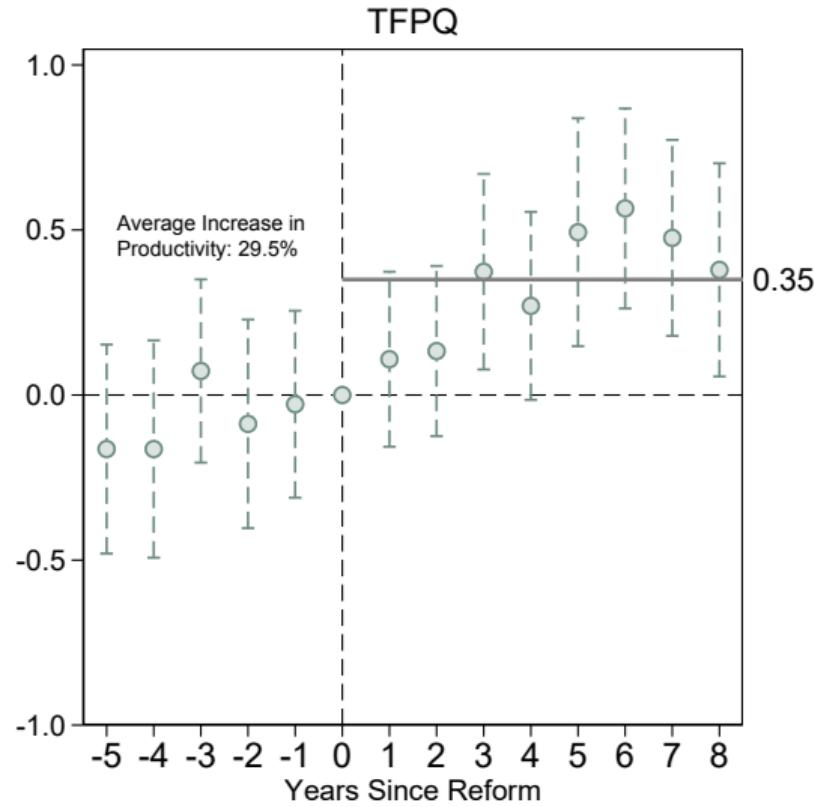
Model: Baseline Equilibrium

Model: Comparative Statics

Revenue and Profit Decline

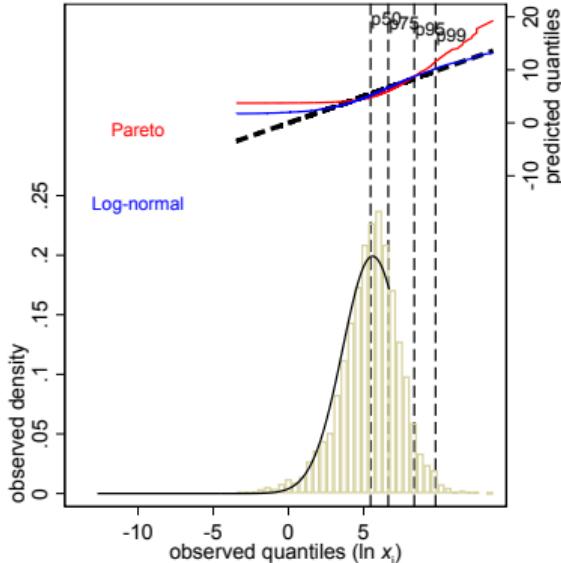


Average Post Treatment Productivity Increases



Calibrating the Pareto Tail (k)

- **Sample.** Rank firms by revenue, keep 95th–99th pct.
- **Transform.** F_i = empirical CDF $\Rightarrow z_i = -\ln(1 - F_i)$ (linearizes a Pareto tail).
- **QQ-regression.** $\ln x_i = \alpha + \underbrace{\beta}_{=(\sigma-1)/k} z_i + \varepsilon_i.$
- **Result.**
$$\hat{\beta} = 0.87 \Rightarrow \hat{k} = \frac{\sigma - 1}{\hat{\beta}} = \frac{3}{0.87} \approx 3.5.$$
- **Robustness.** Cut-offs from 95th to 99th give $k \in [3.4, 3.6]$ ✓



QQ-plot of $\ln x_i$ (log revenue) against $z_i = -\ln(1 - F_i)$ for the top 5% of firms

Analytical Moment Conditions for β, γ

- Difference in mean log revenue of family and professional firms:
$$(\sigma - 1) \log \gamma + \log \left[\frac{\gamma^{-(\sigma-k-1)} - 1 + \delta^{\sigma-k-1}}{\gamma^k - 1 + \delta^{-k}} \cdot \frac{1 - \delta^{-k}}{1 - \delta^{\sigma-k-1}} \right]$$
- Share of family-managed firms: $\gamma^{-k} (1 - \delta^{-k})$

$$\text{where } \delta = \left[\frac{B}{f(\gamma^{\sigma-1} - 1)} \right]^{1/(\sigma-1)}$$

Back

Aggregate Productivity: Exit vs. Professionalization

$$\underbrace{\bar{z}_1 - \bar{z}_0}_{\Delta \text{ aggregate productivity}} = \underbrace{(\bar{z}_1^{\text{sel}} - \bar{z}_0)}_{\text{exit / selection}} + \underbrace{(\bar{z}_1 - \bar{z}_1^{\text{sel}})}_{\text{professionalization}}$$

$$\bar{z}_0 = \frac{1}{N_0} \sum_{i \in S_0} z_{i0}$$

mean realized productivity at $t = 0$

$$\bar{z}_1^{\text{sel}} = \frac{1}{N_1} \sum_{i \in S_1} z_{i0}$$

survivors (S_1) but with $t = 0$ productivities

$$\bar{z}_1 = \frac{1}{N_1} \sum_{i \in S_1} z_{i1}$$

post-shock mean

where N_t is the number of active firms in period t ; S_0 : set of active firms at $t = 0$; $S_1 \subseteq S_0$: survivors after the trade shock; z_{i0} : realized productivity at time t (z_i if family, γz_i if professional)

Back

Welfare Accounting

- Consumption welfare

$$W^C = (1 - \alpha)^{1-\alpha} \alpha^\alpha \frac{I}{P^\alpha}.$$

- Net welfare

$$W = (1 - \alpha)^{1-\alpha} \alpha^\alpha \frac{I + B \cdot M_{H,\text{fam}}}{P^\alpha}$$

where $M_{H,\text{fam}}$ is the mass of active family-managed firms

- Change after import competition

$$\frac{W_1}{W_0} = \frac{W_1^C}{W_0^C} \times \frac{1 + s_1}{1 + s_0}, \quad \text{where } s_t \equiv \frac{B M_{H,\text{fam},t}}{I_t}$$

- Lost private benefits are concentrated among owners of switching and exiting family firms
- Productivity gains lower prices, raising real income for all consumers
- TFP +12%; consumption welfare +9.4%; net welfare +8.7%