

When Competition Compels Change: Trade, Management, and Productivity

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Tufts

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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Great progress in our understanding of trade \leftrightarrow competition \leftrightarrow productivity

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

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Great progress in our understanding of trade \leftrightarrow competition \leftrightarrow productivity

- **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 managerial quality and firm organization
 \implies productivity growth within firm

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
Deputy Managing Director

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Joint Managing Director

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Joint Managing Director

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George Alexander Muthoot
Managing Director

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Family Firms are widespread in ▶ India and across the ▶ Developing World

Management Quality and Firm Organization: The House of Georges



Shri **George** Jacob Muthoot
Group Chairman
The Muthoot Group of Companies



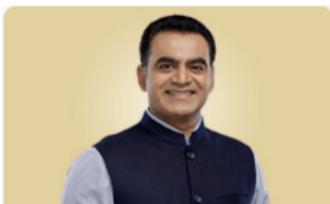
V.A. George
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Within-firm Channel Accounts for 30% of Aggregate Productivity Gains from Trade

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 Melitz model

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3. **Quantitative Framework:** embed management choice in a Melitz model
 - i. Why do firms only professionalize after competition? A key trade-off helps answer:
 - ii. Within-firm gains from professionalizing are **30% of total productivity gains** from trade

Contribution to the Literature

- **Competition and Firm Productivity:** Leibenstein (1966); Schmidt (1997); Raith (2003); Nickell (1996); 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: Topalova & Khandelwal (2011); Amiti and Konings (2007); Bernard et al. (2011); Dhingra (2013) Atkin & Khandelwal (2017); Alfaro-Urena et al. (2022) Bustos (2011); Bloom et al. (2016); Hombert & Matray (2018); Autor et al. (2020); Chen & Steinwender (2021)
→ Organizational channel of within-firm productivity gains from trade
- **Family Firms:** Bertrand Mullainathan (2003); Bertrand & Schoar (2006); Burkart Panunzi & Shleifer (2003); Caselli & Gennaioli (2013); Bandiera et al. (2018); Lippi & Schiavardi (2014); Lemos & Scur (2018); Akcigit, Alp, & Peters (2021); Bloom et al. (2013)
→ Response of family firms to globalization

Outline

Introduction

Natural Experiment

Data

Empirical Results

Model

Estimation & Counterfactuals

Outline

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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.

Outline

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Data Construction

Digitized > 1,000 pages of
Customs Notifications

1. QR removal: Identify affected products

संख्या अ. नं. प्रति - 33204/98

REGD. NO. D. L-31903/98



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 JTC (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/FD shrimp frozen	Free		
03061303	Prawns frozen	Free		
03061400	Crabs	Free		
03061900	Other, 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
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**
2. QR removal: Identify affected **firms**
3. **Firm panel data** (CMIE Prowess):
 - Balance sheet + financial statements
 - Product scope ➔ Summary Statistics

Data Construction

1. QR removal: Identify affected products
2. QR removal: Identify affected firms
3. Firm panel data (CMIE Prowess):
 - Balance sheet + financial statements
 - Product scope → Summary Statistics
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

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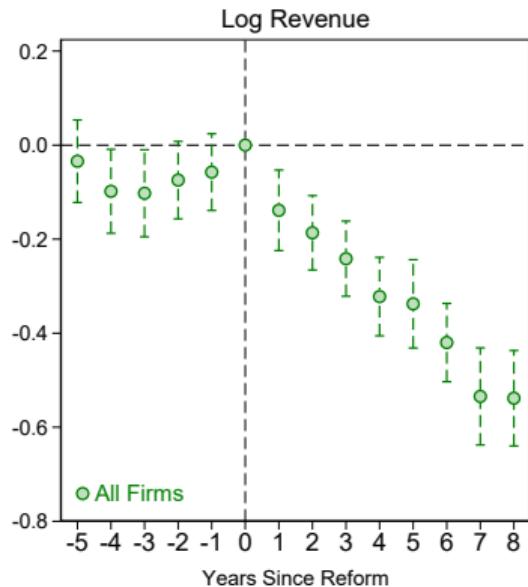
Estimation & Counterfactuals

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

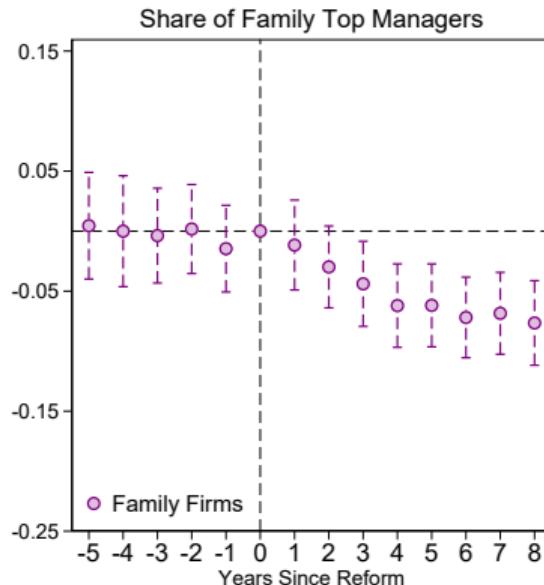
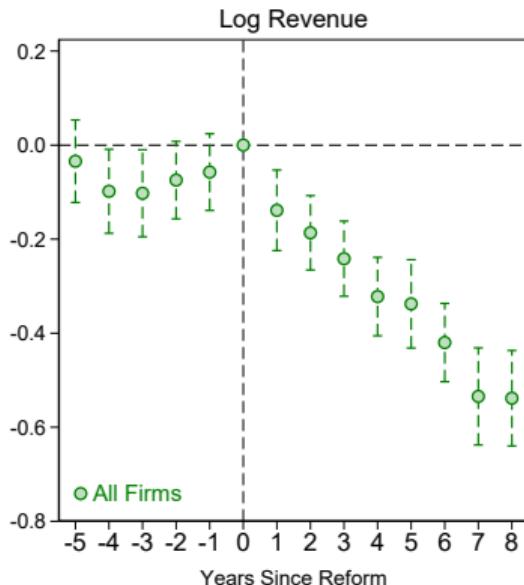
① First Stage: Firms Contract



- ▶ Treated vs. Control Group
- ▶ Wage Bill and Inputs
- ▶ Alternative Specifications
- ▶ Family/Professional Firms Separately
- ▶ Lee Bounds: Financial
- ▶ Lee Bounds: Management
- ▶ Number of Managers
- ▶ Place of Birth and Last Name
- ▶ Directors' Age Distribution
- ▶ Ownership
- ▶ Exit
- ▶ Model: Baseline Equilibrium
- ▶ Model: Comparative Statics

① First Stage: Firms Contract

② Laggards Professionalize



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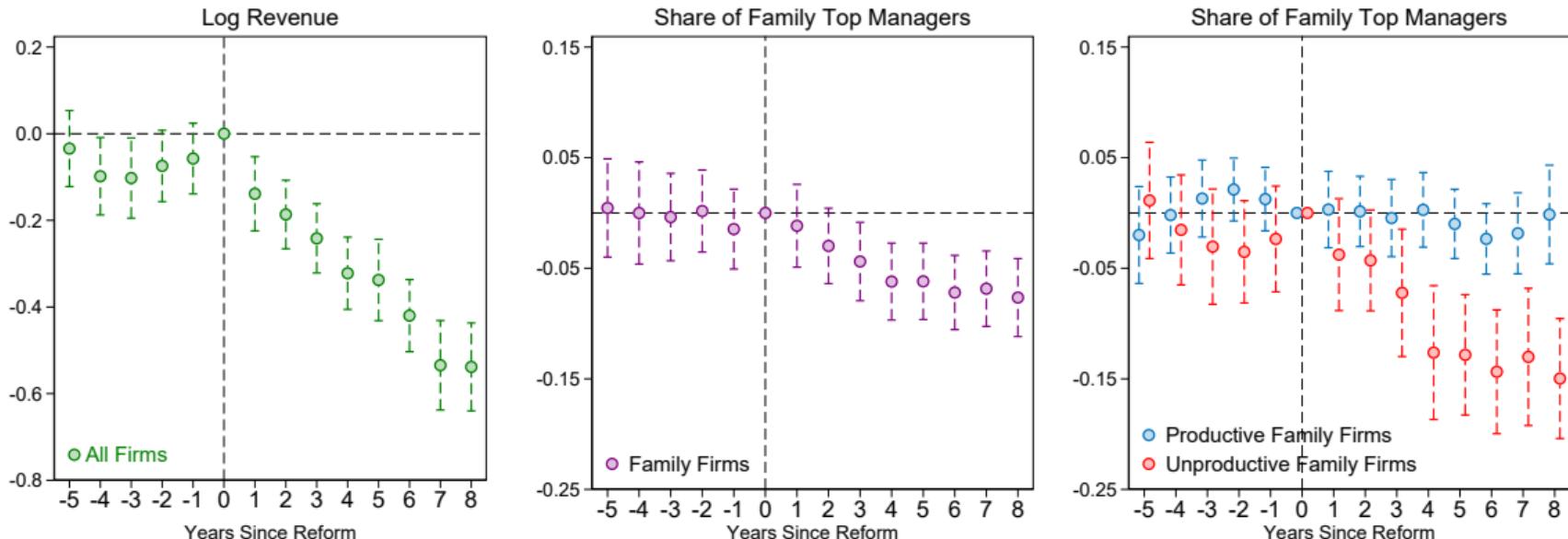
► Exit

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① First Stage: Firms Contract

② Laggards Professionalize



Treated vs. Control Group

Wage Bill and Inputs

Alternative Specifications

Family/Professional Firms Separately

Lee Bounds: Financial

Lee Bounds: Management

Number of Managers

Place of Birth and Last Name

Directors' Age Distribution

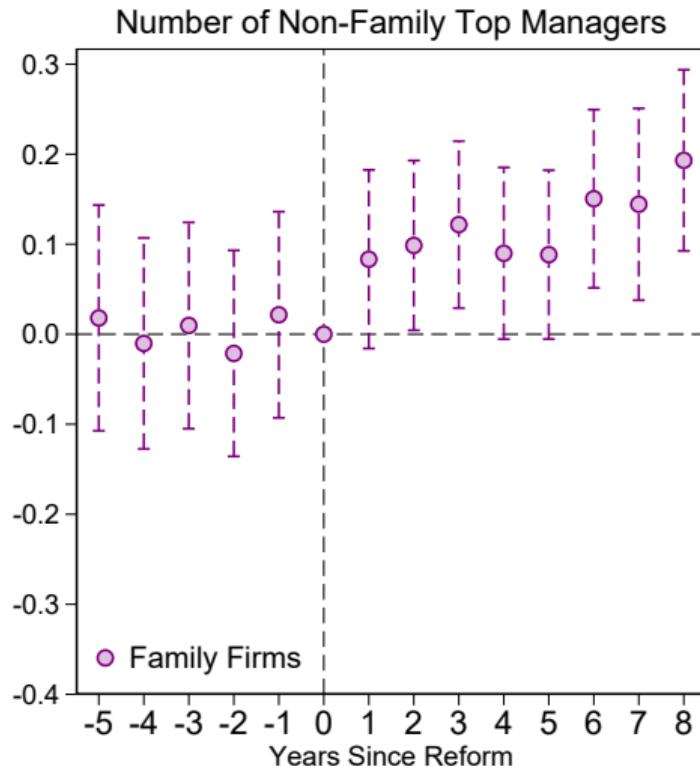
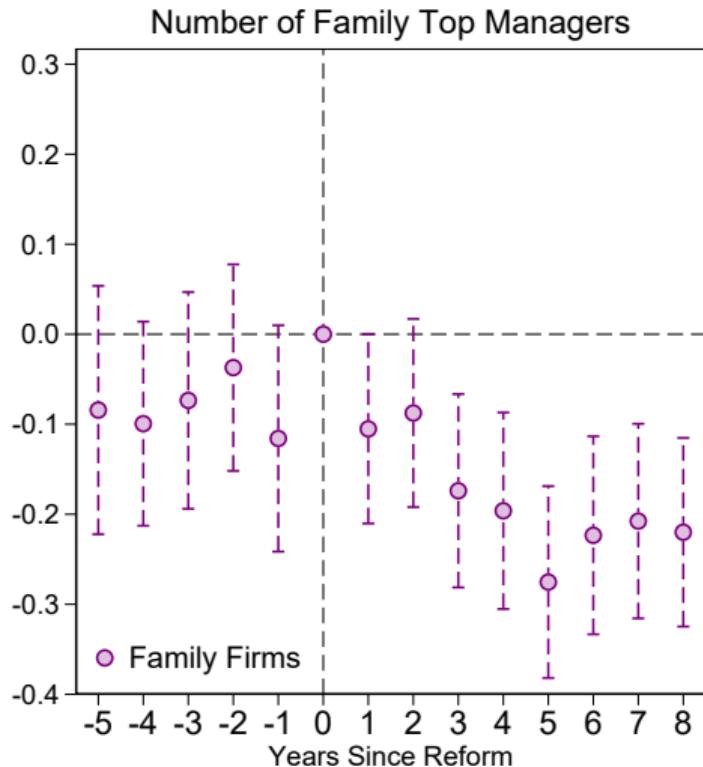
Ownership

Exit

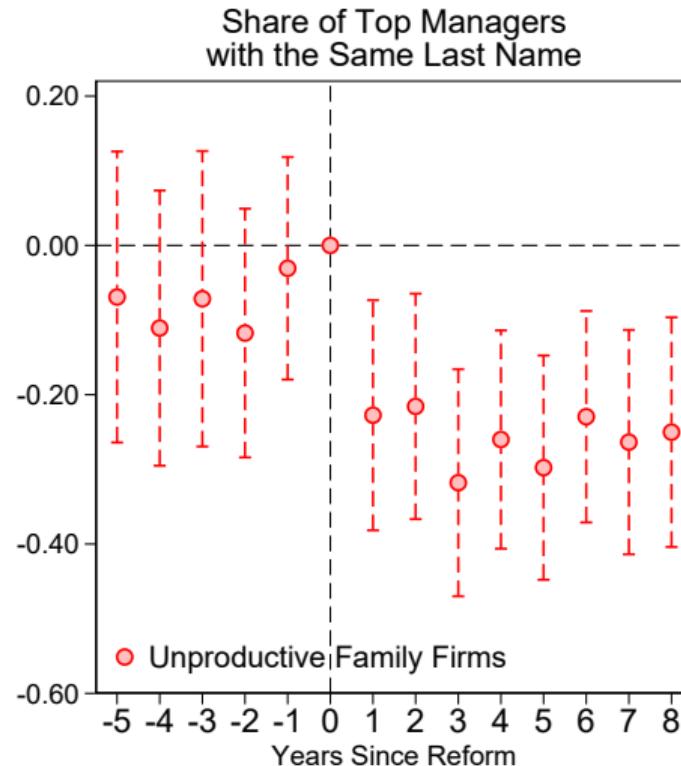
Model: Baseline Equilibrium

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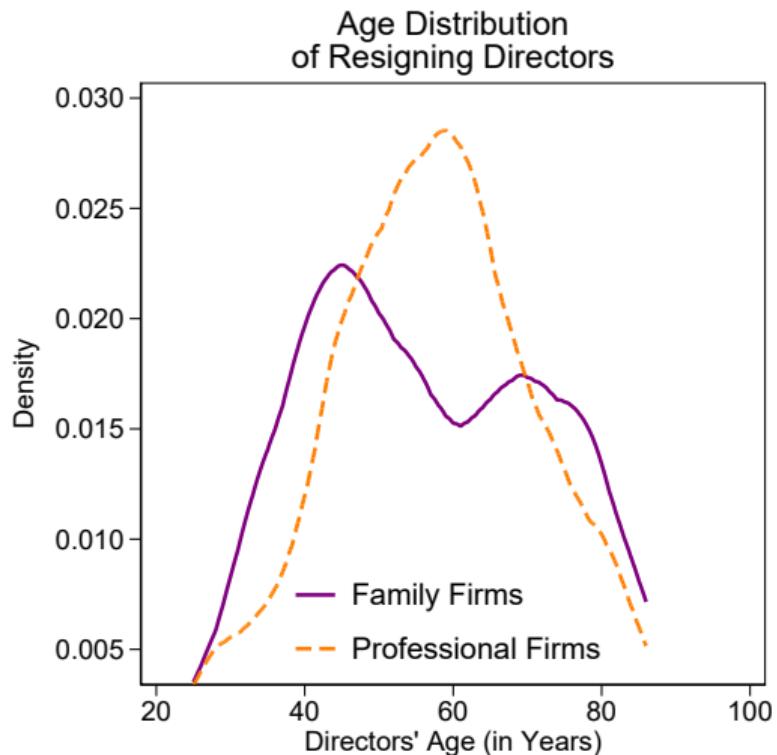
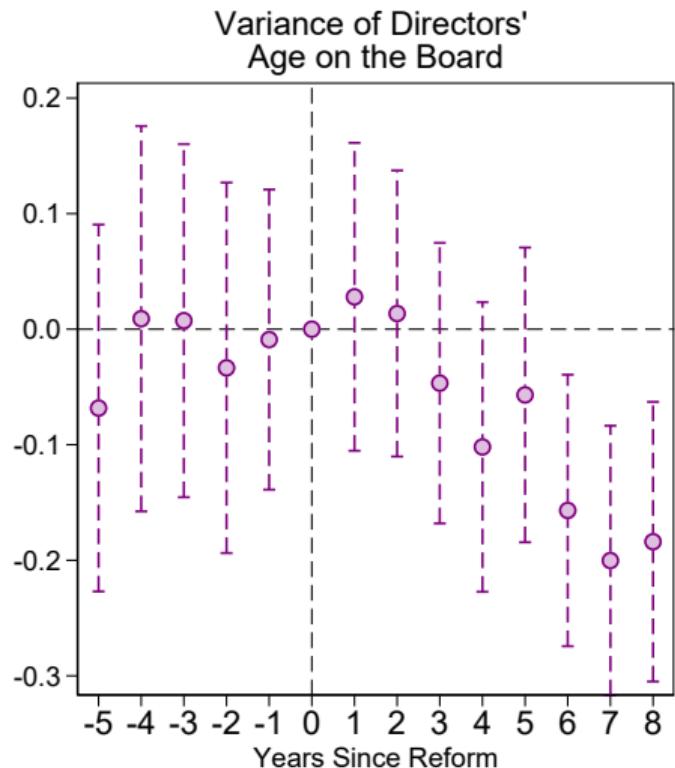
② Laggards Professionalize: Number of Family and Professional Executives



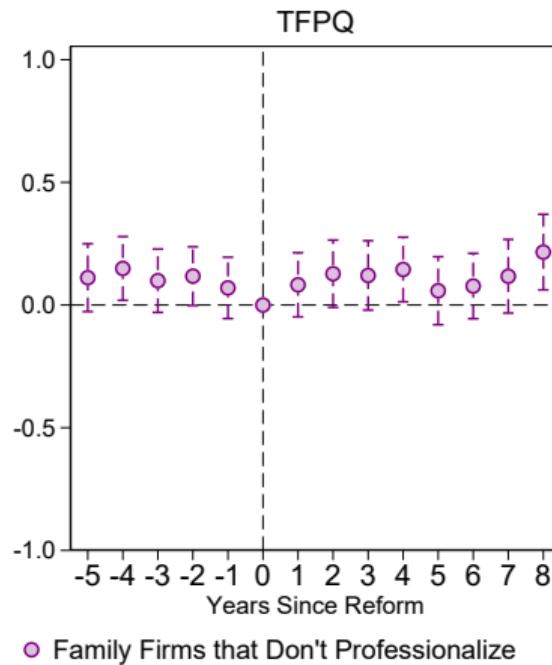
② Laggards Professionalize: Last Names and Place of Birth



② Laggards Professionalize: Compression of the Executives' Age Distribution

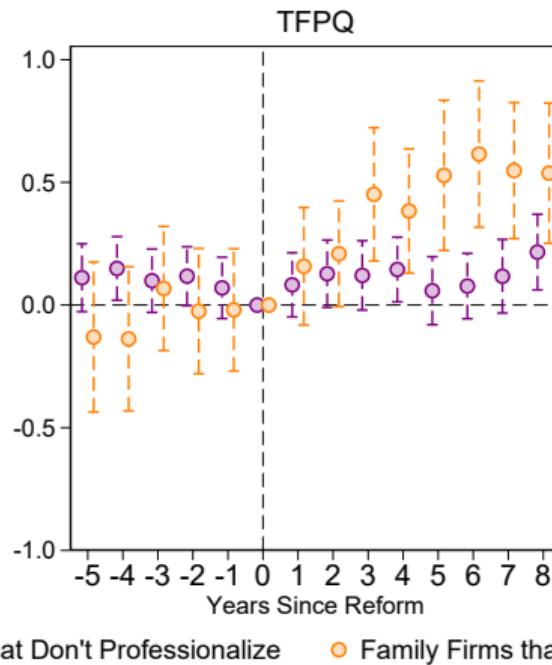


③ Firms that Professionalize Report Higher Quantity Productivity



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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Management Choice

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

▶ Preferences

▶ Technology

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

- \mathcal{B} : owners derive non-pecuniary **private benefits** from running a firm as a family firm
(Burkart, Panunzi, and Shleifer, 2003; Hurst and Pugsley, 2015)
- $\gamma > 1$: gains from **professionalizing** firm management. Absorbing state ▶ Reputation Cost
- Firm owners are hand-to-mouth: \implies exit if $\pi(z) < 0$

Management Choice

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▶ Technology

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

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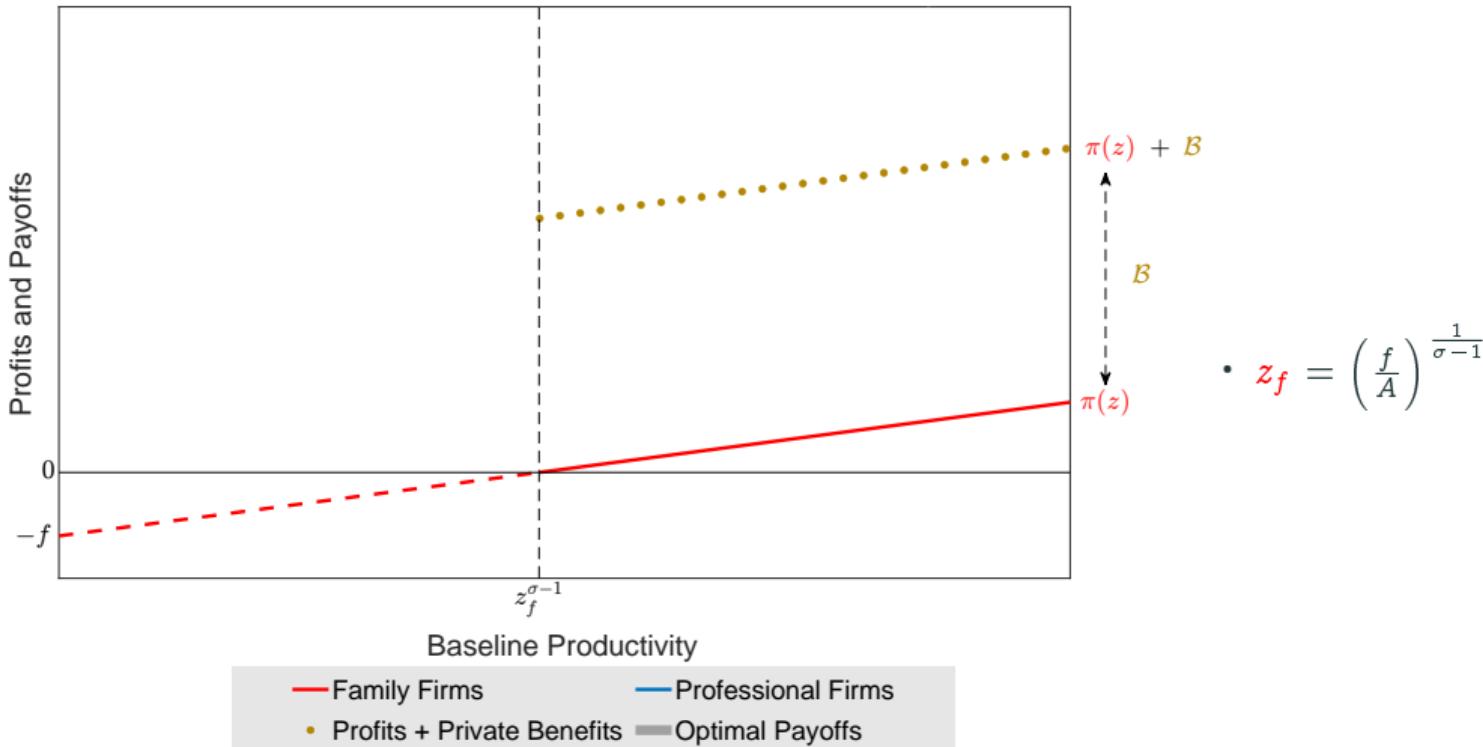
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Firm Profits and Management Choice:



Firm Profits and Management Choice: Family Firms



Note: Baseline productivity: before decision to professionalize.

▶ Exit

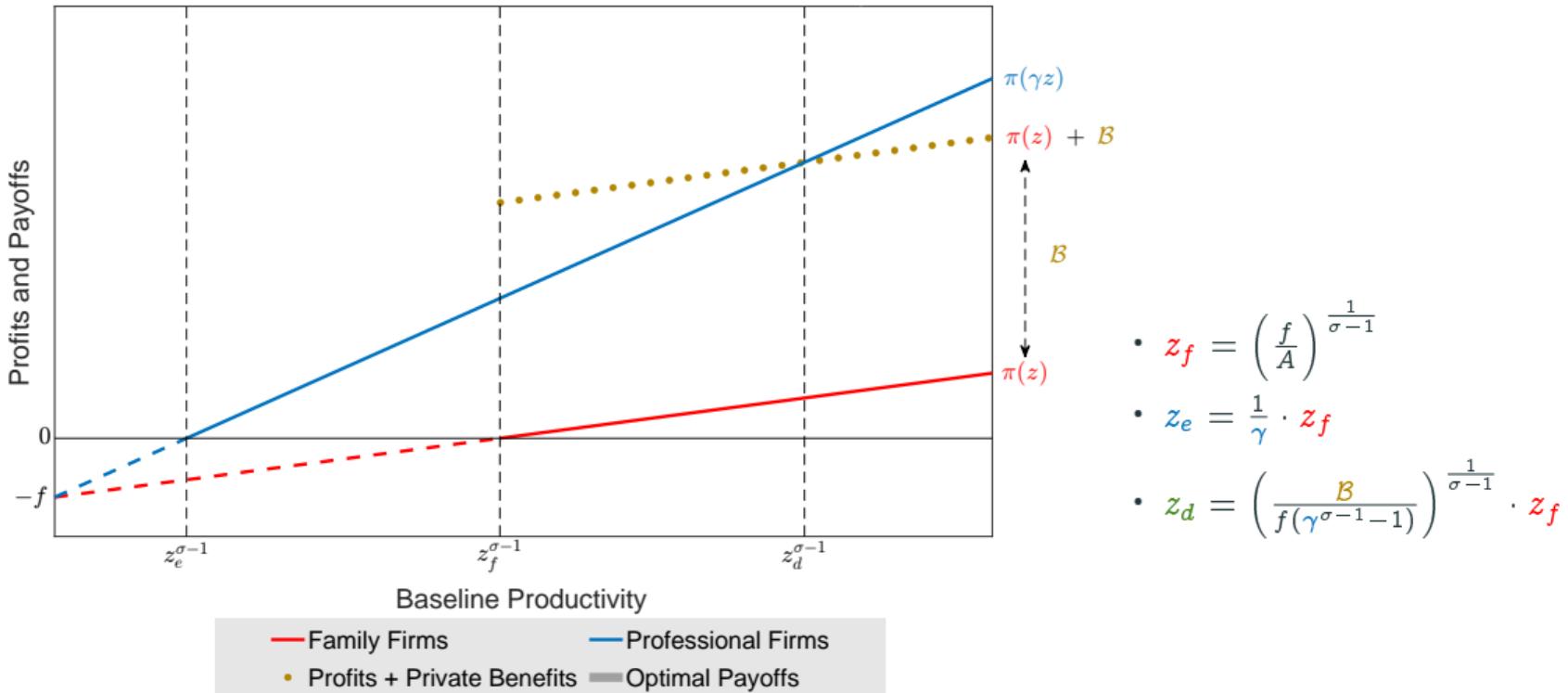
▶ Contracting Frictions

▶ Productivity Distribution

▶ Data

◀ Event Studies

Firm Profits and Management Choice: Professional Firms



Note: Baseline productivity: before decision to professionalize.

▶ Exit

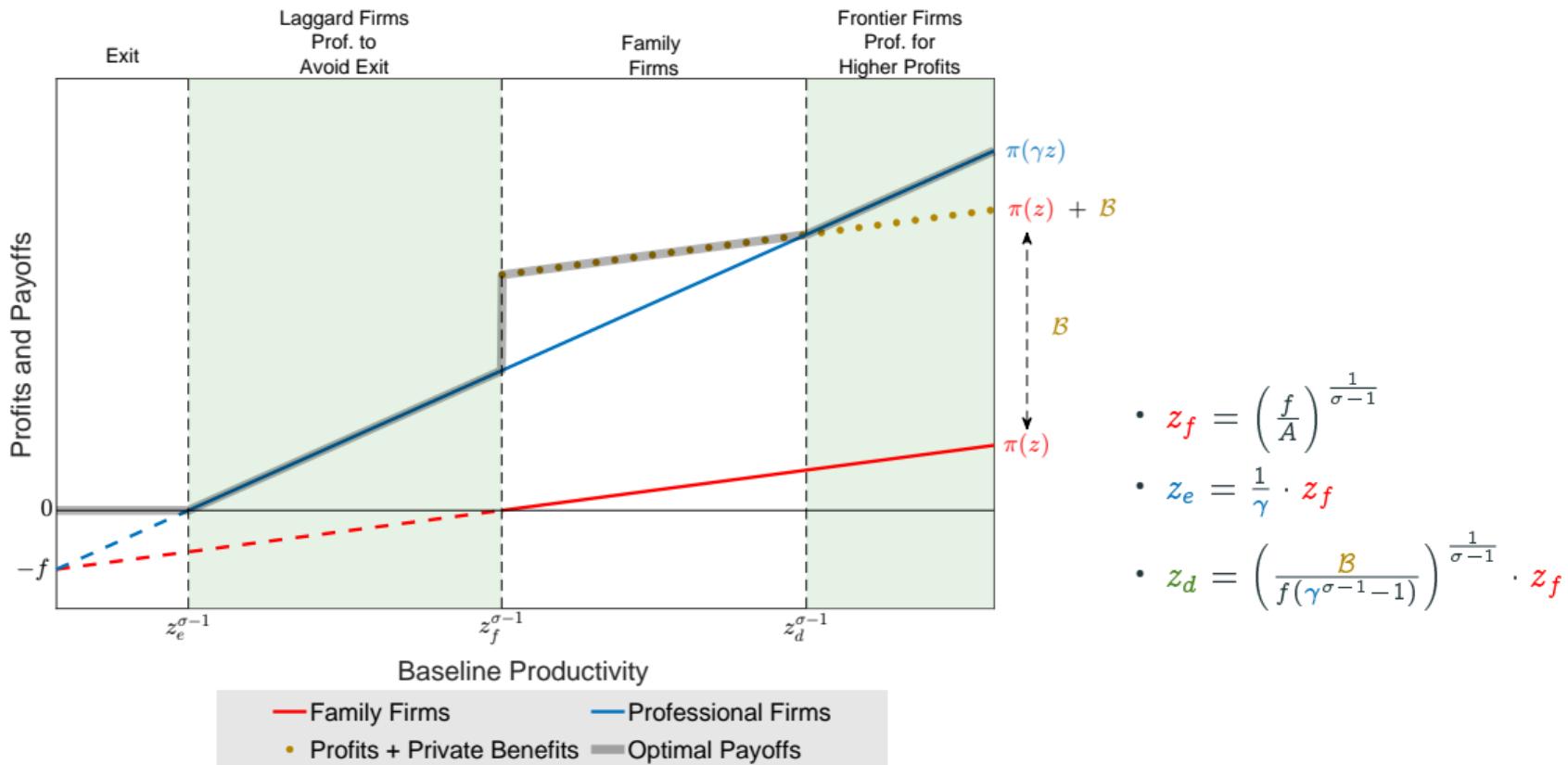
▶ Contracting Frictions

▶ Productivity Distribution

▶ Data

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Firm Profits and Management Choice: Optimal Payoff



Note: Baseline productivity: before decision to professionalize.

▶ Exit

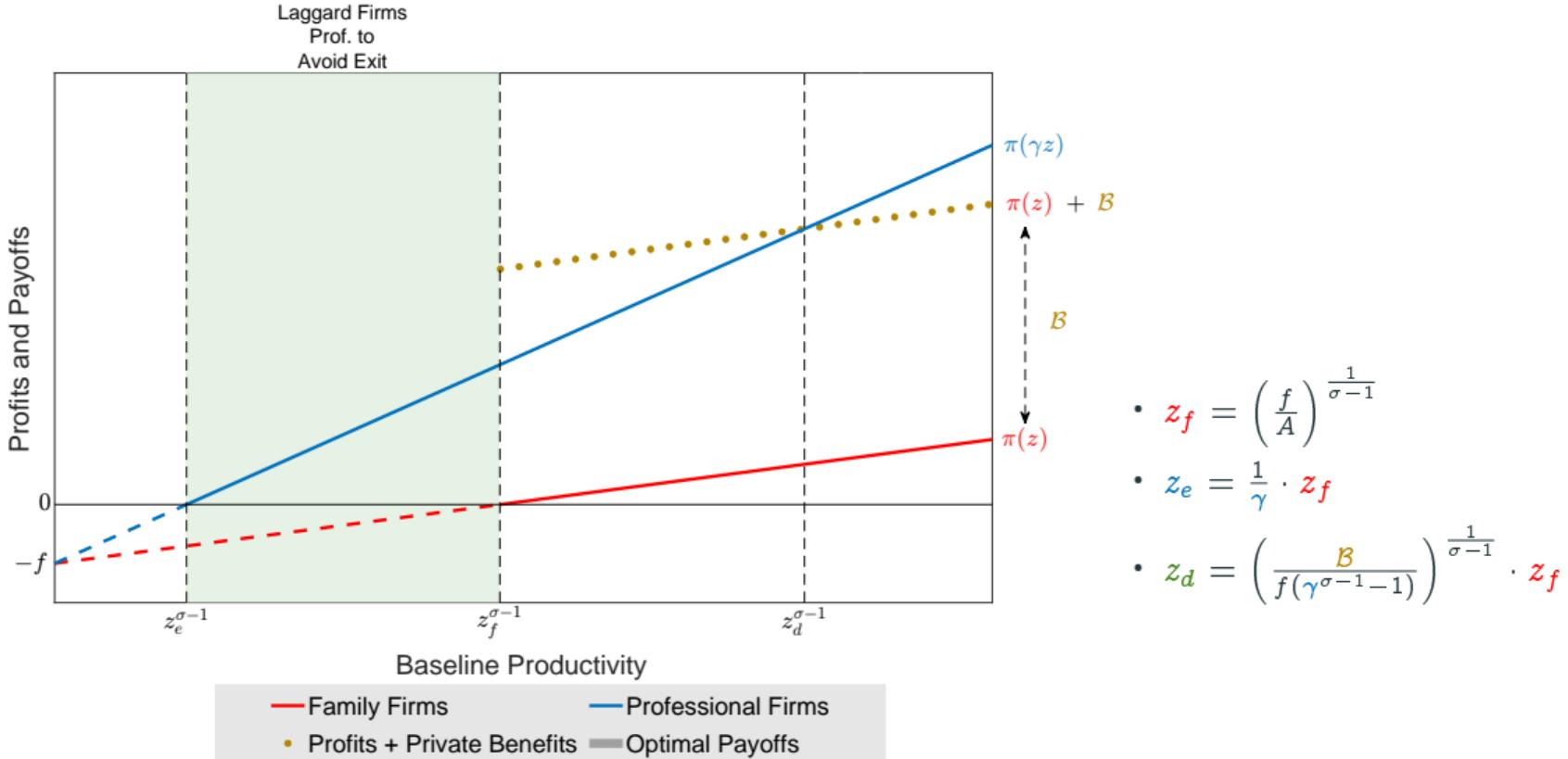
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▶ Productivity Distribution

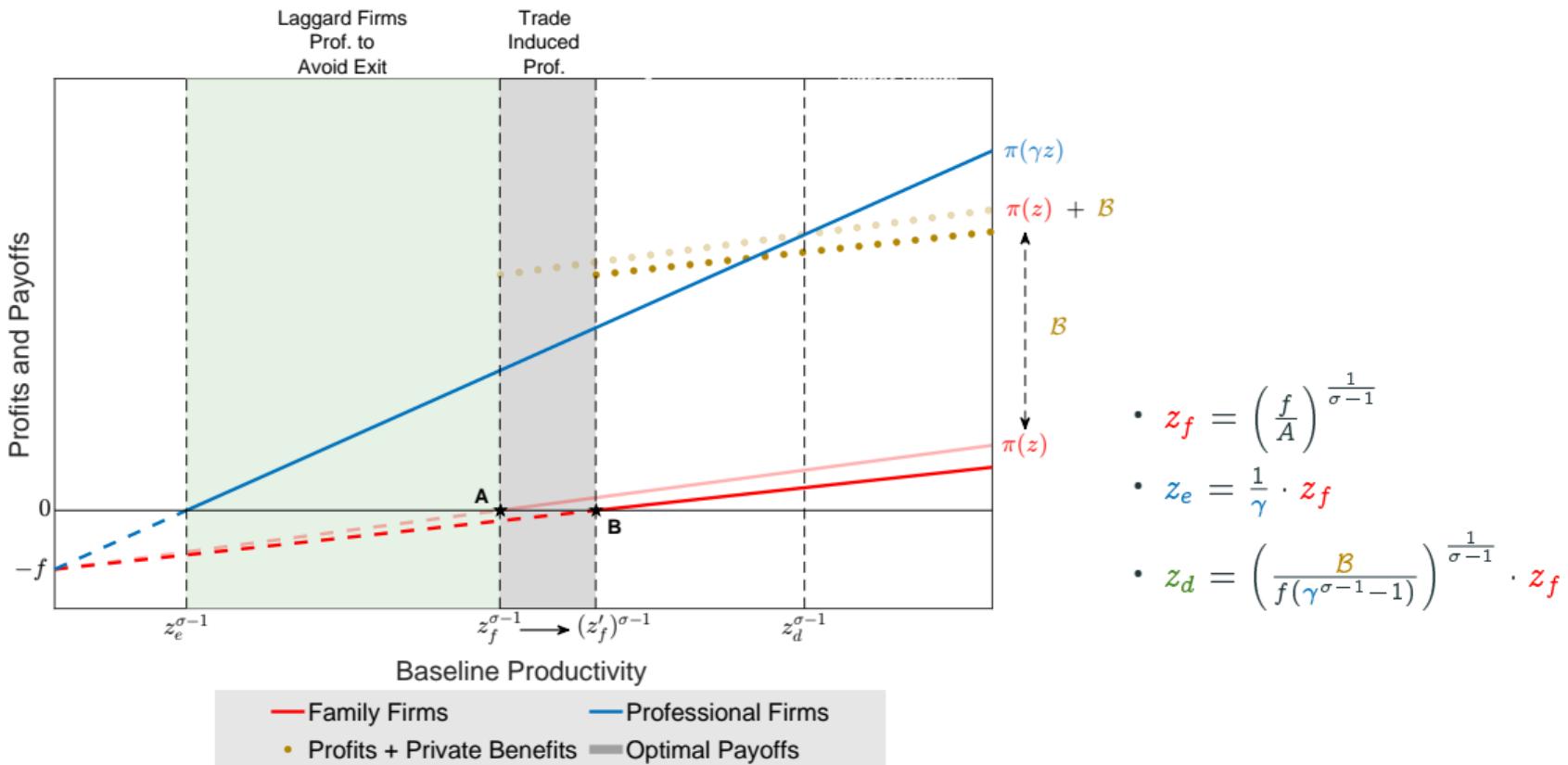
▶ Data

◀ Event Studies

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



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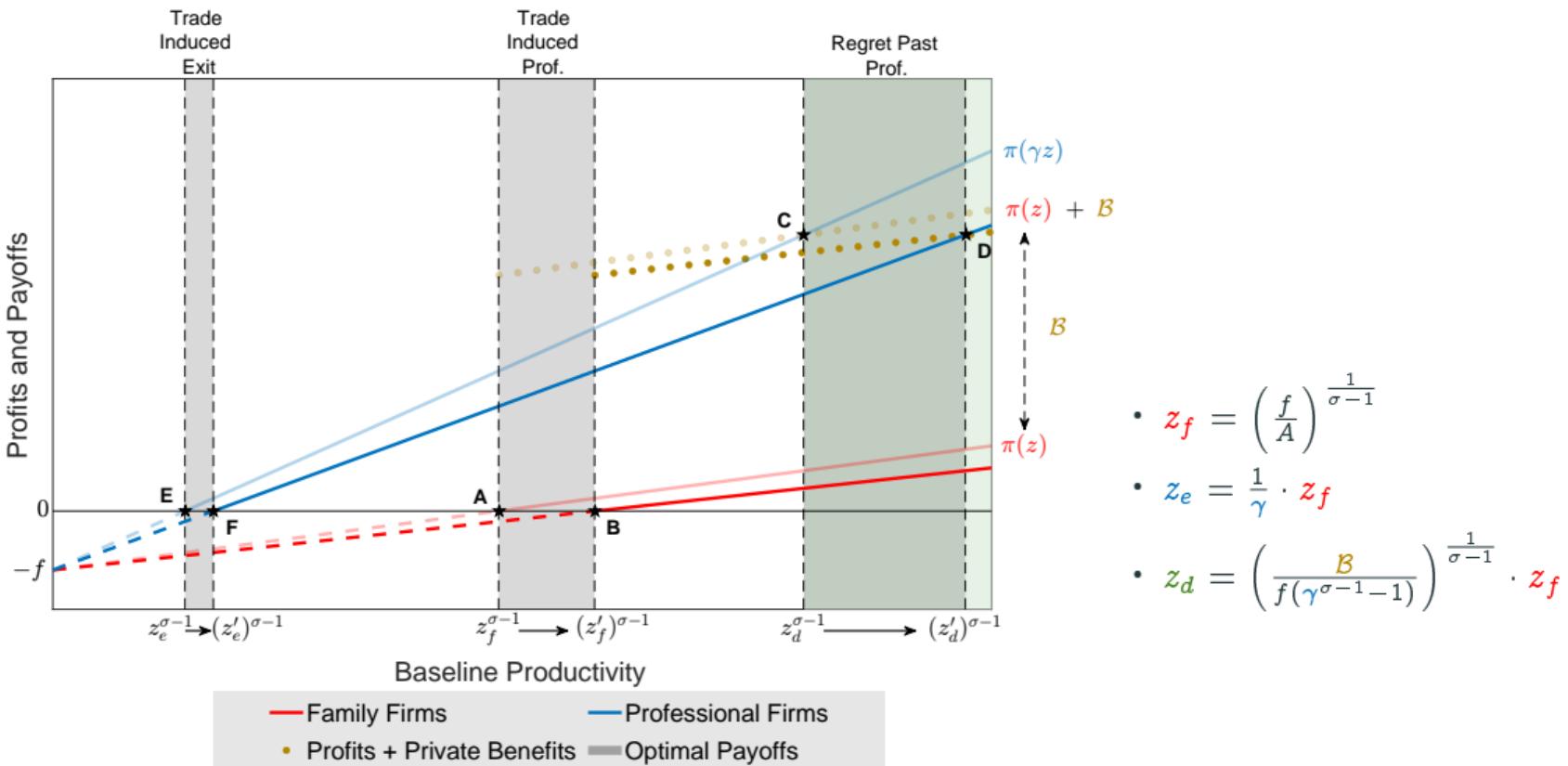
► Import Competition

► Contracting Frictions

► Reputation Cost

◀ Event Studies

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



- $z_f = \left(\frac{f}{A}\right)^{\frac{1}{\sigma-1}}$
- $z_e = \frac{1}{\gamma} \cdot z_f$
- $z_d = \left(\frac{\mathcal{B}}{f(\gamma^{\sigma-1}-1)}\right)^{\frac{1}{\sigma-1}} \cdot z_f$

Note: Baseline productivity: before the decision to professionalize.

► Import Competition

► Contracting Frictions

► Reputation Cost

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Natural Experiment

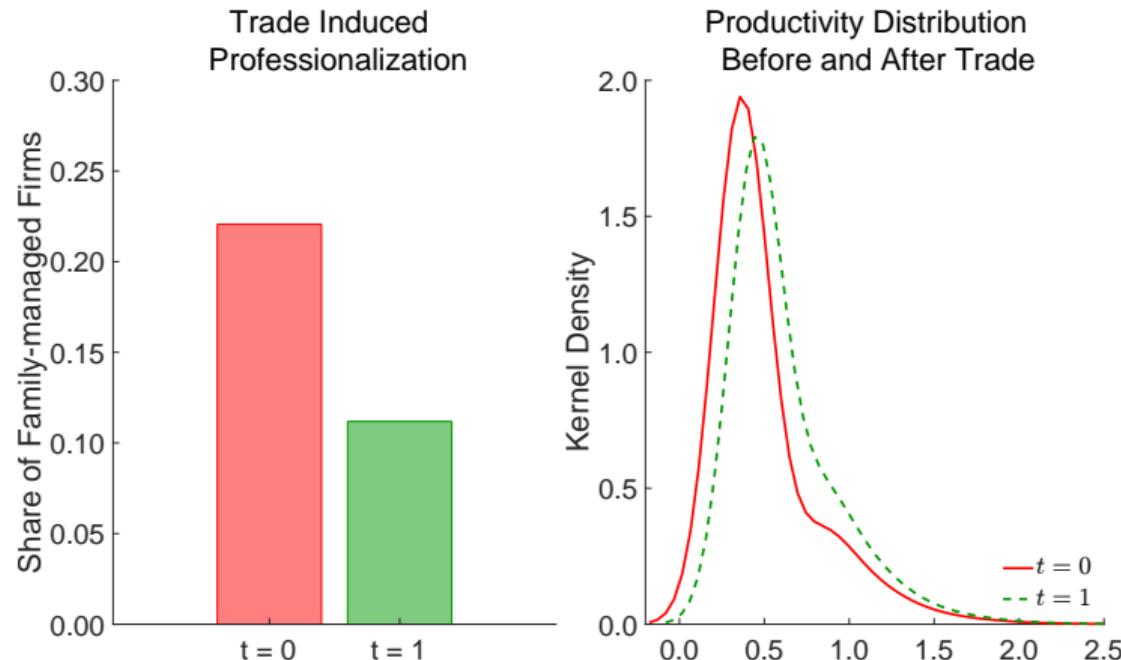
Data

Empirical Results

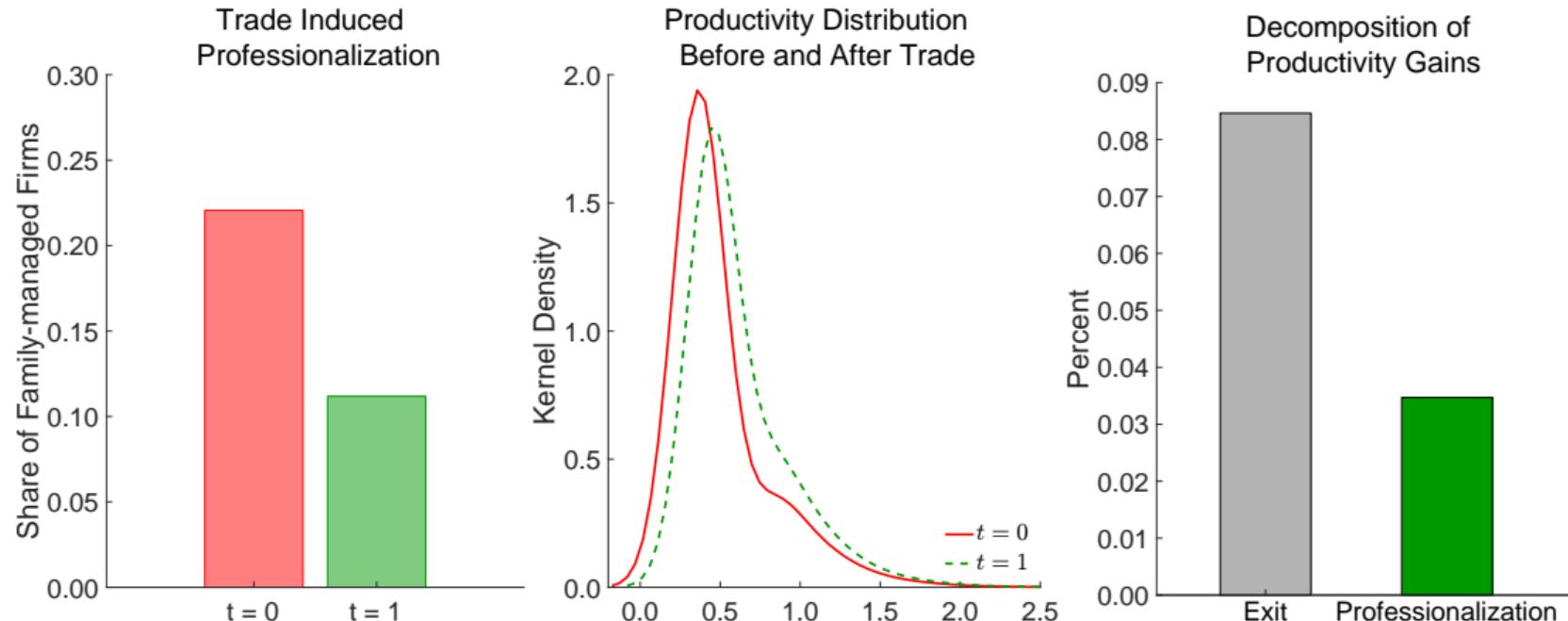
Model

Estimation & Counterfactuals

Import Competition \implies 12% \uparrow Productivity: 30% from Professionalization



Import Competition \implies 12% \uparrow Productivity: 30% from Professionalization



▶ Estimation

▶ Model vs. Data

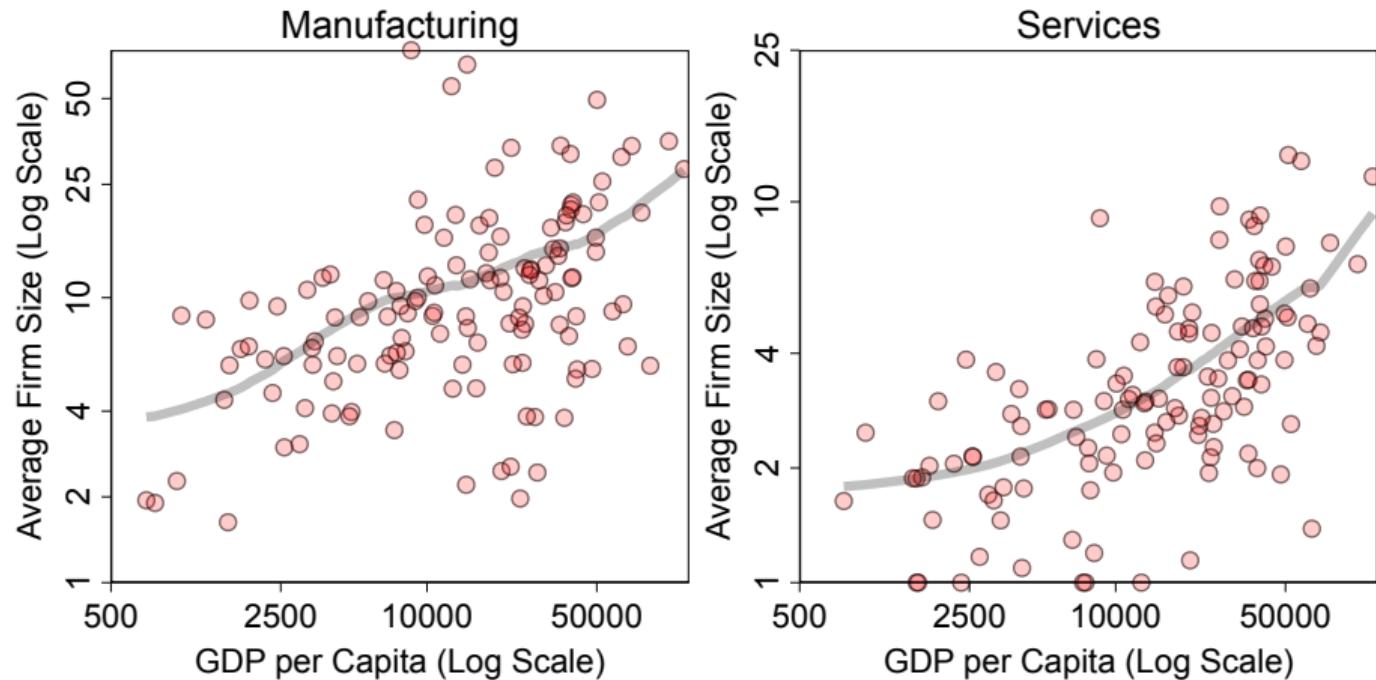
▶ Details

Conclusion

- Import competition can drive within-firm productivity changes through managerial reorganization
- Large, product-specific import competition shock + novel data on the internal firm organization
- Indian family firms respond to import exposure by professionalizing management
- Globalization is a powerful force that can blunt the effect of taste-based discrimination leading to efficiency gains.

Thank you!

Manufacturing and Services



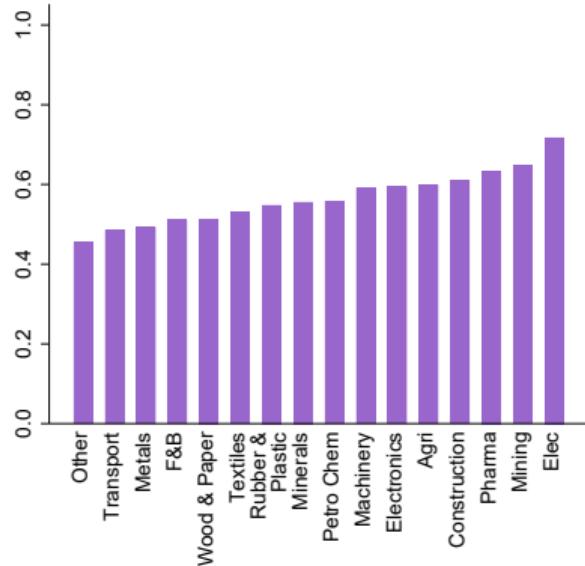
Source: estimates from Bento and Restuccia (2021) based on country-level economic censuses and surveys

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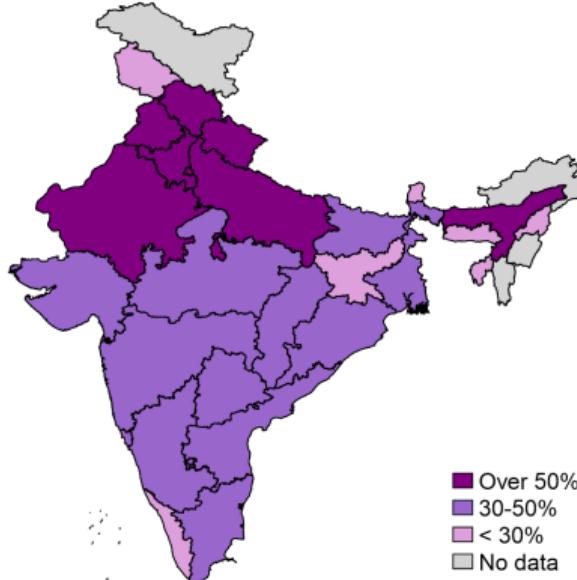
Family Firms are Widespread in India

Family Firms: at least two family members on board

Share of Family Firms across Industries

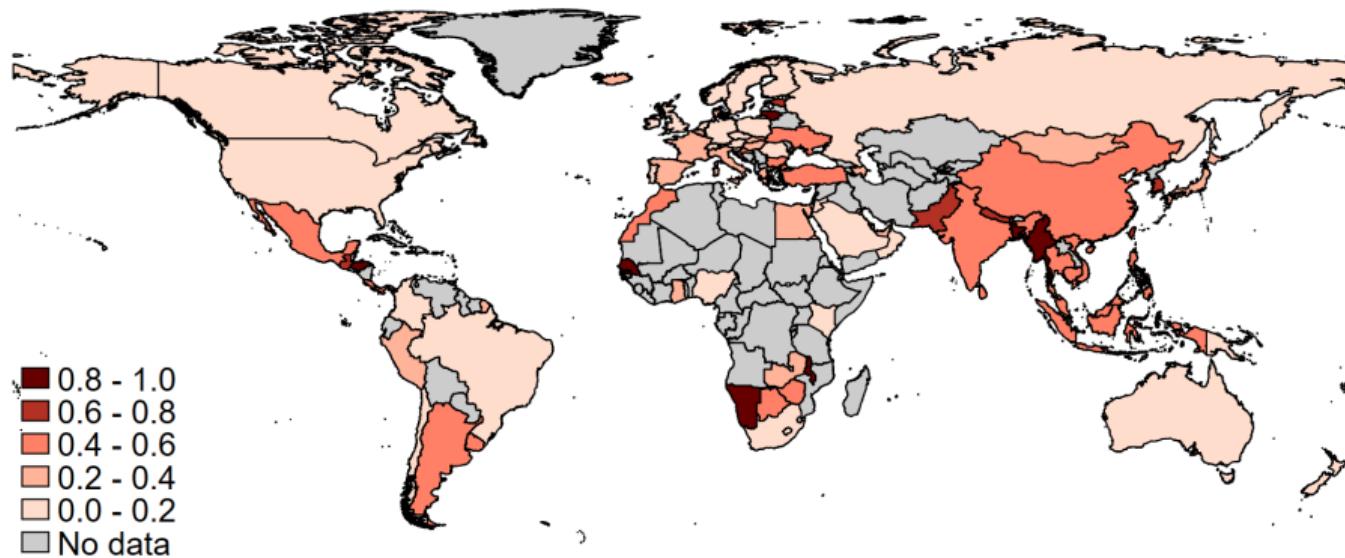


Share of Family Firms across States



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.

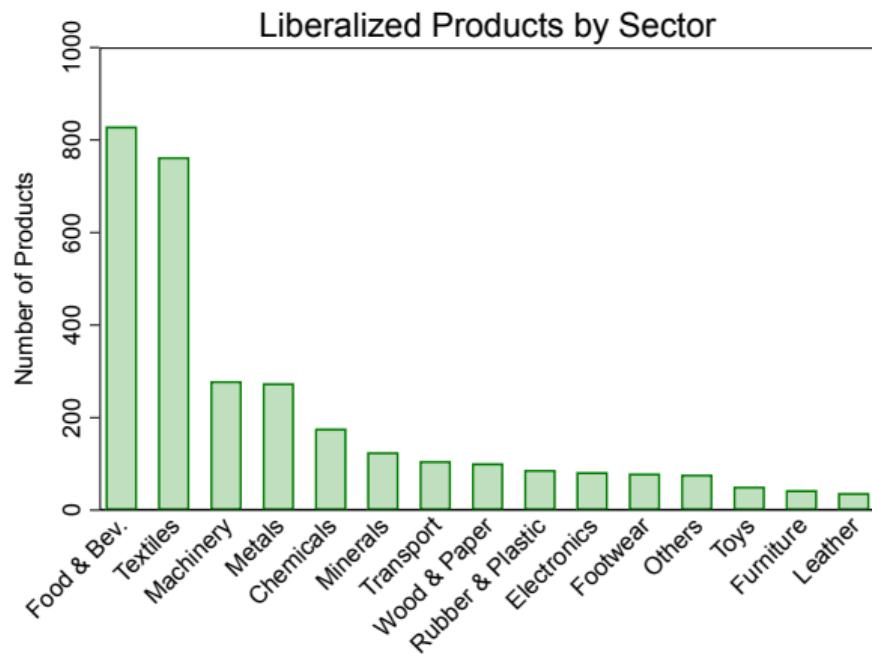
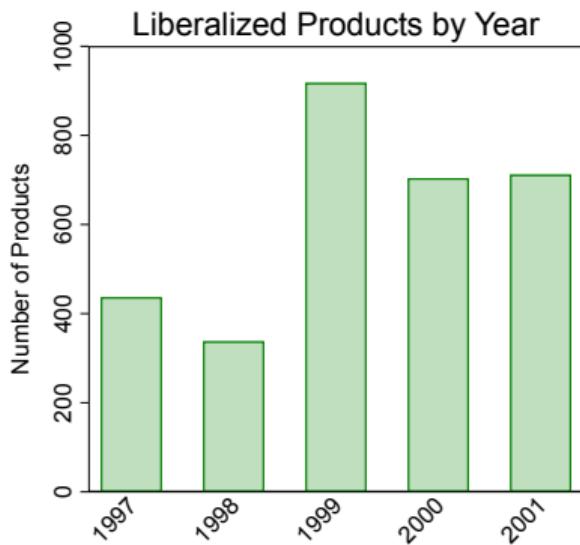
Unusually Narrow Scope of the 2001 Trade Reform

- Variation in import competition across the **product space** and time
- **Externally imposed**: hinged on IMF technical assessment of India's BoP
- 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

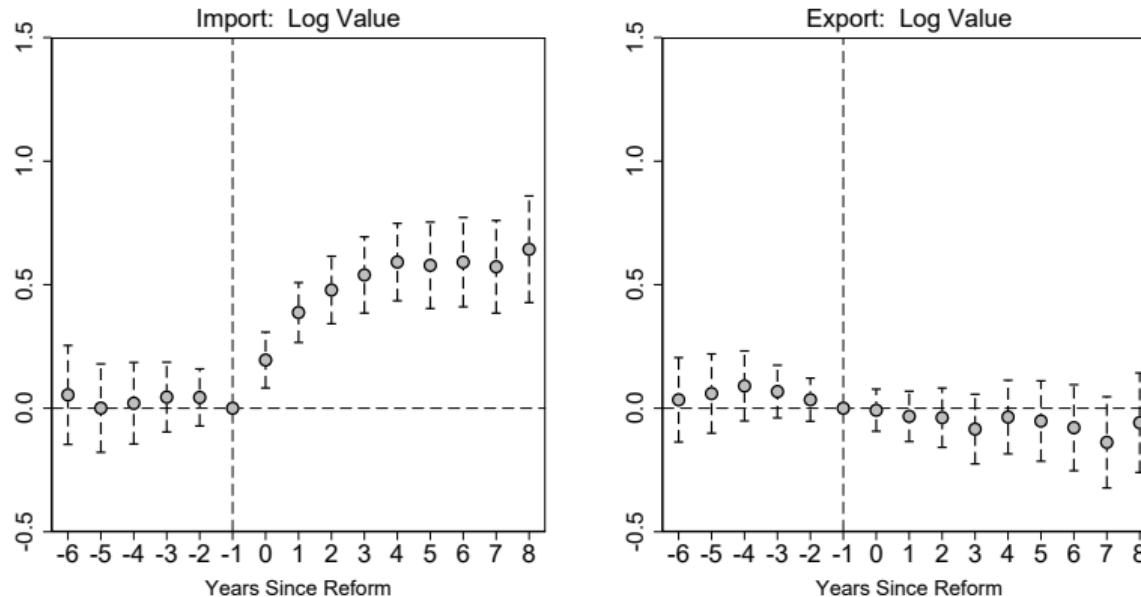
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◀ HS Product Code Example

QR-Removal: Timeline and Sectoral Scope



QR-Removal: Imports Soar, No Effect on Exports



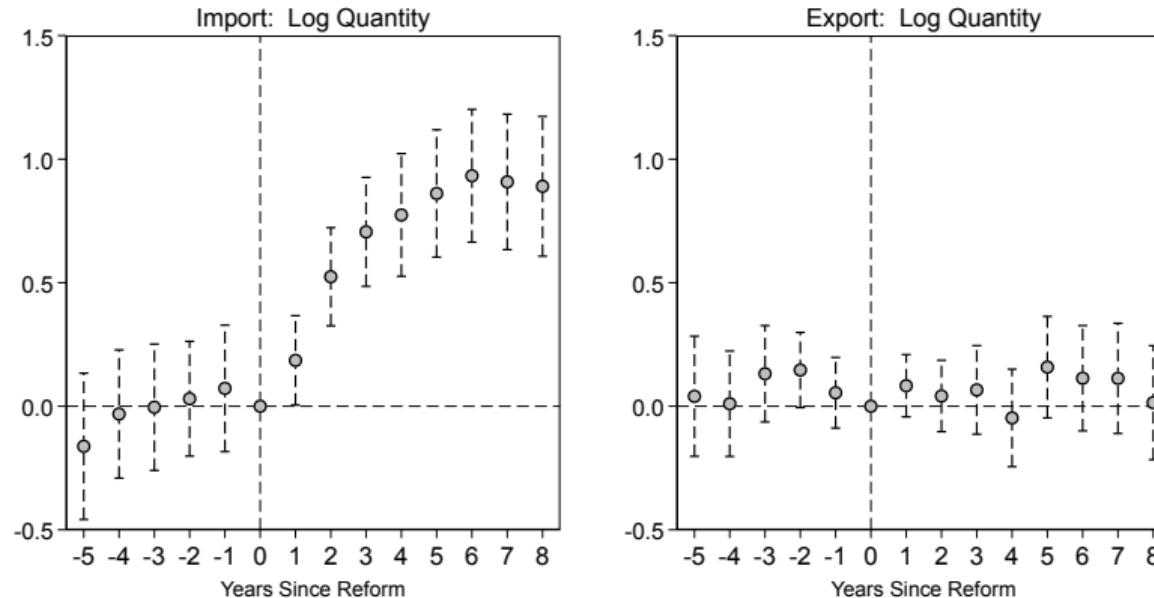
$$y_{pt} = \sum_{k=\underline{T}}^{\bar{T}} \beta_k D_{pt}^k + \delta_p + \lambda_{qt} + \varepsilon_{pt}$$

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

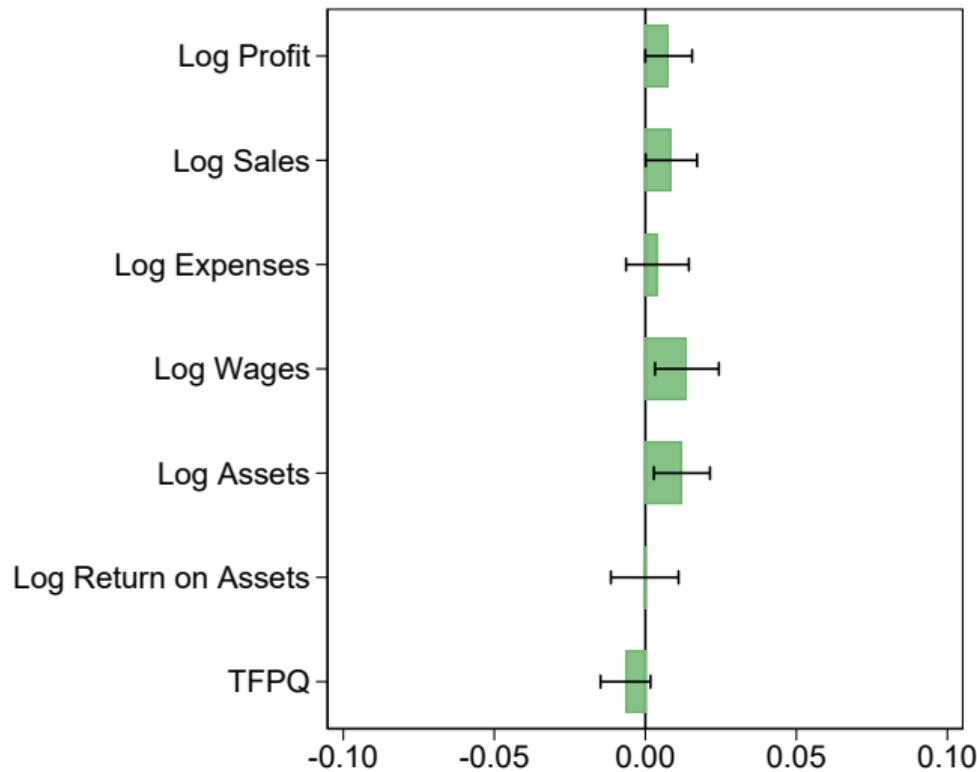
◀ Values

Summary Statistics

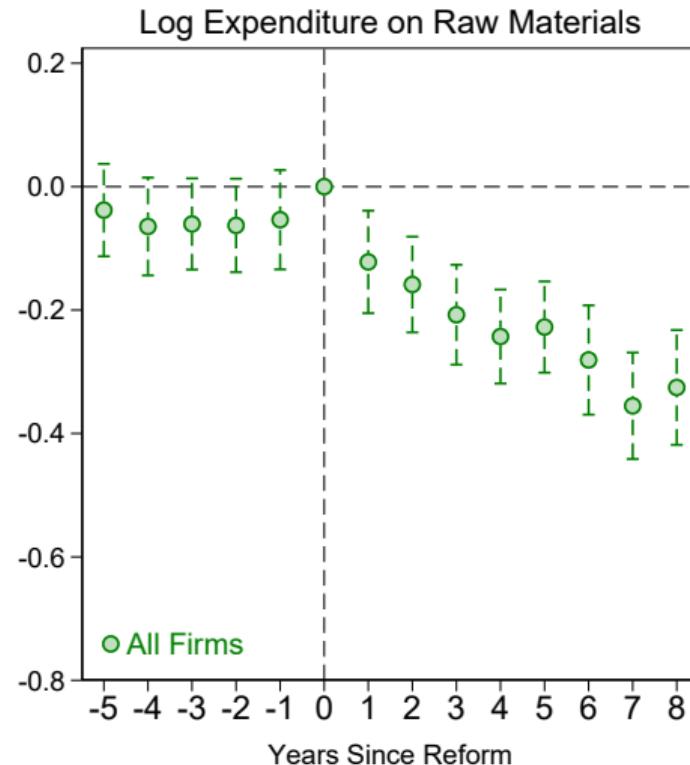
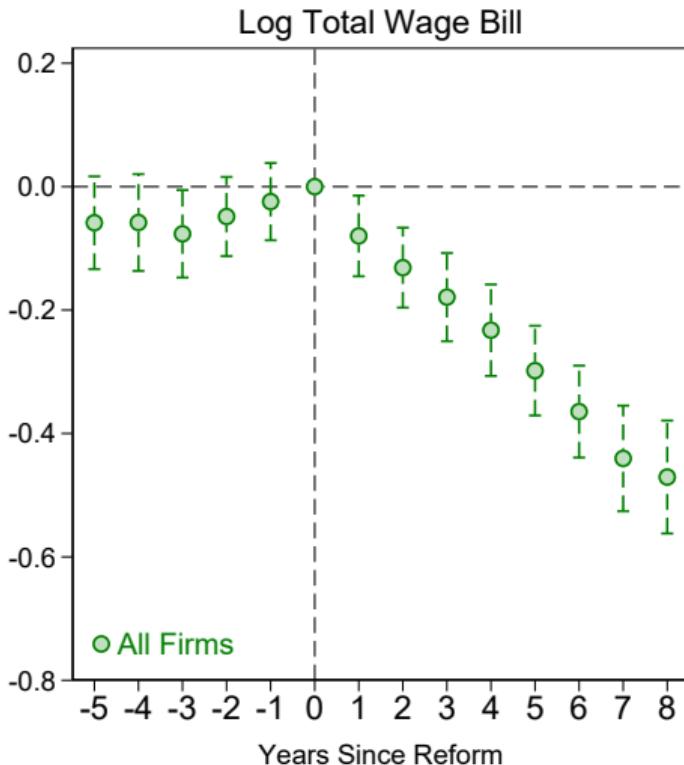
	Obs	p10	Mean	p50	SD
Treated Firms (%)	4,996	0	0	1	0
Firm Age (Years)	83,726	7	26	56	20
Wages	77,724	1	220	326	1,382
Total Assets	82,465	46	4,083	4,983	31,652
Revenues	76,552	19	3,674	4,785	36,687
Expenses on Raw Materials	67,944	13	1,687	2,227	17,783
At least 2 Family Members on Board	4,852	0.00	0.45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

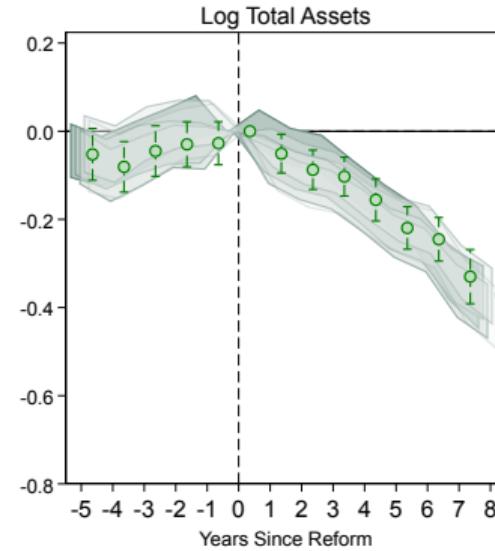
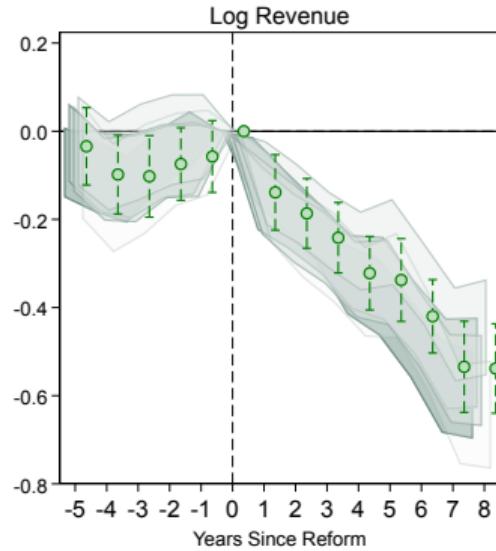
Treated and Control Firms are Similar



① All Firms Contract: Total Wage Bill and Expenses



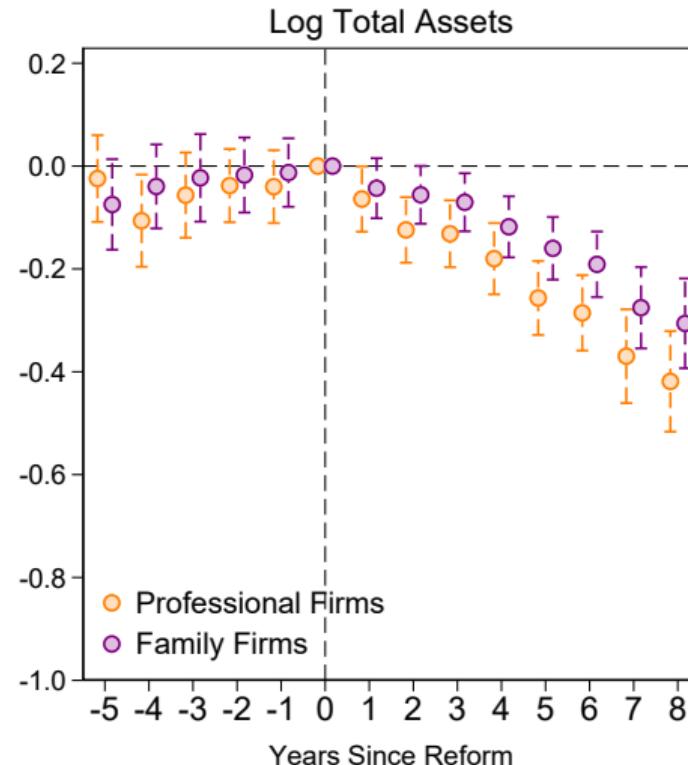
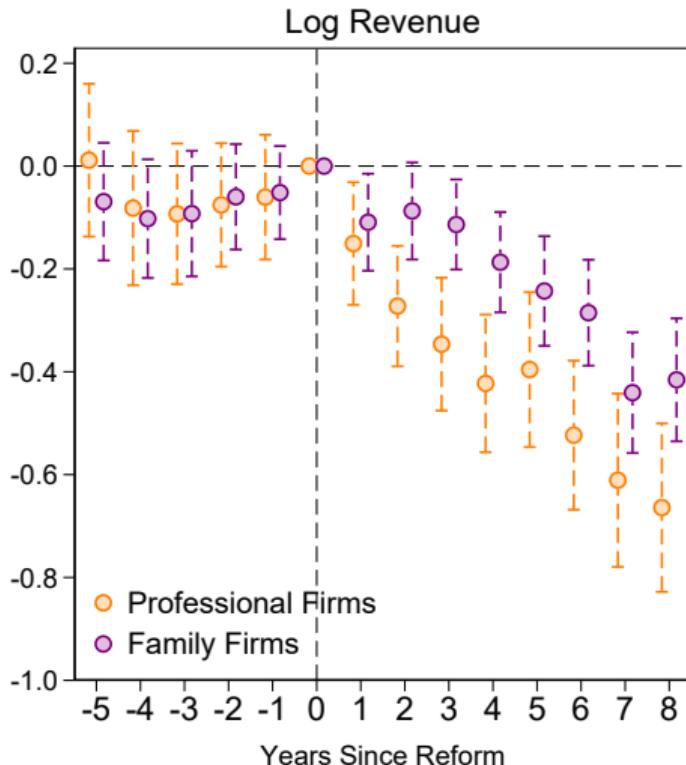
① All Firms Contract: Robustness to Alternative Specifications



Alternative Fixed Effects:

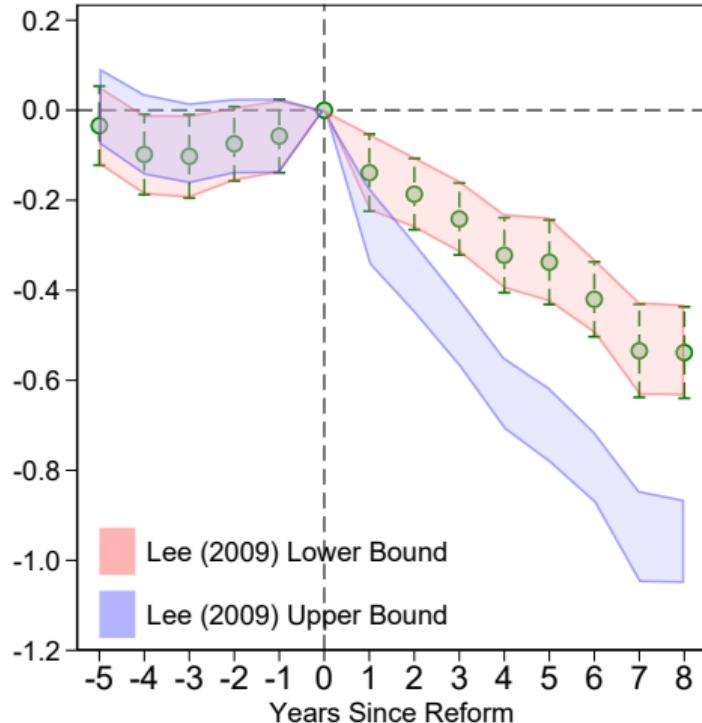
- | | |
|---|--|
| (1) Firm + Year | (4) Firm + (Industry \times Year) + (District \times Year) |
| (2) Firm + (Industry \times Year) | (5) Firm + (Industry \times Year \times State) |
| (3) Firm + (Industry \times Year) + (State \times Year) | (6) Firm + (Industry \times Year \times District) |

① All Firms Contract

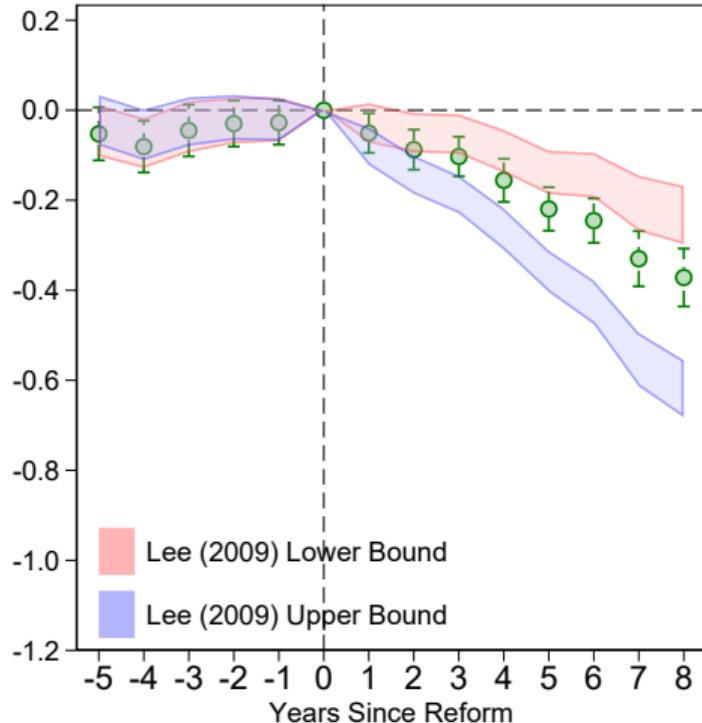


Lee Bounds

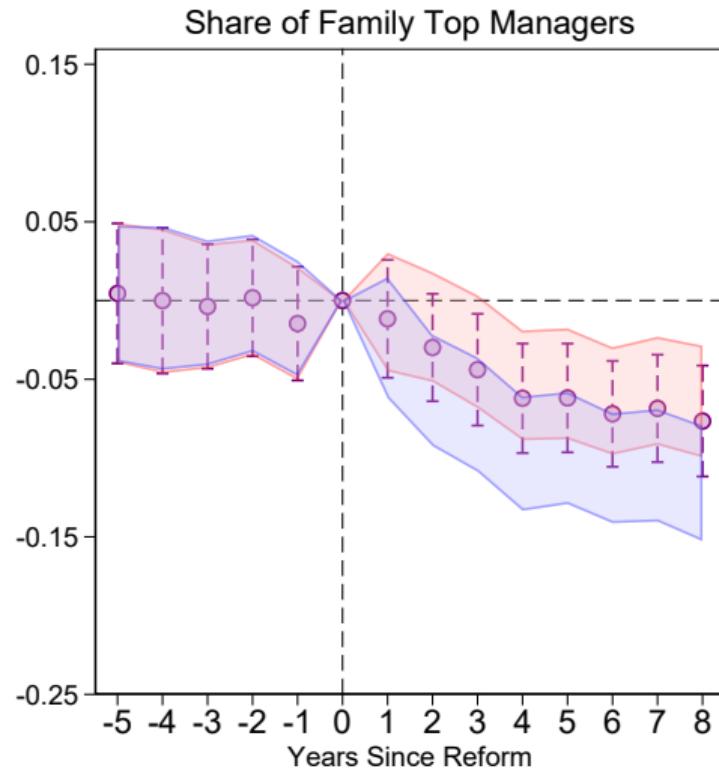
Log Revenue



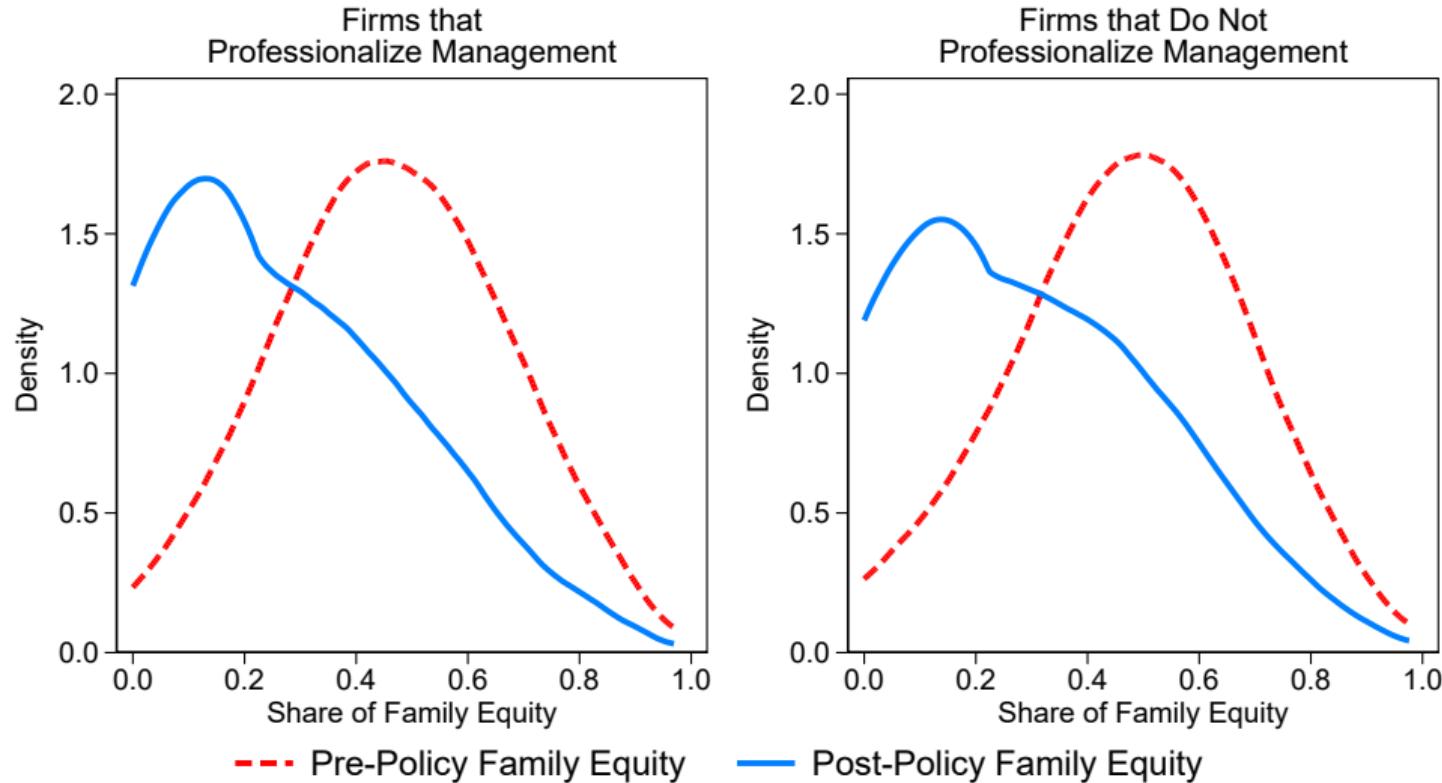
Log Total Assets



Lee Bounds

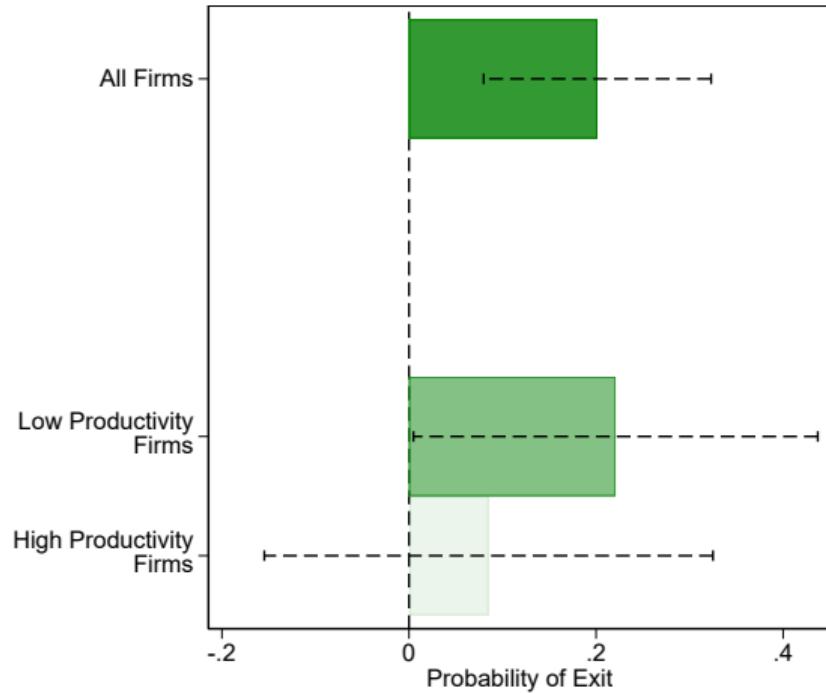


Family Ownership

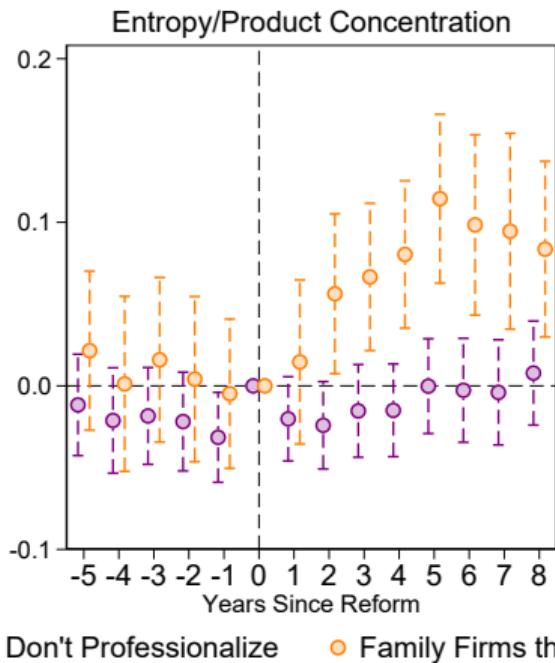


Exit (in the Long Run)

- 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

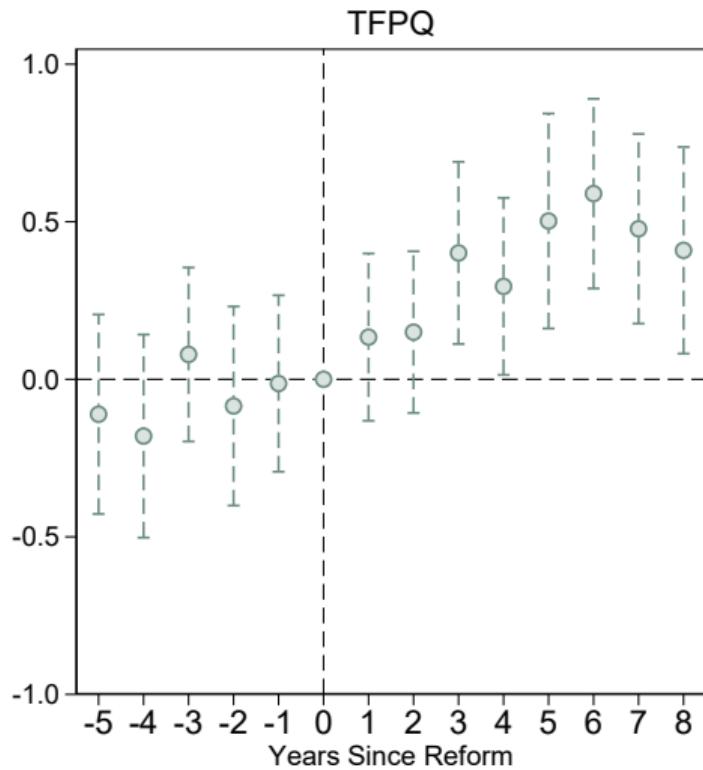


Note: A family firm is defined as having professionalized if its share of family top managers was lower in $t = 8$ as compared to $t = 0$.

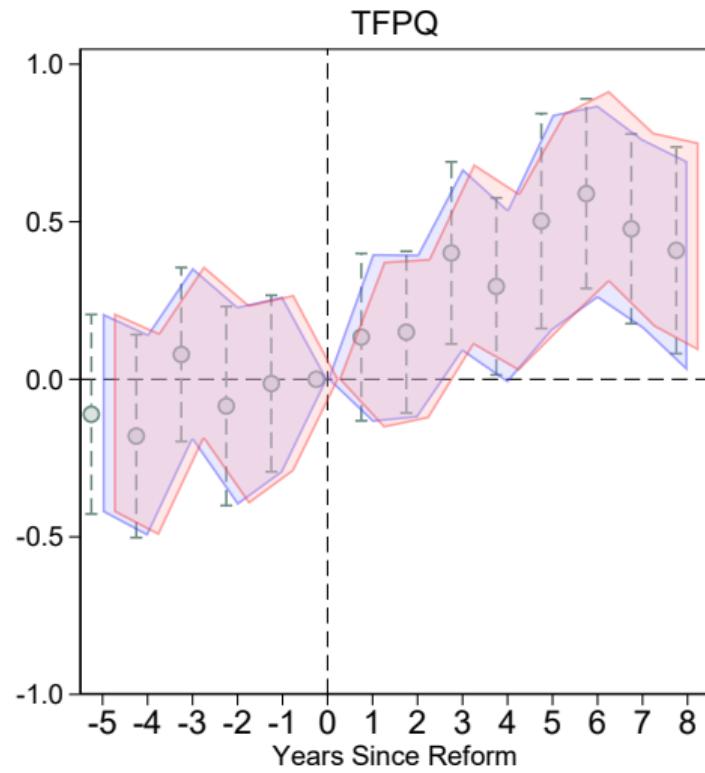
No Increase in Productivity for Professional Firms

	(1)	(2)
	Baseline Family Firms	Baseline Professional Firms
TFPQ	0.18** (0.077)	-0.076 (0.076)
Firm FE	✓	✓
Industry × Year FE	✓	✓
Observations	24356	22096

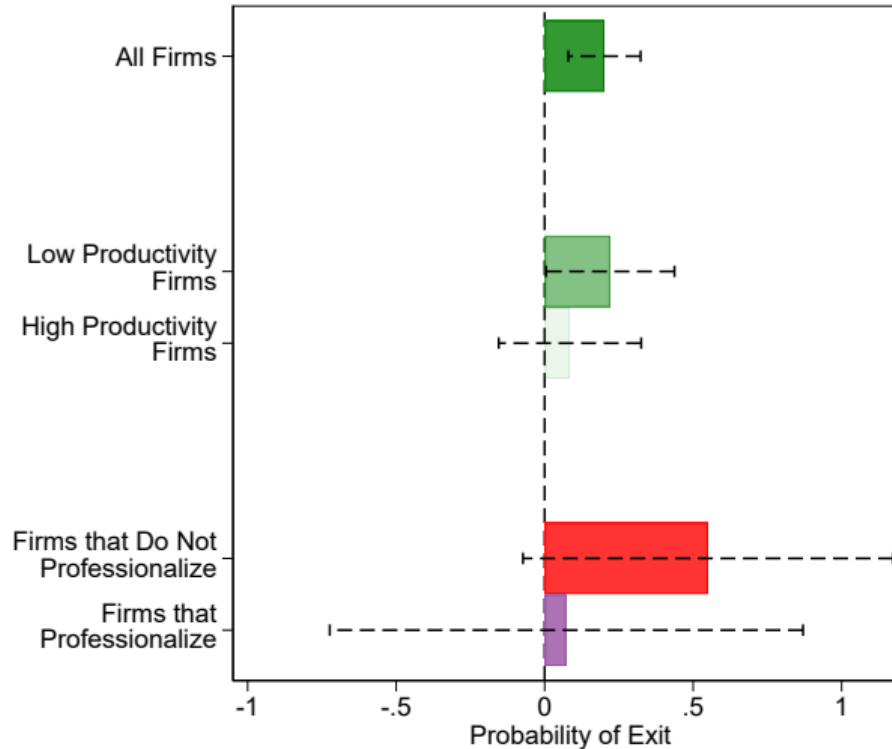
Firms that Professionalize Report Higher Productivity (Triple Difference)



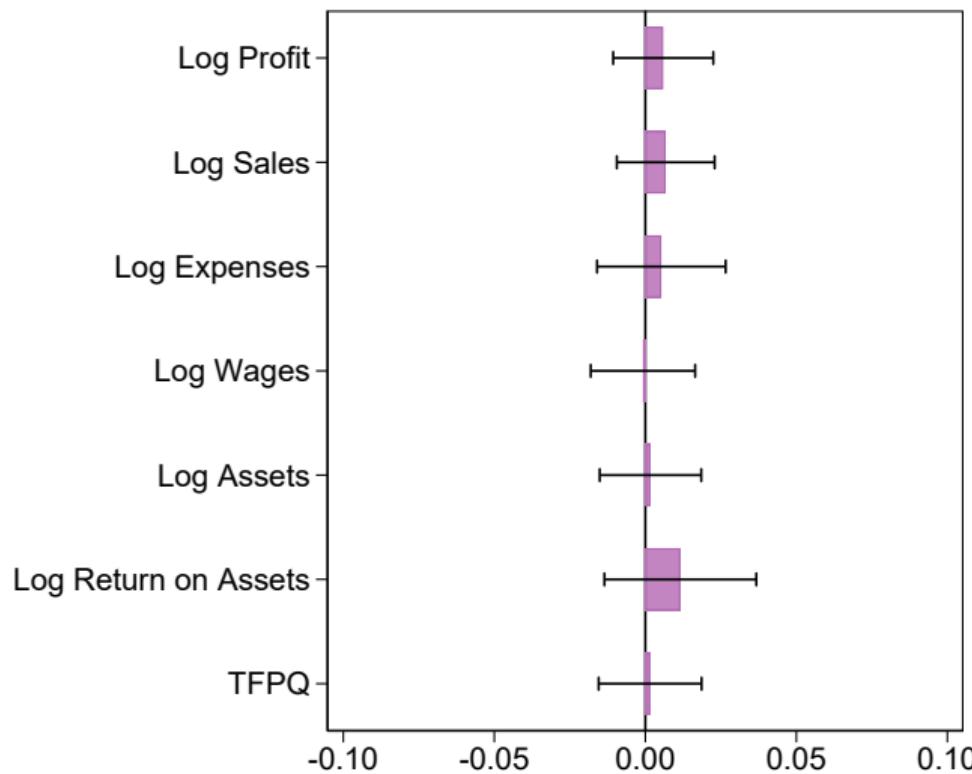
Lee Bounds



Exit



Selection Into Professionalizing Management



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 $y = \alpha EP^{\sigma-1}p^{-\sigma}$

- 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: $\pi(z) = Az^{\sigma-1} - wf$ $\left(\text{where } A = \frac{1}{\sigma} \left(\frac{\sigma-1}{\sigma}\right)^{\sigma-1} EP^{\sigma-1} w^{1-\sigma} = \text{market demand} \right)$

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
- 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

Import Competition: Fall in Aggregate Demand

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

⇒ Lowers the price index

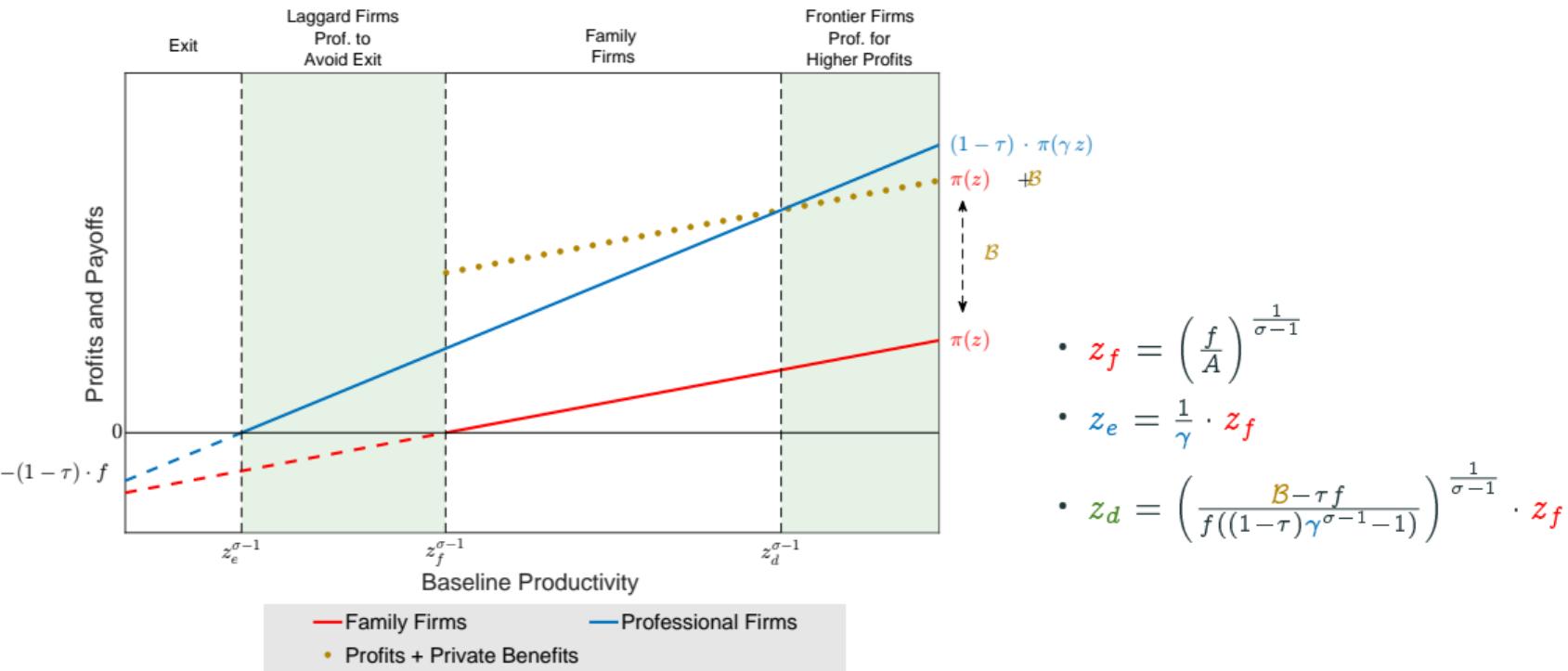
$$P = \left[M_H \int_{z_e}^{\infty} p(z)^{1-\sigma} \frac{g(z)}{[1 - G(z_e)]} dz + M_F \uparrow \int_{z_F}^{\infty} p_F(z)^{1-\sigma} \frac{g(z)}{[1 - G(z_F)]} dz \right]^{1/(1-\sigma)}$$

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

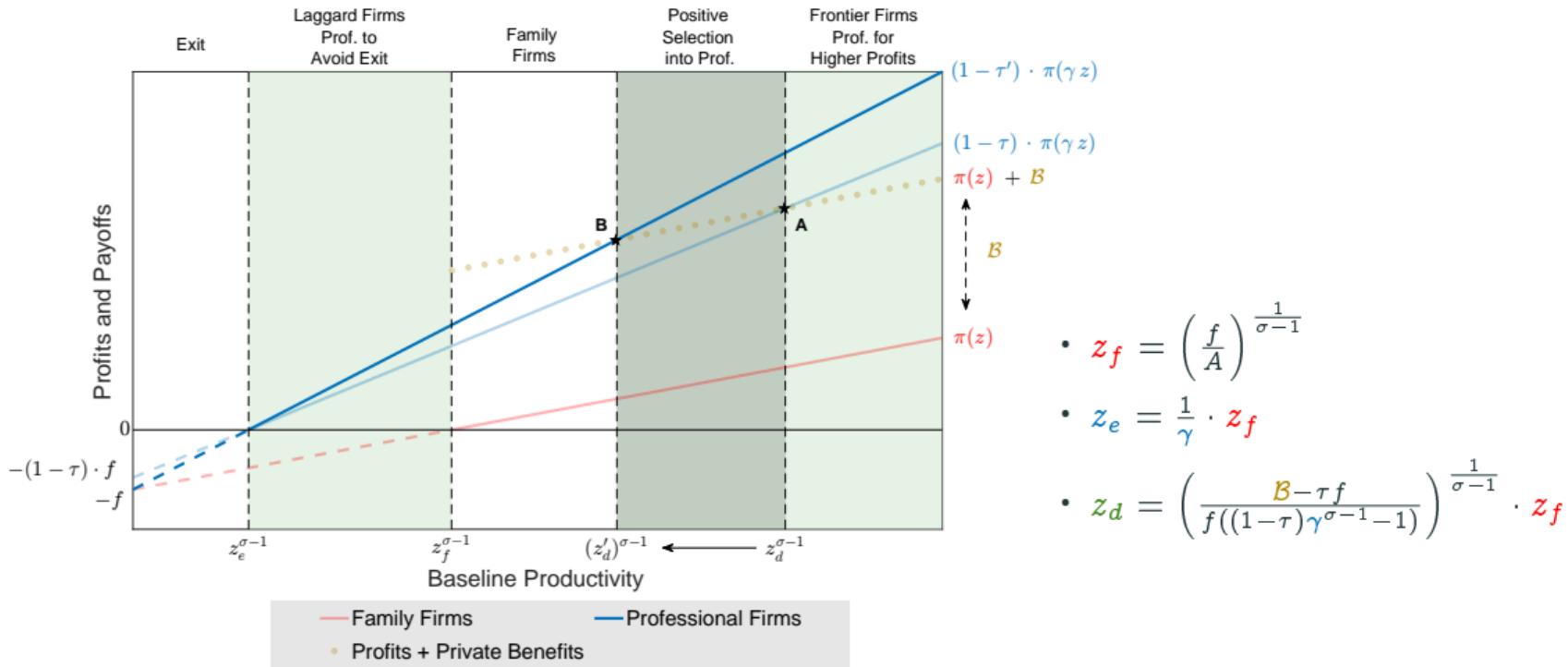
⇒ Reduces profits for all domestic firms

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

Contracting Frictions

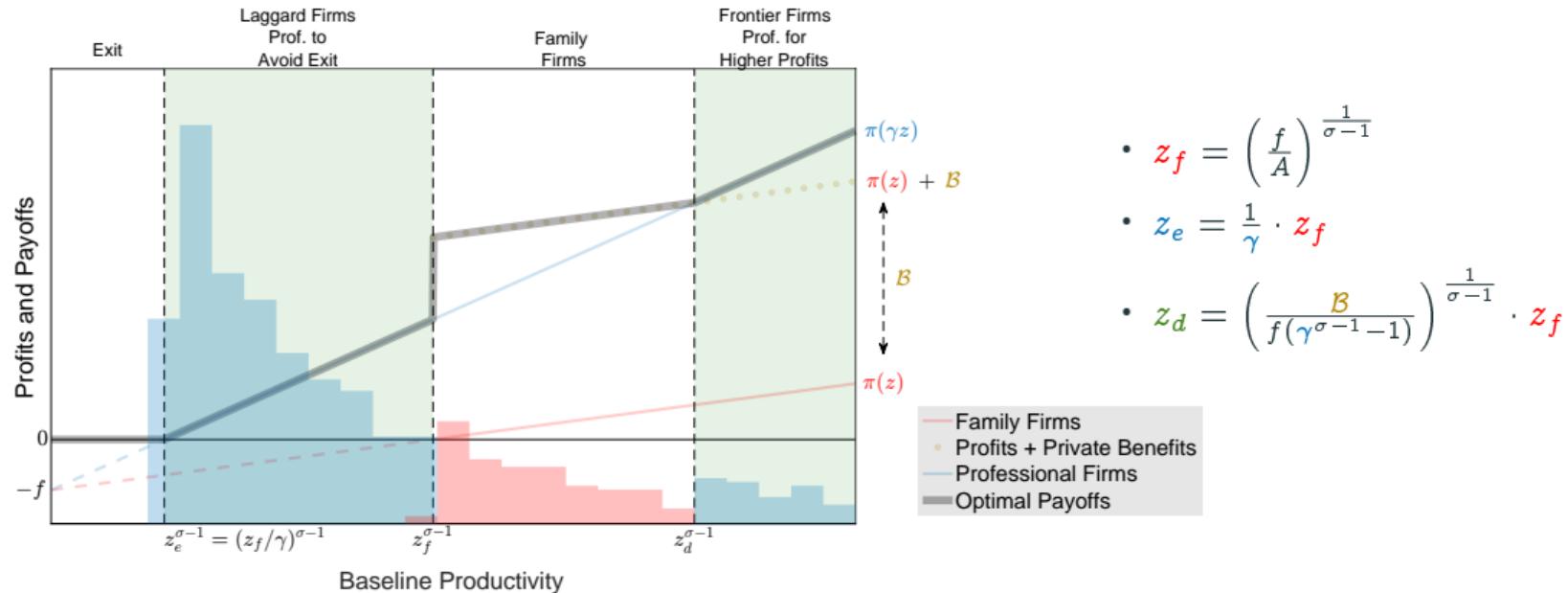


Contracting Frictions



- $z_f = \left(\frac{f}{A} \right)^{\frac{1}{\sigma-1}}$
- $z_e = \frac{1}{\gamma} \cdot z_f$
- $z_d = \left(\frac{\mathcal{B} - \tau f}{f((1-\tau)\gamma^{\sigma-1}-1)} \right)^{\frac{1}{\sigma-1}} \cdot z_f$

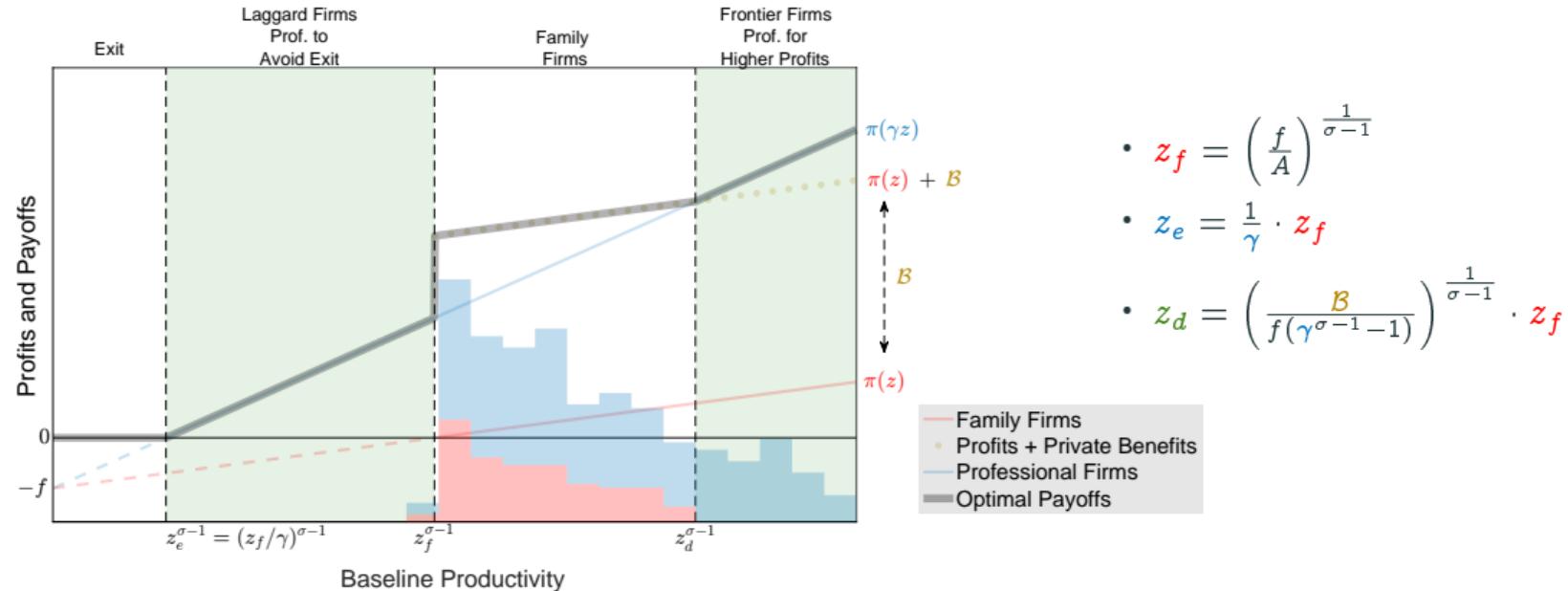
Firm Profits and Management Choice: Baseline Productivity Distribution



Note: Baseline productivity: before decision to professionalize.

◀ Back

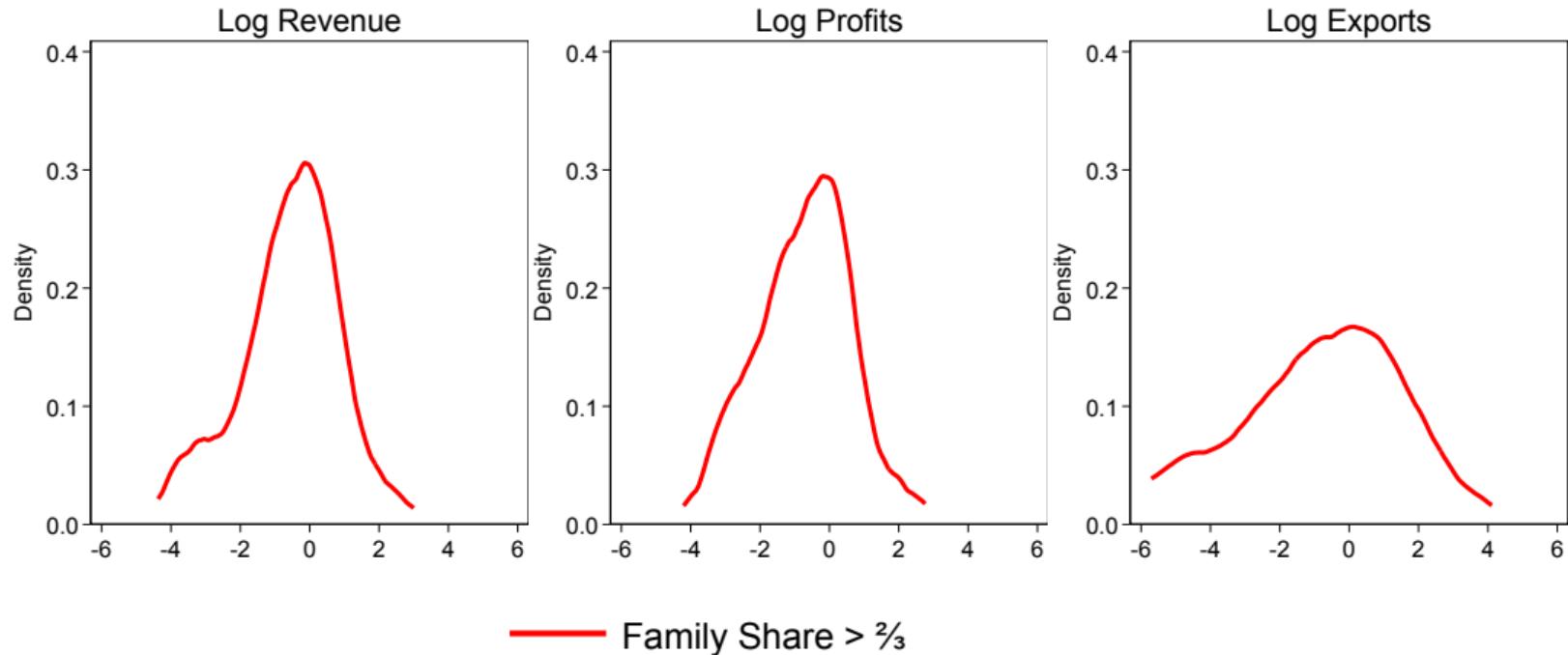
Firm Profits and Management Choice: Observed Productivity Distribution



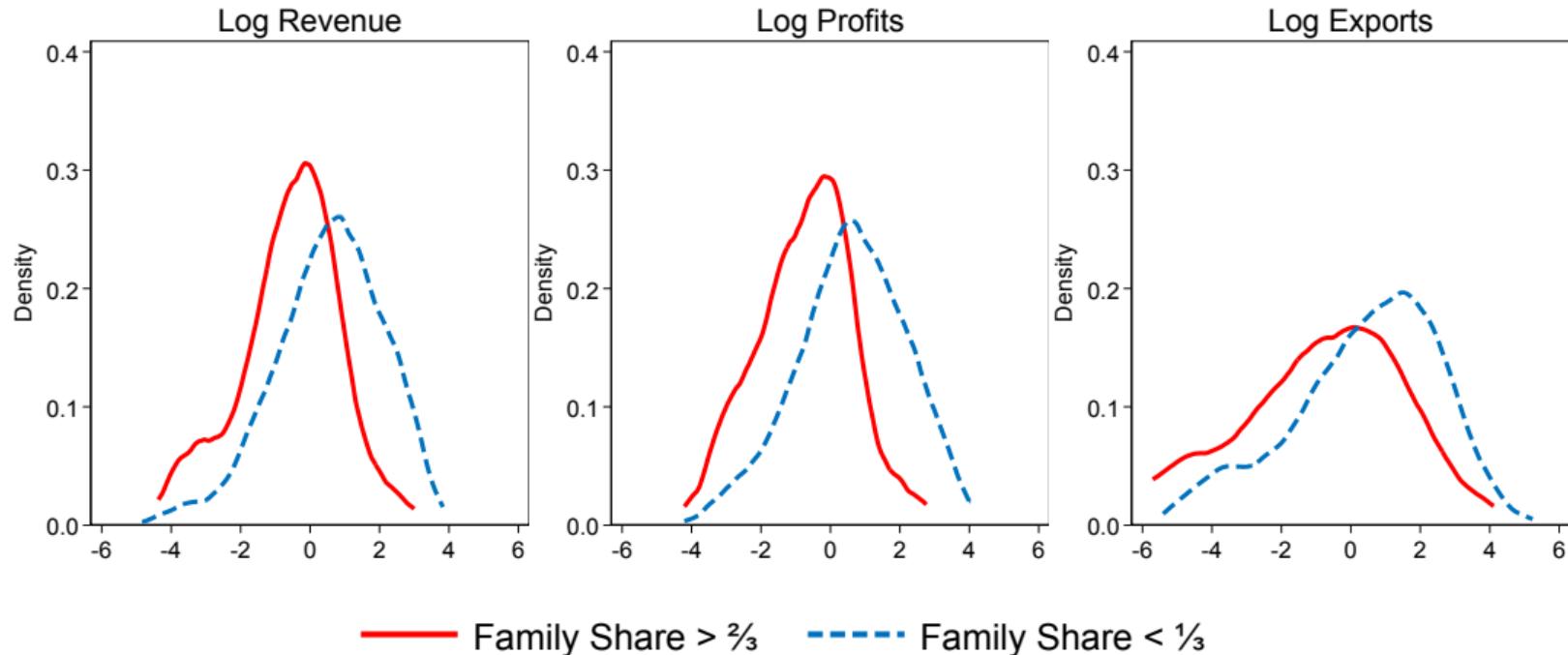
Note: Baseline productivity: before decision to professionalize.

◀ Back

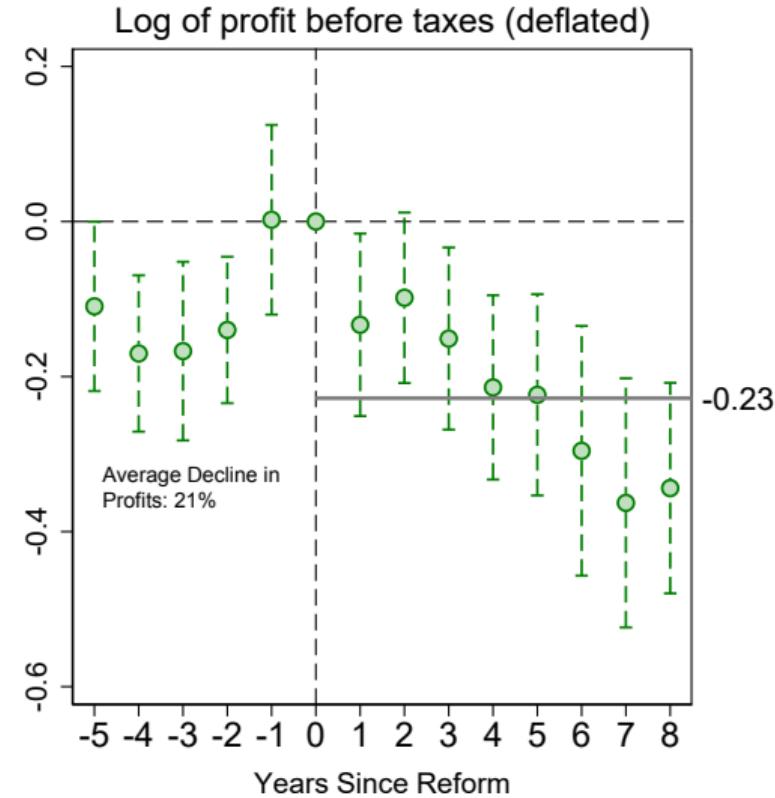
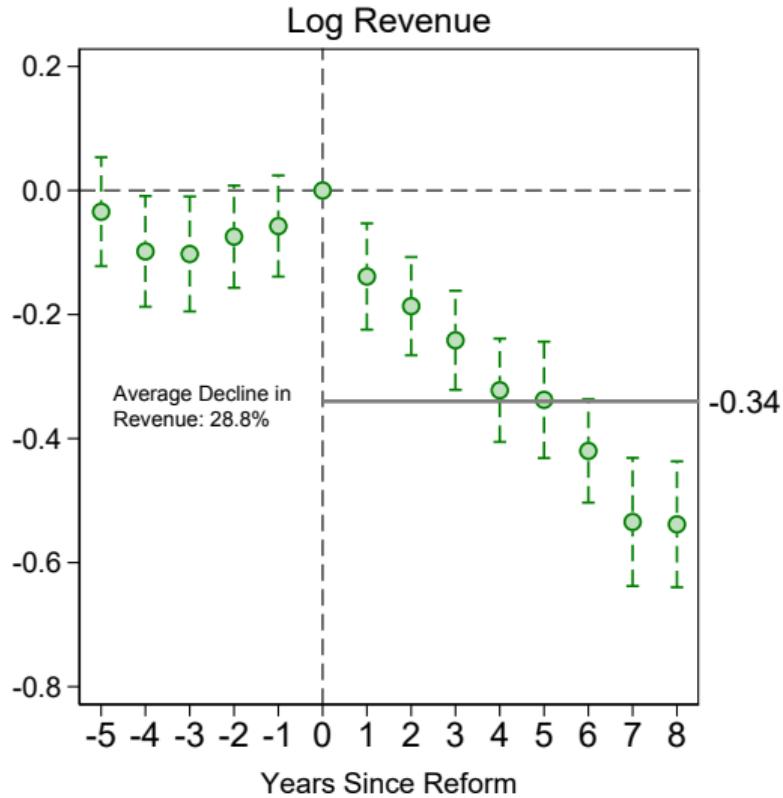
Baseline Descriptive Statistics: Family Firms are Smaller and Less Profitable



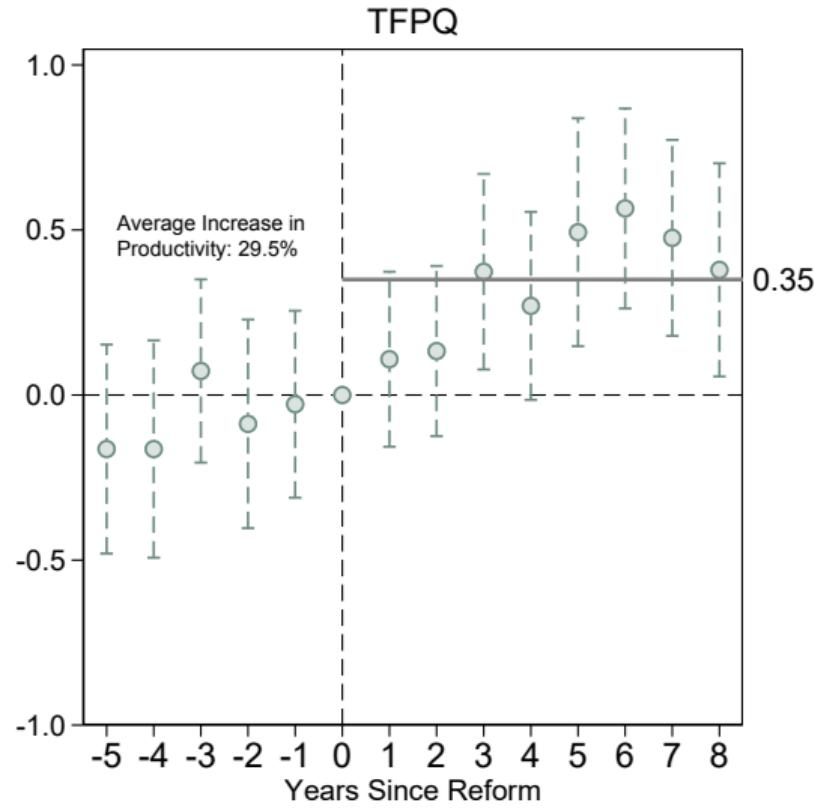
Baseline Descriptive Statistics: Family Firms are Smaller and Less Profitable



Revenue and Profit Decline



Average Post Treatment Productivity Increases



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

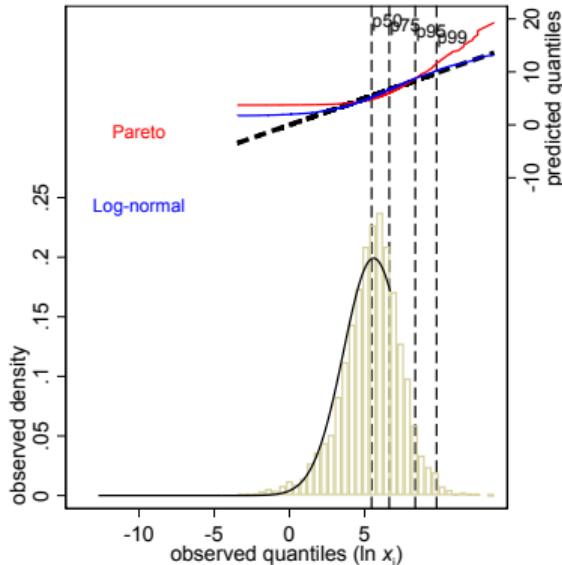
Key Estimates

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

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

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

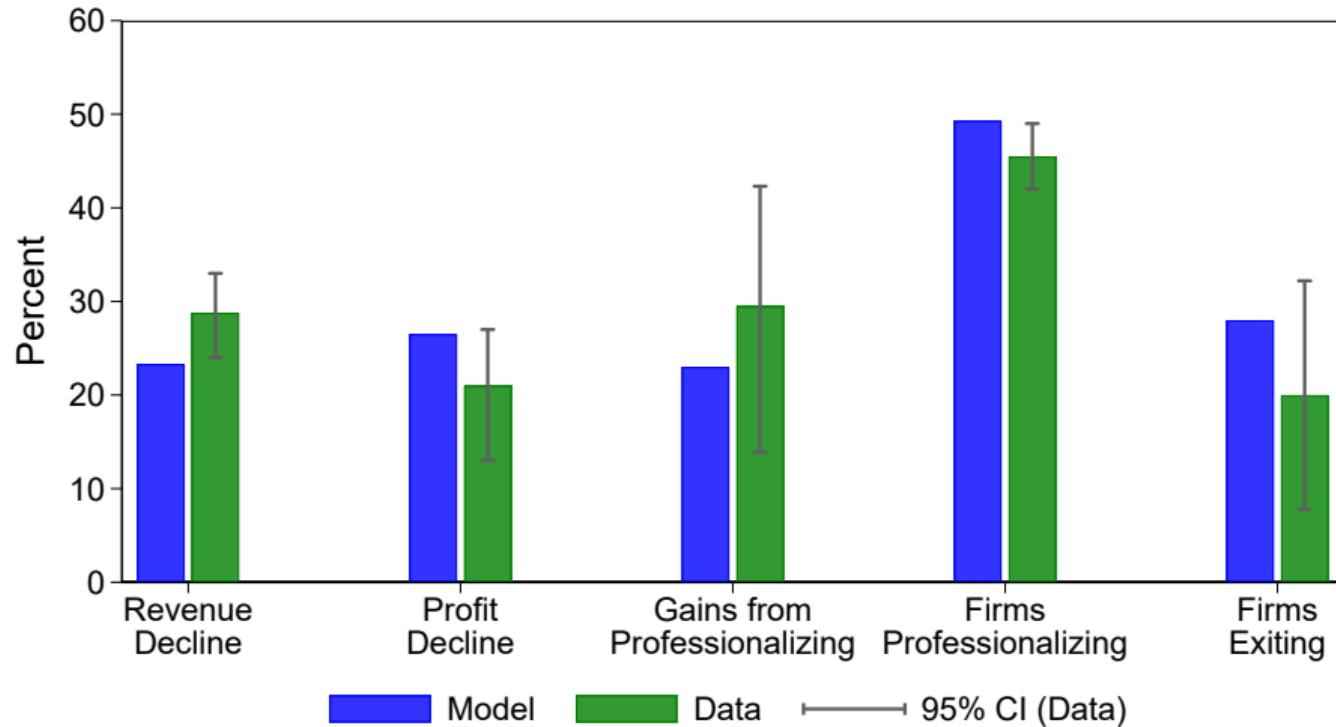
Analytical Moment Conditions for β, γ

- 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

Comparison of Model and Data Estimates



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)