When Competition Compels Change: Trade, Management, and Productivity*

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Abstract

Competition reallocates resources toward more productive firms, raising aggregate productivity. In this paper, I show that competition also operates within firms, inducing organizational change that raises managerial efficiency. I exploit a product-specific import competition shock in India, assembling novel data on family-managed firms—the predominant form of corporate governance worldwide—with tenure records and family ties for over 6 million company executives and directors. Using an event-study design, I show that exposed firms respond to import competition by replacing family managers with non-family, professional executives. Firms that professionalize experience productivity gains of over 30 percent. To quantify the aggregate implications of these managerial adjustments, I develop a quantitative model embedding a management choice within a model of heterogeneous firms with monopolistic competition. Firms trade off the non-pecuniary private benefits associated with family management against the profit gains from professionalization. Using my model, I estimate that import liberalization increased aggregate productivity in India by 12 percent, with within-firm improvements in managerial allocation explaining nearly 30 percent of this increase.

Keywords: trade, competition, management, firm productivity, corporate governance, family firms, growth

JEL Codes: D24, F10, G30, L20, O32, O33, O40

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1 Introduction

Competition is often credited with boosting firm productivity by reducing operational slack (Hicks, 1935; Leibenstein, 1966; Hart, 1983; Schmitz Jr, 2005). One important mechanism through which competition raises productivity is by stimulating managerial innovation and internal organizational change. As early as 1776, Adam Smith remarked that "*monopoly... is a great enemy to good management,*" capturing the idea that competitive pressure disciplines managerial behavior (Smith, 1776).

Import competition provides a particularly powerful source of product market competition. Existing work on the pro-competitive gains from trade has largely focused on productivity growth through between-firm reallocation: the exit of low-productivity firms and the expansion of efficient ones (Melitz, 2003). However, import competition may also trigger organizational changes within surviving firms—a margin that remains underexplored. In today's global context, marked by rising protectionism and a retreat from free trade, understanding how competition shapes firms' internal organization has gained renewed urgency.

I examine this issue by studying how import competition shapes the selection of top managerial personnel and, in turn, affects firm productivity in India. My empirical setting is family-managed firms, where senior leadership is typically drawn from the narrow pool of talent of the founder's family. While the lens here is family firms, the mechanism is general: when owners place taste-based value on non-productive attributes such as kinship, caste, religion, race, or gender, managerial selection departs from merit in the spirit of Becker (1957). Family-managed firms are the predominant organizational form worldwide (La Porta et al., 1999; Bertrand and Schoar, 2006), making this context relevant for understanding productivity differences across the development spectrum. Yet, despite their prevalence, little is known about how external market forces, particularly trade, can disrupt these entrenched organizational structures (Atkin and Khandelwal, 2020). This raises the central questions of this paper: Can the competitive pressures of globalization induce family-managed firms to professionalize their management and thereby raise firm productivity? And to what extent do within-firm adjustments contribute to the aggregate productivity gains from trade?

In this paper, I address these questions with four contributions. First, I assemble novel manager-firm-linked administrative data for India, recording tenure histories and confidential familial ties for over 6 million top executives and directors. Second, exploiting a WTO-mandated dismantling of India's quantitative restrictions on imports, I provide new empirical evidence that exposure to import competition compels firms to restructure their top management and boards, replacing family members with professional executives. This managerial reorganization leads to substantial productivity gains

among the surviving firms. Third, I develop a quantitative model in which family firms trade off the private benefits against the higher profits from professionalization, embedding this trade off in a model of heterogeneous firms with monopolistic competition. Fourth, I estimate this model using Indian firm-level data to quantify how much managerial reorganization contributes to aggregate productivity gains from trade.

To examine how import competition shapes firm organization and management, I assemble three novel datasets that allow me to link firms' production and balance-sheet information to detailed data on managerial structure and to product-level trade policy variation. First, I obtain first-time access to administrative data from the Ministry of Corporate Affairs (MCA), which records confidential information on family ties and tenure histories for the universe of all company executives and directors in India—over six million individuals across approximately 1.3 million registered firms. Unlike prior studies that infer family links from last names, this dataset records each executive's father's name, enabling precise identification of family connections within firm boards. By merging these administrative records with firm-level panel data, I build a comprehensive dataset that captures production, product scope, and internal organizational structure to analyze how trade liberalization shapes firm operations, management, and internal organization. Second, I digitize archival documents from the Ministry of Commerce to construct a novel HS 8-digit product-level database that traces product-specific import restrictions in India during the 1990s and their phased removal between 1997 and 2001. Third, I create a detailed concordance between nearly 3,000 HS 8-digit product codes from government trade policy documents and over 6,000 product categories reported in the CMIE Prowess data, allowing me to precisely link the policy-induced changes in import restrictions to the specific products that firms produce.

My empirical setting is an externally mandated import liberalization, which provides quasi-experimental variation in import competition across product markets. Since the 1950s, India had maintained one of the world's most restrictive trade regimes, known as the *Import License Raj*. A hallmark of this trade regime was the use of product-level quantitative restrictions (QRs), which effectively banned the import of certain intermediate goods and nearly all consumer goods. India could maintain these sweeping QRs by utilizing Article XVIII:B of the GATT, which allows developing countries with "weak" balance of payments to restrict imports. Although first-generation reforms in 1991 eased tariffs and lifted QRs on intermediate goods, most QRs on consumer goods—about 3,000 HS 8-digit products representing 30 percent of all tariff lines—remained in place.[1] In this paper, I exploit the staggered removal of all remaining

[1]The 1991 reforms left in place QRs on virtually all final consumer goods, covering roughly 30% of all tariff lines (Hasan et al., 2007; Topalova, 2010; Goldberg et al., 2010a; Topalova and Khandelwal, 2011;

QRs, mostly on consumer goods, between 1997 and 2001. Using product-level customs data, I show that this trade reform triggered a sharp and persistent rise in imports of affected products, with no comparable change in exports—a pattern consistent with a unilateral liberalization that intensifies domestic competition without changing firms' export incentives. Since the liberalized products were mostly consumer goods, the policy operated through output-market competition and did not meaningfully expand access to cheaper imported inputs.

To quantify firm-level adjustments to the reform, I implement a staggered difference-in-differences event-study design that exploits the timing and product coverage of the removal of QRs across narrowly defined product markets. The removal of QRs was externally imposed by a WTO ruling in response to multiple member countries challenging India's QR regime. Thus, there was minimal influence of domestic political considerations on either the scope or timing of the policy. The decision to remove QRs hinged on the IMF's technical assessment, which concluded that India's balance of payments and foreign exchange reserves were no longer sufficiently weak to justify import restrictions under GATT's Article XVIII:B. Specifically, I compare the evolution of outcomes for firms producing goods subject to QR liberalization with those firms operating in unaffected product markets, controlling for firm and industry-year fixed effects. The identifying assumption is that, in the absence of the reform, outcomes for firms in affected and unaffected markets would have evolved similarly. To validate this assumption, I provide graphical evidence showing similar trends in various outcome variables during the pre-policy period. Given the staggered implementation of the reform across products, I estimate dynamic treatment effects using the Sun and Abraham (2021) estimator.

Exposure to import competition led to significant contractions in firm size and profitability. As domestic firms lost market share to imports, firms producing QR-affected goods experienced sharp revenue declines of over 40 percent. These revenue declines were accompanied by substantial reductions in operating profit margins, total assets, and the wage bill. Importantly, these contractions were not solely driven by firm exit; similar patterns emerge even when analyses are restricted to surviving firms. Moreover, implementing Lee (2009) bounds to account for differential attrition confirms that these results are robust, alleviating concerns that selective exit might bias the estimates.[2]

While both family and non-family firms contracted in response to import competi-

DeLoecker et al., 2016).

[2]This method equalizes response rates across treated and control groups by trimming the higher-response group (the control group in this setting) by the attrition differential. Trimming is performed from the upper or lower tail depending on the outcome's sign, yielding upper and lower bounds of the treatment effect under a monotone selection assumption.

tion, only family firms experienced significant changes in managerial turnover and board composition. On average, the share of family members on executive boards—comprising the firm's C-suite, including the CEO, CFO, and managing directors—fell by more than 15 percent relative to the pre-reform mean. This decline in the share is driven by a 20 percent drop in the number of family executives and an equally large increase in the number of outside professional executives. The managerial turnover is especially pronounced among firms that were less productive before the reform, indicating a selective move toward professionalization where it was most needed. These results suggest that trade-induced competition can have long-lasting effects on firm organization.

Consistent with the view that replacing family managers improves managerial quality, firms that professionalize their management report large productivity gains, with quantity productivity increasing by 35 percent after the policy compared to firms that retain family-dominated management. The results suggest that import competition triggers within-firm productivity growth among surviving firms through managerial reorganization. These gains are distinct from and augment the canonical pro-competitive gains from trade that operate through between-firm reallocation of resources and the exit of low-productivity producers (Melitz, 2003; Arkolakis et al., 2012, 2019; Edmond et al., 2015).

To verify that these productivity gains among professionalizing firms are not simply the result of other channels activated by the trade reform, I conduct a placebo test on firms that were already professionalized before the policy. Consistent with the managerial-quality channel, I find no productivity effects in these firms, reinforcing the interpretation that the observed improvements are attributable to managerial restructuring rather than to alternative channels activated by trade, such as access to imported inputs or learning from trade.

Classical price theory leaves little room for competition-induced productivity improvements; persistent hiring of less-qualified family managers is inconsistent with profit-maximizing behavior (Stigler, 1976). To capture why such behavior persists and how competition can change it, I develop a quantitative model that embeds managerial choice in a model of heterogeneous firms with monopolistic competition. Upon entry, firms draw a productivity parameter (baseline productivity) and subsequently choose between family and professional management Firm owners derive *non-pecuniary private benefits* from retaining family management, such as the satisfaction of having children or siblings run the business (Aghion et al., 1999; Burkart et al., 2003; Bertrand and Mullainathan, 2003; Gómez-Mejía et al., 2007; Lippi and Schivardi, 2014; Chen and Steinwender, 2021). Alternatively, firm owners can hire external professionals, which increases their baseline productivity by a constant factor but entails the loss of private

benefits associated with family management. This choice determines the firm's *realized productivity*, which is ultimately observed in the data. Additionally, I show that allowing for the possibility that family management lowers contracting frictions, such as by reducing the risk of expropriation by professional managers, does not alter the qualitative results or the core mechanism through which competition induces the least productive firms to professionalize.

The model predicts a dual selection mechanism for professionalizing management based on firms' baseline productivity. Firms with low baseline productivity professionalize primarily to survive, as they would otherwise earn negative profits under family management and be unable to operate. In contrast, firms with high baseline productivity professionalize due to its efficiency-boosting effect, whereby the gains from professional management amplify their existing productivity advantage, as in Bustos (2011). Firms with intermediate baseline productivity levels retain family management, as the incremental benefits of professionalization do not outweigh the loss of private benefits. While management choices vary non-monotonically with baseline productivity, this prediction does not translate to realized productivity, which is observed only after management choices take effect. In terms of realized productivity, the model predicts that professionally managed firms should outperform family-managed firms on average, a pattern borne out in the data.

I calibrate the model to quantify the impact of trade liberalization on managerial choices and aggregate productivity. Model parameters are set to match key empirical moments observed among Indian firms, such as the share of family-managed firms in the economy and the observed productivity gap between family-run and professionally managed firms. Using this calibrated model, I perform a policy counterfactual to simulate the effects of removing QRs, which intensifies import competition for domestic firms. Competitive pressure reduces the profits of domestic firms, pushing low-productivity firms into losses. This decline in profitability induces family-managed firms to professionalize whenever doing so restores positive profits. Firms whose productivity is too low to survive, even after professionalization, as well as already professional firms that have no further margin for adjustment, exit the market. Both responses—professionalization among surviving family firms and the exit of unprofitable ones—raise aggregate productivity by 12 percent. A decomposition reveals that approximately 70 percent of this increase comes from the exit of low-productivity firms, with the remaining 30 percent stemming from within-firm productivity improvements due to professionalization. Together, these results highlight the role of managerial reorganization in contributing to productivity gains from trade liberalization.

This paper adds to three strands of the literature. First, it relates to work examining why firms in more competitive markets exhibit higher productivity, a pattern Leiben-

stein (1966) described as *"X-inefficiency"*. Although the correlation between competition and firm productivity has been extensively studied in theoretical (Holmstrom, 1982; Nalebuff and Stiglitz, 1983; Schmidt, 1997; Raith, 2003; Acemoglu et al., 2006) and empirical work (Nickell, 1996; Holmes and Schmitz, 2010), the mechanisms behind X-inefficiency remain unclear (Backus, 2020). Complementing this work, Walker et al. (2024) document substantial slack in Kenyan firms and show that underutilized capacity can generate highly elastic aggregate supply and large transfer multipliers. By showing that import competition induces managerial turnover, specifically the replacement of family with professional managers, this paper contributes to unpacking the black box of X-inefficiency and identifies organizational restructuring as an important mechanism linking competition and firm productivity.

This paper also connects to evidence that product-market competition influences organizational and governance structures within firms and that strong governance matters most in less competitive industries (Giroud and Mueller, 2011, 2010; Guadalupe and Wulf, 2010; Frésard and Phillips, 2024).

Second, this paper contributes to the literature on the pro-competitive gains from international trade. One strand emphasizes reallocation across firms through changes in markups or selection on the extensive margin (Melitz, 2003; Arkolakis et al., 2012; Edmond et al., 2015; Arkolakis et al., 2019). By contrast, I show that import competition raises productivity within surviving firms. While prior work has documented within-firm adjustments, these have largely focused on production-side adjustments, and some of these are driven by an expansion in export opportunities for domestic firms; see, for example, work on gains from learning from exporting (Atkin et al., 2017), technology adoption and innovation (Bustos, 2011; Bloom et al., 2016; Hombert and Matray, 2018; Perla et al., 2021), access to better imported inputs (Amiti and Konings, 2007; Topalova and Khandelwal, 2011), shifts in product scope (Bernard et al., 2011; Dhingra, 2013), and joining multinational supply chains (Alfaro-Ureña et al., 2022). I highlight a distinct organizational channel by showing that the pro-competitive pressures of trade induce managerial turnover and professionalization. Closest to my work, Chen and Steinwender (2021) show that import competition raises managerial effort, especially in family firms. I complement the literature by showing that competition changes the composition of management itself and that import liberalization, rather than export expansion, drives these within-firm productivity gains.[3]

Finally, there is a rich literature on family firms, which documents their prevalence in both rich and poor countries (Bertrand and Schoar, 2006; Burkart et al., 2003; Morck

[3]Related work in trade examines how organizational hierarchies respond to trade (Caliendo and Rossi-Hansberg, 2012; Marin and Verdier, 2014). This paper complements that literature by documenting an additional margin through which trade reshapes organizational structure.

et al., 2005; Villalonga et al., 2015). This literature links family control to weaker management practices, lower managerial effort, smaller firm size, lower productivity, less innovation, lower firm value, and worse management (Claessens et al., 2000; Pérez-González, 2006; Villalonga and Amit, 2006; Bennedsen et al., 2007; Bertrand et al., 2008; Gomez-Mejia et al., 2011; Bloom et al., 2012, 2013; Cai et al., 2013; Caselli and Gennaioli, 2013; Mullins and Schoar, 2016; Bandiera et al., 2018, 2020; Lemos and Scur, 2019; Akcigit et al., 2021; Tsoutsoura, 2021). A related literature also documents the importance of large business groups (Khanna and Yafeh, 2007; Gopalan et al., 2007; Almeida et al., 2011; Gopalan et al., 2014), and shows that the predominance of such firms can lead to capital misallocation (Almeida and Wolfenzon, 2006; Naaraayanan and Wolfenzon, 2024). There is also evidence that family firms can outperform, as in Sraer and Thesmar (2007), who show that French family-controlled firms earn higher returns than widely held firms due to lower wage payments and more parsimonious use of capital. By analyzing family firms during a period of dramatic import competition following trade liberalization, this paper provides new insights into managerial succession and turnover during a crisis. My results also complement the work of Cuñat and Guadalupe (2005, 2009), who study the impact of product market competition on executive compensation.

The remainder of the paper is organized as follows. Sections 2 and 3 provide details of the policy setting and data construction. Section 4 outlines the empirical strategy, and Section 5 presents the event study results. Section 6 introduces the quantitative model, and Section 7 discusses identification and calibration. Section 8 concludes.

2 Policy Background

In 1947, following independence from British rule, India's economic planning was characterized by a strong desire for self-reliance and minimal dependence on the West for its development objectives. A key outcome of this strategy was the implementation of a comprehensive import substitution and licensing regime, which involved direct control over foreign exchange utilization by Indian firms and households. A balance of payments (BOP) crisis in 1957 further intensified these import controls. Instead of relying on price controls such as tariffs, the Indian government employed quantitative restrictions (QRs) as its main policy instrument. A small group of bureaucrats in Delhi was responsible for allocating scarce foreign exchange across different sectors of the economy and among firms within each industry.[4] Imports of consumer goods were even more heavily regulated and virtually eliminated (Bhagwati and Srinivasan, 1975;

[4]For instance, firms could only obtain an import license if they demonstrated that their imports were essential for production and that the imported product was not manufactured domestically (Bhagwati and Srinivasan, 1975; Pursell and Sattar, 2004).

Krueger, 2010). A complex web of overlapping agencies responsible for certification and license issuance managed this process. During this period, there was a lucrative premium on import licenses, and foreign consumer goods were essentially absent from the market.

The framework of India's restrictive trade practices, particularly the use of QRs, was facilitated by specific exceptions within international trade agreements. Although the General Agreement on Tariffs and Trade (GATT) fundamentally prohibited QRs under Article XI, it provided crucial exceptions that India utilized. Article XVIII:B of the GATT allowed countries in the "early" stages of development to impose QRs to *"safeguard [their] external financial position and ensure a level of reserves adequate for the implementation of their program of economic development"*.[5] India utilized this provision of Article XVIII:B to support its QR regime since 1957 (Pursell and Sattar, 2004).

2.1 India's First Generation Trade Reform (1991)

By the 1980s, it was evident that India's regime of import-substituting industrialization had failed, yielding a per capita economic growth rate of only 1.7 percent. Although growth accelerated in the 1980s, India's public debt steadily increased throughout the decade, rendering its macro-fiscal situation vulnerable. The rising debt was exacerbated by a spike in oil prices during the Gulf War and a decline in remittances from workers in the Middle East, leading to a downgrade in India's credit rating. By 1991, India was on the brink of default. Consequently, India approached the International Monetary Fund (IMF) for emergency financing and agreed to implement macroeconomic stabilization and structural reforms.

The structural reforms of the early 1990s extended well beyond the scope of the IMF program (Krueger, 2010; Ahluwalia, 2019) and impacted several spheres of the economy. Revisions to the industrial licensing regime facilitated firm entry and capacity expansion; private firms were permitted to enter sectors previously reserved for state-owned enterprises, and foreign direct investment was eased in several industries.

In terms of trade policy, the exchange rate was devalued by over 20 percent, and both quantitative restrictions and tariffs were eased on *intermediate and capital goods*. With the removal of quantitative restrictions, tariffs became the primary restriction on the imports of these goods. Average tariffs were reduced from over 80 percent in 1990 to 36 percent by 1996 (Topalova, 2010). Several papers have studied the various impacts of these tariff reductions (Hasan et al., 2007; Topalova, 2010; Goldberg et al., 2010b; Topalova and Khandelwal, 2011).

[5]For details, see https://www.wto.org/english/tratop_e/bop_e/bop_e.htm, accessed July 30, 2024.

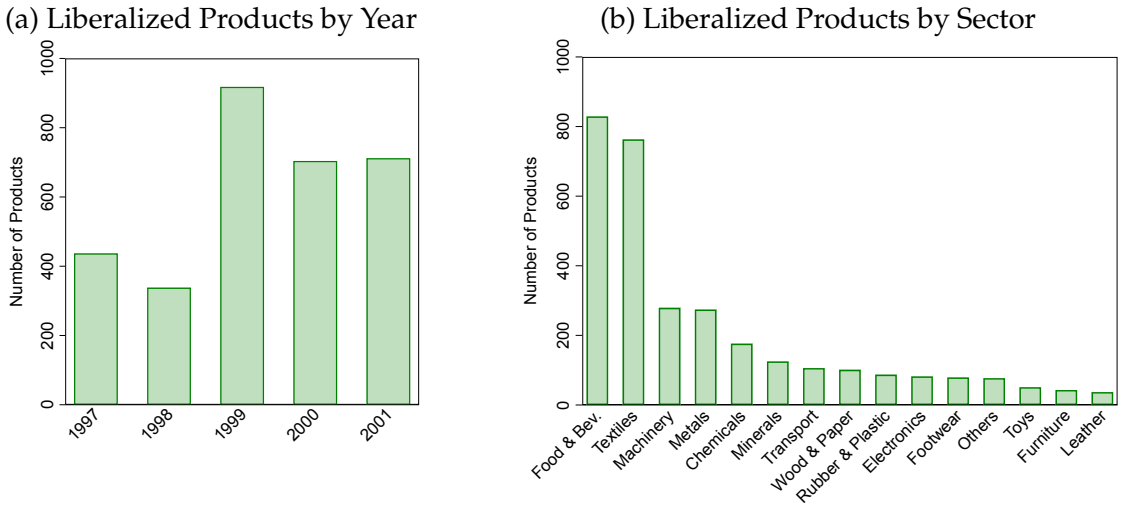
Despite these reforms, India continued to impose stringent QRs on almost all consumer goods and a small number of intermediate products, which constitute almost 3000 products at the 8-digit HS level or 30 percent of all tariff lines (Panagariya, 2004). India justified these QRs under Article XVIII:B of the GATT, asserting that they were necessary to safeguard its external financial position due to inadequate foreign exchange reserves. QRs on consumer products were lifted a decade later and are the focus of this paper. One of the challenges in evaluating the impact of the 1991 trade reforms is precisely that they were implemented as part of a broad-based structural reform package. This makes it difficult to attribute post-policy changes in data to trade policy. While tariff changes were product-specific, as Topalova and Khandelwal (2011) note, there may be considerable complementarity between sectors that saw the highest tariff reductions and industries that benefited from other industrial reforms, such as those mentioned above. This concern is less relevant to the removal of QRs during India's second generation of reforms in the late 1990s and early 2000s, as I will argue in the next section.

2.2 Second Generation Trade Reform (1997-2001): Removal of Quantitative Restrictions (QRs)

While there are many studies on how India's 1991 liberalization affected various aspects of the Indian economy, there is virtually no work on the impact of continuing QRs on over 30 percent of tariff lines and the impact of their eventual removal a decade later. This is surprising, given that even after the 1991 reforms, over two-thirds of India's tradable GDP remained protected by some kind of non-tariff import restrictions, most commonly QRs (Pursell and Sattar, 2004).

From 1997 to 2001, the remaining QRs were also removed. The impulse of this policy was external to India. In July 1997, the United States requested consultations with India under the World Trade Organization's (WTO) Understanding on Rules and Procedures Governing the Settlement of Disputes (DSU) to challenge India's QRs as being inconsistent with WTO obligations. In the following months, the US was joined by the European Communities, Switzerland, Australia, Canada, and New Zealand, leading the WTO Dispute Settlement Body to set up a panel to examine the validity of India's QRs in November 1997. The panel submitted its report a year later, in December 1998. The panel ruled that India's foreign exchange reserves are adequate and "not facing a serious decline or threat," and concluded that India's QRs, therefore, do not constitute permissible "necessary" measures to address a weak BOP situation under Article XVIII:B. It further recommended that India remove *all* QRs that it maintains under Article XVIII:B. Subsequently, India and the US mutually agreed on a phase-out plan in which India agreed to remove all its outstanding BOP-related QRs by April 1, 2001.

Figure 1: Composition of Liberalized Products By Year and Sector



Notes: The figure displays the number of products that were liberalized over time (panel a) and across different sectors (panel b), based on a dataset created by digitizing archival policy documents from the Ministry of Commerce, Government of India, as outlined in Section 3. *Source:* Ministry of Commerce, Government of India.

Two features of the institutional procedure leading to the removal of India's QRs have important implications for the empirical strategy outlined in Section 4. First, India's case for maintaining QRs under Article XVIII:B largely hinged on showing that its BOP situation was vulnerable. For such an assessment, instead of relying on materials submitted by the disputing countries, the WTO relies almost exclusively on the independent determination of the International Monetary Fund (IMF), which is a permanent invitee in all Article XVIII consultations.[6] The IMF held that India is well placed to manage its external financial situation and that its reserves are adequate to remove all existing QRs over a relatively short period. Because the IMF was called upon to conduct this technical assessment, it is unlikely that this externally imposed policy reform was influenced by politicians or policymakers in India or any of the disputing countries.

The second noteworthy feature of this policy is that the single technical assessment by the IMF was applied uniformly to almost 3000 products on which India maintained QRs based on India's aggregate BOP position. It was an all-or-nothing approach. Neither the United States could selectively target certain products for the removal of QRs,

[6]According to Article XV:2 of the GATT, *"... the contracting parties shall accept all findings of statistical and other facts presented by the IMF relating to foreign exchange, monetary reserves and balances of payments, and shall accept the determination of the Fund as to whether action by a contracting party in exchange matters is in accordance with the Articles of Agreement of the International Monetary Fund, or with the terms of a special exchange agreement between that contracting party and the contracting parties. The contracting parties in reaching their final decision in cases involving the criteria set forth in paragraph 2 (a) of Article XII or in paragraph 9 of Article XVIII, shall accept the determination of the Fund as to what constitutes a serious decline in the contracting party's monetary reserves, a very low level of its monetary reserves or a reasonable rate of increase in its monetary reserves, and as to the financial aspects of other matters covered in consultation in such cases."*

nor could India selectively retain QRs on specific products. The policy did not allow for any selective application or exemptions. Consequently, India's loss in this dispute resulted in the removal of QRs on almost 3000 products across the board.

3 Data

This study leverages three novel sources of data that are merged with comprehensive firm-level panel data. The construction of this data enables an in-depth analysis of how trade shocks affect both the production outcomes and the internal organization of firms.

CMIE Prowess. The primary data source is the CMIE Prowess database, which covers a substantial portion of India's formal economic activity. Firms in the Prowess database collectively account for 60 to 70 percent of the economic activity in the organized industrial sector, 75 percent of corporate taxes, and 95 percent of the excise duty collected by the Government of India (Goldberg et al., 2010a). CMIE has been compiling these data since 1988, primarily drawing on firms' annual reports and audited financial statements. The database contains information on manufacturing firms as well as on financial and non-financial services companies, spanning 775 5-digit industry codes based on the 2008 National Industrial Classification (NIC). Of these, 462 industries belong to manufacturing, which are further grouped into 20 2-digit sectors.

Prowess offers two distinctive features that have received relatively little attention from researchers. First, it provides detailed data on the product scope of each firm. Until 2011, the Companies Act (1956) required firms to report quantitative information, such as the value and quantity of production, revenues, stock, and capacity for every product they produced. This obligation, coupled with the annual publication of financial statements, enabled Prowess to capture rich data on firms' product scopes. Prowess' product classification contains a total of 6,130 products. I use these data to determine whether a firm was exposed to the QR removal policy based on the extent of its product offerings and operations in product markets affected by QR removals. Other studies that have employed these product scope data include Goldberg et al. (2010a); DeLoecker et al. (2016).

Second, and less widely recognized, is that Prowess publishes the names, designations, and tenures of all board members of each company for every year. Importantly, it also provides the Director Identification Number (DIN) for these directors, an 8-digit unique identifier issued by the Ministry of Corporate Affairs (MCA), Government of India. This feature facilitates matching with a larger administrative dataset from the MCA, as discussed below. Unlike the financial and product data, the board data are

somewhat incomplete. Director names are often abbreviated to initials and last names, and designations are often missing. A key innovation of this project is the systematic cleaning and imputation of missing information for directors, performed on a firm-by-firm and director-by-director basis by cross-referencing the Prowess data with the administrative records from the MCA.

For cleaning the Prowess data, I follow the sample selection steps outlined below. First, I restrict the sample to manufacturing firms, thereby excluding service and financial companies. Next, I retain only those firms that began reporting data before the last pre-policy year and that provide at least two observations during the pre-policy period. I also exclude a small number of firms that never report any information on the products they produce. These steps yield a panel dataset comprising 5008 firms observed over the period 1988-2010.

Prowess serves as the baseline dataset for this study. However, to investigate how the import competition shock impacts manufacturing firms in India, particularly regarding their internal organization and top management, I supplement Prowess with three novel datasets. This three-step data construction procedure is described below.

Novel Dataset on Product-level Quantitative Restrictions in India. The first step in identifying which firms are affected by the QR removal policy is to determine which products are subject to the policy and when the restrictions were removed. There is no central database for this information, and the liberalization policy was implemented over several years (with a particularly heavy emphasis in the final three years, 1999-2001) through more than 26 government notifications issued in the Official Gazette of India.

I obtained these notifications from the archives of the Ministry of Commerce, Government of India, to create a detailed dataset of products under quantitative restrictions (QRs), including the exact removal dates. Figure A1 in Appendix A.1 shows an example of one such policy notification. These notifications typically provide a list of products along with their corresponding product codes, based on the 1996 Indian Trade Classification Harmonized System (ITCHS) nomenclature, the import licensing policy applicable to each product, and the date of notification. In most cases, the column for the new import policy indicates "*Free*", implying that there are no quantitative restrictions on the product after the notification date. In some instances, however, the policy may be less liberal; for example, quantitative restrictions might be partially lifted such that the product can be imported into India only by a State Trading Corporation (STC) or only imported through a Special Import License (SIL). I treat a product as liberalized if the imports of that product are completely free of any kind of quantitative or licensing restrictions.

Thus, after processing these data, I obtained a dataset at the 8-digit level that details the year in which QRs were removed for each product. Based on the above classification, out of a total of 10,839 ITCHS 8-digit products, 3,109 products appear in the QR removal government notifications, and of these, 2,982 were made completely free of any kind of quantitative restriction between 1997 and 2001.

Novel Product Concordances. In the next step, I construct novel product concordances between the 1996 ITCHS product nomenclature used by the Indian customs authority and the product nomenclature in the firm-level CMIE Prowess data. These concordances were prepared by hand by going through the following resources: (1) detailed product descriptions of each of the 3,109 ITCHS 8-digit products contained in the QR notifications and matching them with the descriptions of 6,130 products reported by Prowess firms, (2) The HS 6-digit to Prowess product code concordance in Barrows and Ollivier (2021) for manufacturing products, and (3) an incomplete concordance between ITCHS products and Prowess products provided by CMIE. Significant manual work was required for this step despite existing concordances because the existing concordances use new vintages of HS products, while the QR notifications used the older 1996 vintage of ITCHS codes. Moreover, existing concordances are at the coarser 6-digit HS level. Table A1 in Appendix A.1 provides a few examples of how this matching is performed. As a result, I identified 1,168 unique Prowess products that correspond to at least one ITCHS product for which QRs were removed during the policy window. The next section discusses how these data are used to assign treatment at the firm level.

Administrative Data on Manager Family Ties. Finally, I obtained access to novel administrative data from the Ministry of Corporate Affairs, covering over 6 million board directors from approximately 1.3 million registered Indian companies. Each director is assigned an 8-digit unique Director Identification Number (DIN), and each firm has a unique 21-digit Company Identification Number (CIN). The dataset records the full legal names of individuals, with official spellings that are rigorously verified against government-issued IDs, along with key demographic details such as date of birth, gender, and place of birth.

Moreover, these data provide a rich historical record of board director tenures dating back to the 1970s. They capture the designations held by directors during their tenure at each firm. For example, while some directors serve solely as independent board members, attending meetings without involvement in daily operations, others hold executive roles (e.g., Managing Director, CEO, or CFO) that entail active participation in the firm's day-to-day management. The dataset also includes the start and end dates of each directorship, which are crucial for analyzing turnover among top managers.

Table 1: Family Ties Among the Board Members and Top Managers of an Indian Firm

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

Notes: The table shows the board of directors of a sports goods firm in India. It lists all board members of the firm from 2000 to 2010, illustrating the board's domination by the Khosla family (name changed to maintain anonymity). The table contains information on the name of each director, with first and middle names abbreviated for brevity (column 1), the father's name of each director (column 2), whether the director is on the executive board, which includes top management positions such as the CEO, CFO, and the managing director (column 3), the director's sex (column 4), age in 2010 (column 5), and place of birth (column 6). *Source:* CMIE Prowess and Ministry of Corporate Affairs, Government of India.

Most crucially for this study, the data feature each director's father's name, thereby facilitating the identification of family ties within firm boards. Since the MCA registration process requires directors to provide their father's names, this information is reliably recorded and enables the tracking of familial relationships among board members.

For instance, Table 1[7] illustrates the board composition of a sports goods firm between 2000 and 2010. The table reveals that directors A Khosla, M Khosla, and P Khosla share the same father's name (D K Khosla), confirming that they are brothers. Additionally, N K Khosla, identified as D K Khosla's brother, and N Khosla, noted as his nephew, are also listed. This example underscores how the inclusion of familial information in the administrative data enables a detailed analysis of family presence on firm boards and sheds light on the extent of familial networks among top managers in Indian companies.

3.1 Descriptive Statistics

This section provides a detailed description of the graphical results presented in Figures 2 and 3, focusing on the descriptive characteristics of family-managed firms in India. I define a firm as a family firm if it has at least two board members from the

[7]The initial and middle names have been abbreviated for clarity.

Table 2: Summary Statistics

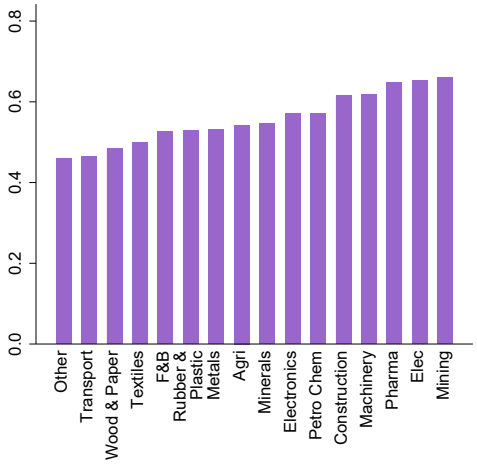
	Obs	Mean	p10	p50	p90
Treated Firms (%)	4,996	47	0	0	100
Company Age	83,726	27	7	21	56
Wages	82,745	207	0	21	305
Gross Fixed Assets	82,067	2307	20	213	2618
Revenues	82,745	3399	1	363	4385
Expenses on Raw Materials	82,745	1386	0	136	1785
At least 2 Family Members on Board (%)	4,852	45	0	0	100
Family Share on Board (%)	39,644	38	10	33	75
Family Share on Executive Board (%)	39,644	64	0	100	100

Notes: This table presents summary statistics for firms included in our analysis, using data from CMIE Prowess and the Ministry of Corporate Affairs, Government of India. "Treated Firms" represents the percentage of firms whose main, highest-revenue product was affected by the QR-removal policy. "Company Age" measures the number of years since incorporation. "Wages" denotes the total wage bill of the firm and is deflated using the GDP deflator. "Gross Fixed Assets" refers to the book value of fixed assets and is deflated using the gross fixed capital formation deflator. "Revenues" indicate total firm revenue and are deflated using NIC output deflators, while "Expenses on Raw Materials" reflect expenditures on material inputs and are deflated using NIC input deflators. "At least two Family Members on Board" represents the percentage of firms in which at least two members on the company's board are from the same family. The next two variables are defined only for firms who have at least two directors from the same family. The first is "Family Share on Board" and the second is "Family Share on Executive Board" representing the percentage of family members on the full board and the executive board of the firm respectively. All monetary values are expressed in millions of Indian Rupees (INR) and deflated using 2004 as the base year. Columns represent the total observations, mean, 10th percentile, median, and 90th percentile of each variable at the firm level. *Source:* CMIE Prowess and Ministry of Corporate Affairs, Government of India.

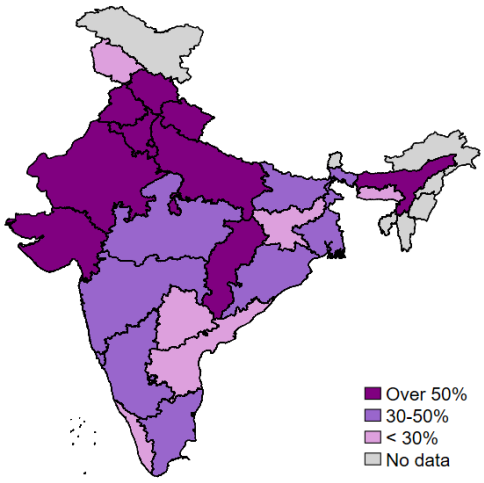
same family.

Figure 2: Share of Family Firms Across Industries and States

(a) Family Firms Across Industries



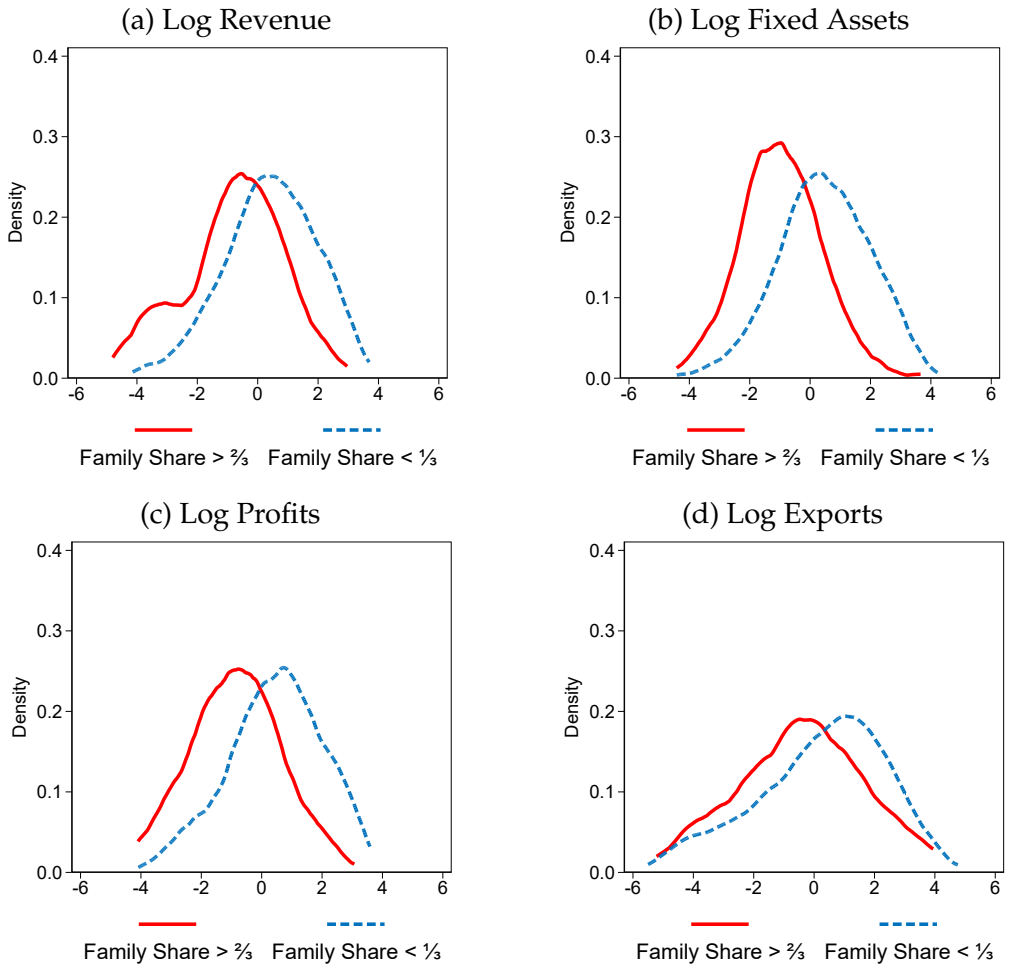
(b) Family Firms Across States



Notes: This figure displays the share of family firms across 2-digit NIC industries (panel a) and across Indian states (panel b). A family firm is defined as a firm in which at least two members on the company's board are from the same family. All data are for the year 1996. *Source:* CMIE Prowess$_{dx}$ and the Ministry of Corporate Affairs, Government of India.

Figure 2 illustrates the distribution of family-managed firms across different industries and geographic regions. Panel (a) reveals some variation across industries in the share of family firms. While some sectors, such as Food & Beverages, Textiles, and Rubber & Plastics, exhibit a higher prevalence of family management, all industries have at least 40 percent of firms with at least two board members who are from the same family. Panel (b) highlights the geographical distribution of family firms across Indian states. It shows that family firms are widespread in India; despite different local business cultures and economic structures, nearly half of the firms in most states across India are family firms.

Figure 3: Firms with High Share of Family Top Managers are Smaller



Notes: The figure plots kernel density estimates of log revenue (panel (a)), log fixed assets (panel (b)), log profits (panel (c)), and log export revenue (panel (d)) in 1996. Estimates for firms with a share of family members on the board below one-third are shown in blue, while those for firms with a share above two-thirds are shown in red. All variables are residualized by 5-digit industry dummies. *Source:* CMIE Prowess$_{dx}$ and Ministry of Corporate Affairs, Government of India.

Figure 3 provides kernel density plots that compare firm-level outcomes based on the degree of family involvement in top management. Panels (a) and (b) depict the distribution of firm size, measured by log revenues and log fixed assets, respectively. Firms

with a higher share of family managers (the share of family among company directors greater than two-thirds, indicated in red) generally tend to be smaller, exhibiting lower revenues and fixed assets. Panel (c) indicates that these family-involved firms also have lower profits. Panel (d) demonstrates that firms with extensive family management also tend to export less. These findings highlight distinctive differences in firm characteristics based on family involvement, underscoring the significant role of family management in influencing firm size and profitability.

4 Empirical Strategy

The removal of QRs from consumer goods in 1997-2001 offers a unique opportunity to analyze the impact of import competition on firm behavior. First, the reform was product-specific, with India removing QRs on about 3000 products at the 8-digit HS level. The 8-digit HS classification provides a detailed breakdown of traded goods (about 10,000 goods in total). This quasi-experimental variation in exposure to import competition across the product space offers a natural setting for a difference-in-differences identification strategy.

Second, this policy is unusual in its primary focus on final consumer goods. Trade reforms typically affect product markets throughout the production network, influencing both intermediate inputs and final goods. Lowering import costs for intermediate goods directly reduces firm costs and may enhance firm productivity (Amiti and Konings, 2007; Goldberg et al., 2010a; Topalova and Khandelwal, 2011). However, this mechanism plays a limited role in the present case, as the QR removal primarily targeted final consumer goods. This narrower scope of the policy provides a unique opportunity to isolate and identify the impact of a specific *demand* shock—heightened import competition in consumer goods markets—on firm outcomes.

Third, the QR removal was a unilateral trade liberalization policy that granted foreign firms access to the Indian market without reducing export costs for Indian firms. Thus, the policy mainly reflects the effects of import competition, not export incentives.

Fourth, similar to the 1991 trade reform, and as discussed earlier, India's removal of QRs was externally imposed. The timing and scope of this liberalization were determined by the WTO, and critically, the IMF played a decisive role in the process. The IMF's decision to no longer allow India to rely on Article XVIII:B of the GATT was based on a technical assessment of India's external financial position. This assessment concluded that India's foreign exchange reserves were adequate, and the decision was made independently of political or other policy considerations. This externally driven process underscores that the QR removal was not influenced by domestic policy pref-

erences or strategic interests, providing a uniquely exogenous shock for empirical analysis.

Finally, unlike the 1991 trade reforms, which coincided with widespread domestic liberalization, the removal of QRs in the late 1990s and early 2000s occurred in relative isolation, unaccompanied by other major domestic or trade policy changes. This limited scope reduces the likelihood of confounding effects, making it easier to attribute observed changes in firm behavior to the QR removal policy.

To analyze the effects of QR removal, I employ an event study framework at two levels:

1. **Aggregate product level:** To examine how the policy influenced aggregate imports.
2. **Firm level:** To assess how firms adjusted in response to increased import competition.

The aggregate product-level analysis allows me to quantify the policy's direct effect on trade flows. The firm-level analysis investigates its implications for the financial and managerial outcomes of exposed firms. Below, I outline the empirical specifications for each level of analysis.

Product-Level Event Studies To estimate the effect of QR removal on aggregate imports, I use the following event study specification at the product level:

$$y_{pt} = \sum_{k=\underline{T}}^{\bar{T}} \beta_k D_{pt}^k + \delta_p + \lambda_{qt} + \varepsilon_{pt} \tag{1}$$

where y_{pt} is the log of the import or export value or quantity of 6-digit HS product p in year t, δ_p denote HS 6-digit product fixed effects, and λ_{qt} are 4-digit HS product $\times$ year fixed effects.[8] The inclusion of λ_{qt} means that the β_k coefficients are identified using liberalized and unaffected HS 6 products within HS 4-digit product $\times$ time. Event time dummies D_{pt}^k are defined as $D_{pt}^k := 1\left[t = \tau_p + k\right] \forall k \in (\underline{T}, \overline{T})$ where τ_p is the year in which QRs were removed for product p. The coefficient for the event year $(k = 0)$ is normalized to zero. I set $\underline{T} = -5$ and $\overline{T} = +8$. Standard errors are clustered at the HS 6-digit product level.

The key identification assumption is that, in the absence of the QR removal policy, products affected by the policy would have followed similar import trends as unaffected

[8] I currently have access to annual trade flow data for India at the 6-digit HS level. A 6-digit HS product is classified as treated if any of its constituent 8-digit products are affected by QR-removal. I am in the process of procuring monthly trade flow data at the 8-digit HS level and plan to update these event studies once the new data becomes available.

products, after accounting for time-invariant differences between 6-digit products and common 4-digit product $\times$ year shocks.

Firm-Level Event Studies. To estimate the impact of the QR-removal policy on firm outcomes, I use an event study approach. The policy was implemented in a staggered manner from 1997 to 2001. All results presented in the next section rely on the estimator of Sun and Abraham (2021). For robustness, I also estimate the event study using a two-way fixed effects specification, which yields similar results (see Appendix A.3). The event study specification is as follows:

$$y_{it} = \sum_{k=\underline{T}}^{\overline{T}} \theta_k D_{it}^k + \delta_i + \lambda_{jt} + \varepsilon_{it}, \tag{2}$$

where y_{it} is an outcome of firm i in the accounting year t, δ_i is a firm fixed effect, and λ_{jt} are three-digit industry $\times$ year fixed effects. Therefore, θ_k coefficients are estimated by comparing treated and untreated firms within sector $\times$ time.[9] In the robustness analysis, I show that the results are similar after controlling for location (state or district) $\times$ year fixed effects and firm size $\times$ year fixed effects. Event time dummies D_{it}^k are defined as follows. $D_{it}^k := \mathbb{1}[t = \tau_i + k] \forall k \in (\underline{T}, \overline{T}), D_{it}^{\overline{T}} = \mathbb{1}\left[t \geqslant \tau_i + \overline{T}\right]$, and $D_{it}^T = \mathbb{1}\left[t \leqslant \tau_i + \underline{T}\right]$, where $\mathbb{1}[.]$ is the indicator function and τ_i is the year in which QRs are removed on the highest-revenue product of firm i. ε_{it} is an error term. I normalize $\theta_0 = 0$ and set $\underline{T} = -5$ and $\overline{T} = +8$. Standard errors are clustered at the three-digit industry $\times$ year level.

The key identification assumption for estimating θ_k is that, in the absence of QR removal, firms operating in product markets exposed to import competition would have followed similar trends in outcome variables as firms in unaffected sectors. This implies that the latter serve as a reasonable counterfactual for the treated firms after accounting for time-invariant differences between firms and common three-digit industry $\times$ year shocks.

5 Results

In this section, I first examine the impact of the QR-removal policy on product-level trade flows into India. After establishing that the policy significantly increased imports

[9] I am able to include three-digit sector $\times$ year fixed effects because the QR-removal policy was implemented at the more granular 8-digit HS code level. This ensures that within each three-digit sector, exposure to the policy varies across products, allowing for the inclusion of sector-level time controls without absorbing the treatment effect.

of liberalized products, I analyze its effects on the financial and managerial behavior of manufacturing firms in India.

5.1 Impact of QR Removal on Aggregate Imports

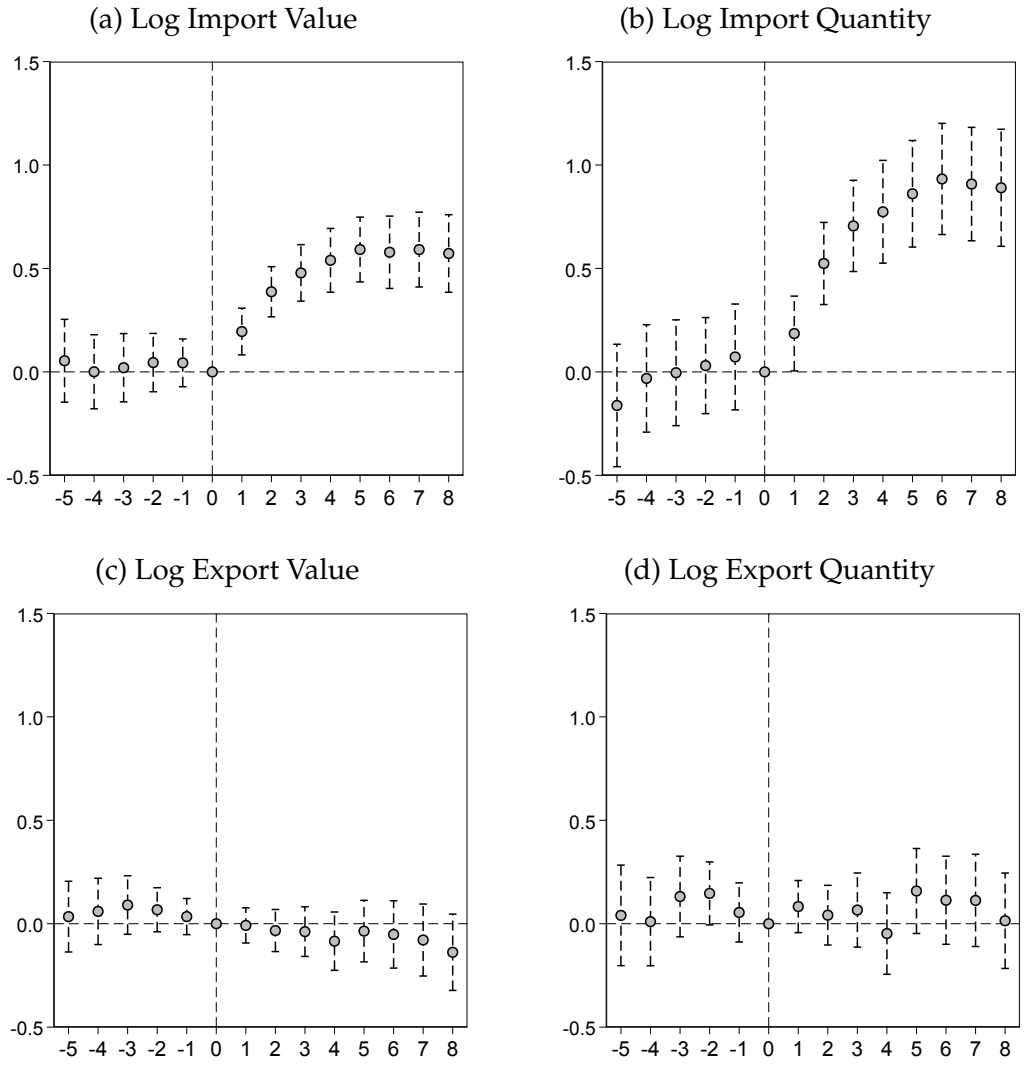
Figure 4 presents event-study estimates from Equation (1), capturing how products exposed to the removal of QRs differed from unaffected products in terms of import and export outcomes. Panels (a) and (b) illustrate a substantial and persistent increase in both the value and quantity of imports for the treated products. Notably, by the third year following QR removal, the import value of these products exceeds that of the control group by over 50 percent (panel (a)). The import value of treated products remains high through the eighth year after the reform, highlighting the persistence of the policy's effect. The impact on import quantities (panel (b)) follows a similar trajectory but is even more pronounced in magnitude, with the treated products reaching an increase of roughly 1 log point (over 150 percent) compared to the control group.

The stability of pre-trend coefficients suggests that treated and untreated products followed comparable trajectories before the reform. Moreover, the inclusion of HS 4-digit product $\times$ year fixed effects (where HS 4 is a broader product classification than HS 6) ensures that any time-varying shocks at the HS 4-digit level do not drive the results. Thus, the post-reform divergence in imports can be credibly attributed to the removal of quantitative restrictions.

The bottom panels confirm that the policy had little to no discernible effect on the exports of the same set of products. This is precisely what one would expect from a reform that exclusively liberalized India's domestic market for foreign producers without granting any reciprocal benefits to Indian exporters. The absence of a parallel export response underscores the unilateral nature of the policy: it primarily heightened competition from foreign producers for Indian firms, without materially altering Indian firms' access to foreign markets. The divergence between imports (which rise sharply and persist) and exports (which remain unchanged) helps rule out alternative explanations related to changes in export opportunities.

These findings confirm that the removal of QRs substantially intensified import competition in India. Having established the surge in imports at the product level, I now turn to examining how firms responded to this heightened competition. Specifically, I employ an event-study framework comparing firms that produce goods affected by QR removal against firms whose product portfolio remained unaffected, enabling me to isolate the causal impact of import competition on firms' financial and managerial outcomes.

Figure 4: Value and Quantity of Imports Increase after QR Removal with No Impact on Exports



Notes: The figure presents β_k event study coefficients from Equation (1) using the Sun and Abraham (2021) estimator on annual HS 6-digit product-level panel data on imports and exports. The coefficients plotted correspond to Table A2, columns (1)-(4). The dependent variables are log import value (panel (a)), log import quantity (panel (b)), log export value (panel (c)), and log export quantity (panel (d)). An HS 6-digit product is identified as treated if QRs were removed from any of its constituent HS 8-digit products. β_0, the coefficient corresponding to the year in which QRs were removed, is normalized to zero. The policy is staggered from 1997 to 2001, with the x-axis denoting years relative to the event. All regressions include HS 6-digit product fixed effects and HS 4-digit product $\times$ year fixed effects. Standard errors are clustered by HS 6-digit product. The vertical lines are the 95 percent confidence intervals. *Source:* CMIE Trade$_{dx}$ and archives of the Ministry of Commerce, Government of India.

5.2 Impact of QR Removal on Firm Size and Financial Performance

Figure 5 presents event-study estimates from Equation (2), offering a 360-degree view of how intensified import competition influences key dimensions of firm size and financial performance. The panels cover firm revenues, costs, and capital structure, allowing us to trace the broad impact of foreign competition on domestic firms.

The first panel shows a substantial decline in total revenue for firms exposed to QR removal, relative to unaffected firms. By the third year following the policy change, treated firms' revenues fell by approximately 20 percent compared with the control-group firms. The gap widens further in subsequent years: by the eighth year, revenues of treated firms are almost 40 percent lower than those of the control group. This pronounced and persistent decrease underscores the depth of the import-competition shock. Panel (b) shows that firm profits decline by a comparable magnitude.

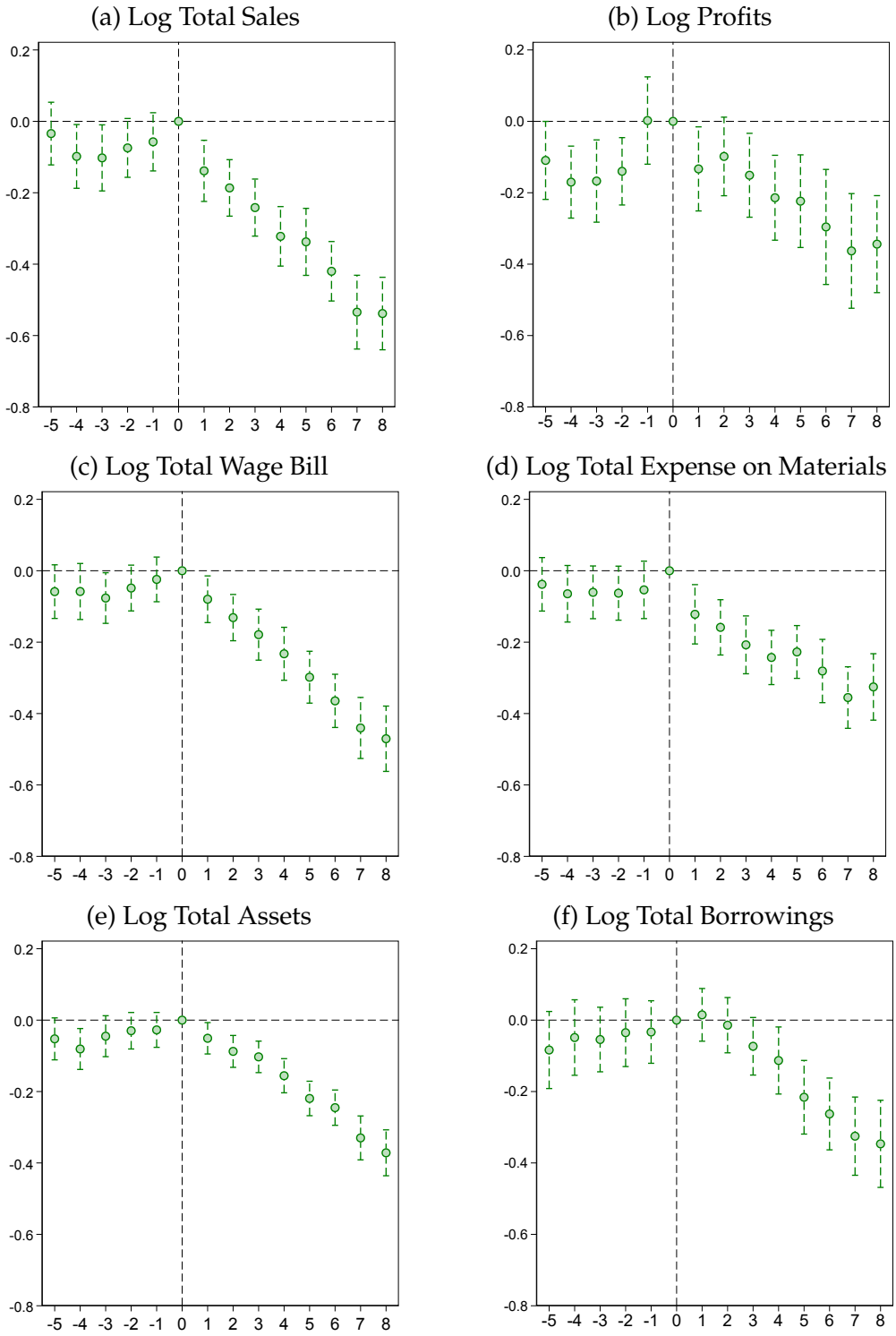
Turning to labor-related expenditures, panel (c) shows that the total wage bill experiences a decline comparable in magnitude to the drop in total sales. The effects manifest soon after the policy takes effect and persist through the eighth year. The protracted nature of this decline suggests that firms engage in sustained cost-cutting on labor, likely in response to shrinking market share and profitability. Expenditure on raw materials (panel (d)) also follows a downward trajectory, decreasing by as much as 30 percent by the eighth year. This reduction is consistent with firms scaling back production and operations in the face of heightened import competition, using fewer inputs in line with reduced output and sales.

The bottom two panels show changes in firms' capital structure. Panel (e) illustrates a substantial and growing decline in the total assets of treated firms. By the third year, assets are around 10 percent lower relative to the control group, and this disparity accelerates over time. By year eight, the total assets of treated firms have fallen by almost 30 percent compared with their unaffected counterparts. This pattern points to a long-term contraction in capacity, possibly due to underutilized assets, disinvestment, or an inability to generate sufficient cash flow to sustain capital stocks. Finally, panel (f) examines total firm borrowings, which decline by a comparable magnitude.

Figure 5 also helps confirm the lack of pre-trends in the outcome variables. Pre-policy event-study coefficients are insignificant and close to zero.

Overall, these results demonstrate that the QR-removal policy delivered a substantial negative shock to Indian firms' operations and balance sheets. As foreign products entered the domestic market at scale, many Indian firms struggled to protect their revenue base and profit margins, leading to cutbacks in labor, materials, and capital. These patterns remain very similar when conditioning on a survivor panel (Figure A7 in Ap-

Figure 5: Domestic Firms Contract after QR Removal



Notes: The figure plots the estimated θ_k event study coefficients from a regression of the form given in (2), estimated using the Sun and Abraham (2021) estimator. The coefficients correspond to those in Table A3, columns (1)-(6). The dependent variables are: log total sales (panel (a)), log profits (panel (b)), log total wage bill (panel (c)), log total expense on raw materials (panel (d)), log total assets (panel (e)), and log total borrowings (panel (f)). A firm is identified as treated in a year if QRs were removed on its highest-revenue product. θ_0, the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1997 to 2001, with the x-axis denoting years relative to the event. All regressions include firm and three-digit industry $\times$ year fixed effects. Standard errors are clustered at three-digit industry $\times$ year level. The vertical lines are the 95 percent confidence intervals. *Source:* CMIE Prowess$_{dx}$ and archives of the Ministry of Commerce, Government of India.

Table 3: Higher Firm Exit in Treated Sectors in the Long Run

	(1)	(2)	(3)	(4)	(5)
Treated_i	0.20***	0.16**	0.15**	0.15**	0.17**
	(0.062)	(0.067)	(0.068)	(0.073)	(0.070)
Age	Yes	Yes	Yes	Yes	Yes
Listed FE	Yes	Yes	Yes	No	Yes
Industry FE	No	Yes	Yes	No	No
State FE	No	No	Yes	No	No
Industry x State FE	No	No	No	Yes	Yes
Number of Firms	5,008	4,980	4,963	4,081	4,081

Notes: Notes: The table reports coefficient estimates from firm-level Poisson regressions of a verified exit indicator on a treatment dummy. The regression specification is $\log \mathbb{E}\left[\text{Exit}_i \mid \text{Treated}_i, \text{Age}_i, \alpha_{\ell(i)}, \lambda_{j(i)}, \delta_{s(i)}, \psi_{j(i)\times s(i)}\right] = \beta_1 \text{Treated}_i + \gamma \text{Age}_i + \alpha_{\ell(i)} + \lambda_{j(i)} + \delta_{s(i)} + \psi_{j(i)\times s(i)}$, where Age_i is firm age in years; $\alpha_{\ell(i)}$ are listed-status fixed effects; $\lambda_{j(i)}$ are three-digit industry fixed effects; $\delta_{s(i)}$ are state fixed effects; and $\psi_{j(i)\times s(i)}$ are industry-by-state fixed effects. The dependent variable, $\text{Exit}_i = 1$ if (i) the firm disappears from the CMIE Prowess database *and* (ii) a one-to-one match with the Ministry of Corporate Affairs (MCA) registry confirms that the company has been struck off, liquidated, dissolved, amalgamated, or otherwise ceased to file statutory returns. It is set to 0 for all other observations, including firms that drop out of Prowess but remain active in MCA data. Treated_i equals 1 for firm i if QRs are removed on its highest-revenue product and zero otherwise. Columns (1)-(5) progressively add the fixed effects as indicated in the table, while firm age is included in every specification. Robust standard errors clustered at the five-digit industry level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. Sources: CMIE Prowess, administrative data from the Ministry of Corporate Affairs, Government of India and archives of the Ministry of Commerce, Government of India.

pendix A.3), indicating that the intensive-margin effects are not mechanically driven by firm exits. In the next subsection, I formally examine exit dynamics and implement Lee (2009) bounds to address potential concerns about selection.

Firm Exit. I next turn to the extensive margin of firm adjustment, firm exit. Measuring firm exit poses a challenge. Although CMIE Prowess is very detailed in its coverage of financial and product scope data, it was never designed to track firm entry and exit. A company disappears from the panel as soon as CMIE fails to source its annual report, so attrition conflates true firm exit with more mundane lapses in data recording. Several papers, therefore, warn against treating raw Prowess attrition as an exit (Goldberg et al., 2010a; Topalova and Khandelwal, 2011; DeLoecker et al., 2016).

To overcome this limitation, I match Prowess firms with firms in the MCA registry using a 21-digit unique firm identification code called the Company Identification Number (CIN). The CIN is issued to all firms registered under the Indian Companies

Act (1956), and Prowess reports the CIN for all firms. Every firm that vanished from Prowess between 2000 and 2022 is matched to its MCA record from 2021 (the earliest year in which I have access to the MCA registry). I define an indicator $Exit_i$ for firm i, which equals 1 only when the firm both drops out of Prowess and is shown in MCA as struck off, liquidated, dissolved, amalgamated, or otherwise non-filing. All other cases, including "missing" but still-active firms, are entered as zeros. This allows me to test whether there is a higher exit rate in the long run (2000-2022) in product markets that were exposed to QR-removal compared to the control group.

A cross-sectional Poisson regression of $Exit_i$ on the treatment dummy, controlling for firm age, reveals sizable effects of QR-removal on firm exit. Treated sectors face 15-20 percent higher verified exit probabilities, confirming that the contractions documented earlier manifest as extensive-margin churn when competition intensifies. This result is robust to controlling for various fixed effects, such as listed-status, three-digit industry, state, and industry-by-state fixed effects.

In the next section, I explore how firms adapt organizationally in the face of heightened competition, focusing on the turnover of top managerial positions, particularly among family-run firms that opt to bring in professional outside managers.[10]

To address the concern that higher exit rates in treated markets may mechanically bias post-reform estimates among survivors, I implement Lee (2009) bounds. The idea is to equalize selection (survival) rates across treated and control groups and then compute the best- and worst-case treatment effects. Concretely, using my preferred specification in Table 3, column (3), treated sectors have roughly 15 percent higher verified exits; I therefore trim 15 percent of the control group (the higher-survival group) and re-estimate event-study coefficients on the trimmed samples. For example, for the upper bound of the treatment effect on firm revenues, I trim the lowest-revenue control survivors in each event time;for the lower bound, I trim the highest-revenue control survivors. This exercise delivers, respectively, the most and least favorable estimates consistent with monotone selection (treatment weakly increases exit). The resulting bound paths for selected key outcome variables are plotted in Figure A11. The blue and red shaded regions reflect the 95 percent confidence interval bands for the upper and lower bounds of the treatment effect, respectively. While results are only shown for firm revenues, across all panels of Figure 5, profit margins, wage bill, materials, assets, and borrowings, the bounded coefficients follow the same post-reform trajectory as the baseline and remain economically large, confirming that the contractions

[10]Figure A6 in Appendix A.3 reproduces the event study estimates presented in Figure 5 for family firms (i.e., firms that have at least two board members from the founder's family). Out of about 5,000 total firms in the sample, almost half of the firms meet this criterion. The results are qualitatively similar to those presented for the whole sample in Figure 5.

are not an artifact of differential attrition among treated firms. This implementation follows the practical "manual trimming" approach used by McKenzie (2017) to handle attrition.

5.3 Impact of QR Removal on Firm Management

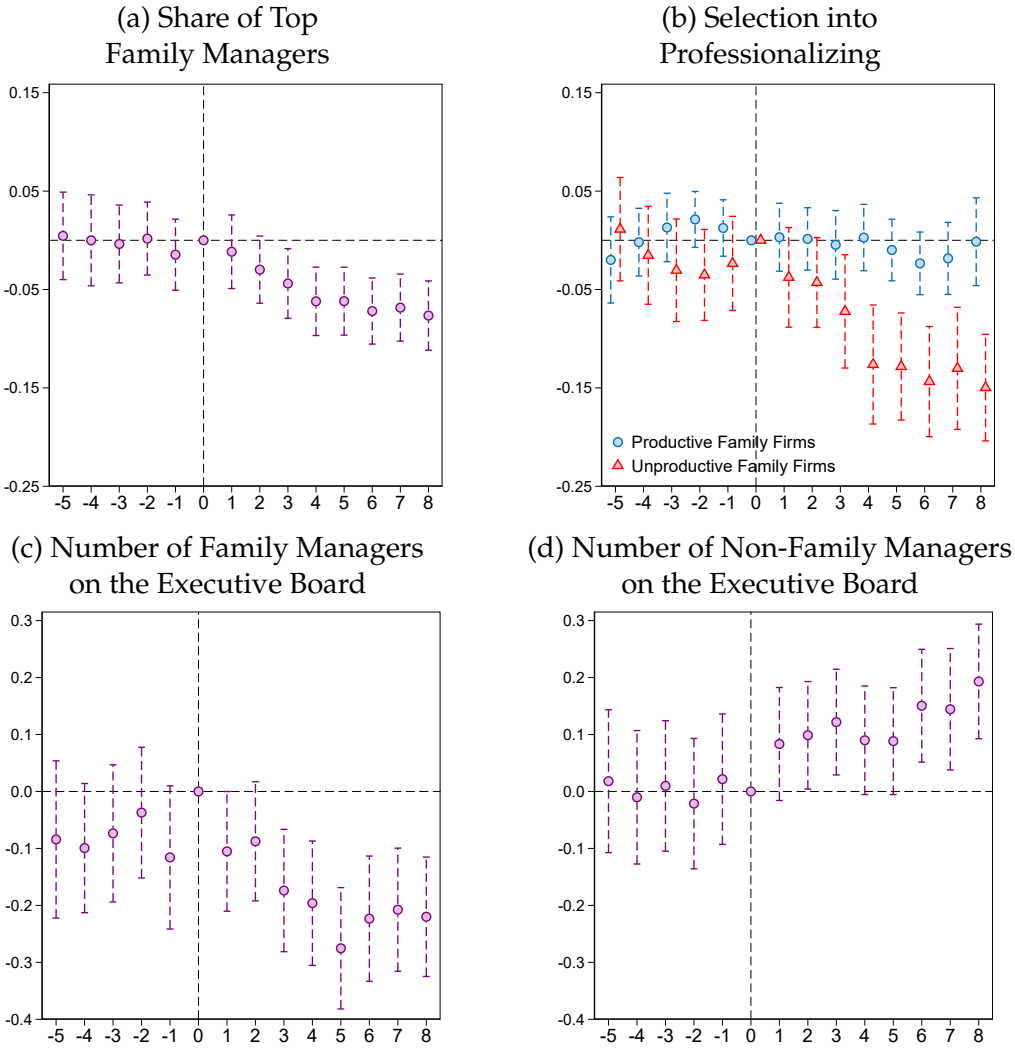
As established in the previous section, the removal of QRs imposed a significant negative shock on the financial health of exposed firms. A natural question follows: what organizational actions did these firms undertake to mitigate the shock? In this paper, I focus specifically on top-management changes, motivated by both theoretical considerations and the empirical regularities documented in the corporate governance and organizational economics literature.

A large body of research demonstrates that negative shocks to profitability and poor firm performance often precipitate the forced or voluntary departures of top executives (Jenter and Kanaan, 2015; Kaplan and Minton, 2011; Parrino, 1997). However, the mechanism of managerial restructuring in the context of family-owned or family-controlled firms differs critically from standard CEO or executive turnover models. In many developing economies, including India, family members frequently occupy the most senior positions, such as CEO, CFO, or Managing Director, irrespective of whether they are the best-qualified individuals to navigate competitive challenges. Such arrangements may be beneficial when family managers possess significant firm-specific knowledge or when they help maintain continuity and trust. Yet, when adverse market shocks arise—in this case, heightened import competition—these same family-oriented hiring practices can become a liability.

Faced with substantial erosion of profitability and revenue, domestically owned family firms may find themselves compelled to reassess the merits of keeping family members in top-level positions. Replacing family managers with external professionals can bring fresh expertise, more experience, access to wider networks, strategic thinking, and managerial skills that are often critical for adapting to intensified competitive pressures. In this study, I capture this phenomenon by looking beyond the traditional turnover measures (e.g., whether the CEO or CFO changes) and instead examine the extent of family involvement in senior management positions and on the executive board of directors.

Figure 6 illustrates these organizational responses and shows how family firms respond to increased import competition by altering the composition of their executive boards. In panel (a), the dependent variable is the *share* of family members on the board, which has a pre-shock control-group mean of 0.60. By the third year after QR removal, this share declines by over 7 percentage points, widening to roughly 8 per-

Figure 6: Firms Reduce Family Members on the Executive Board of Directors after the QR Shock



Notes: The figure plots the estimated θ_k event study coefficients from a regression of the form given in (2) and estimated using the Sun and Abraham (2021) estimator. The coefficients correspond to those in Table A4, columns (1)-(3). The dependent variables are: the share of family members on the executive board of directors of a firm (i.e., top management positions like CEO, CFO, MD, etc.) in panels (a) and (b), the number of family members on the executive board of directors in panel (c) and the number of non-family professionals on the executive board of directors in panel (d). In panel (b), firms are divided into two mutually exclusive groups: first are firms that are in the bottom tercile of pre-policy productivity (shown in red triangles) and second are all remaining firms (shown in blue circles). Productivity (TFPQ) is estimated using the method proposed by Ackerberg et al. (2015). A firm is identified as treated in a year if QRs are removed on its highest-revenue product. θ_0, the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1997 to 2001, with the x-axis labels denoting years relative to the event. All regressions include firm and three-digit industry $\times$ year fixed effects. Standard errors are clustered at three-digit industry $\times$ year level. The vertical lines are the 95 percent confidence intervals. *Source:* CMIE Prowess$_{dx}$, administrative data from the Ministry of Corporate Affairs, Government of India, and archives of the Ministry of Commerce, Government of India.

centage points by the eighth year. In relative terms, these coefficients represent a substantial reduction of about 15 percent in the fraction of family executives at the top.

Panel (b) zooms in on which firms are *most likely* to shed family managers by comparing the bottom tercile of pre-policy productivity (red triangles) to the rest of the sample (blue circles).[11] The figure reveals that *almost all* of the reduction in the share of family members in top managerial roles is driven by firms that were relatively *less productive* before the QR removal. Indeed, these bottom-tercile firms show a pronounced and persistent decline in family share, while higher-productivity firms display little to no change. By the fourth year after QR removal, the share of top family managers in ex-ante unproductive firms declined by about 15 percentage points, almost three times higher than the overall impact for all firms in panel (a). Higher productivity firms showed no such change in their management structure. This pattern implies that the decision to replace family managers with external professionals is more prevalent and extensive among firms that were initially weaker performers. Such selection into professionalization highlights a mechanism through which less-competitive firms may attempt to bolster their managerial capabilities when faced with heightened import competition. As elaborated in Section 6, this finding forms a core basis of my theoretical framework: the firms most in need of improving their productivity are the ones most likely to seek outside talent.

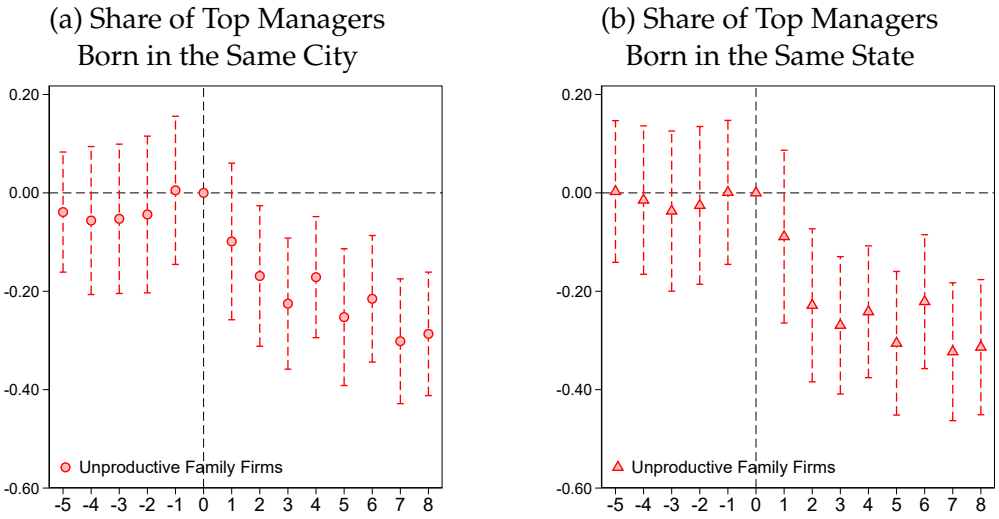
Panels (c) and (d) split the churn in top management into family and non-family managers. Before the shock, the average family firm in the control group had 1.3 family members on its executive board, compared to 0.5 non-family managers. After QR removal, the number of family managers steadily drops, culminating in a decrease of roughly 0.2 by the end of the sample window. Notably, panel (d) shows a nearly mirror-image increase in non-family professionals over the same horizon, pointing to a one-to-one replacement effect. In other words, for every family manager who exits, almost exactly one external professional joins the board.

To confirm that these results are not driven by differential exit in the treatment and control groups, Figure A11, panel (b) shows that even the conservative Lee (2009) lower-bound estimates remain negative and sizable, while the upper bound is more negative. This confirms that the managerial reorganization documented above is not driven by selective attrition but reflects within-firm changes in management and governance.

Figure 7 shows that these organizational changes extend beyond familial ties. The figure plots the evolution of the share of top executives who share the same city (panel a) and the same state (panel b) of birth. Both indicators decline sharply among unproductive family firms following the removal of QRs. These patterns suggest that,

[11] Firm productivity is estimated using the method proposed in Ackerberg et al. (2015).

Figure 7: Firms Reduce Top Managers with the Same Birthplace after the QR Shock



Notes: The figure plots the estimated θ_k event study coefficients from a regression of the form given in (2), estimated using the Sun and Abraham (2021) estimator. The dependent variables are the share of executive board members with the same place of birth in panel (a), and share of executive board members with the same state of birth in panel (b). The sample is restricted to family firms in the bottom tercile of pre-policy productivity. A firm is identified as treated in a year if QRs are removed on its highest-revenue product. θ_0, the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1997 to 2001, with the x-axis labels denoting years relative to the event. All regressions include firm and three-digit industry $\times$ year fixed effects. Standard errors are clustered at the three-digit industry $\times$ year level. The vertical lines are the 95 percent confidence intervals. *Source:* CMIE Prowess$_{dx}$, administrative data from the Ministry of Corporate Affairs, Government of India, and archives of the Ministry of Commerce, Government of India.

alongside a reduction in family management, firms also move away from hiring managers connected through local networks such as caste—dimensions of social proximity that historically shaped recruitment in Indian firms.

Taken together, these results highlight that, under heightened competitive pressure, family-controlled firms do not simply shed family executives but actively seek outside managerial talent to fill vacated positions, reconfiguring the firm's top hierarchy. Professionalization after trade liberalization is not limited to replacing kin; it reflects a broader shift away from taste-based or network-based managerial selection toward more meritocratic, geographically, and socially diverse leadership structures. To the best of my knowledge, this is the first study to show that globalization can trigger deeper changes in organizational structure within firms. An important point of comparison is Chen and Steinwender (2021), which examines how managers, particularly in family firms, exert more effort in response to import competition. My focus is different in that I link a negative trade shock to the *composition* of senior management within the firm.

Such trade-induced changes in corporate culture can be important, particularly in the context of developing countries where family-run firms and business groups are per-

vasive. As highlighted by recent work (Bloom and Van Reenen, 2007; Caliendo and Rossi-Hansberg, 2012; Akcigit et al., 2021), tight family control can constrain a firm's ability to adjust organizational layers or recruit external talent, potentially limiting the firm's capacity to respond effectively to competitive pressures. Bloom et al. (2013) identify weak competitive pressure (for instance, due to protection from imports) and the predominance of family members in top management as major impediments to adopting effective management practices that, in turn, can substantially boost firm performance. By showing that intensified import competition motivates family-owned firms to replace family managers with outside professionals, this paper offers fresh insights into how greater trade openness can reshape a firm's internal governance structure.

These results also speak to broader debates on whether business groups and family ownership in emerging markets facilitate or hinder growth. While such organizational forms may help mitigate imperfect capital markets or reputational frictions (Khanna and Yafeh, 2007), they can also exhibit weaker corporate governance, such as tunneling or underinvestment (Bertrand et al., 2002; Bertrand and Schoar, 2006). The evidence presented here suggests that when faced with an exogenous shock, such as the removal of QRs, family-controlled firms do not necessarily remain locked into potentially suboptimal leadership arrangements. Instead, they appear capable of adopting professional management structures to enhance competitiveness. Thus, the dismantling of protective barriers in India reveals how trade liberalization can catalyze deeper organizational changes, prompting even family-based firms to reconfigure their top management in pursuit of higher productivity and improved performance.

5.4 Impact of QR Removal on the Age Structure of Company Directors

After documenting in Figure 6 that firms rebalanced their executive boards away from family members and toward outside professionals, Figure 8 turns to the entire board of directors and asks *who* exactly is moving. It is the board that ultimately sets oversight, appointments, and strategy; therefore, it is the appropriate level at which to assess governance upgrades. A simple way to see professionalization on the full board is to look at age at the extremes: the young "dynastic apprentices" placed very early in their careers and the old, entrenched patriarchs who linger long after their prime. Panel (a) shows that following the QR removal, the probability that a firm has any director younger than 40 falls sharply by roughly a quarter relative to the pre-policy baseline. Panel (b) shows a corresponding decline in the probability of any director older than 65, albeit with a much smaller magnitude and greater noise.

Because both tails thin out, the second moments are compressed. Panels (c) and (d)

show that both the within-firm age range and variance on the board contract meaningfully post-reform. This is exactly what we would expect if trade pressure trims the young boardroom scions and phases out the emeritus patriarchs, making the age structure of the boards converge toward a tighter, more professionally typical age profile.

Panel (e) corroborates these findings by focusing on the age distribution of resigning directors in treated firms after the policy. The age distribution of resigning family directors is distinctly bimodal, with a spike among the very young and another among the very old. In contrast, in the same firms, the age distribution of resigning professional directors has a unimodal, bell-shaped profile. This pattern lines up neatly with the mechanism: import competition induces family firms to clear out both the junior scions and the long-tenured patriarchs, while professional directors, already staffed from the market, show no such two-hump churn.

A natural question arising from the preceding analysis is: what are the implications of this push toward professionalization for firm productivity? In the following section, I explore this issue in greater detail.

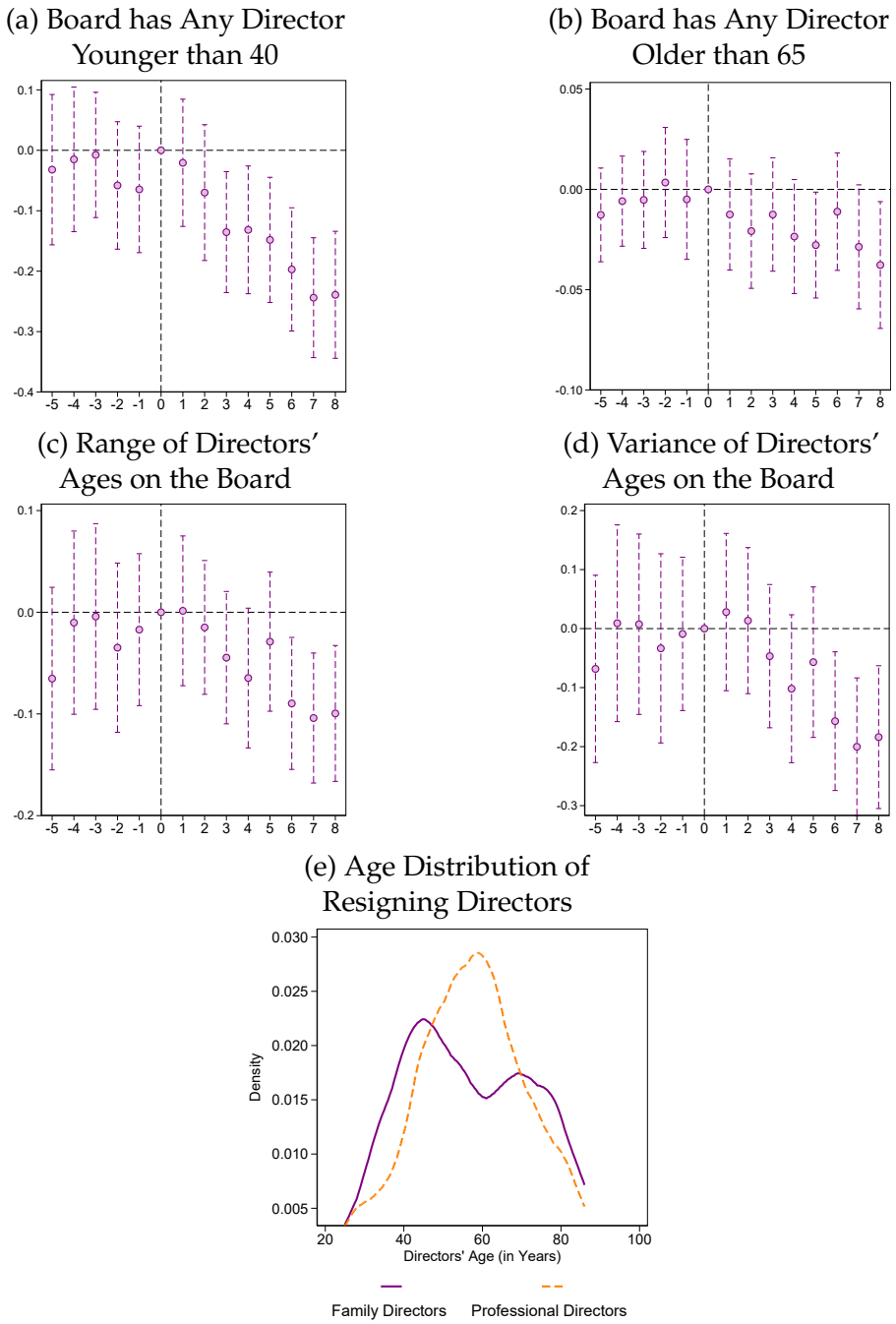
5.5 The Impact of Professionalizing Management

Figure 9 offers indicative evidence that family-controlled firms that *professionalized* their top management—by reducing the share of family members in senior executive roles—enjoyed a greater post-reform boost in productivity relative to those that did not. I classify a firm as having professionalized if its share of family top managers declined between the pre-policy period and the end of the sample window (i.e., by $t = 8$ for the last-treated cohort). Figure 9 presents the event-study estimates from equation 2 separately for each group, focusing on productivity and prices.

Panel (a) in Figure 9 depicts the evolution of TFPQ (estimated following Ackerberg et al. 2015). For *professionalizing* firms (shown in orange triangles), TFPQ begins to diverge positively from zero in the first or second year following the policy and continues to rise thereafter. By contrast, firms that retain family managers (shown in purple circles) show little change in TFPQ. Averaging across all eight post-policy periods, the estimated coefficients imply that TFPQ for professionalizing firms is roughly 35 percent higher than for firms that continue under family management, suggesting that bringing in non-family managers may have facilitated substantial efficiency gains.

It is useful to clarify the relationship between these results and the selection into professionalization, as shown in panel (b) of Figure 6. Figure 6 illustrates that firms selecting into professionalization are predominantly those in the lowest tercile of pre-reform productivity, suggesting a negative selection mechanism. Subsequently, Figure 9 shows that these professionalizing firms exhibit productivity gains. One might mistakenly

Figure 8: Import Competition Prunes Board Age Extremes and Compresses Age Dispersion



Notes: Panels (a) to (d) of this figure plot the estimated θ_k event study coefficients from a regression of the form given in (2) and estimated using the Sun and Abraham (2021) estimator. The dependent variables are: an indicator equal to one if the board has any director younger than 40 years (panel (a)) or older than 65 years (panel(b)), the range of directors' ages on the board in panel (c), and the variance of directors' ages on the board in panel (d). The sample for these event study is baseline family firms, which had at least two family members on the executive board in the pre-policy period. θ_0, the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1997 to 2001, with the x-axis labels denoting years relative to the event. All regressions include firm and three-digit industry $\times$ year fixed effects. Standard errors are clustered at the three-digit industry $\times$ year level. The vertical lines are the 95 percent confidence intervals. Panel (e) shows kernel density estimates of the age distribution of directors who resign from treated firms after the QR removal policy. The solid line represents family directors and the dashed line represents professional directors. For this plot, I consider only those firms which professionalized their management after QR removal, where I classify a firm as having professionalized if its share of family top managers declined between the pre-policy period and the end of the sample window (i.e., by $t = 8$ for the last-treated cohort). *Source:* CMIE Prowess$_{dx}$, administrative data from the Ministry of Corporate Affairs, Government of India, and archives of the Ministry of Commerce, Government of India.

attribute these gains to simple mean reversion, given that the professionalizing firms are initially less productive. However, the regression specification underlying Figure 9 includes firm fixed effects, which absorb any baseline (pre-policy) productivity level differences between firms that professionalize and those that do not. Because the fixed effects remove baseline levels and the pre-event slopes are parallel, simple statistical mean reversion is an unlikely explanation for the post-event gap.

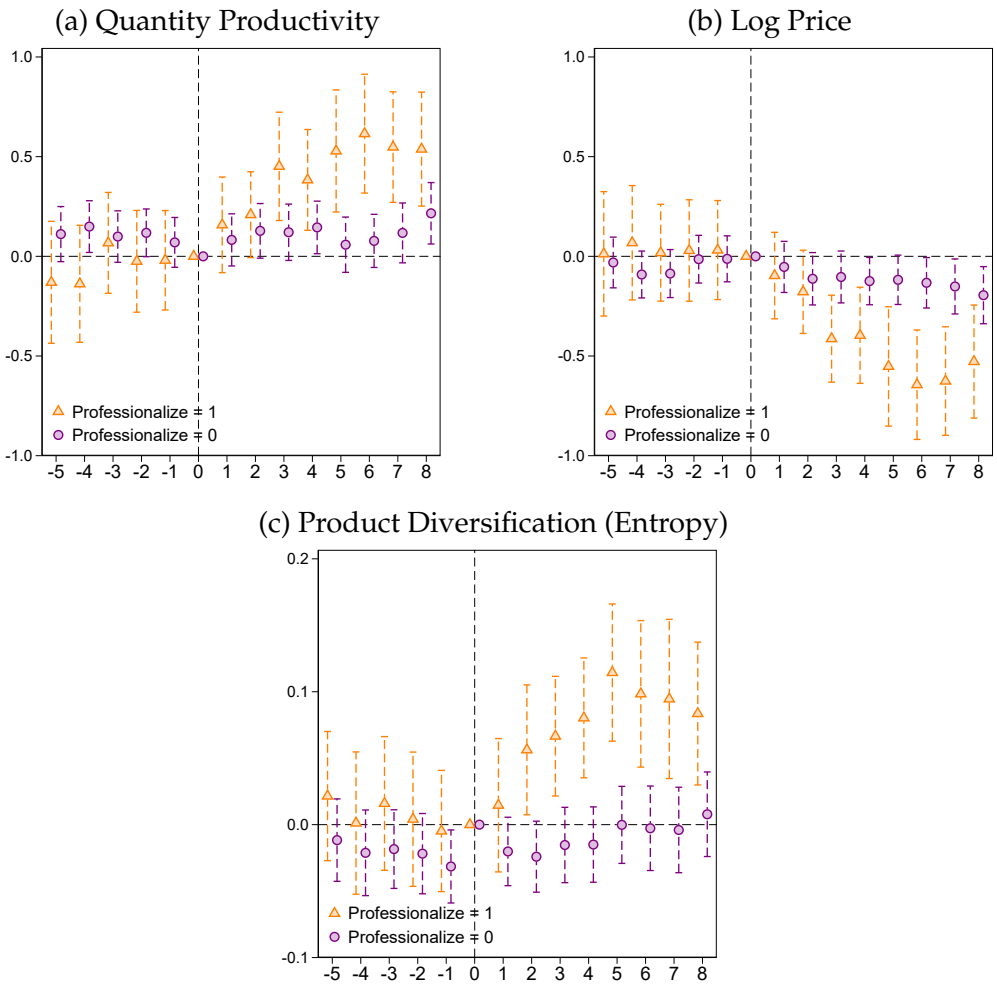
Panel (b) of Figure 9 shows the trajectory of average log prices, defined as the total value of a firm's output divided by the total quantity produced. Among professionalizing firms, prices drop notably after the reform, stabilizing at about 0.5 to 0.6 log points below pre-policy levels. By contrast, the non-professionalizing group exhibits minimal price adjustment. One interpretation is that firms with new (outside) management either implemented efficiency and cost-cutting measures that enabled price reductions or shifted toward lower-priced varieties.

Panel (c) sheds additional light on how these reorganizing firms adjusted their product portfolios. Panel (c) plots an entropy-based measure of product diversification (following Bernard et al. 2011 and Baldwin and Gu 2009). Professionalizing firms exhibit higher product concentration relative to firms that do not professionalize their management. Thus, firms reallocate resources in ways that yield a more concentrated revenue distribution across their product lines, suggesting that in times of higher import competition, firms are forced to focus on their core competencies as in (Bernard et al., 2011).

Overall, these patterns are consistent with the notion that heightened import competition catalyzes a deeper reorganization in firms that actively replace family managers with professional outsiders. The evidence in Figure 9 is inherently suggestive. Firms self-select into professionalization, and not all organizational changes may be captured. Some firms may have other unobserved advantages (e.g., more liquid credit lines and stronger networks) that facilitate the hiring of external managers. These hidden characteristics could shape both the likelihood of professionalization and subsequent performance improvements. Firms may also adapt in ways other than changing their top management, such as changes in mid-level managerial layers, shifts in organizational culture, etc. Nevertheless, the event study results highlight two important themes. First, top-management turnover can be a critical margin of adjustment in response to negative trade shocks. Second, in family-run firms, bringing in external managerial talent appears to correlate with enhanced productivity performance.

Placebo Test: No Productivity Change in Firms Already Professionalized. To verify that the productivity gains documented in Figure 9 are driven by the replacement of family managers, rather than by alternative channels activated by the trade shock, I

Figure 9: Increase in Productivity as Firms Shed Family Members after QR Removal



Notes: This figure presents the estimated θ_k event study coefficients from a regression specified in equation (2) and estimated using the Sun and Abraham (2021) estimator. The dependent variables are quantity productivity (TFPQ) (panel (a)), log price (panel (b)), and product diversification in panel (c). TFPQ is estimated using the method proposed in Ackerberg et al. (2015). Log price is defined as the ratio of a firm's total value of products produced and the total quantity of products produced. Product diversification is measured using an entropy measure based on Bernard et al. (2011); Baldwin and Gu (2009). Entropy is calculated as $\sum_k s_{ikt} \ln(s_{ikt})$, where s_{ikt} represents the revenue share of product k for firm i in year t. Event studies are conducted separately for firms that professionalized their management after QR removal (shown in orange triangles) and those that did not (shown in purple circles). I classify a firm as having professionalized if its share of family top managers declined between the pre-policy period and the end of the sample window (i.e., by $t = 8$ for the last-treated cohort). A firm is classified as treated in a year if QRs are removed on its highest-revenue product. θ_0, the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1997 to 2001, with the x-axis indicating years relative to the event. All regressions include firm and three-digit industry $\times$ year fixed effects. Standard errors are clustered at three-digit industry $\times$ year level. The vertical lines represent 95 percent confidence intervals. *Source:* CMIE Prowess$_{dx}$, administrative data from the Ministry of Corporate Affairs, Government of India, and archives of the Ministry of Commerce, Government of India.

examine the productivity of firms that had *already* professionalized their top management before the policy. If the improvements in Figure 9 were instead caused by trade-related forces unrelated to managerial quality, comparable gains should also appear among these baseline professional firms.

Table A5 in Appendix A.5 reports difference-in-differences estimates for two mutually exclusive groups: *(i) Baseline family firms*, which had at least two family members on the executive board in the pre-policy period, and *(ii) Baseline professional firms*, which had no family members on the executive board. Consistent with the managerial-quality channel, baseline professional firms exhibit coefficients that are small, negative, and statistically insignificant for TFPQ. By contrast, baseline family firms display positive and statistically significant gains in productivity.

The magnitudes for family firms in Table A5 are smaller than those in panels (a) and (b) of Figure 9 because the table includes *all* family firms, i.e., those that maintain family management and those that later professionalize, while Figure 9 focuses exclusively on the subset that *professionalizes* after the reform.

Robustness to Differential Attrition. Finally, I show that the productivity results are robust to the same Lee-bounds exercise. Using the same trimming share (15 percent) implied by Table 3, column (3), I recompute the productivity event studies. In Figure A11, panels (c)(d) (quantity and revenue productivity), the lower-bound (red) estimates remain positive and sizable throughout the post-period, while the upper-bound (blue) estimates are larger, implying that even under the most adverse selection consistent with Lee's monotonicity assumption, surviving treated firms become more productive relative to controls. Hence, the within-firm productivity gains documented in this section are not driven by selection induced by higher exit rates in treated markets.

6 Theory

The economy features L consumers, two sectors, and one factor of production: labor. The first sector produces a homogeneous good with a unit input requirement and serves as the numeraire. The second sector produces a continuum of differentiated varieties under monopolistic competition and increasing returns.

6.1 Preferences

The utility function of the consumers is defined by

$$\mathcal{U} \;=\; X^{1-\alpha}\, Y^{\alpha}, \qquad 0 < \alpha < 1. \tag{3}$$

where X is the homogeneous good and $Y \;=\; \left(\int_{i\in\Omega} y(i)^{\frac{\sigma-1}{\sigma}}\, di\right)^{\frac{\sigma}{\sigma-1}}$ is a composite of differentiated varieties. Ω denotes the set of available varieties in the differentiated goods sector, and $\sigma > 1$ is the elasticity of substitution between any two differentiated varieties.

Let $\mathcal{I}$ denote aggregate income. Then, the Cobb-Douglas preference over X and Y implies that consumers spend $(1-\alpha)\mathcal{I}$ and $E \equiv \int_{i\in\Omega} p(i)q(i)\, di = \alpha\mathcal{I}$ on goods X and Y, respectively. Cost minimization implies that the demand for variety i is given by

$$y(i) = EP^{\sigma-1}p(i)^{-\sigma}. \tag{4}$$

where $P \;=\; \left(\int_{i\in\Omega} p(i)^{1-\sigma}\, di\right)^{\frac{1}{1-\sigma}}$ is the price index.

6.2 Technology

The homogeneous good is produced under constant returns to scale using labor as the only input, with one unit of labor yielding one unit of output. Under perfect competition, this normalizes both the wage rate and the price of the homogeneous good to unity.

In the differentiated goods sector, each firm produces one variety using labor as the only factor, and the production function is given by

$$y = z\ell.$$

where ℓ is labor employed and z is firm productivity. To produce, the firm pays a fixed cost of f, which is incurred in labor units. Firms maximize profits subject to the demand for their product (4), leading to the usual expression that equilibrium prices are a constant markup over marginal cost:

$$p = \frac{\sigma}{\sigma-1}\left(\frac{1}{z}\right) = \frac{1}{\rho z} \tag{5}$$

where $\rho = \frac{\sigma-1}{\sigma}$. This implies that firm profits are given by:

$$\begin{aligned}\pi(z) &= p(z)y(z) - \ell(z) - f \\ &= Az^{\sigma-1} - f,\end{aligned} \tag{6}$$

where $A = \frac{1}{\sigma}\rho^{\sigma-1}EP^{\sigma-1}$ and E denotes the aggregate expenditure in the differentiated goods sector.

6.3 Management Choice

Firms in the differentiated goods sector face a management choice: they can operate as either a family-managed firm or a professionally managed firm. If a firm remains family-managed, its productivity remains fixed at z. Owners of family-managed firms enjoy a *non-monetary private benefit*, $\mathcal{B}$, which is common to all firms. Private benefits measure the non-pecuniary utility that a firm's owner enjoys from running a family firm and keeping the firm's management within the family. For example, a firm owner may derive pleasure if their children or siblings run the firm. Such non-pecuniary returns to specific organizational forms—such as retaining family control or running a small business—have a long tradition in the corporate finance and entrepreneurship literature (Demsetz and Lehn, 1985; Burkart et al., 2003; Bertrand and Schoar, 2006; Hurst and Pugsley, 2011). Firm owners can only enjoy private benefits if the firm is active. If the firm exits, its owner loses all private benefits associated with running the family enterprise.

Firms may choose to professionalize their management by recruiting external executives, thereby accessing a broader talent pool that surpasses the limitations of relying solely on family members. If the firm decides to do so, it loses its private benefit, $\mathcal{B}$, but at the same time, professionalization raises the productivity of the firm to γz (with $\gamma > 1$); therefore, it earns the firm higher *monetary profits*. I assume that, other than losing private benefits, there is no other cost of professionalization.[12]

I assume that professionalization is an absorbing state. That is, once management is professionalized to unrelated managers, the firm cannot regress back to family management. This rigidity in managerial choice captures several real-world frictions that make switching from professional management back to family difficult. Moreover, I do not observe any movement from professional to family management in the data. Pro-

[12] In practice, firms may incur fixed search or hiring costs when professionalizing management and may also need to offer higher wages to attract external managers. However, introducing such costs into the model would not change its qualitative predictions, particularly the result that import competition induces the least productive firms to professionalize. For simplicity, I therefore assume that the only cost of professionalization is the loss of private benefits.

fessional directors are typically bound by contractual commitments and fixed terms, which, along with the enhanced credibility and robust governance structures they provide, significantly boost the firm's market reputation and stakeholder confidence. Moreover, dismantling these established systems would not only disrupt the firm's operations but also risk reputational damage and a loss of investor trust. Together, these factors ensure that once professionalization occurs, the path back to family management is fraught with substantial costs.[13] Therefore, the decision to professionalize depends on its costs and benefits. The advantage of professionalizing management is higher monetary profits due to better management. The cost is forgoing private benefits.

Thus, in this setup, the total payoff to the firm owner from an active firm is the sum of monetary profits, $\pi(z)$, and non-monetary private benefits, $\mathcal{B}$, that the firm owner enjoys only if management is held within the family.

Define an indicator variable $\mathcal{M}$, where $\mathcal{M} = 1$ if the firm professionalizes management and $\mathcal{M} = 0$ if it retains family management. Then the firms' optimal payoff is given by:

$$\text{Firm's payoff} = \begin{cases} \pi(z) + \mathcal{B} & \text{if } \mathcal{M} = 0 \\ \pi(\gamma z) & \text{if } \mathcal{M} = 1 \\ 0 & \text{if the firm exits.} \end{cases} \tag{7}$$

6.4 Firm Entry and Exit

The differentiated goods sector has a mass M_e of potential entrants who pay a fixed cost f_E, in labor units, to enter the market and produce. After paying the fixed entry cost, the firm draws a productivity parameter $z \geq 1$ from a Pareto distribution

$$G(z) = 1 - z^{-k}$$

with $k > 1$ and $k > \sigma - 1$. After drawing z, the firm faces two choices. First, it decides whether to produce or exit. Firms that decide to produce then face the management choice described above. In each period, a firm exits with a constant probability δ.

I assume that firm owners are *hand-to-mouth*, that is, they have no liquid wealth. In each period, a firm must cover its operating costs (including the fixed cost f) from its monetary profits. Because the private benefit $\mathcal{B}$ is non-pecuniary, it provides no

[13] I assume that professionalization is an absorbing state for simplicity. Alternatively, one could introduce a cost κ that is incurred whenever a professionalized firm seeks to revert to family management, which could be disciplined using the observed (and very low) frequency of firms moving from professional to family management. See footnote 14 for more details.

liquidity. Thus, a negative monetary profit (i.e., $\pi(z) < 0$) leaves the firm unable to cover its operating expenses, forcing it to exit. For a firm to operate as a family firm, its productivity must be at least

$$z_f = \left(\frac{f}{A}\right)^{\frac{1}{\sigma-1}} \tag{8}$$

where $\pi(z_f) = 0$.

For firms that have professionalized management, the exit threshold, denoted z_e, is defined by $\pi(\gamma z_e) = 0$:

$$z_e = \frac{1}{\gamma}\left(\frac{f}{A}\right)^{\frac{1}{\sigma-1}} = \frac{z_f}{\gamma} \tag{9}$$

Note that the survival productivity cutoff for family firms is higher than that for firms with professionalized management. This is because firms that professionalize management enjoy a productivity boost of $\gamma > 1$.

6.5 Dual Selection into Professionalizing Management

This setup leads to dual selection into professionalizing management, as shown in Panel (a) of Figure 10. The horizontal axis measures firm productivity, $z^{\sigma-1}$, and the vertical axis reports both the firm's *monetary profits* and its *total payoff* (monetary profits plus non-pecuniary private benefits). The three vertical dashed lines divide the productivity space into four distinct regions that capture how firms decide whether to exit, remain family-managed, or professionalize management. Profits are proportional to $z^{\sigma-1}$, and are denoted in red for family firms and blue for professional firms. The difference in slope between the two profit lines reflects the gains from professionalizing, γ. The total payoffs of family firms are denoted by the golden dotted line and include the non-pecuniary private benefits $\mathcal{B}$, which are measured by the vertical distance between the profit and total payoff lines of family firms.

Professionalization to Survive among Laggard Firms. Between z_e and z_f, firms survive *only* if they professionalize. As the red dashed line (profit without professionalization) remains below zero in this region, these "laggard" firms cannot cover their fixed costs under family management; however, by professionalizing management, they can increase their productivity parameter to γz, thereby generating positive profits. In this

region, firms are compelled to professionalize purely as a survival strategy. I refer to this as *negative selection into professionalizing management* since relatively unproductive firms upgrade their management out of necessity rather than choice. Note that within this region, the magnitude of private benefits $\mathcal{B}$ has no impact on the professionalization decision: firms lose $\mathcal{B}$ whether they exit or professionalize management. The imperative to remain viable thus overrides any preference for family management.

Family Firms. If both $\pi(z)$ and $\pi(\gamma z)$ are positive, a firm chooses the managerial choice that maximizes its total payoff. In the intermediate region $[z_f, z_d)$, it is optimal for the owner to *retain family management*. Even though monetary profits from professionalizing (solid blue line, $\pi(\gamma z)$) are higher than those from running the firm as a family firm (solid red line), they are not large enough to offset the owner's loss of the private benefit $\mathcal{B}$.

Professionalization to Boost Profits among Frontier Firms. Finally, at sufficiently high levels of productivity, firms reach a threshold beyond which firms *professionalize to increase profits* rather than to avoid exit. This decision yields another productivity threshold, z_d, at which the firm is indifferent between remaining a family firm and upgrading its management through professionalization:

$$\begin{aligned} &\pi(z_d) + \mathcal{B} = \pi(\gamma z_d) \\ &\implies z_d = \left(\frac{\mathcal{B}}{f(\gamma^{\sigma-1} - 1)}\right)^{\frac{1}{\sigma-1}} \cdot z_f \end{aligned} \tag{10}$$

Past z_d, the profit increase from γz exceeds the loss of the private benefit. Hence, the blue line representing $\pi(\gamma z)$ lies above the total payoff of retaining family management, the golden dotted line. The thick gray line shows optimal firm payoffs for different levels of productivity.

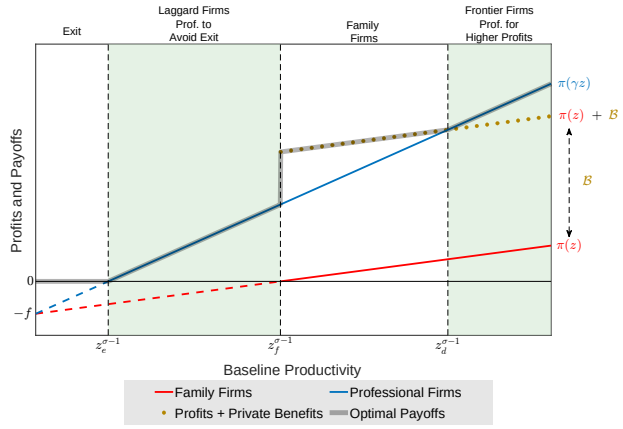
Comparing equations (8) and (10) shows that the parameter restriction required for $z_d > z_f$ is that the non-monetary private benefits from family management are high enough relative to the fixed cost of operation:

$$\frac{z_d}{z_f} = \left(\frac{\mathcal{B}}{f(\gamma^{\sigma-1} - 1)}\right)^{\frac{1}{\sigma-1}} > 1. \tag{11}$$

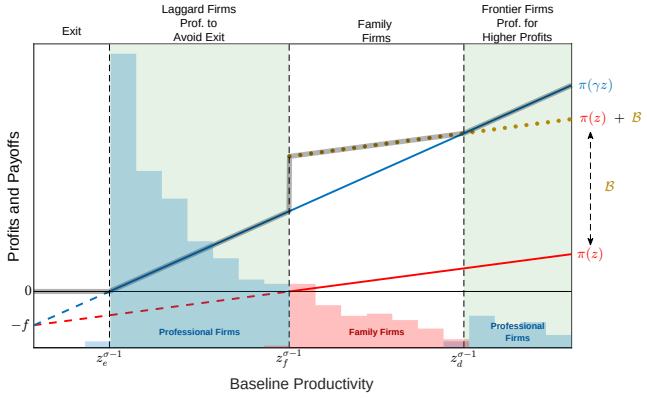
The next two panels of Figure 10 illustrate simulated distributions of firm productivity drawn from a Pareto distribution. Family firms are shown in pink, while profes-

Figure 10: Management Choice

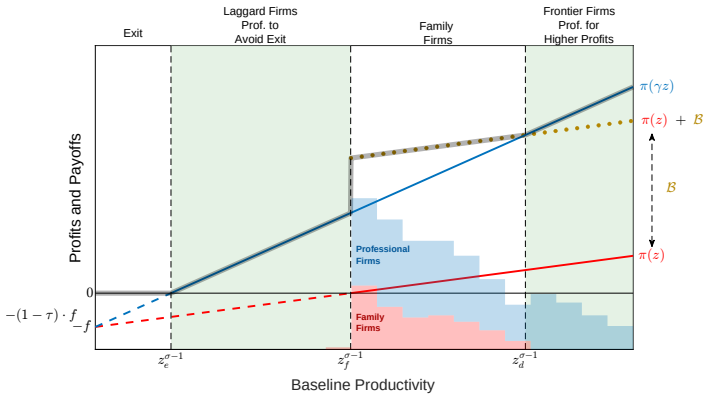
(a) Baseline Equilibrium



(b) Baseline Productivity Distribution



(c) Observed Productivity Distribution



Notes: This figure depicts firm-level profits and payoffs as a function of baseline productivity in the calibrated theoretical model. The red line represents monetary profits for family-managed firms, while the blue line denotes profits for professionally-managed firms. The golden dotted line denotes the sum of monetary profits and the non-monetary private benefits derived by family firm owners. The vertical dashed lines indicate productivity thresholds: z_e (exit threshold), z_f (family-professionalization threshold to avoid exit), and z_d (threshold for professionalization to achieve higher profits). These thresholds divide the productivity space into four distinct regions, corresponding to (from left to right) firm exit, laggard firms professionalizing management to avoid exit, firms retaining family management, and frontier firms professionalizing management for increased profits. Panel (b) superimposes the initial or baseline productivity distribution on this framework. Family firms are colored in red and professional firms are depicted in blue. The realized productivity distribution, observed after firms make their management choices, is depicted in panel (c), demonstrating shifts due to managerial restructuring.

sional firms are depicted in blue. Panel (b) represents the baseline productivity distribution upon firm entry. At this initial stage, firms decide whether to remain family-managed or to professionalize. The distribution features a large mass of initially low-productivity firms opting for professional management to avoid exit, followed by family firms positioned in the intermediate productivity range. Firms with high initial productivity also professionalize, but their choice is driven by the potential for higher profits.

Importantly, the baseline productivity of a firm is not directly observable in the data. Instead, Panel (c) shows the realized or observed productivity distribution, which reflects firm productivity after management choices have been made. After firms make their management decisions, professional firms experience a productivity boost by a factor of $\gamma > 1$. This productivity gain redistributes the initially concentrated mass of lower-productivity professional firms, spreading them across higher productivity levels. Consequently, the observed productivity distribution in the model mirrors empirical findings (see Figure 3 panels (a)-(d)): professional firms exhibit a rightward-shifted size distribution relative to family-managed firms.

6.6 Equilibrium

Equilibrium in the differentiated goods sector. Average profits and the equilibrium price index, P are determined by the free entry condition, which states that the expected value of entry net of the entry fixed cost f_E is zero:

$$[1 - G(z_e)] \frac{1}{\delta} \overline{\pi} - f_E = 0 \tag{12}$$

where $1 - G(z_e)$ is the probability of survival and $\overline{\pi}$ denotes the expected profits among surviving firms, given by

$$\begin{aligned} \overline{\pi} &= \int_{z_e}^{z_f} \pi(\gamma z)\mu(z)dz + \int_{z_f}^{z_d} \pi(z)\mu(z)dz + \int_{z_d}^{\infty} \pi(\gamma z)\mu(z)dz \\ &= \frac{\sigma - 1}{k - \sigma + 1} f \Delta \end{aligned}$$

where $\mu(z) = \frac{g(z)}{1-G(z_e)}$ and $\Delta \equiv 1 + \frac{k}{\sigma-1}\left(\gamma^{\sigma-1} - 1\right)\gamma^{-k}\left(\left(\frac{\mathcal{B}}{f\left(\gamma^{\sigma-1}-1\right)}\right)^{\frac{\sigma-k-1}{\sigma-1}} - 1\right)$.

Substituting expected profits into the free entry condition (12) yields the exit and cutoff:

$$z_e = \left(\frac{1}{\delta f_E} \cdot \frac{\sigma - 1}{k - \sigma + 1} f \Delta \right)^{\frac{1}{k}} \tag{13}$$

which can be combined with (9) and (10) to solve for the remaining thresholds in the model: z_f and z_d.

The equilibrium price index can be solved for by substituting (13) into (9) to obtain

$$P = \frac{1}{\rho \gamma} \left(\frac{\sigma f}{E} \right)^{\frac{1}{\sigma - 1}} \cdot \left(\frac{\sigma - 1}{k - \sigma + 1} \cdot \frac{f}{\delta f_E} \cdot \Delta \right)^{-\frac{1}{k}}. \tag{14}$$

Let M_E denote the mass of entrants and M the mass of active firms, with $M = [1 - G(z_e)] M_E / \delta$ in the stationary equilibrium. Labor is the only factor of production and is used both for production by active firms and to cover the sunk entry cost f_E paid by all entrants. Since payments to labor used in production equal aggregate sector revenue (R) net of operating profits (Π), total labor demand in the differentiated sector (L_Y) satisfies

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

The free-entry condition implies that aggregate operating profits exactly cover aggregate entry costs, $\Pi = w M_E f_E$. Hence, aggregate sector revenue is pinned down by labor supply,

$$R = w L_Y.$$

In a closed economy, goods-market clearing requires that aggregate revenue equals aggregate expenditure on the differentiated sector, $R = E$. With the homogeneous good fixing the numeraire $w = 1$, labor, revenue, and expenditure coincide: $L_Y = R = E$.

Economy-wide equilibrium. The equilibrium characterized above for the differentiated sector is embedded in a standard economy-wide equilibrium. Labor is the only factor of production, and the homogeneous good is produced under constant returns to scale and chosen as the numeraire, which pins down the equilibrium wage at $w = 1$. Free entry implies zero expected profits net of entry costs, so that aggregate operating profits in the differentiated sector are exactly offset by aggregate entry costs. As a result, aggregate income equals the wage bill, $\mathcal{I} = wL$.

Since labor is the only input, sectoral revenue equals payments to labor, labor employed in the differentiated sector satisfies $L_Y = R/w = \alpha L$, while the remaining labor $L_X = (1-\alpha)L$ is allocated to the homogeneous sector.

6.7 Import Competition

This section introduces the import-competition environment used to analyze India's removal of quantitative restrictions (QRs). I adapt an "imports only" thought experiment in Melitz (2018): trade runs in one direction, so domestic firms face new imports but do not access export markets. This is a natural simplifying assumption in my context, both because the QR episode was a unilateral liberalization that primarily increased imports and because Indian manufacturing exports were limited over the period I study. As in the baseline model, I abstract from exporting entirely.

Small open economy restriction and exogenous foreign block. There is a unique trading partner, the rest of the world, denoted by F. I impose a small open economy restriction in the spirit of Demidova and Rodriguez-Clare (2013), where changes in the domestic economy have no repercussions for foreign market aggregates. In particular, the set of foreign varieties available for sale in India, and their delivered prices are taken as exogenous from the perspective of the domestic economy. The only open-economy margin that varies in the policy experiment is the mass of imported varieties.

Timing. To make the short-run comparative static explicit, I introduce time subscripts. Period $t = 0$ denotes the baseline allocation characterized by the stationary equilibrium in Section 6.6. Period $t = 1$ denotes the short-run allocation after import liberalization. The key short-run restriction is that domestic entry is held fixed at its pre-shock level, so the free-entry condition that characterizes the stationary equilibrium at $t = 0$ need not hold at $t = 1$. This captures the idea, emphasized by Melitz (2018), that entry responds with delay in practice, and that trade shocks can generate meaningful short-run reallocations even when long-run entry eventually adjusts.

Preferences, varieties, and the price index with imports. Let $\Omega_{H,t}$ denote the set of active domestic varieties in period t and $\Omega_{F,t}$ the set of imported varieties available to domestic consumers. The CES composite of differentiated varieties is

$$Y_t = \left[\int_{i \in \Omega_{H,t}} y_{H,t}(i)^{\frac{\sigma-1}{\sigma}} \, di + \int_{i \in \Omega_{F,t}} y_{F,t}(i)^{\frac{\sigma-1}{\sigma}} \, di \right]^{\frac{\sigma}{\sigma-1}}.$$

The associated price index is

$$P_t \;=\; \left[\int_{i\in\Omega_{H,t}} p_{H,t}(i)^{1-\sigma}\,di \;+\; \int_{i\in\Omega_{F,t}} p_{F,t}(i)^{1-\sigma}\,di\right]^{\frac{1}{1-\sigma}}.$$

It is convenient to define the domestic and foreign contributions to $P_t^{1-\sigma}$:

$$P_{H,t}^{1-\sigma} \equiv \int_{i\in\Omega_{H,t}} p_{H,t}(i)^{1-\sigma}\,di, \qquad P_{F,t}^{1-\sigma} \equiv \int_{i\in\Omega_{F,t}} p_{F,t}(i)^{1-\sigma}\,di,$$

so that

$$P_t^{1-\sigma} \;=\; P_{H,t}^{1-\sigma} \;+\; P_{F,t}^{1-\sigma}, \tag{15}$$

where

$$P_{H,t}^{1-\sigma} = M_{H,t}\left[\int_{z_{e,t}}^{z_{f,t}} \big(p(\gamma z)\big)^{1-\sigma}\mu_t(z)\,dz \;+\; \int_{z_{f,t}}^{z_{d,t}} \big(p(z)\big)^{1-\sigma}\mu_t(z)\,dz \;+\; \int_{z_{d,t}}^{\infty} \big(p(\gamma z)\big)^{1-\sigma}\mu_t(z)dz\right]$$

$\mu_t(z) = g(z)/(1-G(z_{e,t}))$ is the conditional density of productivity among domestic survivors in period t, and $M_{H,t}$ is the mass of active domestic varieties in period t.

I model the foreign supply of varieties in reduced form. Let $M_{F,t}$ denote the mass of imported varieties available to domestic consumers in period t. Let z_F denote the productivity parameter of foreign producers supplying the domestic market, with survival cutoff $z_{F,e}$ and conditional density $\mu_F(z_F)$. Then the foreign contribution to the domestic price index can be written as

$$P_{F,t}^{1-\sigma} = M_{F,t}\int_{z_{F,e}}^{\infty} \big(p_F(z_F)\big)^{1-\sigma}\mu_F(z_F)\,dz_F.$$

This integral term is taken as fixed from the perspective of the domestic economy.

As in the closed economy, the homogeneous good X is produced under constant returns using labor, is freely traded without costs, and serves as the numeraire. This fixes the wage at $w = 1$ and allows the trade balance to clear through X, so that one-way trade in the differentiated sector is consistent with equilibrium.

Unilateral import competition. I now characterize the short-run impact of unilateral import competition, modeled as an exogenous increase in the mass of imported varieties, $M_{F,t}$, available to domestic consumers. The experiment compares a baseline allocation at $t = 0$ to a short-run post-shock allocation at $t = 1$.

Imports reduce domestic market share and lower the aggregate price index via (15): an increase in the mass of imported varieties from $M_{F,0}$ to $M_{F,1} > M_{F,0}$ raises $P_{F,t}^{1-\sigma}$. A fall in P reduces the composite profitability parameter A, which in turn lowers firm profits, as new imports reduce the market share of domestic firms. As profits shrink, the key productivity thresholds derived in the previous section respond as follows:

(i) **Rise in the Exit Thresholds.** From equations (8) and (9), both z_f (the minimum productivity required for profitable operation under family management) and z_e (the minimum productivity under professionalization) increase when A decreases. Intuitively, each firm's revenues drop, making it more difficult to cover the fixed production costs f. This implies:

- **More exit at the bottom:** As z_e rises, some firms in the lower tail now fall below this new, higher productivity threshold and must exit the market, even if they would have been able to survive under professionalization prior to the shock.
- **More professionalization by laggard firms:** Because z_f also rises, there is a broader range of "laggard" firms whose productivity *as family firms* would no longer cover fixed costs. Such firms must now professionalize to boost productivity to γz in order to avoid exit.

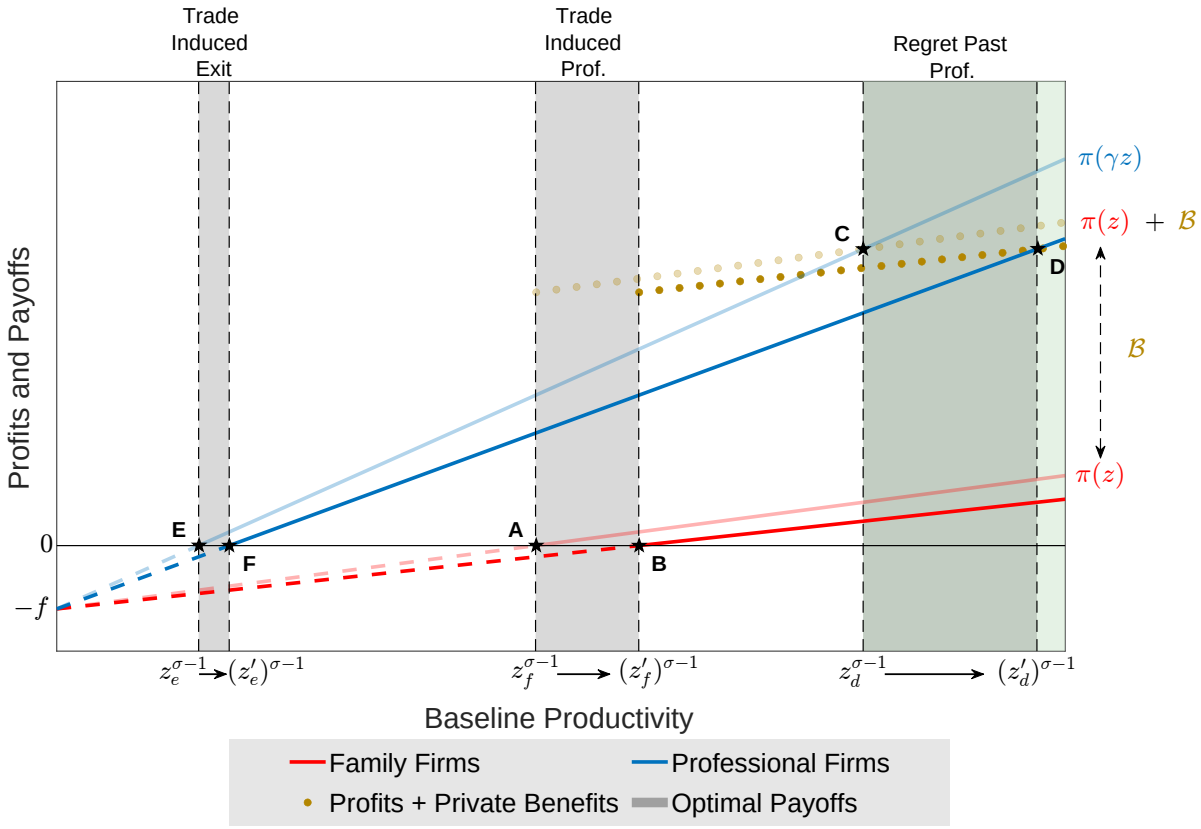
(ii) **Rise in the Frontier Professionalization Threshold.** Turning to equation (10), the cutoff z_d at which a firm is indifferent between retaining family management and delegating (purely to enhance profits) also increases as A falls. In essence, lower market-wide profitability makes the private benefit $\mathcal{B}$ more valuable in relative terms. Some professional firms may, therefore, regret their past professionalization decision. However, recall that a key feature of the baseline model is that professionalization is an absorbing state (Section 6.3). Thus, any firm that is professional in the baseline remains professional after the shock.[14]

[14] I assume that professionalization is an absorbing state for simplicity. Alternatively, one can allow reversion at a cost $\kappa > 0$ that is incurred whenever a professionalized firm seeks to revert to family management, so that reverting yields a payoff of $\pi(z) + B - \kappa$. One convenient formulation is a two-period extension with indicators $\mathcal{M}_t \in \{0, 1\}$:

$$\pi(z, \mathcal{M}_0, \mathcal{M}_1) = \mathcal{M}_1 \cdot \pi(\gamma z) + (1 - \mathcal{M}_1)\big[\pi(z) + B - \kappa \mathcal{M}_0\big].$$

When κ is large, this reversible formulation approximates the absorbing-state case, so the import-competition comparative statics generate negligible switching back. In principle, κ can be disciplined using the observed (virtually zero) frequency of moves from professional to family management in the

Figure 11: The Impact of Import Competition on Firm Management and Productivity



Notes: This figure illustrates firm-level responses to import competition, modeled as a comparative static resulting from a decrease in market demand. The original profit and payoff lines for family-managed firms (red), professionally-managed firms (blue), and non-monetary private benefits (golden dotted line) are now affected by the decrease in market demand. For family-managed firms, lower profits shift the exit threshold from z_f to z_f'. Similarly, the professional firms' exit threshold moves from z_e to z_e'. Additionally, the productivity threshold for frontier firms considering professionalization for higher profits increases from z_d to z_d'. Importantly, due to professionalization being an absorbing state, firms that previously professionalized but now find themselves below z_d' experience regret of past professionalization but cannot revert to family management.

Figure 11 illustrates the heterogeneous responses of firm profits to the import competition shock induced by the removal of quantitative restrictions (QRs). The dashed lines indicate pre-shock profit levels, while solid lines represent post-shock profits. Panel (a) shows that for low-productivity 'laggard' firms, the import competition shock significantly reduces profits below their pre-shock levels, compelling these firms to delegate management to external professionals as a survival strategy. Panel (b) depicts that for high-productivity 'frontier' firms, lower profits following the shock reduce the appeal of professionalization relative to private benefits.

6.8 Comparing Model Predictions with Empirical Evidence

The comparative-statics results of the previous section suggest that a unilateral trade shock—modeled here as an exogenous increase in foreign varieties that lowers the aggregate price index P—leads to two central predictions about professionalization

data, which implies a high κ.

among domestic firms:

(i) Exit and "negative-selection" professionalization rise for laggard firms.

(ii) Professionalization becomes less attractive for frontier firms.

These predictions align closely with the empirical results shown in Section 5, where the removal of quantitative restrictions (QRs) in India increased import competition and generated new incentives for organizational change in domestic firms. Below, I highlight how the main findings map to the theoretical comparative statics:

A Rise in Professionalization among Laggard Firms. Figure 6 documents that, after the removal of QRs, there is a notable decline in the share of family members occupying top executive positions. Moreover, panel (b) in Figure 6 clarifies that this *aggregate* shift is driven almost entirely by firms in the *bottom tercile of pre-policy productivity*. This selection pattern is precisely the "negative selection into professionalization" mechanism described in the model: less-productive firms, i.e., those closest to the family-firm exit threshold (z_f), are the ones that restructure their top management in order to boost productivity and mitigate the profitability shock. In short, the firms whose survival is most imperiled by rising foreign competition are precisely the ones that replace family managers with external professionals. The fact that the total number of professionalized firms increases, while highly productive incumbents *do not* systematically shift from family to professional management, confirms that it is predominantly the negative-selection professionalization margin that shapes the new equilibrium under unilateral trade liberalization.

No Change in Professionalization among Frontier Firms. As discussed in the previous section, import competition makes professionalization less appealing for frontier firms. As heightened competition reduces overall profitability, the private benefit $\mathcal{B}$ looms larger in the firm's payoff calculation, making the incremental profit gains from professionalization insufficient to justify forgoing family control. In the data, there is little evidence that the most productive firms respond to the shock by reversing professionalization. Empirically, higher-productivity enterprises do not show any change in the share of family members on the executive board (Figure 6(b)). This is indicative of the high cost of switching back from professional to family management.

6.9 Alternative Mechanisms

In the model, import competition operates by altering the private-benefit trade-off that sustains family management. This section examines alternative channels, including

contracting frictions and the monetary costs of professionalization, and shows that they either predict counterfactual selection or fail key empirical tests.

Contracting Frictions and Trust. An extensive literature on family firms emphasizes contracting frictions and trust as key reasons why family ownership and management might be optimal, particularly in economies with weak judicial capacity and inadequate contract enforcement. While contracting frictions are important for understanding the origins of family firms, they are unlikely to explain why family firms professionalize their management in response to import competition.

To formally examine the impact of contracting frictions within my model, I introduce an exogenous wedge, τ, that represents the proportion of a firm's operating profits expropriated by professional managers. This wedge captures contracting frictions in a simple, reduced-form manner and can be interpreted as reflecting the quality of judicial and administrative state capacity in a country. A higher τ implies greater expropriation and poorer judicial quality. Thus, the firm's payoffs are given by

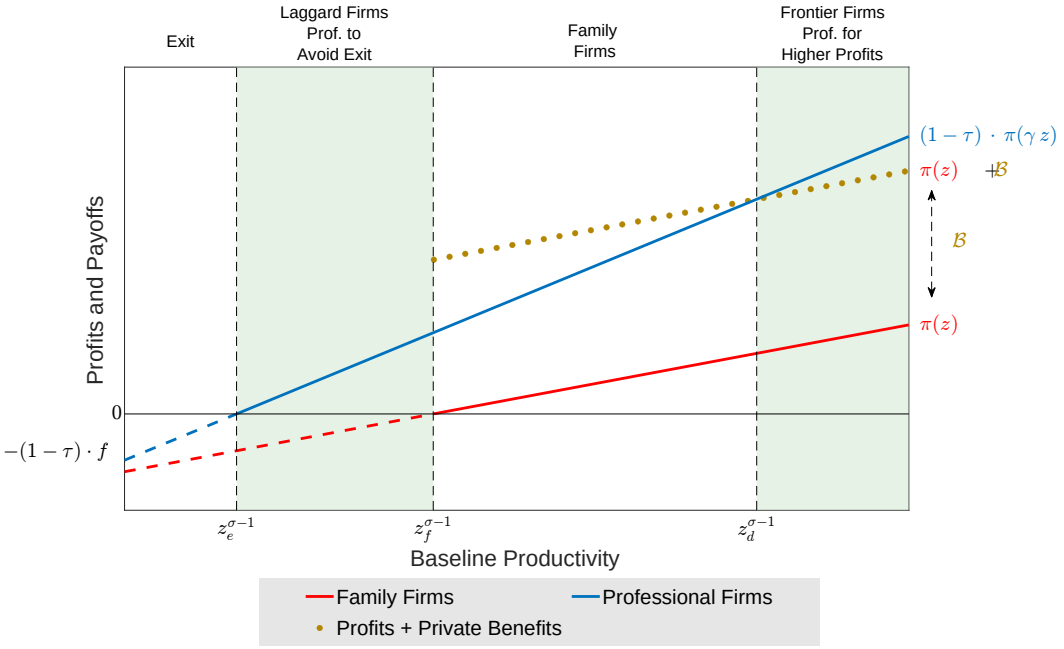
$$\text{Firm's payoff} = \begin{cases} Az^{\sigma-1} - f + \mathcal{B} & \text{if } \mathcal{M} = 0 \\ (1-\tau) \cdot A(\gamma z)^{\sigma-1} - f & \text{if } \mathcal{M} = 1 \\ 0 & \text{if firm exits} \end{cases}$$

First, it is crucial to recognize that import competition alone is unlikely to directly affect institutional features, such as judicial state capacity, which underpin contracting frictions. Such institutional frameworks typically exhibit inertia and are unlikely to change materially due to trade policy. Nevertheless, for completeness, I consider the hypothetical scenario in which trade liberalization reduces contracting frictions. For instance, one might argue that import competition could indirectly ease input procurement frictions, thereby reducing overall contracting costs. Even if this were plausible, which is doubtful in the context of my trade shock that primarily targeted consumer goods, Figure 12 demonstrates that such a reduction in contracting frictions cannot qualitatively explain my empirical findings.

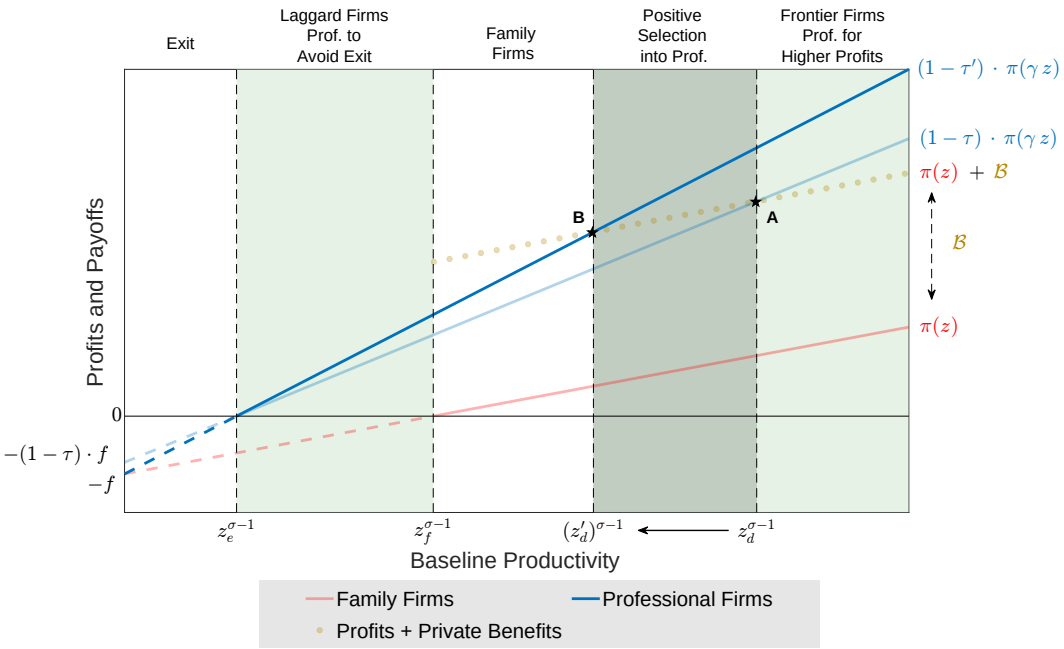
Panel (a) of Figure 12 depicts firm profits under high contracting frictions ($\tau = 0.2$). In this setting, the profit curve for professionally managed firms is rotated downward, reflecting the losses due to expropriation by professional managers. Panel (b) illustrates the scenario in which import competition reduces contracting frictions by setting τ to zero. This reduction increases the slope of the professional firms' profit line, shifting the intersection with the total payoff of family firms from point A to point B. Consequently, more firms find it optimal to professionalize management due to the increased net benefit after accounting for lower contracting frictions.

Figure 12: Contracting Frictions

(a) High Contracting Frictions: $\tau = 0.2$



(b) Zero Contracting Frictions



Notes: This figure examines the theoretical implications of contracting frictions on firm-level management choices. Panel (a) illustrates firm profits and payoffs in an economy with high contracting frictions, represented by an expropriation wedge ($\tau = 0.2$) on the profits of professionally managed firms. The red line denotes monetary profits for family-managed firms, the blue line depicts profits for professionally managed firms subject to expropriation, and the golden dotted line represents non-monetary private benefits for family firms. Panel (b) considers a scenario where import competition hypothetically reduces contracting frictions (τ reduced to zero). This shifts the professional firms' profit curve upward, effectively increasing the profitability of professionalization relative to family management.

However, this reveals an important discrepancy with the empirical results. Such a reduction in contracting frictions predominantly induces the most productive firms, i.e., those between the original professionalization threshold z_d and the new threshold z'_d, to professionalize. Empirically, however, Figure 6 panel (b) clearly demonstrates that it is the least productive firms that professionalize in response to import competition. Thus, even under the scenario of reduced contracting frictions, the qualitative pattern of firm selection into professionalization observed in the data cannot be replicated.

This section highlights that incorporating contracting frictions alone does not *qualitatively* explain the empirical patterns of managerial professionalization following increased import competition. Appendix A.7 discusses the direction of bias in parameter estimates and *quantitative* results if the true model featured $\tau > 0$ and finds that the model's current specification likely yields a conservative lower bound for the within-firm contribution to aggregate productivity gains from trade discussed in the next section. Specifically, ignoring contracting frictions leads to a downward bias in the estimated productivity gains from professionalizing, $\hat{\gamma}$, because the model must rationalize lower observed professional revenues by underestimating managerial efficiency. Simultaneously, the model overestimates the fixed operating cost, $\hat{f}$, which artificially pushes marginal 'laggard' firms to exit rather than professionalize during a trade shock. Finally, while the resulting upward bias in private benefits, $\hat{\mathcal{B}}$, distorts the initial mass of family firms, it does not alter the fundamental incentive for laggard firms to professionalize, as these non-pecuniary benefits are lost regardless of whether the firm exits or upgrades its management. In future work, I plan to structurally incorporate contracting frictions, as outlined here, estimating the parameter τ at the state level in India using an instrumental variables approach similar to Boehm and Oberfield (2020).

Monetary Fixed Costs of Professionalizing. Another plausible mechanism influencing firms' managerial decisions is the presence of monetary fixed costs associated with professionalizing management. Such costs might include search expenses incurred while identifying suitable external managers, hiring transition costs, training and integration costs for new managers, and potential disruptions during organizational restructuring.

In principle, monetary fixed costs, by their very nature, constitute a barrier to managerial transitions. Thus, higher monetary fixed costs would *reduce* firms' incentives to professionalize their management, especially following a negative profitability shock, such as intensified import competition. The empirical findings documented in Section 5 run contrary to this straightforward intuition. This implies that monetary fixed costs alone, as an isolated mechanism, cannot rationalize the key empirical regularity documented in this paper, that less productive, family-managed firms professionalize in

response to increased import competition. Future work aims to explicitly integrate and estimate these monetary fixed costs in the structural model.

Professionalization with Partial Private-Benefit Retention. In the baseline model, I abstracted from residual tunneling by setting the private-benefit flow to zero once a firm hires professional managers. In this section, I discuss the implications of this simplifying assumption by allowing the founder to retain a fraction $\lambda \in (0,1)$ of the per-period private benefit $\mathcal{B}$. Under family management, the owner's payoff remains $\pi(z) + \mathcal{B}$; under professional management, it becomes $\pi(\gamma z) + \lambda\mathcal{B}$, so the incremental private-benefit loss is only $(1-\lambda)\mathcal{B}$. The indifference condition that pins down the "frontier" productivity cut-off therefore generalizes from

$$\pi\left(\gamma z_d\right) = \pi\left(z_d\right) + \mathcal{B} \quad \Longrightarrow \quad z_d^{\text{baseline}} = \left[\frac{\mathcal{B}}{f\left(\gamma^{\sigma-1}-1\right)}\right]^{\frac{1}{\sigma-1}} z_f$$

to

$$\pi\left(\gamma z_d\right) = \pi\left(z_d\right) + (1-\lambda)\mathcal{B} \quad \Longrightarrow \quad z_d(\lambda) = \left[\frac{(1-\lambda)\mathcal{B}}{f\left(\gamma^{\sigma-1}-1\right)}\right]^{\frac{1}{\sigma-1}} z_f$$

Because $(1-\lambda)\mathcal{B} > 0$ as long as $\lambda < 1$, the cut-off $z_d(\lambda)$ is finite and strictly decreasing in λ. Hence, firms still professionalize only when productivity is high enough for the profit gain $\pi(\gamma z) - \pi(z)$ to compensate for the remaining private-benefit loss.

All key comparative statics follow unchanged: (i) the negative-selection region $\left[z_e, z_f\right)$ is unaffected because firms there would exit if they did not professionalize, and private benefits drop out of the payoff comparison; (ii) the share of professional firms still rises when trade lowers A; and (iii) the model's aggregate-productivity implications remain intact, with $z_d(\lambda)$ entering the same closed-form expressions that drive the quantitative results in Sections 6 and 7. Although the qualitative selection results remain intact, setting $\lambda > 0$ will shift the calibrated cut-offs and therefore the quantitative outcomes of the structural estimation; incorporating this richer specification is a priority for future work.

This extension also directly speaks to the corporate finance evidence that professional CEOs seldom completely eliminate tunneling (La Porta et al., 1999; Burkart et al., 2003). By allowing $\lambda > 0$, the model admits precisely this coexistence of improved management and residual private benefits; yet, it shows that any reduction in tunneling, no matter how partial, is sufficient to generate the dual selection pattern and the trade-induced productivity gains that the paper documents.

Beyond the Binary: A Continuous Professionalization Choice. The model delivers similar insights if I let the owner choose a degree of professionalization $d \in [0,1]$. A higher d simultaneously (i) raises operating productivity through a concave multiplier $\varphi(d)$ with $\varphi'(d) > 0 > \varphi''(d)$ and (ii) lowers private benefits through a convex loss $\mathcal{B}(d) > 0$ with $\mathcal{B}'(d) < 0 \leq \mathcal{B}''(d)$. The owner, therefore, maximizes

$$U(d) = \varphi(d) A z^{\sigma-1} - f + \mathcal{B}(d)$$

The interior optimum $d^\star(z, A)$ is characterized by the first-order condition

$$\varphi'\left(d^\star\right) A z^{\sigma-1} + \mathcal{B}'\left(d^\star\right) = 0, \quad \varphi''\left(d^\star\right) A z^{\sigma-1} + \mathcal{B}''\left(d^\star\right) < 0$$

so that $\partial d^\star / \partial A > 0$ by the implicit-function theorem: tougher product-market conditions induce more delegation on the intensive margin.

Crucially, the corner predictions of the binary model re-emerge naturally. When an import competition shock (a fall in market demand, A) threatens survival, the firm jumps to the lowest d such that $\varphi(d) A z^{\sigma-1} = f$; all firms with productivity $z \in \left(z_e, z_f\right)$ therefore "delegate to avoid exit,", exactly as before. Likewise, high-z frontier firms still delegate further whenever the marginal profit gain exceeds the marginal private-benefit loss, so the dual selection pattern and all comparative-static results carry through unchanged.

This continuous formulation also addresses the tunneling consideration: because $\mathcal{B}(d)$ is strictly decreasing, the founder always retains some private benefits, and the effective loss $\Delta\mathcal{B} = \mathcal{B}(0) - \mathcal{B}\left(d^\star\right)$ is endogenously determined by the optimal $d^\star$. In other words, residual tunneling is built into the model instead of being imposed ex-post. Quantitatively, introducing d will alter the calibrated cut-offs and elasticities, but only through the estimated shape of $\varphi(\cdot)$ and $\mathcal{B}(\cdot)$, a refinement I plan to incorporate in the forthcoming structural estimation.

7 Identification and Estimation

The model features five structural parameters

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

where σ is the constant elasticity of substitution across varieties, f is the fixed operating cost, k is the Pareto-shape parameter governing firm heterogeneity, $\gamma > 1$ measures the

productivity gain realized when a family firm professionalizes its management, and $\mathcal{B}$ measures the non-pecuniary benefit that founders derive from retaining family management. I fix the σ exogenously based on the literature and calibrate the remaining moments by minimizing the distance between a small set of model moments and their empirical counterparts.

Following the existing literature, σ is set at 4, which aligns with estimates commonly used for India (Hsieh and Klenow, 2009, 2014; Fan et al., 2023).

Pareto shape parameter, k. To calibrate the Pareto shape parameter k, I employ the methodology proposed by Head et al. (2014), who suggest estimating k by matching the slope of the empirical size distribution in the upper tail of firm revenues.

Firms are first ranked by total sales. For each observation, I compute the transformed rank as:

$$\mathsf{rank}_i \;=\; -\ln(1-F_i),$$

where F_i is the empirical cumulative distribution function (CDF) of log total sales. Head et al. (2014) show that, when sales follow a Pareto distribution, regressing log sales on rank_i for sufficiently high percentiles yields a slope $\hat{\beta}$ that maps to the shape parameter through

$$k \;=\; \frac{\sigma-1}{\hat{\beta}}.$$

Applying this method to my data for the top 5 percent of firms and using the standard CES elasticity $\sigma = 4$ yields an estimate of $\hat{k} = 3.47$. Re-estimating this slope using progressively tighter cutoffs (from the 96th to the 99th percentiles) produces consistent estimates ranging between 3.40 and 3.60. Additionally, alternative transformations (such as a log-normal benchmark) do not significantly alter the point estimate. Given this robustness, I set $k = 3.5$ for my calibration.

The remaining parameters, $\gamma, \mathcal{B}$ and f, are pinned down jointly by matching a parsimonious set of empirical moments that summarize the management and exit choices of the firm. While these three parameters are estimated jointly, I provide the intuition for identification and discuss which moment is the most informative about each of the parameters below.

Firm Management: Identifying $\mathcal{B}, \gamma$. The parameter $\mathcal{B}$ directly affects the payoffs of family firms and is identified using the observed share of family firms in the Indian economy. Panel (a) of Figure 10 illustrates how increasing $\mathcal{B}$ expands the region between productivity thresholds z_f and z_d, in which firms choose to retain family management. A higher $\mathcal{B}$ increases the threshold productivity z_d, indicating that firms with

higher private benefits require greater monetary incentives to switch to professional management.

The parameter γ is identified by the difference in average monetary profits between family and professional firms. Panel (a) of Figure 10 further demonstrates how a higher γ directly boosts the profits of professional firms, leaving family firms' profits unchanged. Thus, this moment clearly isolates the productivity gain realized by firms when transitioning to professional management.

Fixed operating cost, f. The main identifying challenge in estimating f is that the CMIE Prowess data is not suited to measure firm entry and exit (see also the discussion in Section 5). Therefore, I do not use exit rates directly as calibration targets. Instead, I identify the fixed operating cost parameter, f, using the share of firms that exhibit negative profits in the data, which captures how many firms are close to the zero-profit threshold. This moment serves as a proxy in the absence of reliable exit counts in Prowess. Note that in the model, active firms cannot operate with $\pi < 0$, so $\Pr[z < z_e]$ reflects the mass of entrants that immediately draw productivity below the survival threshold and thus exit. In the data, I approximate this exit margin using the share of firms that report negative accounting profits. This proxy is motivated by two considerations. First, in steady state, the mass of firms drawing $z < z_e$ each period equals the observed flow of exits. Second, firms in practice often post accounting losses for some years before formally exiting, so the prevalence of loss-making firms provides an informative measure of the relevant exit margin.

7.1 Estimation Routine

As described above, σ is fixed at 4 and the Pareto shape parameter, k, is calibrated to 3.5 by matching the slope of the empirical size distribution in the upper tail of firm revenues. Conditional on fixing these parameters, $\gamma, \mathcal{B}$ and f are jointly estimated by minimizing the distance between the three model moments and their empirical counterparts described above.

Let $\mathcal{M}_E$ denote the set of empirical moments constructed from firm level data. For any candidate vector $\vartheta = (\sigma, f, k, \gamma, \mathcal{B})$, all the model moments have analytical solutions (see appendix A.6). Therefore, each equilibrium evaluation reduces to solving closed-form expressions for the productivity cut-offs, ensuring rapid convergence and precision in parameter estimation. Denote this vector of model moments by $\mathcal{M}_M$. Then, the parameters are chosen to minimize the quadratic loss given by

$$SSR(\vartheta) = \sum_j \left[\mathcal{M}_E(\text{data}) - \mathcal{M}_M(\vartheta)\right]^2,$$

subject to $\gamma \geq 1$, $f \geq 0$, and the feasibility condition that the exit threshold for family firms exceeds that for professional firms (11). Because each equilibrium evaluation reduces to closed-form expressions for the productivity cut-offs, convergence is rapid.

7.2 Estimated Results

Table 4 summarizes the results of the structural estimation procedure, presenting both the targeted empirical moments and the corresponding moments generated by the calibrated model, along with the parameter values themselves. The model-generated moments closely match their empirical counterparts. Specifically, the share of family firms, the average revenue gap between family and professional firms, and the share of firms exhibiting negative profits are precisely replicated by the model.

Turning to the magnitudes of the key estimated parameters, the productivity gain from professionalizing management, γ, is estimated to be approximately 1.23. This value is notable because it closely aligns with independent empirical findings presented earlier in Figure 9. Additionally, the estimated non-pecuniary private benefit of retaining family management, $\mathcal{B}$, is around 0.06. To interpret this magnitude, consider that average profits in the model economy are roughly three times this estimate, underscoring that family owners place substantial value on maintaining family management despite the clear potential for higher monetary returns from professionalization. This magnitude highlights the significant role that non-monetary preferences play in shaping firm governance structures, particularly in economies dominated by family-managed businesses.

7.3 Aggregate Importance of Professionalizing Management

To quantify the aggregate importance of professionalizing management, I conduct a policy experiment within the calibrated model. Specifically, I simulate an increase in the mass of foreign varieties that raises the import-to-GDP ratio from 8 percent in 1995 (pre-QR removal) to 25 percent in 2005 (post-QR removal) and trace the economy's transition from the baseline equilibrium at $t = 0$ to the new short-run post-shock allocation at $t = 1$ to evaluate the aggregate consequences.

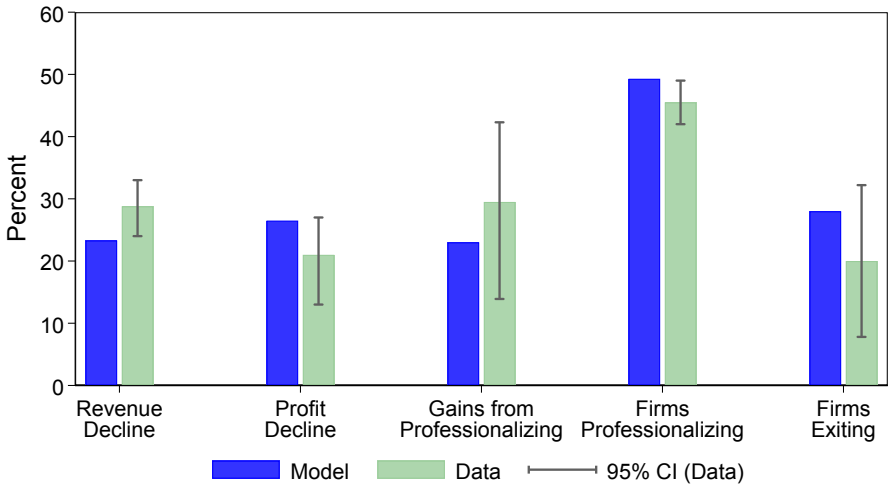
Figure 13 evaluates how well this simulation reproduces the empirical responses of firms to import competition documented in Section 4. The estimation strategy does not target these moments directly; rather, the model is entirely disciplined by pre-

Table 4: Estimated Parameters

Parameter	Interpretation	Target	Moments		Estimated Value
			Data	Model	
$\mathcal{B}$	Private benefits of family management	Share of family firms	0.283	0.283	0.06
γ	Gain from professionalizing management	Difference in mean log revenue between family and professional firms	1.829	1.829	1.23
f	Fixed cost of operation	Share of firms with negative accounting profits	0.216	0.216	0.03
k	Pareto shape parameter	Slope of upper tail (Head et al., 2014)	-	-	3.5
σ	Elasticity of substitution	Externally calibrated	-	-	4

Notes: This table summarizes the calibration of the model parameters. Parameters are calibrated using data from CMIE Prowess and the methodology outlined in the text. The elasticity of substitution, σ, is fixed at following existing estimates for India. The Pareto shape parameter, k, is estimated by matching the slope of the empirical size distribution in the upper tail of firm revenues as per Head et al. (2014). Parameters $\gamma, \mathcal{B}$, and f are jointly calibrated by minimizing the distance between model-generated moments and their empirical counterparts.

Figure 13: Comparison of Model and Data Estimates



Notes: This figure compares model-predicted and empirical estimates of firm-level responses to import competition. The figure presents five key outcomes: (1) "Revenue Decline" shows the percentage decrease in firm revenues following QR removal; (2) "Profit Decline" measures the percentage reduction in operating profits; (3) "Gains from Professionalizing" captures the productivity improvement (TFPQ) among firms that replaced family managers with professional managers; (4) "Firms Professionalizing" indicates the share of family firms that reduced their proportion of family managers on executive boards; and (5) "Firms Exiting" represents the share of firms that exited the market. Model estimates (shown in blue) are derived from simulating a reduction in aggregate market demand implied by an increase in the mass of foreign varieties required to raise the import-to-GDP ratio from 8 percent in 1995 (pre-QR removal) to 25 percent in 2005 (post-QR removal). Data estimates (shown in green) correspond to the estimated θ_k event study coefficients from a regression of the form given in (2). For data estimates, vertical lines represent 95 percent confidence intervals based on standard errors clustered at the three-digit industry $\times$ year level. *Source:* CMIE Prowess and Ministry of Corporate Affairs, Government of India.

liberalization cross-sectional data, and the comparative static exercise is informed by matching the increase in the import-GDP ratio in India after the removal of import restrictions. Therefore, the goal of this exercise is to provide an external validation of the model's ability to account for observed firm-level adjustment patterns. The figure shows that the simulated model aligns closely with the data. The first two sets of bars show the average decline in firm revenues and profits across all post-reform years ($t = 1, \ldots, 8$) following the removal of QRs. These declines—approximately 28 percent for revenues and 21 percent for profits (see panels (a) and (b) of Figure 5)—closely match the model's corresponding predictions of 23 percent and 26 percent, respectively.

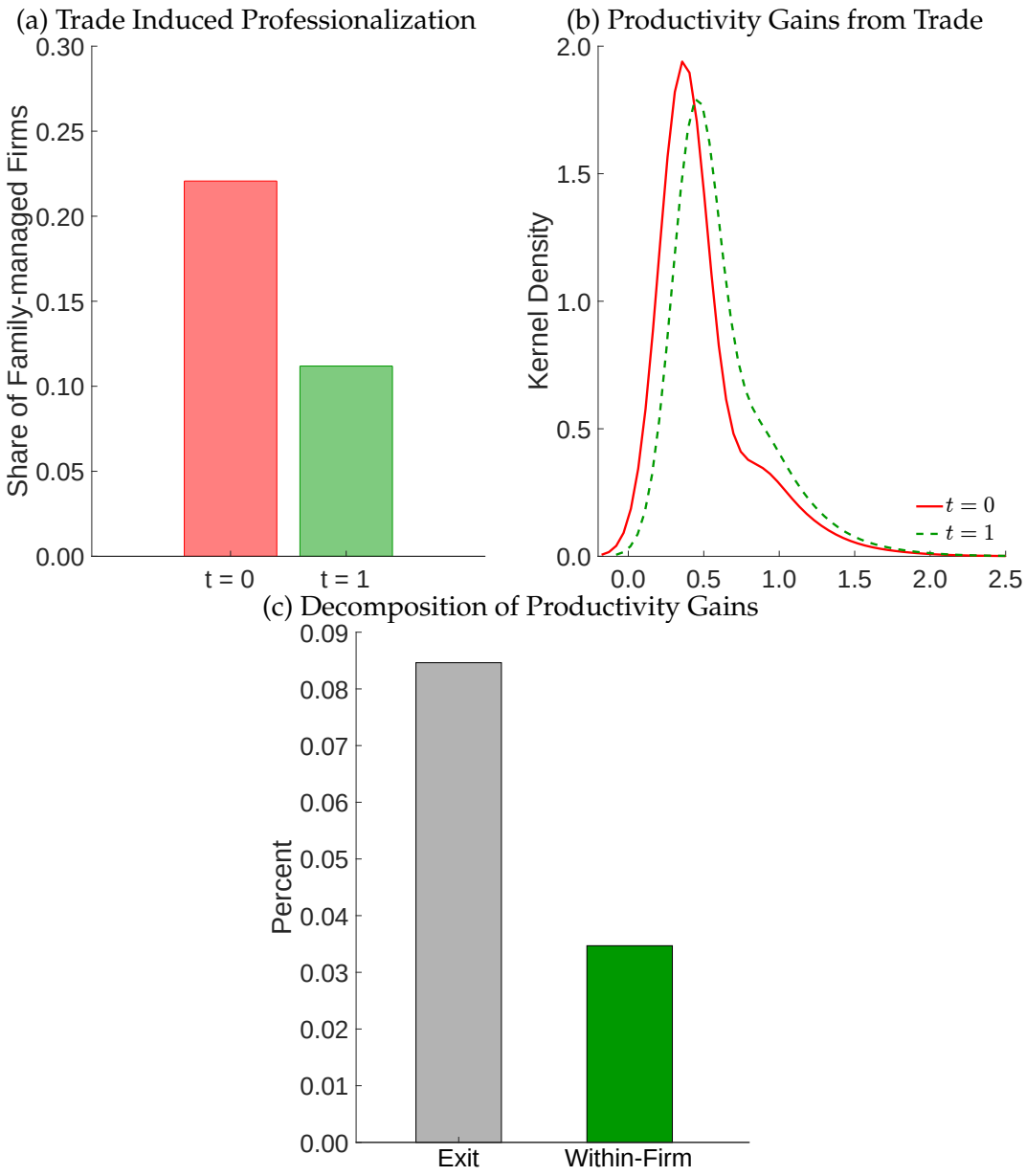
The remaining outcomes demonstrate that the model captures key mechanisms of adjustment. The predicted share of family firms that professionalizes after the shock is consistent with the data, with roughly half of the affected family firms replacing family managers with outside professionals. The estimated productivity gain from professionalization, governed by the parameter γ, is somewhat lower in the model (23 percent) compared to the average post-period increase in TFPQ shown in panel (a) of Figure 9 (35 percent); however, it is within the 95 percent confidence interval of this empirical point estimate. Finally, the model reproduces the observed rise in firm exit rates, as reported in Table 3. Together, these comparisons suggest that the model successfully matches the main empirical regularities and provides a credible quantitative framework for analyzing the impact of trade-induced competition on firm organization and productivity.

Figure 14, Panel (a), shows that this import-competition shock significantly increases professionalization among family-managed firms. Initially, about 28 percent of firms were family-managed; this share falls substantially following the policy shock. The underlying mechanism driving this response is depicted in Figure 11, which illustrates how increased import competition shifts the exit threshold for family firms upward (from z_f to z'_f), compelling many firms to professionalize management as a strategy to avoid exit. This effect is especially pronounced among low-productivity, family-managed firms.

Besides incentivizing management changes, the import competition shock also increases firm exit, as suggested in Figure 11. The policy also raises the exit threshold for professional firms from z_e to z'_e so that only more productive firms survive.

Both the extensive-margin selection effects due to exit and the within-firm productivity improvements due to professionalizing management contribute to increasing aggregate productivity by 12 percent following the import competition shock. Figure 14, Panel (b), shows kernel density estimates comparing the distribution of firm pro-

Figure 14: Trade-Induced Professionalization and Productivity Gains



Notes: This figure simulates a trade liberalization episode within the estimated model by simulating a reduction in aggregate market demand that is implied by an increase in the mass of foreign varieties required to raise the import-to-GDP ratio from 8 percent in 1995 (pre-QR removal) to 25 percent in 2005 (post-QR removal). Panel (a) tracks the share of family-managed firms, demonstrating a decline that corresponds directly to increased professionalization in response to import competition. Panel (b) illustrates the aggregate productivity gains by presenting kernel density plots of the productivity distribution before and after the import competition shock, highlighting shifts toward higher productivity due to two firm-level adjustments: within firm gains and extensive-margin effects due to exit. Panel (c) decomposes the total productivity increase into these two mutually exclusive components, underscoring the distinct mechanisms through which aggregate productivity is enhanced in response to import competition.

ductivity before and after the import-competition shock. The rightward shift in the productivity distribution at $t = 1$ relative to the baseline at $t = 0$ clearly demonstrates these aggregate productivity gains.

These gains arise from two distinct sources, each operating through fundamentally different mechanisms. The extensive margin selection effect is emphasized in the existing trade literature (e.g., Melitz (2003)). This mechanism operates through the exit of the least productive firms from the market, thereby raising aggregate productivity by reallocating resources toward more productive firms. Second, and qualitatively distinct, are the within-firm productivity gains resulting from the professionalization of management. Unlike the selection mechanism, these productivity improvements occur among the surviving firms. While the extensive margin selection effects have received substantial attention and are a staple in canonical models of trade and heterogeneous firms, within-firm productivity improvements due to management restructuring have been relatively understudied and remain quantitatively unexplored. The analysis here aims to explicitly quantify these within-firm productivity gains.

Figure 14, Panel (c), displays this statistical decomposition. While a substantial portion of the aggregate productivity improvement (around 70 percent) is driven by selection through firm exit, within-firm productivity gains also play a significant role, accounting for approximately 30 percent of the aggregate productivity gains. These within-firm efficiency gains underscore the role that organizational restructuring plays in enhancing aggregate productivity. Ignoring such within-firm organizational improvements can underestimate the total benefits of trade liberalization policies.

Thus, fostering an environment that encourages professionalization in management, particularly in economies dominated by family-managed firms, could amplify the gains from international trade.

8 Conclusion

This study demonstrates that trade liberalization, through a product-specific import competition shock, reshapes firm management structures in a profound way. Focusing on family firms, the predominant mode of corporate governance in many developing countries, I find that heightened import competition compels these firms to undertake significant managerial turnover. Empirically, firms facing increased foreign competition are more likely to replace family managers with professional executives, a shift that is closely associated with improved within-firm productivity. The evidence, drawn from a novel manager-firm matched dataset and detailed board director tenure records for over 6 million Indian directors, reveals that the restructuring of top man-

agement is not merely a byproduct of declining sales or contracting firm size. Instead, it reflects a deliberate organizational response to external competitive pressures.

The event study analysis highlights that, following the removal of quantitative restrictions, family-controlled firms–particularly those with lower pre-policy productivity—experience a marked decline in the share of family members on their executive boards. This replacement is accompanied by a corresponding rise in non-family professional managers, suggesting a one-to-one substitution effect. Furthermore, these changes in management composition are linked to subsequent productivity improvements, as evidenced by rising quantity productivity and declining average output prices. Such findings support the broader hypothesis that organizational reform is a key channel through which competition reduces X-inefficiency.

To further interpret these empirical results, I develop a simple model of industrial equilibrium in which family firms face a trade-off between the non-monetary private benefits of retaining family management and the monetary gains from delegating management to professionals. The model predicts a dual-selection mechanism: less productive family firms delegate management out of necessity to avert exit, while more productive firms delegate to further boost efficiency. The data primarily reflect the negative-selection channel, with laggard firms undergoing managerial changes to survive under harsher competitive conditions.

These insights have important policy implications. In contexts where family firms dominate, trade liberalization can trigger internal restructuring that not only improves firm-level productivity but also contributes to aggregate efficiency gains.

In sum, this paper contributes to the literature on trade-induced productivity improvements by highlighting an often-overlooked internal adjustment mechanism. It underscores the importance of managerial innovation in response to external shocks and suggests that policies promoting competitive pressures can stimulate organizational reforms that bolster firm performance.

References

Acemoglu, Daron, Philippe Aghion, and Fabrizio Zilibotti, "Distance to frontier, selection, and economic growth," *Journal of the European Economic association*, 2006, *4* (1), 37–74.

Ackerberg, Daniel A, Kevin Caves, and Garth Frazer, "Identification properties of recent production function estimators," *Econometrica*, 2015, *83* (6), 2411–2451.

Aghion, Philippe, Mathias Dewatripont, and Patrick Rey, "Competition, Financial Discipline and Growth," *The Review of Economic Studies*, 10 1999, *66* (4), 825–852.

Ahluwalia, Montek, *Backstage: The Story Behind India's High Growth Years*, New Delhi: Rupa Publications India, 2019.

Akcigit, Ufuk, Harun Alp, and Michael Peters, "Lack of selection and limits to delegation: firm dynamics in developing countries," *American Economic Review*, 2021, *111* (1), 231–275.

Alfaro-Ureña, Alonso, Isabela Manelici, and Jose P Vasquez, "The Effects of Joining Multinational Supply Chains: New Evidence from Firm-to-Firm Linkages*," *The Quarterly Journal of Economics*, 01 2022, *137* (3), 1495–1552.

Almeida, Heitor and Daniel Wolfenzon, "Should business groups be dismantled? The equilibrium costs of efficient internal capital markets," *Journal of Financial Economics*, 2006, *79* (1), 99–144.

_ , Sang Yong Park, Marti G Subrahmanyam, and Daniel Wolfenzon, "The structure and formation of business groups: Evidence from Korean chaebols," *Journal of Financial Economics*, 2011, *99* (2), 447–475.

Amiti, Mary and Jozef Konings, "Trade Liberalization, Intermediate Inputs, and Productivity: Evidence from Indonesia," *American Economic Review*, December 2007, *97* (5), 16111638.

Arkolakis, Costas, Arnaud Costinot, and Andrés Rodríguez-Clare, "New trade models, same old gains?," *American Economic Review*, 2012, *102* (1), 94–130.

_ , _ , Dave Donaldson, and Andrés Rodríguez-Clare, "The elusive pro-competitive effects of trade," *The Review of Economic Studies*, 2019, *86* (1), 46–80.

Atkin, David, Amit K Khandelwal, and Adam Osman, "Exporting and firm performance: Evidence from a randomized experiment," *The quarterly journal of economics*, 2017, *132* (2), 551–615.

_ **and** _ , "How distortions alter the impacts of international trade in developing countries," *Annual Review of Economics*, 2020, *12*, 213–238.

Backus, Matthew, "Why is productivity correlated with competition?," *Econometrica*, 2020, *88* (6), 2415–2444.

Baldwin, John and Wulong Gu, "The Impact of Trade on Plant Scale, Production-Run Length, and Diversification," in "Producer Dynamics: New Evidence from Micro Data," University of Chicago Press, 03 2009.

Bandiera, Oriana, Andrea Prat, Stephen Hansen, and Raffaella Sadun, "CEO behavior and firm performance," *Journal of Political Economy*, 2020, *128* (4), 1325–1369.

_ **, Renata Lemos, Andrea Prat, and Raffaella Sadun**, "Managing the family firm: Evidence from CEOs at work," *The Review of Financial Studies*, 2018, *31* (5), 1605–1653.

Barrows, Geoffrey and Hélène Ollivier, "Foreign demand, developing country exports, and CO2 emissions: Firm-level evidence from India," *Journal of Development Economics*, 2021, *149*, 102587.

Becker, Gary S., *The Economics of Discrimination*, Chicago: University of Chicago Press, 1957.

Bennedsen, Morten, Kasper Meisner Nielsen, Francisco Pérez-González, and Daniel Wolfenzon, "Inside the family firm: The role of families in succession decisions and performance," *The Quarterly Journal of Economics*, 2007, *122* (2), 647–691.

Bernard, Andrew B, Stephen J Redding, and Peter K Schott, "Multiproduct firms and trade liberalization," *The Quarterly journal of economics*, 2011, *126* (3), 1271–1318.

Bertrand, Marianne and Antoinette Schoar, "The role of family in family firms," *Journal of economic perspectives*, 2006, *20* (2), 73–96.

_ **and Sendhil Mullainathan**, "Enjoying the quiet life? Corporate governance and managerial preferences," *Journal of political Economy*, 2003, *111* (5), 1043–1075.

_ **, Paras Mehta, and Sendhil Mullainathan**, "Ferreting out tunneling: An application to Indian business groups," *The quarterly journal of economics*, 2002, *117* (1), 121–148.

_ **, Simon Johnson, Krislert Samphantharak, and Antoinette Schoar**, "Mixing family with business: A study of Thai business groups and the families behind them," *Journal of financial Economics*, 2008, *88* (3), 466–498.

Bhagwati, Jagdish N and Thirukodikaval Nilakanta Srinivasan, *Foreign trade regimes and economic development: India* number bhag75-1, National Bureau of Economic Research, 1975.

Bloom, Nicholas and John Van Reenen, "Measuring and explaining management practices across firms and countries," *The quarterly journal of Economics*, 2007, *122* (4), 1351–1408.

_ , Benn Eifert, Aprajit Mahajan, David McKenzie, and John Roberts, "Does management matter? Evidence from India," *The Quarterly journal of economics*, 2013, *128* (1), 1–51.

_ , Mirko Draca, and John Van Reenen, "Trade induced technical change? The impact of Chinese imports on innovation, IT and productivity," *The review of economic studies*, 2016, *83* (1), 87–117.

_ , Raffaella Sadun, and John Van Reenen, "The organization of firms across countries," *The quarterly journal of economics*, 2012, *127* (4), 1663–1705.

Boehm, Johannes and Ezra Oberfield, "Misallocation in the Market for Inputs: Enforcement and the Organization of Production," *The Quarterly Journal of Economics*, 2020, *135* (4), 2007–2058.

Burkart, Mike, Fausto Panunzi, and Andrei Shleifer, "Family firms," *The journal of finance*, 2003, *58* (5), 2167–2201.

Bustos, Paula, "Trade Liberalization, Exports, and Technology Upgrading: Evidence on the Impact of MERCOSUR on Argentinian Firms," *American Economic Review*, February 2011, *101* (1), 30440.

Cai, Hongbin, Hongbin Li, Albert Park, and Li-An Zhou, "Family ties and organizational design: Evidence from Chinese private firms," *Review of Economics and Statistics*, 2013, *95* (3), 850–867.

Caliendo, Lorenzo and Esteban Rossi-Hansberg, "The impact of trade on organization and productivity," *The quarterly journal of economics*, 2012, *127* (3), 1393–1467.

Caselli, Francesco and Nicola Gennaioli, "Dynastic management," *Economic Inquiry*, 2013, *51* (1), 971–996.

Chen, Cheng and Claudia Steinwender, "Import competition, heterogeneous preferences of managers, and productivity," *Journal of International Economics*, 2021, *133*, 103533.

Claessens, Stijn, Simeon Djankov, and Larry HP Lang, "The separation of ownership and control in East Asian corporations," *Journal of financial Economics*, 2000, *58* (1-2), 81–112.

Cuñat, Vicente and Maria Guadalupe, "How does product market competition shape incentive contracts?," *Journal of the European Economic Association*, 2005, *3* (5), 1058–1082.

_ **and** _ , "Executive compensation and competition in the banking and financial sectors," *Journal of Banking & Finance*, 2009, *33* (3), 495–504.

DeLoecker, Jan, Pinelopi K Goldberg, Amit K Khandelwal, and Nina Pavcnik, "Prices, markups, and trade reform," *Econometrica*, 2016, *84* (2), 445–510.

Demidova, Svetlana and Andres Rodriguez-Clare, "The simple analytics of the Melitz model in a small economy," *Journal of International Economics*, 2013, *90* (2), 266–272.

Demsetz, Harold and Kenneth Lehn, "The structure of corporate ownership: Causes and consequences," *Journal of political economy*, 1985, *93* (6), 1155–1177.

Dhingra, Swati, "Trading away wide brands for cheap brands," *American Economic Review*, 2013, *103* (6), 2554–2584.

Edmond, Chris, Virgiliu Midrigan, and Daniel Yi Xu, "Competition, markups, and the gains from international trade," *American Economic Review*, 2015, *105* (10), 3183–3221.

Fan, Tianyu, Michael Peters, and Fabrizio Zilibotti, "Growing like Indiathe unequal effects of service-led growth," *Econometrica*, 2023, *91* (4), 1457–1494.

Frésard, Laurent and Gordon M Phillips, "Product markets, competition and corporate finance: A review and directions for future research," *Handbook of Corporate Finance*, 2024, pp. 591–646.

Giroud, Xavier and Holger M Mueller, "Does corporate governance matter in competitive industries?," *Journal of financial economics*, 2010, *95* (3), 312–331.

_ **and** _ , "Corporate governance, product market competition, and equity prices," *the Journal of Finance*, 2011, *66* (2), 563–600.

Goldberg, Pinelopi K, Amit K Khandelwal, Nina Pavcnik, and Petia Topalova, "Multiproduct firms and product turnover in the developing world: Evidence from India," *The Review of Economics and Statistics*, 2010, *92* (4), 1042–1049.

Goldberg, Pinelopi Koujianou, Amit Kumar Khandelwal, Nina Pavcnik, and Petia Topalova, "Imported intermediate inputs and domestic product growth: Evidence from India," *The Quarterly journal of economics*, 2010, *125* (4), 1727–1767.

Gomez-Mejia, Luis R, Cristina Cruz, Pascual Berrone, and Julio De Castro, "The bind that ties: Socioemotional wealth preservation in family firms," *Academy of Management annals*, 2011, *5* (1), 653–707.

Gómez-Mejía, Luis R, Katalin Takács Haynes, Manuel Núñez-Nickel, Kathyrn JL Jacobson, and José Moyano-Fuentes, "Socioemotional wealth and business risks in family-controlled firms: Evidence from Spanish olive oil mills," *Administrative science quarterly*, 2007, *52* (1), 106–137.

Gopalan, Radhakrishnan, Vikram Nanda, and Amit Seru, "Affiliated firms and financial support: Evidence from Indian business groups," *Journal of Financial Economics*, 2007, *86* (3), 759–795.

_ , _ , and _ , "Internal capital market and dividend policies: Evidence from business groups," *The Review of Financial Studies*, 2014, *27* (4), 1102–1142.

Guadalupe, Maria and Julie Wulf, "The flattening firm and product market competition: The effect of trade liberalization on corporate hierarchies," *American Economic Journal: Applied Economics*, 2010, *2* (4), 105–127.

Hart, Oliver, "The market as an incentive mechanism," *Bell Journal of Economics*, 1983, *14* (2), 336–82.

Hasan, Rana, Devashish Mitra, and Krishnarajapet V Ramaswamy, "Trade reforms, labor regulations, and labor-demand elasticities: Empirical evidence from India," *The Review of Economics and Statistics*, 2007, *89* (3), 466–481.

Head, Keith, Thierry Mayer, and Mathias Thoenig, "Welfare and Trade without Pareto," *American Economic Review*, May 2014, *104* (5), 31016.

Hicks, John R, "Annual survey of economic theory: the theory of monopoly," *Econometrica: Journal of the Econometric Society*, 1935, pp. 1–20.

Holmes, Thomas J and James A Schmitz, "Competition and productivity: a review of evidence," *Annu. Rev. Econ.*, 2010, *2* (1), 619–642.

Holmstrom, Bengt, "Moral hazard in teams," *The Bell journal of economics*, 1982, pp. 324–340.

Hombert, Johan and Adrien Matray, "Can innovation help US manufacturing firms escape import competition from China?," *The Journal of Finance*, 2018, *73* (5), 2003–2039.

Hsieh, Chang-Tai and Peter J Klenow, "Misallocation and manufacturing TFP in China and India," *The Quarterly journal of economics*, 2009, *124* (4), 1403–1448.

_ **and** _ , "The life cycle of plants in India and Mexico," *The Quarterly Journal of Economics*, 2014, *129* (3), 1035–1084.

Hurst, Erik and Benjamin Wild Pugsley, "What do small businesses do?," Technical Report, National Bureau of Economic Research 2011.

Jenter, Dirk and Fadi Kanaan, "CEO Turnover and Relative Performance Evaluation," *The Journal of Finance*, 2015, *70* (5), 2155–2182.

Jr, James A Schmitz, "What determines productivity? Lessons from the dramatic recovery of the US and Canadian iron ore industries following their early 1980s crisis," *Journal of political Economy*, 2005, *113* (3), 582–625.

Kaplan, Steven N and Bernadette Minton, "How has CEO turnover changed? Increasing sensitivity to poor stock performance," *International Review of Finance*, 2011, *12* (1), 57–87.

Khanna, Tarun and Yishay Yafeh, "Business groups in emerging markets: Paragons or parasites?," *Journal of Economic literature*, 2007, *45* (2), 331–372.

Krueger, Anne O, "India's trade with the world: Retrospect and prospect," *India's economy: Performance and challenges*, 2010, pp. 399–429.

Lee, David S, "Training, Wages, and Sample Selection: Estimating Sharp Bounds on Treatment Effects," *The Review of Economic Studies*, 2009, *76* (3), 1071–1102.

Leibenstein, Harvey, "Allocative efficiency vs." X-efficiency"," *The American economic review*, 1966, *56* (3), 392–415.

Lemos, Renata and Daniela Scur, "The ties that bind: implicit contracts and management practices in family-run firms," 2019.

Lippi, Francesco and Fabiano Schivardi, "Corporate control and executive selection," *Quantitative economics*, 2014, *5* (2), 417–456.

Marin, Dalia and Thierry Verdier, "Corporate hierarchies and international trade: Theory and evidence," *Journal of International Economics*, 2014, *94* (2), 295–310.

McKenzie, David, "Identifying and Spurring High-Growth Entrepreneurship: Experimental Evidence from a Business Plan Competition," *American Economic Review*, August 2017, *107* (8), 22782307.

Melitz, Marc, "Trade competition and reallocations in a small open economy," *World Trade Evolution*, 2018, pp. 60–81.

Melitz, Marc J, "The impact of trade on intra-industry reallocations and aggregate industry productivity," *econometrica*, 2003, *71* (6), 1695–1725.

Morck, Randall, Daniel Wolfenzon, and Bernard Yeung, "Corporate governance, economic entrenchment, and growth," *Journal of economic literature*, 2005, *43* (3), 655–720.

Mullins, William and Antoinette Schoar, "How do CEOs see their roles? Management philosophies and styles in family and non-family firms," *Journal of Financial Economics*, 2016, *119* (1), 24–43.

Naaraayanan, S Lakshmi and Daniel Wolfenzon, "Business group spillovers," *The Review of Financial Studies*, 2024, *37* (1), 231–264.

Nalebuff, Barry J and Joseph E Stiglitz, "Information, competition, and markets," *The American economic review*, 1983, *73* (2), 278–283.

Nickell, Stephen J, "Competition and corporate performance," *Journal of political economy*, 1996, *104* (4), 724–746.

Panagariya, Arvind, "India's trade reform," in "India Policy Forum," Vol. 1 National Council of Applied Economic Research 2004, pp. 1–57.

Parrino, Robert, "CEO turnover and outside succession: A dynamic analysis," *Journal of Financial Economics*, 1997, *46* (2), 165–197.

Pérez-González, Francisco, "Inherited control and firm performance," *American Economic Review*, 2006, *96* (5), 1559–1588.

Perla, Jesse, Christopher Tonetti, and Michael E Waugh, "Equilibrium technology diffusion, trade, and growth," *American Economic Review*, 2021, *111* (1), 73–128.

Porta, Rafael La, Florencio Lopez de Silanes, and Andrei Shleifer, "Corporate ownership around the world," *The journal of finance*, 1999, *54* (2), 471–517.

Pursell, Garry and Zaidi Sattar, "Trade Policies in South Asia: An Overview," 2004.

Raith, Michael, "Competition, risk, and managerial incentives," *American Economic Review*, 2003, *93* (4), 1425–1436.

Schmidt, Klaus M, "Managerial incentives and product market competition," *The review of economic studies*, 1997, *64* (2), 191–213.

Smith, Adam, *An Inquiry into the Nature and Causes of the Wealth of Nations*, London: W. Strahan and T. Cadell, 1776.

Sraer, David and David Thesmar, "Performance and behavior of family firms: Evidence from the French stock market," *Journal of the european economic Association*, 2007, *5* (4), 709–751.

Stigler, George J, "The Xistence of X-efficiency," *The American Economic Review*, 1976, *66* (1), 213–216.

Sun, Liyang and Sarah Abraham, "Estimating dynamic treatment effects in event studies with heterogeneous treatment effects," *Journal of econometrics*, 2021, *225* (2), 175–199.

Topalova, Petia, "Factor immobility and regional impacts of trade liberalization: Evidence on poverty from India," *American Economic Journal: Applied Economics*, 2010, *2* (4), 1–41.

_ **and Amit Khandelwal**, "Trade liberalization and firm productivity: The case of India," *Review of economics and statistics*, 2011, *93* (3), 995–1009.

Tsoutsoura, Margarita, "Family firms and management practices," *Oxford Review of Economic Policy*, 2021, *37* (2), 323–334.

Villalonga, Belen and Raphael Amit, "How do family ownership, control and management affect firm value?," *Journal of financial Economics*, 2006, *80* (2), 385–417.

Villalonga, Belén, Raphael Amit, María-Andrea Trujillo, and Alexander Guzmán, "Governance of family firms," *Annual Review of Financial Economics*, 2015, *7* (1), 635–654.

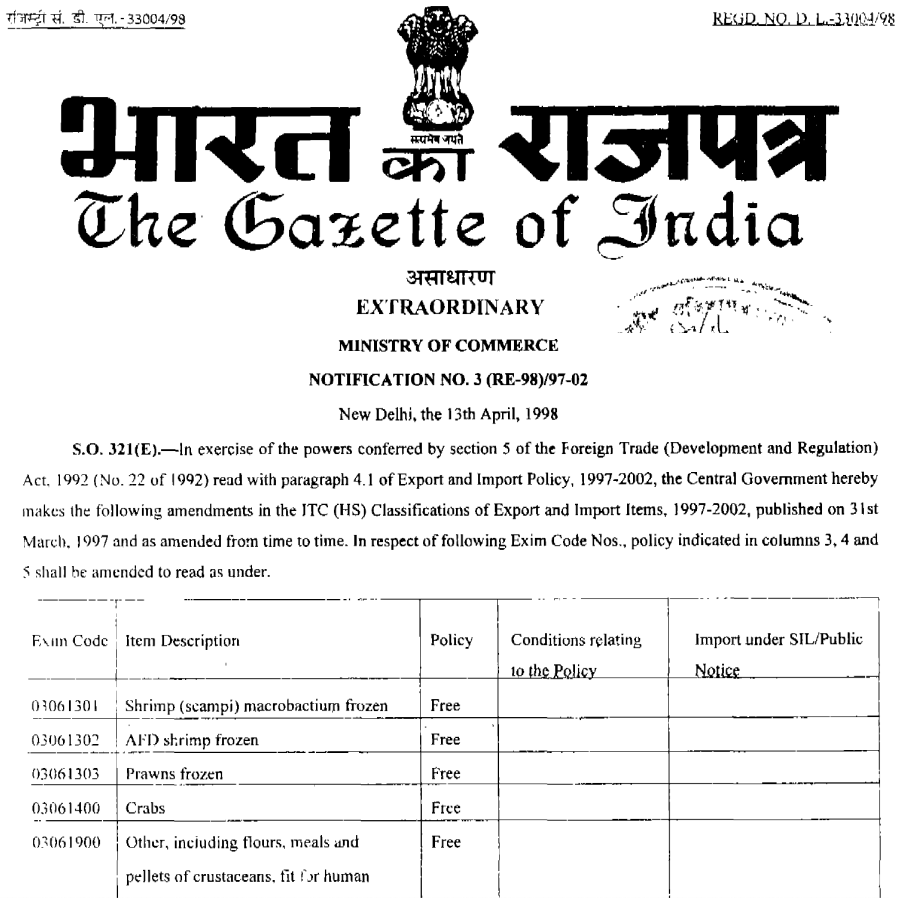
Walker, Michael W, Nachiket Shah, Edward Miguel, Dennis Egger, Felix Samy Soliman, and Tilman Graff, "Slack and economic development," Technical Report, National Bureau of Economic Research 2024.

Appendix Contents

A Appendix

A.1 Appendix: Data

Figure A1: Example of a 1998 Government of India Policy Notification Mentioning Product Codes for which QRs were Removed



रजिस्ट्री सं. डी. एल.-33004/98 REGD. NO. D. L.-33004/98

भारत का राजपत्र
The Gazette of India

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 SIL/Public Notice
03061301	Shrimp (scampi) macrobactium frozen	Free		
03061302	AFD shrimp frozen	Free		
03061303	Prawns frozen	Free		
03061400	Crabs	Free		
03061900	Other, including flours, meals and pellets of crustaceans, fit for human	Free		

Notes: This figure shows an example of a government notification issued by the Ministry of Commerce in 1998, detailing the products for which quantitative restrictions were adjusted. The first column lists the 8-digit ITC HS codes, with corresponding product descriptions in the second column. The third column, labeled "Policy", indicates the status of restrictions; "Free" signifies that QRs on that specific product have been lifted. More than 30 such notifications, spanning over 1,000 pages, were digitized to create a novel dataset on product-level quantitative restrictions in India. *Source:* Ministry of Commerce, Government of India.

Table A1: Novel Product Concordances

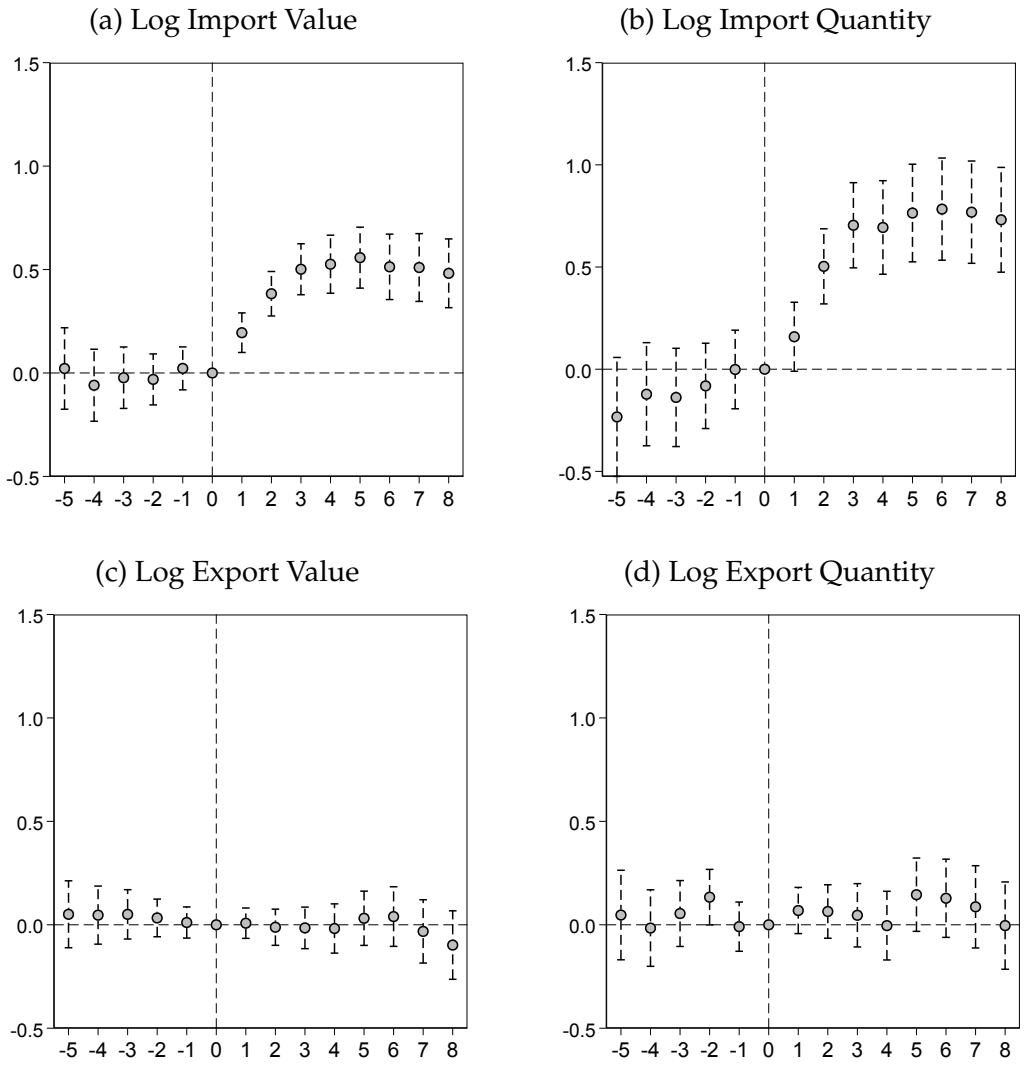
Prowess Products		ITC HS Products		Industry	
3008040800	Sunflower seed oil	15121910	Sunflower oil edible grade	15142	Manufacture of vegetable oils and fats, excluding corn oil.
3008040804	Sunflower seed oil, refined				
4012080400	Suitcases	420212.04	Plastic moulded suit-cases	19121	Manufacture of travel goods like suitcases, bags and holdalls etc.
5024200404	Distempers	321000.01	Distempers	24222	Manufacture of paints, varnishes, enamels or lacquers.
6308361216	Washing Machines/Laundry Mach	84501100	Fully - automatic washing machines (upto 10kg)	29308	Manufacture of other electric domestic appliances n.e.c.: dishwashers, household type laundry equipment, electric razors including parts and accessories for electrical domestic appliances
		84501200	Other washing machines with built-in centrifugal drier (upto 10kg)		
		84501300	Other washing machines (upto 10kg)		

Notes: This table shows a mapping of ITC HS codes to both NIC industry codes and Prowess product codes. Two separate mapping exercises were conducted to achieve this concordance. First, 8-digit ITC HS codes were mapped to NIC industry codes at the 4-digit level using the HI to I3 concordance provided by the World Bank, which served as a foundation for further manual extension to the 5-digit NIC 1998 codes. Second, an ITC HS to Prowess mapping was created at the most granular level, linking 8-digit ITC HS codes to 10-digit Prowess codes based on product descriptions. This concordance links over 2,700 HS products to more than 6,000 Prowess products across 400 industries, providing a comprehensive framework for analyzing product-level and industry-level relationships. *Source:* CMIE Prowess and Ministry of Corporate Affairs, Government of India.

A.2 Appendix: Results

A.2.1 Aggregate Product-Level Analysis

Figure A2: Value and Quantity of Imports Increase after QR Removal with No Impact on Exports: Robustness to Two-Way Fixed Effects Estimator



Notes: The figure presents β_k event study coefficients from Equation (1) using the two-way fixed effects estimator on annual HS-6 digit product-level panel data on imports and exports. The dependent variables are log import value (panel (a)), log import quantity (panel (b)), log export value (panel (c)), and log export quantity (panel (d)). An HS-6 digit product is identified as treated if QRs were removed from any of its constituent HS-8 digit products. β_0, the coefficient for the year in which QRs were removed, is normalized to zero. The policy is staggered from 1997 to 2001, with the x-axis denoting years relative to the event. All regressions include HS-6 digit product fixed effects and HS-4 digit product $\times$ year fixed effects. Standard errors are clustered at the HS-6 digit product level. The vertical lines are the 95 percent confidence intervals. *Source:* CMIE Trade$_{dx}$ and archives of the Ministry of Commerce, Government of India.

Table A2: Value and Quantity of Imports Increase after QR Removal with No Impact on Exports

	(1) Import Value	(2) Import Quantity	(3) Export Value	(4) Export Quantity
5 years before event	0.054	-0.16	0.034	0.040
	(0.10)	(0.15)	(0.087)	(0.12)
4 years before event	0.00060	-0.031	0.060	0.010
	(0.091)	(0.13)	(0.082)	(0.11)
3 years before event	0.020	-0.0040	0.090	0.13
	(0.084)	(0.13)	(0.072)	(0.099)
2 years before event	0.045	0.030	0.067	0.15*
	(0.072)	(0.12)	(0.054)	(0.078)
1 year before event	0.044	0.072	0.035	0.054
	(0.059)	(0.13)	(0.045)	(0.073)
1 year after event	0.39***	0.52***	-0.033	0.041
	(0.062)	(0.10)	(0.052)	(0.074)
2 years after event	0.48***	0.71***	-0.038	0.066
	(0.070)	(0.11)	(0.061)	(0.091)
3 years after event	0.54***	0.77***	-0.084	-0.047
	(0.079)	(0.13)	(0.072)	(0.10)
4 years after event	0.59***	0.86***	-0.036	0.16
	(0.080)	(0.13)	(0.076)	(0.10)
5 years after event	0.58***	0.93***	-0.052	0.11
	(0.089)	(0.14)	(0.083)	(0.11)
6 years after event	0.59***	0.91***	-0.079	0.11
	(0.092)	(0.14)	(0.089)	(0.11)
7 years after event	0.57***	0.89***	-0.14	0.014
	(0.096)	(0.14)	(0.094)	(0.12)
8 years after event	0.64***	1.03***	-0.059	0.14
	(0.11)	(0.16)	(0.10)	(0.13)
HS-6 digit FE	✓	✓	✓	✓
HS-4 digit × Year FE	✓	✓	✓	✓
Observations	90364	89911	93222	92503
R^2	0.89	0.91	0.86	0.89

Notes: The table shows the results of running the event study specification (1), estimated using Sun and Abraham (2021) estimator with corresponding coefficients plotted in Figure 4. The dependent variables are log import value (column (1)), log import quantity (column (2)), log export value (column (3)), and log export quantity (column (4)). An HS-6 digit product is identified as treated if QRs were removed from any of its constituent HS-8 digit products. β_0, the coefficient prior to the year in which QRs were removed, is normalized to zero. The policy is staggered from 1997 to 2001. All regressions include HS-6 digit product fixed effects and HS-4 digit product × year fixed effects. Clustering of standard errors is done at HS-6 digit product. Standard errors are in parentheses. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. *Source:* CMIE Trade_{dx} and archives of the Ministry of Commerce, Government of India.

A.3 Appendix: Firm Level Event Studies: Financial Indicators

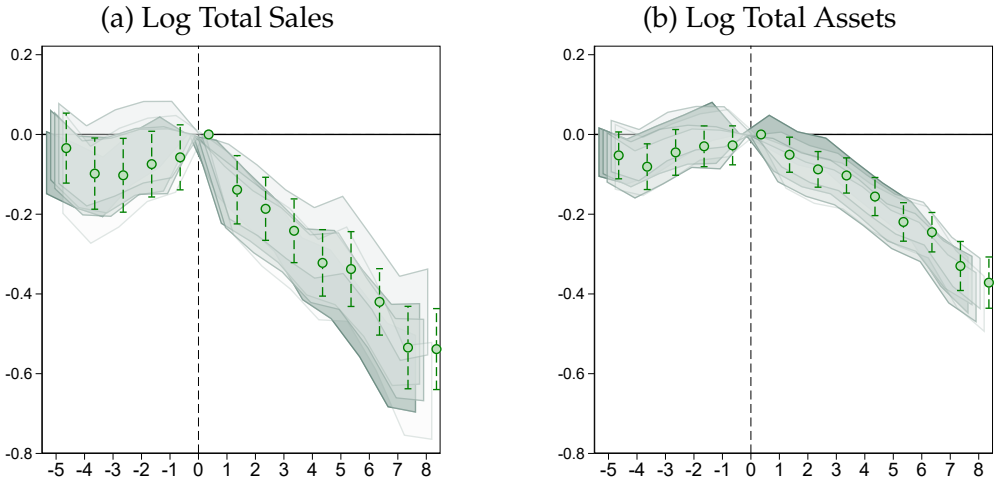
Table A3: Domestic Firms Contract after QR Removal

	(1) Total Sales	(2) Log Profits	(3) Total Wage Bill	(4) Total Expense on Materials	(5) Total Assets	(6) Total Borrowings
5 years before event	-0.034	-0.11**	-0.059	-0.038	-0.052*	-0.065
	(0.045)	(0.056)	(0.038)	(0.038)	(0.030)	(0.047)
4 years before event	-0.098**	-0.17***	-0.058	-0.065	-0.081***	-0.047
	(0.046)	(0.051)	(0.040)	(0.040)	(0.029)	(0.043)
3 years before event	-0.10**	-0.17***	-0.076**	-0.060	-0.045	-0.046
	(0.047)	(0.059)	(0.036)	(0.038)	(0.029)	(0.037)
2 years before event	-0.074*	-0.14***	-0.048	-0.063	-0.030	-0.029
	(0.042)	(0.048)	(0.033)	(0.039)	(0.026)	(0.035)
1 year before event	-0.057	0.0023	-0.024	-0.054	-0.027	-0.046
	(0.042)	(0.062)	(0.032)	(0.041)	(0.025)	(0.037)
1 year after event	-0.14***	-0.13**	-0.080**	-0.12***	-0.051**	0.0015
	(0.044)	(0.060)	(0.033)	(0.042)	(0.022)	(0.036)
2 years after event	-0.19***	-0.098*	-0.13***	-0.16***	-0.088***	-0.010
	(0.040)	(0.056)	(0.033)	(0.039)	(0.023)	(0.038)
3 years after event	-0.24***	-0.15**	-0.18***	-0.21***	-0.10***	-0.055
	(0.041)	(0.060)	(0.036)	(0.041)	(0.022)	(0.036)
4 years after event	-0.32***	-0.21***	-0.23***	-0.24***	-0.16***	-0.100**
	(0.042)	(0.061)	(0.038)	(0.039)	(0.024)	(0.039)
5 years after event	-0.34***	-0.22***	-0.30***	-0.23***	-0.22***	-0.18***
	(0.048)	(0.066)	(0.037)	(0.038)	(0.025)	(0.042)
6 years after event	-0.42***	-0.30***	-0.36***	-0.28***	-0.25***	-0.19***
	(0.042)	(0.082)	(0.038)	(0.045)	(0.025)	(0.049)
7 years after event	-0.53***	-0.36***	-0.44***	-0.36***	-0.33***	-0.28***
	(0.053)	(0.082)	(0.044)	(0.044)	(0.031)	(0.047)
8 years after event	-0.54***	-0.34***	-0.47***	-0.33***	-0.37***	-0.31***
	(0.052)	(0.069)	(0.047)	(0.047)	(0.033)	(0.053)
Firm FE	✓	✓	✓	✓	✓	✓
Industry × Year FE	✓	✓	✓	✓	✓	✓
Observations	72633	53368	73804	64620	78481	73572
R^2	0.77	0.77	0.83	0.79	0.84	0.77

Notes: The table shows the results of running the event study specification (2) estimated using Sun and Abraham (2021) estimator with corresponding coefficients plotted in Figure 5. The dependent variables are: log total sales (column (1)), log profits (column (2)), log total wage bill (column (3)), log total expense on materials (column (4)), log total assets (column (5)), and log total borrowings (column (6)). A firm is identified as treated in a year if QRs were removed on its highest-revenue product. θ_0, the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1997 to 2001. All regressions include firm and three-digit industry × year fixed effects. Clustering of standard errors is at the three-digit industry × year. Standard errors are in parentheses. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. *Source:* CMIE Prowess_{dx} and archives of the Ministry of Commerce, Government of India.

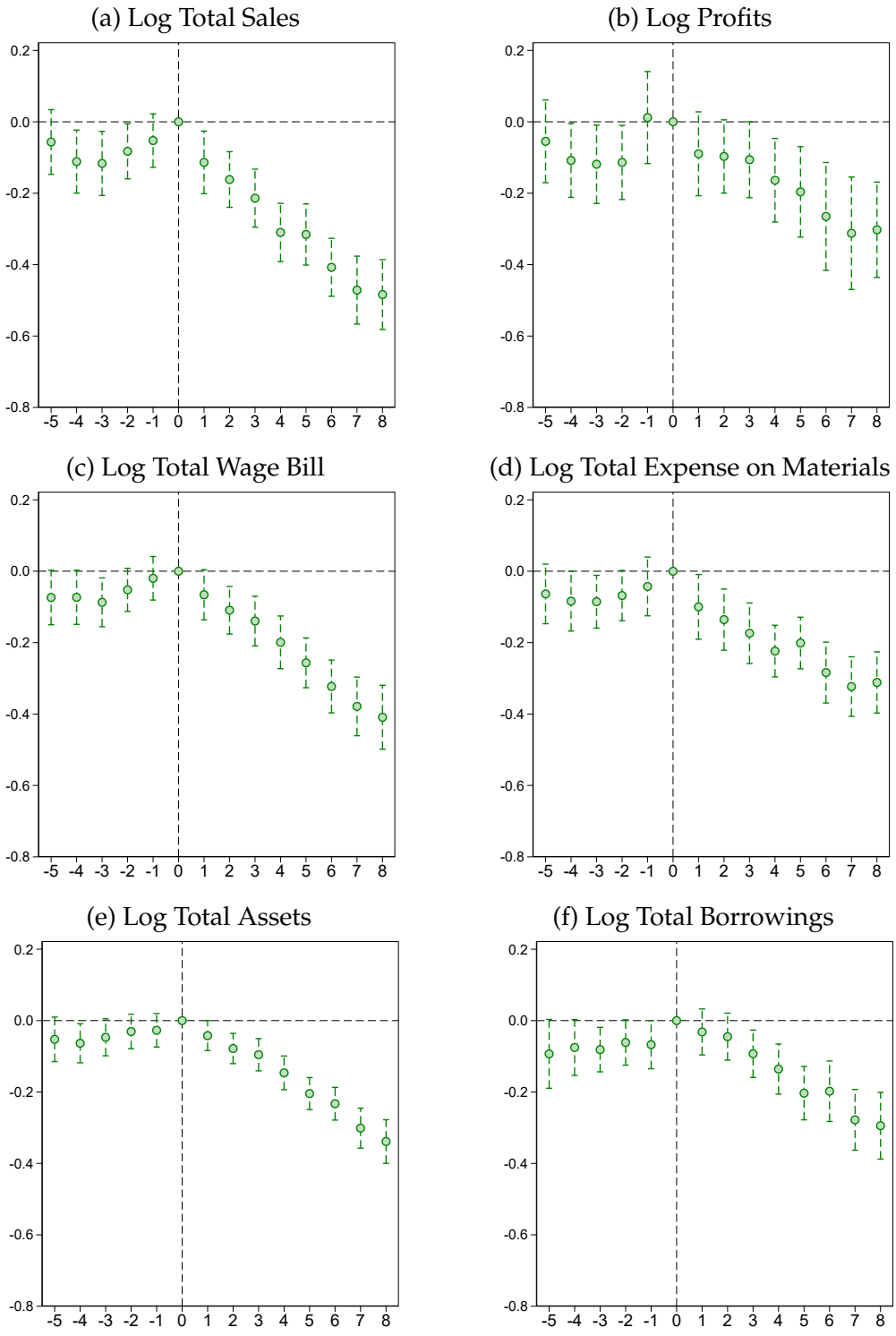
A.4 Appendix: Firm Level Event Studies: Managerial Indicators

Figure A3: Domestic Firms Contract after QR Removal: Robustness to Alternative Fixed Effects



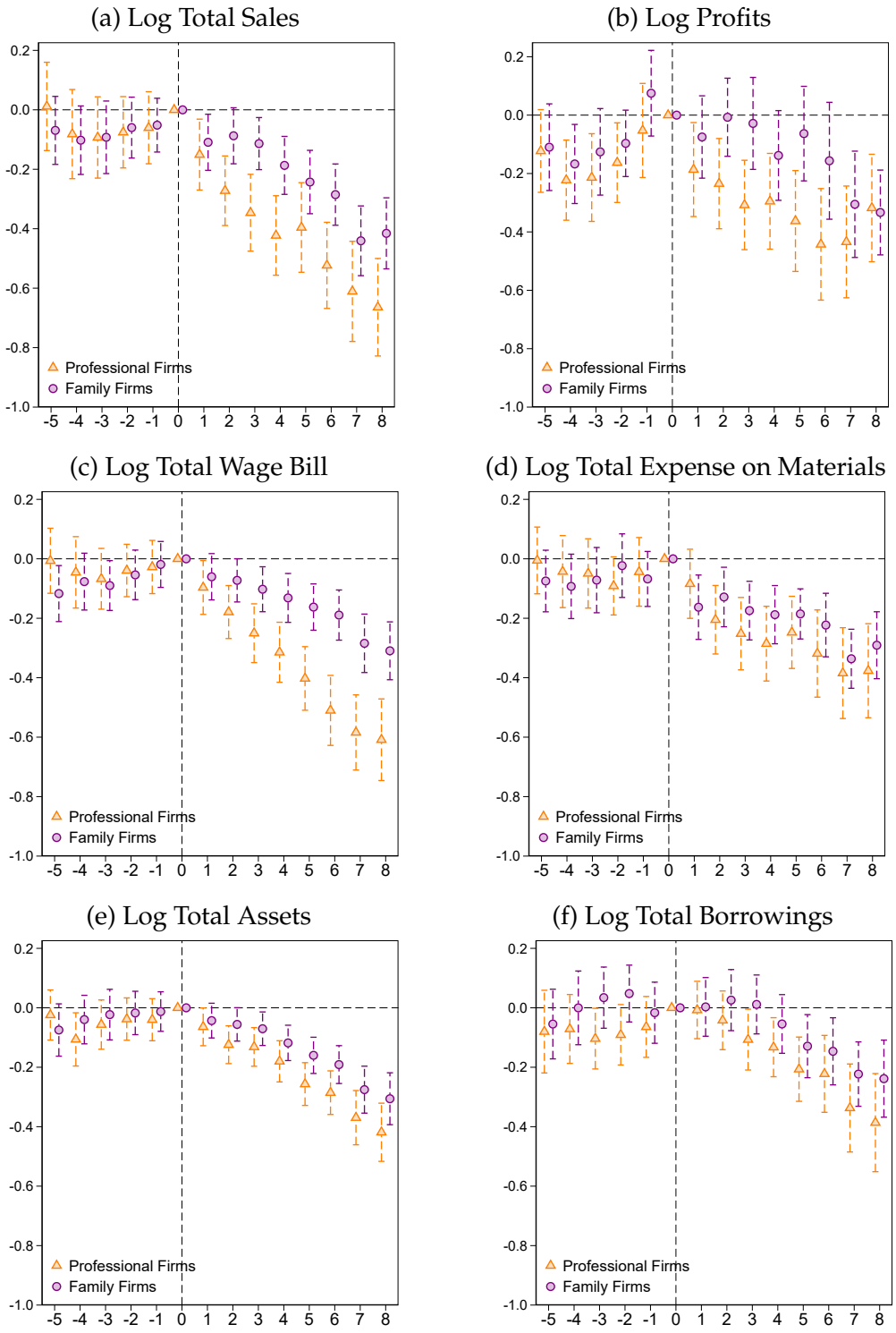
Notes: The figure plots the estimated θ_k event study coefficients from a regression of the form given in (2), estimated using the Sun and Abraham (2021) estimator with alternative fixed effects specifications. The dependent variables are: log total sales (panel (a)) and log total assets (panel (b)). Six specifications are examined: (1) firm and year fixed effects; (2) firm and three-digit industry × year fixed effects (baseline); (3) firm, three-digit industry × year, and state × year fixed effects; (4) firm, three-digit industry × year, and district × year fixed effects; (5) firm and three-digit industry × year × state fixed effects; and (6) firm and three-digit industry × year × district fixed effects. A firm is identified as treated in a year if QRs were removed on its highest-revenue product. θ_0, the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1997 to 2001, with the x-axis denoting years relative to the event. Standard errors are clustered at the three-digit industry × year level. The vertical lines are the 95 percent confidence intervals. *Source:* CMIE Prowess$_{dx}$ and archives of the Ministry of Commerce, Government of India.

Figure A4: Domestic Firms Contract after QR Removal: Robustness to Two-way Fixed Effects Estimator



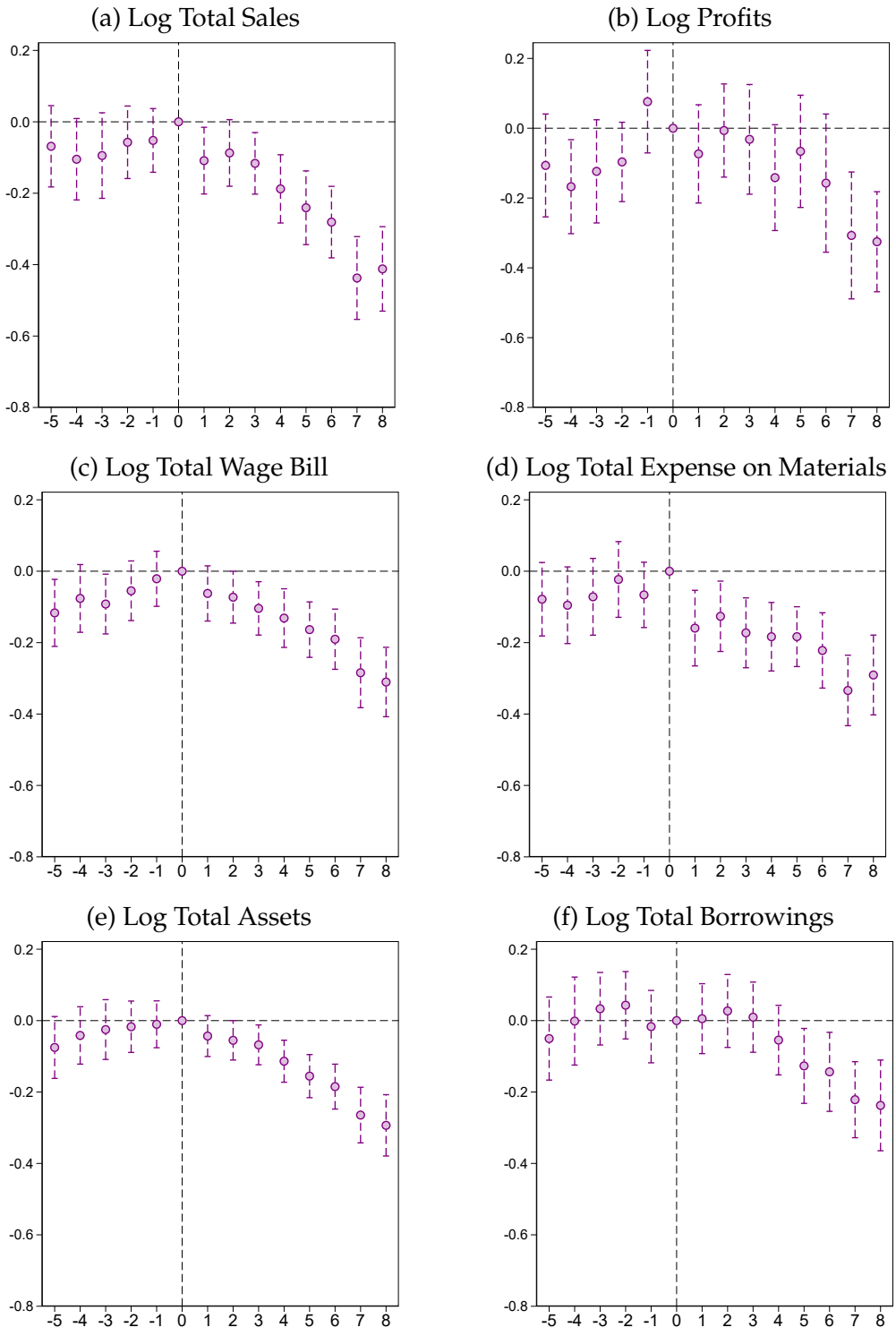
Notes: The figure plots the estimated θ_k event study coefficients from a regression of the form given in (2), estimated using two-way fixed effects estimator. The dependent variables are: log total sales (panel (a)), log profits (panel (b)), log total wage bill (panel (c)), log total expense on raw materials (panel (d)), log total assets (panel (e)), and log total borrowings (panel (f)). A firm is identified as treated in a year if QRs were removed on its highest-revenue product. θ_0, the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1997 to 2001, with the x-axis denoting years relative to the event. All regressions include firm and three-digit industry $\times$ year fixed effects. Standard errors are clustered at the three-digit industry $\times$ year level. The vertical lines are the 95 percent confidence intervals. *Source:* CMIE Prowess$_{dx}$ and archives of the Ministry of Commerce, Government of India.

Figure A5: Domestic Firms Contract after QR Removal: Comparison of Professional Firms and Family Firms



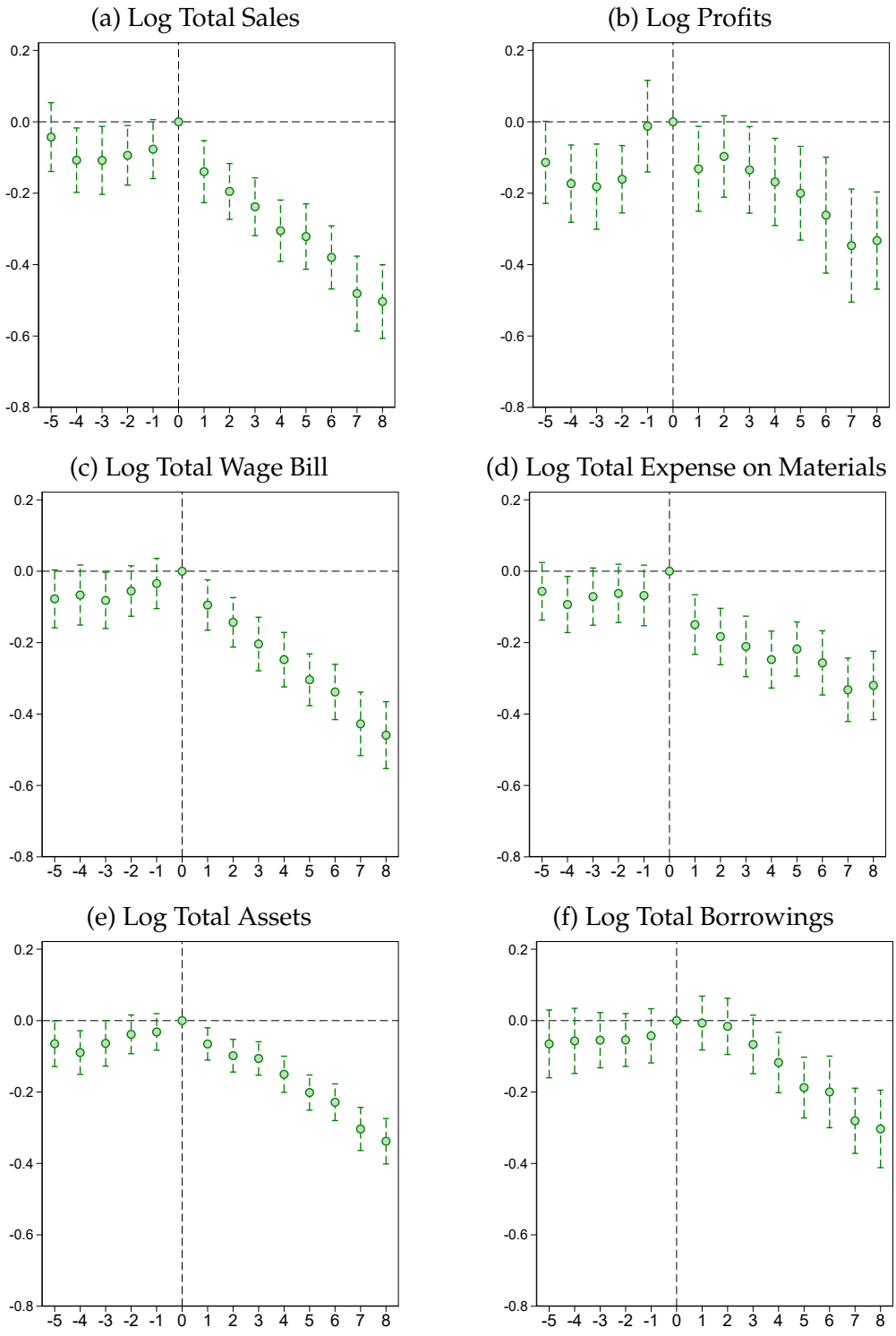
Notes: The figure plots the estimated θ_k event study coefficients from a regression of the form given in (2), estimated using Sun and Abraham (2021) estimator. The dependent variables are: log total sales (panel (a)), log profits (panel (b)), log total wage bill (panel (c)), log total expense on raw materials (panel (d)), log total assets (panel (e)), and log total borrowings (panel (f)). Event studies are conducted separately for professional firms (shown in orange triangles) and family firms (shown in purple circles). A firm is identified as treated in a year if QRs were removed on its highest-revenue product. θ_0, the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1997 to 2001, with the x-axis denoting years relative to the event. All regressions include firm and three-digit industry $\times$ year fixed effects. Standard errors are clustered at the three-digit industry $\times$ year level. The vertical lines are the 95 percent confidence intervals. *Source:* CMIE Prowess$_{dx}$ and archives of the Ministry of Commerce, Government of India.

Figure A6: Domestic Firms Contract after QR Removal: Robustness to Conditioning on Family Firms



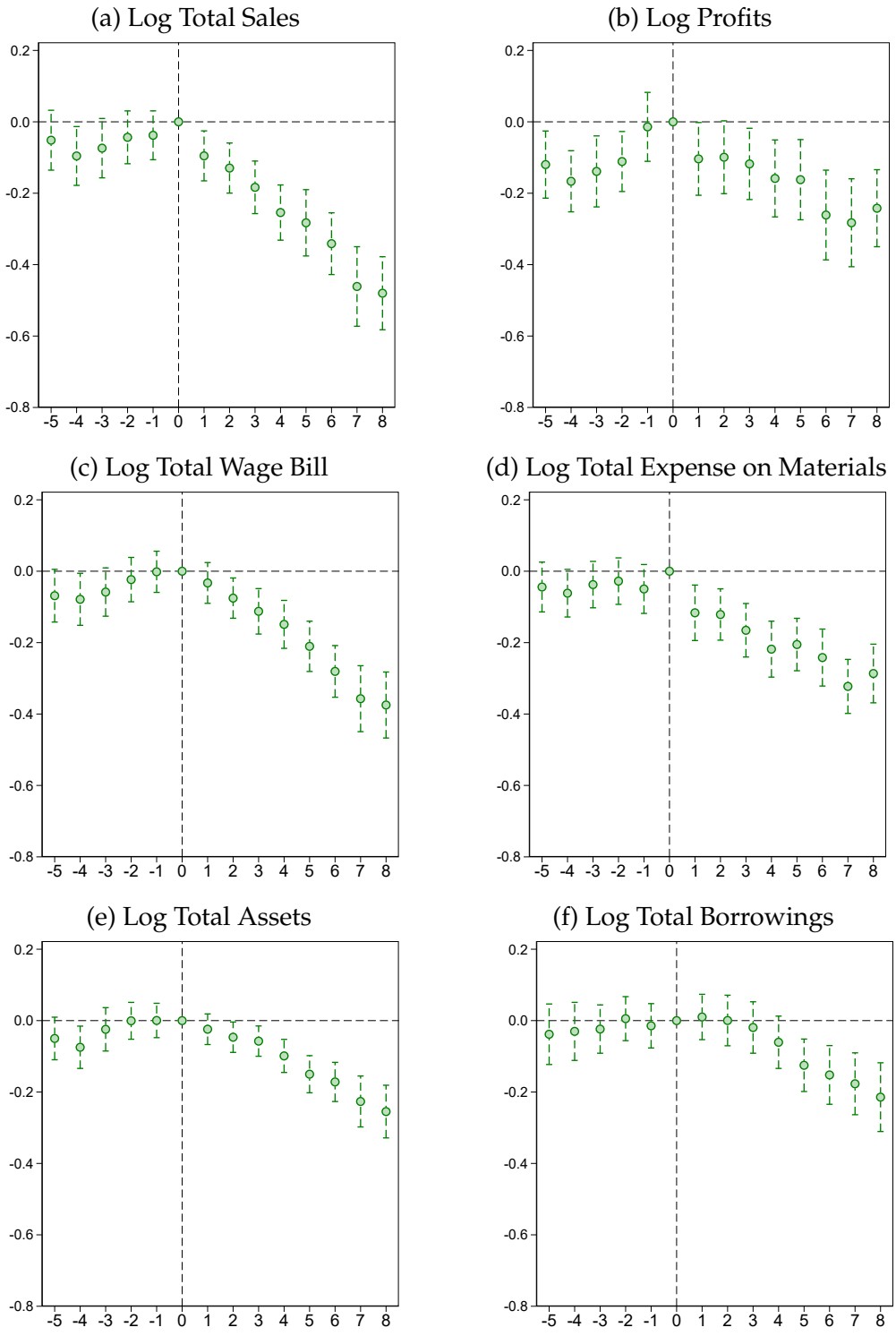
Notes: The figure plots the estimated θ_k event study coefficients from a regression of the form given in specification (2), estimated using Sun and Abraham (2021) estimator for baseline family firms, which had at least two family members on the executive board in the pre-policy period. The dependent variables are: log total sales (panel (a)), log profits (panel (b)), log total wage bill (panel (c)), log total expense on raw materials (panel (d)), log total assets (panel (e)), and log total borrowings (panel (f)). A firm is identified as treated in a year if QRs were removed on its highest-revenue product. θ_0, the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1997 to 2001, with the x-axis denoting years relative to the event. All regressions include firm and three-digit industry $\times$ year fixed effects. Standard errors are clustered at the three-digit industry $\times$ year level. The vertical lines are the 95 percent confidence intervals. *Source:* CMIE Prowess$_{dx}$ and archives of the Ministry of Commerce, Government of India.

Figure A7: Domestic Firms Contract after QR Removal: Robustness to Conditioning on Surviving Firms



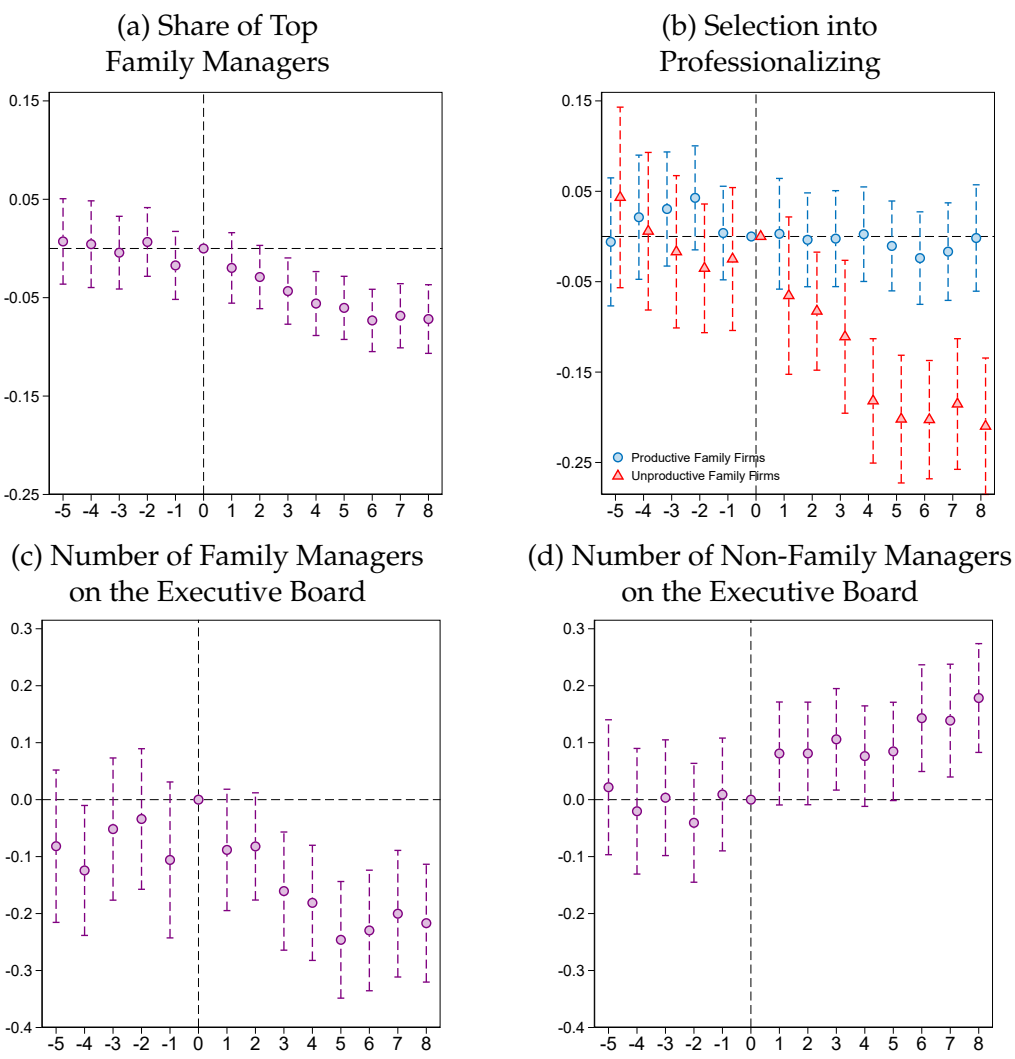
Notes: The figure plots the estimated θ_k event study coefficients from a regression of the form given in (2), estimated using Sun and Abraham (2021) estimator for firms that survive after the shock (i.e., firms that do not exit after the shock). The dependent variables are: log total sales (panel (a)), log profits (panel (b)), log total wage bill (panel (c)), log total expense on raw materials (panel (d)), log total assets (panel (e)), and log total borrowings (panel (f)). A firm is identified as treated in a year if QRs were removed on its highest-revenue product. θ_0, the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1997 to 2001, with the x-axis denoting years relative to the event. All regressions include firm and three-digit industry $\times$ year fixed effects. Standard errors are clustered at the three-digit industry $\times$ year level. The vertical lines are the 95 percent confidence intervals. *Source:* CMIE Prowess$_{dx}$ and archives of the Ministry of Commerce, Government of India.

Figure A8: Domestic Firms Contract After QR Removal: Robustness to Alternative Treatment Assignment Based on All Products Contributing $\geq$ 10% of Firm Revenue



Notes: The figure plots the estimated θ_k event study coefficients from a regression of the form given in (2), estimated using Sun and Abraham (2021) estimator. The dependent variables are: log total sales (panel (a)), log profits (panel (b)), log total wage bill (panel (c)), log total expense on raw materials (panel (d)), log total assets (panel (e)), and log total borrowings (panel (f)). A firm is identified as treated in a year if QRs were removed on any product that accounts for at least 10% of the firm's total production value. θ_0, the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1997 to 2001, with the x-axis denoting years relative to the event. All regressions include firm and three-digit industry $\times$ year fixed effects. Standard errors are clustered at the three-digit industry $\times$ year level. The vertical lines are the 95 percent confidence intervals. *Source:* CMIE Prowess$_{dx}$ and archives of the Ministry of Commerce, Government of India.

Figure A9: Firms Reduce Family Members on the Executive Board of Directors after the QR Shock: Robustness to Two-way Fixed Effects Estimator



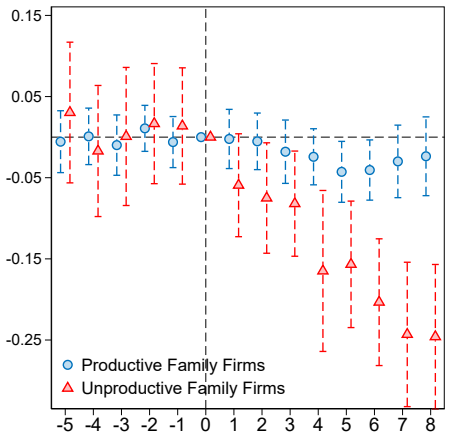
Notes: The figure plots the estimated θ_k event study coefficients from a regression of the form given in (2), estimated using two-way fixed effects estimator. The dependent variables are: the share of family members on the executive board of directors of a firm (i.e., top management positions like CEO, CFO, MD, etc.) in panel (a) and (b), the number of family members on the executive board of directors in panel (c) and the number of non-family professionals on the executive board of directors in panel (d). In panel (b), firms are divided into two mutually exclusive groups: first are firms that are in the bottom tercile of pre-policy productivity (shown in red triangles) and second are all remaining firms (shown in blue circles). Productivity (TFPQ) is estimated using the method proposed by Ackerberg et al. (2015). A firm is identified as treated in a year if QRs are removed on its highest-revenue product. θ_0, the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1997 to 2001, with the x-axis labels denoting years relative to the event. All regressions include firm and three-digit industry $\times$ year fixed effects. Standard errors are clustered at the three-digit industry $\times$ year level. The vertical lines are the 95 percent confidence intervals. *Source: Source:* CMIE Prowess$_{dx}$ and archives of the Ministry of Commerce, Government of India.

Table A4: Firms Reduce Family Members on the Executive Board of Directors after the QR Shock

	(1) Share of Top Family Managers	(2) Number of Family Managers	(3) Number of Non-Family Managers
5 years before event	0.0045	-0.084	0.018
	(0.023)	(0.070)	(0.064)
4 years before event	-0.000056	-0.099*	-0.010
	(0.024)	(0.058)	(0.060)
3 years before event	-0.0038	-0.074	0.0097
	(0.020)	(0.061)	(0.058)
2 years before event	0.0017	-0.037	-0.021
	(0.019)	(0.058)	(0.058)
1 year before event	-0.015	-0.12*	0.022
	(0.018)	(0.064)	(0.058)
1 year after event	-0.012	-0.11**	0.083*
	(0.019)	(0.054)	(0.051)
2 years after event	-0.030*	-0.088	0.099**
	(0.017)	(0.053)	(0.048)
3 years after event	-0.044**	-0.17***	0.12**
	(0.018)	(0.055)	(0.047)
4 years after event	-0.062***	-0.20***	0.090*
	(0.018)	(0.056)	(0.049)
5 years after event	-0.062***	-0.28***	0.088*
	(0.018)	(0.054)	(0.048)
6 years after event	-0.072***	-0.22***	0.15***
	(0.017)	(0.056)	(0.050)
7 years after event	-0.068***	-0.21***	0.14***
	(0.017)	(0.055)	(0.054)
8 years after event	-0.077***	-0.22***	0.19***
	(0.018)	(0.053)	(0.051)
Firm FE	✓	✓	✓
Industry × Year FE	✓	✓	✓
Observations	23445	23800	23800
R^2	0.83	0.78	0.75

Notes: The table shows the results of running the event study specification (2), estimated using Sun and Abraham (2021) estimator. The coefficients correspond to those plotted in Figure 6 in panels (a), (c) and (d) respectively. The dependent variables are: the share of family members on the executive board of directors of a firm (i.e., top management positions like CEO, CFO, MD, etc.) in (column (1)), the number of family members on the executive board of directors in (column (2)) and the number of non-family professionals on the executive board of directors in (column (3)). A firm is identified as treated in a year if QRs were removed on its highest-revenue product. θ_0, the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1997 to 2001. All regressions include firm and three-digit industry × year fixed effects. Clustering of standard errors is at the three-digit industry × year. Standard errors are in parentheses. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. *Source:* CMIE Prowess$_{dx}$ and archives of the Ministry of Commerce, Government of India.

Figure A10: Negative Selection into Professionalizing: Robustness to Alternative Definition of Firm Productivity (DeLoecker et al., 2016)



Notes: This figure presents the estimated θ_k event study coefficients from a regression specified in equation (2). The dependent variable is the share of top family managers dropped from the board while transitioning toward professional management. Here, we examine selection into professionalizing by comparing firms based on their pre-policy productivity levels. Firms are divided into two mutually exclusive groups: first are firms that are in the bottom tercile of pre-policy productivity (shown in red triangles) and second are all remaining firms (shown in blue circles). Productivity (TFPQ) is estimated using the method proposed in DeLoecker et al. (2016). A firm is identified as treated in a year if QRs are removed on its highest-revenue product. θ_0, the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1997 to 2001, with the x-axis indicating years relative to the event. All regressions include firm and three-digit industry $\times$ year fixed effects. Standard errors are clustered at three-digit industry $\times$ year level. The vertical lines represent 95 percent confidence intervals. *Source:* CMIE Prowess$_{dx}$ and the Ministry of Corporate Affairs, Government of India.

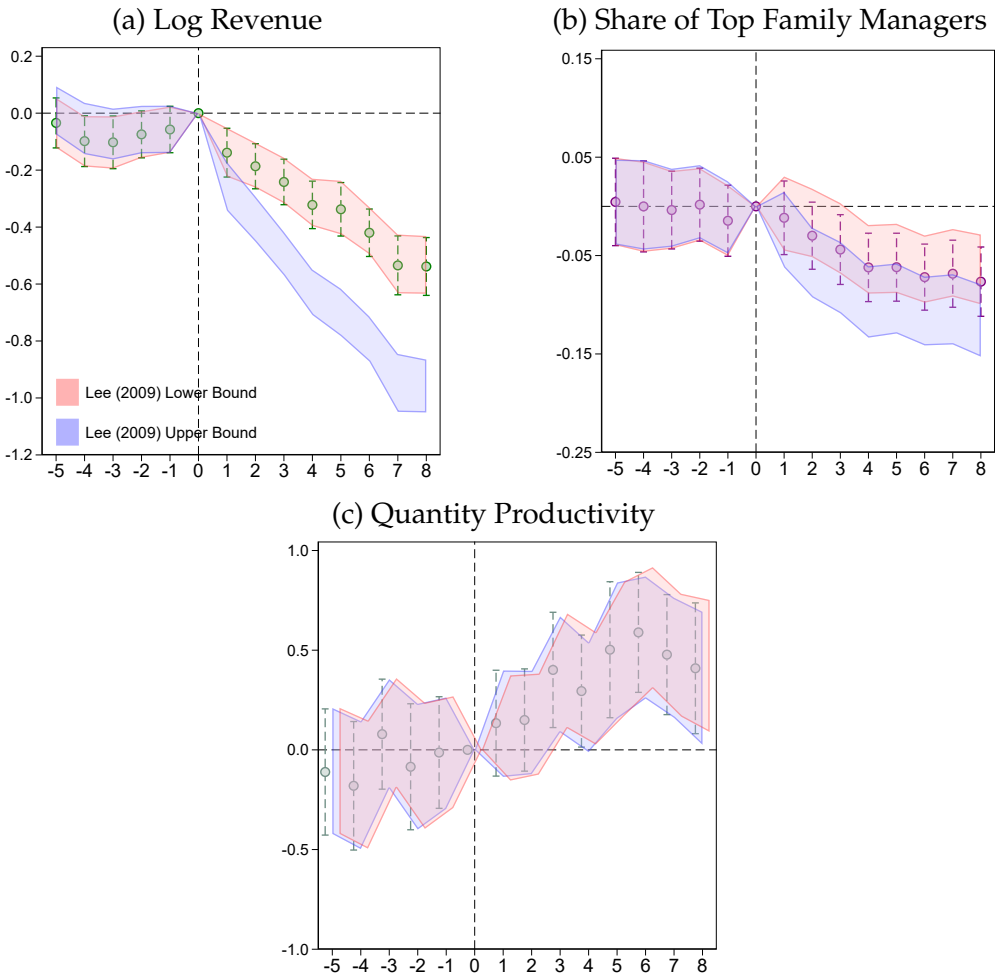
A.5 Appendix: Firm Level Event Studies: Managerial Turnover and Firm Productivity

Table A5: Placebo Test: No Productivity Change due to Trade in Already Professionalized Firms

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

Notes: This table presents the average of estimated θ_k event study coefficients from a regression specified in equation (2). The table reports average effects of import competition on productivity of firms. Productivity (TFPQ) is estimated using the method proposed by Ackerberg et al. (2015). Average treatment effects are calculated separately for Baseline family firms (column 1), which had at least two family members on the executive board in the pre-policy period, and Baseline professional firms (column 2), which had no family members on the executive board. Robust standard errors clustered at the three-digit industry × year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. *Source:* CMIE Prowess, the Ministry of Corporate Affairs, Government of India, and archives of the Ministry of Commerce.

Figure A11: Event Study Estimates with Lee Bounds: Firm Revenue, Managerial Composition, and Productivity



Notes: Panels (a) and (b) plot the θ_k event-study coefficients from equation (2), estimated using the Sun and Abraham (2021) estimator, for log revenue and the share of top family managers, respectively. Following Lee (2009), I construct selection bounds to account for differential attrition by trimming 15% of control-group observations in each post-event year (as implied by the verified exit differential in Table 3). The red (blue) band reports the 95% confidence region for the Lee lower (upper) bound, obtained by trimming the upper (lower) tail of the control-group outcome distribution in each post-event year. Panel (c) reports analogous Lee bounds for a triple-difference event-study specification for quantity productivity: I interact the treatment event-time indicators with an indicator for whether the firm professionalizes (defined as a decline in the family share on the executive board over the post-policy window). Each θ_k in panel (c) therefore captures the differential post-QR change in TFPQ for professionalizing firms relative to non-professionalizing firms, comparing treated and control groups. Equivalently, it corresponds to the gap between the orange and purple event-study paths in panel (a) of Figure 9. TFPQ is estimated following Ackerberg et al. (2015). All regressions include firm and three-digit industry $\times$ year fixed effects. Standard errors are clustered at the three-digit industry $\times$ year level. Vertical bars denote 95 percent confidence intervals. *Source:* CMIE Prowess$_{dx}$, administrative data from the Ministry of Corporate Affairs, Government of India, and archives of the Ministry of Commerce, Government of India.

A.6 Appendix: Estimation

As mentioned in Section 6, firms draw their productivity parameter $z \geq 1$ from a Pareto distribution with cdf $G(z) = 1 - z^{-k}$ and survival function $S(z) \equiv \Pr(Z \geq z) = z^{-k}$.

Thus, the mass of all firms M_{all}, family firms M_{all}, and professional firms, M_{prof}, is given by:

$$\begin{aligned} M_{\text{all}} &= S\left(z_e\right) = z_e^{-k}, \\ M_{\text{fam}} &= S\left(z_f\right) - S\left(z_d\right) = z_f^{-k} - z_d^{-k}, \\ M_{\text{prof,low}} &= S\left(z_e\right) - S\left(z_f\right) = z_e^{-k} - z_f^{-k}, \\ M_{\text{prof,high}} &= S\left(z_d\right) = z_d^{-k}, \\ M_{\text{prof}} &= M_{\text{prof,low}} + M_{\text{prof,high}} \,. \end{aligned} \tag{16}$$

where the mass of professional firms can further be split into laggard firms who professionalize to avoid exit and frontier firms who professionalize for higher profits.

Using (8), (10), and (11),

$$M_{\text{fam}} = z_f^{-k} \underbrace{\left(1 - \left(\frac{1}{\chi}\right)^{\frac{k}{\sigma-1}}\right)}_{>0} \tag{17}$$

where $\chi \equiv \frac{B}{f(\gamma^{\sigma-1}-1)} > 1$ (11).

Moment 1: Share of Family Firms.

$$\begin{aligned} \text{Share}_{\text{fam}} = \frac{M_{\text{fam}}}{M_{\text{all}}} &= \frac{z_f^{-k} - z_d^{-k}}{(z_f/\gamma)^{-k}} \\ &= \gamma^{-k}\left[1 - \left(\frac{1}{\chi}\right)^{\frac{k}{\sigma-1}}\right]. \end{aligned}$$

Thus, conditional on independently identifying σ and k, this moment depends on f, B, γ. It does not depend on market demand A or the aggregate price level, P.

Moment 2: Difference in Mean Log Revenue between Family and Professional Firms. I identify the productivity gain from professionalization, $\gamma > 1$, using the average revenue gap between professional and family-managed firms, i.e.

$$\log\big(\text{mean revenue} \mid \text{professional}\big) - \log\big(\text{mean revenue} \mid \text{family}\big).$$

Revenues for family and professional firms are given by

$$\begin{aligned} r_{\mathsf{fam}}(z) &= \sigma A z^{\sigma-1}, \\ r_{\mathsf{prof}}(z) &= \sigma A(\gamma z)^{\sigma-1} = \sigma A \gamma^{\sigma-1} z^{\sigma-1}. \end{aligned}$$

Hence, mean revenues are given by

$$\bar{r}_f = \sigma A\, E_{\mathsf{fam}}, \qquad \bar{r}_p = \sigma A\, \gamma^{\sigma-1} E_{\mathsf{prof}},$$

where

$$E_{\mathsf{fam}} = \frac{\displaystyle\int_{z_f}^{z_d} z^{\sigma-1} k z^{-k-1}\, dz}{\displaystyle\int_{z_f}^{z_d} k z^{-k-1}\, dz} \;=\; K\, \frac{z_f^{\alpha} - z_d^{\alpha}}{z_f^{-k} - z_d^{-k}}, \tag{18}$$

$$\begin{aligned} E_{\mathsf{prof}} &= \frac{\displaystyle\int_{z_e}^{z_f} z^{\sigma-1} k z^{-k-1}\, dz + \int_{z_d}^{\infty} z^{\sigma-1} k z^{-k-1}\, dz}{\displaystyle\int_{z_e}^{z_f} k z^{-k-1}\, dz + \int_{z_d}^{\infty} k z^{-k-1}\, dz} \\ &= K\, \frac{z_e^{\alpha} - z_f^{\alpha} + z_d^{\alpha}}{z_e^{-k} - z_f^{-k} + z_d^{-k}}, \end{aligned} \tag{19}$$

and $\alpha \equiv \sigma - k - 1 < 0$ and $K \equiv \frac{k}{k-(\sigma-1)} > 0$.

Thus, the mean log revenue difference between family and professional firms is given by

$$\mathcal{R} = (\sigma - 1)\, \log \gamma + \log E_{\mathsf{prof}} - \log E_{\mathsf{fam}}.$$

The first term, $(\sigma - 1) \log \gamma$, is the direct scale effect of professionalization. The second term, $\log E_{\mathsf{prof}} - \log E_{\mathsf{fam}}$ is the composition effect: professionals occupy the outer tails of the Pareto distribution, which (given $k > \sigma - 1$) raises their mean $z^{\sigma-1}$ relative to family firms.

Moment 3: Share of firms with negative profits. Because productivity draws are Pareto, $G(z) = 1 - z^{-k}$, the share of entrants whose monetary profits are negative is

$$\text{Share}_{\pi<0} = \Pr[z < z_e] = 1 - z_e^{-k},$$

where $z_e = z_f/\gamma$ and $z_f = (f/A)^{1/(\sigma-1)}$. Substituting yields

$$\text{Share}_{\pi<0} = 1 - \gamma^k \left(\frac{f}{A}\right)^{-k/(\sigma-1)}.$$

Note that in the model, active firms cannot operate with $\pi < 0$, so $\Pr[z < z_e]$ reflects the mass of entrants that immediately draw productivity below the survival threshold and thus exit. In the data, I approximate this exit margin using the share of firms that report negative accounting profits. This proxy is motivated by two considerations. First, in steady state the mass of firms drawing $z < z_e$ each period equals the observed flow of exits. Second, firms in practice often post accounting losses for some years before formally exiting, so the prevalence of loss-making firms provides an informative measure of the relevant exit margin.

A.7 Model Misspecification from Ignoring Contracting Frictions

This appendix evaluates the potential bias in the estimated parameters $(\mathcal{B}, \gamma, f)$ and the resulting aggregate productivity decomposition if the true economic environment contains contracting frictions ($\tau > 0$) while the model assumes no such frictions ($\tau = 0$).

Theoretical Framework of Misspecification. In the baseline model, the firm's payoff is defined by the trade-off between baseline productivity (z) and professional management (γz) without expropriation. If the true model includes a friction τ, where a fraction of operating profits is expropriated by professional managers, the payoffs become:

$$\text{Firm's payoff} = \begin{cases} Az^{\sigma-1} - f + \mathcal{B} & \text{if } \mathcal{M} = 0, \\ (1-\tau) \cdot A(\gamma z)^{\sigma-1} - f & \text{if } \mathcal{M} = 1, \\ 0 & \text{if the firm exits.} \end{cases} \tag{20}$$

Impact on Productivity Thresholds. The introduction of $\tau > 0$ shifts the selection thresholds relative to the baseline $\tau = 0$ case. In the notation below z^τ denotes a productivity threshold with $\tau > 0$ and z^0 denotes the threshold in the baseline model,

with $\tau = 0$.

- **Family survival threshold (z_f)** remains unchanged: $z_f^\tau = z_f^0 = (f/A)^{1/(\sigma-1)}$ because family firms do not incur the friction τ.
- **Professional survival threshold (z_e)** increases as firms require higher baseline productivity to cover fixed costs after expropriation:

$$z_e^\tau = \frac{z_f^0}{\gamma(1-\tau)^{1/(\sigma-1)}} = \left(\frac{1}{1-\tau}\right)^{\frac{1}{\sigma-1}} \cdot z_e^0 > z_e^0$$

- **Professionalization for profit threshold (z_d)** also increases as the productivity level required for profit gains to offset the loss of private benefits $\mathcal{B}$ shifts rightward:

$$z_d^\tau = \left(\frac{\mathcal{B}}{f[(1-\tau)\gamma^{\sigma-1}-1]}\right)^{\frac{1}{\sigma-1}} z_f^0 = \left(\frac{1}{1-\tau}\right)^{\frac{1}{\sigma-1}} \cdot z_d^0 > z_d^0$$

Bias in Estimated Parameters The joint estimation routine minimizes the distance between the model moments and the empirical data. Misspecification forces the structural parameters to compensate for the omitted τ term.

1. Gains from Professionalizing ($\hat{\gamma}$) — Downward Bias. The second moment is the log revenue difference between professional and family firms. In the true model, the observed revenue of professional firms is net of expropriation. The observed gap $\mathcal{R}_\tau$ is:

$$\mathcal{R}_\tau = (\sigma-1)\ln\gamma + \ln(1-\tau) + [\ln E_{prof}^\tau - \ln E_{fam}^\tau], \tag{21}$$

where

$$E_{fam}^\tau = \frac{\int_{z_f}^{z_d^\tau} z^{\sigma-1} g(z)dz}{\int_{z_f}^{z_d^\tau} g(z)dz}$$

and

$$E_{prof}^\tau = \frac{\int_{z_e^\tau}^{z_f} z^{\sigma-1} g(z)dz + \int_{z_d^\tau}^{\infty} z^{\sigma-1} g(z)dz}{\int_{z_e^\tau}^{z_f} g(z)dz + \int_{z_d^\tau}^{\infty} g(z)dz}.$$

When $\tau > 0$, E_{prof} rises for two reasons. First, the increase in z_e^τ removes the lowest-productivity professional survivors, raising the average productivity of the segment. Second, the increase in z_d^τ means the high-productivity professional segment starts at a higher baseline point, further increasing E_{prof}.

Simultaneously, E_{fam} increases because the family pool now retains high-productivity firms (between z_d^0 and z_d^τ) that forgo professionalization. Because the Pareto distribu-

tion ($k = 3.5$) is bottom-heavy, the mechanical revenue loss from $\ln(1-\tau)$ is the first-order effect. To match the smaller observed revenue gap while assuming $\tau = 0$, the routine attributes the lower revenue to a lower intrinsic productivity gain ($\hat{\gamma} < \gamma_{\text{true}}$).

2. Private Benefits $(\hat{\mathcal{B}})$ — Upward Bias Moment 1 is the share of family firms. Frictions make family management relatively more attractive by increasing the threshold z_d. To explain a high observed share of family firms in a model where professionalization appears "frictionless" ($\tau = 0$), the routine must assume owners place an erroneously high non-monetary value on family control, leading to $\hat{\mathcal{B}} > \mathcal{B}_{\text{true}}$.

3. Fixed Operating Cost $\left(\hat{f}\right)$ — Upward Bias Moment 3 targets the share of firms with negative accounting profits. Under $\tau > 0$, professional firms are pushed closer to the zero-profit margin at higher productivity levels. If τ is ignored, the model must compensate by assuming higher fixed operating costs f to replicate the mass of firms near the exit threshold, resulting in $\hat{f} > f_{\text{true}}$.

Impact on Trade-Induced Productivity Gains The aggregate productivity contribution of the within-firm channel, roughly 30% in the baseline, likely represents a conservative lower bound due to the joint bias in the estimated parameters $\hat{\gamma}$ and $\hat{f}$. The downward bias in $\hat{\gamma}$ mechanically underestimates the efficiency boost contributed by every firm that switches management structure. Second, the upward bias in the fixed cost leads to an artificially high survival hurdle, which pushes marginal laggard firms into exit rather than professionalization during the trade shock, overstating the between-firm exit channel at the expense of the within-firm reorganization channel. While the overestimation of private benefits $(\hat{\mathcal{B}})$ distorts the baseline mass of family firms, it does not alter the fundamental incentive for a laggard firm to professionalize, as the non-pecuniary benefit is lost regardless of whether the firm exits or upgrades its management.