

Family Matters: Globalization, Management, and Firm Productivity^{*}

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Abstract

How does globalization affect firm management and productivity? I investigate this question by pairing a product-specific import competition shock in India with new data on family-managed firms, the predominant form of corporate governance in the developing world. Using this novel manager-firm matched dataset, I analyze tenure records and family ties of over 6 million company directors. Employing an event-study approach, I find that firms exposed to import competition replace family managers with unrelated professional executives, increasing firm productivity by 20 percent. I embed management choice in a Melitz model where family firms balance non-pecuniary private benefits of family management against higher profits achievable through professional management. Consistent with empirical findings, the model predicts that import competition forces the least productive family firms to professionalize management, boosting productivity. These within-firm improvements account for 30 percent of total gains from liberalization, underscoring managerial restructuring as a key channel for productivity growth.

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

It is commonly believed that the competitive pressures of globalization can boost firm productivity and reduce operational slack. A key channel through which firms can achieve higher productivity is managerial innovation and organizational change. However, in the absence of such pressures, the incentive to pursue these improvements may wane. As early as 1776, Adam Smith remarked that “*monopoly... is a great enemy to good management*,” capturing the intuition that competition plays a disciplining role in managerial behavior (Smith, 1776). Alfred Marshall later echoed a similar view, noting that many firms postpone productivity-enhancing changes until external forces compel them “*to exert themselves to the utmost to invent improved methods*” (Marshall, 1926). Despite their enduring influence, these ideas remain empirically underexplored. In today’s global context—marked by a retreat from free trade and a renewed emphasis on protectionism and industrial policy—the question of how competition shapes internal firm organization has gained renewed urgency.

In this paper, I examine how globalization and import competition influence *within-firm* productivity. In particular, I demonstrate that exposure to global competition compels firms to overhaul their board of directors and top management, triggering fundamental changes in their organizational structure that are correlated with within-firm productivity improvements. I focus on the management structures of family-managed firms in India, the predominant form of corporate governance in many developing countries (La Porta et al., 1999; Lemos and Scur, 2019).

Family firms typically emerge for two broad reasons (Bertrand and Schoar, 2006). First, in cultures with strong family values, founders may derive intrinsic satisfaction from involving kin in the management of their business. Second, in countries with weak legal institutions, family firms may represent an optimal response, as trust among family members can substitute for robust contract enforcement. In either case, unless family members are also the most talented managers, the dominance of family management often reflects a failure of meritocracy that leads to misallocation of talent *within* the firm. A substantial body of research has shown that family firms are less productive and follow poorer management practices than firms whose top managers are unrelated to the founder (Pérez-González, 2006; Bennedsen et al., 2007; Bloom et al., 2012, 2013a). In this paper, I show that trade exposure reduces talent misallocation within firms by compelling them to reassess the tradeoff between the non-monetary benefits of family management and the higher productivity potential of professional management, ultimately driving improvements in firm performance.

Prior research has not conclusively examined the role of competition and talent allocation within firms due to a combination of data limitations, empirical challenges, and theoretical constraints. First, a primary obstacle is the need for detailed data on a firm’s *internal organization*; most firm-level datasets concentrate on balance sheet and financial variables, leaving information on organizational structure and management composition scarce. Second, identifying exogenous variation in competitive pressures across product markets is challenging. Even policies like trade liberalizations often generate export opportunities for domestic firms or occur alongside domestic reforms, thereby complicating efforts to isolate the impact of competition. Finally, on the theoretical side, classical price theory leaves no room for competition-induced improvements in productivity: there is no possibility for internal reallocation of resources within a firm

that is already operating optimally (Stigler, 1976).

I address these challenges in four steps. First, I identify and digitize old policy notifications from the archives of India's Commerce Ministry. This enables the analysis of a previously unexamined product-level import liberalization policy that exposed over a third of Indian manufacturing firms to heightened import competition. In the second step, I construct a novel manager-firm matched microdata with rich information on the tenure and family ties among the board of directors of firms. Third, I estimate event studies to provide a direct assessment of how trade shocks affect firms' production, organization, and productivity. In the final step, I develop a model of industry equilibrium where firms balance the non-pecuniary private benefits of employing family managers against the higher profitability achievable through professional management. For example, a firm owner may derive pleasure if their children or siblings run the firm. However, family managers may not be the most talented at running the firm. The model shows how increased import competition sharpens this trade-off between private benefits and profits, prompting low-productivity firms to professionalize their management to enhance productivity and avoid market exit. The theoretical framework also enables me to quantify the impact of within-firm productivity changes on aggregate TFP.

The foundation of my empirical analysis is a natural experiment stemming from the dismantling of India's Import License Raj in the late 1990s and early 2000s. This regime was among the most extensive protectionist policies ever implemented, effectively banning imports of almost all consumer goods since the mid-1950s. Although the widespread economic reforms of 1991 significantly reduced tariff and non-tariff barriers for intermediate goods (Hasan et al., 2007; Topalova, 2010; Goldberg et al., 2010a; Topalova and Khandelwal, 2011; DeLoecker et al., 2016), non-tariff measures—in the form of quantitative restrictions (QRs)—remained on virtually all *final consumer goods*, accounting for roughly 30 percent of all tariff lines, until 2001.

These protections were enabled by specific provisions in the General Agreement on Tariffs and Trade (GATT) Articles that permitted developing countries to impose QRs to safeguard their external financial stability. For nearly half a century, these QRs insulated Indian manufacturing firms from foreign competition. However, in the late 1990s, the United States challenged India's continued use of these provisions by approaching the WTO, arguing that India's growing foreign reserves no longer justified such measures. Joined by several other countries, this challenge culminated in a WTO ruling—based on an independent IMF assessment affirming India's robust external position—that required the removal of QRs on balance-of-payments grounds across *all goods*. Consequently, nearly 3,000 goods at the HS 8-digit level, primarily final consumer goods, were liberalized.

Several features make this policy ideal for empirical analysis. First, the QR removal was externally imposed, with its timing and scope determined by the WTO and supported by an independent IMF assessment, minimizing domestic political or strategic influences. Second, unlike the comprehensive domestic reforms of 1991, the late-1990s QR removal occurred in relative isolation, reducing confounding effects and strengthening causal attribution to the policy change. Third, by targeting specific, narrowly defined HS-8 digit products (mostly final consumer goods), the reform generates quasi-experimental variation in import competition, enabling the use of an event study de-

sign. The focus on consumer goods ensures that the primary mechanism at work is a demand shock stemming from heightened import competition in consumer goods markets rather than cost reductions from cheaper intermediate inputs. Fourth, as a unilateral trade liberalization measure, it enhanced foreign access to the Indian market without concurrently improving export conditions for domestic firms, further isolating the impact of increased import competition. Finally, because this trade liberalization took place in the late 1990s and early 2000s, high-quality firm-level panel data are readily available—unlike the 1991 reforms in India or comparable policies in the 1980s and 1990s in other regions.

To examine how import competition influences firm-level operations and management, I assembled three novel datasets that, when integrated with comprehensive panel data on large and medium-sized firms, form the core of this analysis. To build the first of these datasets, I digitized archival documents from the Ministry of Commerce to create a detailed dataset of products subject to QRs, capturing the exact dates of their removal. This process enabled me to construct a novel HS 8-digit product-level database that chronicles QRs in India during the 1990s and their subsequent removal in the late 1990s and early 2000s.

A critical challenge arose from the fact that government notifications on QRs use HS product codes, which differ from the product nomenclature in the firm panel data. To address this, in the second step, I developed a novel concordance linking almost 3000 HS 8-digit codes to over 6,000 product categories in the firm panel data, thereby providing a precise measure of a firm's exposure to import competition—determined by whether a firm produces an affected product. Unlike previous studies that typically define exposure at broad industry levels—largely due to data constraints and the lack of detailed concordances—this approach identifies which firms produce the affected products directly, offering a much more granular and accurate measure of the import competition they face.

Finally, I obtained first-time access to administrative data from the Ministry of Corporate Affairs (MCA), which includes records on over 6 million company directors with complete tenure histories dating back to the 1970s. Researchers studying family firms often rely on last-name matching to infer family ties. However, this method can be imprecise in India, where last names may indicate caste rather than actual familial relationships. In contrast, the dataset used here includes managers' fathers' names. This additional detail allows for a more accurate identification of family connections within firm boards. By merging these administrative records with the firm panel data, I build a comprehensive dataset that captures firm production, product scope, and internal organizational structures—paving the way for a rigorous analysis of how the trade shock impacted firm operations, size, and most significantly, their internal organization and management structures.

The empirical analysis proceeds in three steps. First, I study aggregate HS-6 digit import and export data from the Indian customs to estimate the direct impact of QR removal on import competition in India. The event-study analysis reveals that, following the reform, treated products experienced a dramatic and persistent surge in imports—both in value and quantity. By the third year, the import value for products affected by the policy exceeded that of the control group by over 50 percent, while import quantities increased by roughly 1 log point, equivalent to over 150 percent. Notably, these

changes were observed only for imports, as export outcomes remained largely unaffected, underscoring the unilateral nature of the reform.

Second, at the firm level, the intensified import competition precipitated significant contractions in domestic firms' financial performance and scale. Both family and non-family firms producing QR-affected goods experienced sharp declines in total revenues relative to firms in the control group— about 20 percent by the third year and nearly 50 percent by the eighth year post-reform— accompanied by substantial reductions in operating profit margins. The shock also triggered a persistent decline in cost components, including labor and raw materials expenses, reflecting a systematic cut-back in operations. These reductions translated into notable contractions in firm size, with treated firms' total assets initially falling by approximately 10 percent and nearly 30 percent over time. Importantly, these financial and scale adjustments were not solely driven by firm exit, as similar patterns emerge even when analyses are restricted to surviving firms.

Beyond the measurable contractions in firm scale and financial performance, the QR removal catalyzed a marked transformation in managerial turnover and corporate governance of family-managed firms that were exposed to import competition. Faced with deteriorating financial performance, these firms began to reconfigure their top management structures. The evidence shows a clear reduction in the share of family members on executive boards— dropping by almost 10 percentage points within a few years— with a corresponding increase in non-family professional managers. This managerial turnover was especially pronounced among firms that were less productive before the reform, indicating a selective move towards professionalization where it was most needed. Furthermore, firms that replaced family managers with external professionals experienced significant productivity improvements, with revenue and quantity productivity measures diverging positively from those that retained family-dominated management. This correlation between professionalizing management and productivity enhancements is suggestive of the role that external managerial talent may play in enabling firms to effectively respond to heightened import competition, unlock latent efficiencies, and drive long-term performance improvements. Concurrently, these professionalizing firms also reduced their average output prices, suggesting that the adoption of external expertise was correlated with cost-cutting. These results shed light on the broader question of why firms in more competitive markets exhibit higher productivity— a phenomenon commonly associated with what [Leibenstein \(1966\)](#) termed “X-inefficiency.” Yet, the mechanisms driving the correlation between productivity and competition remain poorly understood ([Backus, 2020](#)). Understanding these dynamics has implications across various economic applications.

If hiring external managers is productivity-enhancing, why do family firms wait for import competition to upgrade their management to outside professionals? To answer this question and quantify the aggregate impact of these firm-level adjustments, I develop a model of industrial equilibrium in which the allocation of top managerial talent within the firm takes center stage. I consider an economy operating under monopolistic competition, where firms produce differentiated products that together form a composite final good. Each firm begins as a family firm, with entrepreneurs enjoying *non-monetary private benefits* from retaining family control over management. For example, an entrepreneur may derive pleasure if their children or siblings run the firm. Such amenity value of family control of firm management has a long tradition in the

corporate finance literature (Demsetz and Lehn, 1985; Burkart et al., 2003; Bertrand and Schoar, 2006). Naturally, the firm may only enjoy such private benefits as long as the firm is alive. If the firm exits, the firm's owner loses any private benefits associated with running a family firm. A firm can choose to upgrade its management by hiring external professionals— a decision that boosts its productivity by some constant multiplier. However, professionalization comes at a cost: the firm's owner loses all private benefits associated with running the business as a family firm.

The model predicts a dual selection mechanism into managerial upgradation that hinges on the firm's baseline productivity. Specifically, ex-ante low-productivity firms— hereafter referred to as *laggards*— professionalize management primarily as a *survival mechanism* because their weak performance makes them vulnerable to competition-induced exit. This form of negative selection arises when the urgency to remain viable outweighs the benefits of retaining family control. In contrast, ex-ante high-productivity firms—termed *frontier firms*— professionalize management due to its *efficiency-boosting mechanism*, whereby the gains from professional management further enhance their already high level of productivity, as in Bustos (2011). Firms with intermediate ex-ante productivity levels, however, tend to retain family management since the incremental benefits of upgrading their management do not fully compensate for the loss of valuable non-monetary private benefits.

Import competition alters firms' incentives to professionalize management in a heterogeneous manner. For laggard firms, survival becomes even more challenging as increased competition erodes profits, prompting them to cede managerial control to professional managers to avoid exit. Although this shift entails the loss of cherished family benefits, it is essential for preserving the firm. Conversely, for frontier firms, professional management becomes less appealing under the trade shock, as lower profits make it difficult to justify the loss of the private benefits associated with family management. Thus, the model predicts that the least productive family firms are most likely to upgrade their management in response to the trade shock— a pattern that is mirrored in the empirical results.

I calibrate the model to quantify the impact of trade liberalization on managerial choices and aggregate productivity. To ensure that the model accurately reflects key features of Indian firms, I set its parameters by matching the predictions of the model with several empirical facts. These include the overall prevalence of family-managed firms and the observed productivity gap between family-run and professionally-managed companies.

Using this calibrated model, I perform a policy counterfactual to simulate the effects of removing quantitative restrictions, thereby intensifying import competition faced by Indian firms. In response to this competitive pressure, many firms professionalize their management to enhance efficiency, while the least productive family-managed firms exit the market entirely. This managerial restructuring leads to substantial productivity gains: aggregate productivity increases by 12 percent. A decomposition reveals that approximately 70 percent of this increase comes from the exit of less productive firms, with the remaining 30 percent stemming from within-firm productivity improvements driven by professional management. This quantitative exercise highlights the crucial role managerial reorganization plays in mediating the productivity gains from trade liberalization.

Contribution to the Literature: Existing research on trade-induced productivity improvements has predominantly focused on production-side adjustments. These include changes in imported inputs (Amiti and Konings, 2007; Topalova and Khandelwal, 2011), shifts in product scope (Bernard et al., 2011), or innovation and technology upgrading (Bustos, 2011; Bloom et al., 2016; Hombert and Matray, 2018; Perla et al., 2021). However, many of these studies focus on trade liberalization episodes that provide export opportunities to domestic firms rather than assess the impact of import competition. Moreover, with the notable exception of Chen and Steinwender (2021), relatively little attention has been devoted to how managerial incentives and organizational structures respond to trade shocks. In contrast, this paper demonstrates that import competition also induces important changes in firms’ internal management structures. Specifically, heightened competitive pressures lead to increased managerial turnover and a greater reliance on external professional managers, mechanisms that can unlock significant aggregate productivity gains. Moreover, while family-managed firms constitute a dominant form of corporate governance in many developing countries, they have received relatively little attention in the trade literature (Atkin and Khandelwal, 2020, 2022). This study fills that gap by directly examining how family firms respond to trade shocks. Related literature in trade focuses on how organizational hierarchies respond to trade (Caliendo and Rossi-Hansberg, 2012; Marin and Verdier, 2014). This study complements these studies by uncovering additional dimensions through which trade reshapes organization structures.

A substantial body of work has documented the critical role of management practices in enhancing firm productivity (Bloom and Van Reenen, 2007; Bloom et al., 2012, 2021). For instance, Bloom et al. (2013b) finds in a randomized controlled trial that adopting improved management practices can raise productivity by as much as 17 percent among large and medium-sized Indian manufacturing firms. This naturally raises the question of why firms do not adopt better practices on their own. Prior research suggests that weak product market competition and the prevalence of family members in managerial roles may be to blame (Bloom and Van Reenen, 2007). In this paper, I combine both forces to tackle this question head-on. Moreover, past research indicates that trust issues between owners and external professionals can constrain the effective span of control. In support of this view, Akcigit et al. (2021) calibrate a model showing that inefficiencies in the delegation environment account for roughly 11 percent of the income per capita gap between the United States and India. While my work is complementary to theirs, it differs in mechanism: in my model, firms professionalize to avoid exit, whereas, in theirs, professionalization is driven by the need to overcome the constraints imposed by the limited span of control of family management.

The broader debate on the link between competition and productivity dates back to Hicks (1935)’s remark that *“the best of all monopoly profits is a quiet life.”* Subsequent studies have proposed various mechanisms, including competition as an incentive to mitigate agency problems through the threat of liquidation (Schmidt, 1997), improved information flow that alleviates moral hazard (Hart, 1983; Nalebuff and Stiglitz, 1983), and the changing incentives for cost reduction in settings with endogenous market structures (Raith, 2003). This paper is complementary to these perspectives— particularly resonating with Schmidt (1997)— by illustrating how increased import competition compels firms to forgo non-monetary benefits associated with family management in favor of strategies that ensure survival.

Finally, there is rich literature on family firms. For example, [Bertrand and Schoar \(2006\)](#) provide a comprehensive survey, while [Burkart et al. \(2003\)](#) develop a model highlighting the role of the legal environment in family firm succession. Empirical studies have generally found that family-controlled firms perform poorly compared to their professionally managed counterparts ([Pérez-González, 2006](#); [Lemos and Scur, 2019](#); [Bandiera et al., 2020](#)), and [Bennedsen et al. \(2007\)](#) use instrumental variables to show that dynastic succession is associated with lower productivity in Denmark. By analyzing family firms during a period of dramatic import competition following the QR-removal policy, this paper offers new insights into managerial succession and turnover under crisis conditions—demonstrating that, when the going gets tough, family firms are more likely to seek external managerial talent to preserve firm viability.

The remainder of the paper is organized as follows. Sections 2 and 3 provide the details of the policy setting and data construction, setting the stage for the event study analysis. Section 4 lays out the empirical strategy and Section 5 presents event study results. Section 6 introduces the theoretical framework. 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.¹ Imports of consumer goods were even more heavily regulated and virtually eliminated ([Bhagwati and Srinivasan, 1975](#); [Krueger, 2010](#)). A complex web of overlapping agencies responsible for certifications 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”.² India utilized this provision of Article XVIII:B to support its QR regime since 1957 ([Pursell and Sattar, 2004](#)).

¹For 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](#)).

²For details, see https://www.wto.org/english/tratop_e/bop_e/bop_e.htm, accessed July 30, 2024.

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 restrictions on 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).

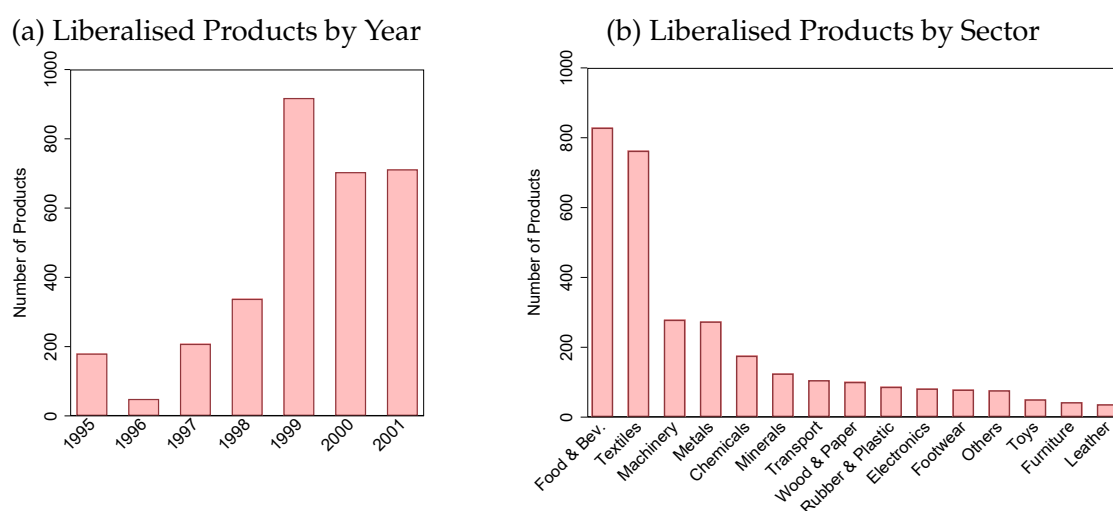
Despite these reforms, India continued to impose stringent QRs on almost all consumer goods and a small number of intermediate products—almost 3000 products at the 8-digit HS level or 30 percent of all tariff lines (Panagariya, 2004). India justified these QRs under Article XVIII:B of the GATT, asserting 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 (1998-2001): 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 1998-2001, these 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 VIII:B. Subsequently, India and the US mutually agreed for a phase-out plan where India agreed to remove all its outstanding BOP-related QRs by April 1, 2001.

Figure 1: Composition of Liberalised 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.³ The IMF held that India is well placed

³According 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

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 either India or any of the disputing countries.

The second noteworthy feature of this policy is that the single technical assessment by the IMF 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, 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 these 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,

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."

it also provides the Director Identification Number (DIN) for these directors, an 8-digit unique identifier issued by the Ministry of Corporate Affairs, Government of India. This feature facilitates matching with a larger administrative dataset from the Ministry of Corporate Affairs, as discussed below. The Prowess dataset includes data for a total of 383,779 directors across 51,125 manufacturing, financial, and non-financial services companies. Unlike the financial and product data, the board data are somewhat incomplete— names are often abbreviated to initials and last names, and designations may be 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 a series of sample selection steps. 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 (i.e., 2000) 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 5002 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 classi-

fication, out of a total of 10,839 ITC-HS 8-digit products, 3,109 products appear in the QR-removal government notifications, and out of these 2,982 are made completely free of any kind of quantitative restriction between 1995 and 2001.

Novel Product Concordances. In the next step, I construct novel product concordances between the 1996 ITC-HS product nomenclature used by the Indian customs authority with 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 ITC-HS 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 ITC-HS products and Prowess products provided by CMIE. Significant manual work was required for this step despite existing concordances, because existing concordances use new vintages of HS products, while the QR notifications used older 1996 vintage of ITC-HS 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 ITC-HS 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.

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

Name	Executive Member	Sex	Father's Name
A Jain	Yes	M	D K Jain
M Jain	Yes	M	D K Jain
P Jain	Yes	M	D K Jain
V K Sood	No	M	H R Sood
D K Jain	Yes	M	K L Jain
N K Jain	Yes	M	K L Jain
N Jain	Yes	M	N K Jain
M P Gupta	No	M	P D Gupta
S Sharma	No	M	R K Sharma
M L Mangla	No	M	T Chand

Notes: The table shows the directors of an example Indian firm, Cosco (India) Ltd, a sports goods producer. It lists all board members of Cosco from 2000 to 2010, illustrating the board's domination by the Jain family. The first column presents the name of each director (with first and middle names abbreviated for brevity), and the second column indicates whether the individual is on the executive board, i.e., top management positions like CEO, CFO, MD, etc and the third column indicates sex of the director. The final column includes the father's name of each person, allowing the identification of family ties among board members within the same firm. *Source:* CMIE Prowess and Ministry of Corporate Affairs, Government of India.

Administrative Data on Manager Family Ties. Finally, I obtained access to novel administrative data from the Ministry of Corporate Affairs (MCA), covering over 6

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 two Family Member 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 Member 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 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.

million board directors from approximately 1.3 million registered Indian companies. Each director is assigned a unique 8-digit Director Identification Number (DIN), and each firm has a unique 23-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 is crucial for analyzing turnover among top managers.

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 name, this information is reliably recorded and enables the tracking of familial relationships across board members.

For instance, Table 1⁴ illustrates the board composition of Cosco India Ltd., a sports goods producer, between 2000 and 2010. The table reveals that directors A Jain, M Jain, and P Jain share the same father’s name (D K Jain), confirming that they are brothers. Additionally, N K Jain, identified as D K Jain’s brother, and N Jain, 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

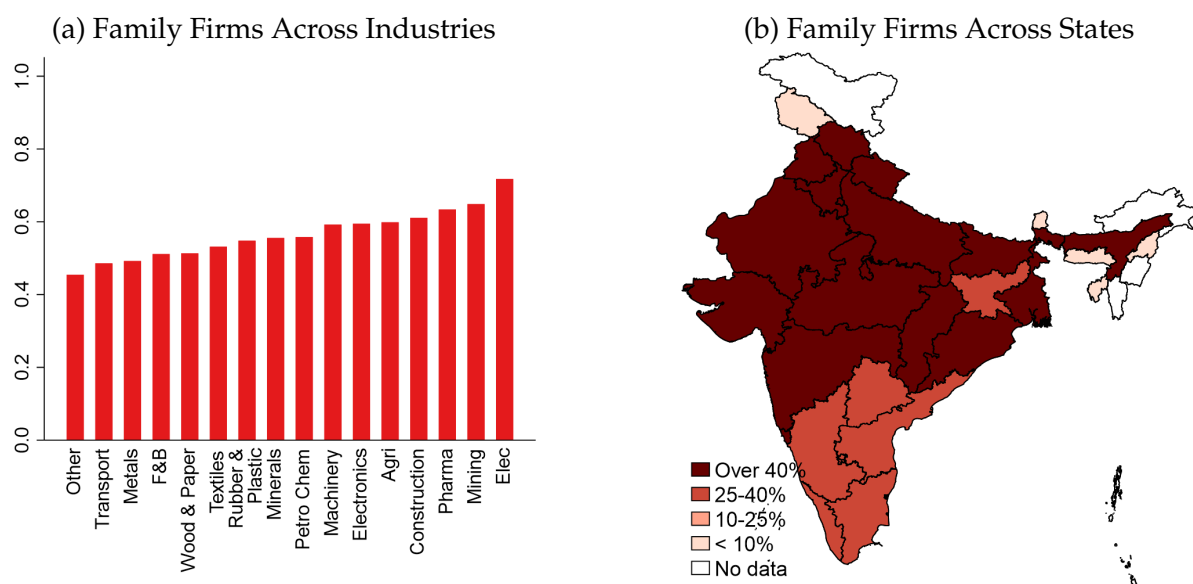
This section provides a detailed description of the graphical results presented in Figures 2 and 3, focusing on the descriptive characteristics of family-managed firms in India. I define a firm as a family firm if it has at least two board members from the same family.

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 & Plastic exhibit a higher prevalence of family management, all industries have at least 40 percent of firms with at least two board of directors 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 culture and economic structures, nearly half of the firms are family firms in most states across India.

Figure 3 provides kernel density plots that compare firm-level outcomes based on the degree of family involvement in top management (panels (a)-(d)) and firm growth over

⁴The initial and middle names have been abbreviated for clarity.

Figure 2: Share of Family Firms Across Industries and States



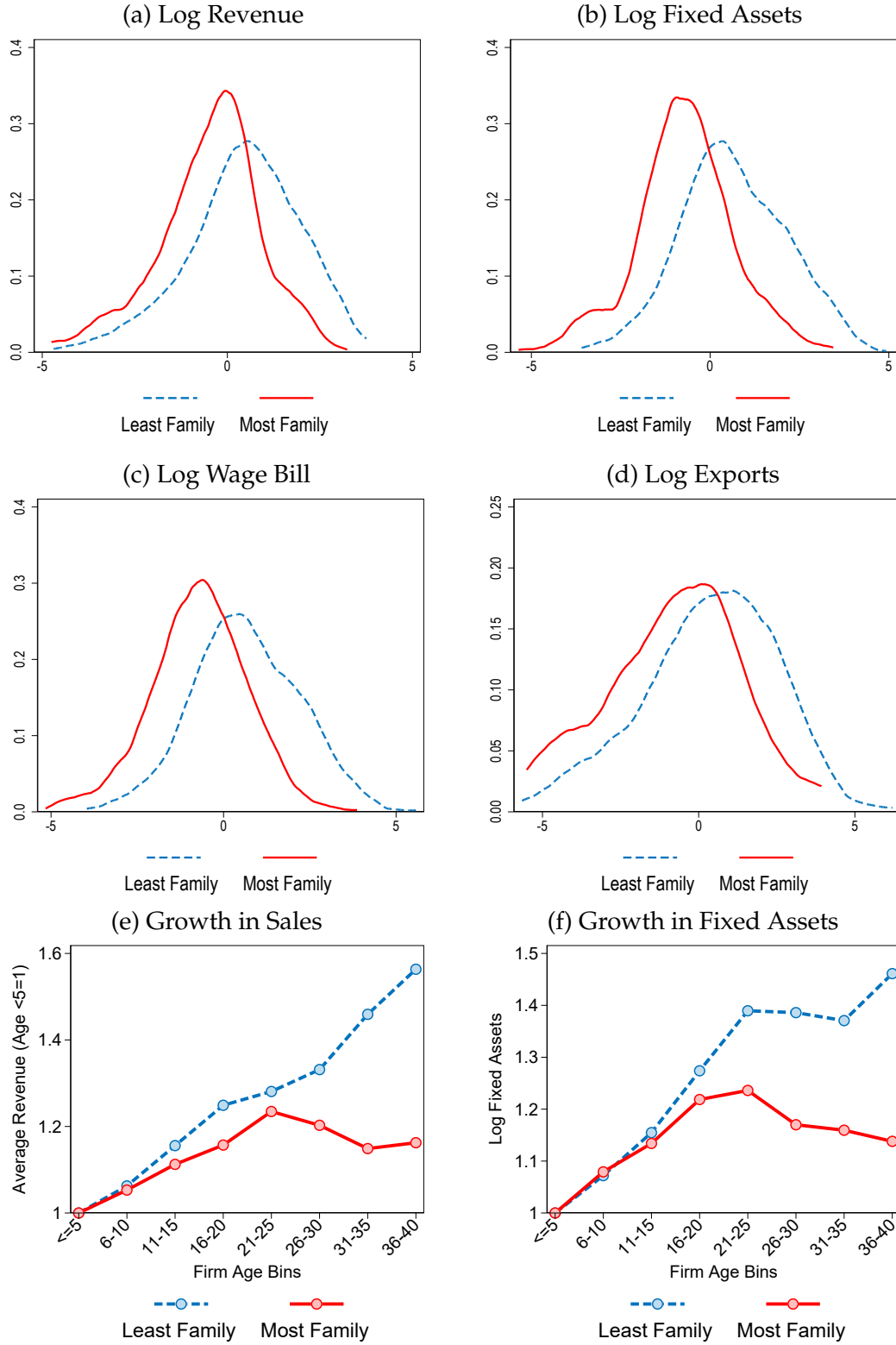
Notes: This figure displays the share of family firms across 2-digit NIC industries (panel a) and across Indian states (panel b). A family firm is defined as a firm in which at least two members on the company's board are from the same family. All data is for the year 2000. Source: CMIE Prowess_{dx} and the Ministry of Corporate Affairs, Government of India.

the life cycle (panels (e) and (f)). 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 (top tercile of share of family among company directors, indicated in red) generally tend to be smaller, exhibiting lower revenues and fixed assets. Panel (c) indicates that these family-involved firms also have a lower wage bill, suggesting either lower employment levels or lower average wages. Panel (d) demonstrates that firms with extensive family management also tend to export less, as indicated by the higher density at the upper tail.

Panels (e) and (f) of Figure 3 trace the expansion of familymanaged versus professionally managed firms over their life cycle. The horizontal axis groups firms into five-year age bins, while the vertical axis reports the *mean* size of all firms in each bin measured by total sales in panel (e) and gross fixed assets in panel (f). For ease of comparison, the average size of the youngest cohort (firms younger than five years) is normalized to 1.

Two patterns stand out. First, professionally managed firms scale up quickly: within two decades their revenues and asset bases more than double. Second, family-managed firms barely grow; by age 30 they remain roughly one-half to two-thirds the size of their professional peers, signaling persistently weaker financial performance. This within-country divergence echoes the cross-country evidence of [Hsieh and Klenow \(2014\)](#), who show that firms in developing economies such as India and Mexico grow far less over their life cycle than firms in the United States (see Figure 1 in [Hsieh and Klenow \(2014\)](#)). In the figure 3, I take a similar approach, except that I look within one country—India, and compare two types of firms—firms dependent on family managed and professionally run. By comparing these two organizational structures within India, Figure 3 highlights managerial structure as a key driver of firm growth.

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



Notes: The figure plots kernel density plots of firm revenue (panel (a)), fixed assets ((panel (b)), wage bill (panel(c)), exports (panel (d)). The blue (red) lines correspond to firms that have the bottom (top) tercile of share of family on the board in the pre-policy period. Variables in panel (a) to (d) are residualized by 5-digit industry dummies. Panels (e) and (f) are life cycle panels where panel (e) plots total sales and panel (f) plots gross fixed assets across eight five-year age bins. Values are normalized to the youngest bin (5 years) within each group. All data is for the year 2000. *Source:* CMIE Prowess_{dx} and Ministry of Corporate Affairs, Government of India.

Collectively, these descriptive statistics highlight distinctive differences in firm characteristics based on family involvement, underscoring the significant role of family management in influencing firm size, profitability, and market orientation in the Indian context.

4 Empirical Strategy

The removal of QRs from consumer goods in 1998-2001 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-difference 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, granting 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 preferences 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:

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

where y_{pt} is the log import or export value or quantity of an 6-digit HS product p in year t , δ_p are HS-6 digit product fixed effects, and λ_{qt} are 4- digit HS product \times year fixed effects.⁵ 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 $D_{pt}^k := 1 [t = \tau_p + k] \forall k \in (\underline{T}, \bar{T})$ 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 $\bar{T} = +8$. Standard errors are clustered at the HS-6 digit product level.

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

$$y_{it} = \sum_{k=\underline{T}}^{\bar{T}} \theta_k D_{it}^k + \delta_i + \lambda_{jt} + \varepsilon_{it}, \quad (2)$$

where y_{it} is an outcome of firm i in 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 comparing treated and untreated firms within sector \times time.⁶ In robustness analysis, I

⁵I 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.

⁶I 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,

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. $D_{it}^k := \mathbb{1}[t = \tau_i + k] \forall k \in (\underline{T}, \bar{T})$, $D_{it}^{\bar{T}} = \mathbb{1}[t \geq \tau_i + \bar{T}]$, and $D_{it}^{\underline{T}} = \mathbb{1}[t \leq \tau_i + \underline{T}]$, where $\mathbb{1}[\cdot]$ 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 $\bar{T} = +8$. 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 the 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 3-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 of liberalized products, I then 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 the 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.

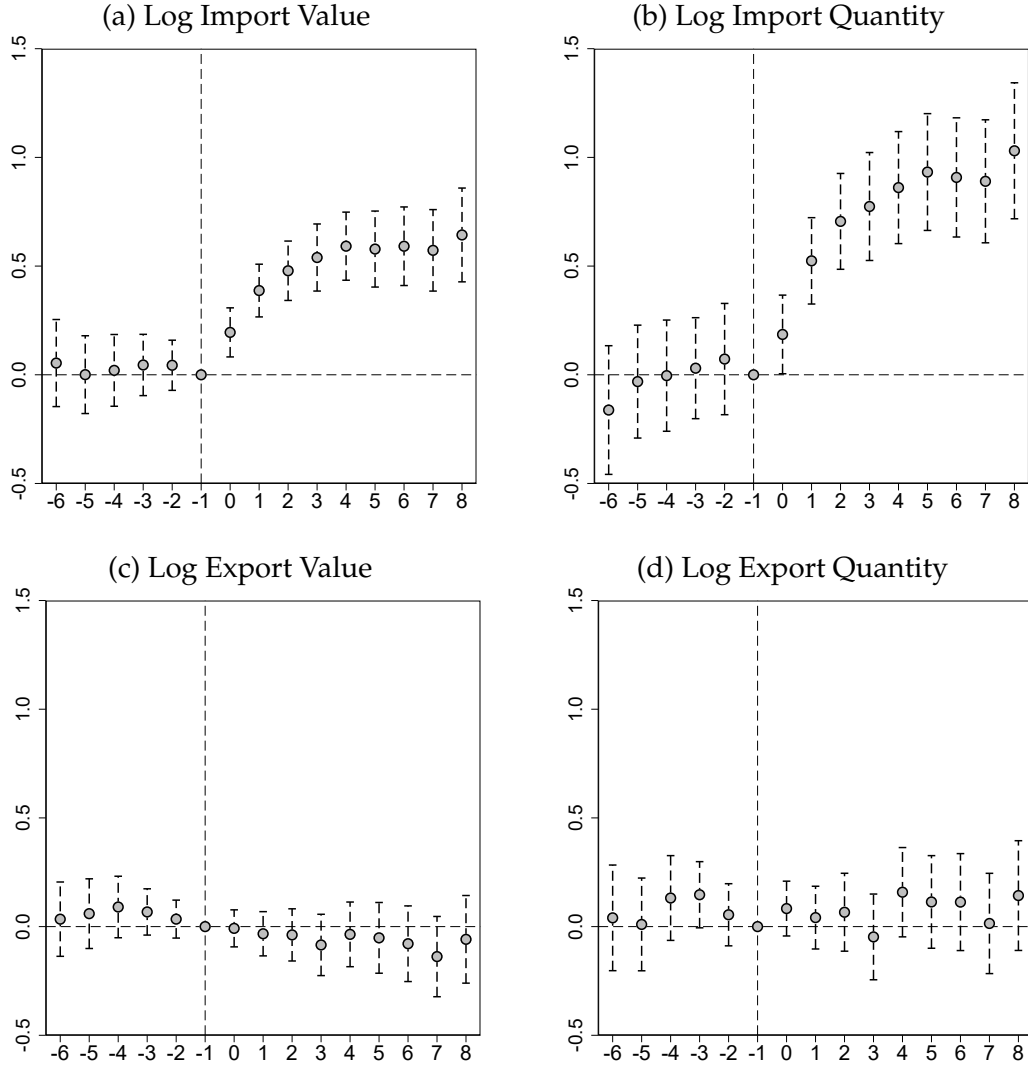
The stability of pre-trend coefficients suggests that treated and untreated products followed comparable trajectories before the reform. Moreover, the inclusion of HS-4 digit product \times year fixed effects (where HS-4 is a broader product classification than HS-6) ensures that any time-varying shocks 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 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

exposure to the policy varies across products, allowing for the inclusion of sector-level time controls without absorbing the treatment effect.

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.

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_{-1} , the coefficient prior to the year in which QRs were removed, is normalized to zero. The policy is staggered from 1995 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.

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.

5.2 Impact 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. Table A3 in a

This 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 50 percent lower than those of the control group. This pronounced and persistent decrease underscores the depth of the import-competition shock. In panel (b), I examine the operating profit-to-revenue ratio, which captures how effectively firms convert sales into operating profits. This ratio declines by about 0.04 for treated firms—equivalent to nearly halving the pre-policy average among control group firms of 0.09. Such a drop highlights that competitive pressures not only reduce overall revenue but also compress margins.

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. Unlike other indicators, borrowing remains relatively stable in the early years post-reform but eventually declines to around 25 percent below the level of control-group firms.

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 results are not driven by firm exits, although some firm exits do happen around the policy. Figure A6 in Appendix A.3 reproduces the event study estimates in Figure 5 conditioning on surviving firms. Out of 4,994 total firms in the sample, 4,147 firms survive till the end of the sample. The results are qualitatively similar to unconditional results presented in Figure 5.

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 of data recording. Several papers therefore warn against treating raw Prowess attrition as 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 Ministry of Corporate Affairs (MCA) registry, using a 23-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 vanishes from Prowess between 2000-2022 is matched to its MCA record in 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 enter as zeros. This allows me to test whether there is higher exit in the long run (2000-2022) in product markets that were exposed to QR-removal as 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 into extensive-margin churn when competition bites. This result is robust to controlling for various fixed effects such as listed-status, three-digit industry, state, and industry-by-state fixed effects.

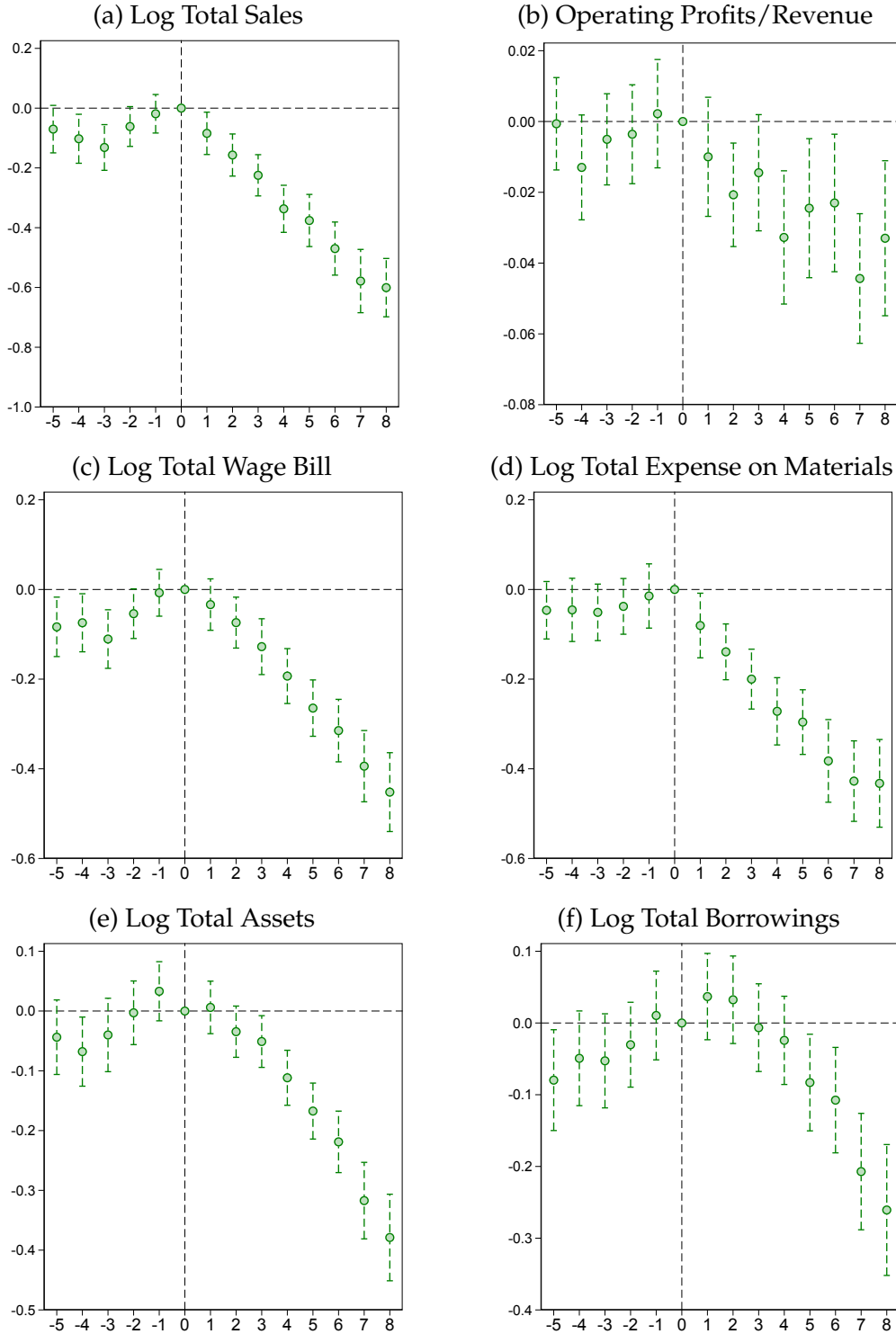
In the next section, I explore how firms adapt organizationally in the face of this heightened competition, focusing on the turnover of top managerial positions— particularly among family-run firms that opt to bring in professional outside managers.⁷

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,

⁷Figure A5 in Appendix A.3 reproduces the event study estimates in Figure 5 for family firms (i.e. firms that have at least board member from the founder's family). Out of about 5,000 total firms in the sample, almost half of the firms meet this criteria. The results are qualitatively similar to results presented for the whole sample in Figure 5.

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)), operating profits/revenue (panel (b)), log total compensation (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 1995 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	0.20*** (0.062)	0.16** (0.067)	0.15** (0.068)	0.15** (0.073)	0.17** (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: The table reports coefficient estimates from firm-level Poisson regressions of a verified exit indicator on a treatment dummy. The regression specification is $\text{Exit}_i = \beta_1 \text{Treated}_i + \gamma \text{Age}_i + \alpha_{\ell(i)} + \lambda_{j(i)} + \delta_{s(i)} + \psi_{j(i) \times s(i)} + \varepsilon_i$, where Age_i is firm age in years; $\alpha_{\ell(i)}$ are listed-status fixed effects; $\lambda_{j(i)}$ are three-digit NIC-2008 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. *Key regressor.* Treated 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. “Number of Firms” refers to unique firms in each regression. Sources: CMIE Prowess, administrative data from the Ministry of Corporate Affairs, Government of India and archives of the Ministry of Commerce, Government of India.

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 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 in a critical way from standard CEO or executive turnover models. In many developing economies, including India, family members frequently occupy the most senior roles 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 a substantial erosion of profitability and revenue, domestically owned family firms may find themselves compelled to reassess the merit of keeping family members in top-level posts. 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 examining the extent of family involvement in senior management positions and 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 about 5 to 6 percentage points, widening to roughly 8 percentage 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 circles) to the rest of the sample (gray triangles).⁸ 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 declined by about 15 percentage points—almost three times as high as 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 more 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 elab-

⁸Firm productivity is estimated using the method proposed in Petrin and Levinsohn (2012).

orated in Section 6, this finding forms a core basis of my theoretical framework: those 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 is joining the board.

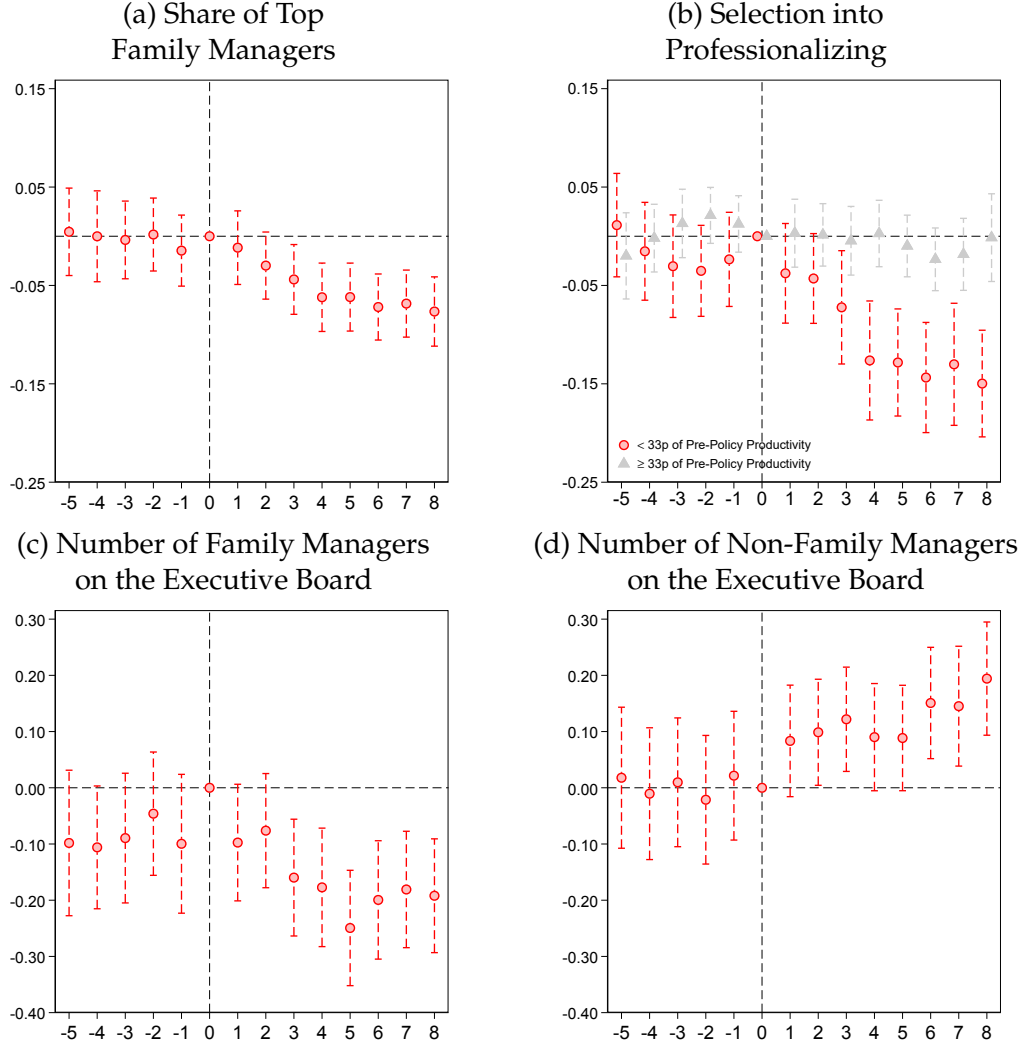
Taken together, these event-study results suggest that, under heightened competitive pressure, family-controlled firms do not simply shed family executives. Rather, they actively seek outside managerial talent to fill vacated positions, reconfiguring the firm's top hierarchy. To the best of my knowledge, 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 studies 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 change in corporate culture can be important, particularly in the context of developing countries where family-run firms and business groups are pervasive. 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. \(2013a\)](#) 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.

A natural question arising from the preceding analysis is: what are the implications of

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. Coefficients correspond to those in Table A4. 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), I examine selection into professionalizing by comparing firms based on their pre-policy productivity. Firms are divided into two mutually exclusive groups: first are firms that are in the bottom tercile of pre-policy productivity (shown in red) and second are all remaining firms (shown in gray). 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 1995 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. 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.

this push toward professionalization for firm productivity? In the following section, I explore this issue in greater detail.

5.4 The Impact of Professionalizing Management: Suggestive Evidence

Figure 7 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 7 presents the event-study estimates from equation 2 separately for each group, focusing on productivity and prices.

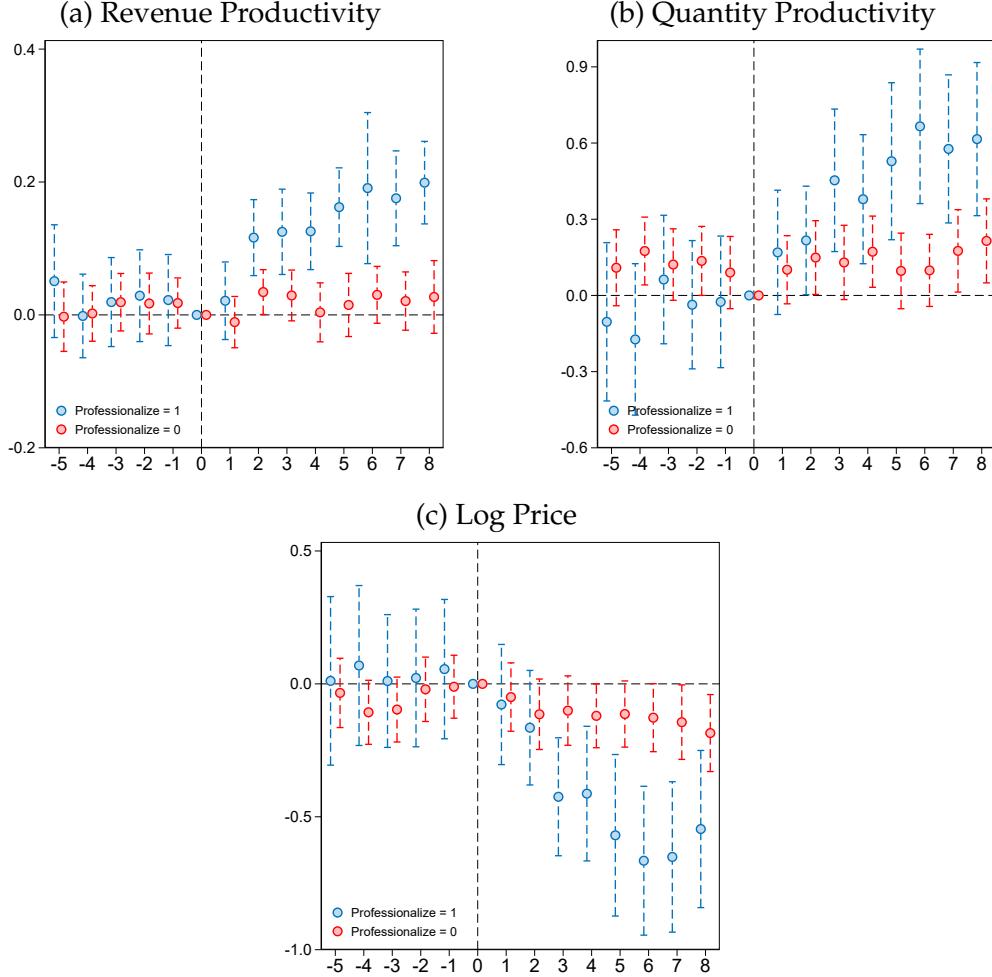
Panels (a) and (b) in Figure 7 depict the evolution of two productivity measures—TFPR and TFPQ (both estimated following [Petrin and Levinsohn 2012](#)). For *professionalizing* firms (in red), both TFPR and TFPQ begin to diverge positively from zero in the first or second year following the policy and continue rising thereafter. By contrast, firms that retain family managers (in gray) show little change in either TFPR or TFPQ. Within about five to six years post-reform, TFPR for professionalizing firms lies roughly 20-30 percentage points above that of firms retaining family-dominated management, suggesting that the decision to bring 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 result 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 7 shows that these professionalizing firms exhibit productivity gains. One might mistakenly attribute these gains to simple mean reversion, given that the professionalizing firms are initially less productive. However, the regression specification underlying Figure 7 includes firm fixed effects, which fully absorb any baseline (pre-policy) productivity level differences between firms that professionalize and those that do not. Consequently, what Figure 7 captures is exclusively the differential productivity trajectories (parallel trends in the pre-policy period followed by divergence in the post-policy period) between firms that professionalize and those that do not, rather than a mere reversion of initially low-productivity firms to a higher mean productivity.

Panel (c) of Figure 7 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-price varieties. This differential change in prices is a key reason for the much larger impact on TFPQ as compared to TFPR in the preceding two panels.

Overall, these patterns are consistent with the notion that heightened import competition catalyzes a deeper reorganization in firms that actively replace family managers

Figure 7: 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. Event studies are conducted separately for firms that professionalized their management after QR removal (in blue) and those that did not (in red). 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. The dependent variables are revenue productivity (TFPR) (panel (a)), quantity productivity (TFPQ) (panel (b)), and log price (panel (c)). TFPR and TFPQ are estimated using the method proposed in [Petrin and Levinsohn \(2012\)](#). Log price is defined as the ratio of a firm's total value of products produced and the total quantity of products produced. θ_0 , the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1995 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..

with professional outsiders. The evidence in Figure 7 is inherently suggestive—firms self-select into professionalization, and not all organizational changes are 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 professionalizing and subsequent performance improvements. Firms may also adapt in ways other than changing their top management, e.g., 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.

Falsification Test: No Productivity Change in Firms Already Professionalized. To verify that the productivity gains documented in Figure 7 are driven by the replacement of family managers rather than by alternative channels activated by the trade shock, I examine the productivity of firms that had *already* professionalized their top management before the policy. If the improvements in Figure 7 were instead caused by trade-related forces unrelated to managerial quality, comparable gains should also appear among these baseline professional firms.

Table A6 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 both TFPQ and TFPR. By contrast, baseline family firms display positive and statistically significant gains in both measures.

The magnitudes for family firms in Table A6 are smaller than those in panels (a) and (b) of Figure 7 because the table includes *all* family firms—those that keep family management as well as those that later professionalize—whereas Figure 7 focuses exclusively on the subset that *does* professionalize after the reform.

6 Theoretical Framework

I consider a closed economy with one sector with monopolistic competition. Firms are heterogeneous in productivity and produce a unique variety indexed by i . The final good output, Y , is a CES aggregate of all intermediate varieties:

$$Y = \left(\sum_{i=1}^N y_i^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}.$$

where $\sigma > 1$ is the elasticity of substitution and N is the total number of varieties.

The aggregate price index is defined as $P \equiv \left(\sum_{i=1}^N p_i^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$, where p_i is the price charged by the firm producing variety i . Cost minimization implies that the demand for variety i is given by

$$y_i = YP^\sigma p_i^{-\sigma}. \quad (3)$$

Firm Entry, Management, and Firm Productivity. In this economy all firms start as family firms.⁹ Each firm has the choice to professionalize firm management by hiring unrelated executives. The trade-offs associated with this choice are discussed below.

Firms pay a fixed cost f_e , paid 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 $k > \sigma - 1$. Thus, z is the firm's productivity, if it decides to operate as a family firm. Owners of family-managed firms enjoy a non-monetary private benefit, \mathcal{B} , which is common for all firms. Private benefits measure the non-pecuniary utility that a firm's owner enjoys from running a firm as a family firm and holding the firm's *management* within the family. For example, a firm owner may derive pleasure if their children or siblings run the firm. Such amenity potential of family control of firm management has a long tradition in the corporate finance literature (Demsetz and Lehn, 1985; Burkart et al., 2003; Bertrand and Schoar, 2006). 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.

Alternatively, firms may choose to professionalize their management by recruiting highly skilled 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 , $\gamma > 1$, therefore earning the firm higher *monetary profits*. I assume that, other than losing private benefits, there is no other cost of professionalization.¹⁰

Professionalization is costly to reverse. Once management is professionalized to unrelated managers, the firm pays cost κ to revert back to family management. κ captures several real-world frictions that make switching from professional management back to family difficult. Professional 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, which our model captures with a high κ . Thus, the payoff from reverting becomes

$$\pi(z) + \mathcal{B} - \kappa,$$

⁹While incorporating a firm, entrepreneurs, particularly in developing countries, often rely on social networks such as family, religion, caste, and geography, to manage their firm. There are many reasons for this, for e.g., trust among family members may substitute for weak legal institutions and contract enforcement in developing countries (Bertrand and Schoar, 2006; Burkart et al., 2003).

¹⁰It's plausible that, in reality, firms incur fixed hiring or search costs when delegating management. However, introducing such costs into the model would not alter any qualitative predictions, as these costs are analytically similar to an increase in private benefits. Thus, for simplicity, I assume that the only cost of professionalization is the loss of private benefits.

instead of the usual family management payoff $\pi(z) + \mathcal{B}$.

Therefore, the decision to professionalize depends on the costs and benefits of delegating. The advantage of delegating is higher expected profits from the new productivity draw. The cost is foregoing private benefits.

Technology. The production function for each intermediate variety i is

$$y = z\ell.$$

where ℓ is labor employed. To produce, the firm pays a fixed cost of wf , which is paid in labor units. w is the wage rate and is used as the numeraire ($w = 1$). The firm maximizes profits subject to demand for its product (3), leading to the usual expression of equilibrium prices being a constant markup over marginal cost:

$$p_i = \frac{\sigma}{\sigma - 1} \left(\frac{w}{z} \right) = \frac{w}{\rho z}. \quad (4)$$

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

$$\begin{aligned} \pi(z) &= p(z)y(z) - w\ell(z) - wf \\ &= Az^{\sigma-1} - wf, \end{aligned} \quad (5)$$

where $A = \frac{1}{\rho} \rho^{\sigma-1} E P^{\sigma-1} w^{1-\sigma}$ and $E = YP$ is the aggregate expenditure in the economy.

Labor demand can be expressed as a function of firm profits

$$\begin{aligned} \ell(z) &= \frac{y(z)}{z} \\ &= \frac{(\sigma - 1)}{w} (\pi(z) + f) \end{aligned} \quad (6)$$

In this setup, the total payoff to the firm owner from an active firm is the sum of monetary profits, π , 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{P} , where $\mathcal{P} = 1$ if the firm professionalizes management and $\mathcal{P} = 0$ if it retains family management. Then firms' optimal payoff which is given by:

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

Liquidity Constraints and Hand-to-Mouth Owners. To endogenize the exit decision, I assume that firm owners are *hand-to-mouth*, that is, they have no liquid wealth (formally, I set owner wealth, $\omega = 0$ for all firms). In each period, a firm must cover its operating costs (including the fixed cost wf) solely from its monetary profits. Because the non-pecuniary benefit \mathcal{B} provides no liquidity, a negative monetary profit (i.e., $\pi(\cdot) < 0$) leaves the firm unable to cover its operating expenses, forcing it to exit. This mechanism endogenizes the no-negative-profits condition: a firm cannot continue operating with $\pi(\cdot) < 0$ because it cannot finance its fixed costs.

$$z_f = \left(\frac{wf}{A} \right)^{\frac{1}{\sigma-1}} \quad (7)$$

Thus, for a firm to be able to operate as a family firm, its productivity must be at least z_f . For firms that have professionalized management, the exit threshold, denoted z_e , is defined by $\pi(\gamma z_e) = 0$:

$$z_e = \frac{1}{\gamma} \left(\frac{wf}{A} \right)^{\frac{1}{\sigma-1}} = \frac{z_f}{\gamma} \quad (8)$$

Professionalization to Survive among Laggard Firms. Note that the survival productivity cutoff for family firms is higher than that of firms that have professionalized management. This is because firms that professionalize management enjoy a productivity boost of $\gamma > 1$. This observation implies that any time a firm draws a productivity parameter less than z_e , it will immediately exit. For such a firm, even professionalization of management does not sufficiently boost its productivity to make enough profits to pay its fixed cost of operation. If a firm draws a productivity parameter $z \in (z_e, z_f)$, it will always choose to professionalize. This is because such a firm cannot make sufficient profits to pay its fixed operating costs as a family firm. However, it can survive if it decides to professionalize management, in which case its productivity will rise to γz , resulting in higher profits, potentially avoiding exit. Thus, the firm chooses to forgo its private benefits as professionalization is essential for preserving the firm. To summarize, for laggard firms with low productivity, there is negative selection into professionalizing. Conditional on survival ($z > z_e$), firms professionalize if they draw an initial productivity parameter $z < z_f$.

Professionalization to Boost Profits among Frontier Firms. If both $\pi(z)$ and $\pi(\gamma z)$ are positive, a firm chooses to professionalize its management if this choice yields a higher payoff than from staying a family firm. Since the firm gives up private benefits if it professionalizes, $\pi(\gamma z)$ must be sufficiently larger than $\pi(z)$ to compensate the firm for the loss of private benefits. Thus, the professionalization decision rests on the trade-off between retaining private benefits associated with running the firm as a family firm and higher profits associated with professionalization. This decision yields another productivity threshold, z_d , at which the firm is indifferent between remaining a family firm and upgrading its management by professionalizing:

$$\begin{aligned}\pi(z_d) + \mathcal{B} &= \pi(\gamma z_d) \\ \implies z_d &= \left(\frac{\mathcal{B}}{wf(\gamma^{\sigma-1} - 1)} \right)^{\frac{1}{\sigma-1}} \cdot z_f\end{aligned}\tag{9}$$

Thus, frontier firms professionalize management if their initial productivity $z > z_d$, i.e. we have more productive firms delegating– there is positive selection into professionalization. Firms with intermediate levels of productivity, i.e., productivity firms with $z \in [z_f, z_d)$, choose to retain family management as the gains from delegating are not sufficient to compensate the firm owner for the loss of private benefits.

Comparing equations (7) and (9) 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:

$$\frac{z_d}{z_f} = \frac{\mathcal{B}}{wf(\gamma^{\sigma-1} - 1)} > 1\tag{10}$$

The following proposition summarizes the dual selection mechanism of the model.

Proposition 1 (Dual Selection Mechanism). *Consider a firm drawing an initial productivity parameter z from the Pareto distribution*

$$G(z) = 1 - z^{-k}, \quad k > 1 \text{ and } k > \sigma - 1.$$

Define

$$z_f = \left(\frac{wf}{A} \right)^{\frac{1}{\sigma-1}},$$

as the minimum productivity level required for profitable operation under family management. The corresponding survival threshold under professional management is given by

$$z_e = \frac{z_f}{\gamma}.$$

Moreover, let z_d denote the productivity cutoff at which a firm is indifferent between retaining family management (with the associated non-pecuniary benefit \mathcal{B}) and delegating to professional management, so that

$$\pi(z_d) + \mathcal{B} = \pi(\gamma z_d)$$

Then, the firm's optimal production and managerial decisions are characterized as follows:

1. **Exit:** If $z < z_e$, the firm cannot generate positive monetary profits even after the managerial productivity boost from professionalization. Consequently, the firm exits the market.
2. **Professionalization to Avert Exit (Negative Selection):** If $z \in [z_e, z_f)$, the firm would incur losses under family management but can achieve positive profits by delegating management. In this range, professionalization is a necessary survival strategy.
3. **Retention of Family Management:** If $z \in [z_f, z_d)$, the firm is sufficiently productive to cover its fixed costs as a family firm. However, the incremental profit gain from professionalization does not offset the loss of the non-pecuniary benefit \mathcal{B} ; hence, the firm opts to retain family management.

4. **Professionalization for Profit Enhancement (Positive Selection):** If $z \geq z_d$, the additional profits from delegating management more than compensate for the forfeited private benefits. As a result, highly productive firms choose to professionalize management.

Figure 8 shows the professionalization thresholds in a diagram. In this diagram, 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 linear in $z^{\sigma-1}$, and 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 in 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.

Panel (a) shows the baseline equilibrium of the model. Starting from the left, the first vertical dashed line at z_e represents the *survival cutoff under professionalization*. Any firm drawing productivity $z < z_e$ will exit immediately because even with the productivity boost from professionalization (from z to γz), it would still not earn enough revenue to cover the fixed cost of operating. Thus, in this *exit region*, monetary profits are below zero, and no strategy can prevent the firm's failure.

Between z_e and z_f (the second dashed line), 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 delegating management to outside professionals, they can increase their productivity parameter to γz , thereby generating positive profits. I refer to this as *negative selection into professionalizing management* since relatively unproductive firms upgrade their management out of necessity rather than choice.

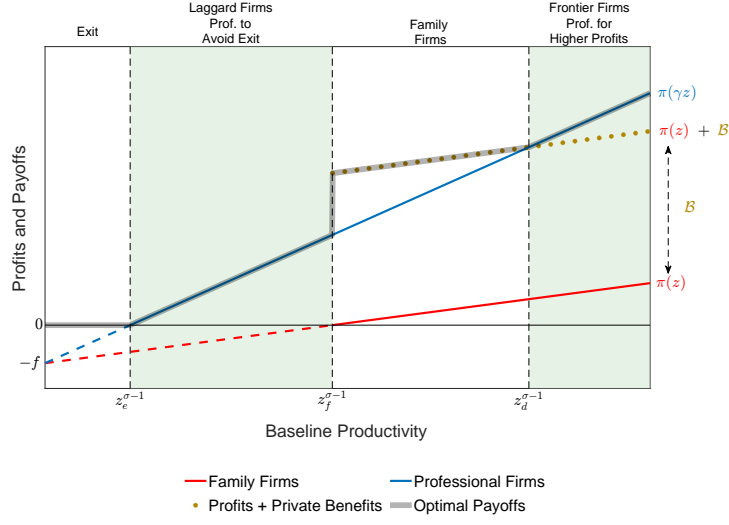
Note that firms between z_e and z_f would ideally prefer to retain family management due to the inherent private benefits associated with it. However, since firms cannot operate with negative profits, they are compelled to professionalize purely as a survival strategy. Crucially, firms lose all private benefits if they exit, identical to the outcome if they professionalize. Hence, within this region, the magnitude of private benefits \mathcal{B} has no impact on the professionalization decision. The imperative to remain viable thus overrides any preference for family management.

Once firm productivity surpasses z_f , indicated by the second dashed line, the firm would be profitable even as a family firm. The red line ($\pi(z)$) is now above zero, reflecting positive profits. However, in the intermediate region $[z_f, z_d)$, it is optimal for the owner to *retain family management*: while monetary profits from delegating (solid blue line, $\pi(\gamma z)$) are higher than monetary profits 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} .

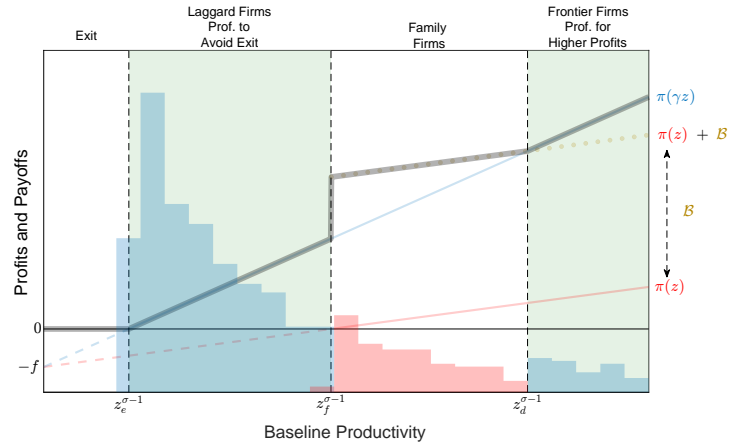
Finally, at the third vertical dashed line, z_d , we reach a threshold beyond which high-productivity “frontier” firms *professionalize to increase profits* rather than to avoid exit. Past this cutoff, the profit increase from γz exceeds the loss of the private benefit.

Figure 8: Management Choice

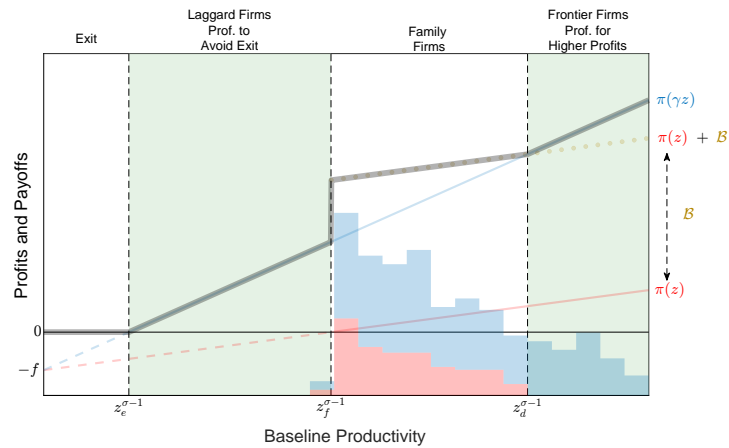
(a) Baseline Equilibrium



(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. Non-monetary private benefits derived by family firm owners are depicted by the golden dotted line, with the total payoff to family firms equal to the upper envelope of the red profit line and the golden private benefits line. 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.

Hence, the blue dashed curve representing $\pi(\gamma z)$ lies above the red dashed curve plus the shaded private-benefit segment. This is termed *positive selection into professionalizing management*, capturing how the most productive firms choose professional management to further boost their earnings. The thick gray line shows optimal firm payoffs for different levels of productivity.

The next two panels of Figure 8 illustrate simulated distributions of firm productivity drawn from a Pareto distribution. Family firms are shown in orange, while professional 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 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.

6.1 Comparative Static: Unilateral Import Competition

In this section, I analyze the partial equilibrium impact of a *unilateral trade liberalization*, like the removal of QRs, that takes the form of an exogenous increase in foreign varieties, lowering the aggregate price index, P . From equation (5), recall that firm profits depend on the composite market demand parameter

$$A = \frac{1}{\sigma} \rho^{\sigma-1} E P^{\sigma-1} w^{1-\sigma}.$$

A fall in P directly reduces A , thereby lowering per-period profits for *all* firms in the domestic market. As profits shrink, the key productivity thresholds derived in the previous section respond as follows:

- (i) **Rise in the Exit Thresholds.** From equations (7) and (8), 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, so it becomes more difficult to cover the fixed production cost wf . 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 negative-selection professionalization** : Because z_f also rises, there is a broader range of “laggard” firms whose productivity *as a family firm* would no longer cover fixed costs. Such firms now *must* professionalize to boost productivity to γz in order to avoid exit.
- (ii) **Rise in the Frontier Professionalization Threshold.** Turning to equation (9), 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, while the additional profit gain from professionalization (beyond covering costs) is smaller. Consequently, fewer *frontier* firms (i.e. those above z_d) wish to professionalize purely for revenue expansion.

To explicitly connect professionalization decisions across periods $t = 0, 1$, define indicator variables \mathcal{P}_t , where $\mathcal{P}_t = 1$ if the firm professionalizes management in period t , and $\mathcal{P}_t = 0$ otherwise. Professionalization boosts productivity from z to γz , with $\gamma > 1$, but entails the loss of private benefits \mathcal{B} . Reverting to family management after previously delegating incurs a switching cost κ . Thus, period-1 profits are given by:

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

Case 1: $\mathcal{P}_1 = 1$. If the firm professionalizes in period $t = 1$, profits are $\pi(\gamma z)$, irrespective of previous choices.

Case 2: $\mathcal{P}_1 = 0$. If the firm remains family-managed in period $t = 1$, profits depend on past choices. For firms family-managed in period $t = 0$ ($\mathcal{P}_0 = 0$), profits are $\pi(z) + \mathcal{B}$. However, firms previously delegating in period $t = 0$ ($\mathcal{P}_0 = 1$) incur the switching cost κ , earning profits $\pi(z) + \mathcal{B} - \kappa$. As discussed in the section, the empirical evidence presented in Section 5 is indicative of such a high value of κ .

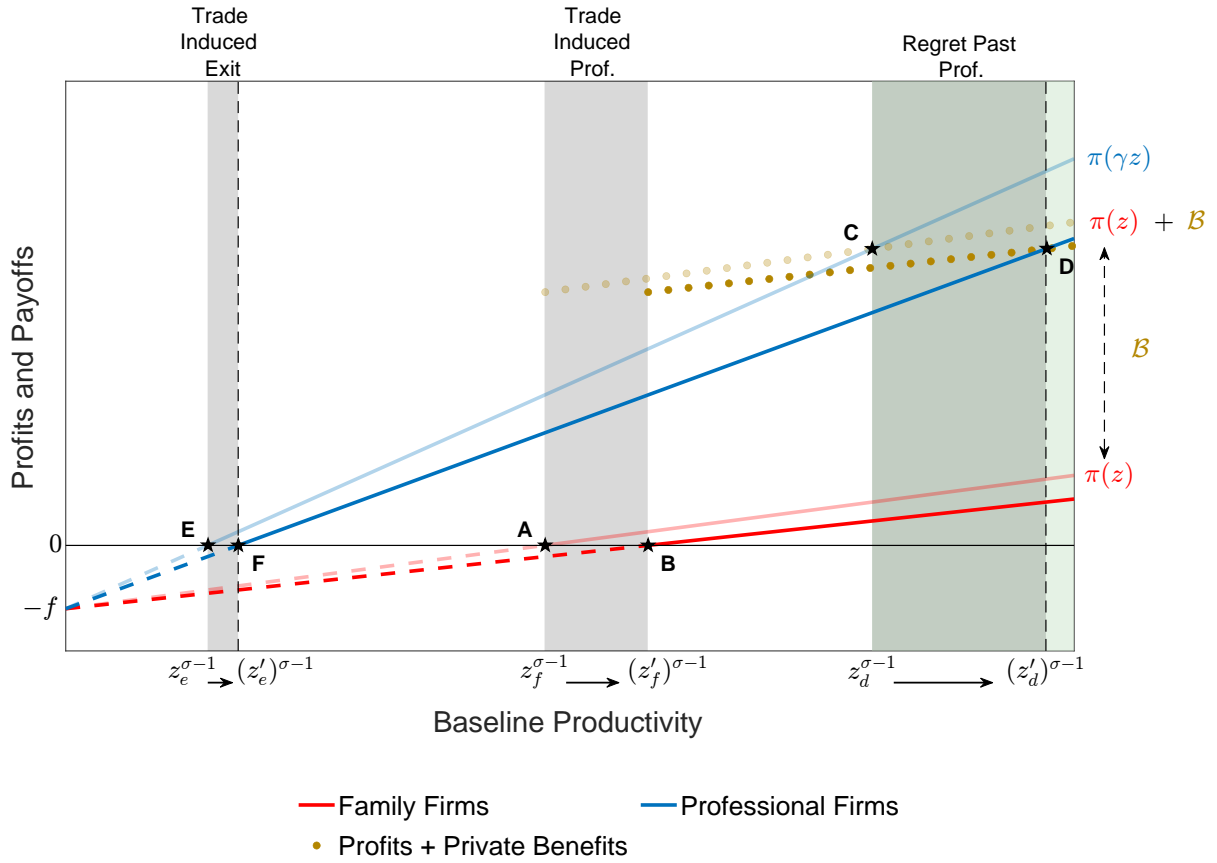
Figure 9 illustrates the heterogeneous responses of firm profits to the import competition shock induced by the removal of quantitative restrictions (QRs). The dashed lines indicate pre-shock profit levels, while solid lines represent post-shock profits. Panel (a) shows that for low-productivity ‘laggard’ firms, the import competition shock reduces profits significantly 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.

6.2 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 among domestic firms:

- (i) *Exit and “Negative-Selection” Professionalization Rise for Laggard Firms.* Because the shock reduces the composite profitability parameter A , both the exit cutoffs z_e

Figure 9: 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.

and z_f increase. More low-productivity (or “laggard”) firms find themselves at risk of making negative profits if they retain family management; these firms can survive only by delegating and thus enjoying the productivity boost γz . This group therefore exhibits a surge in professionalization driven by the need to avert exit.

- (ii) *Professionalization Becomes Less Attractive for Frontier Firms.* The higher “frontier” threshold z_d also moves upward, reducing the fraction of large, highly-productive firms that choose to professionalize solely for profit enhancement. In other words, lower overall profitability tightens the trade-off between forgoing private benefits and realizing higher productivity, leading fewer of the most productive firms to initiate professionalization *ex-post*. Whether this change in incentives induces professional firms to switch back to family to not depends on how high the re-switching costs, κ are.

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—those closest to the exit threshold—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 firms, κ .

6.3 Alternative Mechanisms

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 to understanding the origins of family firms, it is 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 firm 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

$$\text{Firm's payoff} = \begin{cases} \pi(z) + \mathcal{B} & \text{if } \mathcal{P} = 0 \\ (1 - \tau) \cdot \pi(\gamma z) & \text{if } \mathcal{P} = 1 \\ 0 & \text{if firm exits} \end{cases}$$

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 10 demonstrates that such a reduction in contracting frictions cannot qualitatively explain my empirical findings.

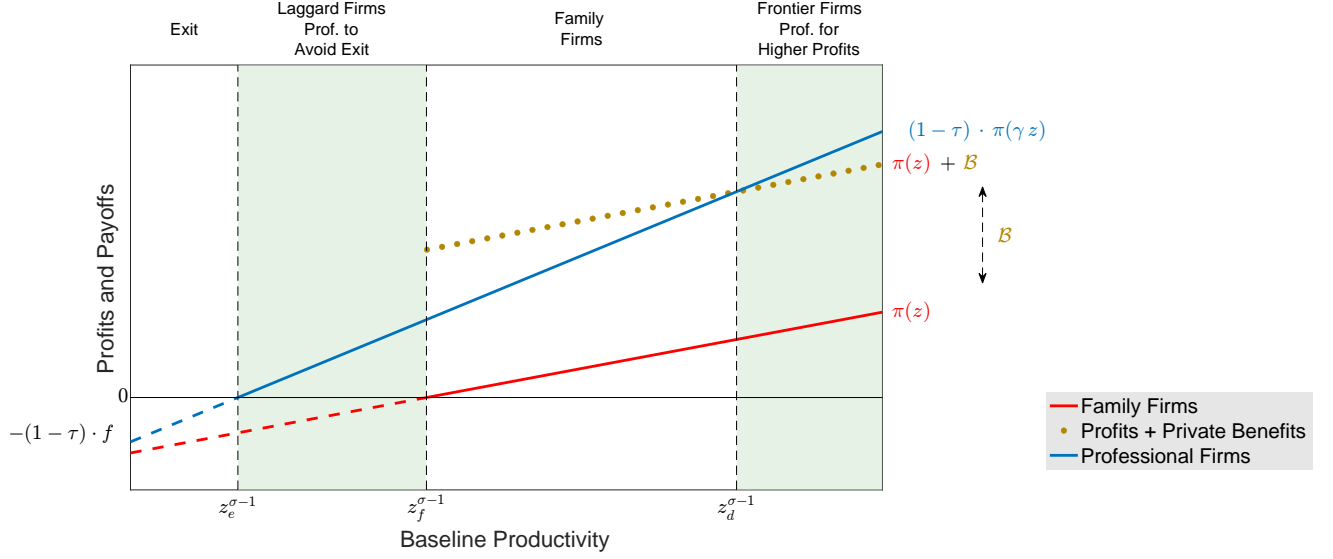
Panel (a) of Figure 10 depicts firm profits under high contracting frictions ($\tau = 0.2$). In this setting, the profit curve for professionally managed firms is rotated downward, reflecting the losses due to expropriation by professional managers. Panel (b) illustrates the scenario where import competition 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.

However, this reveals an important discrepancy with the empirical results. Such a reduction in contracting frictions predominantly induces the most productive firms—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.

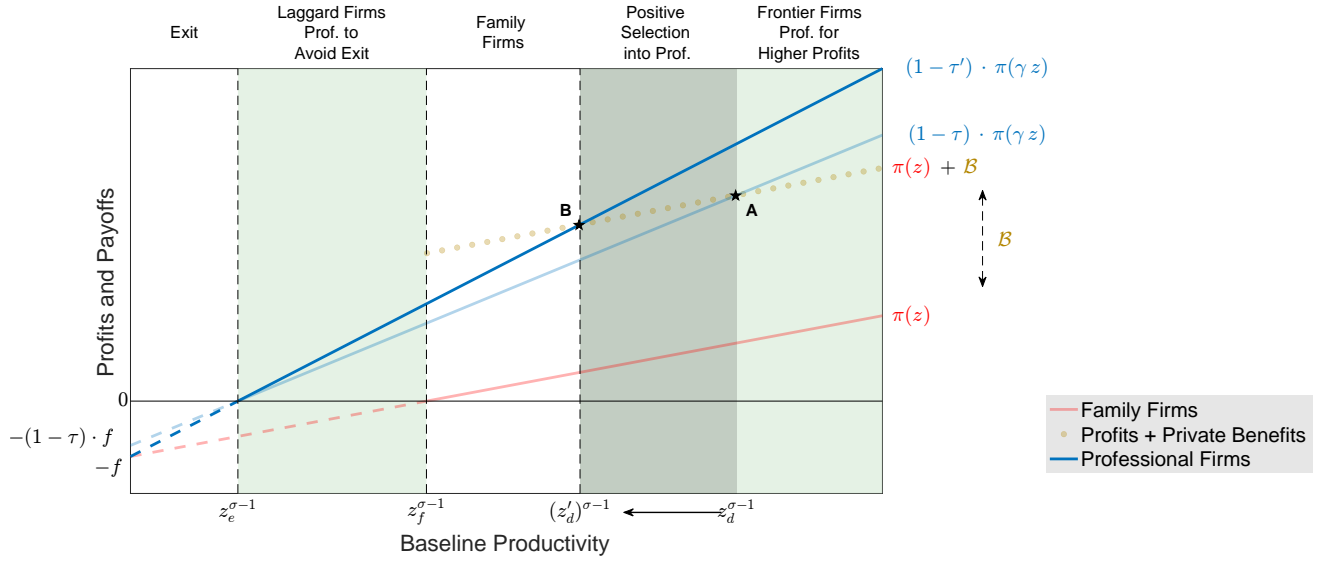
This section highlights that incorporating contracting frictions alone does not qualitatively explain the empirical patterns of managerial professionalization following increased import competition. Nonetheless, this does not diminish the potential quantitative importance of contracting frictions. In future work, I plan to structurally incorporate contracting frictions as outlined here, estimating the parameter τ at the state

Figure 10: 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.

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.

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 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:

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

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 (96th to 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, γ , \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} , γ . 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 8 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 8 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 have data on exit rates of firms in the CMIE Prowess. Given this limitation, the fixed operating cost parameter, f , is identified using the share of firms exhibiting negative profits in the data. Firms with lower productivity may find it challenging to cover fixed costs, resulting in negative profits and eventual exit from the market. In the model, an increase in f raises the minimum productivity threshold required for firms to remain profitable, thereby increasing the share of firms with negative profits. This method ensures that the calibrated fixed cost accurately reflects the observed rate of firm exit and the broader distribution of firm profitability in the Indian economy.

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 fixing these parameters, γ , \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

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

subject to $\gamma \geq 1$, $f \geq 0$, and the feasibility condition that the exit threshold for professional firms exceeds that for family firms (10). 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 productivity 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 7. The event-study evidence indicated that firms who professionalize management report higher firm-level revenue productivity by about 20 percent, a magnitude comparable to the 23 percent productivity gain implied by the calibrated parameter. Although the event-study analysis and structural estimation utilize entirely separate empirical inputs—firm-level responses to a trade shock versus steady-state calibration based on firm-level moments—the similarity between the two estimates suggests that the model captures a realistic magnitude of productivity gains from professionalization.

Additionally, the estimated non-pecuniary private benefit of retaining family management, \mathcal{B} , is around 0.05. To interpret this magnitude, consider that average profits in the model economy are roughly three times this estimate. Therefore, private benefits represent about one-third of average profits, underscoring that family owners place substantial value on maintaining family management despite the clear potential for higher monetary returns from professionalizing. This magnitude highlights the significant role non-monetary preferences play in shaping firm governance structures, particularly in economies dominated by family-managed businesses.

Table 4: Estimated Parameters

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

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 the empirical size distribution in the upper tail of firm revenues as per Head et al. (2014). Parameters γ , \mathcal{B} , and f are jointly calibrated by minimizing the distance between model-generated moments and their empirical counterparts.

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 a reduction in aggregate market demand that precisely matches the average decline in firm revenues observed empirically in response to the QR removal, approximately a 50 percent decrease in the long run (Figure 5). I then trace the economy's transition from the baseline equilibrium at $t = 0$ to the new equilibrium at $t = 1$ to evaluate the aggregate consequences.

Figure 11, 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 9, 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 9. 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 following the import competition shock. Figure 11, Panel (b), shows kernel density estimates comparing the distribution of firm productivity 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.

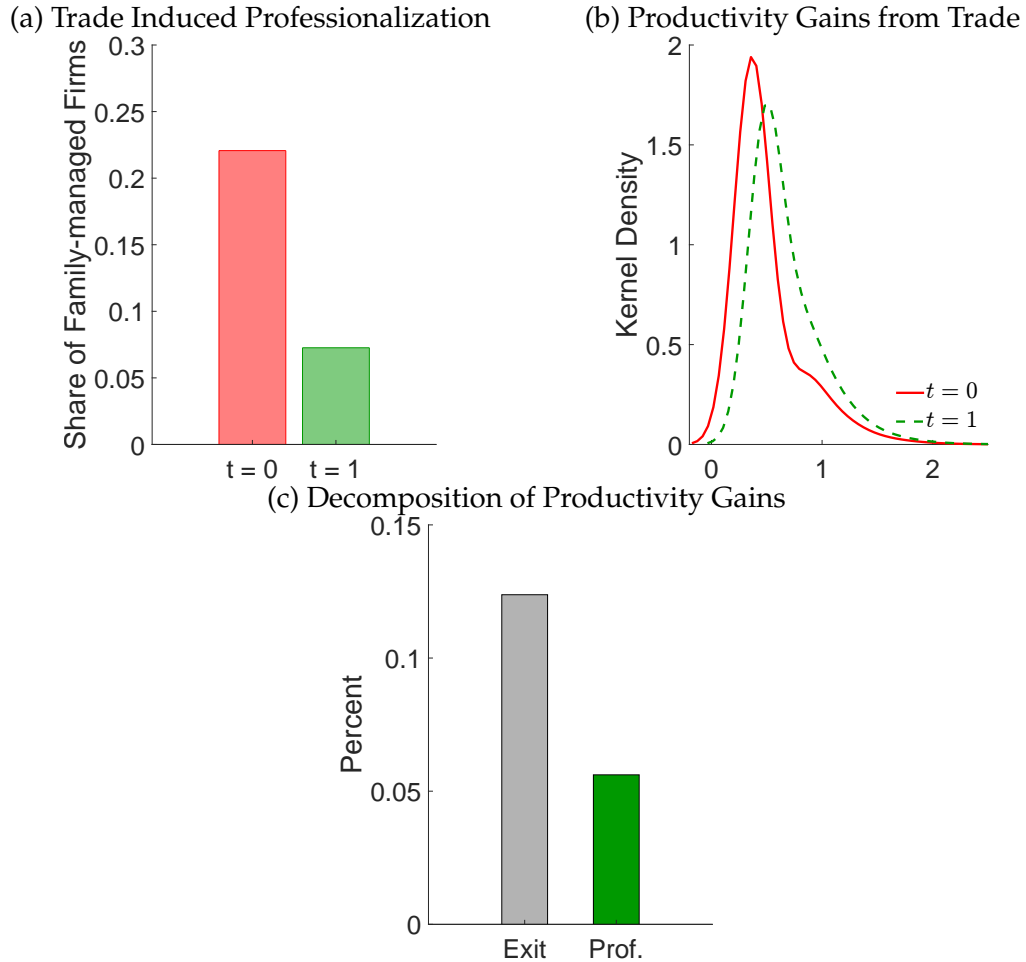
These gains arise from two distinct sources, each operating through fundamentally different mechanisms. The extensive margin selection effect is emphasized extensively in existing trade literature (e.g., [Melitz \(2003\)](#)). This mechanism operates through the exit of the least productive firms from 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 professionalizing management. Unlike the selection mechanism, these productivity improvements occur among 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 11, 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 due to professionalization also play a significant role. Specifically, approximately 2530 percent of the aggregate productivity gains come directly from professionalizing management. 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.

Figure 11: Trade Induces Professionalization and Productivity Gains



Notes: This figure simulates a trade liberalization episode within the estimated model by implementing a reduction in market demand sufficient to lower average firm profits by approximately 45%, consistent with empirical findings from the event studies presented in Figure 5. 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 due to professionalizing 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.

8 Conclusion

This study demonstrates that trade liberalization, through a productspecific 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 withinfirm productivity. The evidence, drawn from a novel managerfirm matched dataset and detailed board director tenure records for over 6 million Indian directors, reveals that the restructuring of top management 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 revenue and quantity productivity measures and declining average output prices. Such findings support the broader hypothesis that organizational reform is a key channel through which competition enhances 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. Future work should extend this analysis by structurally estimating the model, incorporating heterogeneous private benefits across firms, and evaluating policy counterfactuals– such as subsidies for managerial professionalization– to better understand the aggregate impact of these organizational adjustments.

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 transparency and competitive pressures can indirectly stimulate organizational reforms that bolster firm performance.

References

- 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.
- Amiti, Mary and Jozef Konings**, "Trade Liberalization, Intermediate Inputs, and Productivity: Evidence from Indonesia," *American Economic Review*, December 2007, 97 (5), 1611–1638.
- Atkin, David and Amit K Khandelwal**, "How distortions alter the impacts of international trade in developing countries," *Annual Review of Economics*, 2020, 12, 213–238.
- and —, "VoxDev Lit International Trade," *VoxDev*, 2022.
- Backus, Matthew**, "Why is productivity correlated with competition?," *Econometrica*, 2020, 88 (6), 2415–2444.
- Bandiera, Oriana, Andrea Prat, Stephen Hansen, and Raffaella Sadun**, "CEO behavior and firm performance," *Journal of Political Economy*, 2020, 128 (4), 1325–1369.
- 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.
- 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.
- , **Paras Mehta, and Sendhil Mullainathan**, "Ferretting out tunneling: An application to Indian business groups," *The quarterly journal of economics*, 2002, 117 (1), 121–148.
- 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.

- , —, —, —, —, and —, “Does management matter? Evidence from India,” *The Quarterly journal of economics*, 2013, 128 (1), 1–51.
- , **Kalina Manova, John Van Reenen, Stephen Teng Sun, and Zhihong Yu**, “Trade and management,” *Review of Economics and Statistics*, 2021, 103 (3), 443–460.
- , **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.
- Caliendo, Lorenzo and Esteban Rossi-Hansberg**, “The impact of trade on organization and productivity,” *The quarterly journal of economics*, 2012, 127 (3), 1393–1467.
- Chen, Cheng and Claudia Steinwender**, “Import competition, heterogeneous preferences of managers, and productivity,” *Journal of International Economics*, 2021, 133, 103533.
- DeLoecker, Jan, Pinelopi K Goldberg, Amit K Khandelwal, and Nina Pavcnik**, “Prices, markups, and trade reform,” *Econometrica*, 2016, 84 (2), 445–510.
- Demsetz, Harold and Kenneth Lehn**, “The structure of corporate ownership: Causes and consequences,” *Journal of political economy*, 1985, 93 (6), 1155–1177.
- Fan, Tianyu, Michael Peters, and Fabrizio Zilibotti**, “Growing like India: the unequal effects of service-led growth,” *Econometrica*, 2023, 91 (4), 1457–1494.
- 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.
- 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.
- 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.
- Jenter, Dirk and Fadi Kanaan**, "CEO Turnover and Relative Performance Evaluation," *The Journal of Finance*, 2015, 70 (5), 2155–2182.
- 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.
- 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.
- Marin, Dalia and Thierry Verdier**, "Corporate hierarchies and international trade: Theory and evidence," *Journal of International Economics*, 2014, 94 (2), 295–310.
- Marshall, Alfred**, "Evidence before the Gold and Silver Commission [Cd. 5512] Question 9816 (16 January)," in "Official Papers," London: Macmillan, 1926, pp. 90–95. Original work published in 1888.
- Melitz, Marc J**, "The impact of trade on intra-industry reallocations and aggregate industry productivity," *econometrica*, 2003, 71 (6), 1695–1725.
- Nalebuff, Barry J and Joseph E Stiglitz**, "Information, competition, and markets," *The American economic review*, 1983, 73 (2), 278–283.
- 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.
- Petrin, Amil and James Levinsohn**, "Measuring aggregate productivity growth using plant-level data," *The Rand journal of economics*, 2012, 43 (4), 705–725.
- 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.
- 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.

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

संज्ञा 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.

A.2 Appendix: Results

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.

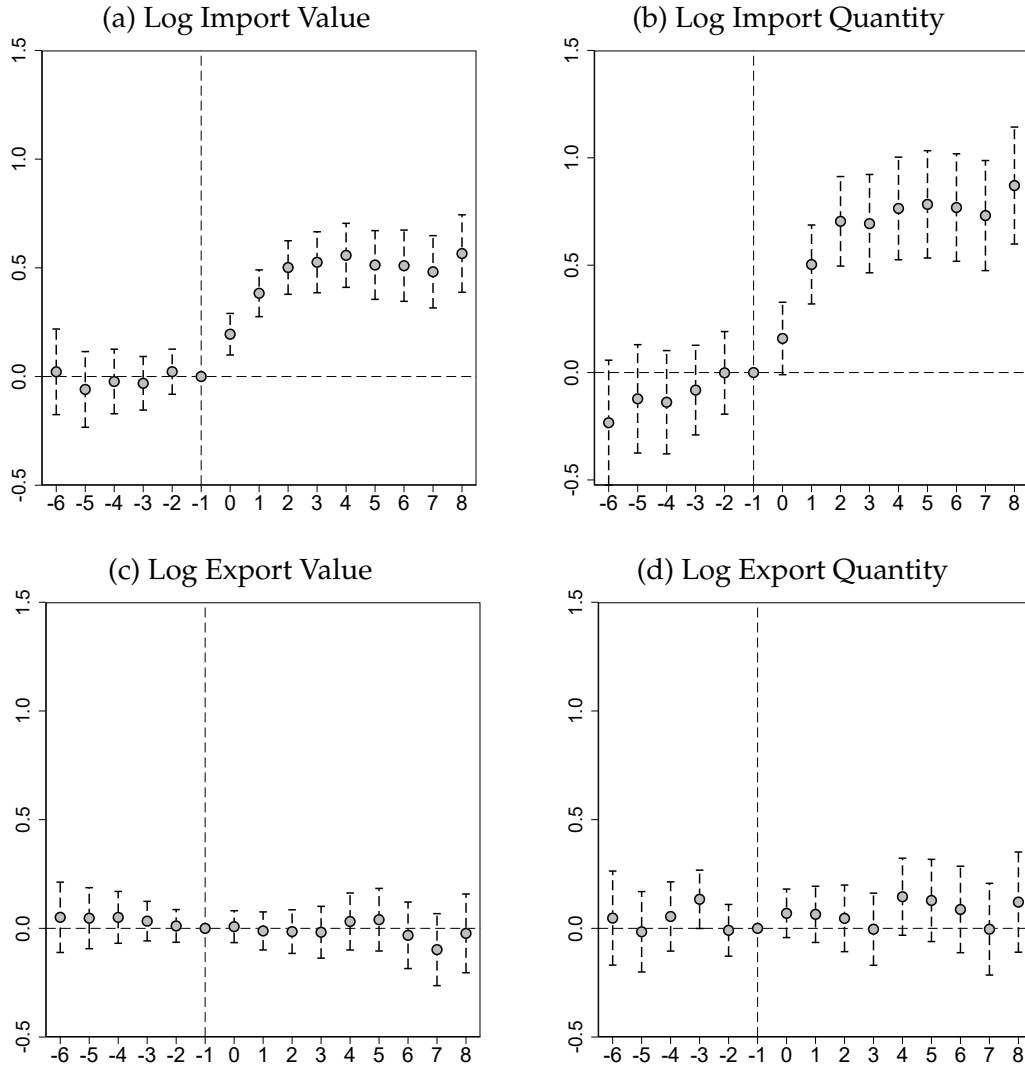
A.2.1 Aggregate Product-Level Analysis

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
6 years before event	0.054 (0.10)	-0.16 (0.15)	0.034 (0.087)	0.040 (0.12)
5 years before event	0.00060 (0.091)	-0.031 (0.13)	0.060 (0.082)	0.010 (0.11)
4 years before event	0.020 (0.084)	-0.0040 (0.13)	0.090 (0.072)	0.13 (0.099)
3 years before event	0.045 (0.072)	0.030 (0.12)	0.067 (0.054)	0.15* (0.078)
2 years before event	0.044 (0.059)	0.072 (0.13)	0.035 (0.045)	0.054 (0.073)
Year of event	0.20*** (0.058)	0.19** (0.092)	-0.0081 (0.043)	0.083 (0.064)
1 year after event	0.39*** (0.062)	0.52*** (0.10)	-0.033 (0.052)	0.041 (0.074)
2 years after event	0.48*** (0.070)	0.71*** (0.11)	-0.038 (0.061)	0.066 (0.091)
3 years after event	0.54*** (0.079)	0.77*** (0.13)	-0.084 (0.072)	-0.047 (0.10)
4 years after event	0.59*** (0.080)	0.86*** (0.13)	-0.036 (0.076)	0.16 (0.10)
5 years after event	0.58*** (0.089)	0.93*** (0.14)	-0.052 (0.083)	0.11 (0.11)
6 years after event	0.59*** (0.092)	0.91*** (0.14)	-0.079 (0.089)	0.11 (0.11)
7 years after event	0.57*** (0.096)	0.89*** (0.14)	-0.14 (0.094)	0.014 (0.12)
8 years after event	0.64*** (0.11)	1.03*** (0.16)	-0.059 (0.10)	0.14 (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). 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_{-1} , the coefficient prior to the year in which QRs were removed, is normalized to zero. The policy is staggered from 1995 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 parenthesis. All columns report event study estimates plotted in Figure 4. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Source: CMIE Trade_{dx}.

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 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_{-1} , the coefficient prior to the year in which QRs were removed, is normalized to zero. The policy is staggered from 1995 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}.

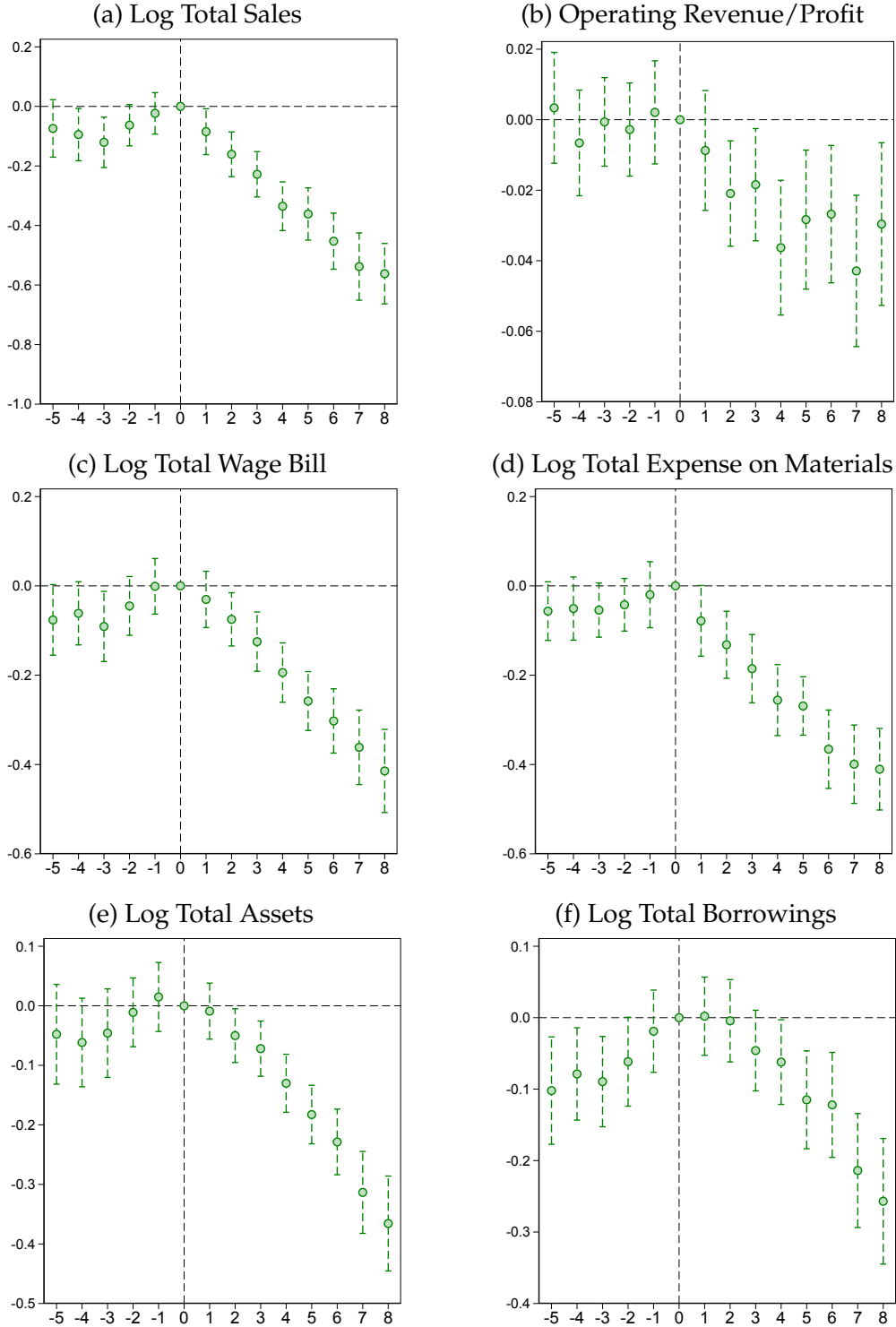
A.3 Appendix: Firm Level Event Studies: Financial Indicators

Table A3: Domestic Firms Contract after QR Removal

	(1)	(2)	(3)	(4)	(5)	(6)
	Total Sales	Operating Profits/ Revenue	Total Wage Bill	Total Expense on Materials	Total Assets	Total Borrowings
5 years before event	-0.070* (0.041)	-0.00064 (0.0067)	-0.083** (0.034)	-0.046 (0.033)	-0.044 (0.032)	-0.080** (0.036)
4 years before event	-0.10** (0.042)	-0.013* (0.0076)	-0.074** (0.033)	-0.046 (0.036)	-0.068** (0.029)	-0.049 (0.034)
3 years before event	-0.13*** (0.039)	-0.0050 (0.0066)	-0.11*** (0.033)	-0.051 (0.032)	-0.040 (0.031)	-0.053 (0.033)
2 years before event	-0.061* (0.034)	-0.0036 (0.0071)	-0.054* (0.028)	-0.038 (0.032)	-0.0029 (0.027)	-0.030 (0.030)
1 year before event	-0.019 (0.033)	0.0022 (0.0078)	-0.0074 (0.027)	-0.015 (0.037)	0.033 (0.025)	0.010 (0.032)
1 year after event	-0.084** (0.036)	-0.0100 (0.0086)	-0.034 (0.029)	-0.080** (0.037)	0.0061 (0.022)	0.037 (0.031)
2 years after event	-0.16*** (0.036)	-0.021*** (0.0075)	-0.074** (0.029)	-0.14*** (0.032)	-0.035 (0.022)	0.032 (0.031)
3 years after event	-0.22*** (0.035)	-0.014* (0.0084)	-0.13*** (0.032)	-0.20*** (0.034)	-0.051** (0.022)	-0.0065 (0.031)
4 years after event	-0.34*** (0.040)	-0.033*** (0.0096)	-0.19*** (0.031)	-0.27*** (0.038)	-0.11*** (0.023)	-0.024 (0.031)
5 years after event	-0.38*** (0.044)	-0.024** (0.010)	-0.26*** (0.032)	-0.30*** (0.037)	-0.17*** (0.024)	-0.083** (0.034)
6 years after event	-0.47*** (0.045)	-0.023** (0.0099)	-0.31*** (0.036)	-0.38*** (0.047)	-0.22*** (0.026)	-0.11*** (0.037)
7 years after event	-0.58*** (0.054)	-0.044*** (0.0093)	-0.39*** (0.041)	-0.43*** (0.046)	-0.32*** (0.033)	-0.21*** (0.041)
8 years after event	-0.60*** (0.050)	-0.033*** (0.011)	-0.45*** (0.045)	-0.43*** (0.050)	-0.38*** (0.037)	-0.26*** (0.047)
Firm FE	✓	✓	✓	✓	✓	✓
year	✓	✓	✓	✓	✓	✓
Observations	72792	72792	73944	64781	78631	73721
R ²	0.76	0.35	0.82	0.78	0.83	0.76

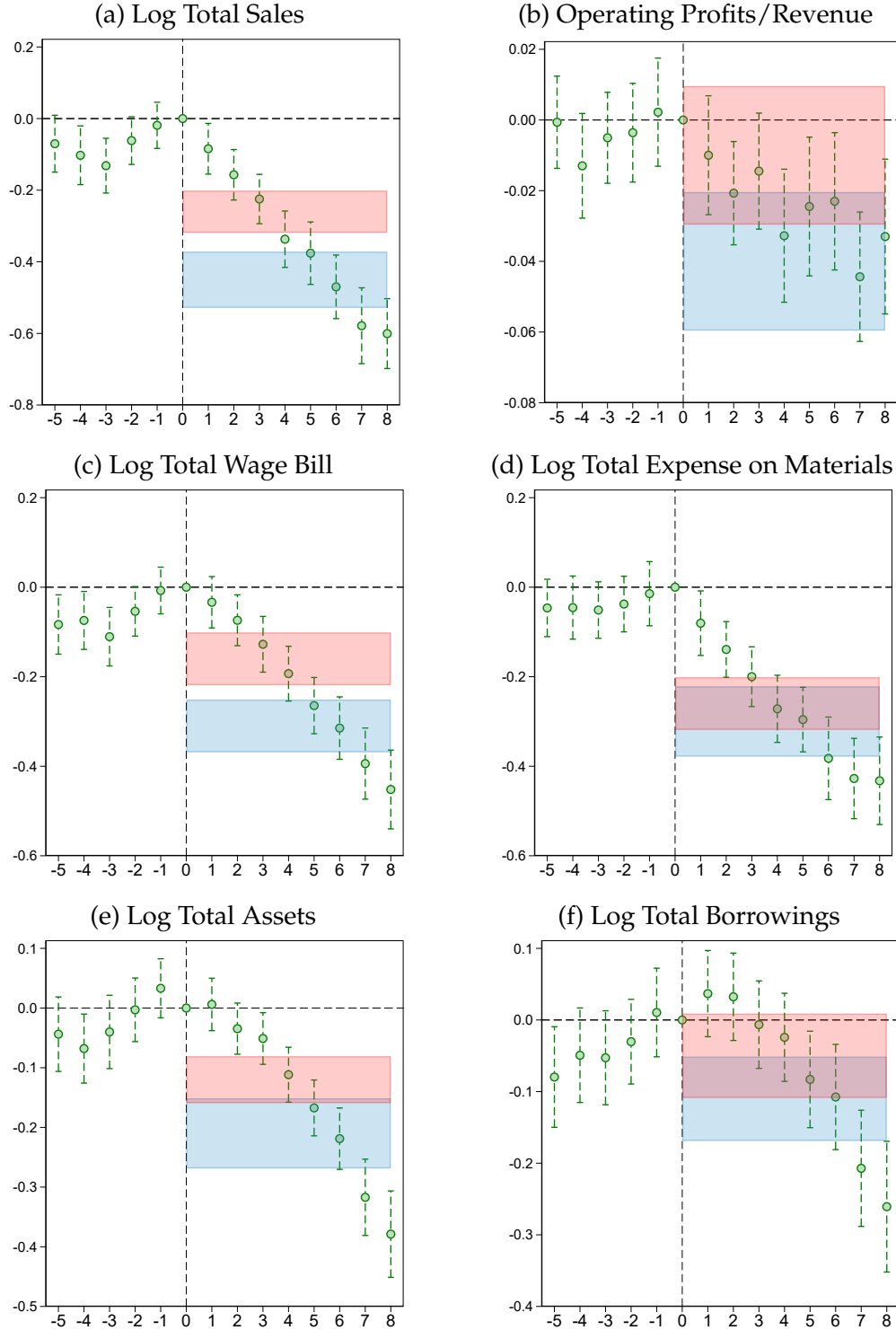
Notes: The table shows the results of running the event study specification (2). The dependent variables are: log total sales (column (1)), operating profits/revenue (column (2)), log total wage bill (column (3)), log total expense on materials (column (4)), log total assets (column (5)), and log total 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 1995 to 2001. Clustering of standard errors is at the four-digit industry \times year. Standard errors are in parenthesis. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Source: CMIE Prowess_{dx}.

Figure A3: Domestic Firms Contract after QR Removal: Robustness to Two-way Fixed Effects Estimator



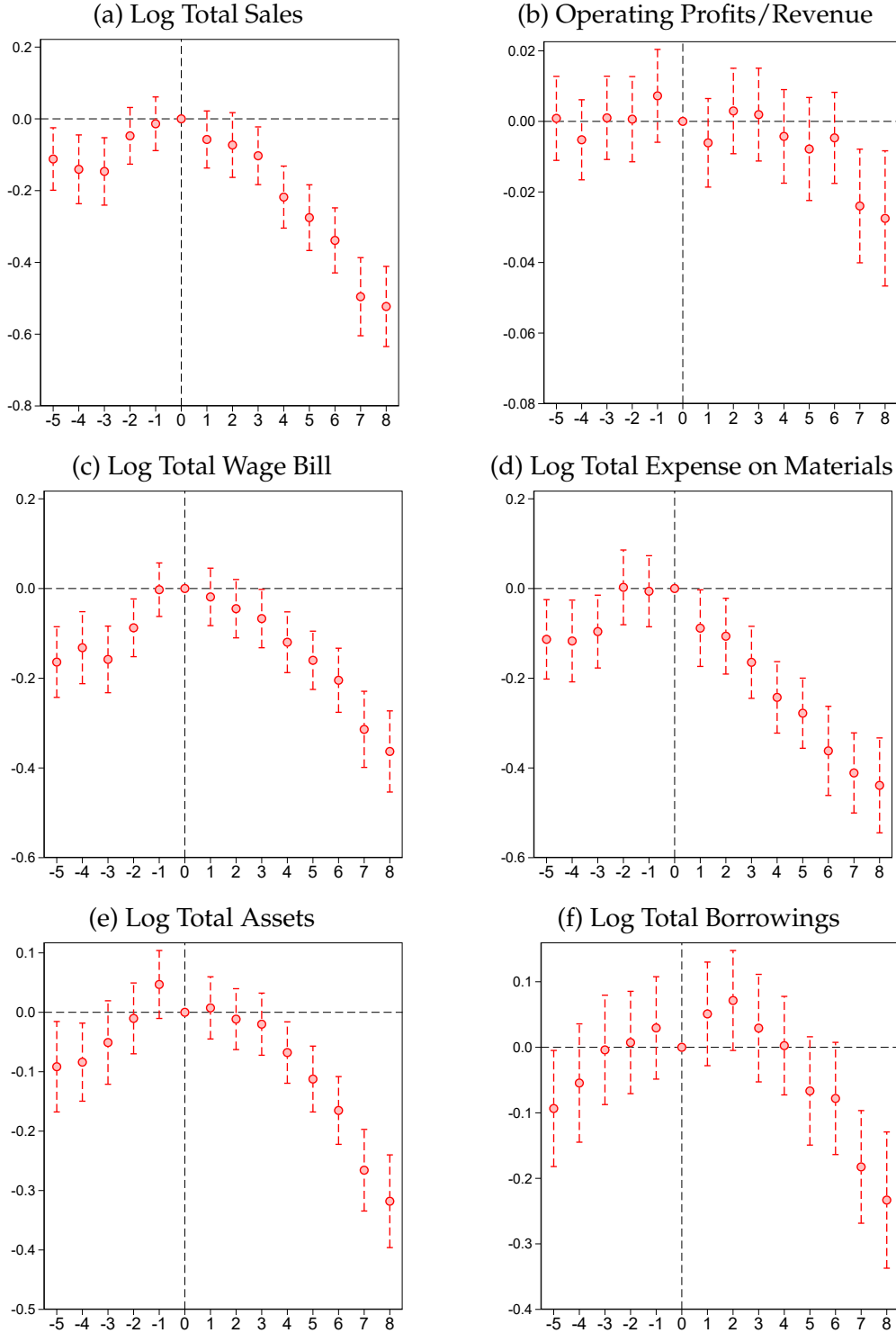
Notes: The figure plots the estimated θ_k event study coefficients from a regression of the form given in (2), estimated using two-way fixed estimator. The dependent variables are: log total sales (panel (a)), operating profits/revenue (panel (b)), log total compensation (panel (c)), log total expense 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 1995 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: Prowess.

Figure A4: Domestic Firms Contract after QR Removal: Comparison of All Firms and Family Firms



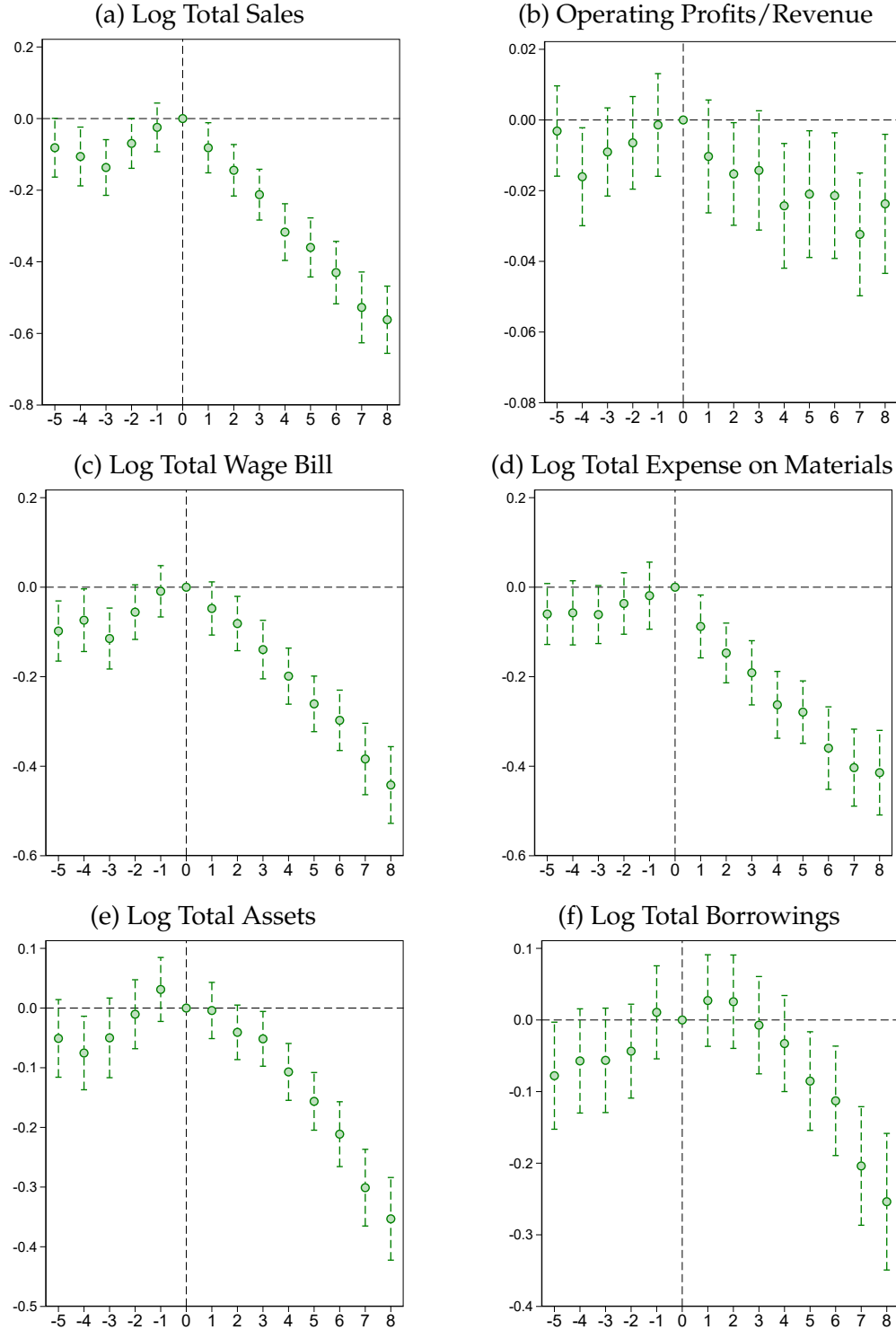
Notes: The figure plots the estimated θ_k event study coefficients from a regression of the form given in (2) for firms which were identified as family firms beginning from pre-policy period, where the dependent variables are: log total sales (panel (a)), operating profits/revenue (panel (b)), log total compensation (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 1995 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. Shaded green bands represent the average post-treatment effect for all treated firms, while red bands represent the same for the family-firm subsample. Source: CMIE Prowess_{dx}.⁶⁰

Figure A5: Domestic Firms Contract after QR Removal: Robustness to Conditioning on Family Firms



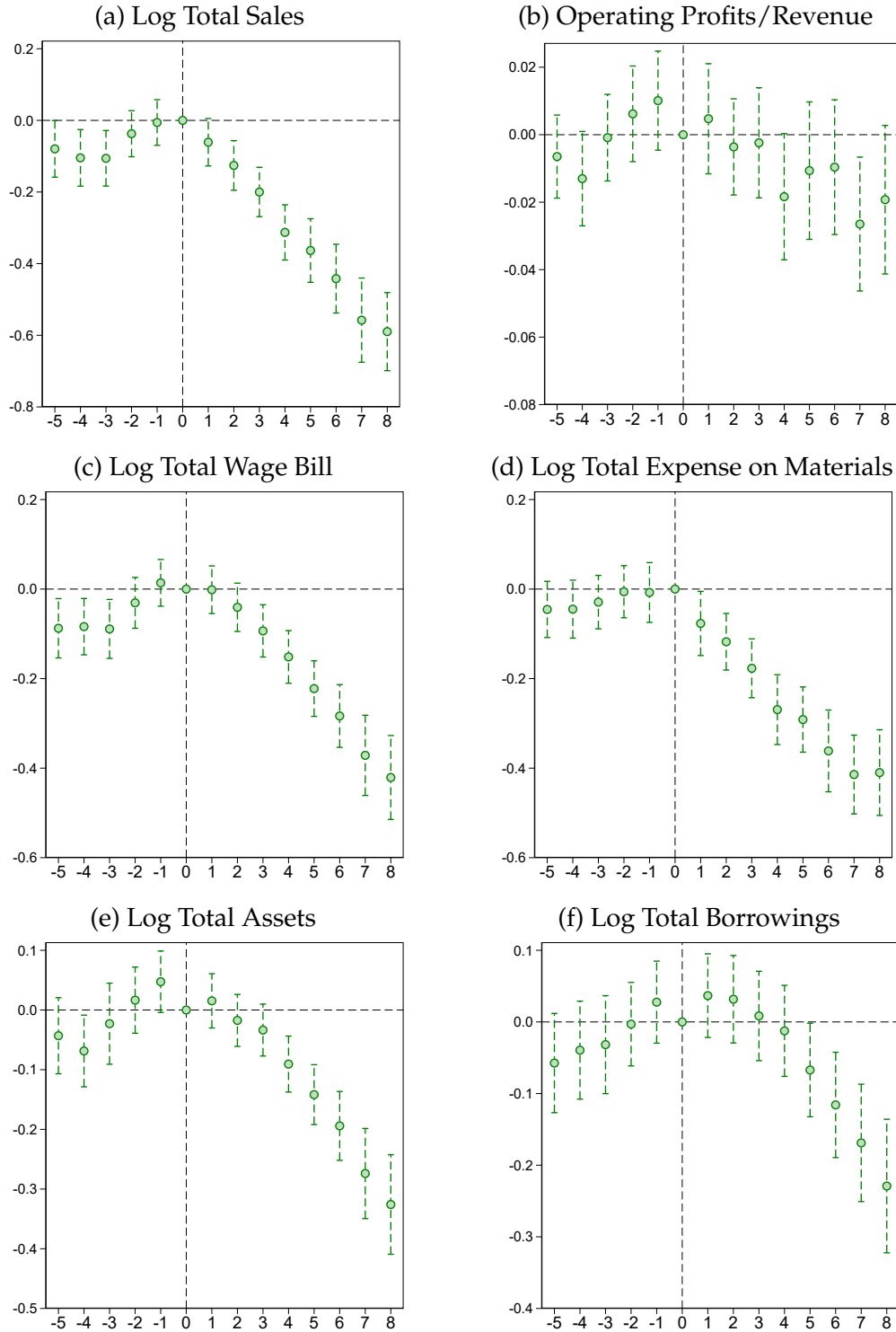
Notes: The figure plots the estimated θ_k event study coefficients from a regression of the form given in (2) for firms which were identified as family firms beginning from pre-policy period, where the dependent variables are: log total sales (panel (a)), operating profits/revenue (panel (b)), log total compensation (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 1995 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}.

Figure A6: 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) 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)), operating profits/revenue (panel (b)), log total compensation (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 1995 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}.

Figure A7: Domestic Firms Contract After QR Removal: Robustness to Alternate 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), where the dependent variables are: log total sales (panel (a)), operating profits/revenue (panel (b)), log total compensation (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 1995 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}.

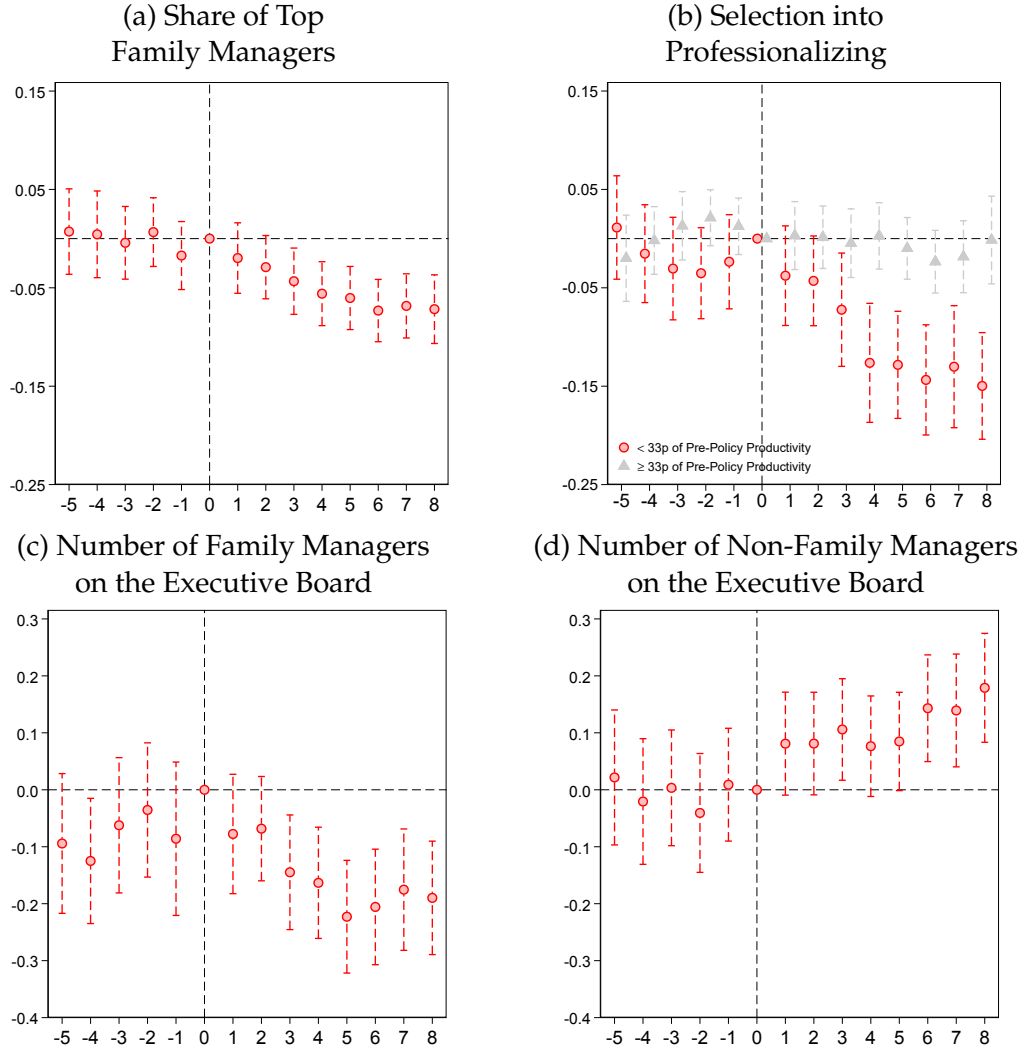
A.4 Appendix: Firm Level Event Studies: Managerial Indicators

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 (0.023)	-0.098 (0.066)	0.018 (0.064)
4 years before event	-0.000056 (0.024)	-0.11* (0.056)	-0.010 (0.060)
3 years before event	-0.0038 (0.020)	-0.089 (0.059)	0.0097 (0.058)
2 years before event	0.0017 (0.019)	-0.046 (0.056)	-0.021 (0.058)
1 year before event	-0.015 (0.018)	-0.100 (0.063)	0.022 (0.058)
1 year after event	-0.012 (0.019)	-0.097* (0.053)	0.083* (0.051)
2 years after event	-0.030* (0.017)	-0.076 (0.052)	0.099** (0.048)
3 years after event	-0.044** (0.018)	-0.16*** (0.053)	0.12** (0.047)
4 years after event	-0.062*** (0.018)	-0.18*** (0.054)	0.090* (0.049)
5 years after event	-0.062*** (0.018)	-0.25*** (0.052)	0.089* (0.048)
6 years after event	-0.072*** (0.017)	-0.20*** (0.054)	0.15*** (0.050)
7 years after event	-0.068*** (0.017)	-0.18*** (0.053)	0.15*** (0.054)
8 years after event	-0.077*** (0.018)	-0.19*** (0.052)	0.19*** (0.051)
Firm FE	✓	✓	✓
Industry \times Year FE	✓	✓	✓
District \times Year FE	✓	✓	✓
Observations	23445	23800	23800
R ²	0.83	0.77	0.75

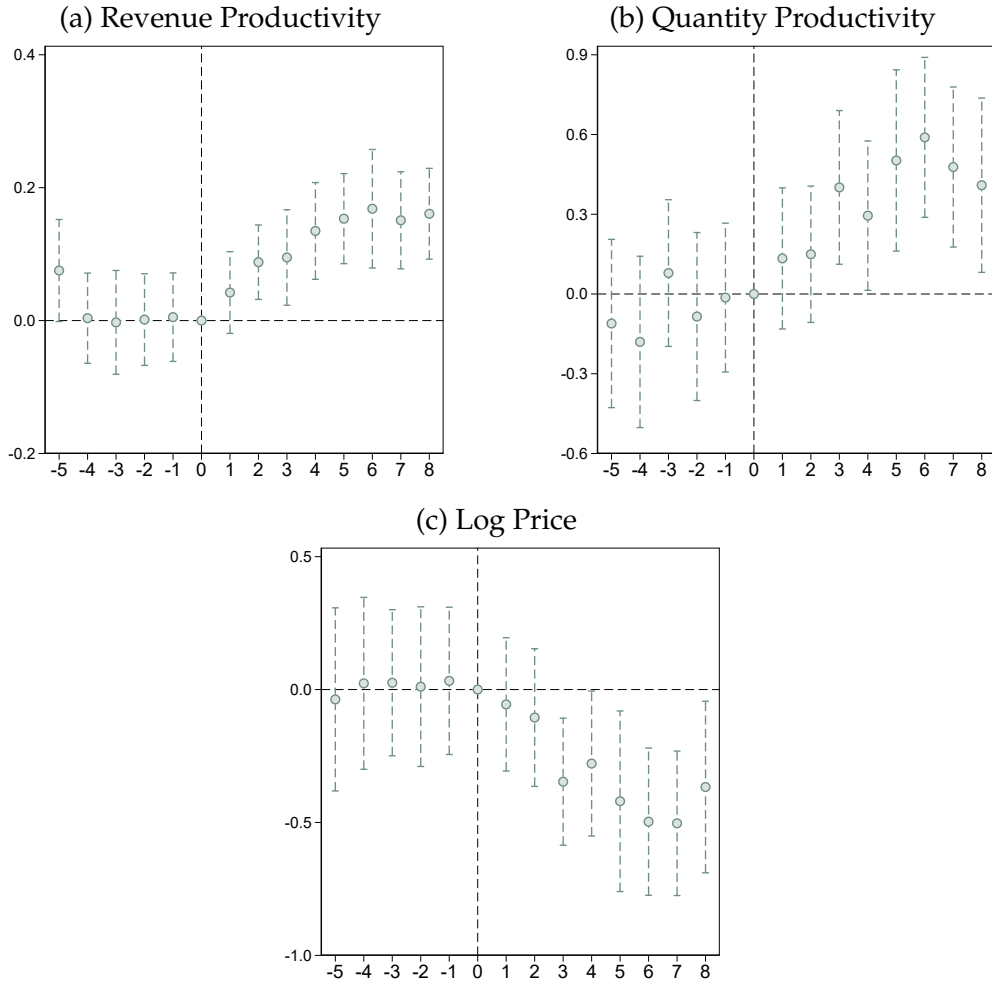
Notes: The table shows the results of running the event study specification (2). The dependent variables are: the share of family members on the executive board of directors of a firm (i.e., top management positions like CEO, CFO, MD, etc.) in (column (1)), the number of family members on the executive 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 1995 to 2001. Clustering of standard errors is at the three-digit industry \times year. Standard errors are in parenthesis. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. *Source:* CMIE Prowess_{dx}.

Figure A8: 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 the two-way fixed 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), share of top family managers dropped from the board while transitioning toward professional management in panel (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), we examine selection into professionalizing by comparing firms based on their pre-policy productivity. Firms are divided into two groups: those in the bottom tertile of pre-policy productivity and the remaining firms. 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 1995 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} and the Ministry of Corporate Affairs, Government of India.

Figure A9: Increase in Productivity as Firms Shed Family Members after QR Removal: Triple Specification



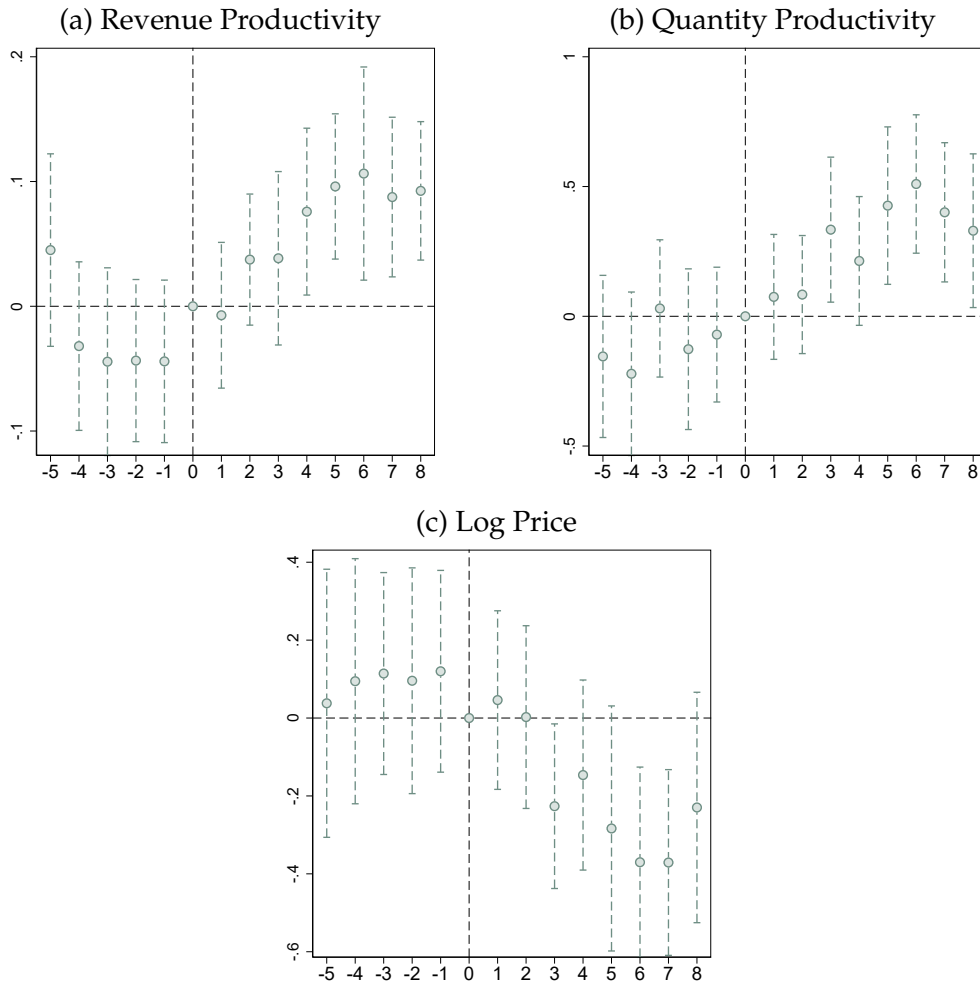
Notes: This figure presents the estimated θ_k event study coefficients from a regression specified in equation (2), with coefficients in Table A5. Event studies are conducted by interacting and taking differences between firms that professionalized their management after QR removal and those that did not. A firm is classified as treated in a year if QRs are removed on its highest-revenue product. A firm is considered to have professionalized if the share of family members on the executive board of directors declined in the post-policy period. The dependent variables are revenue productivity (TFPR) (panel (a)), quantity productivity (TFPQ) (panel (b)), and log price (panel (c)). TFPR and TFPQ are estimated using the method proposed in [Petrin and Levinsohn \(2012\)](#). Log price is defined as the ratio of a firm's total value of products produced and the total quantity of products produced. θ_0 , the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1995 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 the 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.

Table A5: Increase in Productivity as Firms Shed Family Members after QR Removal: Triple Specification

	(1) Revenue Productivity	(2) Quantity Productivity	(3) Log Price
5 years before event	0.075* (0.039)	-0.11 (0.16)	-0.037 (0.18)
4 years before event	0.0036 (0.035)	-0.18 (0.16)	0.023 (0.16)
3 years before event	-0.0027 (0.040)	0.079 (0.14)	0.026 (0.14)
2 years before event	0.0015 (0.035)	-0.085 (0.16)	0.011 (0.15)
1 year before event	0.0052 (0.034)	-0.013 (0.14)	0.033 (0.14)
1 year after event	0.042 (0.031)	0.13 (0.14)	-0.056 (0.13)
2 years after event	0.088*** (0.029)	0.15 (0.13)	-0.11 (0.13)
3 years after event	0.095*** (0.037)	0.40*** (0.15)	-0.35*** (0.12)
4 years after event	0.13*** (0.037)	0.29** (0.14)	-0.28** (0.14)
5 years after event	0.15*** (0.035)	0.50*** (0.17)	-0.42** (0.17)
6 years after event	0.17*** (0.045)	0.59*** (0.15)	-0.50*** (0.14)
7 years after event	0.15*** (0.037)	0.48*** (0.15)	-0.50*** (0.14)
8 years after event	0.16*** (0.035)	0.41** (0.17)	-0.37** (0.16)
Firm FE	✓	✓	✓
Industry \times Year FE	✓	✓	✓
Observations	25473	25473	25473
R ²	0.87	0.86	0.86

Notes: The table presents the estimated θ_k event study coefficients from a regression specified in equation (2), with corresponding estimates plotted in A9. Event studies are conducted by interacting and taking differences between firms that professionalized their management after QR removal and those that did not. A firm is classified as treated in a year if QRs are removed on its highest-revenue product. A firm is considered to have professionalized if the share of family members on the executive board of directors declined in the post-policy period. The dependent variables are revenue productivity (TFPR) (column (1)), quantity productivity (TFPQ) (column (2)), and log price (column (3)). TFPR and TFPQ are estimated using the method proposed in Petrin and Levinsohn (2012). Log price is defined as the ratio of a firm's total value of products produced and the total quantity of products produced. θ_0 , the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1995 to 2001. All regressions include firm and year fixed effects. Clustering of standard errors is at the three-digit industry \times year. Standard errors are in parenthesis. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Source: CMIE Prowess_{dx} and the Ministry of Corporate Affairs, Government of India.

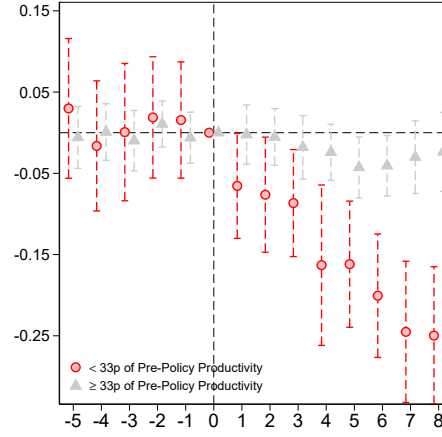
Figure A10: Increase in Productivity as Firms Shed Family Members after QR Removal: Robustness to Two-Way Fixed Effects Estimator



Notes: This figure presents the estimated θ_k event study coefficients from a regression specified in equation (2), estimated using two-way fixed estimator. Event studies are conducted separately for firms that professionalized their management after QR removal (in red) and those that did not (in grey). A firm is classified as treated in a year if QRs are removed on its highest-revenue product. A firm is considered to have professionalized if the share of family members on the executive board of directors declined in the post-policy period. The dependent variables are revenue productivity (TFPR) (panel (a)), quantity productivity (TFPQ) (panel (b)), and log price (panel (c)). TFPR and TFPQ are estimated using the method proposed in [Petrin and Levinsohn \(2012\)](#). Log price is defined as the ratio of a firm's total value of products produced and the total quantity of products produced. θ_0 , the coefficient for the year in which QRs were removed, is normalized to zero. The event is staggered from 1995 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 the 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

Figure A11: 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 groups: those in the bottom tertile of pre-policy productivity and the remaining firms. 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 1995 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.

Table A6: Falsification: No Productivity Change due to Trade in Already Professionalized Firms

	Baseline Family Firms	Baseline Professional Firms
TFPR	0.043* (0.025)	-0.035 (0.023)
TFPQ	0.18** (0.077)	-0.076 (0.076)
Firm FE	✓	✓
Industry \times Year FE	✓	✓
District \times Year FE	✓	✓
Observations	24356	22096

Notes: This figure 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 the TFPR and TFPQ of firms. Average treatment effects are calculated separately for firms that were already family-managed (column 1) and those that were already professionally managed (column 2). Robust standard errors clustered at the three-digit industry \times year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. “Number of Firms” refers to unique firms in each regression. *Source* : CMIE Prowess, the Ministry of Corporate Affairs, Government of India, and archives of the Ministry of Commerce.

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:

$$\begin{aligned}
 M_{\text{all}} &= S(z_e) = z_e^{-k}, \\
 M_{\text{fam}} &= S(z_f) - S(z_d) = z_f^{-k} - z_d^{-k}, \\
 M_{\text{prof,low}} &= S(z_e) - S(z_f) = z_e^{-k} - z_f^{-k}, \\
 M_{\text{prof,high}} &= S(z_d) = z_d^{-k}, \\
 M_{\text{prof}} &= M_{\text{prof,low}} + M_{\text{prof,high}}.
 \end{aligned} \tag{11}$$

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 (7), (9), and (10),

$$M_{\text{fam}} = z_f^{-k} \underbrace{\left(1 - \left(\frac{1}{\delta} \right)^{\frac{k}{\sigma-1}} \right)}_{>0} \tag{12}$$

where $\delta \equiv \frac{B}{f(\gamma^{\sigma-1}-1)} > 1$ (10).

Moment 1: Share of Family Firms.

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

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.

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

Revenues for family and professional firms are given by

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

Hence, mean revenues are given by

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

where

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

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

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

$$\Delta = (\sigma - 1) \log \gamma + \log E_{\text{prof}} - \log E_{\text{fam}}.$$

The first term, $(\sigma - 1) \log \gamma$, is the direct scale effect of professionalization. The second term, $\log E_{\text{prof}} - \log E_{\text{fam}}$ 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

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