Globalization and State Capitalism: Assessing Vietnam's Accession to the WTO*

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Abstract

What do state-owned enterprises (SOEs) do? How do they respond to market incentives? Can we expect substantial efficiency gains from trade liberalization in economies with a strong presence of SOEs? Using a new dataset of Vietnamese firms we document a set of empirical regularities distinguishing SOEs from private firms. Then we empirically study the effect of the 2007 WTO accession on selection, competition, and productivity. Our results show that WTO entry is associated with higher probability of exit, lower firm profitability, and substantial increases in productivity for private firms but not for SOEs. Our estimates suggest that the overall productivity gains would have been about 40% larger in a counterfactual Vietnamese economy without SOEs. We highlight some economic mechanisms possibly driving these findings through the lenses of a model of trade with heterogeneous private and state-owned firms. The model suggests that political/regulatory barriers to entry and access to credit are key drivers of the different response of SOEs to trade liberalization. Further empirical tests broadly validate these insights.

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1 Introduction

In the major emerging economies, state owned enterprises (SOEs) still account for a substantial share of income and capital. Focusing on the Forbes Global 2000 list of the world's largest 2,000 public companies and their 330,000 subsidiaries worldwide, a recent OECD study shows that SOE sales, market values, and assets account for a large share of the economy in BRIC countries (Kowalski, Büge, Sztajerowska, and Egeland, 2013).[1] The strong presence of SOEs and the staggering recent success of these economies has triggered a new debate over "state capitalism" as a viable growth and development model (The Economist, 2012). Although they are at the center stage of this important debate, our understanding of this new form of enterprises is still in very limited. What do SOEs do? How do they respond, if at all, to market forces and reforms? Are they an obstacle or an engine of growth in a globalized economy? Using a new rich data set of Vietnamese firms, we first document a set of empirical regularities on SOEs operations and on those of private firms (POEs). Then, we examine the effect of large scale trade reform, the 2007 entry into the WTO, on selection, firm profitability, and productivity for both POEs and SOEs. Third, using a simple model of trade under firm heterogeneity in a small economy, we highlight how specific features of SOEs, regulatory/political barriers to entry and preferential access to credit, can shape the economic mechanisms driving their different response to trade. Specific tests provide empirical validations of these mechanisms.

Vietnam represents an ideal country for our research purposes, since more than one-third of its economy is still state owned and the WTO accession represents one of the largest market reforms, possibly the largest, in its history. We rely on data from the General Statistics Office (GSO), which covers the entire spectrum of Vietnamese firms over the period 2006-2012. Given that Vietnam was in a weak bargaining position in seeking accession to the WTO, MFN tariff cuts provide arguably exogenous variation in international exposure, as tariff rates fell from an average of 20% in 2006 to 8% in 2009, and varied extensively across industries. Using a difference-in-differences approach, we directly estimate the impact of the reduction in Vietnam's Most Favored National (MFN) tariffs on the probability of exit of private firms in comparison to SOEs. We also assess the impact of MFN cuts on firm profitability. In addition to analysis at the firm level, we study the impact of MFN cuts on average productivity at the industry level, exploiting the cross-industry variation of SOEs' presence. The main econometric challenge is that private firms are likely to differ from SOEs in many characteristics, which could also affect their probability of entering and exiting the market. We account for this source of heterogeneity by using entropy balancing to establish a reasonable comparison group between POEs and SOEs with respect to a battery of firm-level and industry-level confounding factors. In addition, we saturate our models with a large number of fixed effects (including firm fixed effects) to account for possible confounding factors and industry specific time trends to mitigate concerns about the violation of the parallel trend assumption.

Our econometric analysis produces the following empirical findings. First, we only find strong evidence of trade-induced selection for POEs and less so for SOEs: Private firms are significantly more likely to exit the market compared to SOEs after Vietnam's accession to the WTO. Second, we find

[1] Based on Country SOE Share (CSS), an index of weighted averages of SOE shares of sales, assets, and market values among countries' top 10 companies, the paper reports that about 95% of top 10 Chinese companies are SOEs, while in Russia, India, and Brazil, SOEs represent 80%, 60%, and 50% of top firms respectively.

that POEs profitability decrease after WTO accession, whereas we do not observe any pro-competitive effects of trade for SOEs. Third, productivity increases after trade liberalization in industries with a negligible presence of SOEs, whereas this effect disappears as the presence of SOEs becomes substantial.

The overall productivity gains of this radical trade reform have been lower than expected. We show that WTO access tariff cuts are associated with an annual average increase in manufacturing productivity of 3.7% during the period 2008-2012. Given that the Vietnamese economy featured a robust growth in the pre-WTO period, but far behind the East Asia miracle pace, larger gains were expected from a small, fairly closed, economy like Vietnam joining the WTO.[2] Trefler (2004), finds that larger and less closed economies like Canada and the US obtained similar gains from their bilateral trade agreement.[3] We show that the presence of SOEs can partially account for the missing productivity gains. We do this by simulating a counterfactual scenario in which we measure the productivity gains that would have been brought about by WTO accession had SOEs not been a strong presence in the economy. This exercise suggests that in the period between 2008 and 2012 the overall productivity gains would have been 40% larger in a counterfactual economy where POEs replace SOEs. In sum, our results indicate that SOEs represent a substantial obstacle to trade-induced efficiency gains.

We look for possible economic mechanisms behind these results through the lenses of a trade model with firm heterogeneity in productivity and ownership. We devise a small open economy version of the Melitz and Ottaviano (2008) model with POEs and SOEs similar in all features except that the latter may operate in sectors subject to higher *political/regulatory barriers* to entry and have cheaper and more flexible *access to credit*. Higher barriers to entry allow SOEs to operate in less competitive markets where they are protected from domestic and foreign competition. Politically regulated entry hampers the pro-competitive effect of trade on firm profitability and firm selection. Things work differently for private firms that face pecuniary barriers to entry due to credit constrains in financing their initial investment. We show that stronger credit constraints generate less entry and less competitive markets, and POEs operating in less competitive industries experience stronger pro-competitive and selection effect of trade. Hence, when entry is regulated politically, liberalization does not increase competition and efficiency, while, when barriers to entry are economic, the impact of trade on competition is stronger the larger the barriers. In our model, as in standard models of trade with firm heterogeneity, selection is a source of trade-induced productivity growth. Consequently, by hampering selection, the presence of SOEs represents a drag on the productivity gains from trade liberalization.

Firms often need to borrow to finance their fixed operating costs, periodic expenses unrelated with the volume of production and sales, such as rental cost of land use, office space, equipment, licences, etc. These expenses play a key role for selection and exit (e.g. Hopenhayn, 1992, Melitz, 2003) because they have to be fully paid even when firms scale down production due to increasing

[2]Vietnam's GDP grew at about 5.5% between 1985 and 2007, and at 6% in the post WTO period till 2016. Per-capita GDP growth is 3.8% pre-WTO and 4.8% post.

[3]He shows that the reduction in Canadian tariffs following the US-Canada free trade agreement triggered a selection effect resulting in a 4.3% increase in Canadian manufacturing productivity. Lileeva and Trefler (2010) find that the reduction in US tariffs associated with the free trade agreement shifted market shares toward highly productive Canadian exporters, leading to an increase in productivity of 4.1%.

competitive pressure. Introducing fixed operating costs and credit constraints on them in the model, we show that the availability of cheaper and more flexible credit conditions allows SOEs to soften the economic constraints represented by these costs, thereby helping them to weather foreign competition better than private firms.

We then go back to the data and search for empirical validation of these insights. First, we find that the selection effect of WTO is stronger for POEs operating in less competitive (more concentrated) industries. Moreover, we find that POEs entry shows a strong positive response to WTO access, while the entry rate of SOEs does not have a statistically significant correlation with the WTO. Then we show that POEs with a larger debt ratio exit more after trade liberalization, while this relationship is not significant for SOEs. We also build a measure of the cost of borrowing, using firms' interest payment over their debt, and show that trade liberalization decreases this cost substantially for SOEs, but not for POEs. This is consistent with the model's suggestion that cheaper and better access to credit weakens the SOEs' response to trade liberalization.

Our paper is related to several strands of the literature. First, several empirical papers have documented the positive effects of trade on industry productivity through tougher selection and market share reallocation.[4] Pavcnik (2002), Trefler (2004), Bernard, Jensen, and Scott (2006), Amiti and Konings (2007), Topalova and Khandelwal (2011), and Brandt et al (2017), among others, analyse the effects of important trade liberalization episodes for Chile, the United States and Canada; the United States alone; Indonesia; India; and China. These works find that a substantial part of the trade-induced increase in productivity is generated by selection and intra-industry reallocations. Our paper contributes to this literature by assessing the productivity gains from trade through inter-firm reallocation in an economy with a non-negligible share of firms owned by the state and with a particular focus on the different response of SOEs and POEs.

There is a stream of new empirical papers assessing the pro-competitive effects of trade with firm-level data. Feenstra and Weinstein (2016) find a substantial reduction in average markups in the US between 1992 and 2005 associated to a large increase in import shares. De Loecker et al. (2016), find that in large trade liberalization episode in India output tariffs reduced markups and that this pro-competitive effect was more than compensated by the positive effect of input tariff cuts on markups. More strictly related to our work, Brandt et al. (2017) show that output tariff cuts related to China's access into the WTO have negative effects on markups and positive effects on TFP, in line with our findings. They also find that input tariff cuts raise both markups and productivity. Although China, as much as Vietnam, has a strong presence of SOEs, the objective of the paper is not to understand the different response of SOEs and POEs to trade. They rather focus on analyzing the different effects of input and output tariffs and on the different response of incumbent firms and entrants.[5]

While SOEs have been largely overlooked by previous studies, there is an emerging literature analyzing different features of 'state capitalism'. Not surprisingly, much of this literature focuses on

[4] For recent extensive surveys and assessment of the empirical literature on trade with firm heterogeneity, see Bernard, Jensen, Redding, and Schott (2012) and Melitz and Trefler (2012).

[5] SOEs are briefly discussed in the short section that analyses the role of the agency problem in shaping the effects of trade on productivity. They show that a higher likelihood of exit following trade liberalization provides increased incentives for effort provision for managers in private firms which, in turn, leads to higher productivity. This mechanism is not operating for SOEs, which instead feature a higher CEOs turnover in the face of stronger foreign competition. We complement this results focusing on the role of barriers to entry and credit constraints.

China. Song, Storesletten, and Zilibotti (2010) present a theory of economic transition in China based on reallocation of manufacturing from less productive SOEs to highly productive "entrepreneurial" firms. Credit constraints and other cost wedges prevent entry of more productive private firms and shelter sluggish SOEs from competition. Economic reforms reduce the cost wedges between the two types of firms and trigger a reallocation of resources toward the most efficient firms, thereby setting the economy on a path of privatization and fast growth. Hsieh and Klenow (2009) find that about two-thirds of aggregate TFP growth in China between 1998 and 2005 - a period that includes China's access to the WTO in 2001 - can be attributed to reallocation from low- to high-productivity plants. Hsieh and Song (2015) compare this view of China's growth, the triumph of "Markets over Mao,"with the conflicting view that 'state capitalism' through large and successful SOEs has driven growth and development in China. They provide empirical evidence that the drastic reforms of Chinese SOEs that started in the late 1990s led to the privatisation or closure of small and inefficient firms, while large firms were corporatised and kept under state control. They find that the labor productivity of these large SOEs has converged to that of private firms, and SOEs were responsible for about a fifth of aggregate TFP growth during the period 1998-2007. In line with this research, we analyse the productivity effects of reallocations from low- to high-productivity firms, but we differ by focusing on the specific role of trade liberalization as a source of productivity growth in an economy with a large presence of SOEs.[6]

Third, preferential trade agreements have recently begun to involve discussions about *behind-the-border barriers*. These include domestic regulations on the environment, health, safety and labor standards, and domestic taxation, which often generate non-tariff barriers behind national borders. As discussed in Ederington and Ruta (2016), the WTO is taking its first steps in the direction of eliciting cooperation on this type of barriers, especially regarding product and process standards. The empirical and theoretical literature are also trying to understand the nature of these barriers and the mechanisms through which they affect the costs and benefits of international trade agreements. Recent research has shown that commitment issues (Brou and Ruta, 2013), bilateral bargaining over prices (Antras and Steiger, 2012) and coordination externalities (Costinot, 2008) can motivate the need for "deep integration,"going beyond tariff reductions to include coordination of domestic policies.[7] Our paper suggests that political/regulatory entry barriers and preferential access to credit can function as de facto behind-the-border barriers and hamper gains from "shallow" integration limited to tariff reduction. Our findings highlight the presence of an important complementarity between trade liberalization and domestic product market reforms. In line with our results, but using cross-country data from 126 countries Freund and Bolaky (2008) show that trade is associated with higher standards of living in economies with less regulated firm entry. They find that a 1% increase in the trade share of GDP is associated with more than a one-half percent rise in per-capita income in economies with low

[6]Another point of difference is our focus on Vietnam instead of China. There is little work on the productivity and welfare effects of Vietnam's WTO accession. Fosse and Raimondos-Moller (2012) and Gosh and Whalley (2008) use general equilibrium trade models with SOEs and calibrate them to Vietnam in order to study the effects of trade liberalization. These papers limit their analysis to economies with representative firms and perform calibration exercises. Our paper, instead, introduces heterogeneity of firm productivity and ownership and assesses Vietnam's WTO entry using firm-level data and by conducting reduced form econometric analysis.

[7]Horn, Maggi, and Staiger (2010) shed a skeptical light noting that removing behind-the-border barriers is more costly than removing border measures, because the former are less transparent than the latter.

barriers to firm entry, but has no effects in more rigid economies.

The remainder of the paper proceeds as follows. In the next section, we offer an overview of the characteristics of Vietnamese firms and document the reduction in trade barriers produced by WTO accession. In the third section, we discuss our empirical strategy, present the empirical results, and implement some robustness checks to further validate our findings. In the fourth section, we present a model that provides an interpretation of our main empirical findings, suggesting some specific economic mechanisms. A fifth section provides an empirical validation of the mechanisms highlighted by the model. A final section concludes.

2 Market Reforms and Vietnamese Firms

In this section we document the reduction in trade barriers brought about by Vietnam's WTO accession, provide a brief discussion of the SOE reforms which started before the accession, and report several stylised facts on Vietnamese firms.

Data. Before presenting the stylised facts, we describe the data and the main variables of interest. Our data come from the annual Enterprise Census of firms performed by Vietnam's GSO for the period 2006-2012. They include the entire universe of Vietnamese firms that have at least 10 employees, and contain a rich set of firm-level characteristics.[8] We follow the classification of firm ownership employed in Vietnamese statistical handbooks and divide business operations into three large categories: state owned enterprises, including centrally-managed SOEs, locally-managed SOEs, and limited liability companies of which all shares are controlled by state agencies; the non-state sector, including registered private domestic operations and cooperatives; and foreign invested enterprises (FIEs) that have less than 50% state ownership. Large SOEs often have multiple subsidiaries, which compete in multiple industries, often outside of the core competency of the main SOE. To more directly model the competition between state and private sectors, we treat each subsidiary as an individual unit in our analysis. This allows for more diversity in the sectorial pattern of SOE participation than analyses that rely solely on the parent firm's headline sector. In addition, it aids comparisons between SOEs and private firms, because the subsidiaries are more similarly sized.

Following common practice, we do not include FIEs in our private firms category (POE), although we always control for FIEs in the econometric analysis. The trade categorisation of the survey follows the fourth revision of the International Standard Industrial Classifications (ISICv4). Since the tariff data are at the HS 6-digit level, we create a crosswalk from ISICv4 to HS 6-digit to merge the GSO data with tariff data. We merge the tariff data at 6-digit level with the 4-digit firm-level data using average tariff values. The trade data come from COMTRADE and are at the HS 6-digit level. In merging the WTO tariff data and the GSO firm-level data, we lose around 20,000 firms for which the trade categories do not match. These firms are almost always in sectors, such as incense stick making or ice delivery, for which international analogues are hard to identify.

[8]The Enterprise Census includes a random sample of firms under 10 employees outside of those in the panel. The data do not include firms that operate in the informal economy. The variables are reported in Vietnamese and translated into English by us.

Before providing an overview of Vietnamese firms, we describe the main variables that we use both in this descriptive section and in the empirical section. *Exit* is defined as the probability of exit for firm f in industry i between year t and $t+1$. Formally, $Exit_{fi,t} = Pr(Exit_{fi,t} = 1)$. The panel structure of the Vietnamese firm-level data collected by the annual Enterprise Census allows us to track firms by tax code over time. In line with previous studies (Pavcinik, 2002; Topalova and Khandelwal, 2011), we use revenue-based total factor productivity *TFPR*.[9] Moreover, we use the price-cost margin (PCM) as a proxy for *firm profitability*. Since we have a direct measure of firm profits in our data, it is straightforward to compute PCM as profits over revenues.[10] Finally, the logged number of employees is a proxy for size and the capital-labor ratio is a proxy for capital-intensive sectors.

WTO accession. We start documenting the characteristics of the tariff cuts brought about by WTO entry. We begin with the MFN tariff cuts implemented by Vietnam to enter the WTO. Tariff cuts are defined as the inverse first differences for each industry i, i.e., $MFN_{i,t-1} - MFN_{i,t}$, with larger values implying greater trade liberalization. The data are collected using the HS trade categorisation at the 6-digit level and come from WITS (2014), from the WTO, and other national sources. Since our tariff data are at the sectoral level, to analyse the characteristics and performance of private and public firms we break down our sample from the GSO census, creating two macro sectors based on firm ownership. We refer to an ISIC 4-digit sector as SOE-dominated if the SOE labor share is larger than 40%, which is the upper quartile, i.e., 75^{th} percentile. In the analysis that follows this is a dummy variable labeled *SOE-dominated Sector*.[11]

The first thing to notice in Figure 1 is that with the exception of the year 2012 the MFN tariff cuts faced by POE-dominated sectors were roughly comparable to the MFN tariff cuts faced by SOE-dominated sectors. This result mitigates concerns that multilateral trade liberalization is endogenous to the type of ownership. The second thing to notice is that there is a great deal of variation across industry types in terms of tariff reduction. Digging inside our two macro sectors, we look at the variation of tariff cuts across 2-digit industries (see Figure A1 in the appendix).[12] There is evidence that POE-dominated sectors faced larger tariff cuts than SOE-dominated sectors in the following industries: food processing, textiles, wood, and precision instruments (see Figure A2 in the appendix). The furniture industry appears to be the only one in which the SOE-dominated sector faced larger MFN cuts than the POE-dominated sector.

The SOE reform. In 1986, the Vietnamese government launched *Doi Moi* (Renovation), an ambitious program of economic reforms which resulted in dismantling most instruments of control over

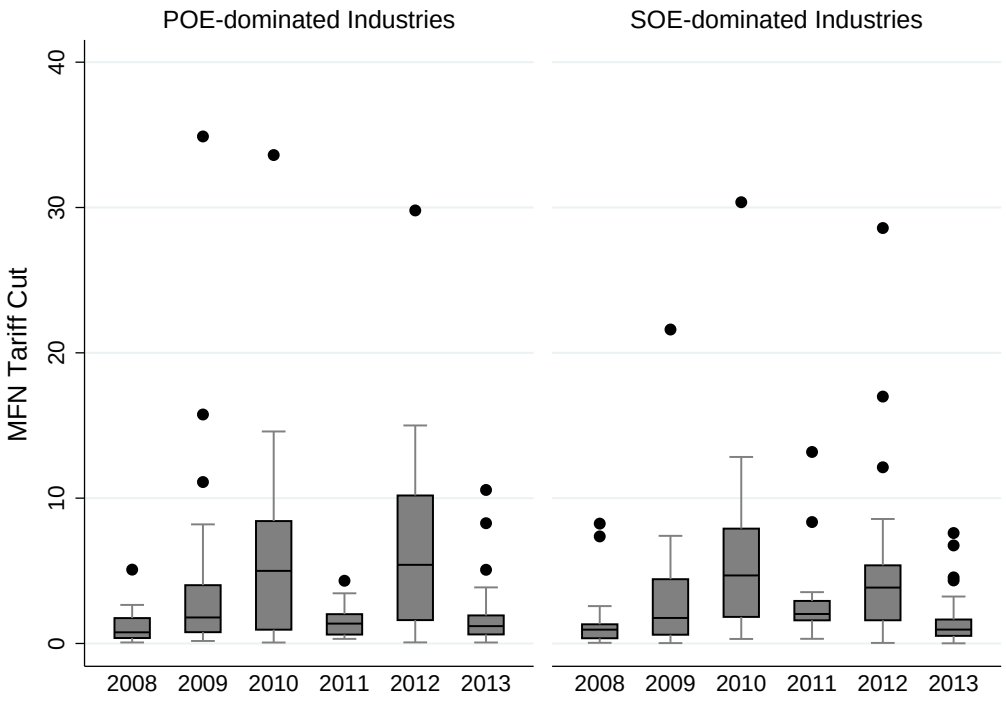
[9] TFPR is calculated using simple firm-level Solow residuals. We calculate TFPR for each firm-year by regressing the firm-level log of revenue on firm-level physical assets, employment, year and 4-digit industry fixed effects. The residuals of this regression, which might also be negative, are our time-varying measures of firm productivity.

[10] We exclude from the sample firms that have negative firm profitability and firm profitability than one. The difference in mean between POE and SOE is not significant for firm profitability lower than zero and higher than one. Our results are not substantively different if we include these observations. Ideally, we would have liked to use markups. Unfortunately, our data do not include accurate pricing data on inputs and we are therefore unable to derive output elasticities such as those in De Loecker and Warzynski (2012).

[11] Results are not sensitive to this threshold and are similar if we use fractions of SOEs over total number of firms in a industry, SOE revenue share, and fraction of SOE capital in each industry.

[12] Since the macro POE and SOE sectors are defined at the 4-digit level, in the same 2-digit industries there might be both POE-dominated and SOE-dominated sectors at the ISIC 4-digit level.

Figure 1: MFN tariff cuts after WTO accession over time.



Note: The box plots show the distribution of tariff cuts in different years. The bars represent the lower and upper quartiles of each distribution, whereas the dots are outliers.

the economy. Among the most critical pillars of Doi Moi was a separation of SOE business operations from state planning in Decision 217/HDBT of 1987. The 12,000 SOEs that existed at the time were given general guidelines as part of the government's 10-year socioeconomic plan, but their decisions were independent of ministerial planning. They were expected to negotiate the price of inputs with suppliers and set their own prices based on market costs. SOE profits were calculated based on the true costs of material inputs (although this figure did not include land and cheap capital), and, with the exception of a compulsory tax payment to the central or local government, SOEs were allowed to retain their profits and reinvest as they saw fit. A number of SOEs struggled under these conditions and these low-performing operations were soon liquidated by the government authorities or equitised with their shares sold to the private sector.[13] In 1995, the hiving off of SOE business operations was further institutionalised under Decisions 90 and 91. Decision 90 merged SOEs into 17 large holding companies, which became the monopoly conglomerates that we see today. Decision 91 created another group of 70 central conglomerates. The new conglomerates were encouraged to structure themselves in such a way as to provide incentives for SOEs to operate along commercial lines.[14] In 2006, with SOEs now equitising by selling shares and even listing shares on the stock market, the government formed the State Council Investment Corporation (SCIC) to manage the state assets held by the newly equitised firms under a single entity. The SCIC has decision-making autonomy and is not subject to

[13] See Painter (2002) for a detailed discussion of the Doi Moi reforms.

[14] A similar reform process took place in China in the 1990s, in which SOEs were "corporatised" and merged into large state-owned conglomerates. See Hsieh and Song (2015) for details.

state planning considerations. Hence, as a result of the economic reform path started in the 1980s, on the eve of the WTO accession Vietnamese SOEs had substantial autonomy from the government in planning their business strategies.[15]

Differences between POEs and SOEs. The aforementioned waves of privatisation explain why the number of SOEs was relatively small compared to the number of POEs at the moment of Vietnam's accession to the WTO. In our census data, before WTO accession we have 2,086 fully-owned SOEs and 1,731 joint stock companies where Vietnamese state agencies were the dominant remaining shareholders. Together, on the eve of WTO accession, these SOEs accounted for 20% of gross industrial output, 37.2% of new investment, and about 11% of total employment (24% of labor employed by the formal business sector). By contrast, there were 151,576 POEs in Vietnam: 146,615 domestic companies and 4,961 active FIE operations. Together, they accounted for 80% of industrial output (35% domestic, 45% foreign), 63% of new investment (38.5% domestic, 24% foreign), and about 33% of total employment (76% of the formal business sector).

The share of firms accounted for by SOEs is roughly 5% of operations across all broad sectors except for agriculture, where SOEs account for 35%. SOEs agricultural operations include large-scale plantations for producing rubber, and major food processing operations, such as rice mills. Although the number of SOEs is relatively low, SOE capital investment is significantly higher compared to the capital investment of other firms. For instance, while SOEs represent only 7.5% of mining firms, they account for over 80% of the stock of capital in this sector. Similarly, large SOEs account for 80% of capital in the agriculture and electricity sectors. The major exception is manufacturing, where SOEs account for about 40% of capital, which still signals a substantial presence. In our empirical analysis we will focus on manufacturing sectors.

Table 1: SOE vs POE: Firm characteristics in Vietnam before and after WTO accession.

Statistics	2006-2007		2008-2010		2011-2012	
	SOEs	POEs	SOEs	POEs	SOEs	POEs
Exit* (% of firms)	0.72	3.33	3.81	10.22	2.41	10.13
Mean Productivity (TFPR)	-0.10	0.02	-0.17	-0.01	-0.40	0.01
Std. Productivity (TFPR)	1.12	1.11	1.31	1.84	1.62	1.83
Mean Firm Profitability	0.06	0.04	0.07	0.04	0.08	0.04
Mean Employment (logs)	5.81	3.13	5.72	2.92	4.94	2.72

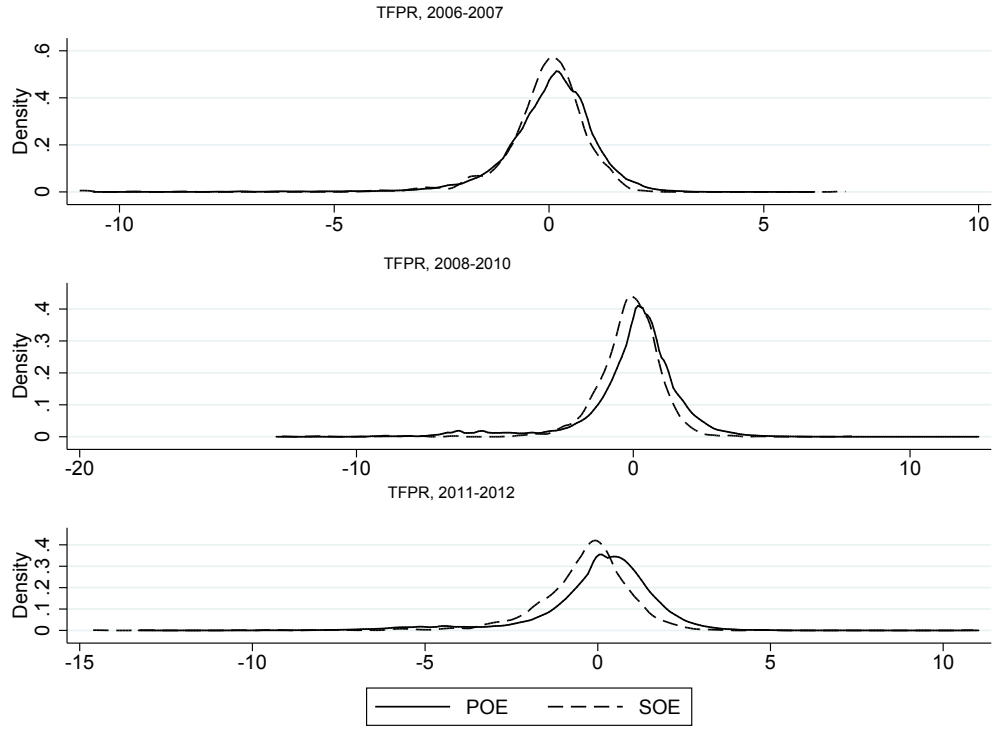
Note: the difference between SOE and POE is statistically significant ($p<.05$) for each covariate.

Next, we document some other differences in key firm-level characteristics between SOEs and POEs both before and after WTO access. In Table 1 we can see that although SOEs do exit, the probability of this event is substantially lower for them than for private firms. Although WTO access increases the exit hazard for both firms, their difference persists. A second remarkable difference is that SOEs have a strikingly stronger market power, as their average profitability is significantly larger than that

[15] Vasavakul (1997) and Vo (2007) provide in-depth examinations of the reforms implemented after Doi Moi.

of POEs in our sample periods. Moreover, while we observe substantial profitability reductions for POEs post-WTO, firm profitability slightly increases for SOEs.

Figure 2: Distribution of POE TFPR and SOE TFPR pre- and post-WTO accession.



Note: the difference between TFPR of SOE and TFPR of POE is statistically significant ($p<.05$) in 2011-2012.

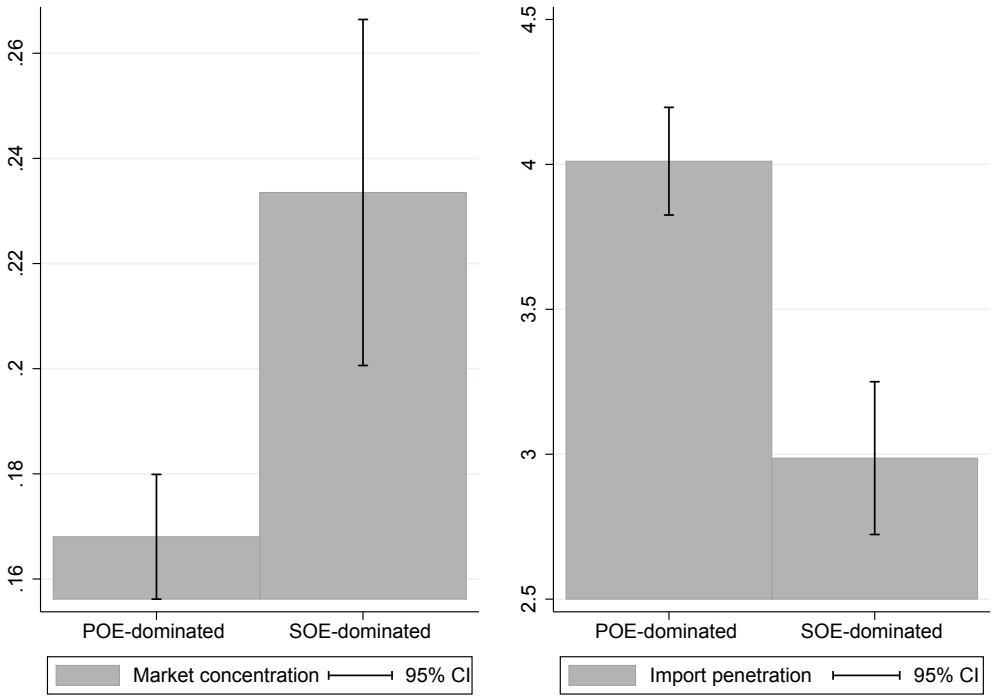
Another remarkable feature is the size and productivity difference. SOEs are larger and less productive than POEs. Figure 2 provides a more suggestive picture of the productivity difference and its change over time. During the period 2006-2007 there is a wide productivity dispersion for both types of firms, and a substantial overlap between the two productivity distributions. However, POEs are on average more productive than SOEs even prior to the WTO accession. In the post-WTO years, the distribution for POEs progressively shifts to the right and, as a result, the productivity gap between POEs and SOEs widens. We also find that the average firm (measured as the log of number of employees) size declines for both POEs and SOEs.

The descriptive statistics presented above suggest that on the eve of WTO access, Vietnamese SOEs despite being corporatized and drastically reformed, were more profitable and less productive than private firms. Here we discuss further evidence on SOEs market power, using our data when possible but also referring to other work in order to provide a more comprehensive view. First, we look at market concentration measures. In Figure 3, we show that sectors dominated by SOEs have remarkably higher Herfindahl indices and lower import penetration than POE-dominated sectors.[16] This suggests the presence of higher barriers to entry in the sectors with a stronger presence of SOEs. The literature documenting barriers shielding Vietnamese SOEs from competition focuses on several

[16]The Herfindahl index is calculated using revenue. Import penetration is defined as ratio of total import over revenue by sector (4-digit industry level) and for each year.

factors. First, certain sectors face formal restrictions for purported *national security* reasons. These sectors, known as "Group A" projects, require special approval from the prime minister's office to receive an investment entry license. While provinces can locally register any investment up to a specified amount, Group A projects still require central approval and the prime minister's signature (Malesky et al., 2014).[17] Second, as in China (Song et al., 2011), many SOEs operate in *capital-intensive* sectors for which private firms currently do not have the scale or access to capital necessary to compete. Utilities, shipbuilding, steel, and cement production are all industries that are formally open but actually feature little private activity (Phan and Coxhead, 2013).

Figure 3: POE-dominated vs. SOE-dominated industries: Average Herfindal index and import penetration.



Note: The Herfindal index is measured using firm revenue. Import penetration is given by $\frac{import}{revenue}$. We take the log of import penetration.

Further evidence shows that *access to credit* is greater when firms have close connections to the party and government (Malesky and Taussig, 2009). Even in 2013, after the dramatic growth of the private sector, roughly 60% of lending by the state-owned banking sector went to SOEs. As we will see in Section 5, our data show that the cost of credit, measured as a firm's interest expenses divided by its debt, which is similar for POEs and SOEs before WTO access, becomes substantially lower for the state-owned firms after WTO. Differential access to credit can generate different barriers to entry or exit between firms. Market access is easier for SOEs than for private firms (Nguyen and Freeman,

[17] One frustration for POEs is that SOEs have been able to use these protected enclaves to cross-subsidize their expansion into mixed sectors. For instance, Vinashin, the state ship-building firm, has 445 subsidiary businesses and 20 joint ventures, which range from real estate to hotels to karaoke bars. These sideline businesses crowd out entrepreneurial businesses (Nguyen and Freeman, 2009).

2009). This is particularly true for *government procurement* (Pincus et al., 2012). Moreover, previous studies have found that for *land use rights* certificates, private firms face processing times that are 200 hundred times greater than those faced by SOEs (Tenev et al., 2003; Pincus et al., 2012). We can get an overall sense of the barriers to competition protecting SOE activity by looking at the annual Provincial Competitiveness Index (PCI) survey, a survey of 8,500 firms which is conducted annually by the Vietnamese Chamber of Commerce and Industry in order to assess the business environments of Vietnamese provinces.[18] Responses to a battery of questions in the PCI survey suggest a bias toward state-owned firms in Vietnamese policy-making. In particular, we find the biggest bias toward SOEs in public procurement and access to credit (see Figures A2 and A3 in the appendix).

3 Empirical Analysis

We assess Vietnam's accession to the WTO on selection, firm profitability, and productivity, using the firm-level data described in Section 2. We restrict the analysis to manufacturing industries. The core of the empirics focuses on the firm-level analysis to test the combining effect of tariff cuts and type of ownership on firm's exit and firm profitability. In the last part of the empirics, using industry-level analysis we test the effect of WTO on productivity at the industry level, and by means of a simple counterfactual exercise we provide a first, partial, assessment of the foregone productivity gains from trade due to the presence of SOEs.

3.1 Firm-Level Analysis

Main Variables and Sample. To test the effect of Vietnams' accession to the WTO at the firm level, we focus on two dependent variables, *Exit* and *Firm Profitability*, described in Section 2. Our main independent variables are a dummy scoring one if a firm is private (POE_{fi}), MFN tariff cuts ($\Delta\tau_{i,t}$), which are the tariff cuts implemented by the Vietnamese government after the accession to the WTO, and their interaction. Not all tariff cuts were implemented in the same year as the accession, and a tariff transition period was granted to many industries. Therefore, MFN tariff cuts vary over time in the post-WTO period. Importantly, we include a dummy for foreign firms in every models so that the baseline is always SOEs.[19]

In our most extensive analysis, we estimate a sample of 46,212 Vietnamese firms between 2006 and 2012 for *Exit*.[20] We analyse the effect of trade liberalization on up to 118 manufacturing products (ISIC 4-digit) for which tariff data are available. Our main models are estimated using OLS regression with robust standard errors clustered at the firm level.

[18] For further information, see `www.pcivietnam.org`.

[19] In the main models we do not include the interaction terms of foreign firms to ease the interpretation of the main coefficients of interest. However, all the main results are virtually the same if we include the interaction terms of foreign firms (see Figures A4 and A6).

[20] Less than 2% of firms in the original sample switches category, e.g., from POE to SOE or from POE to foreign firm. We drop these observations, since we assume that the type of ownership is exogenous in our empirical models. In other words, the dummy POE is at its baseline value. This modelling decision does not affect our results (see tables in appendix A4).

Econometric Strategy. Our empirical strategy boils down to a difference-in-differences with elasticities. *POE* is our treatment, which distinguishes firms according to the type of ownership. $\Delta\tau$ captures the magnitude of trade liberalization for each industry i, which kicks in after the accession to the WTO, that is, after 2007.

Our firm-level analysis faces several identification challenges. The first threat to inference we face is the large difference in the covariates observed between private firms and SOEs. Indeed, our preliminary look at the data in Section 2 has shown that the SOEs tend to be larger than private firms; we also find that they are more capital intensive and have more assets than the POEs.[21] In econometric terms, the observations are unbalanced with respect to the dummy variable *SOE*. This poses a threat to our conclusions if these observed differences are also correlated with differences in the probability of exiting the market, or if they proxy for unobserved differences that might drive the correlation. To overcome this issue, we rely on entropy balancing (Hainmueller, 2012). This technique is similar to propensity matching, but it has the welcome feature that unbalanced observations are not dropped from the analysis. Specifically, by using entropy balancing observations are re-weighted with respect to the treatment (i.e., SOE) so that all the relevant covariates are balanced (i.e., they have the same mean). In econometric terms, entropy balancing reweights the observations to statistically generate a region of common support where private and public companies are comparable on structural covariates.[22]

Table A1 (bottom) in the appendix shows the means of private firms and state owned firms before and after balancing. By using entropy balancing, the difference in means between POEs and SOES is substantially reduced and is never statistically significantly different from zero. Importantly, we balance all the *exogenous* control variables with respect to POE, i.e., Size, Assets, Capital-labor ratio, MFN tariff, Exports, US PTA, Age, and Age^2. The endogenous variables, e.g., firm profitability and firm's debt, *are not* included in entropy balancing, a decision that does not affect our main results. Then we run our main models using the weights obtained from entropy balancing.

Second, following Angrist and Pischke (2009), we include industry-specific (4-digit) time trends to check if the parallel trend assumption holds. The inclusion of such variables accounts for sectorial growth trends which might be related to MFN tariff cuts. For instance, declining industries with a large number of firms exiting might have higher tariffs and hence deep MFN cuts. Third, in order to further account for sources of industry-level heterogeneity, we include time-varying industry (2-digit) fixed effects to control for time-varying unobserved factors. Such fixed effects account for industry-specific demand and supply shocks, which in turn might affect the probability of exiting the market. Fourth, in some estimates, we include firm fixed effects to account for time-invariant firm-level characteristics. Since we have a fairly short time span, exploiting within-firm variation is a very demanding test.

Fifth, following Trefler (2004), we include controls of business conditions built at the industry level to account for the 2008 global economic crisis. Specifically, these controls are built by regressing the number of exiting firms and their profitability in industry i at time t over Vietnam's GDP and

[21] Table A1 (top) in the appendix shows how the relevant covariates are unbalanced between POEs and SOEs.

[22] Entropy balancing does this by directly incorporating covariate balance into the weight function that is applied to the sample units. The net result is that we can compare SOEs to a comparable counterfactual of private firms. We perform this exercise using "ebalance" in Stata 14, the software created by Hainmueller (2012). We adjust the covariates, using the first moment, i.e., we set target equal to one.

Vietnam's real interest rate, including industry and year fixed effects.[23] These regressions generate a time-varying industry-specific prediction ($\widehat{Exit}$ and and $Firm\widehat{Profitability}$) of the effect of business conditions on the WTO-period probability of exiting for firm f and its profitability. We include these predicted values on the right-hand side of some models.

Finally, we address the concern of a possible endogeneity of MFN tariff cuts, which could potentially invalidate our empirical strategy. In line with Topalova and Khandelwal (2011), we show that TFPR and firm profitability do not predict MFN tariff cuts, that is, neither productivity nor firm profitability are statistically significant in estimations in which MFN cuts are the outcome variable (see Table A2 in the appendix). This is the case even when we interact both productivity and firm profitability with *SOE Labor Share*. Hence, it does not seem to be the case that trade liberalization is greater in industries in which the anticipated gains from trade are higher. These results seem to indicate that Vietnam had to meet externally imposed benchmarks in order to join the WTO, requiring the implementation of a demanding trade liberalization (Pelc, 2011). The strong bargaining power of the WTO paired with the relatively weak bargaining position of Vietnam mitigates concerns that MFN cuts are endogenous to firm-level and industry-level characteristics.[24]

Selection Effect. We begin with exploring how tariff cuts affect the probability of exiting for POEs and SOEs. In line with Bernard et al. (2006), for the exit probability of firm f in industry i at time $t+1$ we estimate the following model:

$$Pr(Exit_{fi,t}=1) = \beta_0 + \beta_1 POE_{fi} + \beta_2 \Delta\tau_{i,t-1} + \beta_3 POE_{fi} \times \Delta\tau_{i,t-1} + \beta_4 X_{fi,t} + \beta_5 W_{i,t} + \delta_i + \delta_t + \epsilon_{fi,t}, \quad (1)$$

where δ_i are industry (HS 4-digit) fixed effects to account for heterogeneity across products, and δ_t are year fixed effects. The key coefficient of interest is β_3, which should be positive. X and W are vectors including, respectively, firm-level and industry-level covariates. Following Bernard et al. (2006), we control for a set of confounding factors which might affect *Exit* and are correlated with our main independent variables.[25]

At the firm level, we control for the logged number of employees, which is a proxy for size. We expect that large firms are less likely to exit the market compared to small firms. We also include the log of assets, and the capital-labor ratio, which are proxies for capital intensity. Moreover, as it is customary, we include a variable measuring the number of years since a given firm entered the market and began business operations (i.e., *Age*) and its square value.

At the product level (4-digit), we include (logged) values of exports to capture comparative advantage sectors, which should experience a lower rate of exit. Unfortunately, we do not have data on export activities at the firm level. We also include a variable capturing market power, calculated using the Herfindahl–Hirschman index of revenue, and preferential tariff cuts implemented in the bilateral

[23] We are unable to use the real exchange rate instead of the real interest rate due to a lack of data.

[24] Part of the WTO accession requirements was about the reform of SOEs and other corporate governance measures. Details of these reforms can be found at `https://www.wto.org/english/thewto_e/acc_e/a1_vietnam_e.htm`. Since Vietnam accession to the WTO was negotiated for a number of years and firms have started readjusting their operations in advance, we acknowledge that this may pose a threat to our identification strategy. However, since our key independent variables are interaction terms between a dummy for SOEs and other covariates such as tariff cuts, productivity, and firm profitability, it is unlikely that the endogeneity of SOEs affects our results.

[25] Table A3 in the appendix shows descriptive statistics of all the variables described below.

trade agreement (BTA) between the US and Vietnam. It has been argued that the BTA was used as a stepping stone for Vietnam's accession to the WTO.[26] We also include the difference between MFN tariff in 1999 and MFN tariff in 2006, 2007, ... 2012 to account for the impact of negotiations to enter the WTO on the outcome of interest. Indeed, it may be that the WTO affected firm's exit in the negotiation period rather than after Vietnam's accession. We label this variable $\Delta\tau_{1999}$.[27] We run OLS regressions with standard errors clustered at the level of the firm.[28]

Table 2 shows the main results of this analysis. We estimate several models as from equation 16. We begin with estimates without controls and weights from entropy balancing (column 1), wihtout controsl and with weights from entropy balancing (column 2), and then we include both of them (Models 3 and 4) together with industry-year fixed effects (column 5) and industry-specific trends (column 6). In our most demanding model specification, we include firm fixed effects to control for firm-specific characteristics (column 7).[29] Results indicate that the probability of exiting the market increases with MFN tariff cuts for POEs, whereas it decreases for SOEs, as can be observed from the positive sign of the coefficient of the interaction term (i.e., POE and $\Delta\tau$). Importantly, the interaction term is significant in every estimates (see columns 1-6).

To ease the interpretation of the interaction terms, we rely on Figure 4, which shows the probability of exiting the market for POEs and SOEs at different levels of tariff cuts.[30] While the exit rate for POEs increases with the magnitude of the MFN cuts, the same is not true for SOEs, which display a flat slope. However, the slope of SOE should be taken cautiously. Indeed, there are only 38 SOEs operating in industries with tariff cuts larger than 20 and only seven SOEs left the market in industries with tariff cuts larger than 10. Thus, there is the risk of extrapolating the linear predictions of SOE or, at the very least, there is the risk that only a few observations are driving the results.

To address this concern, we re-run our main models, replacing MFN tariff cuts with a dummy that scores one after Vietnam's accession to the WTO, i.e., after 2007. While results are reported in Table A7 in the appendix, Figure 5 shows the graphical results of the interaction term and confirms the results of Figure 4. Indeed, the slope of POE is positive, whereas the slope of SOE is completely flat.[31] All in all, these results show that Vietnam's WTO accession generate a selection effect for POE, but not for SOE.

Finally, *TFPR*, *Number of Employees*, *Capital*, *Capital-labor Ratio*, and *Age* are the control variables that are significant. They have usually the expected sign. Interestingly, once controlling for *TFPR* and *Capital*, firm size increases the probability of exiting. Moroever, the coefficient of *Capital-*

[26] See what the US Ambassador in Vietnam Michael W. Marine says on this issue. The document is available at `http://www.vietnamembassy-algerie.org/en/vnemb.vn/tin_hddn/ns060705093904`. For a paper showing the effect of the BTA with the US on the Vietnamese economy, see McCaig (2011).

[27] We rely on 1999 MFN since data of pre-1999 tariffs are either unavailable or available for only a limited number of industries.

[28] Our results are very similar if we rely on logit or probit models, though we lose some observations due to incidental parameters. Our results are similar if we cluster standard errors at the level of the industry (Table A4) or at the level of industry-year (Table A5) or if we double-cluster standard errors at the level of the firm and the industry (Table A6).

[29] We are impeded to include POE, since it does not vary over time.

[30] In testing our hypotheses, we always plot the linear predictions of POE and SOE separately. The difference between the two slopes for each value of the moderator would give the marginal effect of the dummy POE on the outcome of interest, which is the coefficient of the interaction terms reported in the tables.

[31] The models do not include year fixed effects as they correlate with the post-WTO accession dummy. Results are similar if we include year fixed effects and drop the post-WTO dummy, leaving its interaction with POE.

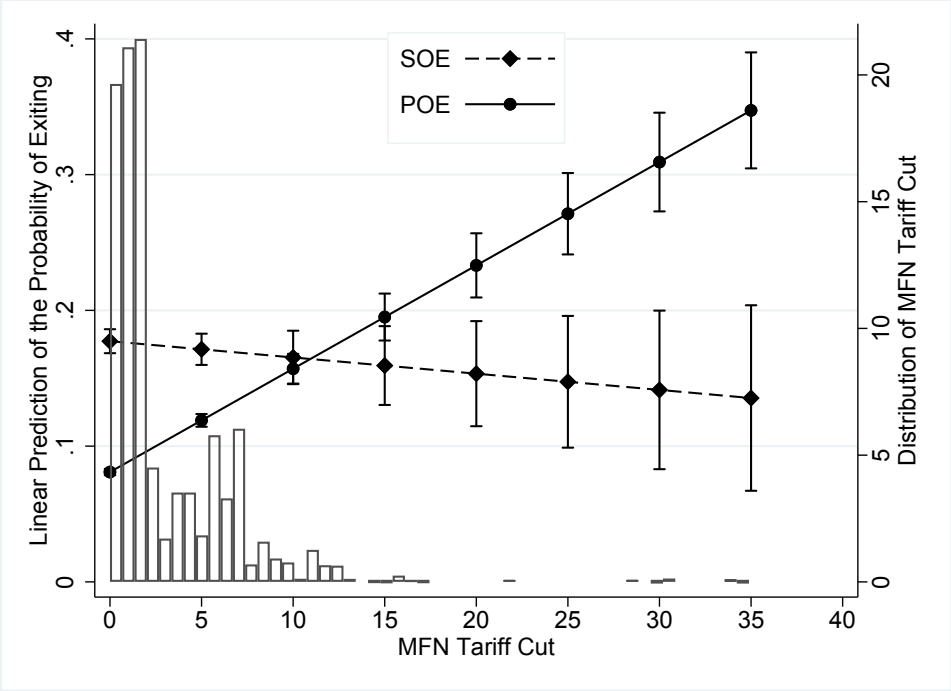
Table 2: POE vs. SOE: exit and MFN tariff cuts.

	(1)	(2)	(3)	(5)	(5)	(6)	(7)
	OLS						
	Pr(Exit=1)						
POE	0.050***	0.010	-0.010	-0.010	-0.010	-0.010	
	(0.003)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	
MFN Tariff Cut	-0.002***	-0.004*	-0.001	-0.001	-0.006***	-0.002	-0.002**
	(0.000)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
POE*MFN Tariff Cut	0.002***	0.015***	0.009***	0.009***	0.009***	0.009***	0.002***
	(0.000)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
FIE	-0.034***	0.074***	0.061***	0.061***	0.056***	0.058***	
	(0.003)	(0.017)	(0.015)	(0.015)	(0.015)	(0.015)	
TFPR			-0.009***	-0.009***	-0.009***	-0.010***	-0.005***
			(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
HHI			0.024	0.024	0.060*	0.051*	-0.000
			(0.026)	(0.026)	(0.036)	(0.026)	(0.005)
Number of Employees			0.013***	0.013***	0.013***	0.013***	0.009***
			(0.004)	(0.004)	(0.004)	(0.004)	(0.002)
Capital			-0.069***	-0.069***	-0.067***	-0.068***	-0.011***
			(0.005)	(0.005)	(0.004)	(0.005)	(0.002)
Capital-labor Ratio			0.007*	0.007*	0.007**	0.007**	0.014***
			(0.004)	(0.004)	(0.004)	(0.004)	(0.003)
Export			0.004**	0.004**		-0.000	0.001
			(0.002)	(0.002)		(0.001)	(0.001)
Preferential Tariffs			-0.001	-0.001		-0.001	0.003
			(0.006)	(0.006)		(0.006)	(0.005)
Age			-0.016***	-0.016***	-0.016***	-0.016***	-0.000
			(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Age2			0.000***	0.000***	0.000***	0.000***	0.000
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
MFN Tariff Cut (1999)			-0.003***	-0.003***		-0.002	0.000
			(0.001)	(0.001)		(0.002)	(0.000)
Constant	-0.062***	-0.078***	0.818***	2.481***	1.085***		
	(0.002)	(0.008)	(0.050)	(0.380)	(0.122)		
Observations	226,050	217,163	216,594	216,594	217,163	216,594	202,798
R-squared	0.038	0.203	0.451	0.451	0.460	0.457	0.436
Controls	NO	NO	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES	YES	YES
Business control	NO	NO	NO	YES	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	YES	NO	NO
Trends	NO	NO	NO	NO	NO	YES	NO
Firm FE	NO	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

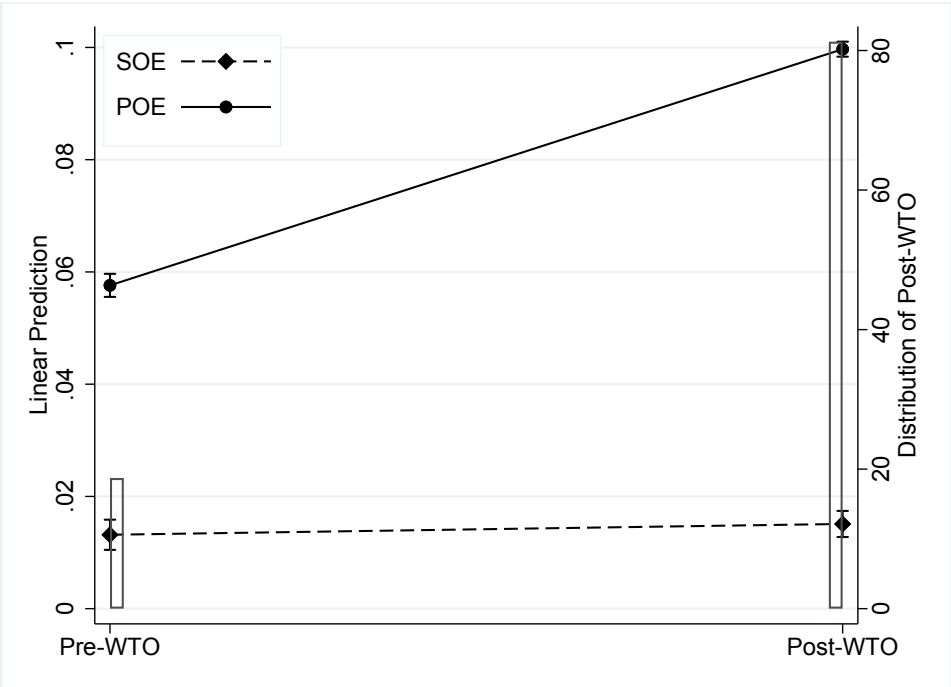
Note: OLS regressions with standard errors clustered at the firm level. The outcome variable is a dummy scoring one if firm exits the market in year t. The main independent variable is the interaction between *MFN Tariff Cut* and *POE*.

Figure 4: POE vs. SOE: the effect of MFN tariff cuts on firm's exit.



Note: The predictions are plotted from column 3 in Table 2. OLS regression with industry (4-digit) fixed effects and robust standard errors clustered at the firm level. The histogram shows the distribution of $\Delta\tau$. 95% C.I.

Figure 5: POE vs. SOE: the effect of the WTO accession on firm's exit



Note: The predictions are plotted from column 2 in Table A4. OLS regression with industry (4-digit) fixed effects and robust standard errors clustered at the firm level. The histogram shows the distribution of the dummy capturing Vietnam's WTO accession. 95% C.I.

labor Ratio has a positive sign[32] Furthermore, some of the covariates may absorb some of the structural differences between POEs and SOEs, e.g. *Number of Employees*, *Capital*, *Age*, which may explain why the coefficient of POE is not significant.

Robustness Checks. We perform several tests to check the robustness of our results. First, a characteristic of Vietnamese POEs is that the state might own a percentage of their capital. In other words, there are some POEs that rely on exclusive private capital and others that rely on a mix of private and public capital. We re-estimate the main models distinguishing between these two types of POEs. Results from these models are reported in Table A8 in the appendix. Results show that the most significant differences are between SOEs and POEs, whereas there is not much of a difference between completely private firms and private firms partially owned by the state. Second, we distinguish between local and central SOEs. Results of this test are reported in Tables A9, whose sample excludes central SOE, and A10, whose sample excludes local SOEs, and show that there is no difference between this two types of SOEs.

Third, we estimate the models with *Exit* as the outcome variable, using survival analysis. Survival analysis allows us to estimate the duration of firms surviving (i.e., not exiting) the market. We expect that $POE \times \Delta\tau$ shortens the survival of firms, i.e., it increases the hazard rate of exit. The main advantage of survival models over OLS is that they have a better handle on the right and left censoring problem.[33] We rely on a parametric survival model using a Weibull distribution, which allows us to estimate accelerated failure time models.[34] Our main results remain unchanged (see Table A11, column 1).

Fourth, our results are similar if we use Propensity Score Matching (PSM), as Table A12 shows in the appendix.[35] Note that our sample shrinks when we use PSM, which drops unmatched observations. Fifth, we interact each of the controls with the post-accession dummy, i.e. *Post-WTO*.[36] Results are reported in Table A13 in the appendix and are very similar to the one showed above.

Finally, we run a placebo test. Specifically, we interact POE with $\Delta\tau_{1999}$, always controlling for $\Delta\tau$. If the WTO accession has an impact on a firm's exit, this interaction should not be significant. On the contrary, if the interaction between POE and $\Delta\tau_{1999}$ is significant, it would imply that the negotiation period triggered the selection effect prior to the WTO accession. Figure A5 in the appendix shows that the interaction between POE and $\Delta\tau_{1999}$ is not significant; confidence intervals are wide and overlapping, confirming the specific importance of Vietnam's accession to the WTO and mitigating further concerns of anticipatory effects.

[32] This is potentially consistent with a comparative advantage argument, since Vietnam is labor-rich compared to many WTO members countries whose economies are more developed.

[33] Left censoring refers to the fact that firms might have exited the market before 2006, i.e., before our time span begins. Right censoring refers to the fact that firms might have exited the market after 2012, i.e., after the end of our time span.

[34] The Weibull model is the most appropriate model, according to the Akaike information criterion.

[35] We use the Stata 14 command `psmatch2`, which implements full Mahalanobis matching (Leuven and Sianesi, 2003). We use the single nearest-neighbor (without caliper) matching method and rely on standard errors as in Abadie and Imbens (2006).

[36] For a similar approach, see Gentzkow (2006). Results are similar if we interact the control variables with year fixed effects instead of the post-accession dummy.

Firm Profitability. Our second dependent variable is *Firm Profitability*. The empirical strategy remains the same as for the selection effect, i.e. a difference-in-differences with elasticity.[37] Formally, we estimate the following model:

$$Firm\ Profitability_{fi,t} = \gamma_0 + \gamma_1 POE_{fi} + \gamma_2 \Delta\tau_{i,t-1} + \gamma_3 POE_{fi} \times \Delta\tau_{i,t-1} + \gamma_4 X_{fi,t} + \delta_i + \delta_t + \epsilon_{fi,t}, \quad (2)$$

where the key coefficient of interest is γ_3 , which should be negative. We include controls that affect *Firm Profitability* and correlate with our main independent variables. More specifically, we include productivity, a proxy for firm's size (logged number of employees), Age, and Age^2. All these controls are at the firm level. At the industry level, we control for Vietnam's preferential tariff cuts implemented after the trade agreement with the US and for $\Delta\tau_{1999}$.

Since our outcome variable is continuous and scores between zero and one, we run fractional outcome regressions, which produce robust specification tests (Papke and Wooldridge, 1996, 2008), with standard errors clustered at the level of the firm.[38] In particular, fractional outcome regressions avoid mis-specification and dubious statistical validity and capture non-linear relationships, especially when the outcome is close to zero and one.[39]

Not controlling for the lagged level of firm profitability in equation 2 is inconsistent with the assumption that firm profitability follows a Markov process in the estimation of the production function (Topalova and Khandelwal, 2011). Therefore, to address the potential problem of serial correlation in relation to *Firm Profitability*, we include a lagged dependent variable on the right-hand side in some estimates. The lagged dependent variable is always significant (see Table A15 in the appendix). Including a lagged dependent variable with fixed effects in a short time series is problematic (Nickel, 1981). In line with Topalova and Khandelwal (2011), we use GMM regressions, which instrument the lagged dependent variable with lags (Arellano and Bond, 1991). Although we lose a large number of observations, the results of these estimates are clear-cut: firm profitability decreases for POEs but not for SOEs after trade liberalization (see Table A16 in the appendix). Note that the coefficient of the lagged dependent variable is significant, but close to zero, indicating that the problem of unit root is not serious in our case, probably due to the short time-span.[40]

Table 3 shows the results of equation 2. Throughout all the estimates the coefficient of the interaction between POE and $\Delta\tau$ is always negative and statistically significant. This is the case even when we include industry year fixed effects (column 5), trends (column 6), and firm fixed effects (column 7), which are very demanding tests. Remember that the number of observations is lower in these models because we dropped the firms with negative firm profitability and firms with firm profitability higher than one.[41]

[37] We exclude assets and $\frac{K}{L}$ from entropy balancing.

[38] We obtain similar results if we run simple OLS regressions. Moreover, our results are similar if we cluster standard errors at the level of the industry (Figure A7) or at the level of industry-year (Figure A8). We show these effects graphically, since fractional regressions are nonlinear models and so standard errors may be milsleading (Ai and Norton 2003). Moreover, our results are similar if we double-cluster standard errors at the level of the firm and the industry for which we run OLS regressions (Table A14).

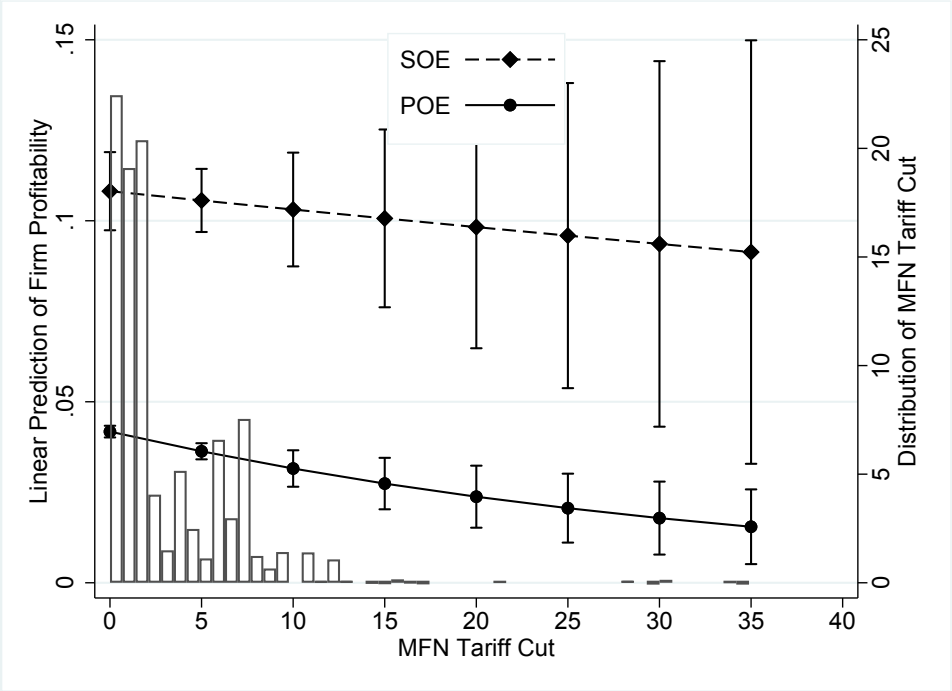
[39] When we include industry specific trends, we are unable to run fractional outcome regressions, which do not converge. As such, we run OLS regressions for columns 6 and 7 in Table 3.

[40] We obtain similar results if we double-difference both the left- and right-and-side variables and run OLS regressions (Table A17 in the appendix).

[41] It is worth noticing that only the coefficients of *TFPR* and *Number of Employees* are significant among the controls

Figure 6 shows the graphical interpretation of the interaction term, which refers to column 3. When tariff cuts increase, POEs' profitability decline significantly. This is evidence of the pro-competitive effect. For SOEs instead, although the slope is still negative, it is not statistically significant. This can be seen from the fact that the confidence intervals overlap for different values of MFN tariff cuts, i.e., linear predictions are statistically non-distinguishable one from the other for SOE. This finding implies that tariff cuts have no effect on SOEs' profitability. In short, trade liberalization does not trigger higher product market competition for SOEs, the presence of which hamper the pro-competitive effect of trade.

Figure 6: POE vs. SOEs: The effect of MFN tariff cuts on firm profitability.



Note: The predictions are plotted from column 3 in Table 3. Fractional outcome regression with industry (4-digit) fixed effects and robust standard errors clustered at the firm level. The histogram shows the distribution of $\Delta\tau$. 95% C.I.

Robustness Checks. We implement the same robustness checks as for the selection effect. In particular, we distinguish between POEs and POEs that are partially owned by the state (Table A18 in the appendix) and between local and central SOEs (Tables A19 and A20 in the appendix). Moreover, we show that results are similar if we use PSM rather than entropy balancing (Table A21 and Figure A9 in the appendix). Furthermore, we show that our results hold if we include interactions between each control and a dummy for the post-WTO accession (Table A22). Moreover, our placebo test confirms that the interaction between POE and MFN tariffs is not significant if we use 1999 MFN tariffs as baseline (Figure A10).

Finally, we re-run our main models, using input tariffs.[42] We find that input tariff cuts increase

and they are both negative. Importantly, the coefficient of *POE* is significant in these estimates, indicating that these covariates do not absorb all the differences between POEs and SOEs.

[42] We built a measure of input tariff following Topalova and Khandelwal (2011). Due to data limitations, we are unable

Table 3: POE vs. SOE: Firm profitability and MFN tariff cuts.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FracReg					OLS	
	Firm Profitability						
POE	-0.506***	-0.790***	-0.770***	-0.770***	-0.828***	-0.043***	
	(0.043)	(0.178)	(0.181)	(0.181)	(0.183)	(0.015)	
MFN Tariff Cut	0.001	-0.009	-0.006	-0.006	-0.004	0.001	0.000
	(0.002)	(0.011)	(0.014)	(0.014)	(0.015)	(0.002)	(0.000)
POE*MFN Tariff Cut	-0.006**	-0.018**	-0.024***	-0.024***	-0.021**	-0.002***	-0.001***
	(0.003)	(0.008)	(0.008)	(0.008)	(0.010)	(0.001)	(0.000)
FIE	0.446***	0.399**	0.547***	0.547***	0.519***	0.040***	
	(0.047)	(0.183)	(0.192)	(0.192)	(0.178)	(0.016)	
TFPR			-0.214***	-0.214***	-0.219***	-0.016***	-0.012***
			(0.038)	(0.038)	(0.031)	(0.004)	(0.002)
Number of Employees			-0.119***	-0.119***	-0.127***	-0.009***	-0.008***
			(0.039)	(0.039)	(0.033)	(0.003)	(0.001)
Age			0.016	0.016	0.020**	0.001*	0.001
			(0.010)	(0.010)	(0.008)	(0.001)	(0.000)
Age2			-0.000	-0.000	-0.000	-0.000	-0.000
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Preferential Tariffs			0.030	0.030	0.044	0.002	0.002
			(0.042)	(0.042)	(0.047)	(0.002)	(0.002)
MFN Tariff Cut (1999)			-0.002	-0.002	-0.007	0.001	0.000
			(0.010)	(0.010)	(0.014)	(0.002)	(0.000)
Constant	-1.080***	-1.116***	-0.834***	-0.543***	0.714	0.374***	
	(0.018)	(0.150)	(0.220)	(0.194)	(0.484)	(0.032)	
Observations	144,479	144,474	144,097	144,097	144,097	144,097	129,909
R-squared						0.218	0.641
Controls	NO	NO	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES	YES	NO
Business control	NO	NO	NO	YES	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	YES	NO	NO
Trends	NO	NO	NO	NO	NO	YES	NO
Firm FE	NO	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Fractional outcome regressions (columns 1-5) and OLS regressions (columns 6-7) with robust standard errors clustered at the firm level. The outcome variable is firm profitability (measured as PCM). The main independent variable is the interaction between *MFN Tariff Cut* and *POE*.

firm profitability for POE, but not for SOE (Table A23 and Figure A11 in the appendix). These results are in line with what Brandt et al (2017) find in China. However, these results are sensitive to the use of entropy balancing and to the inclusion of firm fixed effects. That is, the positive effect of input tariff cuts on firm profitability for POEs is no longer significant when we use entropy balancing and include firm fixed effects. Note that the interaction between MFN tariff cut (i.e. output tariff cuts) and POE remains generally significant, even though the number of observations is substantively smaller.

3.2 Industry-Level Analysis

Main Variables and Sample. We now move to the industry-level analysis to test the effect of Vietnam's accession to the WTO on productivity of POE-dominated and SOE-dominated industries. The dependent variables are two time-varying measures of productivity. The first measure of productivity are the Solow's residuals as described above (*TFPR*). The second measure of producitivty is estimated using Olley and Pakes (1996) methodology.[43] We label this second variable *Olley & Pakes*. For both measures, we calculate the weighted average value of productivity for all firms f operating in industry i in time t.[44] Note that *TFPR* and *Olley & Pakes* reports data at the beginning of the year.

Our main independent variables are MFN tariff cuts, a dummy for the SOE-dominated sectors, and their interaction. While we have already described the first variable, i.e., $\Delta\tau_{i,t}$, remember that *SOE-dominated Sector* is a dummy scoring one if an industry has more than 40% of workers employed in SOEs. We use the percentage of workers in the pre-WTO accession period, i.e,. in 2006 and 2007.[45] The larger SOE labor share is, the more an industry is "owned" by the state.[46] As we showed above, both POEs and SOEs operate in the vast majority of industries. Therefore, we are unable to compare industries in which only SOEs operate and for which we have data, as we would be left with only a few industries.[47]

We estimate a sample of 620 industries (ISIC 4-digit) between 2006 and 2012, for which data on tariffs are available.[48] We rely on OLS regressions with robust standard errors clustered by industry at the ISIC 4-digit level for our baseline models. As in the case of firm profitability, not controlling

to measure input for all industries and so we lose a large number of observations. Moreover, the Vietnamese input-output tables are available only at the 2-digit level, whereas output tariffs are available at the 4-digit level.

[43] We incorporate MFN tariff cuts and the dummy for POE into the inversion step of the Olley-Pakes-type productivity estimation. This approach is similar to Amit and Konings (2007) and De Loecker (2013). Our results are not sensitive to the inclusion of these variables in the inversion step of the productivity estimation.

[44] The average value of each firm-level variable is weighted by share of firm size by industry, i.e., number of employees. We rely on size rather than revenue for the same reason that we explained above: POEs tend to under-report sales to evade taxes (whereas SOEs do not). Therefore weighting on revenue would lead us to under-estimate POEs in moving from firm-year to industry-year as unit of analysis.

[45] Tariff cuts kick in after 2007 in our sample. Results are similar if we use data of workers (employed in SOEs) reported at the beginning of the year or at the end of the year.

[46] Results are similar if we use different thresholds, e.g., 35% or 45% of workers employed in SOEs.

[47] Given the distribution of the continuous measure of SOE labor share, using a dummy variable to identify SOE-dominated sectors seems appropriate (Figure A12).

[48] We are able to estimate up to 117 industries in a given year. There are 120 industries at the 4-digit level, which would result in 840 observations in seven years, 2006-2012. However, we have missing values for some covariates, which reduces our total number of observations. Moreover, when we include the lagged dependent variable on the right-hand-side of the model, we lose observations in the first year in which industries appear in the dataset. Since our dataset is unbalanced, we lose not only observations in 2006, but also in subsequent years.

for lagged productivity generates the potential problem of serial correlation. As such, we include a lagged dependent variable on the right-hand side of some models. In some estimates in which we include a lagged dependent variable, we run GMM regressions that instrument the lagged dependent variable with one lag (Arellano and Bond, 1991) to avoid Nickel bias (Nickel, 1981). Finally, we double-difference both dependent and independent variables as a further way to take care of dynamic panel estimation problems (Arellano and Honoré, 2001; Trefler, 2004).

Econometric Strategy. The challenges we face in the industry-level analysis are similar to those we faced in the firm-level analysis. A first concern is that there are differences in the covariates observed between SOE-dominated industries and POE-dominated industries, as shown in the descriptive section. For instance, compared to POE-dominated industries, SOE-dominated industries tend (1) to be more capital-rich industries; (2) to have a significantly lower number of firms; and (3) to have larger firms. To tackle this issue, we again rely on entropy balancing. Specifically, we balance out a set of *exogenous* covariates with the respect to *SOE-dominated Sector*. We can thus compare SOE-dominated sectors with a comparable counterfactual of POE-dominated sectors, running our main models with the weights obtained from entropy balancing.[49]

Second, similar to the firm-level analysis, we include Trefler (2004) business condition controls. In this case, the business conditions controls are built by regressing $TFPR_{i,t}$ over Vietnam's GDP, and the real interest rate, including industry and year fixed effects. These regressions generate a time-varying industry-specific prediction ($\widehat{TFPR}$) of the effect of business conditions on the WTO-period productivity. Hence, we include these values on the right-hand side of the models. Third, we include an industry-specific (2-digit) time trend to check if the parallel trend assumption holds.

Productivity. Formally, we estimate the following main model:

$$\begin{aligned} TFPR_{i,t} = \zeta_0 + \zeta_1 SOE-dominated\ Sector_{i,pre-WTO} + \zeta_2 \Delta\tau_{i,t-1} + \\ \zeta_3 SOE-dominated\ Sector_{i,pre-WTO} \times \Delta\tau_{i,t-1} + \zeta_4 X_{i,t} + \delta_i + \delta_t + \epsilon_{i,t}, \end{aligned} \tag{3}$$

where the key coefficient of interest is ζ_3. X includes a set of control variables at the industry level. More specifically, we control for (logged) values of imports at the industry level, for the number of POEs and SOEs operating in each industry. Furthermore, we include the proportion of POEs and SOEs exiting the market in each industry. In addition, we control for average firm age, the logged number of employees and profit, the percentage of capital owned by the state in POEs, and the capital-labor ratio, which are calculated as weighted average values for all the firms operating in a given industry i.[50] Furthermore, we include 2-digit industry fixed effects δ_i.

The interaction between *SOE-dominated Sector* and MFN tariff cuts is always negative and statistically significant in every model (see Table 4). Moreover, the coefficient of $\Delta\tau$ is always positive

[49] We balance POE with respect to the following variables: logged number of employees, log of profit, log of exports, level of tariff prior WTO accession, number of POEs and SOEs operating in each industry, capital-labor ratio, and average firm age. Our results hold if we use propensity score matching instead of entropy balancing, though we lose a large number of observations.

[50] Table A2 in the appendix shows descriptive statistics of all the variables described above.

and significant except in column 3. The effects of trade liberalization diverge strikingly from the predictions of standard trade models with heterogeneous firms (e.g. Melitz, 2003). These findings are in line with the ones of the firm-level analysis. Since the selection effect is null for SOEs, this implies that, after trade liberalization, unproductive SOEs do not exit the market differently from unproductive POEs. In turn, SOE-dominated industries do not experience the same productivity kick as POE-dominated industries. Moreover, we note that the coefficient of controls are usually not significant with the exception of *Number of Employees* whose coefficient is negative and signiticant throughout all models.

We implement further tests to corroborate our findings. First, our results are similar if we include industry-specific trends (columns 3 and 6), which is a very demanding test. Second, our results hold when we double first-difference, which is de facto equivalent to use 4-digit industry fixed effects (see Table A24 in the appendix). Third, our results are robust to the inclusion of the lagged dependent variable, which is often not significant, and run both OLS and GMM (Tables A25 and A26 in the appendix). The fact that the lagged dependent variable is often not significant may be explained by our relatively short time-span and by the fact that accession to the WTO has been a shock for the Vietnamese economy. Fourth, our results hold if we use a continuous measure of SOE labor share (pre-WTO values), instead of the 40% threshold, as showed in Table A27 in the appendix. Fifth, we interact each of the controls with the post-accession dummy, i.e., *Post-WTO*. Results are reported in Table A28 in the appendix and are very similar to the one showed above. Finally, Table A29 in the appendix shows that results are similar if we use PSM rather than entropy balancing.

A counterfactual exercise. Our analysis has showed that the presence of SOEs tames selection, competition, and productivity effects of trade. Although our reduced-form empirical approach does not allow us to account for general equilibrium interactions, we can use regression coefficients to perform partial equilibrium calculations and get a sense of the magnitude of the foregone productivity gains from trade due to the presence of SOEs.

We start showing the overall productivity gains from the accession to the WTO (see Table 5). We rely on the coefficient estimates in column 1 of Table 4, and focus on POE-dominated industries (i.e., *SOE-dominated Sector* = 0). We then estimate (i) the linear predictions of POE-dominated industries with zero tariff cuts and (ii) the linear predictions of POE-dominated industries with tariff reductions greater than zero in the post-WTO period. Then, we take the average value of these two linear predictions across industries and years and calculate their growth rate. By dividing this growth rate by the number of years, we obtain our annual productivity growth in the post-WTO period, 2008-2012. In these industries, the post-WTO tariff reductions produce an annual increase in TFPR of 9.2%. Since these industries account for about 40% of Vietnam's manufacturing output, the annual overall manufacturing productivity increases by 3.7%, a result in line with Trefler (2004) and Trefler and Lileeva (2010). This effect is substantive, but not particularly remarkable, given the importance of accessing the WTO for a small closed economy.[51]

To get a sense of the loss of efficiency produced by a strong SOE presence, we implement the following simulations. We estimate the linear predictions of SOE-dominated industries facing positive

[51] Trefler (2004) looks at the effect of a single preferential trade agreements between Canada and the US on those two large open economies.

Table 4: TFPR, MFN tariff cuts, and SOE-dominated Sectors.

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS					
	TFPR			Olley & Pakes		
SOE-dominated	0.163	0.163	0.213**	-0.114*	-0.114*	-0.121
	(0.103)	(0.103)	(0.093)	(0.063)	(0.063)	(0.074)
MFN Tariff Cut	0.021***	0.021***	0.013	0.028***	0.028***	0.035***
	(0.004)	(0.004)	(0.009)	(0.006)	(0.006)	(0.007)
SOE-dominated*MFN Tariff Cut	-0.029***	-0.029***	-0.024***	-0.015*	-0.015*	-0.015**
	(0.004)	(0.004)	(0.006)	(0.008)	(0.008)	(0.007)
Number of Employees	-0.292***	-0.292***	-0.328***	-0.225***	-0.225***	-0.220**
	(0.044)	(0.044)	(0.062)	(0.079)	(0.079)	(0.084)
Capital-labor ratio	0.174	0.174	0.168	0.270***	0.270***	0.224***
	(0.123)	(0.123)	(0.131)	(0.064)	(0.064)	(0.061)
Age	-0.016*	-0.016*	-0.017*	0.006	0.006	0.007*
	(0.008)	(0.008)	(0.008)	(0.004)	(0.004)	(0.003)
POE Exit Rate	-0.386	-0.386	-0.109	-0.118	-0.118	0.135
	(0.350)	(0.350)	(0.393)	(0.325)	(0.325)	(0.347)
SOE Exit Rate	0.661***	0.661***	0.633**	0.000	0.000	-0.039
	(0.210)	(0.210)	(0.243)	(0.249)	(0.249)	(0.185)
Export	-0.002	-0.002	-0.012	0.000	0.000	0.004
	(0.012)	(0.012)	(0.013)	(0.010)	(0.010)	(0.012)
Profit	0.077	0.077	0.167*	-0.078	-0.078	-0.113
	(0.088)	(0.088)	(0.088)	(0.100)	(0.100)	(0.131)
Number of POES	0.000	0.000	0.000	-0.001**	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of SOEs	0.001	0.001	0.008**	0.000	0.000	0.004
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.007)
MFN Tariff Cut (1999)	-0.001	-0.001	-0.001	-0.006**	-0.006**	-0.010**
	(0.004)	(0.004)	(0.005)	(0.003)	(0.003)	(0.004)
Constant	-0.016	-20.604**	-0.923	1.311***	6.568	2.118***
	(0.946)	(8.113)	(1.118)	(0.419)	(7.800)	(0.699)
Observations	620	620	620	620	620	620
R-squared	0.665	0.665	0.721	0.781	0.781	0.811
Controls	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Balancing	YES	YES	YES	YES	YES	YES
Business control	NO	YES	NO	NO	YES	NO
Trends	NO	NO	YES	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regressions with standard errors clustered by HS 4-digit The outcome variables are *TFPR* and *Olley & Pakes*. The main independent variable is the interaction between *MFN Tariff Cut* and *SOE-dominated Sector*.

Table 5: Productivity gains with and without SOE-dominated sectors.

POE-dominated Sector

	$\Delta\tau = 0 \rightarrow \Delta\tau > 0$	Output	Annual aggregate gains
Annual gains	9.2%	40%	3.7%

Couterfactual analysis : $\Delta\tau > 0$

	SOE-dominated $\rightarrow$ *POE-dominated*	Output	Annual aggregate gains
Annual gains	7.9%	7%	0.6%

tariff cuts (i.e. $\Delta\tau > 0$). Next, we build our counterfactual by replacing the value of *SOE-dominated Sector* with zero and then estimating a second set of the linear predictions. In other words, we estimate what, according to our empirical model, would have been the effect of trade liberalization on TFPR if the industries with high presence of SOEs had been replaced by the same industries but with low or no presence of SOEs. As before, we take the average value of these two linear predictions across industries and years. Finally, we calculate the growth rate of the two average values (i.e., when *SOE-dominated Sector* $= 1$ and *SOE-dominated Sector* $= 0$) to capture the lower productivity gains from trade in industries with a large presence of SOEs.

Table 5 shows the result of this simulation. The average overall productivity gains would have been 7.9% larger in a counterfactual Vietnamese economy without SOE-dominated sectors. Thus, in the period between 2008 and 2012, the overall productivity gains would have been 40% larger in a counterfactual economy where POEs replace SOEs, i.e. 7.9% multiplied by the 5 years in which Vietnam has been a WTO member. Since SOE-dominated industries account for 7% of Vietnam's manufacturing output, the annual overall manufacturing productivity would have been increased by an extra 0.6% by replacing SOE-dominated industries with POE-dominated industries. In sum, we find that the presence of SOEs has substantively hampered productivity growth in Vietnam after the accession to the WTO.

4 Exploring the Mechanisms

We provide some economic intuition for our results through the lenses of a model of trade with firm heterogeneity. The main purpose of the model is to suggests theoretical interpretations of the empirical results and to guide us to test specific transmission mechanisms driving the different response of SOEs and POEs to trade openness. The model is an extension of Melitz and Ottaviano (2008) (MO henceforth) along the following dimensions: first, we devise the model in a small open economy setting to better represent the experience of Vietnam joining the WTO. Second, we introduce credit constraints on the sunk entry cost. Third, we allow for two types of firms, SOEs and POEs, differing in the extent of credit constraints and in non-pecuniary entry barriers. Finally we add fixed operating

costs which are also subject to different credit constraints for SOEs and POEs.

Paying a sunk entry cost firms draw an efficiency level which determines their decision to produce for the domestic and for the export market. We assume that firms borrow to finance the entire entry cost and that they face credit constraints on this activity. Financial institutions can expect to be payed the full firm profit with probability $\phi < 1$, or only a fraction $t_e \in (0,1)$ of it with probability $(1-\phi)$. Following the evidence presented in Section 2, we assume that POEs are more credit constrained than SOEs: $\phi_y < \phi_g$, where subindex y indicates private firms and g SOEs.

Closed economy. Households have the following preferences

$$U = q_0^c + \sum_{j=1}^{S_g} \beta_{g_j} G_j + \sum_{j=1}^{S_y} \beta_{y_j} Y_j,$$

where q_0^c is an outside good, β_g and β_y are utility weights, G and Y are bundles of SOEs and POEs-produced goods respectively, with

$$\begin{aligned} G_j &= \alpha \int_0^{N_{gj}} g_{ij}^c di - \frac{\gamma}{2} \int_0^{N_{gj}} \left(g_{ij}^c\right)^2 di - \frac{\eta}{2} \left(\int_0^{N_{gj}} g_{ij}^c di \right)^2, \\ Y_j &= \alpha \int_0^{N_{yj}} y_{ij}^c di - \frac{\gamma}{2} \int_0^{N_{yj}} \left(y_{ij}^c\right)^2 di - \frac{\eta}{2} \left(\int_0^{N_{yj}} y_{ij}^c di \right)^2, \end{aligned}$$

and S_g and S_y are the mass of SOEs and POEs sectors. Parameter γ pins down substitutability across varieties and $\eta > 0$ substitutability between the homogeneous good and the differentiated varieties, and N denotes the mass of varieties of each type of good.[52] Solving the household problem the demand for each variety reads

$$\begin{aligned} g_{ij} &\equiv L g_{ij}^c = \frac{\alpha L}{\eta N_{gj} + \gamma} - \frac{L}{\gamma} \frac{p_{igj}}{\beta_{gj}} + \frac{\eta N_{gj}}{\eta N_{gj} + \gamma} \frac{L}{\gamma} \frac{\overline{p}_{gj}}{\beta_{gj}}, \\ y_{ij} &\equiv L y_{ij}^c = \frac{\alpha L}{\eta N_{yj} + \gamma} - \frac{L}{\gamma} \frac{p_{iyj}}{\beta_{yj}} + \frac{\eta N_{yj}}{\eta N_{yj} + \gamma} \frac{L}{\gamma} \frac{\overline{p}_{yj}}{\beta_{yj}}, \end{aligned} \tag{4}$$

where $\overline{p}_{gj}$ and $\overline{p}_{yj}$ are the average prices of SOEs and POEs goods respectively in sector j, and L is population size.

All SOEs and POEs solve similar and separable problems in all sectors, we report only one of them for brevity and ignore the sector index. At entry, firms draw a cost level c to produce a particular variety from a given distribution $G(C)$. Identifying each variety i with its cost draw c, a POE choses a price $p(c)$ to max profits $\pi_y(c) = (p(c) - c)\, y(c)$ subject to the demand (4). The solution to this problem allows us to derive the cost cutoff c_{Dy} above which producing is not profitable and firms do not operate $\pi_y(c_{Dy}) = 0$,

$$c_{Dy} = \frac{\alpha \beta_y \gamma}{\eta N_y + \gamma} + \frac{\eta N_y}{\eta N_y + \gamma} \overline{p}_y. \tag{5}$$

The cutoff depends on the mass of firms operating in the sector and on the average price level, as in the standard MO model. In this economy selection depends on the degree of product market competition

[52] The separability of all sectors in the utility is needed to preserve some tractability in the comparative statics.

which responds endogenously to policy changes. The markup for any firm c can be written as

$$\mu_y(c) = p_y(c) - c = \frac{1}{2}(c_{Dy} - c), \tag{6}$$

suggesting that a more competitive sector is also more selective.

Financial institutions pay the full entry cost F_{Ey} and expect π_y with probability ϕ_y and $t_e\pi_y$ with probability $(1-\phi_y)$. Competition among financial institutions leads to the free entry condition

$$\pi_y = \int_0^{c_{Dy}} \frac{L}{4\gamma\beta_y}(c_{Dy} - c)^2 dG(c) = \frac{F_{Ey}}{\phi_y + (1-\phi_y)t_e} \equiv \hat{F}_{Ey},$$

where $\hat{F}_{ey}$ is the entry cost inclusive of the cost of borrowing, and π_y is the expected profit at entry.[53] Higher credit constraints imply higher cost of borrowing to finance entry and therefore higher entry costs. We assume that all SOEs and POEs face the same entry cost, $F_E = F_{Eg} = F_{Ey}$, but POEs are more credit constrained than SOEs, $\phi_y < \phi_g$. We also assume, for both types of firms, a Pareto distribution of the cost parameter c, $dG(c) = (k/c_M)(c/c_M)^{k-1}$, and setting $c_M = 1$ for simplicity we can write the free entry condition as,

$$b_1 c_{Dy}^{k+2} = \hat{F}_{Ey},$$

where $b_1 = L/[2\gamma\beta_y(k+2)(k+1)]$. It is easy to see that $\partial c_{Dy}/\partial \hat{F}_{Ey} > 0$. A higher sunk entry cost makes the economy less selective and, as suggested by the markup expression (6), less competitive. Hence, since $\partial \hat{F}_{Ey}/\partial \phi_y < 0$, sectors with higher credit constraints face higher entry cost and therefore are less competitive and less selective.

Small open economy. Consider now a small open economy trading with the rest of the world at an iceberg cost $\tau > 1$. Following Demidova and Rodriguez-Clare (2013), the small open economy assumption requires that Foreign demand for Home goods is not affected by changes in the Home country. This boils down to assume that Foreign demand for Home goods takes the form, $A - Bp_j(c)$ for $j = g, y$, where A and B are exogenously given. Similar to domestic firms, exporters face credit constraints on the entry cost, pinned down by ϕ.

The problem for non-exporting firms is identical to the one in closed economy yielding the same cutoff c_{Dy} as in (5), while exporters' equilibrium yields the export cost cutoff

$$c_{Xy} = \frac{1}{\tau^*}\left(\frac{A}{B}\right), \tag{7}$$

where τ^* is the iceberg trade cost to sell in the Foreign country. The free entry condition in open economy writes

$$\int_0^{c_{Dy}} \pi_{Dy}(c) dGc + \int_0^{c_{Xy}} \pi_{Xy}(c) dGc = \frac{F_{Ey}}{\phi_y + (1-\phi_y)t_e} \equiv \hat{F}_{Ey},$$

where the profit on domestic sales $\pi_{Dy}(c) = \pi_y(c)$ is the same as in autarky. After some manipulations

[53] Substituting the cutoff condition back into the profit function we can express the latter as, $\pi_y(c) = L/(4\gamma\beta_y)(c_{Dy} - c)^2$.

this condition can be written as,

$$c_{Dy} = \left\{ \frac{1}{b_1} \left[\hat{F}_{Ey} - \rho b_1^* \left(\frac{A}{B} \right)^{k+1} \right] \right\}^{\frac{1}{k+2}}, \tag{8}$$

where for simplicity we assume symmetric variable trade costs, $\tau^* = \tau$, $\rho = \tau^{-k}$ is a measure of the "freeness" of trade, $b_1^* = B/\left[2\left(k+2\right)\left(k+1\right)\right]$, and b_1 is identical to that derived for the closed economy. Using the free entry condition we can show that

$$\frac{\partial c_{Dy}}{\partial \rho} = -\left(k+2\right) c_{Dy}^{\frac{k+1}{k+2}} \frac{b_1^*}{b_1} \left(\frac{A}{B} \right)^{k+1} < 0. \tag{9}$$

This is the standard selection effect of trade liberalization. In our model, as in MO, selection is driven by the pro-competitive effect of trade on markups. Lower trade costs lead to entry of more domestic and foreign firms, which in turn leads to lower markups and more selection.

The role of financial frictions in shaping the selection effect is derived as follows,

$$\frac{\partial^2 c_{Dy}}{\partial \rho \partial \hat{F}_{Ey}} < 0, \tag{10}$$

suggesting that trade-induced selection is stronger for firms facing higher credit constraints. Equation 6 suggests that, as in the standard MO model, markups and the survival cutoff are strictly related. Consequently, trade liberalization has both a stronger pro-competitive and selection effect for more credit constrained firms. Intuitively, high constraints imply high entry costs ($\partial \hat{F}_{Ey}/\partial \phi_y < 0$) which, due to the positive relationship between markups and firm survival probability, lead to weak selection and high markups. If markups are high, there is a large scope for trade to improve competition. As the economy moves toward perfect competition, the pro-competitive effect of trade tends to disappear, and with it the selection effect vanishes as well. Hence, the pro-competitive and selection effects of trade are stronger for firms operating in markets where competition before opening is less fierce. Finally, as in the standard MO model, the average productivity in this economy is the inverse of the average cost: $\bar{c}_y^{-1} = \left(k-1\right) c_{Dy}/k$ for POEs and $\bar{c}_g^{-1} = \left(k-1\right) c_{Dg}/k$ for SOEs. Hence the stronger the pro-competitive and selection effect of trade, the stronger the increase in productivity.

The model suggests that if firms face stronger financial constraints on entry costs, they are hit harder by trade liberalization. Our empirical results in Section 3 show that the selection and competition effect of trade are stronger for POEs than for SOEs. If credit frictions are at the root of this different response to trade openness, the model then suggests that this is because SOEs operate in more competitive sectors than POEs. But this is at odds with the evidence presented in Section 2, which shows that state-owned firms have higher markups and that SOE-dominated sectors are more concentrated. These facts suggest that if anything, SOEs have higher market power and operate in less competitive markets both before and after WTO entry. Hence, although pecuniary barriers to entry due to credit constraints could play a role in affecting the pro-competitive and selection effects of trade for private firms, something else is driving the difference between POEs and SOEs. [54]

[54] A straightforward extension of the model with different POEs sectors facing different credit constraints would generate the prediction that more credit constrained POEs face stronger competition.

We posit that barriers to entry of a different nature could play a role. In those sectors dominated by SOEs, *political barriers* to entry, unrelated to the financial costs to start up a firm, such as regulations, preferential access to public procurement and barriers due to national security issues can grant firms a strong protection from both domestic and foreign competition. These barriers can be easily incorporated in our model by assuming that in SOEs sectors entry is politically restricted. This is equivalent to the *short-run* version of the MO model and leads to similar results. Fixing the mass of entrants to $\bar{N}_{ge}$ we can express the mass of active SOEs as $N_g = \bar{N}_{ge} G\left(c_{Dg}\right) = \bar{N}_{ge} c_{Dg}^k$. The cutoff condition (5) becomes

$$c_{Dg} = \frac{\alpha \beta_g \gamma}{\eta \bar{N}_{ge} c_{Dg}^k + \gamma} + \frac{\eta \bar{N}_{ge} c_{Dg}^k}{\eta \bar{N}_{ge} c_{Dg}^k + \gamma} \overline{p}_g\left(c_{Dg}\right),$$

which is independent of the trade cost and, as a consequence, trade liberalization affects neither selection nor competition.[55] The stark form of entry restriction considered here leads to a very simple result: when the mass of potential (domestic and foreign) entrants cannot respond to market incentives, because it is restricted by domestic regulation, changes in trade costs cannot affect either the degree of product market competition or selection. Hence in an economy where selection and product market competition are tied together, *regulatory entry barriers* and the *pecuniary barriers* generated by credit constraints on entry costs have different implications for the impact of trade. When credit frictions leads to high monetary entry costs but entry is not restricted, trade has large competitive and selection effects. When instead entry is strongly regulated, the market mechanism breaks down and with it the efficiency gains triggered by trade liberalization vanish.

Summing up, our model shows that political barriers to entry are a good candidate to explain the different response of SOEs to trade liberalization, both in terms of selection and competition. It also suggests that credit constrains could be a source of heterogeneity in the response of POEs operating in different sectors.

Constraints on fixed operating costs. So far we have provided economic intuition for the different response of POEs and SOEs based on the assumption that these firms operate in separate sectors, competing only horizontally, with competition regulated by the fixed utility weights. This assumption was motivated by the evidence presented in Section 2 suggesting that SOEs have higher profitability and that sectors where they have a dominant presence show higher market concentration. Although this assumption has empirical bite, reality is less stark and there are many sectors where POEs and SOEs compete head to head. In these circumstances, neither pecuniary nor regulatory entry barriers can explain the different behaviour of these two types of firms. The different response of POEs and SOEs could then be determined by *barriers to exit*. It is plausible to think that preferential access to credit can allow SOEs to weather the storm of foreign competition better than private firms. A simple way to incorporate this mechanism is to introduce fixed operating costs, periodic expenses unrelated

[55] Here we are assuming that entry in these SOE-dominated sectors is restricted for both domestic and foreign firms. The foreign export cutoff into the home country in SOEs sectors can be shown to be $c_{Xg} = (1/\tau)\, c_{Dg}$. Hence, as in Melitz and Ottaviano (2008), the distribution of prices is the same as in the closed economy and the explicit expression for the average price is

$$\bar{p}_g = \frac{2k+1}{2k+2} c_{Dg}.$$

with the volume of production and sales, such as rental cost of land use, office space, equipment, licences, etc. These expenses have an important role for selection and exit (e.g. Hopenhayn, 1992, Melitz, 2003), and they often have to be incurred previous to production and sales. Although the assumption of SOEs and POEs operating in different sectors is not needed to analyse barriers to exit, as we make clear below, we keep it in this extension with fixed operating cost in order to have a framework in which credit constraints can affect the entry and exit margin for both types of firms.

We follow Manova (2013) and assume that while variable costs can be funded internally, firms must pay a fraction $d \in (0,1)$ of their fixed operating costs λ upfront. In order to cover this upfront cost, firms borrow from financial institutions pledging a fraction $t \in (0,1)$ as collateral, with $t < d$, implying that the loan is larger than the collateral.[56] Higher d and lower t indicate stronger *financial vulnerability* of the firm or sector. Because of *imperfect financial contractibility* credit institutions can expect to be repaid by firms with probability $\delta \in (0,1)$, which embodies the strength of financial institutions or their willingness to enforce credit contracts. The role of credit frictions can be easily shown analyzing how different values of the contractibility parameter δ affect trade-induced selection and reallocation. We assume that POEs are more credit constrained than SOEs on fixed operating costs as well: $\delta_y < \delta_g$.

The model has the same structure as the baseline model described above and we only present the essential new features leaving the detailed description and derivation to the appendix. The survival cutoff now becomes,

$$c_{Dy} = \frac{\alpha\beta_y\gamma}{\eta N_y + \gamma} + \frac{\eta N_y}{\eta N_y + \gamma}\overline{p}_y - 2\sqrt{\frac{\beta_y\gamma\hat{\lambda}_y}{L}}, \tag{11}$$

where $\hat{\lambda}_y = [1 + (1-\delta_y)(d-t)/\delta_y]\lambda$ is the fixed operating cost augmented for the cost of financing it externally. Since $d > t$, stronger credit constraints, lower δ, imply a higher cost of borrowing and, as a consequence, a higher fixed operating cost. The markup for firm c is

$$\mu_y(c) = p_y(c) - c = \frac{1}{2}(c_{Dy} - c) + 2\sqrt{\frac{\gamma\hat{\lambda}_y\beta_y}{L}}. \tag{12}$$

Assuming for simplicity $\lambda_X = \lambda$, then $\hat{\lambda}_{Xy} = \hat{\lambda}_y$, the free entry condition can be written as

$$b_1 c_{Dy}^{k+2} + b_2\sqrt{\hat{\lambda}_y}c_{Dy}^{k+1} + \rho b_1^* c_{Xy}^{k+2} + \rho b_2^*\sqrt{\hat{\lambda}_y}c_{Xy}^{k+1} = \hat{F}_{Ey}, \tag{13}$$

where b_1 and b_2 are constants defined in the appendix, and $c_{Xy} = (1/\tau)\left(A/B - 2\sqrt{\hat{\lambda}_y/B}\right)$ is also a constant. It is easy to show that a higher fixed operating cost leads to more selection, $\partial c_{Dy}/\partial\hat{\lambda}_y < 0$. We also find that higher credit constraints on fixed operating costs lead to a weaker selection effect of trade,

[56] In purchasing intermediate inputs, paying salaries to workers, and paying rents for land use and equipment, firms often have to incur in expenses previous to production and sales.

$$\frac{\partial^2 c_{Dy}}{\partial\rho\partial\delta_y} = -\left(\frac{\frac{\partial^2 F}{\partial\rho\partial\delta_y}\frac{\partial F}{\partial c_{Dy}} - \frac{\partial^2 F}{\partial c_{Dy}\partial\delta_y}\frac{\partial F}{\partial\rho}}{\left(\frac{\partial F}{\partial c_{Dy}}\right)^2}\right) < 0, \tag{14}$$

where $F = b_1 c_{Dy}^{k+2} + b_2\sqrt{\hat{\lambda}_y}c_{Dy}^{k+1} + \rho b_1^* c_{Xy}^{k+2} + \rho b_2^*\sqrt{\hat{\lambda}_{Xy}}c_{Xy}^{k+1} - \hat{F}_{Ey}$ is the free entry condition. Since POEs are likely to be more credit constrained than SOEs (as we will see later), constraints on fixed operating costs cannot explain the different response of SOEs and POEs to trade. This suggests that a different mechanism is driving the differential effect of trade on exit between SOEs and POEs observed in the data.

Access to credit can be used by SOEs to *soften* budget constraints when challenged by a more competitive environment, such as the post-WTO economy. As we saw above, by reducing the fixed operating cost, easier access to credit leads to lower selection and this can potentially offset the selection effect of trade. Considering the financial friction parameters δ_g as a policy parameter, banks can weaken the constraints on SOEs credit for those firms going under in the post-WTO, thereby essentially bailing them out. Hence, we observe a weaker fall in markups and less exit for SOEs not because their level of credit constraints on fixed operations is lower than POEs before trade liberalization, but because SOEs can soften these constraints when liberalization hits them. Notice that this result would hold even if we remove the assumption that SOEs and POEs compete in different sectors. In fact, if we assume that these firms compete vertically, the number of firms and average price in (11) will not differ for POEs and SOEs and the cutoffs difference will be uniquely pinned down by the different cost of accessing credit leading to different fixed operating costs. It follows that the bailout via credit operates similarly to the benchmark model.

Taking stock, the model delivers three predictions suggestive of economic mechanisms which can contribute to explain our empirical findings.

i. **Barriers to entry I**. POEs facing high entry barriers due to credit constrains, therefore operating in less competitive markets, experience stronger competition and selection effects of trade.

ii. **Barriers to entry II**. Pecuniary barriers to entry cannot explain the different response of SOEs and POEs to trade, but political barriers to entry can.

iii. **Barriers to exit**. The neutrality of SOEs' selection and profitability to trade liberalization is produced by a bail-out mechanism via credit supply.

The economic intuition for (i) is that if firms find it difficult to borrow to enter the market, product market competition is low and there is a large scope for trade to affect it, thereby generating large selection effects. Result (ii) allows us to exclude the hypothesis that preferential access to credit to finance entry drives SOEs' response and suggests that if entry barriers play a role in shaping SOEs performance they are most likely of a political/bureaucratic nature. Result (iii) shows that the credit channel can still play a role in explaining the different response of SOEs and POEs to trade if we consider financial constraints on fixed operating costs and assume that the government can use credit to help SOEs weather the trade shock.

5 Testing the Theoretical Mechanisms

Next, we provide some broad tests of the predictions of the model.[57] First, we check whether POEs operating in less competitive sectors experience a stronger selection effect after WTO entry. Second, we explore the hypothesis that the entry margin responds positively to trade liberalization for POEs but not for SOEs. These are both indirect tests of the predictions that entry barriers, pecuniary or regulatory, shape the effects of trade on selection. Finally, we ask whether access to cheap credit is important in affecting the different response of POEs and SOEs to trade. This provides broad tests of both the role of credit constraint as generating barriers to entry and to exit.

Exit and Market Concentration. One implication of the model is that POEs should experience a stronger selection effect of trade if they operate in less competitive markets. To test this prediction, we use market concentration, captured by the Herfindahl–Hirschman index of revenue ($HHI_{i,2006}$), and we interact it with $\Delta\tau$. Since market concentration is affected by trade liberalization, we use a baseline value of HHI, i.e. its pre-WTO accession value in 2006.[58] In this analysis, we restrict the sample to POEs, as the model suggests that cross-sector variation in pre-WTO competition is likely to affect these firms' response to trade. More specifically, we test the following model:

$$Pr(Exit_{fi,t} = 1) = \kappa_0 + \kappa_1 HHI_{i,2006} + \kappa_2 \Delta\tau_{i,t-1} + \kappa_3 HHI_{i,2006} \times \Delta\tau_{i,t-1} + \kappa_4 X_{fi,t} + \kappa_5 W_{i,t} + \delta_i + \delta_t + \epsilon_{fi,t}, \tag{15}$$

where δ_i are industry (HS 2-digit) fixed effects to account for heterogeneity across products, and δ_t are year fixed effects. Since $HHI_{i,2006}$ does not change over time, i.e. it has 2006 baseline values, we are unable to control for industry (HS 4-digit) fixed effects as in the previous models. The key coefficient of interest is κ_3, which should be positive. X and W are vectors including, respectively, firm-level and industry-level covariates. We run OLS regressions with standard errors clustered at the level of the firm.

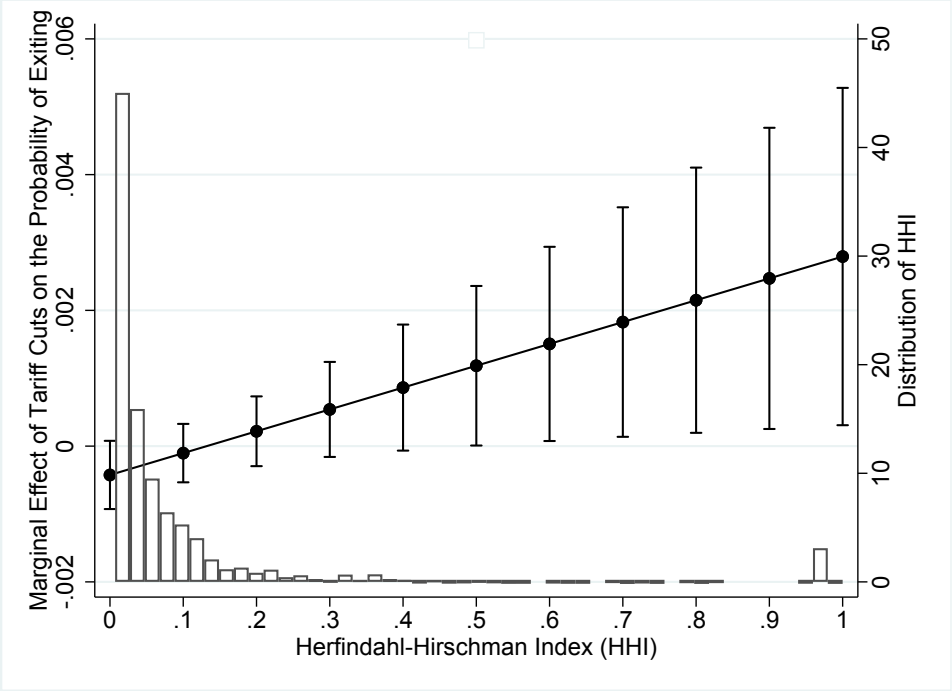
Table A30 in the appendix shows that the probability of exiting the market increases with the combination of MFN tariff cuts and market concentration. Indeed, the interaction term is positive and significant in every estimates, even when we include industry specific trends (2-digit). Figure 7 shows that the marginal effect of tariff cuts on the probability of exiting the market is not significant when $HHI_{i,2006}$ is lower than 0.2, whereas it becomes positive and significant for value of $HHI_{i,2006}$ higher than 0.2. In sum, in case of trade liberalization, POEs operating in uncompetitive industries, i.e. high-concentrated industries, are more likely to exit the market than POEs operating in competitive markets, which is in line with prediction (i) of the model.[59] The full mechanism of the model suggests that entry barriers due to credit constraints on fixed operating costs leading to more concentrated markets increase the competition and selection effect of trade. Although we cannot test the full mechanism, as we cannot distinguish in the data whether firms are constrained on credit for

[57] The tests are only broadly validating the predictions of the model due to data limitations and to the fact that our reduce-form approach does not allow a full structural validation of the theoretical mechanisms.

[58] By doing so, we lose these industries whose data is not available in 2006. That is why the sample size shrinks in this analysis.

[59] In the appendix (Table A31) we show that the interaction between tariff cuts and market concentration is never significant for SOEs, in line with our model.

Figure 7: The effect of MFN tariff cuts and market concentration on POEs' exit.



Note: The predictions are plotted from column 1 in Table A22. OLS regression with industry (4-digit) fixed effects and robust standard errors clustered at the firm level. The histogram shows the distribution of $HHI_{i,2006}$. 95% C.I.

entry or fixed operating costs, below we show that more credit constrained POEs experience stronger competition and selection effects of trade.

Barriers to Entry. Another insight of the model is that if SOEs are protected by political barriers to entry while POEs are not, we should observe WTO to have a positive effect on entry of POEs but not of SOEs. Although we cannot identify the exact source of barriers to entry in the data, we can test whether WTO induces more entry for POEs than for SOEs. Precisely, we use the following model:

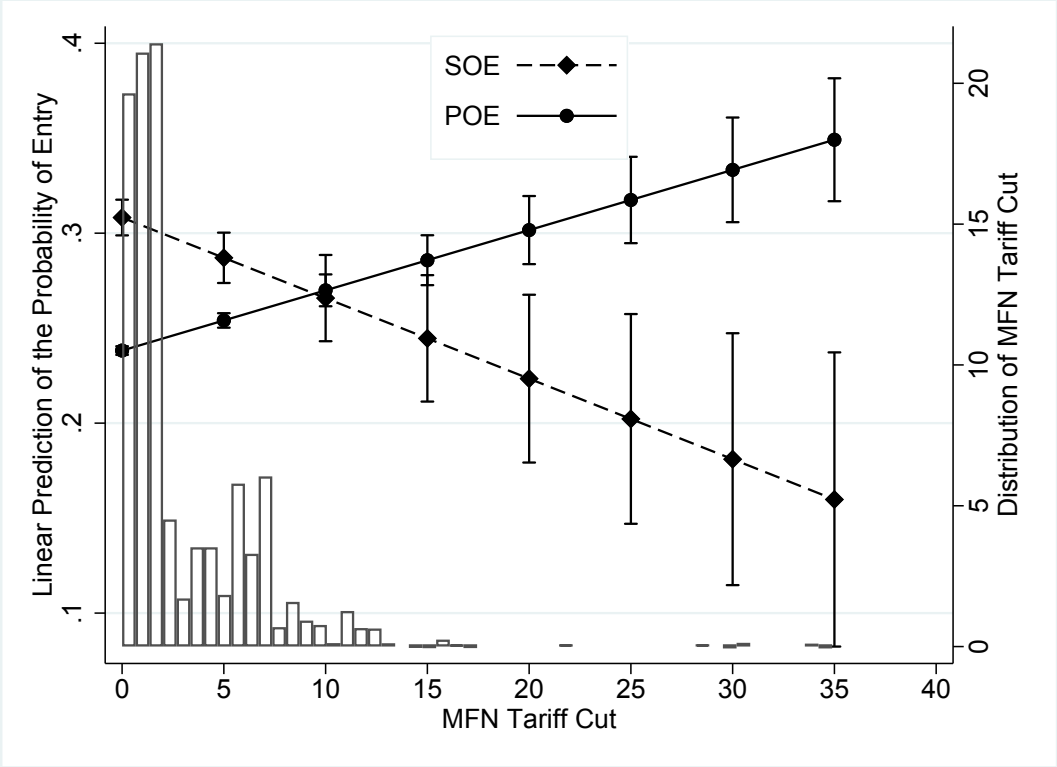
$$Pr(Entry_{fi,t}=1) = \lambda_0 + \lambda_1 POE_{fi} + \lambda_2 \Delta\tau_{i,t-1} + \lambda_3 POE_{fi} \times \Delta\tau_{i,t-1} + \lambda_4 X_{fi,t} + \lambda_5 W_{i,t} + \delta_i + \delta_t + \epsilon_{fi,t}, \tag{16}$$

where δ_i are industry (HS 4-digit) fixed effects to account for heterogeneity across products, and δ_t are year fixed effects. The key coefficient of interest is λ_3, which should be positive. X and W are vectors including, respectively, firm-level and industry-level covariates. We control for the same set of confounding factors as for *Exit*.[60] We run OLS regressions with standard errors clustered at the level of the firm.

Table A32 in the appendix shows that the probability of entering the market increases with MFN tariff cuts for POEs, whereas it does not increase for SOEs, as can be observed from the positive sign of the coefficient of the interaction term (i.e., POE and $\Delta\tau$). Importantly, the interaction term is significant in every estimates, even when we include industry-year fixed effects and industry specific trends (4-digit). As with previous analyses, to ease the interpretation of the interaction terms, we

[60] Table A3 in the appendix shows descriptive statistics of all the variables described below.

Figure 8: POE vs. SOE: the effect of MFN tariff cuts on firm's entry.



Note: The predictions are plotted from column 2 in Table A32. OLS regression with industry (4-digit) fixed effects and robust standard errors clustered at the firm level. The histogram shows the distribution of $\Delta\tau$. 95% C.I.

rely on Figure 8, which shows the probability of entering the market for POEs and SOEs at different levels of tariff cuts. While the entry rate for POEs increases with the magnitude of the MFN cuts, the same is not true for SOEs, which display a negative slope.

Credit constraints. Our model suggests that credit constraints can be a source of variation in firms' response to trade openness, both within POEs and between POEs and SOEs. If two firms need to finance externally the same percentage of the fixed operating costs or the same entry investment, the firm with a preferential access to credit can borrow at a cheaper rate. Hence, the same amount of debt has a different impact on the fixed costs for firms with different access to credit. The model predicts that credit constraints on entry costs can contribute to explain the effect of trade on competition and selection for POEs. While credit constraints on fixed operating costs can contribute to explain the differential response of POEs and SOEs.

Here we provide some broad tests of these predictions. We begin with including the triple interaction term among *POE*, *Firm Debt*, and $\Delta\tau$, where *Firm Debt* is the difference between total capital *used* by firms and capital *owned* by firms divided by capital used not to over-estimate capital-intensive sectors.[61] The idea is to explore whether firm debt has a different impact on the post-liberalization exit probability for POEs and SOEs. *Firm Debt* is not necessarily a proxy for credit constraints or the cost of credit. Higher levels of debt could signal that a firm has good access to credit, or that it is

[61] The variable *Firm Debt* is available only for the period 2006-2010.

highly constrained and accumulates higher debt because it is charged higher borrowing rates. Our test sheds some light on this issue: if high *Firm Debt* proxies high credit constraints we would observe the positive effect of debt on post-WTO exit, otherwise we would see the opposite result. More formally, we estimate the following model:

$$\begin{aligned} Pr(Exit_{fi,t}=1) = \mu_0 &+ \mu_1 POE_{fi,t} + \mu_2 \Delta\tau_{i,t-1} + \mu_3 Firm\ Debt_{fi,t} + \mu_4 POE_{fi,t} \times \Delta\tau_{i,t-1} \\ &+ \mu_5 POE_{fi,t} \times Firm\ Debt_{fi,t} + \mu_6 \Delta\tau_{i,t-1} \times Debt_{fi,t} \\ &+ \mu_7 POE_{fi,t} \times \Delta\tau_{i,t-1} \times Firm\ Debt_{fi,t} + \mu_8 X_{fi,t} + \mu_9 W_{i,t} + \delta_i + \delta_t + \epsilon_{fi,t}, \end{aligned} \tag{17}$$

where the key coefficient of interest is μ_7. As is common practice with a triple interaction term, we include double interaction terms for each combination of *POE*, $\Delta\tau$, and *Debt*. We include the same controls X and W as in equation (16), since the outcome variable is the same. Moreover, we use entropy balancing to balance out POEs and SOEs with respect to exogenous variables (including capital-labor ratio and assets) in line with our identification strategy in equation (16). We run OLS regressions with standard errors clustered at the level of the firm.[62] Results of equation (17) are reported in Table A33 (column 1) in the appendix. The coefficient of the triple interaction term is positive and significant, indicating that *Firm Debt* increases the probability of leaving the market after trade liberalization for POEs, but not for SOEs.[63] The crucial test is reported in Figure 9, which refers to model 4 and plots the marginal effect of MFN tariff cuts on the probability of exiting. A given level of debt ratio increases the post-liberalization probability of exiting for POEs but not for SOEs. Moreover, a higher debt ratio is associated with more exit for POEs but not for SOEs.

These results support the hypothesis that high *Firm Debt* is a proxy of credit constraints. Moreover, they provide support to the model's prediction that for a given level of borrowing has makes it harder for POEs to survive trade liberalization while it has no effect on SOEs' exit rates. The model suggests that this different behaviour is due to different borrowing costs faced by POEs and SOEs. To provide further support on the model's prediction, we ask whether trade openness affects the evolution of the cost of credit differentially for POEs and SOEs. To measure *Cost of Credit*, we rely on a measure of interest expenses, which we divide by debt so to have a measure of the borrowing cost. We estimate the following model:

$$\begin{aligned} Cost\ of\ Credit_{fi,t} = \nu_0 &+ \nu_1 POE_{fi,t} + \nu_2 \Delta\tau_{i,t-1} + \nu_3 POE_{fi,t} \times \Delta\tau_{i,t-1} \\ &+ \nu_4 X_{fi,t} + \delta_i + \delta_t + \epsilon_{fi,t}, \end{aligned} \tag{18}$$

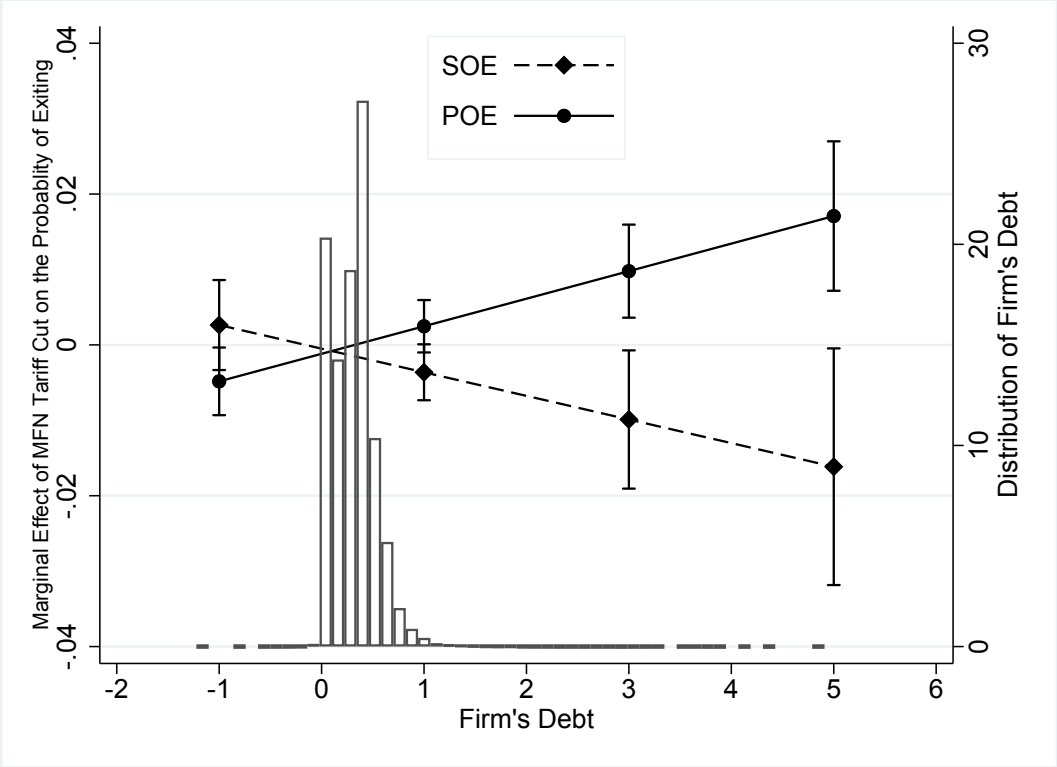
where *Cost of Credit* is measured as interest payments over debt, and the key coefficient of interest is ν_3, which we expect positive. In this model, we control for a dummy for foreign firms, value of the assets, and the capital-labor ratio. We also include industry (4-digit) and year fixed effects. We run OLS regressions with standard errors clustered at the level of the firm.

We report the regression results on Table A33 in the appendix (column 2). Here we focus on the graphical representation of the results, which we report in Figure 10. For POEs, a higher tariff cut

[62] Our results are very similar if we rely on logit or probit modes, though we lose some observations due to incidental parameter.

[63] Results are similar if we rely on survival analysis (Table A11 (Model 2)).

Figure 9: POE vs SOE: The effect of firm's debt on firm's exit.

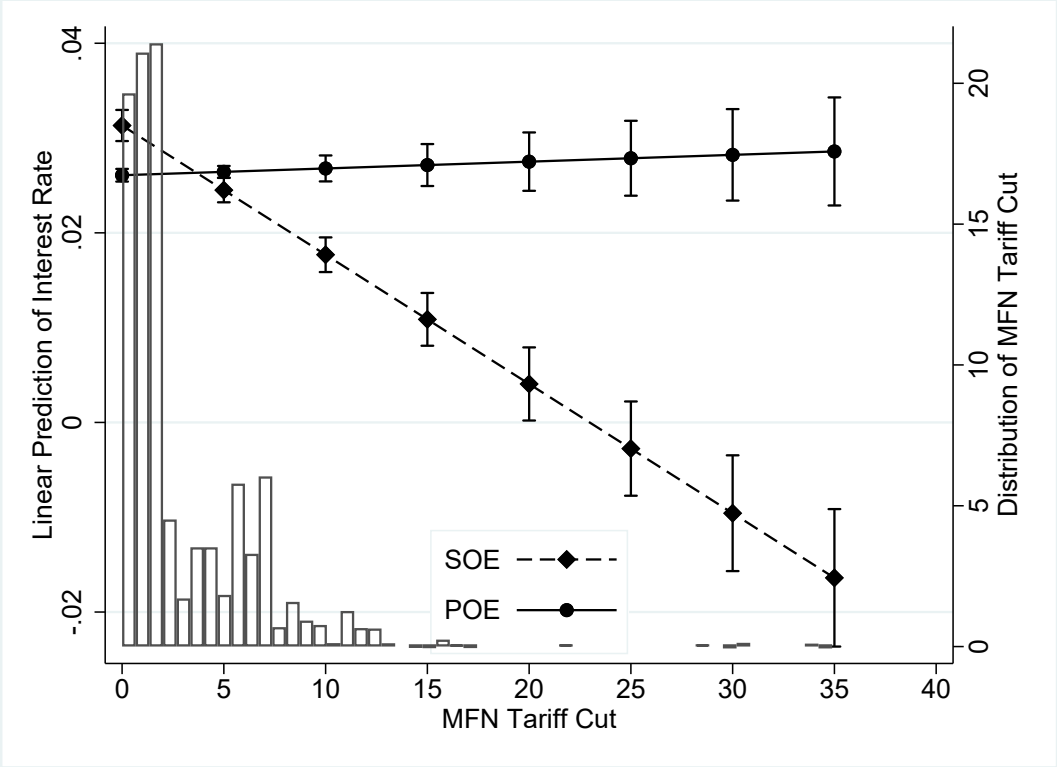


Note: The predictions are plotted from column 1 in Table A33. OLS regression with industry (4-digit) fixed effects and robust standard errors clustered at the firm level. The histogram shows the distribution of . 90% C.I.

is associated with a higher cost of credit, though the effect is not significant. On the contrary, as the magnitude of tariff cuts increases for SOEs, the cost of credit decreases dramatically. This supports the hypothesis that SOEs' credit condition improves with trade liberalization, while the same is not true for POEs. In line with our model where government can help SOEs face the trade-induced competition shock by reducing the cost of borrowing to finance their fixed operating cost. Hence, this finding is broadly compatible with the role of credit constraints as '*de facto*' subsidies directly affecting the exit margin.

Firm profitability. Although for data limitation our main empirical analysis focuses on the effects of trade on selection, we perform a few broad tests of the model's predictions for the effect of trade on firm profitability. Our measure of profitability, computed as profits over revenues is too crude to distinguish the effect of trade on pure firm profitability (markups) from its effect on the cost of capital/credit. The negative effect of trade on POEs' profitability shown in Figure 6 could be produced by a reduction in firms' market power and/or by an increase in the cost of credit. Similarly the neutrality of trade for SOEs profitability could be compatible with a reduction in markups compensated by a reduction in the cost of credit. To address this point we recompute our measure of profitability subtracting interest payments from profits. The results in Figure A13 confirm our finding from the baseline specification. POEs' profitability is negatively affected by trade liberalization while the effects on SOEs' profitability are not significative. This suggests that the different effects of trade on SOEs and

Figure 10: POE vs. SOE: The effect of trade liberalization on the cost of credit.



Note: The predictions are plotted from column 2 in Table A33. OLS regression with industry (4-digit) fixed effects and robust standard errors clustered at the firm level. The histogram shows the distribution of . 90% C.I.

POEs profitability are driven by the different impact of trade on these firms' market power. Moreover, this is consistent with the theoretical prediction that political/bureaucratic barriers to entry neutralise the pro-competitive effect of trade for SOEs.

Finally, we have repeated the regression in Table 3 restricting the sample to those sectors where both POEs and SOEs are present, that is to say, we have excluded the sectors dominated by SOEs which presumably are those more likely experiencing political/bureaucratic entry barriers. As shown in Table A34, the neutrality of trade for SOEs profits is confirmed even for this subsample where the degree of product market competition faced by SOEs can potentially be affected by trade. This is further evidence that the credit channel could be playing an important role in sectors where SOEs and POEs face similar barriers to entry.

6 Conclusion

In this paper, we have analysed the effects of the 2007 WTO entry on Vietnamese firms. Our analysis shows that the post-WTO probability of exiting the market is much larger for private firms than for state-owned firms. Moreover, while we find a strong pro-competitive effect of WTO entry on POEs profitability, SOEs profitability is unaffected by the trade reform. In the industry-level analysis, we show that trade liberalization generates sizable productivity gains in industries with a strong presence of POEs, while the gains are missing in industries dominated by SOEs. A simple counterfactual

exercise suggests that the aggregate productivity gains from trade in the five years after Vietnam's accession to the WTO would have been 66% higher if SOEs would have been replaced by private firms.

A model of trade under firm heterogeneity suggests that barriers to entry and credit constraints could be at the root of the different response of POEs and SOEs to trade liberalization. If entry is regulated politically, the market mechanism breaks down and the effects of trade on selection and competition are weakened. These efficiency effects of trade are instead more powerful if firm entry faces pecuniary barriers, such as credit frictions. We provide broad tests of these model's predictions showing that while POEs' entry responds positively to trade, market incentives do not work for SOEs', whose entry is not affected by trade. Moreover, POEs facing higher entry barriers (operating in less competitive sectors), are less likely to survive trade liberalization. We also provide evidence that the cost of credit drops substantially for SOEs after WTO entry, suggesting that bail-out via credit could be driving the missing selection effect of trade for these firms.

The goal of this paper is to analyse the role of SOEs in shaping the efficiency gains from globalization. We focus exclusively on productivity gains, but it is likely that SOEs affect other outcomes of globalization which have first order impact on a country's welfare. In Vietnam, as in many other developing countries, an important share of the economy operates informally, and also private firms tend to evade taxes to an non-negligible extent (Tenev et al., 2003). A substantial presence of SOEs then guarantees a solid flow of tax revenues, with important implications for public goods provision and redistributive policies. Moreover, if large scale trade liberalization has temporary or permanent negative effect on employment, in some areas or in the whole country (Autor, Dorn and Hanson, 2013), the presence of SOEs could help the economy smoothing the employment shock, thereby reducing the damage and taming the welfare losses from globalization. These are interesting extensions of our analysis that we leave for future research.

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Appendix: for Online Publication

A1. Model derivations

Closed economy. Here we provide a short derivation of the results of the model with fixed operating costs, which represents a bigger departure from the MO structure. The POEs' problem is

$$\begin{aligned}
&\max_{p(c)} \pi_y(c) = (p(c)-c)\, y(c) - (1-d)\,\lambda - \delta_y F(c) - (1-\delta_y)\, t\lambda \\
&\qquad s.t. \\
&\qquad y(c) = \frac{\alpha L}{\eta N_y + \gamma} - \frac{L}{\gamma}\frac{p(c)}{\beta_y} + \frac{\eta N_y}{\eta N_y + \gamma}\frac{L}{\gamma}\frac{\overline{p}_y}{\beta_y} \qquad (19) \\
&LC: \quad (p(c)-c)\, y(c) - (1-d)\,\lambda \geq F(c) \\
&PC: \quad -d\lambda + \delta_y F(c) + (1-\delta_y)\, t\lambda \geq 0.
\end{aligned}$$

The profit function shows that only a fraction $(1-d)$ of the fixed cost is financed internally, and that if the contract is enforced firms must pay $F(c)$ to the financial institution, while in case of default firms lose the collateral. The first constraint is the demand function, the liquidity constraint (LC) implies that in case of repayment firms can pay up to their net revenues. The participation constraint (PC) implies that the financial institution is willing to enter the contract only if the net expected returns exceed the outside option, which for simplicity is normalised to zero.

The first order condition for the firm problem (19) gives

$$p(c) = \frac{1}{2}\left(\frac{\alpha\gamma\beta_y}{\eta N_y + \gamma} + c + \frac{\eta N_y}{\eta N_y + \gamma}\overline{p}_y\right). \qquad (20)$$

The optimal decision of firms is to adjust their payment F to take the investors to their participation constraint, which in equilibrium holds with equality. Solving (PC) w.r.t. $F(c)$, substituting it into the (LC) taken as an equality and using the result that equilibrium profits gross of fixed costs are

$$(p(c)-c)\, y(c) = \frac{L}{4\gamma\beta_y}\left(\frac{\alpha\gamma}{\eta N_y + \gamma} + \frac{\eta N_y}{\eta N_y + \gamma}\overline{p}_y - c\right)^2$$

we obtain the survival cutoff the survival cutoff

$$c_{Dy} = \frac{\alpha\gamma\beta_y}{\eta N_y + \gamma} + \frac{\eta N_y}{\eta N_y + \gamma}\overline{p}_y - 2\sqrt{\frac{\gamma\hat{\lambda}_y\beta_y}{L}}, \qquad (21)$$

where $\hat{\lambda}_y = \left[1 + \frac{1-\delta_y}{\delta_y}(d-t)\right]\lambda$. Substituting it back into the equilibrium profit function we obtain

$$\pi_y(c) = \frac{L}{4\gamma\beta_y}\left(2\sqrt{\frac{\gamma\hat{\lambda}_y\beta_y}{L}} + c_{Dy} - c\right)^2 - \hat{\lambda}_y.$$

The free entry condition follows from using the Pareto distribution for c.

Small open economy. The decision to export is derived form the following problem,

$$\begin{aligned}
&\max_{p(c)} \pi_{Xy}(c) = (p(c) - \tau^* c) y_X(c) - (1-d)\lambda_X - \delta F(c) - (1-\delta_y) t\lambda_X \\
&\qquad s.t. \\
&\qquad y_X(c) = A - Bp(c) \qquad (22) \\
&LC: \quad (p(c) - \tau^* c) y_X(c) - (1-d)\lambda \geq F(c) \\
&PC: \quad -d\lambda_X + \delta_y F(c) + (1-\delta_y) t\lambda_X \geq 0.
\end{aligned}$$

The problem is similar to that of the closed economy and proceeding similarly we obtain the export cutoff

$$c_{Xy} = \frac{1}{\tau^*}\left(\frac{A}{B} - 2\sqrt{\frac{\hat{\lambda}_{Xy}}{B}}\right), \qquad (23)$$

where $\hat{\lambda}_{Xy} = \left[1 + \frac{1-\delta_y}{\delta_y}(d-t)\right]\lambda_X$, and the profit function can be written as

$$\pi_{Xy}(c) = \frac{B}{4}\left(\frac{A}{B} - \tau^* c\right)^2 - \hat{\lambda}_{Xy}.$$

The free entry condition in open economy writes

$$\int_0^{c_{Dy}} \pi_{Dy}(c) dGc + \int_0^{c_{Xy}} \pi_{Xy}(c) dGc = \frac{F_{Ey}}{\phi_y + (1-\phi_y) t_e} \equiv \hat{F}_{Ey},$$

where the profit on domestic sales $\pi_{Dy}(c) = \pi_y(c)$ is the same as in autarky. After some manipulations this condition can be written as,

$$b_1 c_{Dy}^{k+2} + b_2\sqrt{\hat{\lambda}_y} c_{Dy}^{k+1} + \rho b_1^* c_{Xy}^{k+2} + \rho b_2^*\sqrt{\hat{\lambda}_{Xy}} c_{Xy}^{k+1} = \hat{F}_{Ey},$$

where for simplicity we assume symmetric variable trade costs, $\tau^* = \tau$, $\rho = \tau^{-k}$ is a measure of the "freeness" of trade, $b_1^* = B/[2\gamma(k+2)(k+1)]$, $b_2^* = \sqrt{B}/(k+1)$, and b_1 and b_2 are identical to those derived for the benchmark model in the main text. Using the implicit function theorem we obtain

$$\partial c_{Dy}/\partial\hat{\lambda}_y = -\frac{\partial F/\partial\hat{\lambda}_y}{\partial F/\partial c_{Dy}} < 0,$$

and

$$\frac{\partial c_{Dy}}{\partial\rho} = -\frac{\frac{\partial F}{\partial\rho}}{\frac{\partial F}{\partial c_{Dy}}} = -\frac{b_1^* c_{Xy}^{k+2} + b_2^*\sqrt{\hat{\lambda}_{Xy}} c_{Xy}^{k+1}}{b_1(k+2) c_{Dy}^{k+1} + b_2(k+1)\sqrt{\hat{\lambda}_y} c_{Dy}^k} < 0, \qquad (24)$$

where $F = b_1 c_{Dy}^{k+2} + b_2\sqrt{\hat{\lambda}_y} c_{Dy}^{k+1} + \rho b_1^* c_{Xy}^{k+2} + \rho b_2^*\sqrt{\hat{\lambda}_{Xy}} c_{Xy}^{k+1} - \hat{F}_{Ey}$. Next we need to show that

$$\frac{\partial^2 c_{Dy}}{\partial\rho\partial\delta_y} = -\left(\frac{\frac{\partial^2 F}{\partial\rho\partial\delta_y}\frac{\partial F}{\partial c_{Dy}} - \frac{\partial^2 F}{\partial c_{Dy}\partial\delta_y}\frac{\partial F}{\partial\rho}}{\left(\frac{\partial F}{\partial c_{Dy}}\right)^2}\right) < 0.$$

Let $\hat{\lambda}_y = [1 + (1 - \delta_y)(d - t)/\delta_y]\lambda = \tilde{\delta}_y\lambda$ and $\hat{\lambda}_{Xy} = \tilde{\delta}_y\lambda_X$, and assume $\lambda_X = \lambda$, then $\hat{\lambda}_{Xy} = \hat{\lambda}_y = \tilde{\delta}_y\lambda$. It is easy to show that

$$\frac{\partial^2 F}{\partial\rho\partial\delta_y} = -\tilde{\delta}_y' 2b_2^* (k+1)\lambda (\tau c_{Xy})^k \sqrt{\frac{\tilde{\delta}_y}{B}} > 0,$$

where $\tilde{\delta}_y' = \partial\tilde{\delta}_y/\partial\delta_y = -\delta_y^{-2}(d-t)$, and

$$\frac{\partial^2 F}{\partial c_{Dy}\partial\delta_y} = b_2 (k+1)\sqrt{\lambda}\tilde{\delta}_y' c_{Dy}^k < 0.$$

Since $\partial F/\partial c_{Dy}$ and $\partial F/\partial\rho$ are both positive it follows that $\partial^2 c_{Dy}/\partial\rho\partial\delta_y < 0$.

Using the free entry condition we can rewrite (24) as

$$\frac{\partial c_{Dy}}{\partial\rho} = -\frac{\frac{\partial F}{\partial\rho}}{\frac{\partial F}{\partial c_{Dy}}} = -\frac{\left(\hat{F}_{Ey} - b_1 c_{Dy}^{k+2} + b_2\sqrt{\hat{\lambda}_y} c_{Dy}^{k+1}\right)/\rho}{b_1 (k+2) c_{Dy}^{k+1} + b_2 (k+1)\sqrt{\hat{\lambda}_y} c_{Dy}^k} < 0.$$

We can also analyse the role of credit constrains on the entry cost:

$$\frac{\partial^2 c_{Dy}}{\partial\rho\partial\phi_y} = -\left(\frac{\frac{\partial^2 F}{\partial\rho\partial\phi_y}\frac{\partial F}{\partial c_{Dy}} - \frac{\partial^2 F}{\partial c_{Dy}\partial\phi_y}\frac{\partial F}{\partial\rho}}{\left(\frac{\partial F}{\partial c_{Dy}}\right)^2}\right) > 0,$$

where $\partial^2 F/\partial c_{Dy}\partial\phi_y = 0$ and $\partial^2 F/\partial\rho\partial\phi_y = \rho^{-1}\left(F_{Ey}(t-1)/[\phi_y + (1-\phi_y)t]^2\right) < 0$, as $t < 1$. This confirms the result obtained in the economy without fixed operating costs.

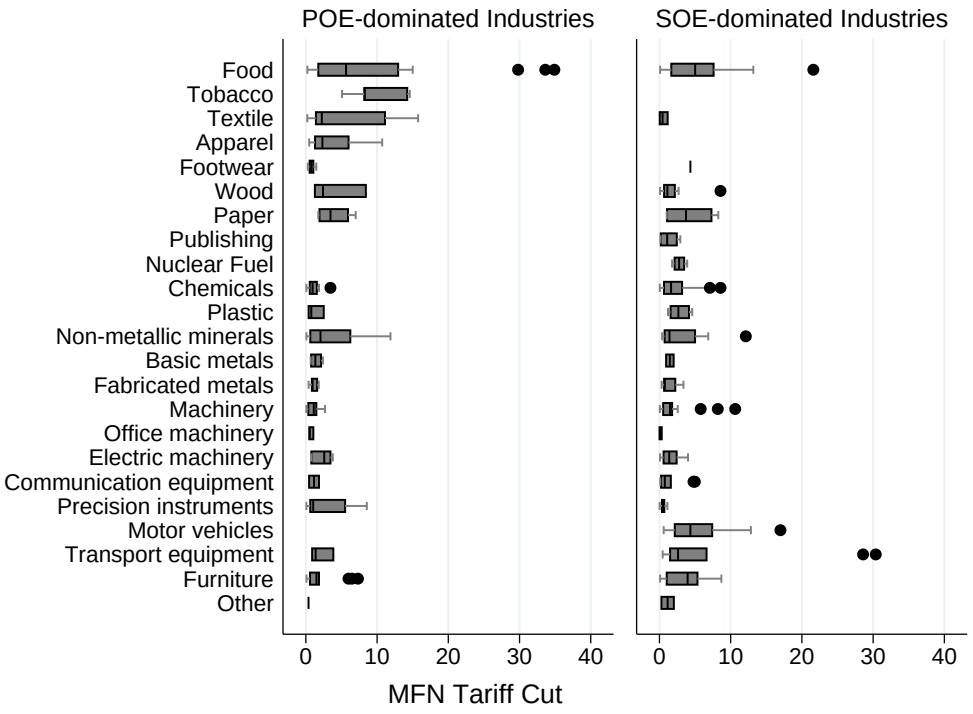
A2. Data

The data sources have been already described in the text, but we add some further details here.

- **General Statistics Office of Vietnam** : data include the entire sample of Vietnamese firms that report their information to the GSO. The data do not include firms that operate in the informal economy. The variables are reported in Vietnamese language and translated in English by us. The trade categorisation of the survey follows ISICv4. We created a cross-walk from the four-digit Vietnam Standard Industrial Classification (VSIC) and ISIC revision 3, and then from ISIC revision 3 to 6-giti HS to merge the GSO data with tariff data.
- **Import and export** : data come from COMTRADE and are at the HS 6-digit level. To merge 6-digit COMTRADE data with 4-digit Vietnamese firm-level data, we take the average value of import and export.
- **MFN** : data come from TRAINS (WITS) and are at the HS 6-digit level. To merge 6-digit WTITS data with 4-digit Vietnamese firm-level data, we take the average value of MFN tariffs.
- **US – Vietnam BTA** : data come from TRAINS (WITS) and are at the HS 6-digit level. To merge 6-digit COMTRADE data with 4-digit Vietnamese firm-level data, we take the average value of preferential tariffs.

A3. Other Figures and Tables

Figure A1: MFN tariff cuts after WTO accession.



Note: The box plots report tariff cuts pre- and post-WTO accession by 2-digit ISIC industries (average values, 2006-2012). *SOE-dominated Sector* is a dummy scoring one if an industry at the 4-digit has more than 40% of workers employed in SOEs.

Figure A2: Bias toward SOEs.

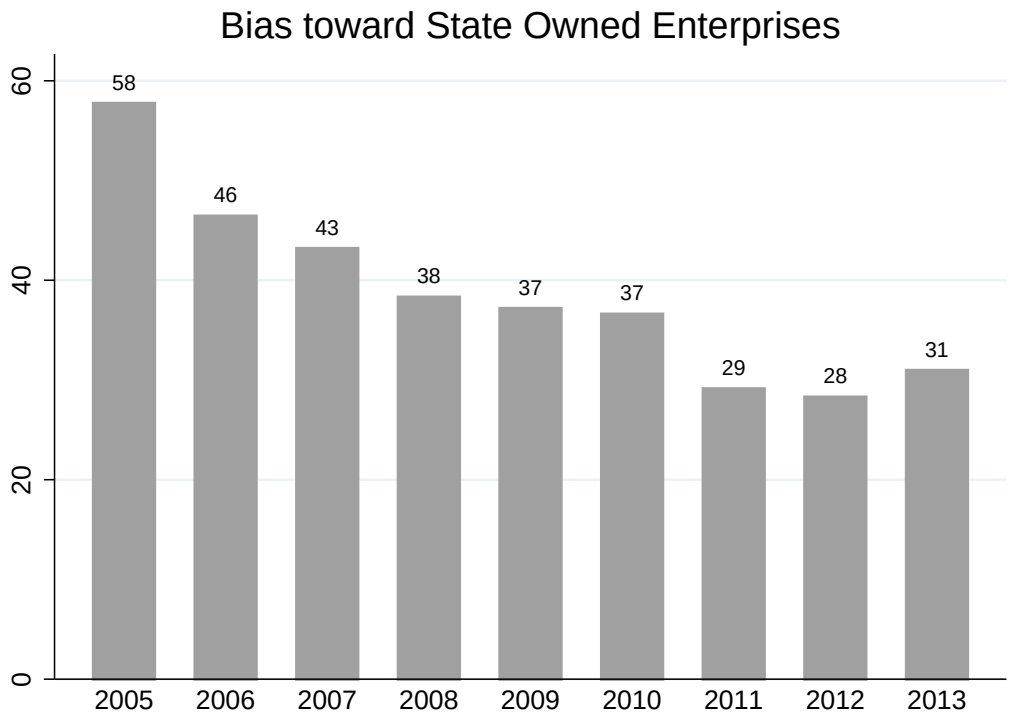


Figure A3: Types of bias toward SOEs.

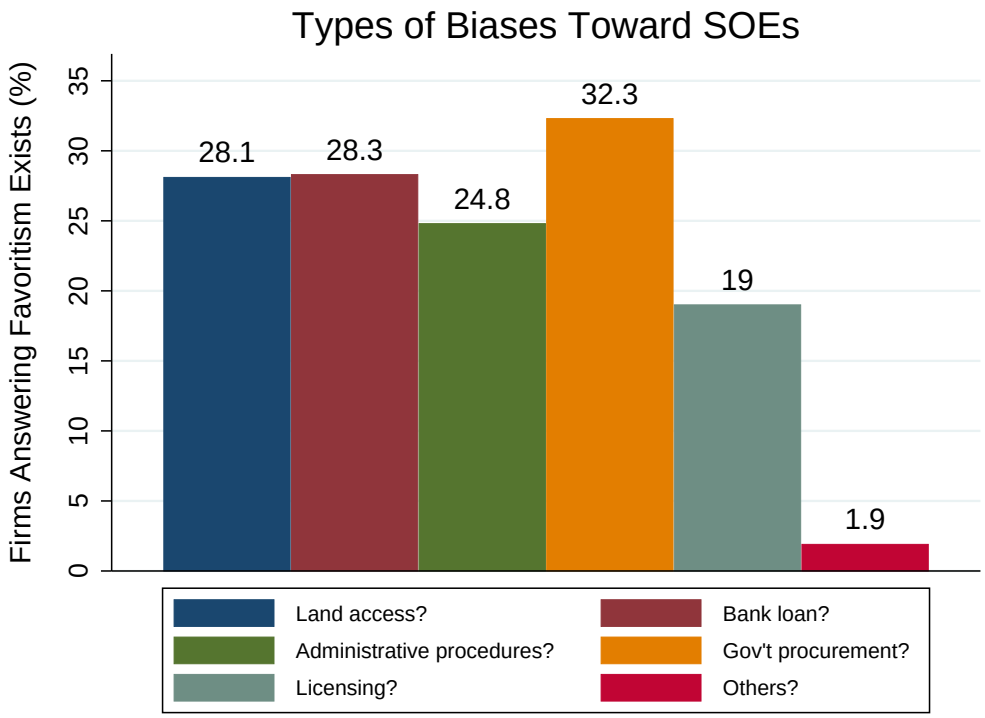
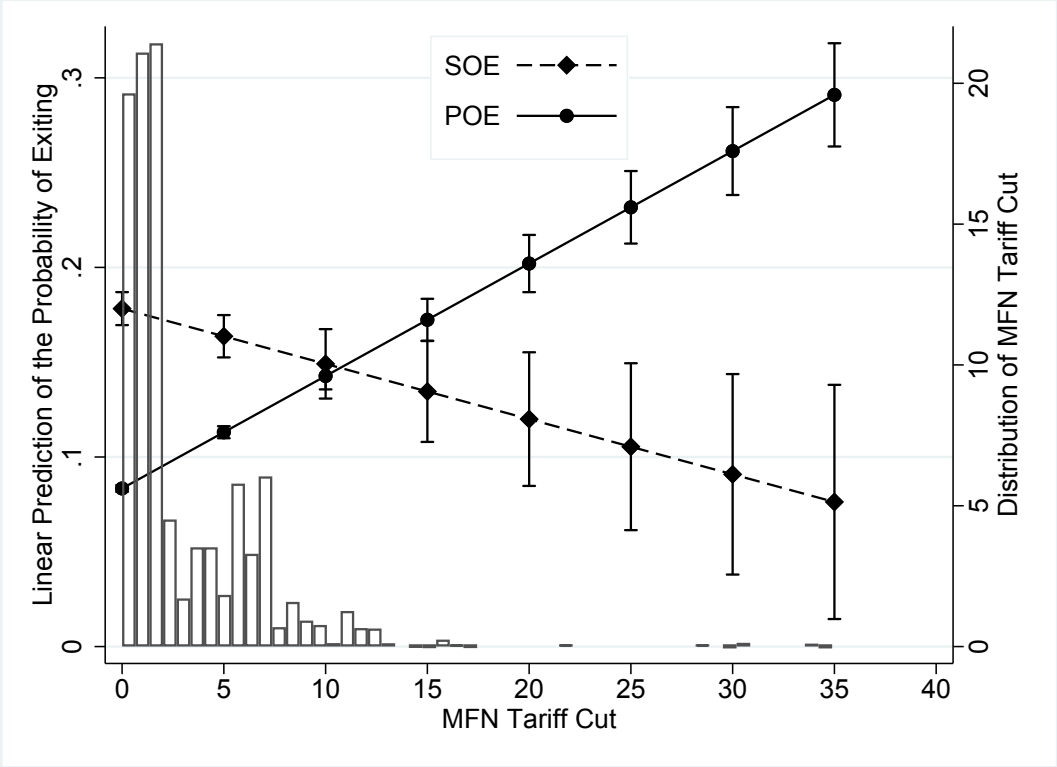
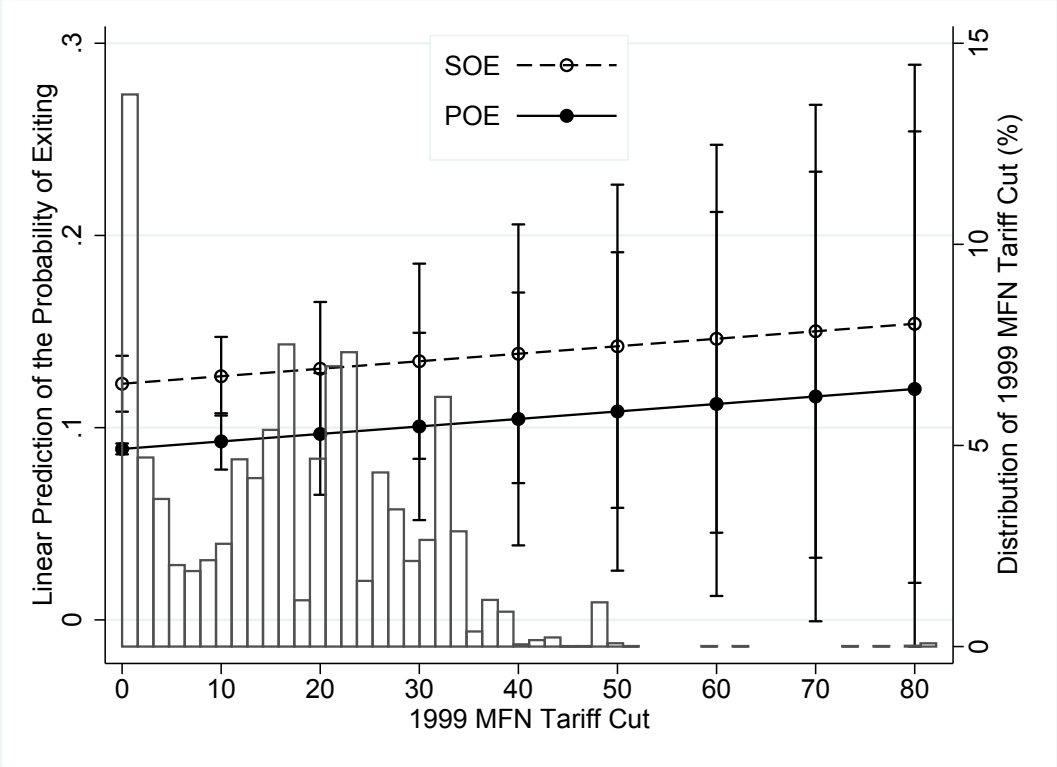


Figure A4: POE vs. SOE: the effect of MFN tariff cuts on firm's exit



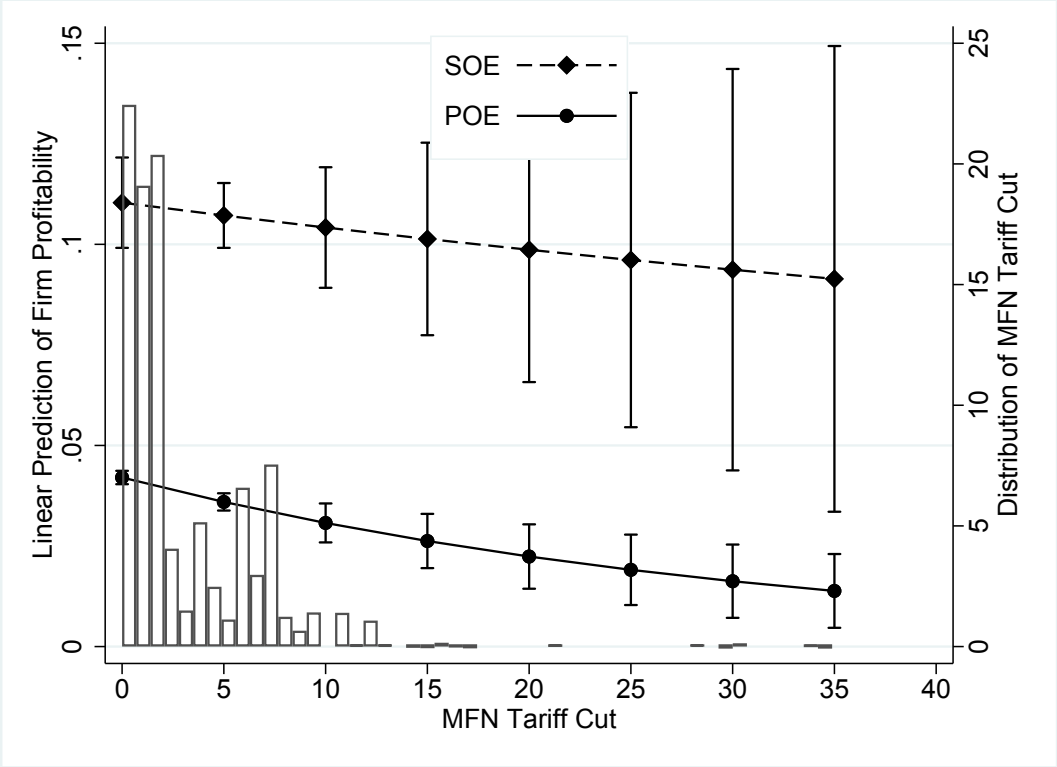
Note: The predictions are plotted from column 3 in Table 2 including the interaction term between a dummy of foreign firms and *MFN Tariff Cut*. OLS regression with industry (4-digit) fixed effects and robust standard errors clustered at the level of the firm. The histogram shows the distribution of $\Delta\tau$. 95% C.I.

Figure A5: POE vs. SOE: the effect of 1999 MFN tariff cuts on firm's exit



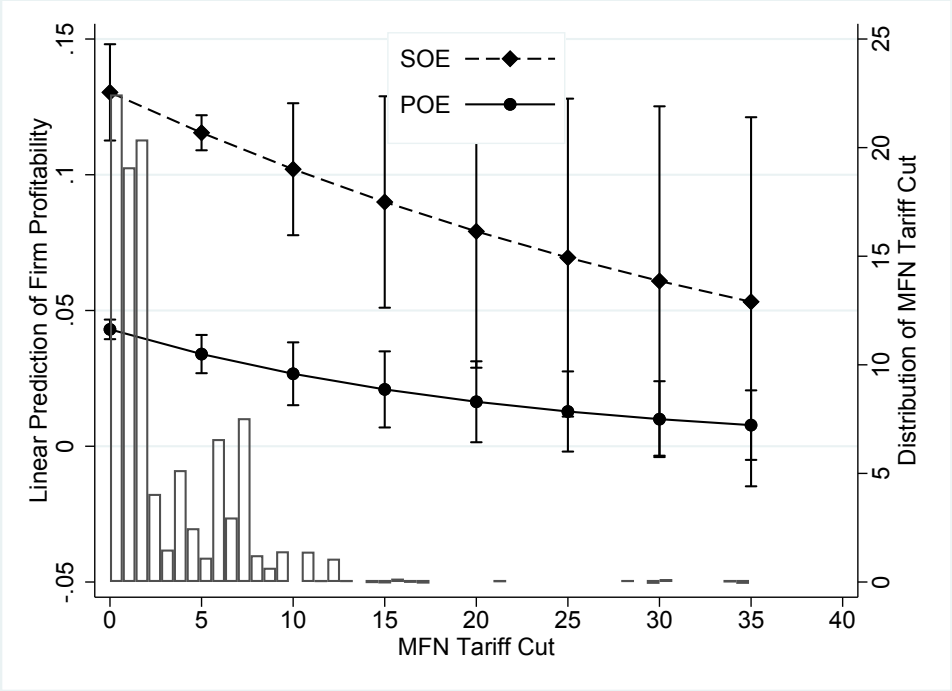
Note: The predictions are plotted from column 3 in Table 2 replacing $\Delta\tau$ with *1999 MFN Tariff Cut*. OLS regression with industry (4-digit) fixed effects and robust standard errors clustered at the level of the firm. The histogram shows the distribution of *1999 MFN Tariff Cut*. 95% C.I.

Figure A6: POE vs. SOEs: The effect of MFN tariff cuts on firm profitability



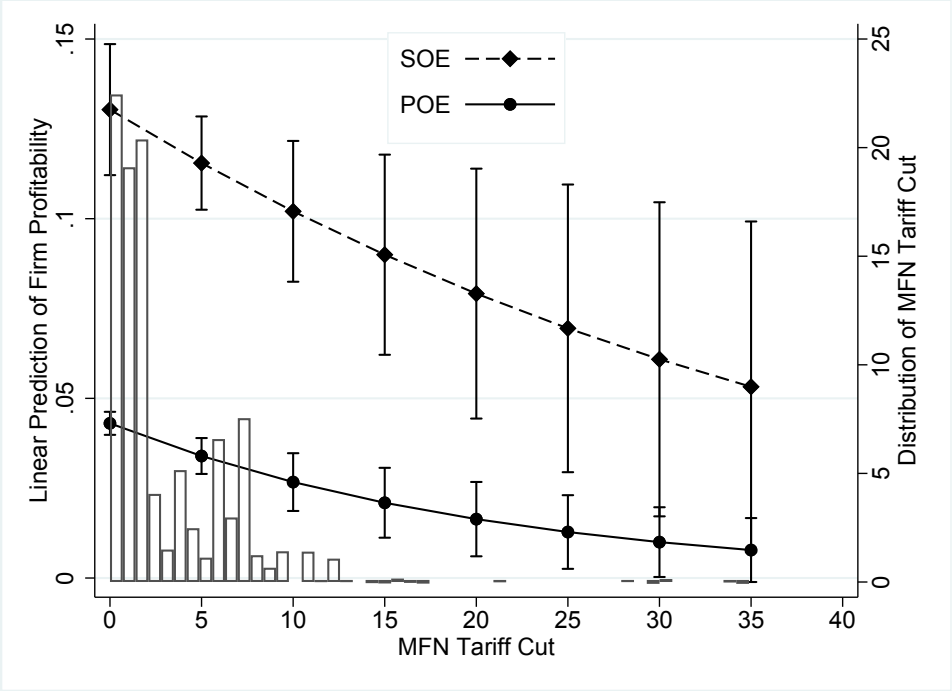
Note: The predictions are plotted from column 6 in Table 3 including the interaction term between a dummy of foreign firms and *MFN Tariff Cut*. Fractional outcome regression with industry (4-digit) fixed effects and robust standard errors clustered at the firm level. The histogram shows the distribution of $\Delta\tau$. 95% C.I.

Figure A7: POE vs. SOEs: The effect of MFN tariff cuts on firm profitability (s.e. clustered by industry).



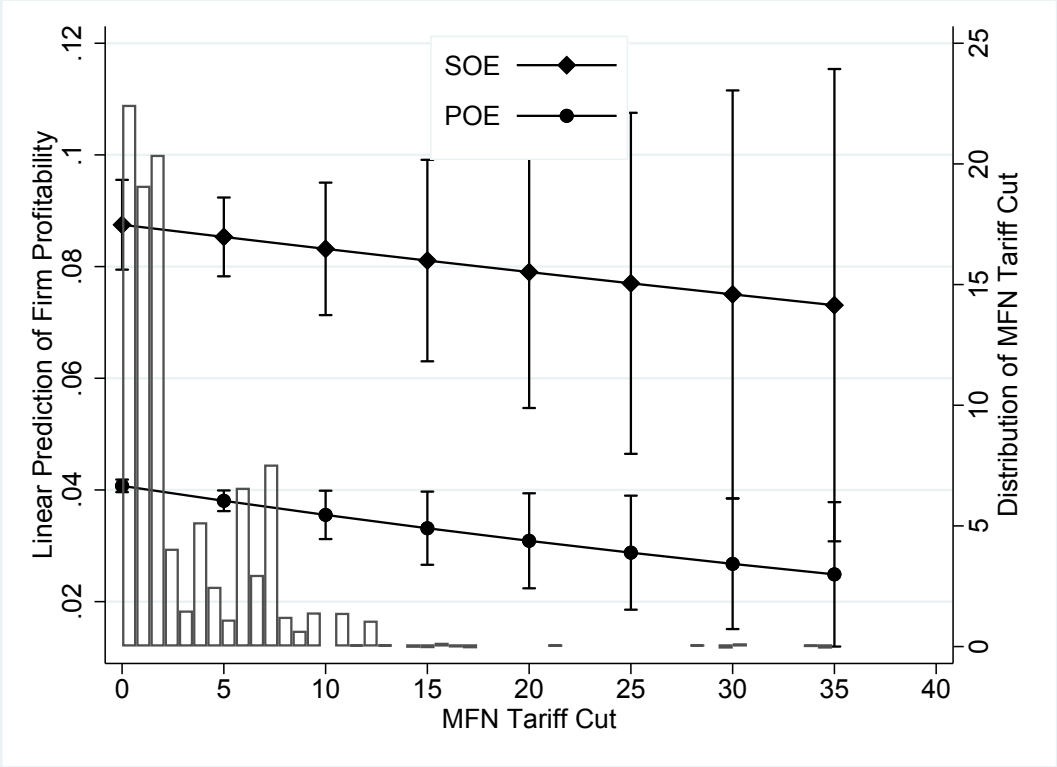
Note: Fractional outcome regression with industry (4-digit) fixed effects and robust standard errors clustered at the industry level. The histogram shows the distribution of $\Delta\tau$. 95% C.I.

Figure A8: POE vs. SOEs: The effect of MFN tariff cuts on firm profitability (s.e. clustered by industry-year).



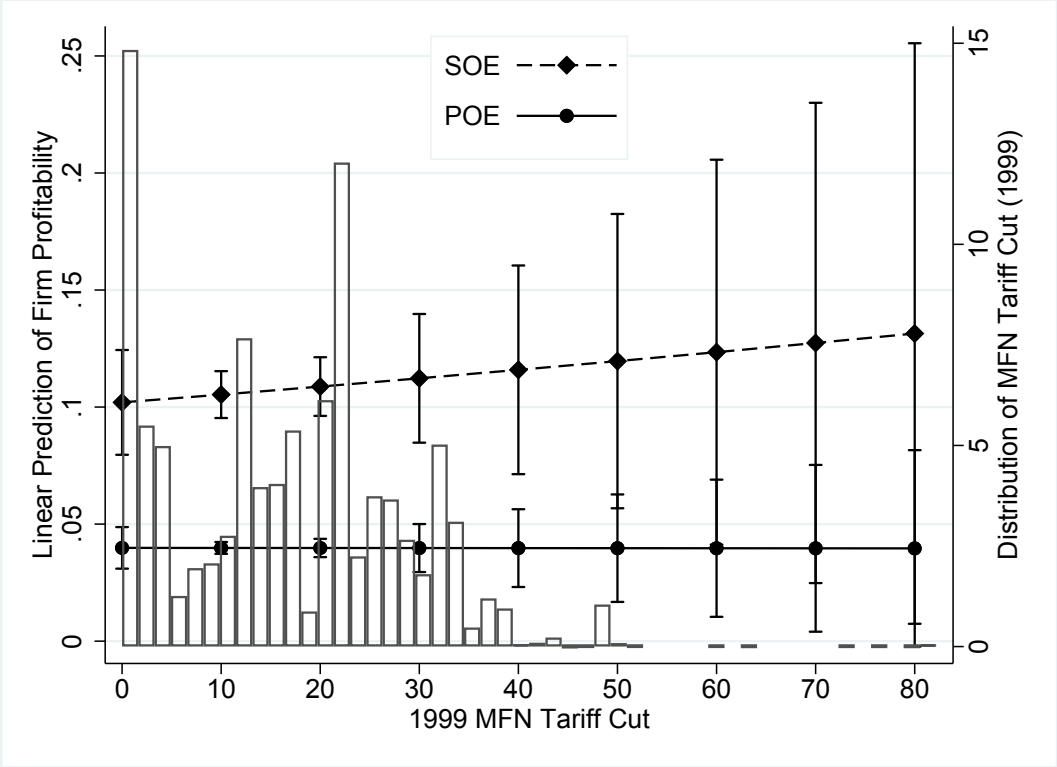
Note: Fractional outcome regression with industry (4-digit) fixed effects and robust standard errors clustered at the industry-year level. The histogram shows the distribution of $\Delta\tau$. 95% C.I.

Figure A9: POE vs. SOEs: The effect of MFN tariff cuts on firm profitability (with PSM)



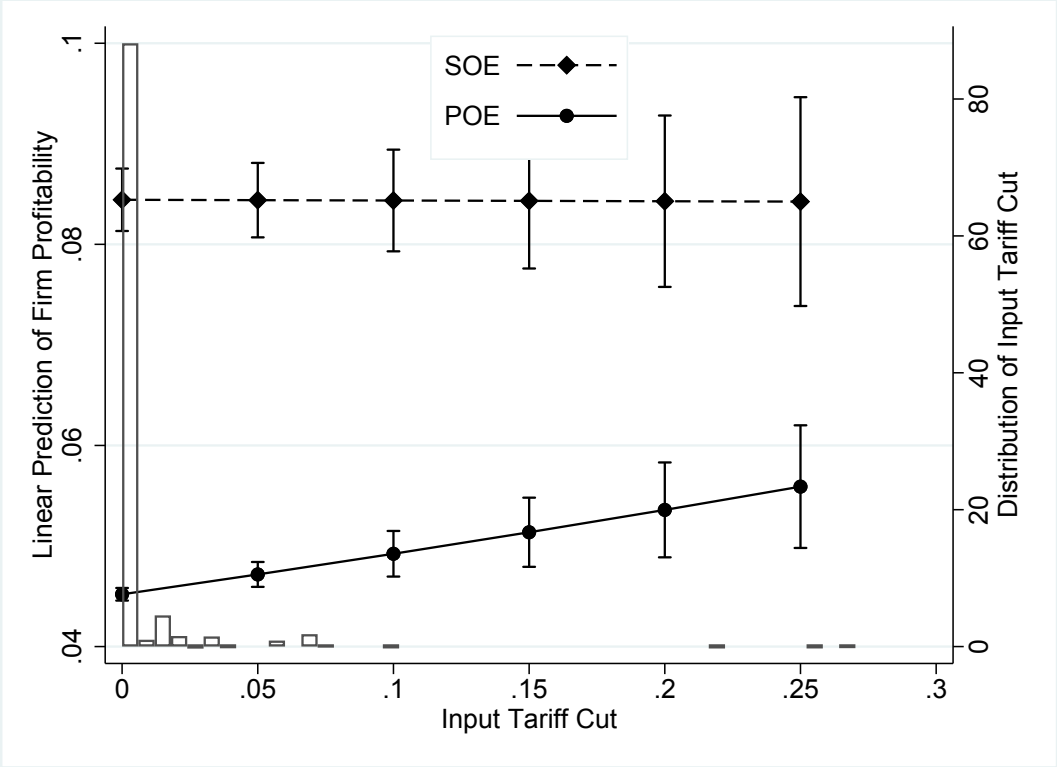
Note: The predictions are plotted from column 1 in Table A21. OLS regression with PSM and industry (4-digit) fixed effects and robust standard errors clustered at the level of the firm. The histogram shows the distribution of *1999 MFN Tariff Cut*. 95% C.I.

Figure A10: POE vs. SOEs: The effect of 1999 MFN tariff cuts on firm profitability



Note: The predictions are plotted from column 3 in Table 3 replacing $\Delta\tau$ with *1999 MFN Tariff Cut*. OLS regression with industry (4-digit) fixed effects and robust standard errors clustered at the level of the firm. The histogram shows the distribution of *1999 MFN Tariff Cut*. 95% C.I.

Figure A11: POE vs. SOEs: The effect of input tariff cuts on firm profitability



Note: The predictions are plotted from column 3 in Table A23. OLS regression with industry (4-digit) fixed effects and robust standard errors clustered at the level of the firm. The histogram shows the distribution of *MFN Tariff Cut*. 95% C.I.

Figure A12: Distribution of SOE Labor Share

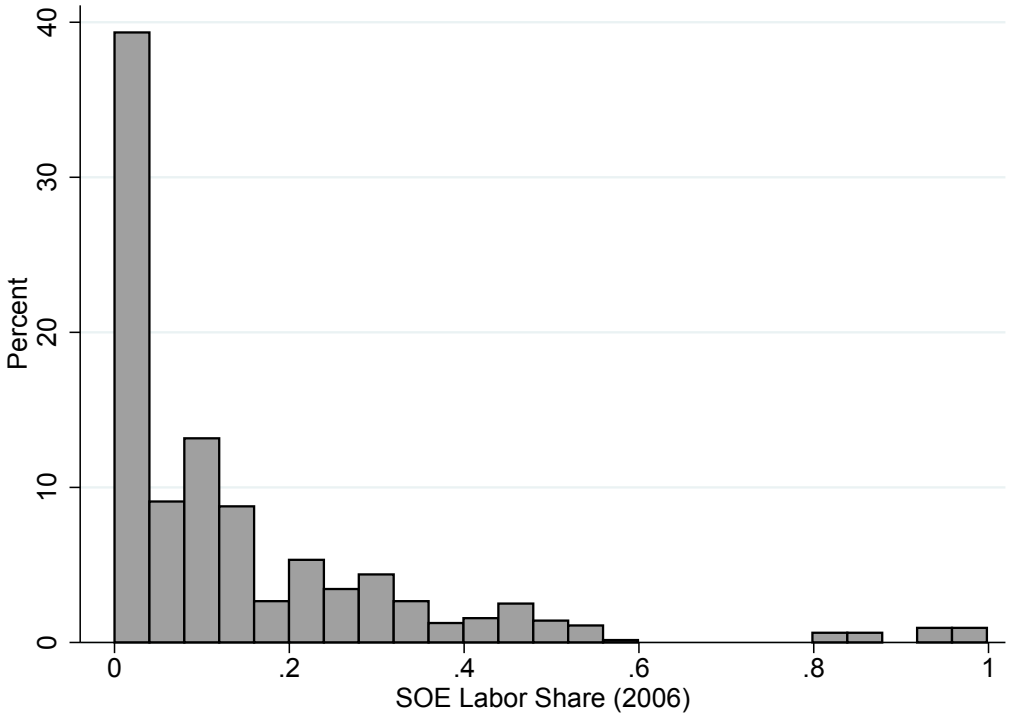
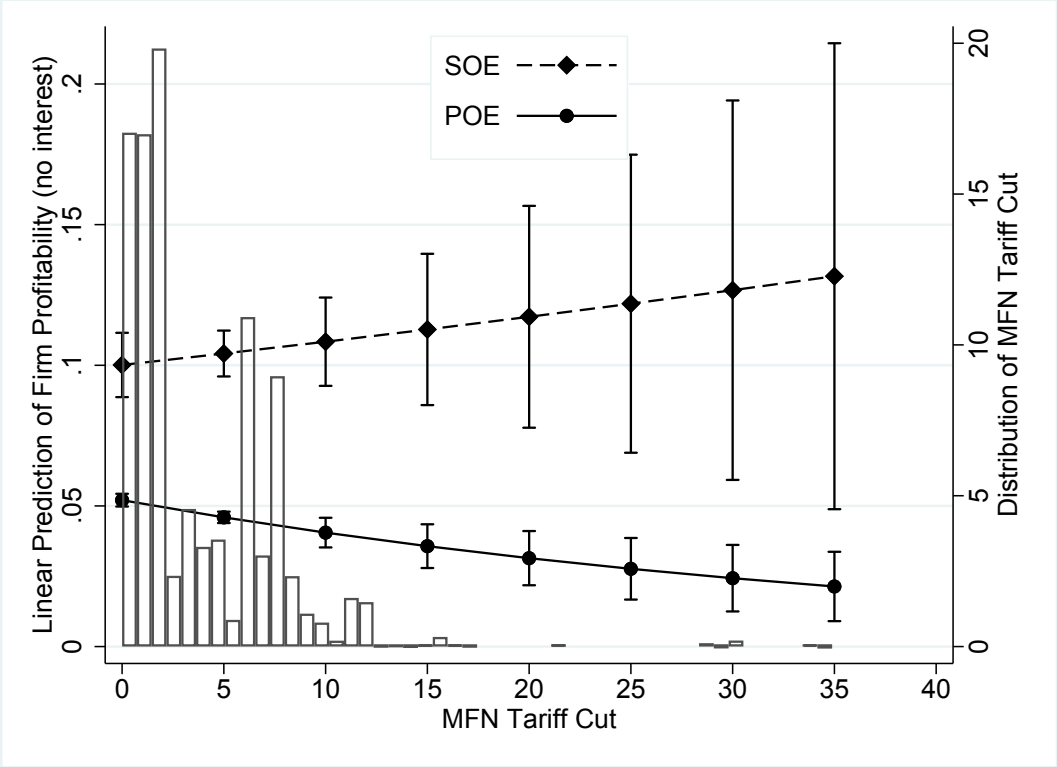


Figure A13: The effect of MFN tariff cuts on firm profitability, excluding interest payments



Note: The predictions are plotted from a model specification similar to column 3 in Table 3. However, the outcome variable is firm profitability excluding interest payments rather than firm profitability including interest payments. The figure is very similar to Figure 6 to which it should be compared. Fractional outcome regression with industry (4-digit) fixed effects and robust standard errors clustered at the firm level. The histogram shows the distribution of $\Delta\tau$. 95% C.I.

Table A1: Differences between POEs covariates and SOEs covariates.

		POE			SOE	
Variable	Mean	Variance	Skewness	Mean	Variance	Skewness
ln(Labour)	2.88	1.73	1.05	4.81	2.59	-0.03
ln(Assets)	8.34	2.91	0.43	10.62	3.68	-0.30
MFN Tariff	10.91	56.99	1.51	13.00	73.46	1.54
ln(Exports)	9.40	90.56	0.07	12.89	84.76	-0.65
ln(K/L)	5.40	1.70	-0.69	5.76	2.12	-0.20
PTA Tariff	0.01	0.14	27.78	0.02	0.21	21.81
Age	41	811	-0.60	55	190	-2.68
Age squared	2529	3563003	-0.46	3216	1071655	-1.80

		POE			SOE	
Variable	Mean	Variance	Skewness	Mean	Variance	Skewness
ln(Labour)	2.88	1.73	1.05	2.88	1.97	-0.03
ln(Assets)	8.34	2.91	0.43	8.34	4.91	-0.30
MFN Tariff	10.91	56.99	1.51	10.91	56.10	1.54
ln(Exports)	9.40	90.56	0.07	9.40	95.62	-0.65
ln(K/L)	5.40	1.70	-0.69	5.40	2.97	-0.20
PTA Tariff	0.01	0.14	27.78	0.01	0.14	21.81
Age	41	811	-0.60	41	811	-2.68
Age squared	2529	3563003	-0.46	2529	3549747	-0.51

Note: Results from entropy balancing. The top panel reports descriptive statistics pre-balancing, whereas the bottom panel reports descriptive statistics post-balancing. After using entropy balancing, the difference in means between *POE* and *SOE* is never significant.

Table A2: Explaining MFN tariff cuts.

	(1)	(2)	(3)	(4)
	OLS			
	MFN Tariff Cut			
MFN Tariff Cut (lagged)	-0.534***	-0.533***	-0.535***	-0.612***
	(0.049)	(0.049)	(0.048)	(0.040)
TFPR	0.333	0.409	0.203	0.295
	(0.469)	(0.574)	(0.404)	(0.375)
Firm Profitability	0.011	0.011	0.073	0.001
	(0.033)	(0.033)	(0.103)	(0.002)
SOE dominated	-0.154	-0.179	-1.005	-0.391
	(1.121)	(1.110)	(1.462)	(3.504)
Firm Debt				1.398
				(1.477)
TFPR*SOE dominated		-0.573		
		(1.266)		
Firm Profitability*SOE dominated			-0.227	
			(0.311)	
Firm Debt*SOE dominated				-0.912
				(9.538)
Number of Employees	-0.089	-0.092	-0.051	-0.019
	(0.293)	(0.296)	(0.245)	(0.164)
POE Exit Rate	0.254	0.239	0.113	0.778
	(0.985)	(0.989)	(0.989)	(1.495)
SOE Exit rate	2.668	2.435	3.004	24.204
	(1.642)	(1.563)	(1.827)	(27.104)
Capital-labor Ratio	0.154	0.156	0.144	0.038
	(0.202)	(0.203)	(0.208)	(0.221)
Age	0.134*	0.131*	0.123*	-0.032
	(0.077)	(0.077)	(0.067)	(0.030)
HHI	0.690	0.697	0.466	-0.287
	(1.838)	(1.855)	(1.552)	(1.100)
Export	-0.042	-0.042	-0.035	-0.013
	(0.062)	(0.062)	(0.054)	(0.046)
Constant	6.393***	6.427***	6.448***	9.015***
	(2.032)	(2.062)	(2.004)	(1.729)
Observations	629	629	629	455
R-squared	0.474	0.474	0.487	0.697
Number of industries	117	117	117	107
Industry FE	YES	YES	YES	YES
Yaer FE	YES	YES	YES	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS with industry (4-digit) fixed effects and robust standard errors by HS 4-digit. The outcome variable is *MFN Tariff Cut*.

Table A3: Descriptive statistics.

Firm-level analysis				
Variable	Mean	Std. Dev.	Min	Max
Exit	0.07	0.25	0	1
MFN Tariff Cut	1.37	1.43	-28.82	34.89
POE*Post-WTO	0.78	0.42	0	1
POE	0.91	0.29	0	1
Foreign firm	0.07	0.25	0	1
TFP	0.04	1.69	-15.40	12.50
ln(Markup)	0.34	0.96	0.01	0.99
HHI	0.06	0.12	0	1
ln(Number of Employees)	3.05	1.46	0	11.46
ln(Assets)	8.54	1.84	0	19.35
ln(K\L)	5.43	1.32	0	13.74
ln(Exports)	9.72	9.54	0	21.74
Age	6	6	0	67
Age squared	71	235	0	4489
Preferential Tariff Cut	0.01	0.38	0	20
MFN Tariff Cut (1999)	11.10	7.67	0	91.39
Industry-level analysis				
Variable	Mean	Std. Dev.	Min	Max
TFP	-0.16	0.50	-2.13	1.41
ln(Markup)	0.26	0.47	0.01	0.82
MFN Tariff Cut	1.27	4.77	-28.82	34.89
SOE Revenue Share	0.11	0.19	0	1
ln(Number of Employees)	5.55	1.17	1.60	10.30
ln(K\L)	5.80	0.83	0	9.11
Exit	30.00	94.00	0	924
Age	50.00	7.00	1	69
ln(Exports)	10.74	9.38	0	21.74
Capital owned by state	3.89	5.80	0	35.08
Number of SOEs	9	19	0	224
Number of Semi-POE	223	500	0	5046.00
Number of POEs	393	906	1	8048
Number of Foreign Firms	29	88	0	927
MFN Tariff Cut (1999)	9.98	11.08	0	91.39

Note: The top panel reports descriptive statistics of the firm-level analysis, the bottom panel reports descriptive statistics of the industry-level analysis, .

Table A4: Exit and MFN Tariff Cut.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS						
	Pr(Exit=1)						
POE	0.050***	0.010	-0.010	-0.010	-0.010	-0.010	
	(0.007)	(0.019)	(0.017)	(0.017)	(0.014)	(0.015)	
MFN Tariff Cut	-0.002***	-0.004	-0.001	-0.001	-0.006***	-0.002	-0.002***
	(0.001)	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)
POE*MFN Tariff Cut	0.002***	0.015***	0.009***	0.009***	0.009***	0.009***	0.002***
	(0.001)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Constant	-0.062***	-0.078***	0.818***	2.481**	1.085***	-164.809***	
	(0.005)	(0.016)	(0.106)	(1.018)	(0.060)	(13.163)	
Observations	226,050	217,163	216,594	216,594	217,163	216,594	202,798
R-squared	0.038	0.203	0.451	0.451	0.460	0.457	0.436
Controls	NO	NO	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES	YES	YES
Business control	NO	NO	NO	YES	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	YES	NO	NO
Trends	NO	NO	NO	NO	NO	YES	NO
Firm FE	NO	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regression with entropy balancing and standard errors clustered at the industry level. The outcome variable is a dummy scoring one if firm exits the market in year t. The main independent variable is the interaction between *MFN Tariff Cut* and *POE*.

Table A5: Exit and MFN Tariff Cut.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS						
	Pr(Exit=1)						
POE	0.050***	0.010	-0.010	-0.010	-0.010	-0.010	
	(0.005)	(0.019)	(0.017)	(0.017)	(0.017)	(0.017)	
MFN Tariff Cut	-0.002***	-0.004	-0.001	-0.001	-0.006***	-0.002	-0.002***
	(0.000)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)
POE*MFN Tariff Cut	0.002***	0.015***	0.009***	0.009***	0.009***	0.009***	0.002***
	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-0.062***	-0.078***	0.818***	2.481***	1.085***		
	(0.005)	(0.017)	(0.106)	(0.734)	(0.096)		
Observations	226,050	217,163	216,594	216,594	217,163	216,594	202,798
R-squared	0.038	0.203	0.451	0.451	0.460	0.457	0.436
Controls	NO	NO	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES	YES	YES
Business control	NO	NO	NO	YES	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	YES	NO	NO
Trends	NO	NO	NO	NO	NO	YES	NO
Firm FE	NO	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regression with entropy balancing and standard errors clustered at the industry-year level. The outcome variable is a dummy scoring one if firm exits the market in year t. The main independent variable is the interaction between *MFN Tariff Cut* and *POE*.

Table A6: Exit and MFN Tariff Cut.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS						
	Pr(Exit=1)						
POE	0.050***	0.010	-0.010	-0.010	-0.010	-0.010	
	(0.007)	(0.019)	(0.017)	(0.008)	(0.014)	(0.015)	
MFN Tariff Cut	0.000	-0.004	-0.001	-0.001	0.004**	-0.002	-0.002**
	(0.000)	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)
POE*MFN Tariff Cut	0.002***	0.015***	0.009***	0.009***	0.009***	0.009***	0.002***
	(0.001)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Observations	226,041	217,155	216,586	216,586	216,586	216,586	202,798
R-squared	0.038	0.203	0.451	0.451	0.460	0.457	0.436
Controls	NO	NO	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES	YES	YES
Business control	NO	NO	NO	YES	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	YES	NO	NO
Trends	NO	NO	NO	NO	NO	YES	NO
Firm FE	NO	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regression with entropy balancing and standard errors double-clustered at the industry and firm level. The outcome variable is a dummy scoring one if firm exits the market in year t. The main independent variable is the interaction between *MFN Tariff Cut* and *POE*.

Table A7: Exit and Post-WTO.

	(1)	(2)	(4)	(5)	(6)
	OLS				
	Pr(Exit=1)				
POE	0.020***	-0.067***	-0.067***	-0.068***	
	(0.003)	(0.003)	(0.003)	(0.004)	
Post-WTO	0.015***	0.002	0.003*	-0.022***	0.003
	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)
POE*Post-WTO	0.047***	0.040***	0.040***	0.042***	0.024***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Constant	-0.015***	0.049***	0.047***	-2.067	
	(0.001)	(0.008)	(0.008)	(137.991)	
Observations	226,050	217,163	217,163	217,163	203,363
R-squared	0.037	0.096	0.096	0.098	0.429
Controls	NO	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES
Business control	NO	NO	YES	NO	NO
Trends	NO	NO	NO	YES	NO
Firm FE	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regression with entropy balancing and standard errors clustered at the firm level. The outcome variable is a dummy scoring one if firm exits the market in year t. The main independent variable is the interaction between a dummy capturing the post-WTO accession and *POE*.

Table A8: Exit and MFN cut: Only POE vs Semi-POE.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS						
	Pr(Exit=1)						
Completely Private	0.064***	0.012	0.009	0.009	0.008	0.008	
	(0.003)	(0.016)	(0.015)	(0.015)	(0.014)	(0.015)	
Partially State Owned	0.041***	0.010	-0.021	-0.021	-0.020	-0.019	
	(0.003)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	
MFN Tariff Cut	-0.002***	-0.004*	-0.001	-0.001	-0.006***	-0.002	-0.002**
	(0.000)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Completely Private*MFN Tariff Cut	0.002***	0.017***	0.010***	0.010***	0.011***	0.010***	0.004***
	(0.000)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Partially State Owned**MFN Tariff Cut	0.002***	0.013***	0.008***	0.008***	0.008***	0.007***	-0.000
	(0.000)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-0.064***	-0.079***	0.821***	2.471***	1.082***	-241.679	
	(0.002)	(0.008)	(0.050)	(0.372)	(0.122)	(1,094.366)	
Observations	226,050	217,163	216,594	216,594	217,163	216,594	202,798
R-squared	0.040	0.203	0.452	0.452	0.461	0.458	0.437
Controls	NO	NO	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES	YES	NO
Business control	NO	NO	NO	YES	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	YES	NO	NO
Trends	NO	NO	NO	NO	NO	YES	NO
Firm FE	NO	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regression with entropy balancing and standard errors clustered at the firm level. The outcome variable is a dummy scoring one if firm exits the market in year t. The main independent variable is the interaction between *MFN Tariff Cut* and *Only POE* and between *MFN Tariff Cut* and *Semi-POE*.

Table A9: Exit and MFN cut: Only locall SOEs.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS						
	Pr(Exit=1)						
POE	0.044***	-0.037	-0.091**	-0.091**	-0.087**	-0.089**	
	(0.006)	(0.044)	(0.042)	(0.042)	(0.039)	(0.042)	
MFN Tariff Cut	-0.002***	-0.005**	-0.001	-0.001	-0.005***	-0.002	-0.002**
	(0.000)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
POE*MFN Tariff Cut	0.002***	0.017***	0.008***	0.008***	0.009***	0.008***	0.002**
	(0.000)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-0.063***	-0.064	0.587***	2.338***	0.669***	0.723***	
	(0.007)	(0.046)	(0.063)	(0.399)	(0.045)	(0.055)	
Observations	222,812	213,990	213,429	213,429	213,990	213,429	199,616
R-squared	0.038	0.210	0.468	0.468	0.475	0.473	0.424
Controls	NO	NO	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES	YES	NO
Business control	NO	NO	NO	YES	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	YES	NO	NO
Trends	NO	NO	NO	NO	NO	YES	NO
Firm FE	NO	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regression with entropy balancing and standard errors clustered at the firm level. The outcome variable is a dummy scoring one if firm exits the market in year t. The main independent variable is the interaction between *MFN Tariff Cut* and *POE*.

Table A10: Exit and MFN cut: Only central SOEs.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS						
	Pr(Exit=1)						
POE	0.052***	0.020	0.003	0.003	0.003	0.004	
	(0.003)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	
MFN Tariff Cut	-0.002***	-0.004*	-0.001	-0.001	-0.005***	-0.002	-0.002**
	(0.000)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
POE*MFN Tariff Cut	0.002***	0.015***	0.009***	0.009***	0.009***	0.009***	0.002***
	(0.000)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-0.062***	-0.078***	0.820***	2.505***	1.081***	1.110***	
	(0.002)	(0.008)	(0.050)	(0.378)	(0.119)	(0.108)	
Observations	225,452	216,572	216,003	216,003	216,572	216,003	202,202
R-squared	0.038	0.204	0.454	0.454	0.462	0.459	0.434
Controls	NO	NO	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES	YES	NO
Business control	NO	NO	NO	YES	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	YES	NO	NO
Trends	NO	NO	NO	NO	NO	YES	NO
Firm FE	NO	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regression with entropy balancing and standard errors clustered at the firm level. The outcome variable is a dummy scoring one if firm exits the market in year t. The main independent variable is the interaction between *MFN Tariff Cut* and *POE*.

Table A11: Exit, MFN Tariff Cut, and Firm's Debt.

	(1)	(2)
	Weibull	
	Pr(Exit=1)	
POE	-0.702***	0.370
	(0.175)	(0.249)
MFN Tariff Cut	-0.027***	0.052**
	(0.010)	(0.026)
Firm Debt		1.011***
		(0.166)
POE*MFN Tariff Cut	0.040***	-0.068**
	(0.009)	(0.033)
POE*Firm Debt		-0.286*
		(0.160)
MFN Tariff Cut*Firm Debt		-0.065***
		(0.025)
POE*MFN Tariff Cut*Firm Debt		0.105***
		(0.030)
Constant	-12.711***	-4.585***
	(1.173)	(0.275)
Observations	216,594	128,119
Controls	YES	YES
Year FE	YES	YES
Industry FE	YES	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Weibull models with standard errors clustered at the firm level. The outcome variable is a dummy scoring one if firm exits the market in year *t*. In Model 1, the main independent variable is the interaction between *MFN Tariff Cut* and *POE*. In Model 2, the main independent variable is the interaction among *MFN Tariff Cut*, *POE*, and *Firm Debt*.

Table A12: Exit and MFN cut.

	(1)	(2)
	OLS	
	Pr(Exit=1)	
POE	0.052***	0.052***
	(0.013)	(0.013)
MFN Tariff Cut	-0.002	-0.002
	(0.002)	(0.002)
POE*MFN Tariff Cut	0.002*	0.002*
	(0.001)	(0.001)
Constant	0.075***	0.674***
	(0.028)	(0.202)
Observations	209,904	209,904
R-squared	0.085	0.085
Controls	YES	YES
Industry FE	YES	YES
Year FE	YES	YES
Balancing	YES	YES
Business control	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regression with propensity score matching and standard errors clustered at the firm level. The outcome variable is a dummy scoring one if firm exits the market in year t. The main independent variable is the interaction between *MFN Tariff Cut* and *POE*.

Table A13: Exit and MFN tariff cut.

	(1)
	OLS
	Pr(Exit=1)
POE	0.009
	(0.015)
MFN Tariff Cut	-0.003***
	(0.001)
POE*MFN Tariff Cut	0.008***
	(0.001)
Constant	0.338***
	(0.049)
Observations	217,163
R-squared	0.468
Controls	YES
Controls*Post-WTO	YES
Industry FE	YES
Year FE	YES
Balancing	YES
Robust standard errors in parentheses *** p<0.01	

Note: OLS regression with entropy balancing and standard errors clustered at the firm level. The outcome variable is a dummy scoring one if firm exits the market in year *t*. The main independent variable is the interaction between *MFN Tariff Cut* and *POE*. Each control is interacted with the post-WTO dummy.

Table A14: Firm Profitability and MFN tariff cut.

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS					
	Firm Profitability					
POE	-0.043***	-0.042***	-0.042	-0.044***	-0.043***	
	(0.010)	(0.010)	(0.355)	(0.010)	(0.011)	
MFN Tariff Cut	0.000	0.000	0.000	-0.002	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.000)
POE*MFN Tariff Cut	-0.002**	-0.002**	-0.002**	-0.002**	-0.002**	-0.001**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Observations	144,461	144,084	144,084	144,084	144,084	129,909
R-squared	0.176	0.204	0.204	0.253	0.218	0.641
Controls	NO	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Balancing	YES	YES	YES	YES	YES	YES
Business control	NO	NO	YES	NO	NO	NO
Industry-year FE	NO	NO	NO	YES	NO	NO
Trends	NO	NO	NO	NO	YES	NO
Firm FE	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regressions with entropy balancing and standard errors double-clustered at the industry and firm level. The outcome variable is firm profitability (measured as PCM). The main independent variable is the interaction between *MFN Tariff Cut* and *POE*.

Table A15: Firm Profitability and MFN tariff cut.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FracReg					OLS	
	Firm Profitability						
POE	-0.302***	-0.233*	-0.341**	-0.341**	-0.373***	-0.013	
	(0.040)	(0.135)	(0.139)	(0.139)	(0.128)	(0.008)	
MFN Tariff Cut	0.002	0.003	0.013	0.013	0.022**	0.001	0.001
	(0.002)	(0.007)	(0.009)	(0.009)	(0.009)	(0.001)	(0.000)
POE*MFN Tariff Cut	-0.008***	-0.013*	-0.014**	-0.014**	-0.018**	-0.001**	-0.001*
	(0.003)	(0.007)	(0.007)	(0.007)	(0.007)	(0.000)	(0.000)
Firm Profitability (lagged)	4.267***	3.838***	3.724***	3.724***	3.787***	0.428***	0.225***
	(0.108)	(0.258)	(0.255)	(0.255)	(0.229)	(0.030)	(0.023)
Constant	-3.518***	-3.656***	-3.179***	-3.088***	-3.349***	0.032***	
	(0.132)	(0.168)	(0.196)	(0.253)	(0.341)	(0.012)	
Observations	64,018	63,757	63,589	63,589	63,589	63,589	56,481
R-squared						0.343	0.572
Controls	NO	NO	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES	YES	NO
Business control	NO	NO	NO	YES	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	YES	NO	NO
Trends	NO	NO	NO	NO	NO	YES	NO
Firm FE	NO	NO	NO	YES	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Fractional outcome regressions (columns 1-5) and OLS regressions (columns 6-7) with robust standard errors clustered at the firm level. The outcome variable is firm profitability (measured as PCM). The main independent variable is the interaction between *MFN Tariff Cut* and *POE*. All the models include the lagged dependent variable.

Table A16: Firm Profitability and MFN tariff cut:.

	(1)	(2)	(3)	(4)	(5)	(6)
	GMM					
	Firm Profitability					
POE	-0.017***	-0.014	-0.010	-0.022	-0.014	-0.233
	(0.003)	(0.009)	(0.009)	(0.016)	(0.010)	(11.217)
MFN Tariff Cut	0.000*	0.001	0.002	-0.046	0.005	-0.017
	(0.000)	(0.000)	(0.002)	(0.028)	(0.014)	(0.947)
POE*MFN Tariff Cut	-0.000**	-0.001**	-0.003***	-0.001	-0.003***	0.016
	(0.000)	(0.000)	(0.001)	(0.002)	(0.001)	(0.893)
Firm Profitability (lagged)	0.199***	0.222***	0.248***	0.292***	0.240***	1.352
	(0.019)	(0.055)	(0.055)	(0.078)	(0.064)	(58.092)
Constant	0.064***	-0.126	0.000	42.228	0.000	0.000
	(0.022)	(0.404)	(0.000)	(85.657)	(0.000)	(0.000)
Observations	64,018	63,757	63,589	63,589	63,589	63,589
Number of instruments	103	103	103	103	103	103
Number of groups	30,608	30,552	30,465	30,465	30,465	30,465
Controls	NO	NO	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES	YES
Business control	NO	NO	YES	YES	YES	YES
Industry-year FE	NO	NO	NO	NO	YES	NO
Trends	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: GMM regressions with entropy balancing and standard errors clustered at the firm level. The outcome variable is firm profitability (measured as PCM). The main independent variable is the interaction between *MFN Tariff Cut* and *POE*. All the models include the lagged dependent variable.

Table A17: Firm Profitability and MFN tariff cut.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	OLS									
	Firm Profitability (first differences)									
MFN Tariff Cut	0.000	0.000	0.000	0.000	0.000	0.000	0.001**	0.001*	0.001***	0.001
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
POE*MFN Tariff Cut	-0.000**	-0.001*	-0.001**	-0.001**	-0.001**	-0.001*	-0.001***	-0.001**	-0.001**	-0.001*
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Constant	-0.005***	0.001	-0.001	-0.002	0.005***	0.007***	0.033***			0.057
	(0.001)	(0.005)	(0.001)	(0.002)	(0.001)	(0.002)	(0.012)			(4,442.783)
Observations	64,018	63,757	63,847	63,587	63,847	63,587	63,847	63,587	63,847	63,587
R-squared	0.002	0.003	0.011	0.012	0.011	0.012	0.019	0.041	0.013	0.029
Controls	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Business control	NO	NO	NO	NO	YES	YES	NO	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO
Trends	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regressions with entropy balancing and standard errors clustered at the firm level. The outcome variable is firm profitability (measured as PCM). The main independent variable is the interaction between *MFN Tariff Cut* and *POE*. All models include double-differenced variables.

Table A18: Firm Profitability and MFN Tariff Cut: Only POE vs Semi-POE.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FracReg					OLS	
	Firm Profitability						
Completely Private	-0.533***	-1.008***	-0.922***	-0.922***	-0.850***	-0.053***	
	(0.044)	(0.232)	(0.206)	(0.206)	(0.187)	(0.017)	
Partially State Owned	-0.489***	-0.813***	-0.845***	-0.845***	-0.840***	-0.051***	
	(0.043)	(0.173)	(0.178)	(0.178)	(0.182)	(0.015)	
MFN Tariff Cut	0.001	-0.047**	-0.031	-0.031	-0.011	-0.001	0.001
	(0.002)	(0.023)	(0.021)	(0.021)	(0.016)	(0.004)	(0.000)
Completely Private*MFN Tariff Cut	-0.003	-0.011	-0.023**	-0.023**	-0.023**	-0.002***	-0.001*
	(0.003)	(0.010)	(0.010)	(0.010)	(0.010)	(0.001)	(0.001)
Partially State Owned**MFN Tariff Cut	-0.009***	-0.010	-0.017*	-0.017*	-0.015	-0.001	-0.001**
	(0.003)	(0.010)	(0.010)	(0.010)	(0.011)	(0.001)	(0.000)
Constant	-1.077***	-1.488***	-0.568	0.009	1.559***		
	(0.018)	(0.171)	(0.401)	(0.367)	(0.494)		
Observations	144,479	140,425	140,055	140,055	140,055	140,055	125,746
R-squared						0.288	0.664
Controls	NO	NO	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES	YES	NO
Business control	NO	NO	NO	YES	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	YES	NO	NO
Trends	NO	NO	NO	NO	NO	YES	NO
Firm FE	NO	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Fractional outcome regressions (columns 1-5) and OLS regressions (columns 6-7) with robust standard errors clustered at the firm level. The outcome variable is firm profitability (measured as PCM). The main independent variable is the interaction between *MFN Tariff Cut* and *Only POE* and between *MFN Tariff Cut* and *Semi-POE*.

Table A19: Firm Profitability and MFN cut: Only local SOE.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FracReg					OLS	
	Firm Profitability						
POE	-0.433***	-0.214	-0.324	-0.358	-0.276	-0.013	
	(0.094)	(0.277)	(0.213)	(0.222)	(0.199)	(0.013)	
MFN Tariff Cut	0.001	-0.048	-0.025	-0.025	0.003	-0.002	0.000
	(0.002)	(0.029)	(0.022)	(0.022)	(0.017)	(0.004)	(0.000)
POE*MFN Tariff Cut	-0.007***	-0.004	-0.023***	-0.025***	-0.031***	-0.002***	-0.001
	(0.002)	(0.012)	(0.008)	(0.008)	(0.009)	(0.001)	(0.001)
Observations	141,937	137,918	137,556	137,556	137,556	137,556	123,236
R-squared						0.322	0.606
Controls	NO	NO	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES	YES	NO
Business control	NO	NO	NO	YES	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	YES	NO	NO
Trends	NO	NO	NO	NO	NO	YES	NO
Firm FE	NO	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Fractional outcome regressions (columns 1-5) and OLS regressions (columns 6-7) with robust standard errors clustered at the firm level. The outcome variable is firm profitability (measured as PCM). The main independent variable is the interaction between *MFN Tariff Cut* and *POE*.

Table A20: Firm Profitability and MFN cut: Only central SOE.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FracReg					OLS	
	Firm Profitability						
POE	-0.495***	-0.948***	-0.931***	-0.980***	-0.892***	-0.056***	
	(0.046)	(0.209)	(0.208)	(0.224)	(0.200)	(0.017)	
MFN Tariff Cut	0.002	-0.047**	-0.029	-0.029	-0.009	-0.001	0.001
	(0.002)	(0.023)	(0.022)	(0.022)	(0.016)	(0.004)	(0.000)
POE*MFN Tariff Cut	-0.008***	-0.011	-0.020**	-0.023**	-0.019*	-0.002**	-0.001**
	(0.003)	(0.010)	(0.010)	(0.010)	(0.010)	(0.001)	(0.000)
Constant	-1.080***	-1.455***	-0.498	0.043	1.646***		
	(0.018)	(0.165)	(0.405)	(0.371)	(0.507)		
Observations	144,012	139,964	139,594	139,594	139,594	139,594	125,281
R-squared						0.289	0.665
Controls	NO	NO	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES	YES	NO
Business control	NO	NO	NO	YES	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	YES	NO	NO
Trends	NO	NO	NO	NO	NO	YES	NO
Firm FE	NO	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Fractional outcome regressions (columns 1-5) and OLS regressions (columns 6-7) with robust standard errors clustered at the firm level. The outcome variable is firm profitability (measured as PCM). The main independent variable is the interaction between *MFN Tariff Cut* and *POE*.

Table A21: Firm Profitability and MFN tariff cut.

	(1)	(2)
	FracReg	
	Firm Profitability	
POE	-0.213***	-0.213***
	(0.057)	(0.057)
MFN Tariff Cut	-0.003	-0.003
	(0.006)	(0.006)
POE*MFN Tariff Cut	-0.004	-0.004
	(0.004)	(0.004)
Constant	-1.840***	-1.708***
	(0.132)	(0.132)
Observations	140,285	140,285
R-squared		
Controls	YES	YES
Industry FE	YES	YES
Year FE	YES	YES
Balancing	YES	YES
Business control	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Fractional outcome regressions with propensity score matching and standard errors clustered at the firm level. The outcome variable is firm profitability (measured as PCM). The main independent variable is the interaction between *MFN Tariff Cut* and *POE*.

Table A22: Firm Profitability and MFN tariff cut: fractional outcome regressions with controls interacted with the post-WTO dummy, entropy balancing and standard errors clustered at the firm level.

	(1)
	FracReg
	Firm Profitability
POE	-0.861***
	(0.188)
MFN Tariff Cut	-0.027**
	(0.012)
POE*MFN Tariff Cut	-0.019**
	(0.009)
Constant	-0.674**
	(0.296)
Observations	140,425
Controls	YES
Controls*Post-WTO	YES
Industry FE	YES
Year FE	YES
Balancing	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05

Note: Fractional outcome regression with entropy balancing and standard errors clustered at the firm level. The outcome variable is firm profitability (measured as PCM). The main independent variable is the interaction between *MFN Tariff Cut* and *POE*. Each control is interacted with the post-WTO dummy.

Table A23: Firm Profitability and MFN tariff cut.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	FracReg						OLS			
	Firm Profitability									
POE	-0.470***	-0.826***	-0.394***	-0.888***	-0.396***	-0.953***	-0.019***	-0.060**		
	(0.063)	(0.254)	(0.064)	(0.249)	(0.064)	(0.245)	(0.004)	(0.025)		
MFN Tariff Cut	0.001	-0.003	-0.000	0.015	-0.000	0.010	0.000	0.002	0.000	0.000
	(0.002)	(0.009)	(0.003)	(0.014)	(0.005)	(0.016)	(0.000)	(0.002)	(0.000)	(0.000)
Input Tariff Cut	-0.025	0.128	-0.010	-0.579	-0.142	-0.127	-0.023	-0.087	0.019	-0.018
	(0.319)	(2.865)	(0.315)	(2.291)	(0.434)	(2.425)	(0.027)	(0.231)	(0.024)	(0.117)
POE*MFN Tariff Cut	-0.004	-0.024**	-0.007**	-0.034***	-0.007*	-0.031**	-0.000	-0.002**	-0.001***	-0.001
	(0.003)	(0.011)	(0.003)	(0.012)	(0.004)	(0.013)	(0.000)	(0.001)	(0.000)	(0.000)
POE*Input Tariff Cut	1.070**	1.018	0.919**	1.322	0.892*	1.012	0.057*	0.182	-0.003	-0.059
	(0.426)	(2.766)	(0.416)	(2.191)	(0.503)	(2.264)	(0.031)	(0.230)	(0.029)	(0.114)
Constant	-1.008***	-1.153***	-0.932***	-0.919***	-1.104***	-0.810*	0.270***	0.314***		
	(0.027)	(0.249)	(0.051)	(0.245)	(0.090)	(0.415)	(0.007)	(0.027)		
Observations	65,724	65,720	65,496	65,496	65,496	65,496	65,496	65,496	57,932	57,932
Controls	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Business control	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	YES	YES	NO	NO	NO	NO
Trends	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO
Firm FE	YES	NO	NO	NO	NO	NO	NO	NO	YES	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Fractional outcome regressions (columns 1-5) and OLS regressions (columns 9-10) with robust standard errors clustered at the firm level. The outcome variable is firm profitability (measured as PCM). The main independent variable is the interaction between *MFN Tariff Cut* and *POE*. All the models include *Input Tariff Cut* and *POE*.

Table A24: TFP, SOE-dominated sectors, and MFN tariff cut (industry-level).

	(1)	(2)
	OLS	
	TFPR (first differences)	
SOE-dominated	-0.033	-0.033
	(0.067)	(0.067)
MFN Tariff Cut	0.011	0.011
	(0.013)	(0.013)
SOE-dominated*MFN Tariff Cut	-0.028*	-0.028*
	(0.015)	(0.015)
Constant	-0.153	-0.460*
	(0.144)	(0.251)
Observations	478	478
R-squared	0.571	0.571
Controls	YES	YES
Industry FE	YES	YES
Year FE	YES	YES
Balancing	YES	YES
Business control	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regression with entropy balancing and standard errors clustered by HS 4-digit. The outcome variable is firm productivity (measured as TFPR). The main independent variable is the interaction between *MFN Tariff Cut* and *SOE-dominated Sectors*. All models include double-differenced variables.

Table A25: TFP, SOE-dominated sectors, and MFN tariff cut (industry-level).

	(1)	(2)	(3)
		OLS	
		TFPR	
SOE-dominated	0.009	0.135	0.135
	(0.061)	(0.102)	(0.102)
MFN Tariff Cut	0.001	0.009	0.009
	(0.004)	(0.009)	(0.009)
SOE-dominated*MFN Tariff Cut	-0.013**	-0.018**	-0.018**
	(0.006)	(0.007)	(0.007)
TFPR (lagged)	0.304***	-0.098	-0.098
	(0.082)	(0.104)	(0.104)
Constant	-0.026	0.207	0.411
	(0.212)	(0.750)	(0.765)
Observations	480	480	480
R-squared	0.505	0.657	0.657
Controls	YES	YES	YES
Industry FE	YES	YES	YES
Year FE	YES	YES	YES
Balancing	NO	YES	YES
Business control	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regression with entropy balancing and standard errors clustered by HS 4-digit. The outcome variable is firm productivity (measured as TFPR). The main independent variable is the interaction between *MFN Tariff Cut* and *SOE-dominated Sectors*. All models include the lagged dependent variable.

Table A26: TFP, SOE-dominated sectors, and MFN tariff cut (industry-level).

	(1)	(2)	(3)
		GMM	
		TFPR	
SOE-dominated	1.425	0.121	0.062
	(0.897)	(0.095)	(0.391)
MFN Tariff Cut	0.005	0.002	-0.002
	(0.004)	(0.009)	(0.009)
SOE-dominated*MFN Tariff Cut	-0.010**	-0.015***	-0.014***
	(0.004)	(0.005)	(0.006)
TFPR (lagged)	0.064	-0.165	-0.234*
	(0.088)	(0.131)	(0.122)
Constant	0.000	0.000	1.187**
	(0.000)	(0.000)	(0.602)
Observations	480	480	480
Number of isic3	95	95	95
Controls	YES	YES	YES
Industry FE	YES	YES	YES
Year FE	YES	YES	YES
Balancing	NO	YES	YES
Business control	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: GMM regression with entropy balancing and standard errors clustered by HS 4-digit.. The outcome variable is firm productivity (measured as TFPR). The main independent variable is the interaction between *MFN Tariff Cut* and *SOE-dominated Sectors*. All models include the lagged dependent variable.

Table A27: TFP, SOE Labor Share, and MFN tariff cut (industry-level).

	(1)	(2)	(3)
	OLS		
	TFPR		
SOE-dominated (share)	0.566***	0.566***	0.601**
	(0.197)	(0.197)	(0.246)
MFN Tariff Cut	0.024***	0.024***	0.014
	(0.005)	(0.005)	(0.012)
SOE-dominated*MFN Tariff Cut	-0.035***	-0.035***	-0.029*
	(0.008)	(0.008)	(0.015)
Constant	-0.252	-18.995**	-1.058
	(0.905)	(8.266)	(1.046)
Observations	620	620	620
R-squared	0.660	0.660	0.719
Controls	YES	YES	YES
Industry FE	YES	YES	YES
Year FE	YES	YES	YES
Balancing	YES	YES	YES
Business control	NO	YES	NO
Trends	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regression with entropy balancing and standard errors clustered by HS 4-digit. The outcome variable is firm productivity (measured as TFPR). The main independent variable is the interaction between *MFN Tariff Cut* and *SOE Labor Share*.

Table A28: TFP, SOE-dominated sectors, and MFN tariff cut (industry-level).

	(1)
	OLS
	TFPR
SOE-dominated	0.184**
	(0.081)
MFN Tariff Cut	0.021***
	(0.005)
SOE-dominated*MFN Tariff Cut	-0.030***
	(0.003)
Constant	-1.054
	(1.069)
Observations	620
R-squared	0.709
Controls	YES
Controls*Post-WTO	YES
Industry FE	YES
Year FE	YES
Balancing	YES
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1	

Note: OLS regression with entropy balancing and standard errors clustered by HS 4-digit. The outcome variable is firm productivity (measured as TFPR). The main independent variable is the interaction between *MFN Tariff Cut* and *SOE-dominated Sectors*. Each control is interacted with the post-WTO dummy.

Table A29: TFP, SOE-dominated sectors, and MFN tariff cut (industry-level).

	(1)	(2)
	OLS	
	TFPR	
SOE-dominated	0.171	0.171
	(0.109)	(0.109)
MFN Tariff Cut	-0.001	-0.001
	(0.010)	(0.010)
SOE-dominated*MFN Tariff Cut	-0.018*	-0.018*
	(0.009)	(0.009)
Constant	-0.374	-40.244
	(0.865)	(23.698)
Observations	109	109
R-squared	0.717	0.717
Controls	YES	YES
Industry FE	YES	YES
Year FE	YES	YES
PSM	YES	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regression with propensity score matching and standard errors clustered by HS 4-digit. The outcome variable is firm productivity (measured as TFPR). The main independent variable is the interaction between *MFN Tariff Cut* and *SOE-dominated Sectors*.

Table A30: Exit, MFN tariff cuts, Market Concentration.

	(1)	(2)	(3)	(4)
	OLS			
	Pr(Exit==1)			
MFN Tariff Cut	-0.000	-0.001**	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)
HHI	0.022***	0.019***	0.019***	0.024***
	(0.004)	(0.004)	(0.004)	(0.005)
MFN Tariff Cut*HHI	0.003**	0.002*	0.002*	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.006	0.037***	0.210**	-20.012**
	(0.004)	(0.011)	(0.094)	(8.026)
Observations	99,339	96,668	96,668	96,668
R-squared	0.016	0.041	0.041	0.042
Controls	NO	YES	YES	YES
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Business control	NO	NO	YES	YES
Trends	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regressions with standard errors clustered at the firm level. The outcome variable is a dummy scoring one if firm exits the market in year t. The main independent variable is the interaction between *MFN Tariff Cut* and *HHI*. The sample includes only POEs.

Table A31: Exit, MFN tariff cuts, Market Concentration.

	(1)	(2)	(3)	(4)
	OLS			
	Pr(Exit==1)			
MFN Tariff Cut	0.000	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
HHI	0.020	0.025	0.025	0.029
	(0.026)	(0.026)	(0.026)	(0.026)
MFN Tariff Cut*HHI	-0.001	-0.001	-0.001	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)
Constant	-0.010	-0.009	0.511	-14.602
	(0.006)	(0.044)	(0.348)	(16.469)
Observations	2,150	2,116	2,116	2,116
R-squared	0.057	0.079	0.079	0.084
Controls	NO	YES	YES	YES
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Business control	NO	NO	YES	YES
Trends	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regressions with standard errors clustered at the firm level. The outcome variable is a dummy scoring one if firm exits the market in year t. The main independent variable is the interaction between *MFN Tariff Cut* and *HHI*. The sample includes only SOEs.

Table A32: POE vs. SOE: entry and MFN tariff cuts.

	(1)	(2)	(4)	(5)	(6)
	OLS				
	Pr(Entry=1)				
POE	-0.004	-0.020	-0.020	-0.011	-0.018
	(0.021)	(0.018)	(0.018)	(0.018)	(0.018)
MFN Tariff Cut	-0.004**	-0.004**	-0.004**	-0.004***	-0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
POE*MFN Tariff Cut	0.013***	0.007***	0.007***	0.006***	0.007***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.922***	1.858***	-6.234***	2.139***	-2.407
	(0.009)	(0.048)	(0.393)	(0.124)	(234.023)
Observations	217,163	216,594	216,594	217,163	216,594
R-squared	0.290	0.497	0.497	0.511	0.506
Controls	NO	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Balancing	YES	YES	YES	YES	YES
Business control	NO	NO	YES	NO	NO
Industry-year FE	NO	NO	NO	YES	NO
Trends	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regressions with entropy balancing and standard errors clustered at the firm level. The outcome variable is a dummy scoring one if firm entries the market in year t. The main independent variable is the interaction between *MFN Tariff Cut* and *POE*.

Table A33: Exit, Firm Debt, and Interest Rate.

	(1)	(2)
	OLS	
	Pr(Exit=1)	Interest Rate
POE	0.053***	-0.004
	(0.006)	(0.002)
MFN Tariff Cut	0.002	-0.001***
	(0.002)	(0.0001)
Firm Debt	0.023	
	(0.015)	
POE*MFN Tariff Cut	-0.002	0.001***
	(0.002)	(0.0001)
POE*Firm Debt	0.054***	
	(0.015)	
MFN Tariff Cut*Firm Debt	-0.005	
	(0.003)	
POE*MFN Tariff Cut*Firm Debt	0.008**	
	(0.003)	
Constant	0.052*	0.0003
	(0.028)	(0.006)
Observations	128,119	78,737
R-squared	0.097	0.043
Controls	YES	YES
Industry FE	YES	YES
Year FE	YES	YES
Balancing	YES	NO
Trends	YES	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regressions with entropy balancing and standard errors clustered at the firm level. In Model 1, the outcome variable is a dummy scoring one if firm entries the market in year t and the main independent variable is the interaction between *MFN Tariff Cut*, *POE*, and *Firm Debt*. In Model 2, the outcome variable captures interest rate and the main independent variable is the interaction between *MFN Tariff Cut* and *POE*.

Table A34: Firm profitability and MFN tariff cuts in industries with SOEs and POEs.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FracReg					OLS	
	Firm Profitability						
POE	-0.507***	-0.805***	-0.794***	-0.794***	-0.843***	-0.044***	
	(0.043)	(0.184)	(0.189)	(0.189)	(0.189)	(0.015)	
MFN Tariff Cut	0.002	-0.009	-0.006	-0.006	-0.004	0.001	0.001
	(0.002)	(0.011)	(0.014)	(0.014)	(0.015)	(0.002)	(0.000)
POE*MFN Tariff Cut	-0.008***	-0.019**	-0.024***	-0.024***	-0.022**	-0.002***	-0.001***
	(0.003)	(0.008)	(0.008)	(0.008)	(0.010)	(0.001)	(0.000)
Constant	-1.082***	-1.122***	-0.828***	-0.534***	0.734	0.376***	
	(0.018)	(0.151)	(0.223)	(0.196)	(0.488)	(0.033)	
Observations	143,920	143,915	143,538	143,538	143,538	143,538	129,358
R-squared						0.219	0.645
Controls	NO	NO	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES	YES	NO
Business control	NO	NO	NO	YES	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	YES	NO	NO
Trends	NO	NO	NO	NO	NO	YES	NO
Firm FE	YES	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Fractional outcome regressions (columns 1-5) and OLS regressions (columns 6-7) with robust standard errors clustered at the firm level. The outcome variable is firm profitability (measured as PCM). The main independent variable is the interaction between *MFN Tariff Cut* and *POE*. The sample excludes *SOE-dominated Sector*.

A4. Main Results Including Switching Firms

Table A35: POE vs. SOE: exit and MFN tariff cuts.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS						
	Pr(Exit=1)						
POE	0.050***	0.026**	0.029***	0.029***	0.030***	0.029***	
	(0.003)	(0.011)	(0.011)	(0.011)	(0.010)	(0.010)	
MFN Tariff Cut	-0.002***	-0.003***	-0.003**	-0.003**	-0.003*	-0.003**	-0.003**
	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
POE*MFN Tariff Cut	0.002***	0.004***	0.004***	0.004***	0.004***	0.004***	0.002***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-0.053***	-0.058***	0.086	0.423	0.165**	0.163**	
	(0.002)	(0.005)	(0.066)	(0.263)	(0.075)	(0.081)	
Observations	240,354	227,775	227,775	227,775	227,775	227,775	227,775
R-squared	0.038	0.043	0.095	0.095	0.104	0.104	0.204
Controls	NO	NO	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES	YES	YES
Business control	NO	NO	NO	YES	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	YES	NO	NO
Trends	NO	NO	NO	NO	NO	YES	NO
Firm FE	NO	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regressions with standard errors clustered at the firm level. The outcome variable is a dummy scoring one if firm exits the market in year *t*. The main independent variable is the interaction between *MFN Tariff Cut* and *POE*. The sample includes firms that switch from POEs to SOEs and vice versa.

Table A36: POE vs. SOE: Firm profitability and MFN tariff cuts

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FracReg					OLS	
	Firm Profitability						
POE	-0.156***	0.059	-0.044	-0.044	-0.078	-0.018	
	(0.048)	(0.099)	(0.091)	(0.091)	(0.091)	(0.018)	
MFN Tariff Cut	0.010	0.032**	0.022*	0.022*	0.015	0.003	0.003
	(0.007)	(0.014)	(0.013)	(0.013)	(0.015)	(0.003)	(0.003)
POE*MFN Tariff Cut	-0.011	-0.042***	-0.031**	-0.031**	-0.024**	-0.005*	-0.005*
	(0.007)	(0.014)	(0.013)	(0.013)	(0.012)	(0.003)	(0.003)
Constant	-0.211*	-0.418**	-1.214***	-1.288***	-1.051***	48.547	
	(0.123)	(0.204)	(0.249)	(0.255)	(0.255)	(35.502)	
Observations	67,210	67,209	67,209	67,209	67,209	67,209	67,209
R-squared						0.247	0.317
Controls	NO	NO	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Balancing	NO	YES	YES	YES	YES	YES	YES
Business control	NO	NO	NO	YES	NO	NO	NO
Industry-year FE	NO	NO	NO	NO	YES	NO	NO
Trends	NO	NO	NO	NO	NO	YES	NO
Firm FE	YES	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Fractional outcome regressions (columns 1-5) and OLS regressions (columns 6-7) with robust standard errors clustered at the firm level. The outcome variable is firm profitability (measured as PCM). The main independent variable is the interaction between *MFN Tariff Cut* and *POE*. The sample includes firms that switch from POEs to SOEs and vice versa.

Table A37: TFPR, MFN tariff cuts, and SOE-dominated Sectors.

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS					
	TFPR			Olley&Pakes		
SOE dominated	0.067	0.122	0.122	0.126	0.057	0.057
	(0.073)	(0.074)	(0.074)	(0.074)	(0.058)	(0.058)
MFN Tariff Cut	0.007*	0.010	0.010	0.007**	0.013*	0.013*
	(0.004)	(0.007)	(0.007)	(0.003)	(0.008)	(0.008)
SOE dominated*MFN Tariff Cut	-0.011**	-0.016**	-0.016**	-0.011**	-0.020**	-0.020**
	(0.004)	(0.007)	(0.007)	(0.004)	(0.008)	(0.008)
Constant	-0.558	0.073	-19.594***	-0.611	-0.160**	-0.301
	(0.331)	(0.762)	(6.097)	(0.847)	(0.073)	(0.199)
Observations	632	632	632	632	632	632
R-squared	0.368	0.594	0.594	0.649	0.416	0.416
Controls	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Balancing	YES	YES	YES	YES	YES	YES
Business control	NO	YES	NO	NO	NO	NO
Trends	NO	NO	YES	NO	NO	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS regressions with standard errors clustered by HS 4-digit The outcome variables are *TFPR* and *Olley & Pakes*. The main independent variable is the interaction between *MFN Tariff Cut* and *SOE-dominated Sector*. The sample includes firms that switch from POEs to SOEs and vice versa.