Export Markets and Long-Run Industry Adjustment: State, Private, and Foreign Firms in Vietnam*

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Abstract

We investigate the long-run impacts of trade policy on manufacturing firms in the presence of foreign investment and a large state-owned sector in a low-income country, Vietnam. We find that reductions in U.S. tariffs on imports from Vietnam, as mandated by the 2001 U.S.-Vietnam Bilateral Trade Agreement, caused an immediate surge in Vietnamese exports which flattens out in the medium run but continues to grow. The U.S. tariff reductions are associated with an increase in industry size, as measured by number of firms, employment, and revenue. While the number of foreign and domestic private firms responds immediately, state firms have a delayed response. Within industries, employment shares shift strongly to new entrants in response to tariff cuts. Counter to the predictions of stylized heterogeneous firm trade models, we find that tariff cuts lead to disproportional increases in employment shares of entrants over incumbents. In addition, firm-type matters as tariff cuts favorably impact employment share of foreign firms over private domestic firms, with no net response by state-owned enterprises. The growth in employment share among entrants is predominantly due to foreign entrants.

Keywords: trade liberalization, exporting, firm dynamics, Vietnam, resource allocation

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1 Introduction

Over recent decades, low- and middle-income countries have become increasingly integrated into global markets, through reductions in trade barriers and inflows of foreign direct investment (FDI), including the growth of export platforms. Developing countries have experienced a remarkable growth in FDI, receiving majority of global FDI inflows during this time period (UNCTAD, 2014). This FDI, which is primarily greenfield, has potential implications for technology transfers, productivity, and job creation in host countries. Firms in low-income countries also often operate in distorted markets, which influences the allocation of resources across firms and potentially leads to large reductions in aggregate productivity (Hsieh and Klenow, 2009; Atkin and Khandelwal, 2019). One commonly cited source of misallocation is the presence of politically connected firms, such as state-owned enterprises (SOEs).

Consequently, more evidence is needed on how trade policy interacts with FDI and other firm types in developing countries. In the presence of politically-connected firms, there is currently no consensus in the literature on how trade reforms affect the allocation of employment, market share, and industry productivity (Atkin *et al.*, 2019; Atkin and Khandelwal, 2019). At the same time, several recent trade agreements, including the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), explicitly include provisions targeting subsidies to SOEs. In addition, there is an ongoing debate on the responsiveness of FDI and value added trade/fragmentation of production to trade agreements (Yi, 2003; Feinberg and Keane, 2006, 2009; Johnson and Noguera, 2017).

In this paper, we investigate the effects of trade policy, namely the 2001 US-Vietnam Bilateral Trade Agreement (the BTA), on firm performance in a low-income country, Vietnam. The BTA induced a large, positive export demand shock for Vietnamese firms (Figure 1). The primary policy change in the agreement was a decline in US tariffs on Vietnamese exports.

Our study makes several contributions. First, our study differentiates between the effects of trade policy on foreign-invested enterprises (FIEs) and private domestic firms (PRIs). This is particularly important in low-income countries with a large state sector, where politically unconnected domestic firms might be credit constrained and face other barriers to operation

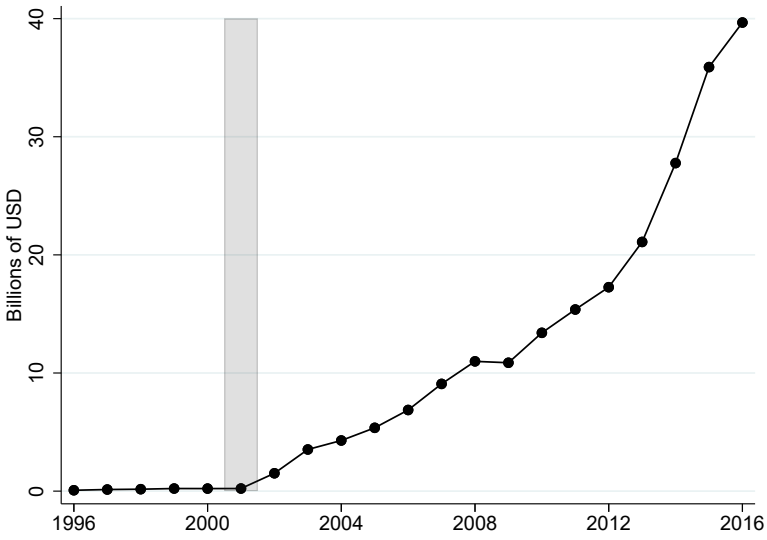


Figure 1: Value of Vietnamese manufacturing exports to the U.S., 1996 to 2016

Note: The year the BTA was implemented, 2001, is highlighted.

relative to SOEs. SOEs may be associated with distortions induced by preferential access to inputs for the state sector or entry barriers (Mishra, 2011; Khandelwal *et al.*, 2013; Pincus, 2015; Baccini *et al.*, 2019; Brandt *et al.*, 2019). Such preferential treatment might artificially lower the operating costs of SOEs relative to private domestic firms, leading to lower productivity SOEs taking market share from more productive firms. Likewise, entry barriers might reduce competition. The distortions could therefore influence the response of firm and industry outcomes to a trade policy change (Bai *et al.*, 2019; Berthou *et al.*, 2019; Baqaee and Farhi, 2019). Importantly, our data captures firms of all firm ownership types, regardless of their size in the registered formal manufacturing sector in Vietnam.[1] This enables us not just to track the responses of large incumbents or exporters, but to comprehensively examine the effects of trade policy on all registered firms.[2]

Second, we investigate the longer term impact of a one-time trade policy reform on firms, spanning a period of 17 years from 2000 to 2017.[3] Longer run responses to trade policy could

[1]See McCaig and Pavcnik (2018) for a discussion of the reallocation of workers from the informal microenterprise sector to the formal registered sector in response to increased market access through the BTA.

[2]For example, Brandt *et al.* (2017) focuses on all Chinese state-owned industrial firms and non-state-owned firms who have more than 5 million RMB worth of sales. Khandelwal *et al.* (2013) focus on exporters.

[3]We also digitized industry-firm-type data from 1995 forwards to better control for pre-existing industry or firm-type secular trends.

differ from shorter-term ones due to slow capital adjustments or if firms, especially those with no political connections, face adjustment frictions (Dix-Carneiro and Kovak, 2017). In addition, as governments try to reduce the overall size of the state sector, the state could cherry pick which SOEs to restructure versus which SOEs to close or privatize (Hsieh and Song, 2015; Song *et al.*, 2011).

Third, we can comprehensively track and study the cumulative effects of trade policy on incumbents, entry, and exit by firm type. Our period of analysis features a period of large FIE entry and sizeable decline in SOE sector (Figure 2). FIE employment expanded from 22 percent in 2000 to 58 percent in 2017 (356 thousand employees to 3.9 million), while the number of FIEs more than quadrupled. Similarly, PRIs also grew from 33 to 39 percent, expanding from 522 thousand to 2.7 million employees. At the start of our sample, Vietnam had a large state sector within manufacturing, but market and input shares gradually declined. In 2000, SOEs accounted for 45 percent of employment in formal manufacturing in Vietnam (712 thousand employees), but this fell continually over time to about 3 percent of employment (212 thousand employees). The reallocation of economic activity from SOEs to FIEs and PRIs could have important implications for aggregate productivity in Vietnamese manufacturing. Our setting enables us to examine the effects of trade policy over a period that starts off with a higher presence of SOEs than in other studies (Khandelwal *et al.*, 2013; Hsieh and Song, 2015; Brandt *et al.*, 2017; Baccini *et al.*, 2019; Brandt *et al.*, 2019).

Our results suggest that the BTA contributed to an expansion of the formal manufacturing sector in Vietnam, consistent with McCaig and Pavcnik (2018), accompanied with the relative contraction of PRIs, expansion of FIEs, and no change in market share of SOEs in response to tariff cuts. At the industry level, firm count, revenue, and employment grew more quickly in industries that experienced greater U.S. tariff reductions in the five years after the BTA. The magnitude of these effects further increases in the medium term, about six years after. The dynamics of changing industry size is consistent with predictions of neoclassical trade models, as resources and revenue allocate toward industries experiencing greater declines in variable export costs, and with the magnifying effects from trade liberalization over time (Dix-Carneiro and Kovak, 2017).

We find important differences in the response of industry outcomes across firm types,

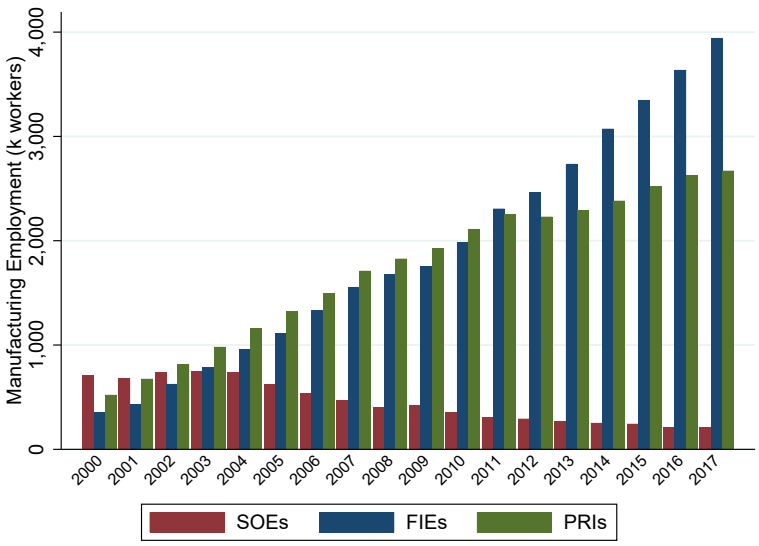


Figure 2: Vietnamese manufacturing employment by ownership type, 2000 to 2017

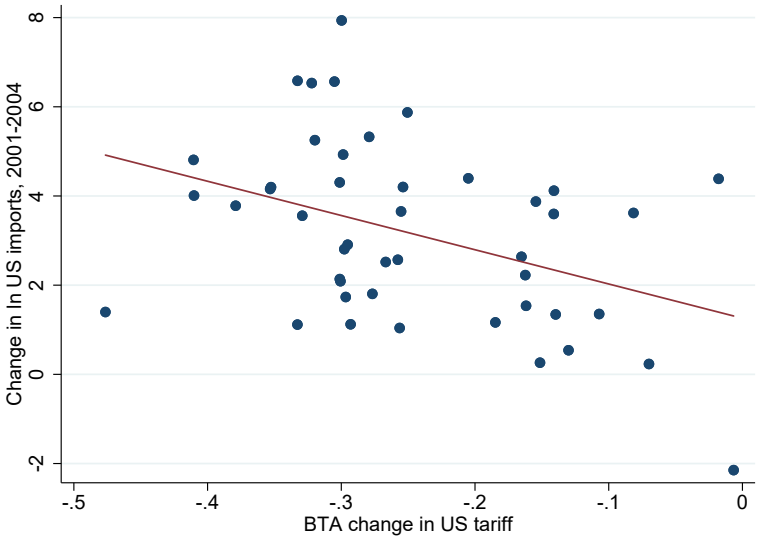


Figure 3: Growth of Vietnamese manufacturing exports to the U.S. versus BTA tariff changes by industry

Note: Each point represents a 3-digit ISIC revision 3 industry.

suggesting that these firm types face different market incentives. The growth of industries with larger tariff cuts was mostly due to FIEs. FIEs are a key contributor to the increases in industry-level firm count, employment, and revenue in response to tariff cuts and the magnitude of these effects increases over time. The dynamics of the tariff effects differ for

PRIs and SOEs. While PRIs are the main driver of the initial increase in firm count, the cumulative effect of the BTA tapers off three years following the agreement. On the other hand, SOEs in industries with bigger tariff cuts observe no change in firm count in 8-10 years after the BTA, but the relative number of SOEs increases with tariff cuts thereafter. This reflects slower decline in SOEs because SOEs exit industries with higher tariff cuts by less than industries with lower cuts. This delayed response of SOEs in terms of firm count (and employment and revenue) is consistent with delayed adjustments to trade reform either due to political connections or due to slow adjustments of capital (Dix-Carneiro and Kovak, 2017).

Finally, BTA-induced tariff reductions change the allocation of employment within industries. Counter to the predictions of stylized heterogeneous firm trade models, we find that tariff cuts lead to disproportional increases in employment shares of entrants over incumbents. Firm-type matters as tariff cuts favorably impact employment share of FIEs over PRIs, with no net response by SOEs. The growth in employment share among entrants is mainly driven by FIE entrants. This is consistent with the responsiveness of gross and value-added exports between countries to the signing of a regional trade agreement (Johnson and Noguera, 2017), suggestive of a link with MNCs supply chains. Interestingly, part of the reason why tariff cuts are not associated with the reallocation of employment through exit is that while lower tariff cuts are associated with drops in market share for exiting FIEs and PRIs (but the latter effects are noisy), they are actually associated with increased within-industry market share due to exit of SOEs. This is due to the fact that SOEs experience less exits in industries with higher tariff cuts than in less affected industries.

Our analysis contributes to the literature on the impact of FDI in low- and middle-income countries. This literature has predominantly focused on spillovers from foreign firms to domestic firms (Harrison and Rodríguez-Clare, 2010; Poole, 2013; Bajgar and Javorcik, 2019), the aggregate effects of foreign direct investment on growth (Hansen and Rand, 2006), or whether FDI jobs are "good" jobs (Javorcik, 2015). Aitken and Harrison (1999) and Alfaro and Chen (2018) examine the positive productivity effects of selection and market reallocation between foreign and domestic firms, but not in the context of trade policy changes. Our results suggest that increased foreign market access may be an important

mechanism for promoting foreign direct investment in developing countries, partially due to the growth of export platforms (Tintelnot, 2017).

Another strand of literature focuses on determinants of FDI entry or acquisition, highlighting the role of selection (Arnold and Javorcik, 2009; Guadalupe *et al.*, 2012) and financial constraints factors (Alfaro and Chen, 2018). Part of this literature examines the role of bilateral tax treaties for FDI entry (Blonigen *et al.*, 2014) and FDI and tariffs/trade agreements (Feinberg and Keane, 2006, 2009). We examine the effects of trade policy on FDI entry and allocation of resources and market share within industries in the host country. Previous literature highlights the endogeneity of trade policy and FDI in this setting (Blanchard, 2007; Blanchard and Matschke, 2015; Blanchard *et al.*, 2017). In our setting, the unique nature of the BTA allows us to overcome concerns about the endogeneity of trade policy and FDI (as discussed in Section 2.1). The agreement lowered U.S. tariffs on imports from Vietnam by moving from one pre-existing tariff schedule, Column 2, to another, Most Favored Nation (MFN). Hence, neither U.S. nor Vietnamese industries had an opportunity to negotiate over industry-specific tariff reductions (McCaig, 2011). Importantly, the tariff reductions are not correlated with contemporaneous export demand shocks, export supply shocks, or pre-existing export growth trends (McCaig and Pavcnik, 2018). However, the variation in U.S. tariff reductions across industries is strongly correlated with growth of Vietnamese industry exports to the U.S. (Figure 3).

Our research also contributes to an emerging literature on firm performance and trade in the presence of politically connected firms. There is currently no consensus in the literature whether trade reforms raise or reduce industry efficiency in this context (Atkin *et al.*, 2019; Atkin and Khandelwal, 2019). On one hand, trade reforms can reduce SOE's export market shares by providing new market access to efficient but constrained FIEs and PRIs who are not politically connected (Khandelwal *et al.*, 2013). Khandelwal *et al.* (2013) find that SOE exporters in China lose export market share when export quotas on clothing and textiles are removed due to the end of the Agreement on Textiles and Clothing. On the other hand, others find that SOEs are not subject to the same competitive pressures due to increased import competition. Brandt *et al.* (2017) find that SOEs in China are not more likely to exit in response to domestic tariff reductions as part of WTO accession. Within Vietnam, Baccini

et al. (2019) find that SOEs do not exit in response to WTO accession tariff reductions, whereas non-state firms do, and productivity increases in response to WTO accession are greater in industries dominated by non-state firms.[4] Our analysis focuses on the effects of increased market access rather than increased import competition. Additionally, our data captures the responses of registered firms of all sizes over a long period, which enables us to capture (cumulative) effects on firm entry and exit dynamics due to potentially delayed capital adjustment documented in Dix-Carneiro and Kovak (2017). As discussed above, this turns out to matter.

Our work also relates to the emerging quantitative literature on trade and misallocation (Bai *et al.*, 2019; Berthou *et al.*, 2019) and more generally on misallocation (Hsieh and Klenow, 2009; Baqaee and Farhi, 2019).[5] In particular, we examine one potentially important dimension of misallocation, firm type, and how it interacts with new export opportunities. Given that distortions are often unobserved, it is difficult to disentangle distortions empirically. Although we, like the existing literature, cannot observe firm-specific distortions, we observe three distinct firm types and we find evidence that these firm-types respond differently to BTA-induced tariff cuts. Our evidence is suggestive that these distortions interact with trade policy, influencing industry outcomes.

Many low- and middle-income countries have a large state-owned sector. Studies on China find that SOEs may be less subject to competitive pressures if they receive subsidized inputs or are protected by entry barriers and thus may survive even if they are less productive than other firms (Song *et al.*, 2011; Wen, 2019; Brandt *et al.*, 2019; Hsieh and Klenow, 2009). As governments try to reduce the overall size of the state sector, the state could cherry pick which SOEs to restructure versus which SOEs to close or privatize (Hsieh and Song, 2015; Song *et al.*, 2011). Changing market conditions to due trade policy may influence which industries experience SOE restructuring and or privatization. Our results suggest that the

[4] Ha *et al.* (2016) report that misallocation of resources did not diminish following WTO accession within Vietnam.

[5] Bai *et al.* (2019) evaluates how firm-level revenue distortions change the impact of trade on productivity and welfare, and how much trade has contributed to Chinese growth in a decomposition exercise. Berthou *et al.* (2019) investigates the impact of trade on aggregate welfare and productivity for 14 European countries by focusing on marginal cost-level distortions that are correlated with productivity. Baqaee and Farhi (2019) investigates the macroeconomic impact of microeconomic shocks and boils it down into a "pure technology effect" and a "resource reallocation effect."

shrinking of the SOE sector (based on pre-BTA ownership) was not influenced by the BTA (although we find slower reallocation of the employment share through exit of SOEs in industries that experience higher tariff cuts), noting the composition of firms within the SOE sector could be changing in response.[6]

Lastly, our research is related to studies of structural change (see, for example, McMillan *et al.* (2014)). Our results suggest the BTA increased employment in Vietnam's formal manufacturing sector. This likely contributed to an increase in aggregate productivity as labor productivity in overall manufacturing was more than twice the aggregate labor productivity in 2000 (McCaig and Pavcnik, 2013) and formal manufacturing is much more productive than informal manufacturing in Vietnam (McCaig and Pavcnik, 2018).

We provide a detailed discussion of the BTA in section 2. In section 3, we summarize a conceptual framework and describe the data in section 4. Subsequently, we present the empirical methodology and results in section 5. Section 6 concludes.

2 U.S.-Vietnam Bilateral Trade Agreement

2.1 Background

Trade and investment relations between the United States and Vietnam have a fairly unique history. Following the U.S.-Vietnam War, the U.S. imposed a trade embargo on Vietnam. This lasted until 1994 when diplomatic relations were restored. However, Vietnamese exports were subject to the high Column 2 U.S. tariffs, which apply to countries without normal trade relations status with the U.S. These tariff rates are punitively high on many goods. The primary trade policy element of the 2001 U.S.-Vietnam Bilateral Trade Agreement (henceforth, BTA) was to reclassify Vietnamese exports from Column 2 to the Most Favored Nation (MFN) or Normal Trade Relations (NTR) tariff schedule.

The unique nature of the BTA makes it an excellent change in trade policy for evaluating the causal impacts of improved foreign market access. First, as described in STAR-Vietnam (2003) and McCaig (2011), the BTA featured a large reduction in U.S. tariffs on imports from

[6] In work in progress, we're further exploring the role of SOE privatization.

Vietnam, but negligible reductions in Vietnamese tariffs on imports from the U.S. Prior to the BTA, Vietnam already offered Most Favored Nation (MFN) tariffs on imports from the U.S., whereas the U.S. applied Column 2 tariffs to imports from Vietnam. When the BTA was implemented on December 10th, 2001, the U.S. immediately switched to applying MFN tariffs on imports from Vietnam.[7] Thus, the U.S. tariff reductions are less likely to suffer from conventional concerns about tariff reductions being endogenous to industry lobbying, either in the U.S. or Vietnam. Indeed, the U.S. tariff cuts occurred through the movement from one pre-existing tariff schedule, Column 2, which originated with the Tariff Act of 1930 (Pregelj, 2001) and remained very stable before and after the BTA (McCaig, 2011), to another pre-existing tariff schedule, the MFN tariff schedule, which was negotiated among World Trade Organization member in 1995. Hence, the tariff cuts were presented as one package without room for negotiating over tariff reductions for specific industries.

A second key feature of the BTA is that the tariff reductions within manufacturing were large, on average, and varied across industries. We use ad valorem equivalents of the Column 2 and MFN tariff rates that prevailed in 2001 when the BTA was implemented, as calculated by McCaig (2011).[8] Across 119 traded manufacturing industries at the 4-digit level, the average tariff reduction was 29.0 percentage points, from 31.9 to 2.9 percentage points. The average reduction hides significant variation across industries. The standard deviation of industry tariff reductions is 15.6 percentage points, ranging from no tariff reduction in coke oven products to a 63.0 percentage point reduction in watches and clocks. In addition, there is also significant variation in the sizes across these industries. Figure 4 is sorted by 2-digit industry employment in year 2000 and shows that the distribution of tariff cuts varies across initial employment. For example, the footwear industry was the largest employer (300,000

[7]The BTA required Vietnam to reduce import tariffs on approximately 250 (out of approximately 6000) 6-digit HS agricultural and manufactured food products. As these tariff cuts were small in comparison to the U.S. tariff cuts and only affected a relatively small number of products, we do not discuss them in detail. As part of the BTA, Vietnam was required to implement various regulatory and legal changes over a period of 10 years following the implementation of the BTA. These included commitments to improve market access in services such as banking and telecommunication, intellectual property rights, and protection of foreign direct investment (STAR-Vietnam, 2003).

[8]McCaig (2011) uses detailed information on U.S. tariffs for both of these tariff schedules from the U.S. International Trade Commission's online Tariff Information Center and computes the ad valorem equivalent of any specific tariffs. He then matches the tariff lines to industries by the concordance provided by the World Bank via the World Integrated Trade Solution database to construct industry-level tariffs according to 3-digit ISIC industry nomenclature. We follow the same procedure by 4-digit ISIC industries.

workers) but was subjected to a higher tariff cut compared to the smallest employer, the coke oven products industry (805 workers). Our empirical strategy relies on the variation in the size of tariff reductions across industries.

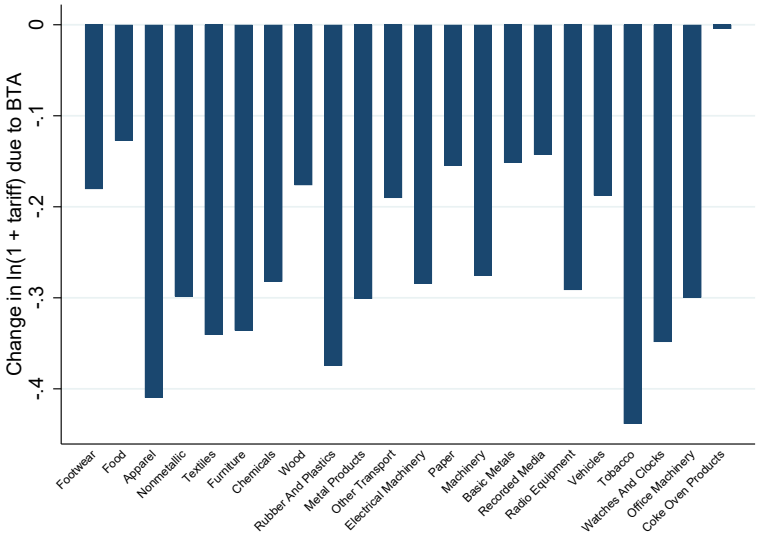


Figure 4: Tariff reductions due to the BTA

Note: 2-digit manufacturing industries are sorted by total employment in year 2000 (largest on the left and smallest on the right).

The U.S. tariff reductions had a large impact on Vietnamese exports to the U.S. (McCaig, 2011; McCaig and Pavcnik, 2018; Fukase, 2013). Figure 1 shows the dramatic break in trend of Vietnamese manufacturing exports to the U.S. immediately following the onset of the BTA. The U.S. quickly became the most important manufacturing export market, accounting for 26.1 percent of Vietnamese manufacturing exports by 2004. By value, the top industries of Vietnamese manufacturing exports to the U.S. in 2004 are wearing apparel; production, processing, and preservation of meat, fish, fruit, vegetables, oils and fats; knitted and crocheted fabrics and articles; footwear; and furniture. Together, these five industries accounted for 87.9 percent of manufacturing exports to the U.S. in 2004. Apparel alone accounted for 45.0 percent.[9]

[9]Upon implementation of the BTA, Vietnamese exports of apparel and textiles did not face any import quotas to the U.S. as Vietnam was not subject to the Multi-Fibre Agreement due to being outside of GATT and WTO. As exports of such items were very low under Column 2 tariffs additional quotas were not necessary. In July 2003 a bilateral textile agreement came into force, which imposed quotas on Vietnamese textile and apparel exports to the U.S.

The U.S. tariff reductions also influenced the composition across industries of Vietnamese manufacturing exports to the U.S. Figure 3 shows the relationship between growth in Vietnamese manufacturing exports to the U.S. between 2001 and 2004 and BTA induced tariff changes across 2-digit ISIC industries. There is a clear negative relationship: Vietnamese industries that experienced the largest decrease in U.S. tariffs saw exports to the U.S. rise more rapidly. McCaig and Pavcnik (2018) document that this pattern of industry export growth was not due to global demand shocks.

Previous work by McCaig and Pavcnik (2018) has shown that the BTA tariff reductions are not correlated with industry levels or trends. For example, the tariff reductions are not strongly correlated with the skilled labor intensity of an industry or the share of informal sector workers within the industry prior to the BTA.

Thus, the BTA represents an excellent empirical setting. The tariff reductions had a large impact on aggregate exports, induced more rapid export growth in industries that experienced greater tariff cuts, were not subject to industry lobbying, and are uncorrelated with pre-existing trends and levels.

2.2 State-owned enterprises prior to the BTA

The pace of SOE reform has been gradual. Reforms throughout the late 1980s and 1990s were centred around improving the incentives faced by SOEs. These included the introduction of a profit-based accounting system, shifting from a quantity to profit targets, providing managers with greater autonomy over inputs and prices, the elimination of direct subsidies, allowing SOEs to form joint ventures, and removing restrictions on importing and exporting rights (cite Van Arkadie and Mallon 2004 Viet Nam - A Transition Tiger). Despite these reforms, the government consistently maintained that the state sector would play a leading role in the Vietnamese economy.

In the early 1990s there was a period of rapid liquidation and mergers among mostly locally owned, small SOEs, followed by little such activity for the rest of the 1990s. Despite the reforms, liquidations, and mergers in the 1990s, remaining SOEs were less efficient than non-state enterprises and a process of equitization, divestment, and mergers and acquisitions picked up paced in the early 2000s (cite World Bank, Vietnam Development Report 2012).

In the years leading up to the BTA, the number of SOEs within manufacturing fell slowly (Table 1).[10] Vietnam has two broad categories of SOEs, those owned by the national or central government and those owned by local governments, typically provinces, but sometimes lower administrative levels as well. The fall in the number of SOEs in the years prior to the BTA is largely due to a reduction in the number of local SOEs as the number of central SOEs remained essentially unchanged.

Table 1: Number of manufacturing enterprises, 1997 to 2001

Ownership	1997	1998	1999	2000	2001
Foreign	654	865	940	1048	1425
SOEs	1645	1619	1581	1429	1340
Central SOEs	506	520	523	483	505
Local SOEs	1139	1099	1058	916	835

Source: Various annual statistical yearbooks produced by the General Statistical Office of Vietnam

2.3 Foreign-invested enterprises prior to the BTA

Very shortly after the onset of *Doi Moi* in 1986, Vietnam passed its first law on foreign investment in 1987 and it allowed for three types of foreign investment: business cooperation contracts, joint ventures, and wholly owned foreign firms (cite: Athukorala and Tien, 2012). A subsequent amendment in 1996 allowed for joint ventures with private partners and made it easier for projects to be licensed. In the second half of the 1990s, FDI became increasingly concentrated within manufacturing, despite a temporary slowdown during the Asian Financial Crisis. Following the slowdown, a further amendment in 2000 allowed for automatic registration of export-oriented FIEs as well as for more power for local governments to reduce administrative hurdles for FDI. In 2006, the unified Investment Law, which covered all enterprises, not just FIEs, offered foreign investors complete freedom in terms of entry mode (joint venture or full ownership) and abolished local content requirements and

[10]This data reported in Table 1 comes from a series of annual statistical yearbooks published by the General Statistical Office of Vietnam. The yearbooks contain some outcomes of interest at the 2-digit industry level and we are currently in process of digitizing this data. Future revisions will use this data for pre-BTA analysis.

export target requirements (cite: Athukorala and Tien, 2012).

As shown in Table 1, the number of FIEs in manufacturing was growing prior to the BTA. They were also growing in terms of their importance for exports. Between 1997 and 2000, their percentage of Vietnamese merchandise exports, excluding crude oil, grew from 17.1 to 22.9% (Vietnam Customs Handbook, 2017).

During this period, foreign investment was predominantly coming from East Asia. Based on the 982 manufacturing FIEs in 2000 that we can match with source country funding, the most common sources of funding are Taiwan (34.2%), Japan (15.4%), South Korea (12.9%), and Singapore (6.5%). Most of this foreign investment is going into wholly-owned foreign enterprises. In 2000, 67% of FIEs were wholly owned (699 firms), while 26% were joint ventures with SOEs (271 firms) and the remaining 7% were joint ventures with PRIs (75 firms). By 2017, 93% of FIEs were wholly owned (7,542), only 1% were joint ventures with SOEs (88 firms), and 6% were joint ventures with PRIs (483 firms).

The BTA made no sector specific changes to FDI investment within manufacturing. However, the BTA did have some provisions related to foreign investment. Government screening of foreign investment was to be eliminated, the removal by 2006 of all trade-related investment measures that are inconsistent with the WTO, such as local content requirements, and the removal of export performance requirements (cite CRS Report for Congress RL30416). Many of these requirements were accomplished with the unified Investment Law that came into force in 2006.

2.4 Other significant changes in trade policy

Given the long period covered in our analysis, it is worth briefly describing some of the other significant changes in trade policy during this period. We restrict our focus to episodes of either large domestic trade policy changes or those involving Vietnam's most important trading partners.

Domestic trade liberalization: Vietnam became a member of ASEAN in July 1995. As part of ASEAN's Common Effective Preferential Tariff scheme for the ASEAN Free Trade Area, Vietnam began reducing tariff applied to ASEAN members. As a member of ASEAN, Vietnam became a member of two subsequent trade agreements between ASEAN and China

and ASEAN and Japan.[11] Vietnam also joined the World Trade Organization (WTO) in January 2007. Vietnam's accession agreement mandated the reduction of Vietnam's Most Favored Nation (MFN) tariffs over time.

Figure 5 shows the average manufacturing tariff applied by Vietnam to ASEAN members, China, Japan, and the overall MFN tariff rate. Tariffs on ASEAN members fall rapidly between 2001 and 2007. Liberalization with China begins in 2007 and extends to about 2015. WTO mandated tariff reductions begin in 2007 and are largely completed by 2013. Tariffs on imports from Japan start to fall relative to MFN rates in 2012.

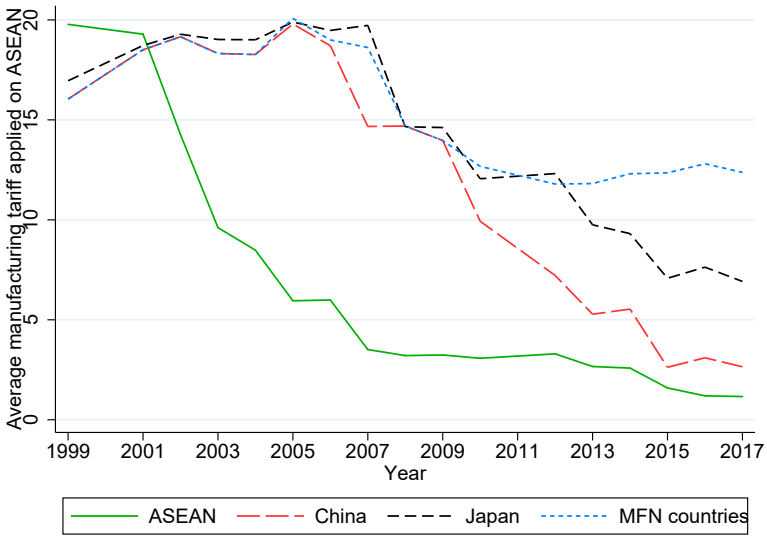


Figure 5: Average manufacturing tariff applied on ASEAN

Note: The average is a simple average over industry tariffs reported by 4-digit ISIC revision 3 industries. The industry tariffs were sourced from the World Integrated Trade Solution database and are themselves simple averages of the effectively applied HS product tariffs.

Figures 6 through 9 shows Vietnam's various tariff reductions against the BTA-mandated US tariff reductions. The patterns consistently show that the US tariff reductions are not strongly correlated with various episodes of domestic trade liberalization within Vietnam during this time. The most strongly correlated episode is Vietnam's reductions of tariffs applied to imports from China.

Changes in foreign market access: Figure 10 displays the average manufacturing

[11] ASEAN also signed important trade agreements with India and South Korea. However, we focus the discussion on Vietnam's most important trading partners.

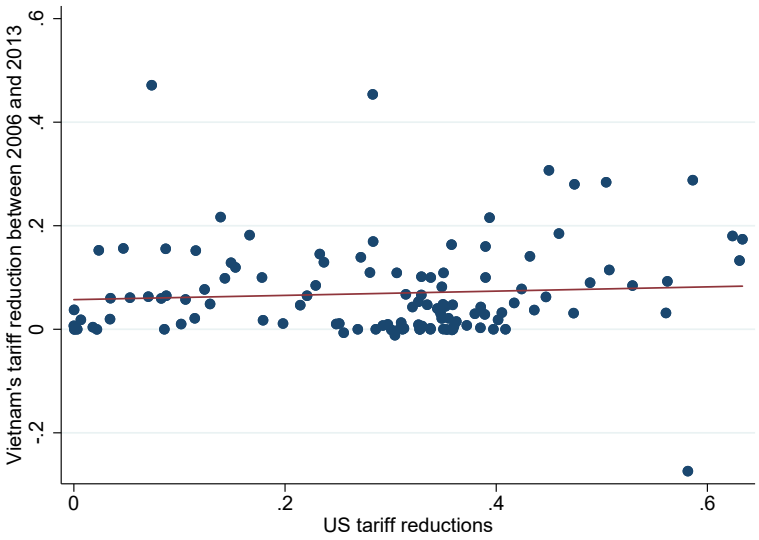


Figure 6: Vietnamese tariff reductions and US tariff reductions

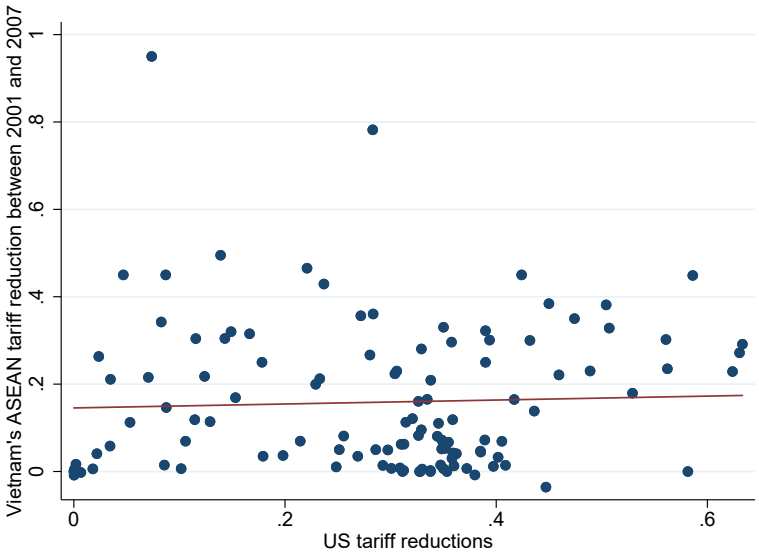


Figure 7: Vietnamese tariffs against ASEAN reductions and US tariff reductions

tariffs faced by Vietnamese exports to China, the EU, and Japan. The tariffs applied by the EU and Japan were low throughout this period. In contrast, China's tariffs applied against Vietnam fell due to a combination of reductions in its MFN tariffs following WTO accession and reductions negotiated as part of the ASEAN-China trade agreement. Figure 11 demonstrates that Chinese tariff reductions on Vietnam between 2000 and 2010 are mildly positively correlated with the US BTA tariff reductions.

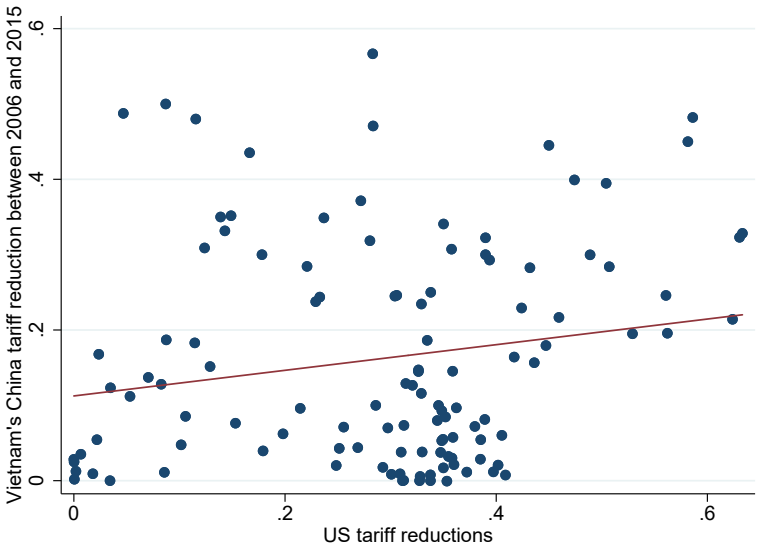


Figure 8: Vietnamese tariffs against China reductions and US tariff reductions

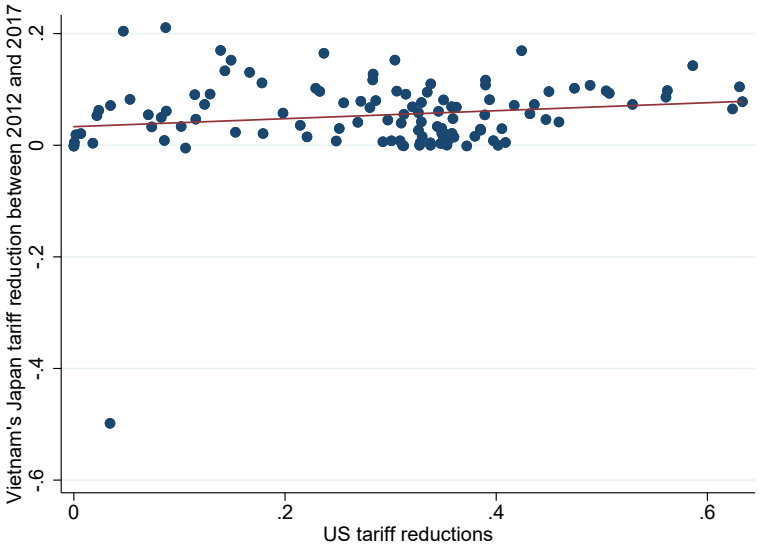


Figure 9: Vietnamese tariffs against Japan reductions and US tariff reductions

3 Conceptual Framework

The primary change in trade policy due to the BTA was a reduction in U.S. tariffs applied to imports from Vietnam. We briefly describe why these tariff reductions could affect the performance and survival probability of existing firms and the entry decision of new firms. We begin with a discussion that focuses on one dimension of heterogeneity, productivity, and then extend it to include differences across firms based on firm ownership (SOEs, FIEs,

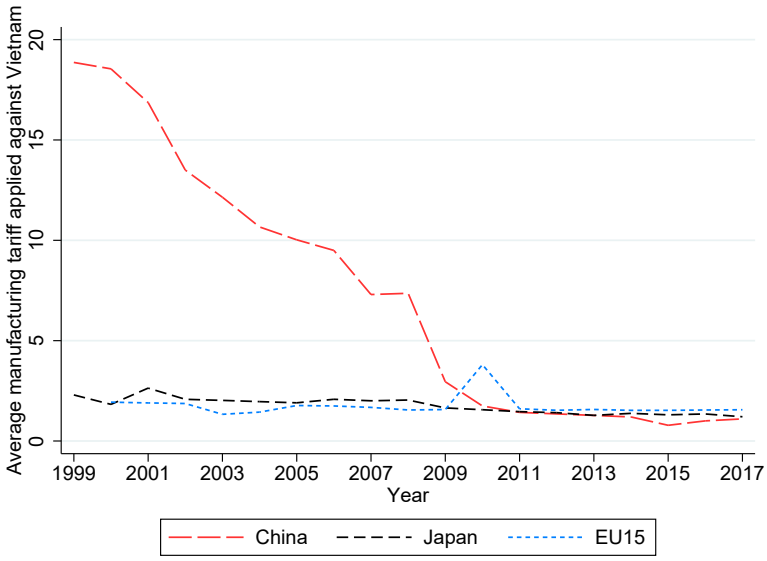


Figure 10: Average manufacturing tariff applied against Vietnam

Note: The average is a simple average over industry tariffs reported by 4-digit ISIC revision 3 industries. The industry tariffs were sourced from the World Integrated Trade Solution database and are themselves simple averages of the effectively applied HS product tariffs.

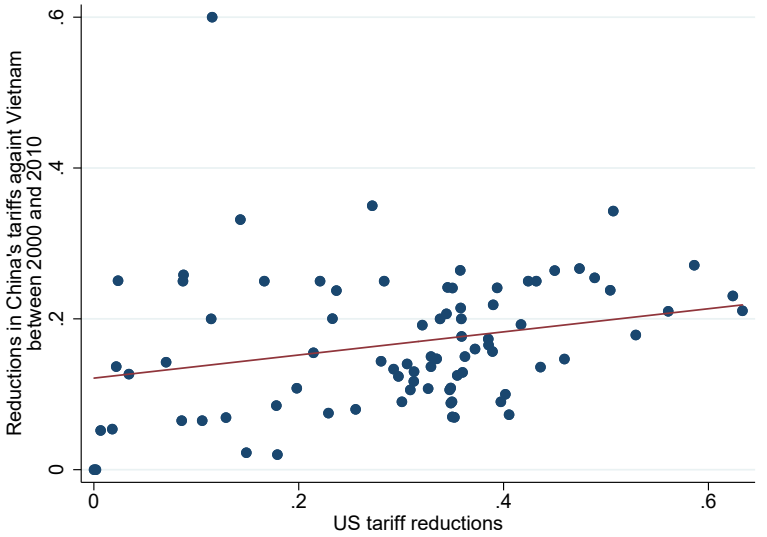


Figure 11: Reductions in Chinese tariffs against Vietnam versus US tariff reductions

and PRI firms), some of which are more likely to be politically connected and thus subject to distortions.[12]

A reduction in U.S. tariffs on imports from Vietnam will increase product and labor

[12]In future work we will formally model the implications of distortions in the allocation of resources according to firm ownership.

demand in industries that received tariff reductions. If firms exhibit heterogeneity in their productivity within an industry, lower tariffs are predicted to increase employment and output in the most productive firms (Melitz, 2003; Mrázová and Neary, 2013). Existing exporters expand and some lower-productivity firms can also enter the export market because with lower tariffs they have sufficiently high variable profits from exporting to cover the fixed cost of exporting. Additionally, the entry and exit cutoff, that is, the lowest productivity level associated with positive operating profits, rises due to the increasing cost of labor. Lower productivity firms will exit and higher productivity is required for a successful entry. In aggregate, the composition of the industry shifts to more productive firms.[13] Thus, tariff-induced expansion of industry revenue and employment is expected to be dominated by high-productivity incumbent firms, increased exit, and less entry. Productivity of new entrants (exiters) is expected to exceed the productivity of entrants (exiters) in cohorts prior to the BTA. These predictions serve as the basis for our empirical approach in section 5.

Two additional issues need to be considered. First, the above predictions might be altered in a setting where firms are politically connected. Many low- and middle-income countries feature a prominent state-owned sector in manufacturing (see, for example, Hsieh and Klenow (2009) for China), which may be associated with distortions induced by preferential access to inputs for the state sector or entry barriers (Mobarak and Purbasari, 2006; Mishra, 2011; Khandelwal *et al.*, 2013; Pincus, 2015; Brandt *et al.*, 2019).[14] Such preferential treatment might artificially lower marginal costs of politically connected firms or keep them protected from new entrants.

In the presence of these politically-connected SOE firms, there is currently no consensus in the literature whether trade reforms raise or reduce industry efficiency (Atkin *et al.*, 2019; Atkin and Khandelwal, 2019). On one hand, trade reforms can reduce SOE's export market shares by providing new market access to efficient but constrained PRIs who are not politically connected (Khandelwal *et al.*, 2013). On the other, connected firms can be

[13] Mrázová and Neary (2013) show that the selection effects in Melitz style models are very robust to functional form assumptions and market structure, requiring supermodularity of the profit function in marginal production costs and market access costs (export).

[14] Khandelwal *et al.* (2013) demonstrate that state firms in China received preferential access to export quotas while Mobarak and Purbasari (2006) finds that politically connected firms in Indonesia are more likely to receive import licenses for raw materials relative to their competitors.

protected from rising import competition (Brandt *et al.*, 2017; Baccini *et al.*, 2019) or in the context of increasing export market access they may be the only ones to benefit due to preferential access to inputs or entry barriers. As such, overall less productive SOEs with artificially lower marginal costs will push out relatively more productive PRIs without preferential treatment and result in a less efficient allocation of firms in the economy.

Second, low-income countries provide attractive locations for export platform FIEs to take advantage of the lower wages. In fact, foreign firms are much more likely to be engaged in exporting than either SOEs or PRIs in Vietnam. In 2000, 73% of FIEs reported positive exports as compared to 32% of SOEs and 16% of PRIs. Conditional on positive exports, both FIEs and PRIs have a high share of firms that are very intensively involved in exporting as over 45% of exporting FIEs and over 60% of exporting PRIs report exports worth more than 95% of revenue. The high export intensity is similar to patterns in China (Lu, 2010; Dai *et al.*, 2016) and for FIEs is suggestive of multinational corporations using Vietnam as an export platform. These firms have access to foreign technology and on average are more productive than both the SOEs and private firms. In addition, FIEs might not face some of the same constraints as domestic firms in factor markets. For example, FIEs have access to international credit markets.

Although FIEs may not be directly competing with domestic firms in the domestic product market, due selling mostly into export markets, they are still competing for workers with domestic-oriented firms.[15] In this setting, increased market access of a host country to an export destination can increase the number of export platforms in that country, which can additionally crowd out some of the production of the less productive firms (Tintelnot, 2017). This results in an increase in the average productivity of the host country.[16]

In our setting, this raises two interesting questions: First, how do trade policy reforms

[15]For example, McCaig (2011) finds that the BTA is associated with an increase in wages. If export-oriented firms are competing for labor, the increased labor demand within these firms increases the labor costs for domestic-market oriented firms. This discussion ignores frictions in the reallocation of labor across firms, but McCaig and Pavcnik (2018) find a strong within industry reallocation of workers from the informal microenterprise sector to the registered firms in response to the BTA, suggesting that the reallocation of labor at a more aggregate level is responsive to the BTA.

[16]Aitken and Harrison (1999) focuses on an alternative crowd out mechanism: that increases in foreign ownership negatively affect the productivity of wholly domestically owned firms in the same industry via a scale effect.

affect the entry of FIEs? And second, to the extent that FIEs entry increases due to tariff cuts, which domestic firms are crowded out, the SOEs or PRIs?

Given the presence of different firm types, a reduction in U.S. tariffs on imports from Vietnam will have slightly more nuanced predictions than in the simple model with only productivity heterogeneity. First, the entry cutoff will rise and second, export platform FDIs will enter. Existing FIEs with foreign technology are more productive overall (in Vietnam) and would crowd out some of the SOEs and private firms. As such, there would be a reallocation of market share towards FIEs particularly within industries with higher tariff cuts. Note that this reallocation would happen regardless of whether the SOEs are more politically connected and therefore have more favorable operating conditions compared to private firms. However, the tariff reduction would also allow for relatively more productive private firms to expand and export. This potentially creates two opposing effects: the first effect is that if the FIE crowds out more SOEs relative to private firms resulting in a more efficient allocation of firms compared to before the BTA; while the second effect is that FIE crowds out more private firms relative to SOEs, potentially resulting in an even less efficient allocation of firms compared to before the BTA. The first effect would result in a net efficiency gain from the BTA while the latter would result in the opposite.

This result is central to the recent and emerging quantitative literature on trade and misallocation which establishes that typical trade liberalization predictions are more nuanced in the presence of a variety of distortions. Distortions can mask a firm's true productivity—— a firm could be producing in the market not because it is inherently productive but because it is sufficiently subsidized. These highly subsidized firms will export and expand at the cost of other more productive but less subsidized firms. When the selection effect in the Melitz-type model is no longer based solely on productivity but instead productivity and distortions, trade may lower the average productivity of firms (Bai *et al.*, 2019; Berthou *et al.*, 2019; Baqaee and Farhi, 2019).[17]

[17]Bai *et al.* (2019) evaluates how firm-level revenue distortions change the impact of trade on productivity and welfare, and how much trade has contributed to Chinese growth in a decomposition exercise. Berthou *et al.* (2019) investigates the impact of trade on aggregate welfare and productivity for 14 European countries by focusing on marginal cost-level distortions that are correlated with productivity. Baqaee and Farhi (2019) investigates the macroeconomic impact of microeconomic shocks and boils it down into a "pure technology effect" and a "resource reallocation effect."

Conventional trade theory also suggests that the relative size of industries should change in response to reductions in variable trade costs. In particular, industries that experienced the largest tariff reductions should grow in relative size compared to industries that received smaller tariff reductions. Industries that initially feature a large share of SOEs may be less responsive than other industries to changes in relative prices induced by changing variable export costs.

Our discussion of the conceptual framework highlights two main ideas. First, there should be a reallocation of output and inputs across firms within an industry in relation to firm productivity. The underlying conceptual framework also generates predictions regarding the productivity of entering and exiting firms, relative to the incumbents. Second, the extent of reallocation across firms may be influenced by firm ownership. As such, in our empirical analysis below, we test for differential effects across industries and ownership types within industries in response to the BTA.

4 Firm Data

The firm data come from the annual enterprise survey conducted by the General Statistics Office (GSO) of Vietnam. The survey covers all businesses in Vietnam registered as an enterprise according to the Enterprise Law.[18] All state, collective, and foreign businesses must register as an enterprise to legally operate in Vietnam. Private businesses, however, have the option of registering as a household business or as an enterprise. A private business is legally required to be registered as an enterprise if it has more than 10 workers or operates in more than one location, but this does not mean that all private enterprises have 10 or more workers. Indeed, many private enterprises have less than 10 workers. We use data for the years 2000 through 2017, which spans the date of implementation of the BTA and allows for a long-term analysis following the implementation of the BTA.

The data contain a number of features important for our study. First, the data allow us to track firms over time. This enables us to examine firm exit and entry, as well as changes in performance among continuing firms. Second, the ownership type of the firm is reported in

[18] See law No. 13-1999-QH10.

a manner that allows us to consistently categorize firms as state-owned enterprises, foreign-invested enterprises, or private domestic enterprises, including collectives. Hence, we can examine differential effects of the BTA by ownership. Third, the data contain information on the industry of operation, revenue, employment, and fixed assets of the firms. In the data appendix we provide additional detail on the sampling framework and preparation of the data for analysis.

We focus on firms in traded manufacturing industries, as indicated by the main industry of operation.[19] We have over 740,000 firm-year observations, with the number of firms growing from 10,285 in 2000 to over 85,000 in 2017 across 122 traded manufacturing industries at the 4-digit level. Table 2 presents the summary statistics of the different ownership types for years 2000 and 2010. In 2000, FIEs have highest average revenue and assets per firm followed by SOEs while PRIs have the lowest by several orders of magnitude. FIEs and SOEs employ more people compared to PRIs although there are many more PRI firms. The overall number of firms grows from 10,288 to 44,958 between 2000 and 2010, primarily due to an increase in private enterprises, but the number of foreign-invested firms increased by more than fourfold from 1,041 to 4,489, while the number of state-owned enterprises contracts from 1,536 to 682. SOEs in 2010 have the same number of employees on average as in 2000, but the amount of fixed assets has grown tremendously, especially relative to FIEs and PRIs. We can track 5,907 continuing firms between 2000 and 2010.

Figure 12 shows the density of productivity measures using a reference firm across ownership types in 2000 (top panel), prior to the implementation of the BTA, and after its implementation in 2010 (bottom panel). Productivity is highest among foreign-invested firms in year 2000, followed by state-owned and private firms. The distribution for foreign-invested firms is shifted to the right relative to the other two ownership categories. By 2010, we see that all firm types have become more productive. However, private firms have made the slowest progress while SOEs have made the fastest progress. In 2010, the distribution for remaining SOEs overlaps much more with distribution of remaining FIEs (bottom panel,

[19]The 2000 through 2010 data provide industry codes according to the 1993 Vietnam Standard Industrial Classification while the 2007 through 2017 data provide industry codes according to the 2007 Vietnam Standard Industrial Classification. We use the overlapping years to create a concordance and perform all analysis using the 1993 VSIC codes, which are identical to the International Standard Industrial Classification revision 3 within traded manufacturing.

Table 2: Summary Statistics: Years 2000 and 2010

Year 2000	FIEs	PRIs	SOEs	Total
Revenue	97,714	6,531	61,041	23,896
	(354,368)	(24,766)	(164,178)	(134,762)
Employment	342	68	464	155
	(1,024)	(259)	(764)	(517)
Fixed Assets	70,681	1,666	18,791	11,206
	(273,465)	(9,024)	(72,851)	(94,065)
Observations	1,041	7,711	1,536	10,288

Year 2010	FIEs	PRIs	SOEs	Total
Revenue	247,599	25,808	475,475	54,775
	(1200159)	(331,469)	(2691214)	(598,227)
Employment	441	52	469	97
	(1,643)	(214)	(746)	(578)
Fixed Assets	69,829	5,408	202,758	14,834
	(305,568)	(44,063)	(1667545)	(232,545)
Observations	4,489	39,787	682	44,958

Note: Revenue and Assets are measured in millions of Vietnamese Dong.

Figure 12).

Firm entry and exit played an important role over the period of the BTA. Table 3 reports the importance of entry and exit in the enterprise sector, overall, and for SOEs, FIEs and PRIs. Exiting firms are defined as firms that operated in 2000, but not in 2010. Likewise, entrants are defined as firms that operated in 2010, but did not operate in 2000. Over 65 percent of firms that operated in 2000 no longer operated by 2010, while over 90 percent of firms in 2010 were not in operation in 2000. Exiters and entrants not only account for a large share of firms, but also a sizable share of revenue and employment. In particular, entrants account for 68 percent of revenue and 73 percent of employment in 2010.

If all types of firms faced similar entry barriers and had similar underlying productivity distributions, the model of heterogeneous firms predicts similar entry and exit rates across different firm types. Yet, Table 3 suggests that entry and exit rates differ widely across SOEs, FIEs, and PRIs. Private domestic firms exhibit the highest entry and exit rates, 71 and 95 percent respectively. SOEs have notably higher exit rates, 55 vs. 33 percent, and

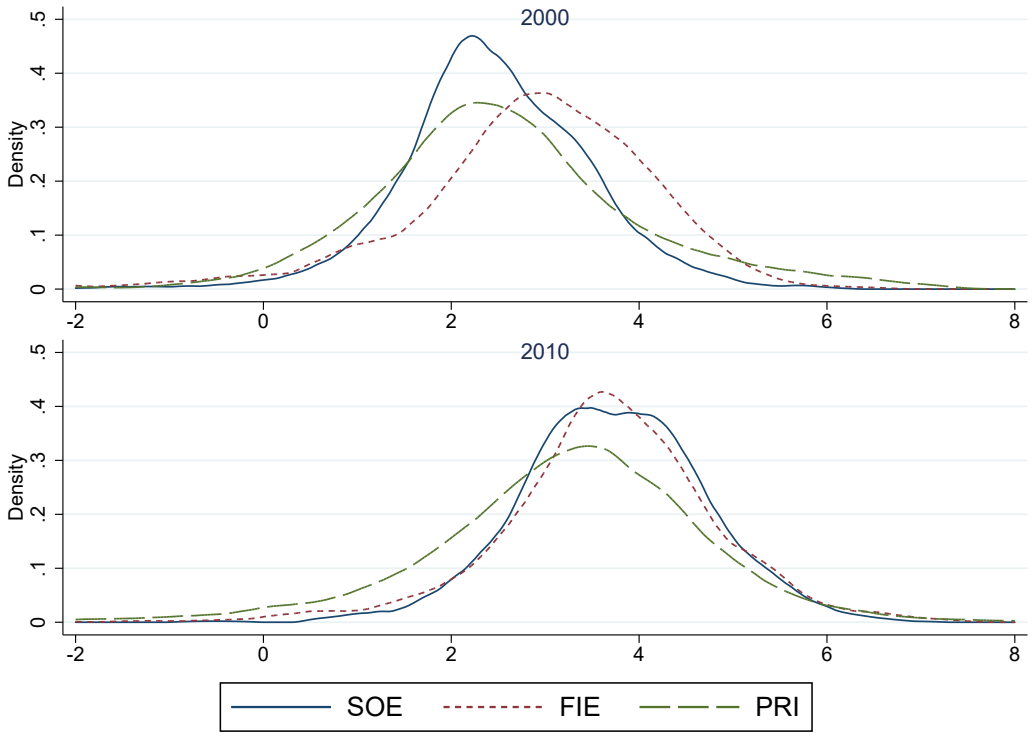


Figure 12: Productivity measure across ownership types and years

Table 3: Entry and Exit of Firms between 2000 and 2010

Share of	Firms	Revenue	Employment
	All ownership types		
Exiters	0.65	0.36	0.42
Entrants	0.92	0.68	0.73
	State-owned enterprises		
Exiters	0.55	0.42	0.44
Entrants	0.39	0.50	0.34
	Foreign-invested enterprises		
Exiters	0.33	0.20	0.21
Entrants	0.85	0.59	0.73
	Private domestic enterprises		
Exiters	0.71	0.56	0.54
Entrants	0.95	0.86	0.85

lower entry rates, 39 vs. 85 percent, compared to FIEs. The differences in entry and exit rates among the SOEs, relative to private firms and FDI firms, are consistent with differences in the fixed cost of entry and exit across firm types and with existence of distortions that

vary across firm types and affect a firm's choice of entry and exit. They are also consistent with a decline in the fixed cost of entry for FDI firms in the aftermath of the BTA. We plan to study the differential exit and entry patterns by firm type.

In future work, we plan to examine the entry margin for entry into exporting. In particular, we plan to examine whether a key prediction of the baseline heterogeneous firms model holds, namely whether new exporters are less productive than incumbent exporters.

5 Empirical Implementation

5.1 Research Design and Identification

Based on the conceptual framework and overview of the BTA, we begin our empirical analysis by investigating the relationship between the U.S. tariff reductions and industry-level outcomes in Vietnam's formal manufacturing sector. Our setting enables us to examine the evolution of industry outcomes in response to the BTA over a longer time period than is usually possible with firm-level data from low-income countries. We implement the analysis starting at the industry-level and then at the industry-firm ownership level. We estimate the following regression:

$$Y_{jt} = \sum_{t=2000\backslash 2001}^{2017} \beta_t \Delta BTA_j \mathbb{1}_t + \lambda_j + \theta_t + \alpha_t C_{jt} + \varepsilon_{jt} \tag{1}$$

where Y_{jt} is the outcome for industry j at year t, ΔBTA_j is the change in in log US tariff applied to VN exports in industry j before and after the BTA, indicator $\mathbb{1}_t$ equals one for year t, λ_j is an industry fixed effect, and θ_t is a year fixed effect. C_{jt} are industry-specific controls for other trade policy changes and include MFA quotas on Vietnamese exports, Chinese MFA quotas, and Vietnam's MFN import tariffs. Standard errors are clustered at the industry level. BTA implementation year 2001 is the base year for outcome changes and the key parameters of interest, β_t, capture the cumulative BTA impact on the outcome by each year t, relative to 2001.

The identification of the causal effect of U.S. tariff reductions on outcomes of interest in Vietnam consequently relies on the assumption that changes in U.S. tariffs are not correlated

with unobserved time-varying industry-level factors. In section 2.1, we discussed in detail the unique political economy of the BTA-induced U.S. tariff reductions. In particular, neither U.S. nor Vietnamese industries had an ability to influence the size of tariff reductions based on the movement of U.S. imports from Vietnam from one pre-existing tariff schedule, Column 2, to another, MFN. Furthermore, McCaig and Pavcnik (2018) show that the U.S. tariff cuts are not correlated with industry-specific global demand shocks for Vietnamese exports during this period nor with pre-existing industry-specific trends in Vietnamese exports to the U.S., E.U., or worldwide. Importantly, as shown in section 2, industry tariff changes are not correlated with baseline industry characteristics such as the industry prevalence of the SOEs or FDI firms.

In order to determine whether industry-specific pre-existing trends are influencing our results, we first conduct a placebo test that shows that tariff changes are not correlated with changes in outcomes of interest prior to the implementation of the agreement. Because firm-level data is only available starting in 2000, we have a short pre-BTA period. Consequently, we estimate equation (1) using UN Comtrade data for US imports from Vietnam using pre and post BTA data covering 1997 to 2010. The estimation is conducted at the 3-digit industry level and the coefficients on tariff change β_t are reported in Figure 13.[20] The estimates for years prior to 2001 confirm that the BTA induced tariff changes were not correlated with imports to the US prior to the implementation of the agreement. Those regression coefficients β_t are small in magnitude and statistically insignificant. However, positive and large estimates after 2001 suggest an immediate and large surge in US imports from Vietnam, which then flattens out but continues to grow over the medium run.

We find that Vietnamese industries subject to larger US tariff reductions expand relative to the industries with lower tariff cuts. The industry-level event study estimates of the coefficients on tariffs β_t from specification (1) are reported in figure 14 for three industry outcomes: log number of firms (Panel a), log employment (Panel b), and log revenue (Panel c). All the coefficients are positive and large in magnitude, suggesting that industries which experience

[20]We conduct the analysis at the 3-digit industry level because many 4-digit industries report no exports to the US prior to the BTA. We don't expect industry aggregation to change our qualitative findings. For example, our findings are in line with the results in McCaig and Pavcnik (2018), who conduct the analysis at the 2-digit industry level.

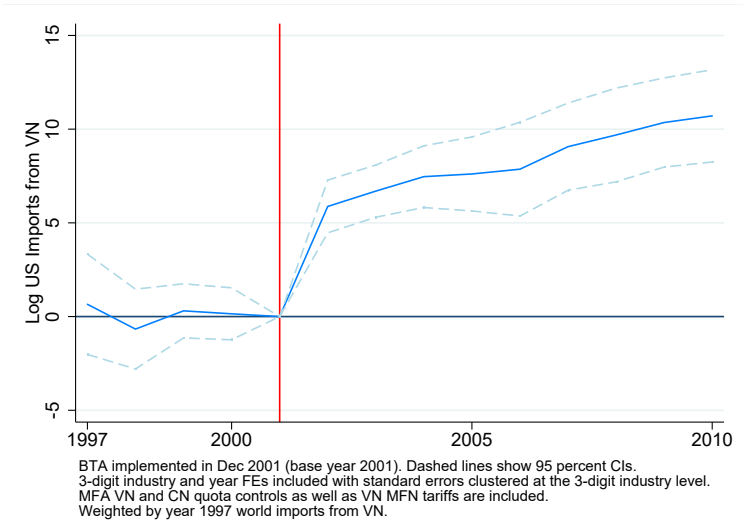
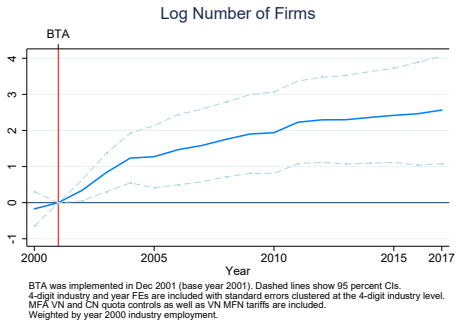


Figure 13: Changes in US imports from Vietnam due to BTA: 1997-2010
$IM_{jt} = \sum_{t=1997\setminus 2001}^{2010} \beta_t \Delta BTA_j \theta_t + \lambda_j + \theta_t + \alpha_{jt} C_{jt} + \varepsilon_{jt}$

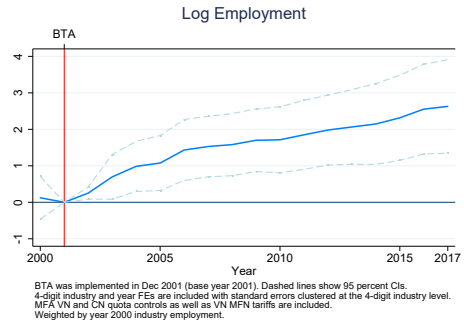
Note: BTA was implemented in Dec 2001. 3-digit industry and year FEs are included. Base year is 2001. Dashed lines show 95 percent confidence intervals. Standard errors clustered at the 3-digit industry level. Weighted by year 1997 world imports from Vietnam.

larger tariff cuts grew in firm count, employment, and revenue (albeit year-specific estimates of the effect on revenue are noisy). Even in cases where individual year-specific estimates are not statistically significant, tests reject the null that the post-BTA estimates are jointly statistically equal to zero. The magnitudes of the coefficients suggest that industry firm count and employment are more responsive to tariff cuts than industry revenue, foreshadowing the importance of firm dynamics along the entry and exit margin in the adjustment process.

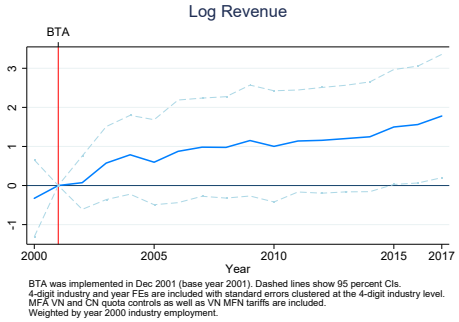
The estimates illustrate how the effects of a one-time decrease in tariffs evolve over time: for all three industry outcomes, the cumulative effects grow in magnitude over time for 5 to 6 years after the BTA, after which they accumulate more slowly, but continue to rise (firm count and employment) or begin to level off (revenue). These results are robust at more aggregated industry levels as well (appendix figures 21 and 22). Overall, the composition of industries changes consistently with predictions of the neoclassical trade models, as resources and revenue allocate toward industries experiencing greater declines in variable export costs.



(a) Firm Count



(b) Employment



(c) Revenue

Figure 14: Changes in industry-level outcomes due to BTA

Note: BTA was implemented in Dec 2001. 4-digit industry and year FEs are included. Base year is 2001. Dashed lines show 95 percent confidence intervals. Standard errors clustered at the 4-digit industry level. Weighted by year 2001 employment.

5.2 Industry and Firm-type Evidence

We find important differences in the response of absolute industry outcomes across firm ownership types. We estimate a version of equation (1) augmented to investigate differential impacts across firm ownership types o where $o \in \{FIE, SOE, PRI\}$:

$$Y_{jot} = \sum_{t'=2000 \setminus 2001}^{2017} \beta_{ot'} \Delta BTA_j \mathbb{1}_{t'} + \lambda_{oj} + \theta_{ot} + \alpha_t C_{jt} + \varepsilon_{jot} \tag{2}$$

where Y_{jot} is the outcome for firm type o in industry j at year t, ΔBTA_j is the change in US tariff applied to VN exports in industry j before and after the BTA, indicator $\mathbb{1}_{t'}$ equala one for year t', λ_{oj} is an industry-ownership fixed effect, and θ_{ot} is a year-ownership fixed effect. Inclusion of these firm-type year fixed effects controls for any firm-type specific secular

trends or government policies that might also contribute to the declining presence of SOEs and increases in PRI and SOEs displayed in Figure 2. C_{jt} are industry-specific controls for other trade policy changes and include MFA quotas on Vietnamese exports, Chinese MFA quotas, and Vietnam's MFN import tariffs. Standard errors are clustered at the industry level. As before, BTA implementation year 2001 is the base year for outcome changes and the key parameters of interest, $\beta_o t$ capture the cumulative BTA impact on the outcome by each firm ownership-year ot, relative to 2001.

We find that the industry expansion following tariff cuts is predominately driven by FIEs over private domestic firms and SOEs and is sustained over time. Figure 15 reports the estimates of the coefficients on tariffs, β_{ot}, for log number of firms for the three firm types. Figures 16 and 17 present the results for log employment and log revenue, respectively. Several interesting facts emerge. First, the FIEs are a key contributor to the increases in industry-level firm count, employment, and revenue, as the coefficient on tariffs for FIEs is always positive, largest in magnitude (with the exception of number of firms), and statistically significant. Second, FIEs are the only firm type for which the declines in industry tariffs are associated with increase in the firm count, accompanied by an increase in employment, and revenue throughout the time period. While the cumulative positive effect on number of FIE firms levels off 8 to 10 years after the BTA, the cumulative effects on FIE employment and revenue effects continue to grow over time, suggesting that employment and revenue growth move from extensive (firm entry) to extensive margin.

Third, the dynamics of the tariff effects differ for PRIs and SOEs. While the PRIs are the main driver of the initial increase in firm count in industries with larger tariff cuts, the cumulative effect tapers off three years following the agreement. On the other hand, SOEs in industries with bigger tariff cuts initially observe no change in firm count in response to tariff cuts in 8-10 years after the BTA, but the (relative) number of SOE firms in industries with bigger tariff cuts increases relative to number of SOEs in less affected industries starting at 8 to 10 years following the BTA.

Finally, compared to FIEs, PRIs experience smaller magnitude of the employment increase and no differential response in revenue in industries with larger tariff cuts. SOEs experience a steady (relative) increase in employment in industries with larger tariff cuts,

but the SOEs response is delayed relative to FIE response. Tariff reductions lead to SOE revenue increases, but the estimates are noisy.

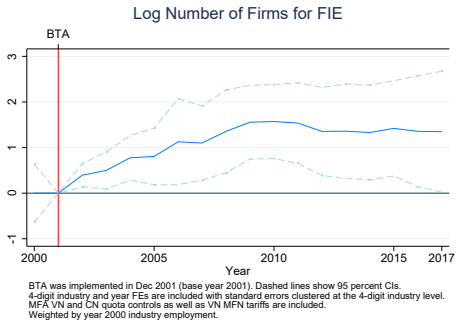
Note that these patterns of adjustments are not driven by secular differential trends across firm types because our specification (2) includes firm type-year fixed effects. During this time period, the aggregate number of SOE firms and SOE employment is falling. The increase in the number of SOE firms (and SOE employment and revenue) in response to tariff cuts does not mean that these industries experience SOE entry. Instead, the tariff cuts are associated with an increased number of SOE firms because the number of firms in industries with larger tariff cuts is decreasing by less than in less affected industries. Given that these SOE dynamics are driven by firm exit, the delayed response of SOEs in terms of firm count (and employment and revenue) is consistent with delayed adjustments to trade reform due to slow adjustments of capital in Dix-Carneiro and Kovak (2017).

Overall, these results illustrate that firm types respond differently to tariff cuts, motivating analysis into the within-industry dynamics in the next subsection.

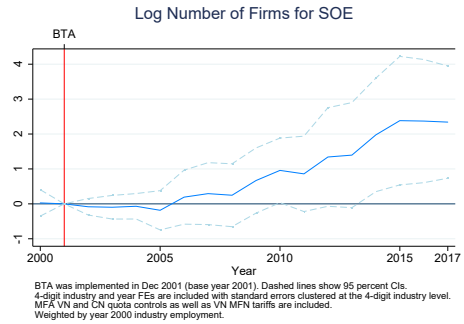
5.3 Reallocation within industries

Analysis in the previous section indicates that U.S. tariff cuts lead to large changes in the number of firms, and, at times, corresponding changes in employment and revenue, across industries and firm types. We next examine whether BTA-induced tariff reductions impact changes in the allocation of resources and market shares within industries as predicted by heterogeneous firm trade models. Counter to these predictions, we find that tariff cuts favor entrants over incumbents. In addition, firm-type matters as tariff cuts favorably impact FDI firms over PRI, with no net response by SOEs.

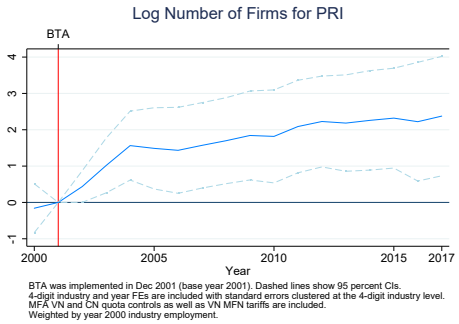
We focus on the allocation of market share and input share across margins of firm dynamic adjustment (incumbents, entrants, exit) and firm-types within each industry. We follow the approach by Khandelwal *et al.* (2013) extended to multiple years and to total production (domestic and exports). To the extent that not all firms export, the inclusion of overall inputs and revenue captures a broader definition of resource allocation. In order to explore industry dynamics, we construct market share by incumbent firms, entrants, and exiters within each industry j and each year t. These market share changes sum to 0 in each industry-



(a) FIEs



(b) SOEs



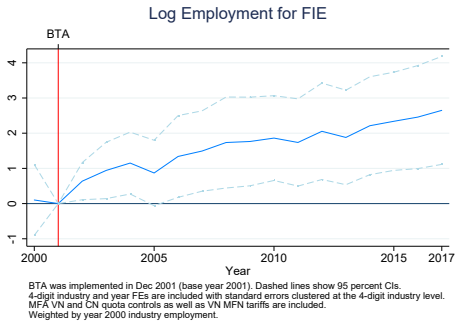
(c) PRIs

Figure 15: Changes in industry-level firm count due to BTA by firm-types

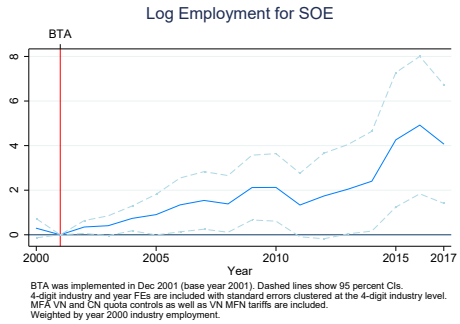
Note: BTA was implemented in Dec 2001. 4-digit industry and year FEs are included. Base year is 2001. Dashed lines show 95 percent confidence intervals. Standard errors clustered at the 4-digit industry level. Weighted by year 2001 employment.

year. Intensive margin comprises of firms that were incumbents in 2000, a year prior to the implementation of the BTA. The extensive margin comprises entrants and exiters. Exiters and entrants at year t are defined relative to the year 2000. Exiters at year t are firms that were present in 2000, but not in year t. Entrants are firms that appear in year t, but were not present in 2000. This definition thus examines cumulative entry and exit up to year t relative to the pre-BTA period. Similarly, for each industry j at year t, we decompose changes in industry employment into that accounted for by firm type o. The market share changes sum to 0 across ownership types within an industry and year. The ownership type is time-invariant and based on the initial ownership of firm in the sample. To the extent that a firm changes ownership type after its first appearance in the sample, that is not captured in the above calculations.[21]

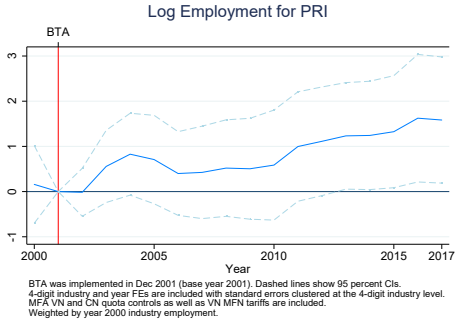
[21]Preliminary analysis suggests that privatization of SOEs may be affected by the BTA. We will examine



(a) FIEs



(b) SOEs



(c) PRIs

Figure 16: Changes in industry-level employment due to BTA by firm-types

Note: BTA was implemented in Dec 2001. 4-digit industry and year FEs are included. Base year is 2001. Dashed lines show 95 percent confidence intervals. Standard errors clustered at the 4-digit industry level. Weighted by year 2001 employment.

Finally, we also compute changes in market and input shares within each industry and time by margin of adjustment and firm type.

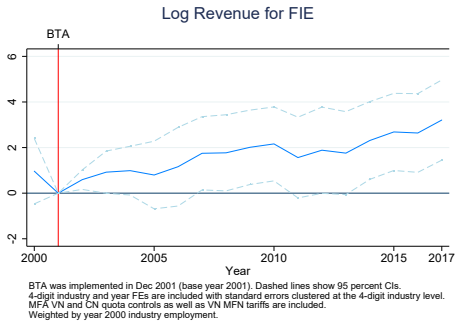
We estimate the following standard two-period fixed effects model:

$$Y_{jot} = \beta_{ot}\Delta BTA_j \mathbb{1}_t + \lambda_{oj} + \theta_{ot} + +\alpha_t C_{jt} + \varepsilon_{jot} \tag{3}$$

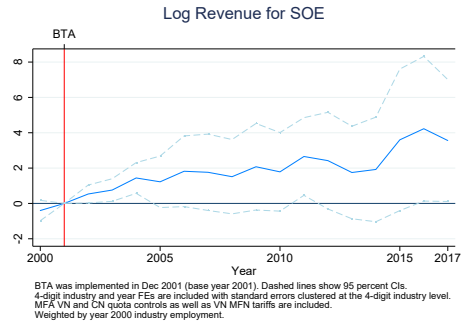
where Y_{jot} is the share for firm type o in industry j at year t, ΔBTA_j is the change in US tariff applied to imports from Vietnam in industry j before and after the BTA, indicator $\mathbb{1}_t$ equals one for year $t \neq 2001$, λ_{oj} is an industry-ownership fixed effect, and θ_{ot} is a year-ownership fixed effect. C_{jt} are industry-specific controls for other trade policy changes.[22]

this further in the future.

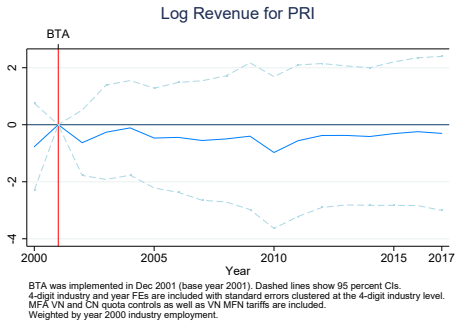
[22]In the current version these share regressions control for the change in Vietnam's MFN tariffs due to WTO accession. Future versions will include additional trade policy controls.



(a) FIEs



(b) SOEs



(c) PRIs

Figure 17: Changes in industry-level revenue due to BTA by firm-types

Note: BTA was implemented in Dec 2001. 4-digit industry and year FEs are included. Base year is 2001. Dashed lines show 95 percent confidence intervals. Standard errors clustered at the 4-digit industry level. Weighted by year 2001 employment.

Standard errors are clustered at the industry level. As before, BTA implementation year 2001 is the base year and the key parameters of interest, β_{ot}, capture the cumulative BTA impact on the outcome by each firm ownership-year ot, relative to 2001. This specification is similar to our earlier specification, but it is estimated separately for each two year period (e.g., 2001 and 2002, 2001 and 2003, etc.). This allows us to update the definition of whether a firm that operated in 2001 is an incumbent in year t or an exiter in year t. For example, a firm that operates in 2001 and exits in 2006, would be defined as an incumbent for years 2002 through 2005, but then as an exiter thereafter. Note that the change in US tariff is measured as the Column 2 tariff minus the MFN tariff. As such, a positive value of β_{ot} represent an expansion in market share in response to the U.S. tariff reductions.

Currently, our estimation focuses on employment shares, but we will add other outcomes, including revenue shares, in the future.

The results are summarized in the following figures, which report the coefficients on U.S. tariffs estimated from each two-year fixed effects model along with 95 percent confidence intervals. Note that each individual figure reports results from 16 individual regressions for each outcome of interest. Figure 18 focuses on the effects of tariff cuts on the overall intensive and extensive (entrants, exiters) margins of adjustment. Figure 19 focuses on the effects on the tariff-induced employment share changes across the three firm types, while Figure 20 further decompose those by the entry/exit and incumbent margin for FIEs, SOEs, and PRIs, respectively.

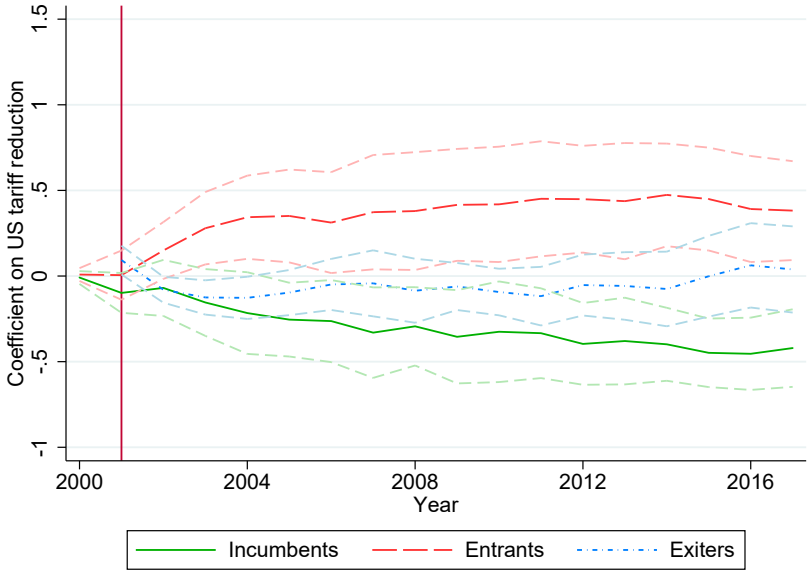


Figure 18: Changes in within industry employment shares for incumbents, entrants, and exiters in response to tariff cuts from the BTA

In Figure 18, we first pool over ownership types (i.e., ignore ownership type) and examine the reallocation of employment in response to tariff cuts across incumbents, exiters, and entrants relative to 2001. Declines in tariffs are associated with a large increase in the employment share of entering firms, a decline in the employment share of incumbents, and a decline (but noisy) in employment share of exiting firms. The mean reduction in ln tariffs was 0.24. This implies that entrants in an industry that received the mean tariff reduction expanded their market share by 8.2 percentage points by 2004, only 3 years after implementation, relative to entrants in an industry that received no tariff reductions. This reallocation continued to grow to about 11 percentage points by 2011. This increase is offset by declines

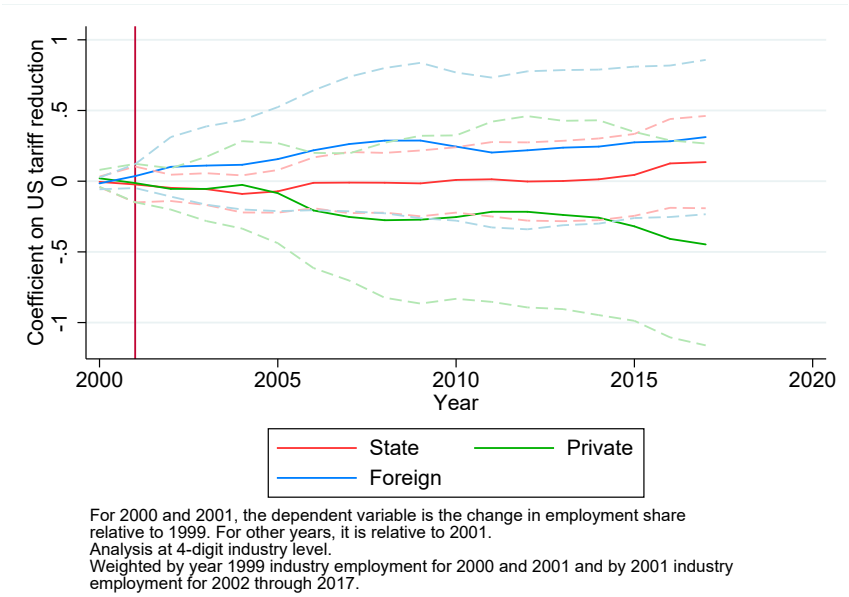
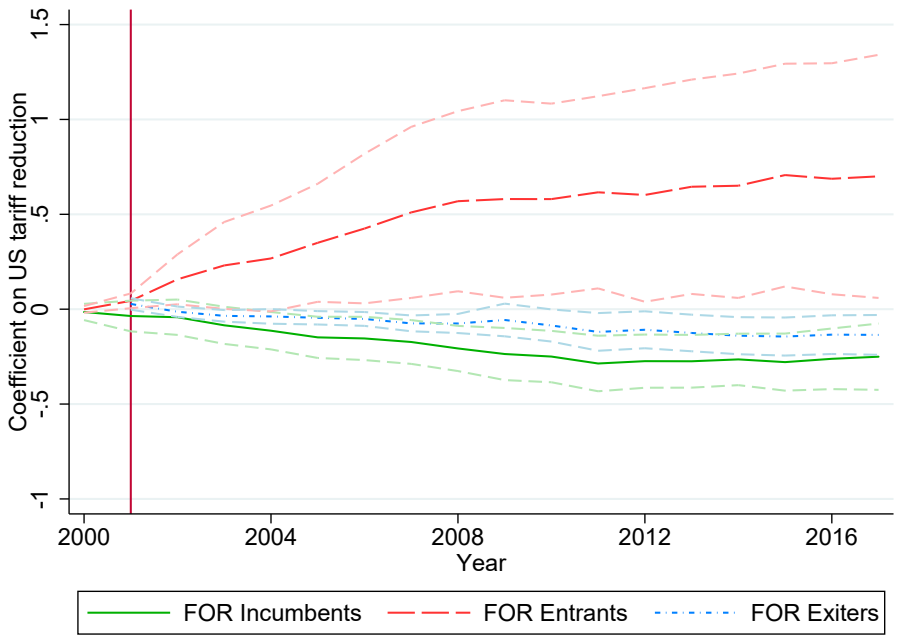


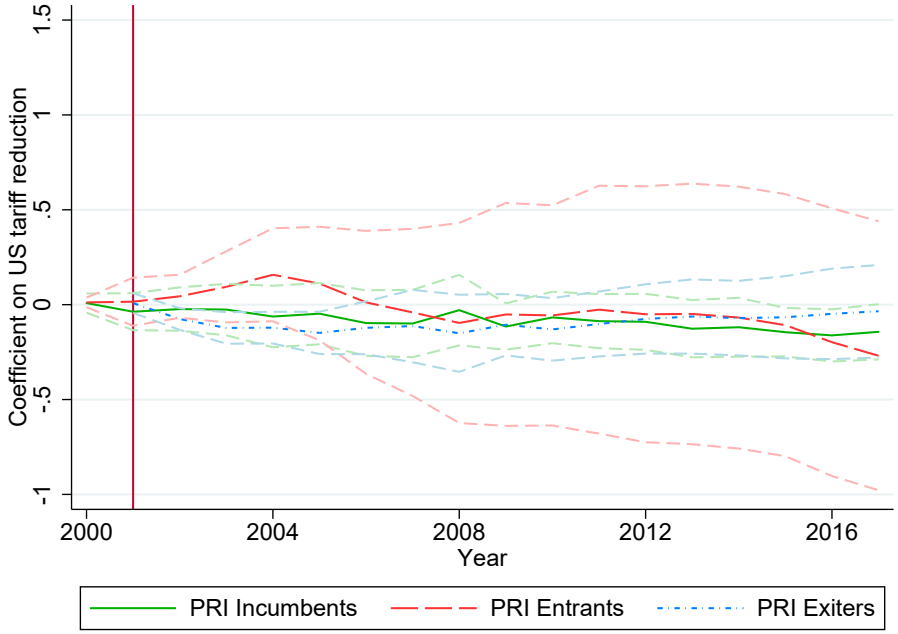
Figure 19: Changes in within industry employment shares for SOEs, PRIs, and FIEs in response to tariff cuts from the BTA

in the market share of exiters by 3.1 percentage points and incumbents by 5.2 percentage point by 2004 and by 8.0 and 2.8 percentage points respectively by 2011, for a net change of zero. The results for net entry and incumbents are counter to the predictions of conventional heterogeneous firms and trade models. These models predict increased allocation of resources to incumbents, because incumbents tend to be more productive and thus better positioned to benefit from an expansion in export markets in response to lower tariffs.

These aggregate responses to tariffs differ widely across the three firm types. Figure 20 reports the estimated coefficients on tariffs on entry, exit, and continuing firms decomposed for the three firm types. The growth in employment share among the entrants is mainly driven by the growth in employments share of FIE entrants (Panel a). This is consistent with responsiveness of Gross and value-added exports between countries to the signing of a regional trade agreement (Johnson and Noguera, 2017), suggestive of a link with MNCs supply chains. Interestingly, trade-induced increased entry of PRIs noted in earlier analysis does not translate into sustained gains in employment shares within industries. PRI entrants initially observe an increase in employment share, but this increase diminishes over time. Finally, tariff cuts are associated with a decrease in the employment share of SOEs entrants because SOE entrants are entering slower in high tariff cut industries relative to the less

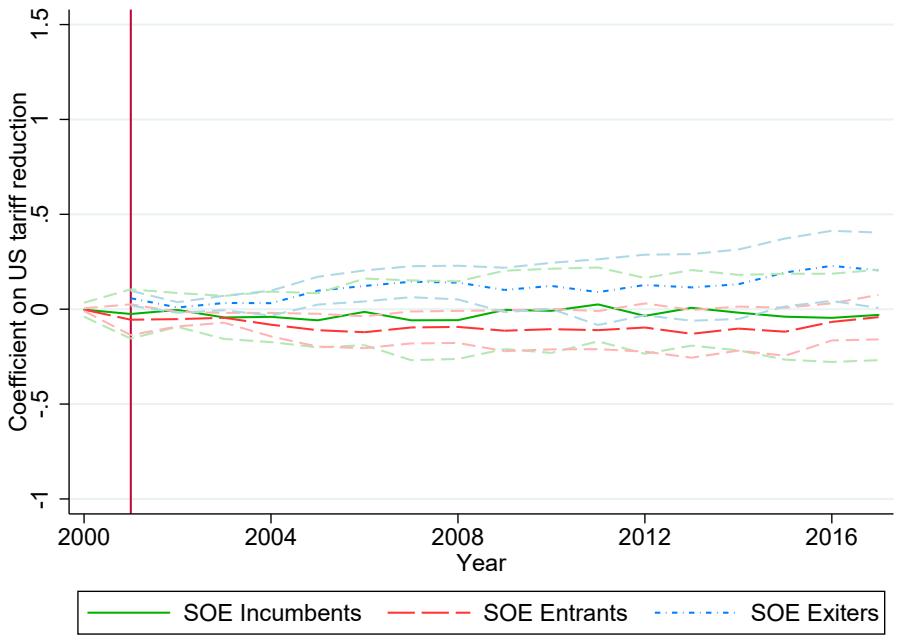


(a) Foreign



(b) Private

Figure 20: Changes in within industry employment shares for incumbents, entrants, and exiters by ownership in response to tariff cuts from the BTA



(c) State

Figure 20: Changes in within industry employment shares for incumbents, entrants, and exiters by ownership in response to tariff cuts from the BTA, cont.

Note: For 2000 and 2001, the base year is 1999 and the observations are weighted by 1999 employment. For other years, the base year is 2001 and the observations are weighted by 2001 employment.

affected industries.

Interestingly, part of the reason why tariff cuts are not associated with the reallocation of employment through exit is that while lower tariff cuts are associated with drops in market share for exiting FIEs and PRIs (but the latter effects are noisy), they are actually associated with increased within-industry market share due to exit of SOEs. This owes to the fact that SOEs experience larger exit in industries with lower tariff cuts relative to more affected industries Finally, counter to the predictions of the heterogeneous firms model, tariff cuts are associated with declines in employment share of FIE incumbents, while having no effects on employment share of SOE and PRI incumbents.

Overall as shown in Figure 19, declines in tariffs are associated with increased employment share of FIEs, reduced employment share of PRIs,and no changes in employment share of SOEs within industries, although some of the estimates are noisy.

The main message from this analysis is that tariff cuts are associated with FIE entry, little

response from SOEs, and a shift in resource allocation away from private domestic firms. All incumbent results are inconsistent with predictions of these models, as is the dominance of the entry margin. In addition, the (noisy) results for SOE exit are also inconsistent with prediction of the model if resources were efficiently allocated. These models predict increased allocation of resources to incumbents and surviving firms, because incumbents tend to be more productive and thus better positioned to benefit from expansion in export markets in response to lower tariffs. At the same time less efficient firms are expected to exit with lower tariffs.

6 Conclusion

TBA

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7 Data Appendix

In this appendix we provide additional details on the enterprise data. Specifically, we describe (1) the sampling framework, (2) consistency of our key variables over time, (3) changes in ownership codes over time, (4) steps taken to clean and prepare the data for analysis, (5) and corrections made to the panel of firms, particularly between 2000 and 2001, but also for other years.

7.1 Sampling framework

We use annual data on enterprises collected by the General Statistics Office (GSO) of Vietnam for the years 2000 through 2017. The survey covers all businesses registered as an enterprise under Vietnam's Enterprise Law.[23] All state-owned, foreign-invested, and collective businesses must legally register as an enterprise, but private businesses may legally operate either as an enterprise or as a household business. Private businesses must register as an enterprise if they have more than ten workers or operate in more than one location.[24] Thus, although registration as an enterprise is not required for small, private businesses, some of those businesses nonetheless register as enterprises and are included in the sample.

As the number of private enterprises grew rapidly over time, the GSO stopped giving all enterprises the full length questionnaire. Instead, the population of enterprises was split into two groups: those that would receive the full length questionnaire and those that would receive a relative short, typically only a page or two, questionnaire. Starting with the 2004 survey, which collected information for the 2003 calendar year, all state enterprises, foreign enterprises, and collectives received the full questionnaire. Additionally, all large private enterprises also received the complete questionnaire, while a subset of small private enterprises received the complete questionnaire and the remaining small private enterprises received the short questionnaire.[25] However, this partitioning of small private enterprises only applies in provinces with a large number of private enterprises. The number of provinces

[23] See law No. 13-1999-QH10.

[24] See decrees No. 02/2000/ND-CP of 3 February 2000 and No. 109/2004/ND-CP of 2 April, which describe household business and enterprise registration requirements during our study period for private businesses.

[25] These small private enterprises are typically referred to as listed enterprises.

included in the short version of the questionnaire grew as did the size cutoff, with the cutoff varying by province and year.[26]

Our period of analysis also overlaps with multiple establishment censuses conducted in Vietnam. The establishment census has a broader scope as it collects information on many of Vietnam's millions of businesses that are not registered as an enterprise. These censuses were conducted in 2002, 2007, 2012, and 2017, collecting information for the previous year. In these years, the small private enterprises that were not selected to receive the full length enterprise survey were not given a short version of the enterprise survey, but instead filled out the establishment census questionnaire.

Firms can be followed over time based on a unique firm identifier. However, a small number of observations features a non-unique firm identifier. Since these firms account for less than 3 percent of total revenue and no more than 2 percent of total employment, we remove these observations from the sample.

7.2 Consistency of data over time

The key variables we employ in our analysis, employment, revenue, and capital, have remained fairly consistently defined over the questionnaires. In particular, all questionnaires, both the full length and the short versions for listed enterprises, consistently ask about end of year employment in the enterprise. However, there are slight changes to questions related to revenue and capital.

7.3 Ownership classification

Table 4 provides a complete list of the various ownership codes used in the years 2000 through 2010. We report the original ownership codes and descriptions from 2000 and 2001. Note, however, that the GSO often distributes the data with ownership codes for 2000 and 2001 that have been changed from the original responses in an effort to make the codes more consistent over time.

[26] We are very thankful to Hanh Nguyen for careful translation of the Enterprise Survey Plans for surveys used in our analysis.

Table 4: Ownership types by year

Ownership type	2000	2001	2002	2003-04	2005-06	2007-10	Consistent
Central SOE	1	1	1	1	1	1	1
Local SOE	2	2	2	2	2	2	2
Central state LLC	x	x	6	3	3	3	3
Local state LLC	x	x	7	4	4	4	3
LLC with 1 state member	x	6	x	x	x	x	3
LLC with 2+ state members	x	8	x	x	x	x	3
JSC or Private LLC with state capital>50%	x	x	x	x	5	5	5
JSC with state capital>50%	x	x	9	5	x	x	5
LLC	6	x	x	x	x	x	3\9
Private LLC or Private LLC with state capital<50%	x	x	x	x	9	9	9\15
Private LLC	x	x	8	9	x	x	9
Private LLC with 1 member	x	7	x	x	x	x	9
Private LLC with 2+ members	x	9	x	x	x	x	9
Collective	3	3	3	6	6	6	6
Private enterprise	4	4	4	7	7	7	7
Partnership company	5	5	5	8	8	8	8
JSC without state capital	8	11	11	10	10	10	10
JSC with state capital<50%	x	x	10	11	11	11	11
JSC with state capital	7	10[a]	x	x	x	x	TBA
100% foreign	9	12	12	12	12	12	12
Foreign with state partner	10	13[a]	13	13	13	13	13
Foreign with collective partner	11	x	x	x	x	x	14
Foreign with other partner	12	14[a]	14	14	14	14	14
Contracted business cooperation	13	x	x	x	x	x	TBA

Note: The table displays the number assigned to the ownership description in that particular year where year refers to the year of the data. An "x" indicates that description was not available in the indicated year. JSC denotes a joint stock company and LLC denotes a limited liability company.

As can be seen from the table, many ownership descriptions are consistently identified across all eleven years, even if the associated code changes across years. These includes central SOEs, local SOEs, collectives, private enterprises, partnership companies, 100% foreign enterprises, and joint ventures between foreign and state firms. In other cases, it is easy to create a consistent definition by aggregating over two or more separate descriptions.

For example, the 2000 data separated foreign joint ventures between collectives and other partners whereas all subsequent years classified foreign joint ventures as other (i.e., non-state) partners. Similarly, in 2001, the ownership types distinguished between state limited liability companies that had 1 or 2+ state members whereas all subsequent years distinguished between state limited liability companies owned by the central government versus local governments. We merge these categories together into state owned limited liability companies.

The table also shows that some harder decisions needs to be made in terms of how best to create consistent ownership classifications over time. We subsequently describe each of these decisions.

In 2000 and 2001, the questionnaires distinguished between joint stock companies with no state investment and joint stock companies with state investment. However, in subsequent years the questionnaires split the joint stock companies with state capital into those with less than or equal to 50% state capital versus those with more than 50% state capital. In 2000, we have no additional data for which we can make this distinction, but in 2001 there was an additional question that asked what share of capital came from the state if the enterprise was a JSC with state capital. We use this share to split the same according to the 50% threshold used in subsequent surveys. For the JSC companies in 2000 with state capital, we use the 2001 information, where available. For the remaining JSC with state capital in 2000 we

We merge together joint stock companies and private limited liability companies that have more than 50% state capital.

The 2000 data does not distinguish between state and private limited liability companies. It simply identifies them all as limited liability companies. There are 10,495 out of 42,307 (24.8%) firms assigned this code in 2000. Within manufacturing, there are 2,414 out of 10,333 (23.4%) firms identified as a limited liability company. In terms of employment, they represent 14.7% and 20.1% of total employment and manufacturing employment respectively. We use two approaches. First, for firms that are part of the 2000-2001 panel, we use their ownership code in 2001 to backcast their ownership in 2000. Of the 10,495 limited liability firms in 2000, 8,347 are present in the 2001 data and the vast majority of these are private

limited liability companies (8,102 or 97.1%). Only 65 (0.8%) are listed as a state limited liability company. The remaining 180 firms are spread across other ownership categories in 2001. We assign these as private limited liability companies in 2000. For the remaining 2,148 limited liability companies in 2000 that are not operating in 2001, we have to decide whether they are a private or state limited liability company without any further information specific to that firm. Since the vast majority of limited liability companies are private based on the 2000-01 panel, we assume that the remaining non-panel limited liability companies in 2000 are all private limited liability companies.

Starting in 2005, the ownership descriptions were combining a private limited liability company with a private limited liability company that had state capital <50%. Additionally, the questionnaire asked what percentage was state capital. This allows us to separate wholly private limited liability companies from those that have some state capital.

7.4 State ownership versus state control

While many of the ownership categories are obvious in terms of whether state, foreign, or private is the correct classification, other categories are less clear. For example, starting in the 2007 survey collecting data for 2006, the survey asked whether the state controlled the enterprise for joint stock companies with less than 50% state capital. Of the 1,360 joint stock companies with less than 50% state capital, the mean state capital is 29% and about 20% of these firms report that the state controls the enterprise. Hence, although the state may not be the majority owner, it may still have significant influence. Moreover, numerous enterprises that are joint stock companies with less than 50% state capital began as fully state owned and were partially privatized. This is similar to the situation in China (Hsieh and Song, 2015).[27]

[27] In the current version, we have included joint stock companies with less than 50% state capital in our SOE category when running our empirical specifications. Table 5 presents the summary statistics for this categorization. However, preliminary results suggest differences among SOE types in responding to the BTA and we plan to investigate this further in the future.

7.5 Removing 2002 entrants from the 2001 data

The 2002 survey, which collected data about firm performance in 2001, also included questions about performance in the first six months of 2002. As such, the set of firms includes some firms that were not actually operating as an enterprise in 2001, but only began operating as an enterprise in the first six months of 2002.

There were originally 56,551 firms in the 2001 dataset. Of these, 6,270 firms report:

1. 0 or a missing value for employment at the start of 2001,
2. 0 or a missing value for assets at the start and end of 2001,
3. 0 or a missing value for revenue in 2001,
4. 0 or a missing value for employee income in 2001,
5. 0 or a missing value for taxes arising in 2001, and
6. 0 or a missing value for taxes paid in 2001.

Most of these firms reported being established in 2002 (74.4%) or 2001 (22.7%). Note that the year of establishment is not necessarily the same as the year that the firm registered as an enterprise or began operations. By comparison, only 71 firms in 2002 fit this set of conditions and no firms in 2000 do. We subsequently drop these firms from the 2001 dataset.

7.6 Tracking firms over time

The data feature a panel component that allows us to track firms over time using the firm identifier. Based on all firms in the data with a unique identifier (using the variable madn), regardless of industry, initial inspection revealed that 67.2 percent of firms from 2000 could be match with firms in 2001, but in the subsequent years this increased substantially to between 81.8 and 85.4 percent. We used additional confidential data made available to us by the GSO to look for additional matches between 2000 and 2001. We employed the following algorithm, with the number of matched firms at each step listed in parentheses:

1. Perfectly match firms based on province, district, ward, start year, ownership, and tax code (2,032),

2. Perfectly match firms based on province, district, ward, start year, ownership, phone number, and owner's name (1,358),

3. Perfectly match firms based on province, district, ward, ownership, phone number, and owner's name (908),

4. Perfectly match firms based on province, district, ward, and phone number (957),

5. Perfectly match firms based on province, district, ownership, phone number, and owner's name (217),

6. Perfectly match firms based on province, district, ward, ownership, and owner's name matches within one character (1,085).

In total, an additional 6,557 firms are matched between 2000 and 2001 using these fairly restrictive criteria. This increases the percentage of 2000 firms matched with 2001 firms from 67.2 to 82.9. The latter is much more consistent with the matching rate between subsequent surveys.

Between other years, we found no evidence of widespread missing matches. However, we systematically examined all instances of exit and entry by state firms for possible incidences of false exit being attributed to a change in the firm identifier (madn). This appeared most commonly when an SOE was going through an ownership transition, such as partial equitization or complete privatization. In these cases, we assign the original firm identifier to the firm for all observations. As such, an SOE that privatizes in not recorded as an SOE exit and simultaneously as a private entrant, but rather as an ownership transition. Below is an example of one instance.

Table 5 reports on the number of SOE exits in the data based on the originally reported firm identifier (madn) and the number that we corrected.

We subsequently extended this visual inspection to the entry and exit of all foreign firms and to all large private enterprises. As the number of exits and entries of small private firms

was too many for visual inspection, we developed an algorithm for identifying instances of false exit and entry among private enterprises.

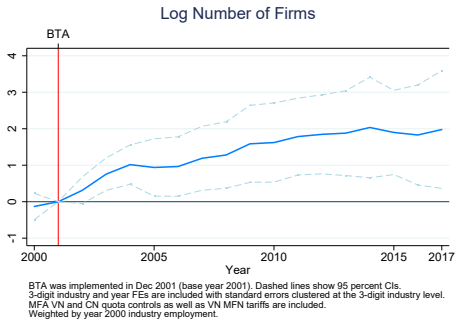
Table 5: Summary Statistics with broader SOE definition: Years 2000 and 2010

Year 2000	FIEs	PRIs	SOEs	Total
Revenue	97,714	6,016	59,355	23,896
	(354,368)	(23,458)	(158,897)	(134,762)
Employment	342	64	452	155
	(1,024)	(254)	(745)	(517)
Fixed Assets	70,681	1,513	18,224	11,206
	(273,465)	(6,581)	(71,353)	(94,065)
Observations	1,041	7,588	1,659	10,288
Year 2010	FIEs	PRIs	SOEs	Total
Revenue	247,599	22,316	387,110	54,775
	(1200159)	(318,365)	(2079015)	(598,227)
Employment	441	46.9	449	97.2
	(1,643)	(195)	(719)	(578)
Fixed Assets	69,829	4,839	133,182	14,834
	(305,568)	(41,468)	(1247632)	(232,545)
Observations	4,489	39,241	1228	44,958

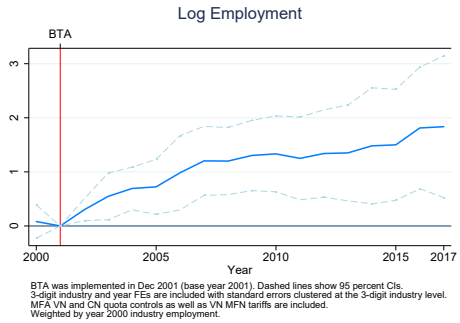
Note: Revenue and Assets are measured in millions of Vietnamese Dong.

8 Appendix

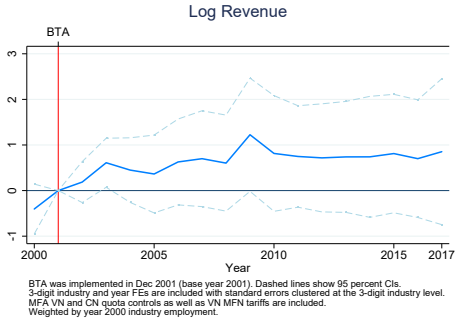
8.1 Additional Tables and Figures



(a) Firm Count



(b) Employment



(c) Revenue

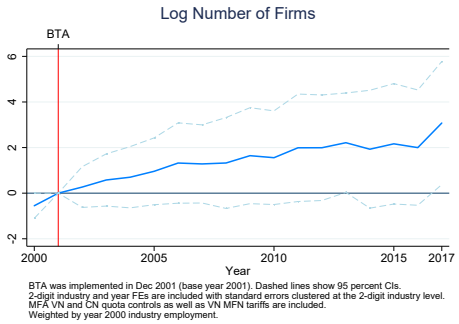
Figure 21: Changes in industry-level outcomes due to BTA

Note: BTA was implemented in Dec 2001. 3-digit industry and year FEs are included. Base year is 2001. Dashed lines show 95 percent confidence intervals. Standard errors clustered at the 3-digit industry level. Weighted by year 2001 employment.

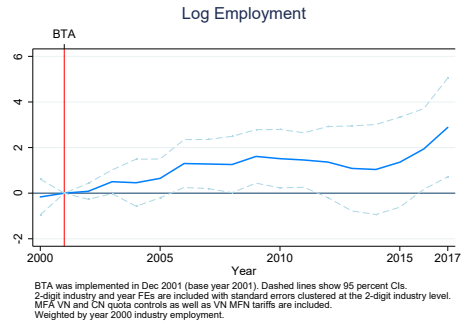
8.2 Pooled Regression Results

Based on the conceptual framework and overview of the BTA, we begin our empirical analysis by investigating the relationship between the U.S. tariff reductions and industry-level outcomes in Vietnam's formal manufacturing sector. We estimate the following pooled regression model:

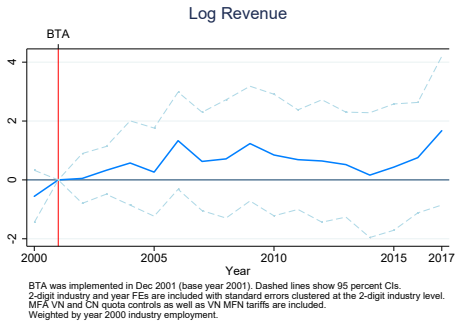
$$Y_{jt} = \beta_1 \Delta BTA_j \mathbb{1}_{t=(2002,2006)} + \beta_2 \Delta BTA_j \mathbb{1}_{t=(2007,2010)} + \lambda_j + \theta_t + \varepsilon_{jt} \tag{4}$$



(a) Firm Count



(b) Employment



(c) Revenue

Figure 22: Changes in industry-level outcomes due to BTA

Note: BTA was implemented in Dec 2001. 2-digit industry and year FEs are included. Base year is 2001. Dashed lines show 95 percent confidence intervals. Standard errors clustered at the 2-digit industry level. Weighted by year 2001 employment.

where Y_{jt} is industry j's outcome in year t (e.g., ln firm count, ln employment, and ln revenue), ΔBTA_j is the decrease in log US tariff applied to VN imports in industry j before and after the BTA, indicator $\mathbb{1}_{t=(2002,2006)}$ equals one for years 2002-2006, indicator $\mathbb{1}_{t=(2007,2010)}$ equals one for years 2007-2010, λ_j is industry fixed effects, and θ_t is year fixed effects. BTA implementation year 2001 and pre-BTA year 2000 are the base years for the outcome changes. As such, the parameters of interest, β_1 estimates the BTA's impact on the outcome variable for years 2002-2006 while β_2 estimates the BTA's impact on the outcome for years 2007-2010 relative to the base years.

The year fixed effects control for aggregate, sector-wide adjustments in industry outcomes that coincide with the implementation of the BTA. Similarly, the industry fixed effects control for all time-invariant unobserved industry characteristics that might independently influence the outcome variables. Hence, the main parameters of interest, β_1 and β_2, are identified

by changes in U.S. tariffs over time within industries. A positive coefficient means that the reduction in U.S. tariffs induced an increase in the associated outcome variable.

The identification of the causal effect of U.S. tariff reductions on outcomes of interest in Vietnam consequently relies on the assumption that changes in U.S. tariffs are not correlated with unobserved time-varying industry-level factors. In section 2, we discussed in detail the unique political economy of the BTA-induced U.S. tariff reductions. In particular, neither U.S. nor Vietnamese industries had an ability to influence the size of tariff reductions based on the movement of U.S. imports from Vietnam from one pre-existing tariff schedule, Column 2, to another, MFN. Furthermore, McCaig and Pavcnik (2018) show that the U.S. tariff cuts are not correlated with industry-specific global demand shocks for Vietnamese exports during this period nor with pre-existing industry-specific trends in Vietnamese exports to the U.S., E.U., or worldwide. Importantly, as shown in section 2, industry tariff changes are not correlated with baseline industry characteristics such as the industry prevalence of the SOEs or FDI firms.

We begin by examining ln firm count, ln employment, and ln revenue for all ownership types, as reported in table 6. We initially restrict the data to years 2000-2006 (odd-numbered columns) and then to all years (even-numbered columns). We conduct the analysis at the 4-digit industry level and all standard errors are clustered by industry. First, we find that U.S. tariff reductions are associated with an increase in industry firm counts, employment, and revenue in years 2000-2006 relative to the base years. Second, the magnitude of these increases grow in the medium term from 2007-2010. This growth is consistent with traditional theories of international trade that predict the expansion of industry size in response to new exporting opportunities.

We find important differences in the response of industry outcomes when we focus on different ownership types. We estimate a version of equation (4) augmented to investigate differential impacts across ownership types o where $o \in \{FIE, SOE, PRI\}$:

$$Y_{jot} = \beta_{1o'} \sum_{o'} \Delta BTA_j \mathbb{1}_{o't=(2002,2006)} + \beta_{2o'} \sum_{o'} \Delta BTA_j \mathbb{1}_{o't=(2007,2010)} + \lambda_{jo} + \theta_{ot} + \varepsilon_{jot} \quad (5)$$

here Y_{jot} is the outcome for ownership type o in industry j at year t, ΔBTA_j is the change

Table 6: Pooled regression at the industry level

	ln Firm Count		ln Employment		ln Revenue	
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta BTA * (2002 - 2006)$	1.21	1.21	0.82	0.82	0.66	0.66
	(0.33)	(0.33)	(0.24)	(0.24)	(0.26)	(0.25)
$\Delta BTA * (2007 - 2010)$		1.99		1.41		0.84
		(0.52)		(0.41)		(0.47)
Industry FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	823	1295	823	1295	823	1295
R^2	0.96	0.96	0.98	0.97	0.96	0.95

Note: Robust standard errors in parentheses adjusted for 122 4-digit industries. Outcome variables are aggregated to the 4-digit industry level. Weighted by year 2000 employment.

in log US tariff applied to VN imports in industry j before and after the BTA, indicator $\mathbb{1}_{o't=(2002,2006)}$ equals one for ownership o' and years 2002-2006, indicator $\mathbb{1}_{o't=(2007,2010)}$ equals one for ownership o' and years 2007-2010, λ_{jo} is industry and ownership fixed effects, and θ_{ot} is year and ownership fixed effects. Similar to the previous specification, BTA implementation year 2001 and pre-BTA year 2000 are the base years for outcome changes. Hence, the coefficients $\beta_{1o'}$ and $\beta_{2o'}$ capture the BTA impact on outcomes for ownership o' during years 2002-2006 and 2007-2010 respectively relative to base years.

In Table 7 we report estimates of differential effects across ownership types. Similar to the previous specification, We initially restrict the data to years 2000-2006 (odd-numbered columns) and then to all years (even-numbered columns). In the years immediately after the BTA, FIE firms are expanding in numbers and employment relative to the base years. FIE revenue is positively increasing but is noisy. In the subsequent period, FIE firms numbers, employment, and revenue continue to increase and is larger in magnitude. In the years immediately after the BTA, SOE firms experience a small but insignificant decline in numbers with increases in employment and revenue. The increase in SOE revenue immediately after the BTA may be due to the closure of the least productive SOEs. In subsequent years, SOE firms count, employment, and revenue experience positive growth but the coefficients are insignificant. PRI firms numbers are expanding in response to the U.S. tariff reductions initially and experiences a larger increase subsequently. However, its employment growth is

noisy as is its revenue outcomes.

Table 7: Pooled regression at the industry and ownership level

	ln Firm Count		ln Employment		ln Revenue	
	(1)	(2)	(3)	(4)	(5)	(6)
$FIE * \Delta BTA * (2002 - 2006)$	0.95	0.95	1.20	1.20	0.43	0.43
	(0.34)	(0.34)	(0.61)	(0.61)	(0.50)	(0.50)
$SOE * \Delta BTA * (2002 - 2006)$	-0.002	-0.001	0.55	0.55	1.10	1.10
	(0.18)	(0.18)	(0.24)	(0.24)	(0.50)	(0.49)
$PRI * \Delta BTA * (2002 - 2006)$	1.42	1.44	0.65	0.65	0.042	0.05
	(0.52)	(0.52)	(0.62)	(0.61)	(0.56)	(0.56)
$FIE * \Delta BTA * (2007 - 2010)$		1.61		1.98		1.22
		(0.38)		(0.86)		(0.68)
$SOE * \Delta BTA * (2007 - 2010)$		0.55		1.2		1.61
		(0.57)		(0.78)		(1.09)
$PRI * \Delta BTA * (2007 - 2010)$		2.1		0.24		-0.99
		(0.68)		(0.76)		(1.18)
Industry & Ownership FE	Y	Y	Y	Y	Y	Y
Year & Ownership FE	Y	Y	Y	Y	Y	Y
Observations	2277	3612	2277	3612	2277	3612
R^2	0.97	0.97	0.97	0.96	0.92	0.91

Note: Robust standard errors in parentheses adjusted for 122 4-digit industries. Outcome variables are aggregated to the 4-digit industry level. Weighted by year 2000 employment.