

Export markets and long-run industry adjustment: State, private, and foreign firms in Vietnam

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Preliminary

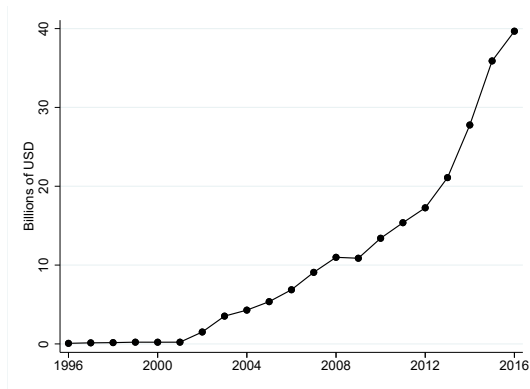
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 - ▶ Politically connected firms, such as state-owned enterprises (SOEs), may receive cheaper credit, easier access to land, face softer budget constraints, etc.

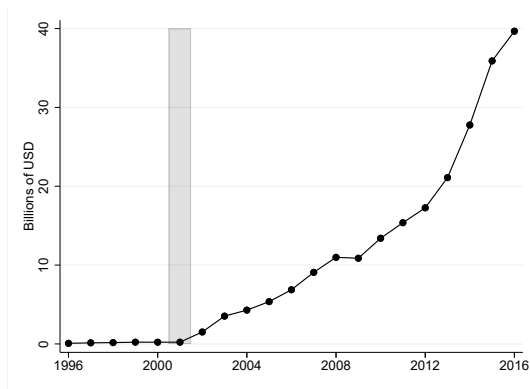
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- ▶ Developing countries typically feature greater misallocation of resources
 - ▶ Politically connected firms, such as state-owned enterprises (SOEs), may receive cheaper credit, easier access to land, face softer budget constraints, etc.
- ▶ More evidence needed on how trade policy interacts directly with FDI or other firm types
 - ▶ In the presence of misallocation, there is no consensus how trade reforms affect allocation of employment/market share and productivity (Atkin & Khandelwal, 2019; Bai, Jin, & Lu, 2019)
 - ▶ There is ongoing debate on responsiveness of value added trade/fragmented production/FDI to trade agreements (Yi, 2003; Feinberg & Keane, 2006; Johnson & Nouguela, 2017)

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- ▶ The BTA induced a large, positive export demand shock for Vietnamese firms
 - ▶ Main policy change: decline in US tariffs on VN exports



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Ownership Type	SOEs vs non-SOEs	Hsieh and Song (2015)	Brandt, Kambourov, and Storesletten (2020)
	Includes FDI but not treated differently from PRIs	Brandt, Van Biesebroeck, Wang, and Zhang (2017)	Baccini, Impullitti, and Malesky (2019)
	Focus on FDI, in addition to SOEs and PRIs	Khandelwal, Schott, and Wei (2013), Bao and Chen (2018), Alfaro and Chen (2018)	McCaig, Pavcnik, and Wong (2020)

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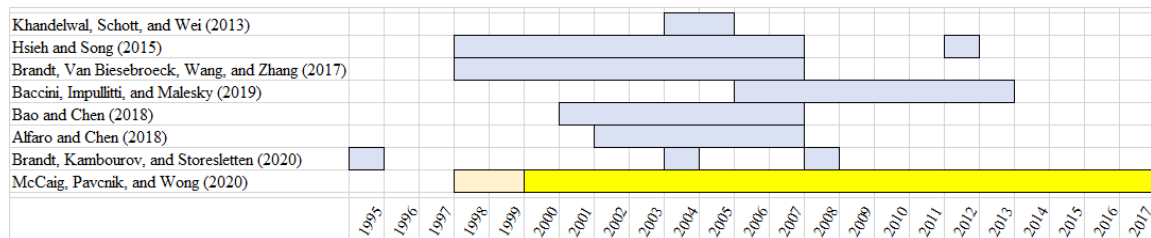
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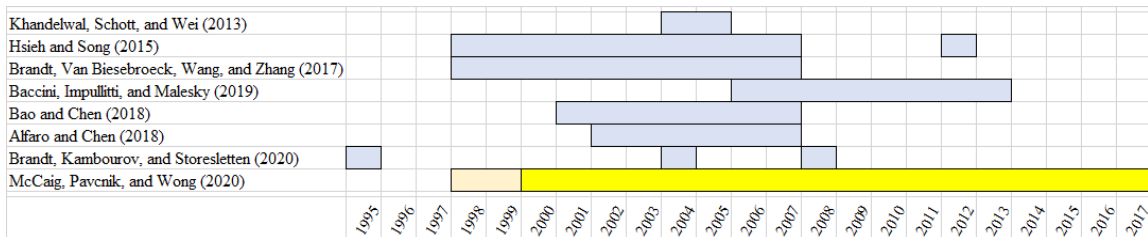
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- Assess the longer-term impact of a large one-time trade policy reform on firms



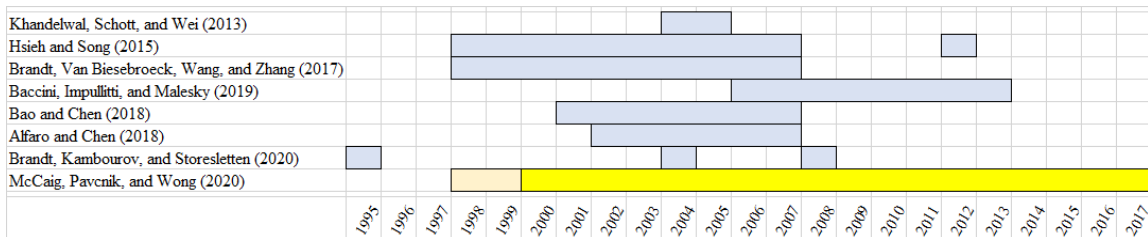
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 - ▶ Important due to potentially delayed adjustment of capital (Dix-Carneiro & Kovak (2017))
 - ▶ Government subsidizes SOEs which may increase survival rates (Storesletten, Song, & Zilibotti (2010), Hsieh & Song (2015))

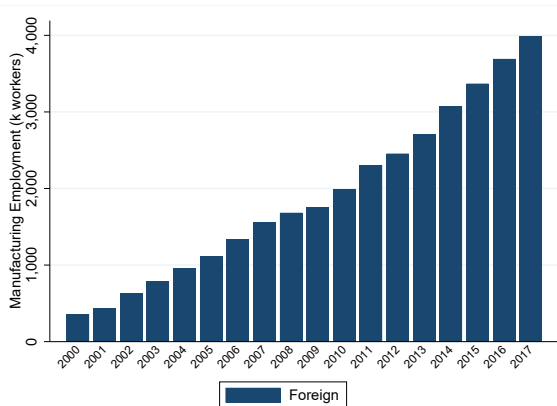


Third Contribution

- ▶ Study cumulative effect on incumbents, entry, and exit by firm-type
 - ▶ Our period of analysis features large FIE entry and sizeable SOE decline

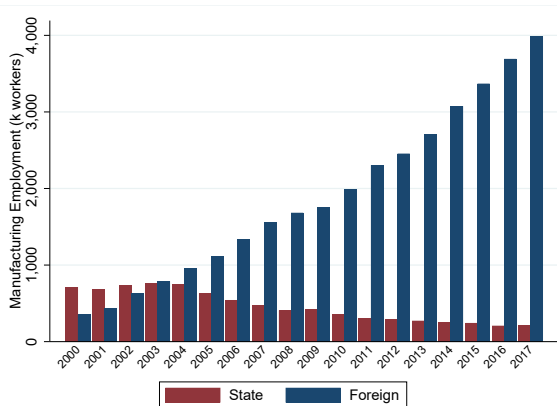
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- ▶ Study cumulative effect on incumbents, entry, and exit by firm-type
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 - ▶ Substantial increase of foreign-invested firms: 22% of employment in 2000, 58% by 2017



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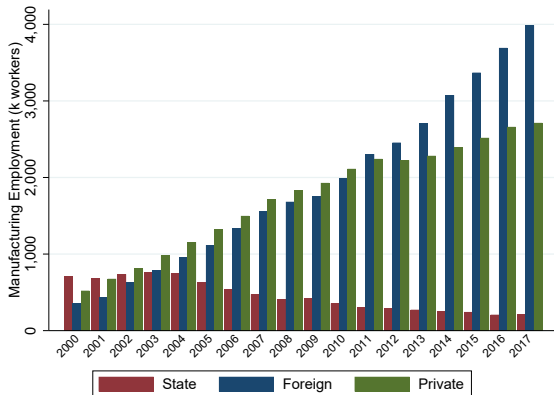
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Revenue Emp Share Rev Share Emp by Initial Type Pop census



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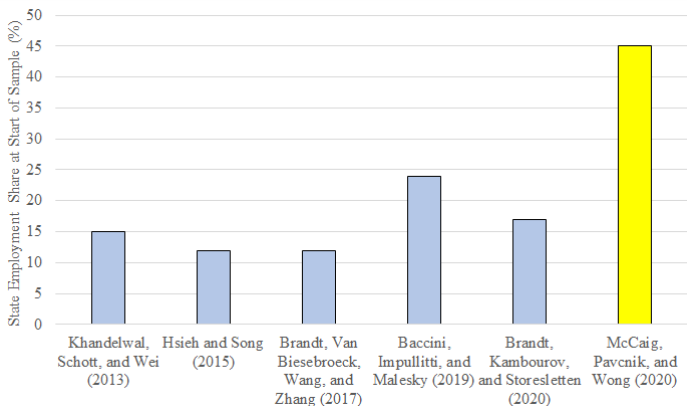
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Related Literature

- ▶ Impacts of FDI on developing countries
 - ▶ Large literature on the effects of FDI on spillovers (Harrison and Rodriguez Clare (2009), Alfaro-Urena, Manelici, and Vasquez (2019))
 - ▶ Emerging literature on the effects on reallocation and competition (Aitken, Harrison, and Lipsey (1996), Alfaro and Chen (2018), Atkin et. al. (2019))
- ▶ FDI entry/acquisition decision is endogenous
 - ▶ Role of selection (Arnold and Javorcik (2009), Guadalupe, Kozmina, and Thomas (2012))
 - ▶ Financial constraints factors (Alfaro and Chen (2018))
- ▶ FDI entry and (trade) policy
 - ▶ Bilateral tax treaties (Blonigen, Oldenski, Sly (2014))
 - ▶ FDI entry and tariffs/trade agreement (Feinberg and Keane 2005, 2006)
 - ▶ Endogeneity of trade policy to FDI/global supply chains (Blanchard (2007), Blanchard and Matschke (2015), Blanchard, Bown, Johnson (2016))

Also related to literature on firm performance and trade in the presence of politically connected firms, trade and misallocation, and SOE restructuring and reform

Overview

Background on BTA

Conceptual Framework

Data and Data Patterns

Empirical Approach and Results

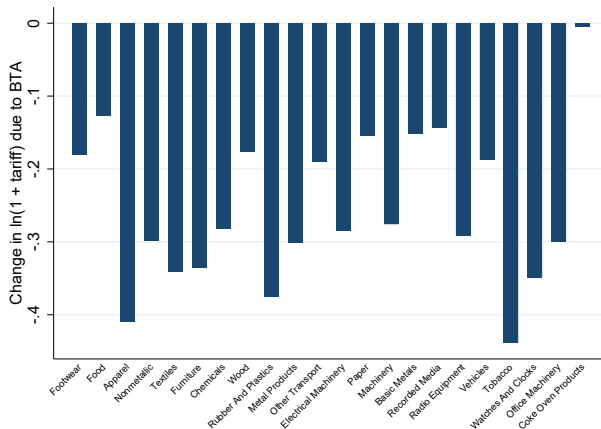
Conclusion

US-Vietnam Bilateral Trade Agreement

- ▶ After US-Vietnam war, US imposed a trade embargo on Vietnam until 1994
- ▶ After embargo is lifted, Vietnamese exports to US still faced high levels of protection as it was subject to the Column 2 US tariff schedule
- ▶ BTA reclassified Vietnamese exports to Most Favored-Nation (MFN) or Normal Trade Relations tariff schedule
- ▶ Tariff cuts resulted from switching from one pre-existing tariff schedule to another
- ▶ Vietnam already applied MFN tariffs on US exports prior to BTA

BTA tariff cuts were large and varied across industries

- ▶ 29 pp average reduction (32% to 3%) in manufacturing, sd 16 pp
- ▶ Varying cuts across industries with high and low employment levels



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

BTA tariff cuts: switching from one pre-existing tariff schedule to another

- ▶ Less likely to suffer from conventional concerns about tariff reductions being endogenous to industry lobby, either in US or Vietnam
 - ▶ Column 2 tariff schedule (Tariff Act of 1930) applies to countries without normal trade relations status with US
 - ▶ MFN tariff schedule was negotiated among WTO members in 1995
- ▶ Tariff cuts are uncorrelated with contemporaneous export demand, supply shocks, or pre-existing trends (McCaig & Pavcnik, 2018) and initial ownership employment shares [Detail](#)
- ▶ The BTA does not have industry-specific policies for FDI [Details](#)

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In typical Melitz framework, reduction in variable export costs due to BTA leads to:

- ▶ Expansion of the most productive firms
- ▶ Contraction and/or exit of the least productive firms
- ▶ A rise in industry productivity due to selection and reallocation

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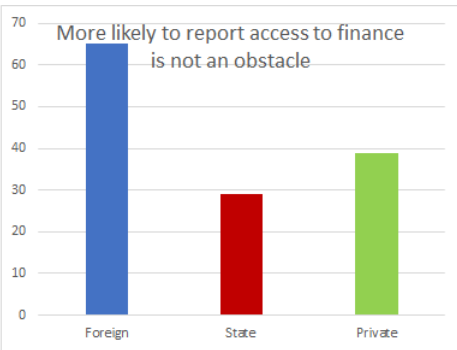
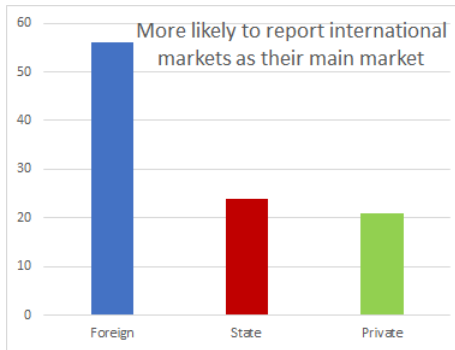
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Vietnamese SOEs receive preferential access to inputs (Pincus, 2015). Same export costs reduction now depend on productivity and distortions:

- ▶ Lower productivity firms can continue to produce or expand with sufficiently high subsidy
- ▶ Higher productivity firms may not expand or could even exit without subsidy
- ▶ The overall impact on productivity could be negative (Bai, Jin, and Lu, 2019)

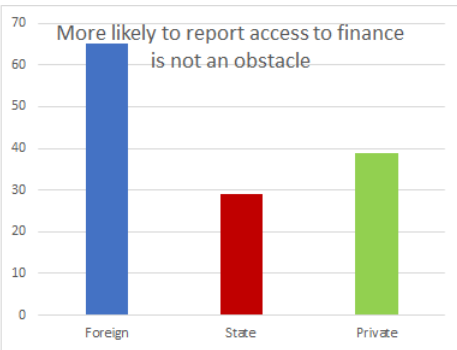
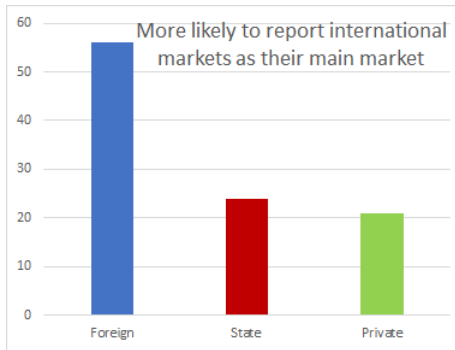
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- ▶ Using three World Bank Enterprise Surveys, we find that foreign firms are more likely to:
 - ▶ Report international markets as their main market (56% vs 24% for state, 21% for private)
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- ▶ The differing barriers that firm-types face might affect how (re)allocation works and we can shed light on this empirically



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Data: Annual Enterprise Survey 2000-2017

- ▶ All VN businesses registered as an enterprise (General Statistics Office)
 - ▶ All state and foreign firms must register to legally operate, private firms only if they employ more than 10 workers (but we observe many register below this cutoff)
- ▶ Panel with unique firm id: entrants, exits, and continuing firms
- ▶ Ownership data: state-owned (SOEs), foreign-invested (FIEs), or private domestic (PRIs)
- ▶ 185,189 firms across 127 4-digit industries

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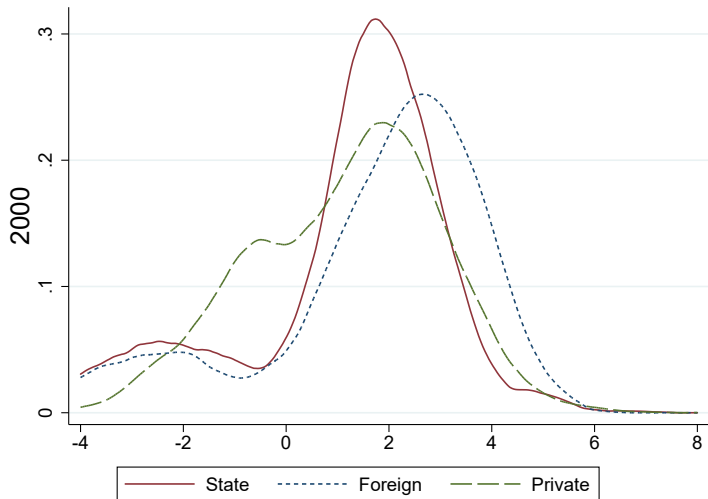
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 - ▶ Panel with unique firm id: entrants, exits, and continuing firms
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TFP across Firm-Types

- ▶ Foreign firms are more productive than state and private firms



Entry and Exit of Firms

- ▶ Between 2000 and 2017, there are high exit and entry rates
 - ▶ 75% of firms that were operating in 2000 exited by 2017
 - ▶ These exiters made up 39% of revenue & 46% of employment in 2000
 - ▶ 97% of firms that were operating in 2017 were not in 2000
 - ▶ These entrants made up 83% of revenue & 84% of employment in 2017

	Firms	Share of Revenue	Employment
	All ownership types		
Exiters	0.75	0.39	0.46
Entrants	0.97	0.83	0.84

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Share of	Firms	Revenue	Employment
State-owned enterprises			
Exiters	0.49	0.33	0.38
Entrants	0.27	0.34	0.23
Foreign-invested enterprises			
Exiters	0.46	0.31	0.31
Entrants	0.93	0.85	0.87
Private domestic enterprises			
Exiters	0.84	0.68	0.67
Entrants	0.98	0.93	0.92

Distortion vs Entry/Exit Costs

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- ▶ However, we see big differences across VN firm types: 49% vs 46% exit rates for SOEs vs FIEs, 27% vs 93% entry rates
- ▶ Suggests firm-type-level barriers that affect entry and exit choices

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Empirical Approach

- ▶ Objective: estimate BTA impact on firms and firm-types in VN manufacturing sector
- ▶ Rely on variation of BTA tariff cuts across industries
- ▶ Examine evolution of outcomes over time

Industry Level Analysis

- ▶ Estimate the evolution of industries as a result of BTA:

$$Y_{jt} = \sum_{t'=2000 \setminus 2001}^{2017} \beta_{t'} \Delta BTA_j \mathbb{1}_{t'} + \lambda_j + \theta_t + \alpha_{jt} C_{jt} + \varepsilon_{jt}$$

where Y_{jt} is the outcome for industry j at year t , ΔBTA_j is change in log US tariff applied to VN imports in industry j before and after the BTA, indicator $\mathbb{1}_{t'}$ equals one for year t' , λ_j is industry-level fixed effects, θ_t is year fixed effects, and C_{jt} are controls for VN and CH MFA quotas as well as VN MFN tariffs.

Without controls

- ▶ $\beta_{t'}$ is the cumulative BTA impact on the outcome by each year
- ▶ BTA implementation year 2001 is the base year for outcome changes

Industry Level Analysis

- ▶ Estimate the evolution of industries as a result of BTA:

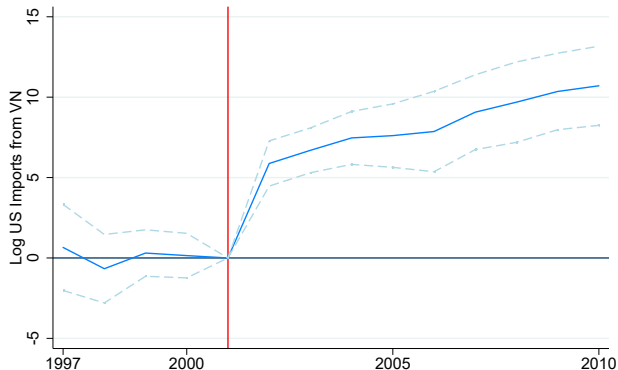
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Without controls

- ▶ $\beta_{t'}$ is the cumulative BTA impact on the outcome by each year
- ▶ BTA implementation year 2001 is the base year for outcome changes
- ▶ Short pre-BTA period due to data limitation

- We can establish a longer pre-BTA period with US imports from VN (UN Comtrade data)



BTA implemented in Dec 2001 (base year 2001). Dashed lines show 95 percent CIs.
 3-digit industry and year FEs included with standard errors clustered at the 3-digit industry level.
 MFA VN and CN quota controls as well as VN MFN tariffs are included.
 Weighted by year 1997 world imports from VN.

$$IM_{jt} = \sum_{t'=1997 \setminus 2001}^{2010} \beta_{t'} \Delta BTA_j \mathbf{1}_{t'} + \lambda_j + \theta_t + \alpha_{jt} C_{jt} + \varepsilon_{jt}$$

Summary of Industry Results

- ▶ Vietnamese industries subject to larger US tariff reductions expand relative to the industries with lower tariff cuts
 - ▶ Employment, firm counts, and revenue (noisy) Results
- ▶ Cumulative effects grow for 5-6 years after the BTA, after which they accumulate more slowly but continue to rise (firm count and employment) or begin to level off (revenue)
- ▶ Consistent with typical predictions, as resources and revenue allocate toward industries experiencing greater declines in variable export costs

Industry and Firm-type Analysis

- ▶ Next, focus on each firm type $o \in \{FIE, SOE, PRI\}$ respectively:

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

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 imports in industry j before and after the BTA, indicator $\mathbb{1}_{t'}$ equals one for year t' , λ_{jo} is industry-ownership-level fixed effects, θ_{ot} is ownership-year fixed effects, and C_{jt} are controls for VN and CH MFA quotas as well as VN MFN tariffs.

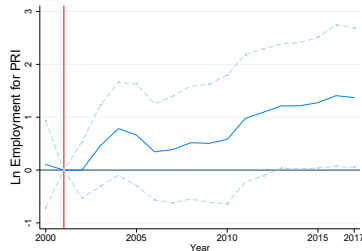
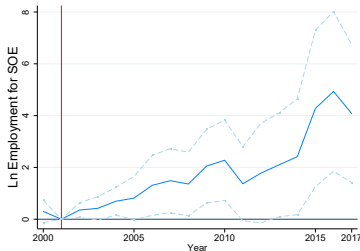
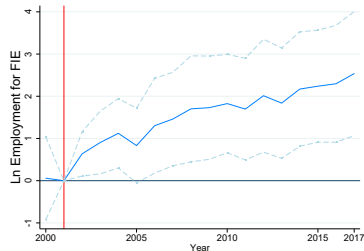
- ▶ $\beta_{ot'}$ is the cumulative BTA impact on the outcome on ownership o by each year

Longer pre-BTA period

Employment by Ownership

- ▶ Industries with larger tariff cuts experience expansion of foreign and private firms, smaller contraction of state firms (relative expansion given overall decline)

Firm Count Revenue



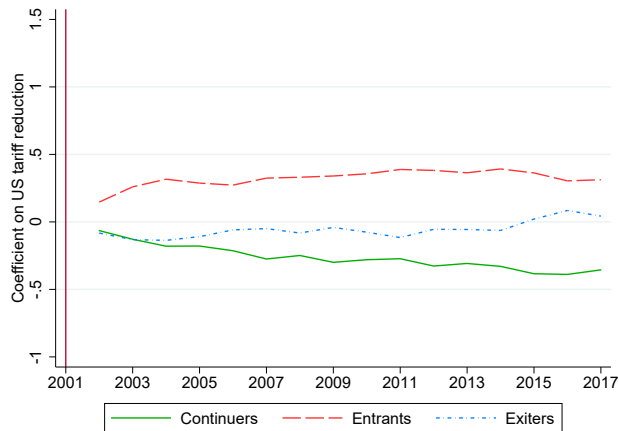
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Summary

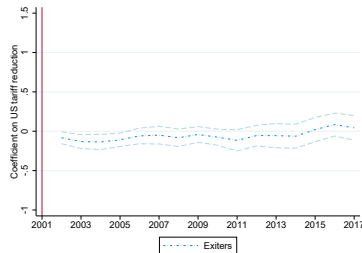
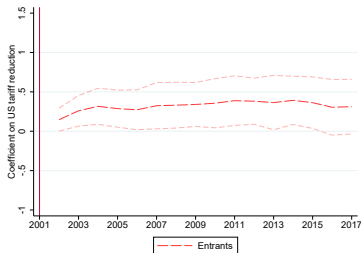
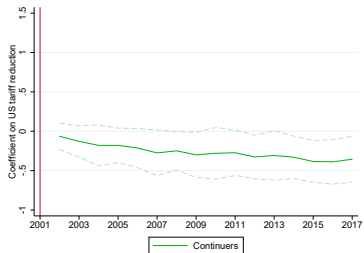
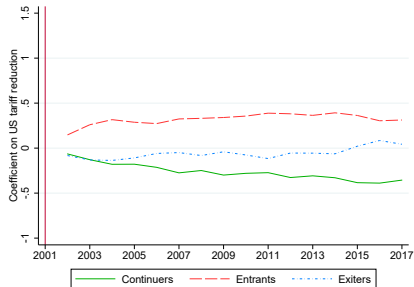
- ▶ Industry-level results are generally in line with traditional trade theory
- ▶ Industry and firm-type: industry-level expansion is predominantly driven by foreign firms (over private and state firms), and is sustained over time
 - ▶ Important to control for firm-type-year trends, especially for state firms
 - ▶ State firms are declining less in industries with higher cuts
- ▶ Next Question: How is employment share/market share reallocating across firm-types within industries?
 - ▶ Split firms into continuers, entrants, and exits (status)

Effects of BTA Tariff Cuts on Employment Shares by Firm Status

- ▶ Tariff cuts result in expansion of entrants, declines in continuing and exiting firms
- ▶ Entry response is particularly pronounced; Counter to typical predictions, continuers contract in response to lower tariffs



Effects of BTA Tariff Cuts on Employment Shares by Firm Status



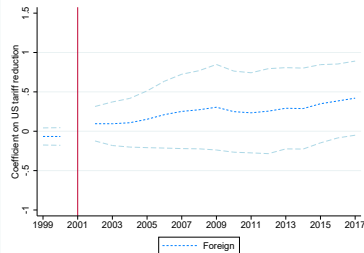
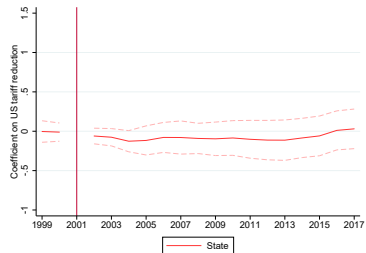
Effects of BTA Tariff Cuts on Employment Shares by Firm-Type

- Tariff cuts result in increased employment share of foreign firms, reduced private share, and no change for the state firms



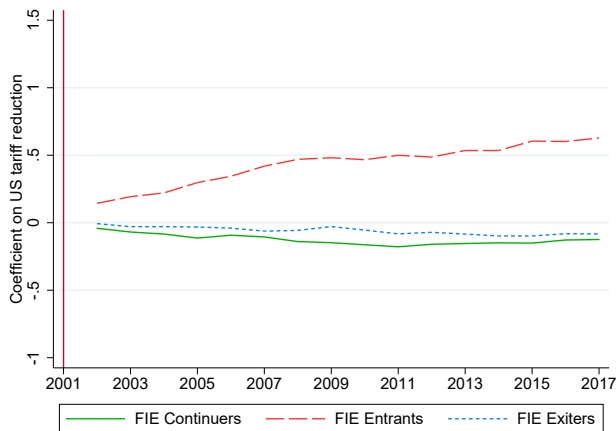
Longer pre-BTA period

Effects of BTA Tariff Cuts on Employment Shares by Firm-Type

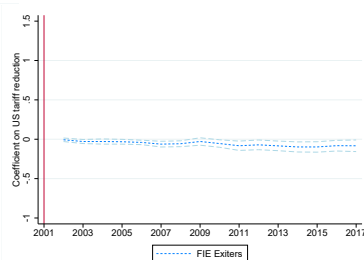
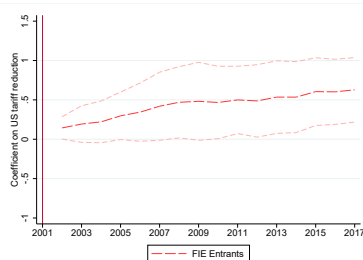
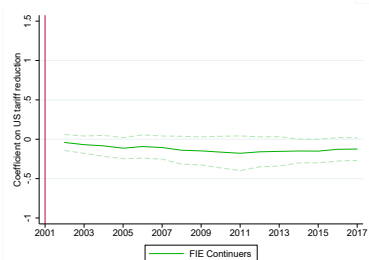
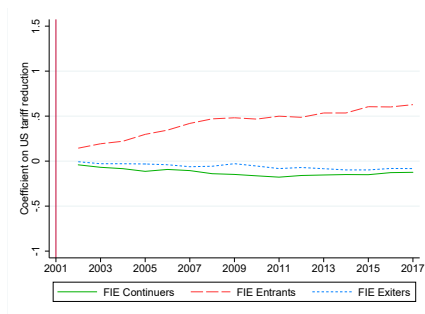


Effects of BTA Tariff Cuts on Employment Shares by Firm Status: Foreign

- Foreign firm entry is driving (1) overall employment growth in entrants and (2) overall growth in foreign firms, while foreign incumbents and exiters decline in employment shares

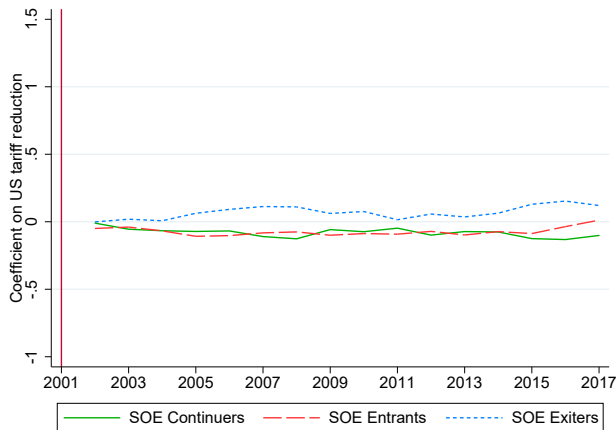


Effects of BTA Tariff Cuts on Employment Shares by Firm Status: Foreign

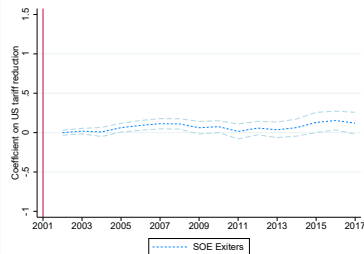
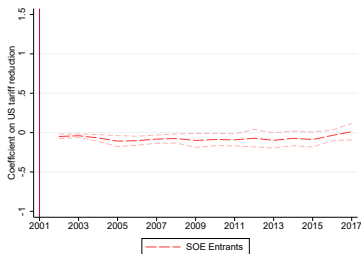
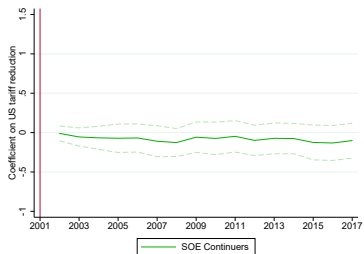
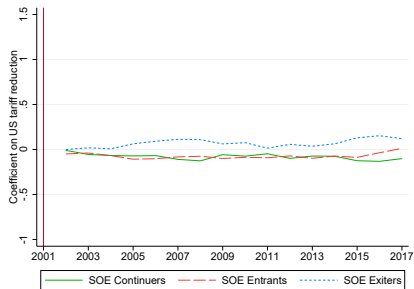


Effects of BTA Tariff Cuts on Employment Shares by Firm Status: State

- ▶ Tariff cuts lower state entrant employment shares but increase exit shares
 - ▶ Entrants enter at lower rates in high cut industries relative to lower one, exit rates are lower
 - ▶ Counter to benchmark model predictions: If everything is allocated efficiently before, we would expect the opposite result (entry contributing to and exit taking away from emp share)

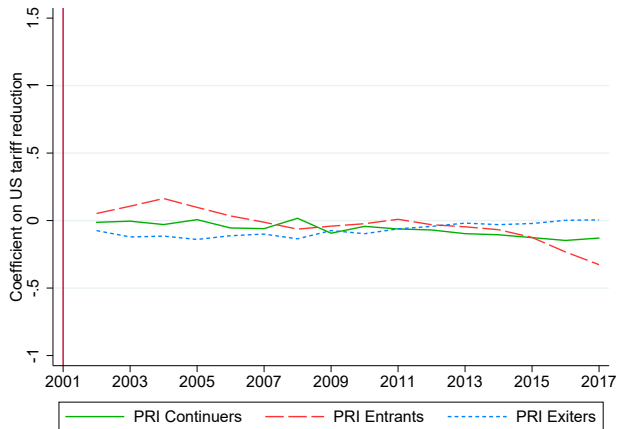


Effects of BTA Tariff Cuts on Employment Shares by Firm Status: State

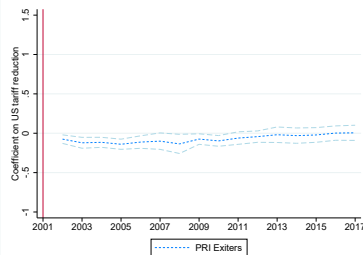
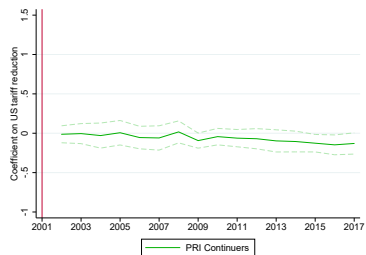
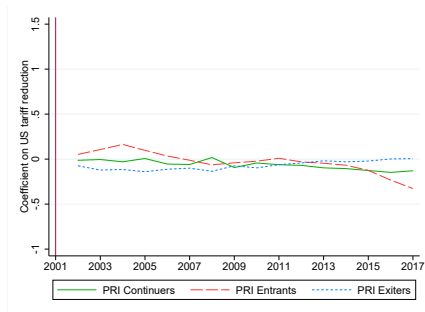


Effects of BTA Tariff Cuts on Employment Shares by Firm Status: Private

- Tariff cuts increase entrant and decrease exit shares initially, but diminishes over time



Effects of BTA Tariff Cuts on Employment Shares by Firm Status: Private



Effects of BTA Tariff Cuts on Employment Shares by Firm Status & Type

	All	Foreign	State	Private
Total		.42	.03	-.045
Continuers	-.36	-.12	-.1	-.13
Entry	.31	.63	.01	-.33
Exit	.04	-.08	.12	.005

2017 coefficient. Bolded term indicates statistical significance. Controls: initial employment shares interacted with year fixed effects and Chinese exports to the US.

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- ▶ Foreign firms play important role in BTA-induced reallocation, entry being key mechanism
- ▶ With less entry and exit, state firms stall reallocation in high-cut industries through exit
- ▶ BTA cuts affects private firms as expected, but cumulative effects diminish over time

Effects of BTA Tariff Cuts on Employment Shares by Firm Status & Type

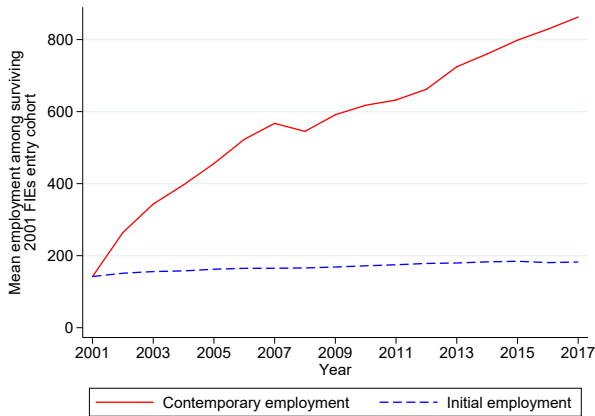
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- ▶ With less entry and exit, state firms stall reallocation in high-cut industries through exit
- ▶ BTA cuts affects private firms as expected, but cumulative effects diminish over time
- ▶ Focus on entry: how much of this is initial entrant size vs subsequent growth?

Growth after entry: Foreign firms that enter in 2001

- ▶ Foreign entrants are larger than average private entrant, and grow by a factor of > 4 by 2017



The figure tracks surviving firms within the 2001 entry cohort. Initial employment is the mean of entry employment (in 2001) among surviving firms in each year. Contemporary employment is the mean of contemporary employment among surviving firms in each year. FIE 2010 entry

Growth after entry: Private Firms that enter in 2001

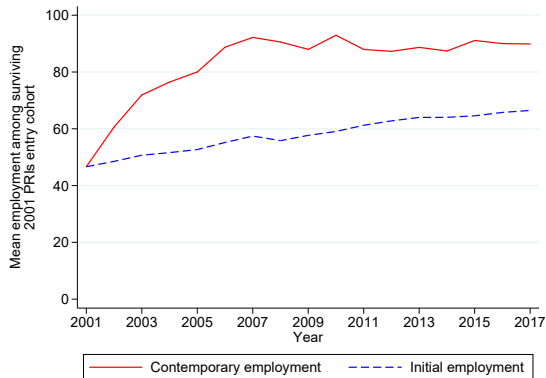
- ▶ Private entrants are smaller, and grow by less—factor of < 2 by 2017



The figure tracks surviving firms within the 2001 entry cohort. Initial employment is the mean of entry employment (in 2001) among surviving firms in each year. Contemporary employment is the mean of contemporary employment among surviving firms in each year. PRI 2010 entry

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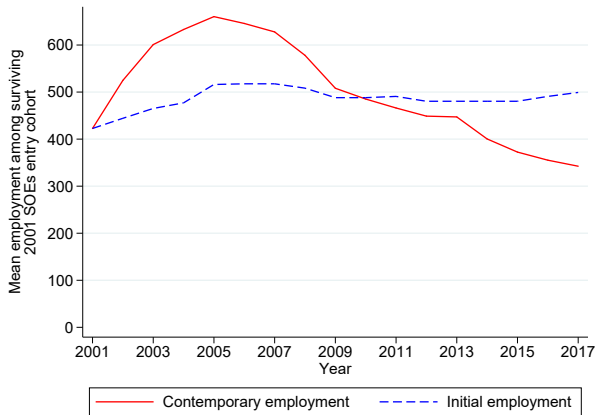
- ▶ Private entrants are smaller, and grow by less—factor of < 2 by 2017—Difference not driven by smaller private firm size (50 or more)



The figure tracks surviving firms within the 2001 entry cohort. Initial employment is the mean of entry employment (in 2001) among surviving firms in each year. Contemporary employment is the mean of contemporary employment among surviving firms in each year. PRI 2010 entry

Growth after entry: State Firms that enter in 2001

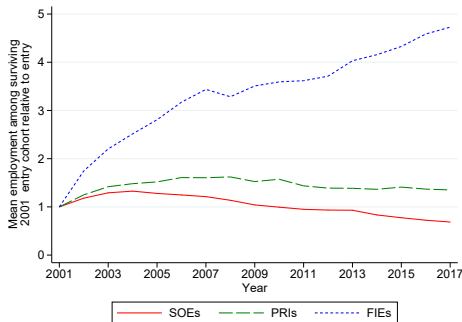
- ▶ State entrants are larger than average foreign entrant, but contract over time



The figure tracks surviving firms within the 2001 entry cohort. Initial employment is the mean of entry employment (in 2001) among surviving firms in each year. Contemporary employment is the mean of contemporary employment among surviving firms in each year. [SOE 2010 entry](#)

Growth after entry: Foreign, State, and Private Firms that enter in 2001

- ▶ Large differences in employment growth after entry across firm-types relative to initial employment—important to allow for longer term adjustments
- ▶ Decomposing tariff cut effects on employment share through foreign entry: half is due to initial entry size and half is subsequent growth



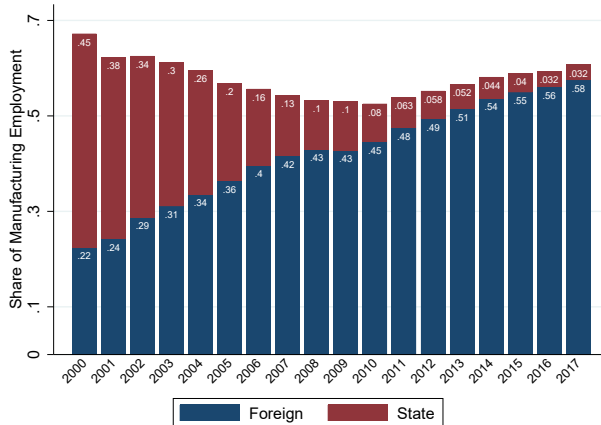
The figure shows the ratio of contemporary employment to initial employment among surviving firms within the 2001 entry cohort. Initial employment is the mean of entry employment (in 2001) among surviving firms in each year. Contemporary employment is the mean of contemporary employment among surviving firms in each year.

Conclusion

- ▶ This paper assesses the longer-term impact of a one-time trade policy reform on firms
- ▶ We find important differences in the effects of trade policy on foreign and private domestic firms in a low income country with a large state sector
 - ▶ Expansion is predominantly driven by foreign firms over private and state firms
- ▶ Results highlight the importance of studying the cumulative effect of trade shock on incumbents, entry, and exit by firm-type
 - ▶ Foreign entry drives overall reallocation, while state firms stall it through low exit rates
- ▶ Takeaway: entry and firm-types are two important factors to take into account when trying to understand the short- and long-term impact of trade liberalization episodes

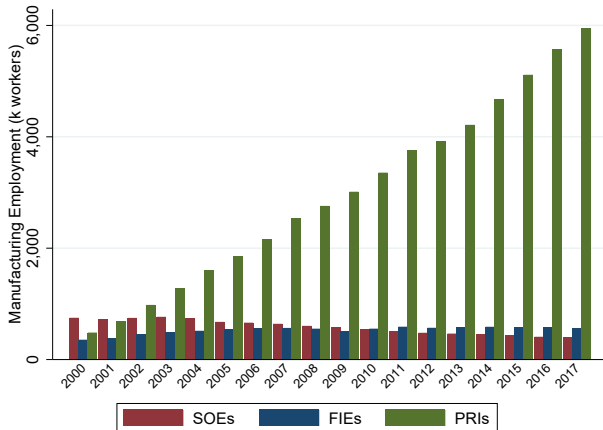
Manufacturing Sector in Vietnam: Employment Share

- ▶ Substantial increase of foreign-invested firms: 22% of employment in 2000, 58% by 2017
- ▶ Large decline of state-owned firms (45% to 3%), while private domestic firms grow (33% to 39%)



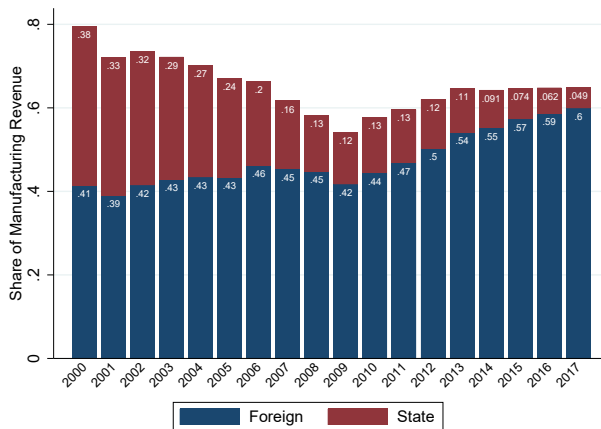
Manufacturing Sector in Vietnam: Employment by Initial Ownership

- ▶ Large initial state-owned sector: 47% of employment in 2000, 6% by 2017
- ▶ Large employment increase of initial private domestic firms (30% to 86%), less so for foreign-invested firms (22% to 8%)



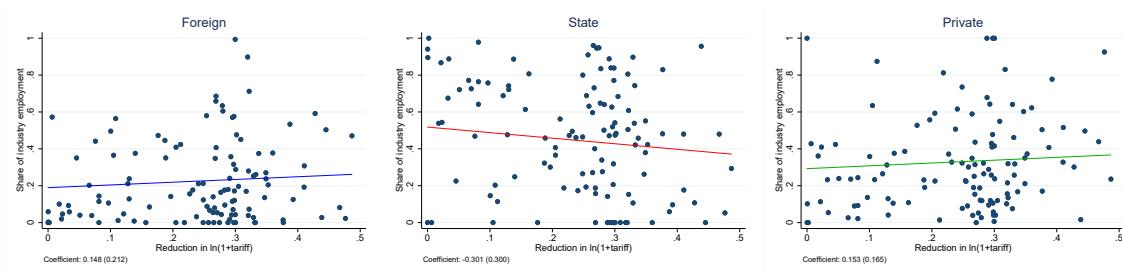
Manufacturing Sector in Vietnam: Revenue Share

- ▶ Large state-owned sector: 38% of revenue in 2000, < 5% by 2017
- ▶ Foreign-invested firms started with 41% of revenue with increase to 60% in 2017, increase in private domestic firms (20% to 35%)



Correlation of tariff cuts with initial ownership employment shares

- ▶ We do not find any strong correlation between the initial within industry employment shares for each ownership type and their corresponding industry-level BTA tariff cuts



The employment shares are in 2000. The tariff reduction is $\ln(1+\text{Column2}) - \ln(1+\text{MFN})$. Each observation is weighted by total industry employment in 2000.

FDI policy in the BTA

- ▶ Includes commitment that VN would open market access for US FDI, focusing on services
 - ▶ VN was already relatively open to FDI in manufacturing by the BTA
 - ▶ No manufacturing industries required special approval for an investment entry license under the 1996 Foreign Investment Law
 - ▶ Very few restricted sectors (tobacco, sugar and alcohol, chemicals, pharmaceuticals)
- ▶ BTA was viewed as a stepping stone to WTO
 - ▶ Commitment to eliminate gov screening of FDI, removal of all trade-related investment measures inconsistent with the WTO
 - ▶ Accomplished by the 2006 Unified Investment Law (covers all enterprises)
 - ▶ Freedom in terms of entry mode of foreign firms (full ownership vs joint venture)
 - ▶ Abolished local content requirements and export performance requirements
- ▶ 77% of manufacturing foreign employment were wholly owned in 2000, 95% by 2017

Year 2000	FIEs	PRIs	SOEs	Total
Revenue	97,714 (354,368)	6,531 (24,766)	61,041 (164,178)	23,896 (134,762)
Employment	342 (1,024)	68 (259)	464 (764)	155 (517)
Fixed Assets	70,681 (273,465)	1,666 (9,024)	18,791 (72,851)	11,206 (94,065)
Observations	1,041	7,711	1,536	10,288
Year 2010	FIEs	PRIs	SOEs	Total
Revenue	247,599 (1200159)	25,808 (331,469)	475,475 (2691214)	54,775 (598,227)
Employment	441 (1,643)	52 (214)	469 (746)	97 (578)
Fixed Assets	69,829 (305,568)	5,408 (44,063)	202,758 (1667545)	14,834 (232,545)
Observations	4,489	39,787	682	44,958

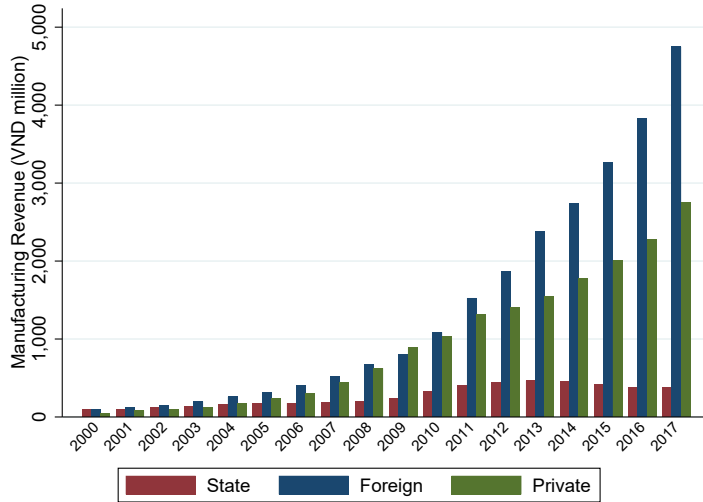
Revenue and Assets are measured in millions of Vietnamese Dong

Entry and Exit of Firms between 2000 and 2010

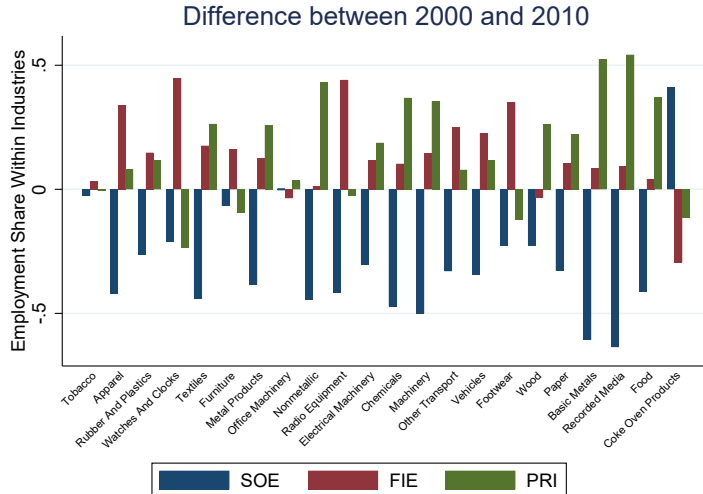
- ▶ Between 2000 and 2010, there are high exit and entry rates
 - ▶ 65% of firms that were operating in 2000 exited by 2010
 - ▶ These exiters made up 36% of revenue & 42% of employment in 2000
 - ▶ 92% of firms that were operating in 2010 were not in 2000
 - ▶ These entrants made up 68% of revenue & 73% of employment in 2010

	Firms	Share of Revenue	Employment
	All ownership types		
Exiters	0.65	0.36	0.42
Entrants	0.92	0.68	0.73

Manufacturing Sector in Vietnam: Revenue

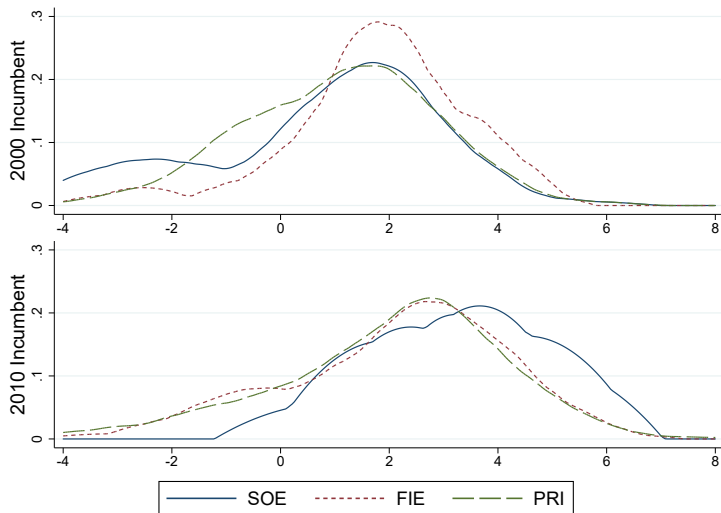


Ownership Distribution across Industries



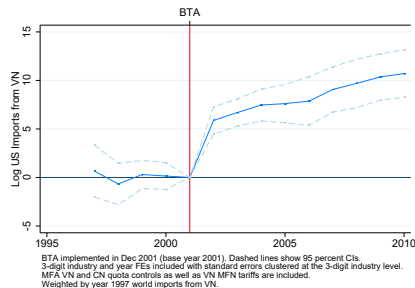
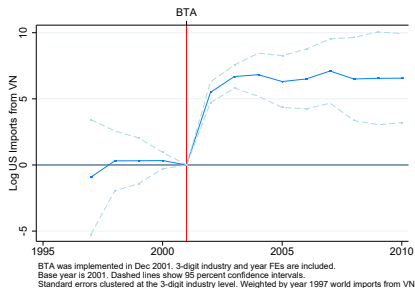
TFP across Firm-Types: Incumbents

- 2010 TFP convergence driven by SOE incumbents

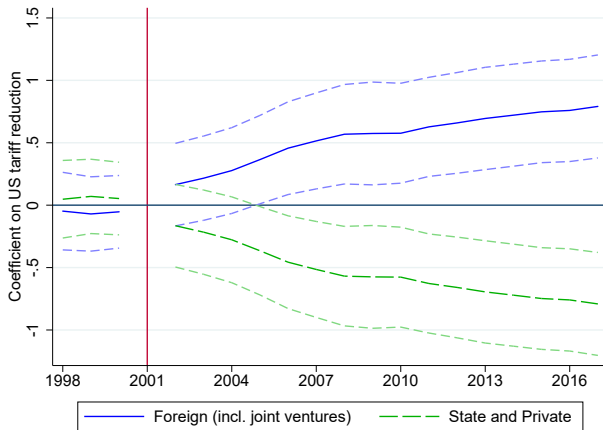


Comparison without and with controls

- ▶ The impact of BTA is large even in the absence of controls
- ▶ MFA expiry in 2005: VN exports were constrained before while CH exports would compete with subsequent VN exports
- ▶ VN joined WTO in 2007: reduction in VN MFN import tariffs

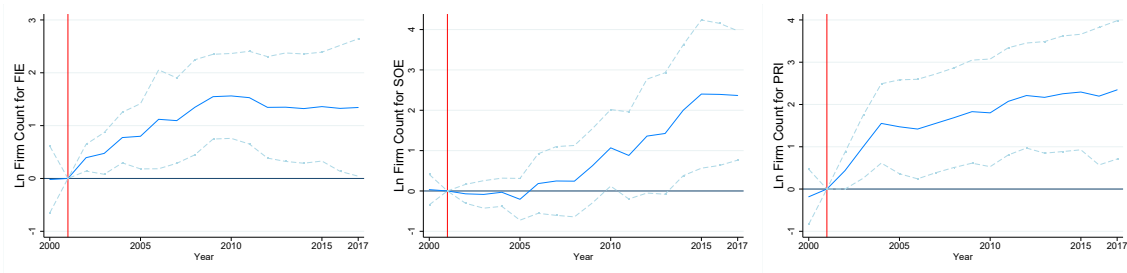


- We can establish a longer pre-BTA period using the 1998 Industrial Complete Survey for foreign vs state and private firms



PRIs and SOEs could not be separated in 1998 in a way consistent with later years because employment in joint stock companies was not listed as $> 50\%$ state or $\leq 50\%$ state as in the enterprise data. Hence, we don't know how to assign JSC employment to either state or private.

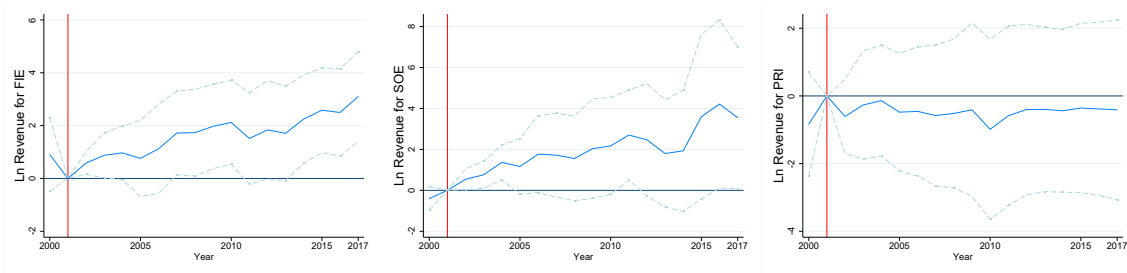
Firm Count by Ownership



BTA was implemented in Dec 2001 (base year 2001). Dashed lines show 95 percent Confidence Intervals. 4-digit industry and year FEs are included with standard errors clustered at the 4-digit industry level. MFA VN and CN quota controls as well as VN MFN tariffs are included. Weighted by year 2000 industry employment.

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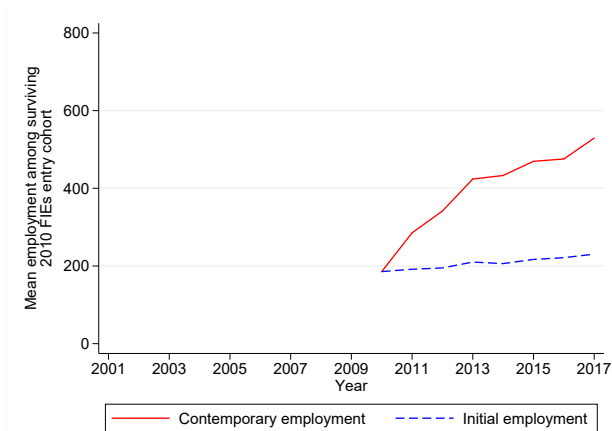
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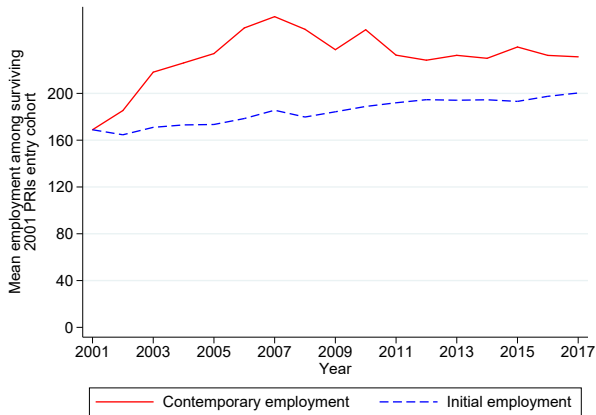
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Growth after entry: Foreign Firms 2010 Cohort



The figure tracks surviving firms within the 2010 entry cohort. Initial employment is the mean of entry employment among surviving firms in each year. Contemporary employment is the mean of contemporary employment among surviving firms in each year.

Growth after entry: PRIs entering with 50 or more workers



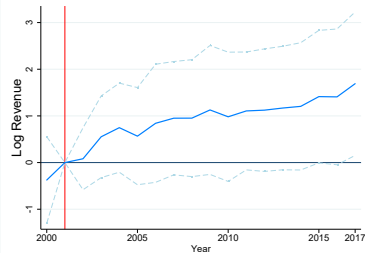
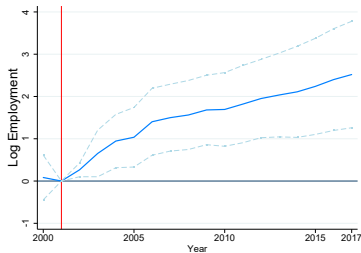
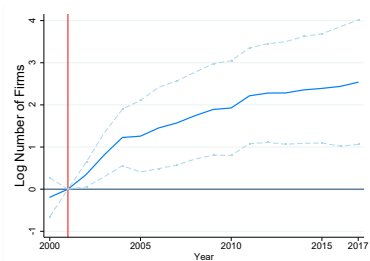
The figure tracks surviving firms within the 2001 entry cohort. Initial employment is the mean of entry employment among surviving firms in each year. Contemporary employment is the mean of contemporary employment among surviving firms in each year.

Growth after entry: SOEs 2010 cohort



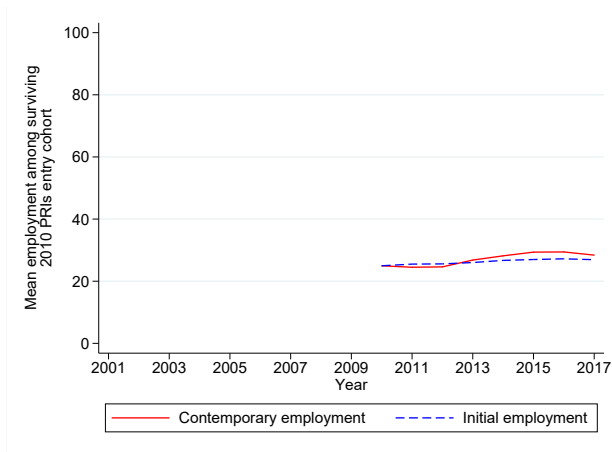
The figure tracks surviving firms within the 2010 entry cohort. Initial employment is the mean of entry employment among surviving firms in each year. Contemporary employment is the mean of contemporary employment among surviving firms in each year.

Industry Results



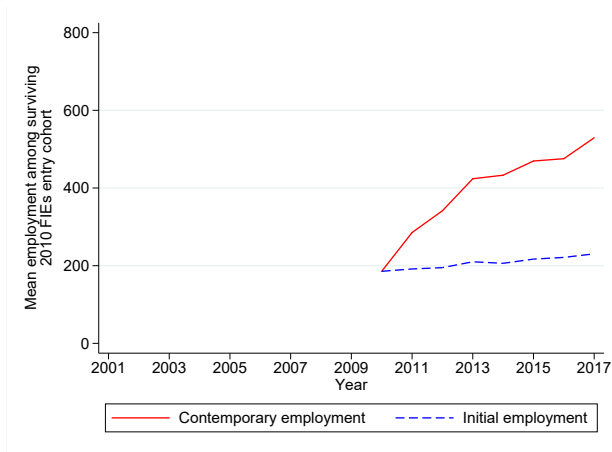
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Growth after entry: PRIs 2010 cohort



The figure tracks surviving firms within the 2010 entry cohort. Initial employment is the mean of entry employment among surviving firms in each year. Contemporary employment is the mean of contemporary employment among surviving firms in each year.

Growth after entry: FIEs 2010 cohort



The figure tracks surviving firms within the 2010 entry cohort. Initial employment is the mean of entry employment among surviving firms in each year. Contemporary employment is the mean of contemporary employment among surviving firms in each year.

Population Census employment estimates

- ▶ In 1999, based on workers age 15 to 64:
 - ▶ 35.06 million total workers
 - ▶ 3.15 million (9.0 percent) in manufacturing
 - ▶ 1.30 million (3.7 percent) in formal manufacturing
- ▶ In 2009, based on workers age 15 to 64:
 - ▶ 46.12 million total workers
 - ▶ 6.46 million (14.0 percent) in manufacturing
 - ▶ 3.68 million (8.0 percent) in formal manufacturing