Trade Liberalization and Engagement in Global Value Chains

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Abstract

Using a rich dataset that matches Chinese firms to their trade transactions for 2000-2006, we investigate the relationship between trade liberalization and firms' engagement in global value chains. We find that input tariff reductions significantly increase global sourcing of intermediate inputs on both intensive and extensive margins. Interestingly, the firms that import more intermediates sell more of their output to the domestic market while reducing their total export slightly. Finally, we find strong evidence that more domestic sales by importers in the upstream industries significantly increase the probability and value of export by firms in the downstream industries. Our results suggest that the input-output linkage along domestic value chains may be an additional channel through while trade liberalization may promote firms' engagement in global value chains. (JEL codes: F1, F2)

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1 Introduction

International production fragmentation has increased rapidly since the 1990s and the expansion of Global Value Chains (GVCs) has become the most significant phenomenon in the recent process of globalization and economic development. About 60% of global trade consists of trade in intermediate goods and services along GVCs (UNCTAD, 2013). Engagement in GVCs and technology upgrading along GVCs are viewed as an important development strategy for less developed countries. In this paper we focus on China's experience. Since its WTO accession in December 2001, China has unilaterally reduced tariffs on many imports. Imports of intermediate inputs tripled between 2000 and 2006. Over this period, China's role in supply chain trade has increased enormously and become the hub in Asian Factoty. As documented in Baldwin and Lopez-Gonzalez (2013), China and the United States are the biggest global suppliers of intermediate goods - each accounts for about 11% of global intermediate exports. China is also the biggest importer of intermediates, accounting for 13% of global intermediate imports. Thus, China has become more deeply engaged in GVCs since its WTO accession. China's recent experience poses interesting questions: does trade liberalization promote developing countries' participation in GVCs? If it does, what are the micro-level channels?

To investigate the relationship between trade liberalization and the engagement in GVCs, we use a rich dataset that matches Chinese firms to their trade transactions. The sample is for 2000-2006, covering the period when China joined the WTO at the end of 2001. The dataset contains information on firm attributes (e.g., firm size, capital intensity, value added, firm age etc.) and firm decisions regarding import, export, and domestic sales. Since we observe the firm-level imports at the 8-digit HS level, we are able to capture the firm-level input tariffs.

Our paper addresses the following questions: how do input tariff reductions affect a firm's decision on the global sourcing of their intermediate inputs? What is the direct impact of intermediate import on a firm's decison about export and domestic sales? Does global sourcing of intermediate inputs by upstream firms facilitate export by downstream firms through the input-output linkage? Previous studies suggest that trade liberalization promotes the import growth of intermediate inputs and directly benefit importers in terms

of increased productivity or production scope (Amiti and Konings, 2007; Goldberg et al., 2010). In contrast to the existing studies, this paper investigates both the direct export-import linkage and an indirect linkage that downstream firms benefit from trade liberalization through the input-output linkage along the domestic value chains.

Our investigation takes three steps. First, we examine how firms change their global sourcing of intermediates in response to input tariff reductions. In the estimation we adopt a difference-in-difference approach and use processing importers as a control group to disentangle the impact of trade liberalization from the effect of other shocks. Under China's "dual track" trade system, processing imports have been exempted from input tariffs and thus are not affected by the WTO accession. By contrast, ordinary (non-processing) imports face substantial tariff reductions after the WTO accession. We find strong evidence that ordinary importers substantially increase their intermediate imports in response to tariff reductions. Our estimates suggest that a 10 percentage point reduction in tariffs increases intermediate imports by 11.9% in general while increasing imports of core inputs by 21.8%. The unit value of imported intermediates increases as a result of tariff reductions. On the other hand, the import quantity falls in general while the quantity of imported core inputs increases substantially after tariff cuts. These results suggest that ordinary importers may upgrade their imported inputs and change their import mix by skewing toward their core inputs. Furthermore, reduced tariffs increase the probability of global sourcing of intermediate inputs, while reducing the probability of exiting from the import market.

Second, we examine the direct import-export linkage at the firm level. We use the firm-level input tariffs as an instrument for intermediate imports to identify the effect of imports on a firm's exports versus domestic sales. We find that an increase in intermediate imports raises the probability of entry into new high-income markets and sales to new foreign markets. However, the total value of exports is slightly lower for firms that import more intermediates as a result of input tariff reductions. On the other hand, firms with more ordinary imports sell more to the domestic market. Since these firms tend to produce higher-quality products compared to firms that serve only the domestic market (Bas and Strauss-Kahn, 2015), increased domestic sales by these importers may potentially generate

benefits to downstream firms through the input-output linkage.

Thus, as the third step, we further investigate whether downstream firms may benefit from trade liberalization through the input-output linkage along domestic value chains. We follow Voigtländer (1966) and use the information from the input-output table to construct a variable that captures the intensity of domestic sales by ordinary importers in the upstream industries. We find strong evidence that more domestic sales by upstream importers significantly increases the probability and the value of export by firms in the downstream industries. This provides evidence for the importance of intermediates inputs in promoting economic development through the input-output linkage and complementary in production chain as discussed in Jones (2011) and other papers.

Our paper is related to the recent literature that emphasizes the importance of intermediate inputs as a source of advanced technology for developing countries. Most studies focus on the effect of trade liberalization on firm productivity. For example, Amiti and Konings (2007) provide evidence that input tariffs have significant impacts on improving firm productivity for Indonesia. Goldberg et al. (2010) document that reduction of input tariffs gives more incentive to Indian firms to import more varieties and thus produce more varieties to the domestic market. However, all of these cited papers focus on the direct effect of trade liberalization on firm performance. In contrast to these studies, our paper also investigates the benefits of trade liberalization to downstream firms through the input-output linkage along domestic value chains.

This paper is organized as follows. Section 2 documents our data and institutional background about the trade liberalization in China. Section 3 examines the firm-level import response to input tariff reductions. Section 4 studies the direct impact of increased intermediate imports on firms' decision about export and domestic sales. Section 5 provides evidence that domestic sales by importers in the upstream industries may facilitate export activities by firms in the downstream industries through the input-output linkage. Section 6 concludes the paper.

2 Data and Institutional Background

2.1 The Matched Firm-Trade Data

Our data mainly come from two sources. The first is the disaggregated trade transaction data at the 8-digit HS level from Chinese Customs. The dataset covers monthly import and export for 2000-2006. The variables include trade type (e.g., processing trade or ordinary trade), value, quantity, and contact information for firms (e.g., company name, telephone, zip code, contact person). The statistics are summarized in Chinese Customs Statistical Yearbooks. The second data source comes from the National Bureau of Statistics Enterprise Dataset for 1998-2007. The National Bureau of Statistics of China (NBS) obtains annual reports from all state enterprises and large- and medium-sized non-state enterprises (with sales above 5 million RMB) in the manufacturing sector. The annual reports contain information on financial statement and nonfinancial variables such as contact information, age, location, industry, ownership structure and main products of the enterprises. The key variables include capital intensity, employment, gross output, intermediate inputs, value added and wages. Based on this dataset, the basic statistics on the aggregate manufacturing sector are summarized in China Statistical Yearbooks (NBS, 1999-2008), and the statistics on the 2-digit manufacturing industries are summarized in China Industry Economy Statistical Yearbooks (NBS, 1999-2008).

We match trade transactions with firm survey data based on the firm contact information. In total 86,835 firms are matched.The matched trade and firm sample covers more than 70% of firm exports in the manufacturing sector. The sample coverage of trade is comparable to the 75% reported in Bernard et al. (2005) about their link between trade transactions and U.S. firms. Because a higher proportion of domestic firms trade through the intermediary of trading companies, the firm-trade matched sample has a lower coverage for domestic firms than for other ownership types. See Appendix **??** for more detail about the data matching.

2.2 Trade Liberalization in China

Our sample period, 2000-2006, covers the period when China joined the WTO (December 2001). As a commitment to the WTO accession, China agreed to lower its average tariff levels on industrial products to 8.9%, and to eliminate all quotas, licenses, tendering requirements and other non-tariff barriers to imports of manufactured goods by 2005. The motivation of China's WTO accession is not only to integrate into global economic system, but more importantly, to advance the domestic reform agenda and speed up the transition into a market economy (Branstetter and Lardy, 2006).

A key feature of China's trade regime is dual-track: an open trade regime for foreign firms and processing traders, and a restrictive regime for ordinary traders. Feenstra (1998) called it "one country, two systems." This dualistic trade regime has been extensively discussed in Feenstra (1998) and Branstetter and Lardy (2006). Before the WTO accession, the Chinese government provides special privileges to processing traders. Imports of intermediate inputs used in the production of goods for export are duty free. Since processing importers are exempted from tariffs, import tariff reductions from the WTO accession have differential effects on processing traders and ordinary traders. We note that this type of special treatment toward processing importers is not unique to China. For example, other developing countries such as Vietnam and Mexico also provide favorable policy to promote processing export.

Previous studies largely use the industry-level input tariff reductions to capture the extent of trade liberalization (e.g., Amiti and Konings, 2007; Goldberg et al., 2010). However, industry-level tariffs may mask the large variation in tariff reductions across firms within an industry and thus likely understate the extent of tariff reductions experienced by individual firms. In addition, firms in many industries may import some general-purpose inputs such as computers and transportation equipments. As a result, a firm's actual imports may not fall into a particular 8-digit HS product category that corresponds to the particular 4-digit CIC industry code with which the firm is affiliated. To avoid the aggregation bias and potential mismatch for the tariff coverage, we thus construct firm-level input tariffs and use them as an instrument for firms' import decisions. Specifically, we compute the firm-level input tariffs as $\tau_{it} = \sum_{g=1}^{G_i} \tau_{gt}/G_i$, where τ_{gt} is the applied MFN

tariff rate at the 8-digit HS level, and G_i is the number of imported inputs by importer i over the sample period. Here, the input set includes all imported inputs over the sample period and each input is given an equal weight. Since the input set is fixed over the sample period, the firm-level tariff reductions reflect changes in the tariff rates rather than a shift in the mix of imported inputs.

Table 1 provides the summary statistics of firm-level tariffs by 2-digit CIC (Chinese Industry Classification) industry for 2000 and 2006. It can be seen that there is a wide variation in the firm-level tariffs within industries. The industry average of firm-level tariffs also varies across industries. However, this between-industry variation is smaller than the within-industry cross-firm variation. A comparison of the tariff rates between 2000 and 2006 also reveals that tariffs reduced across all industries. However, firms in some industries experienced more tariff cuts.

Table 2 shows the growth of imports from 2000 to 2006. Overall, the growth of ordinary imports is higher than the growth of processing imports. This is expected since only ordinary imports are affected by tariff cuts.

Table 3 displays the share of ordinary exporters that also have ordinary imports. Looking at exports to all markets, we can see a declining share. If we separate export markets by income level, we can see that this share is very stable for exports to high-income markets, but appears declining for exports to low-income markets. This pattern suggests that increasingly exports to low-income markets have only domestic content. Finally, as expected, the share is higher for exports to high-income markets and lower for exports to low-income markets.

3 Import Response to Trade Liberalization

Now we focus on the firm-level import response to tariff cuts. There are two major differences from previous studies. First, most studies use industry-level tariffs to capture the extent of trade liberalization experienced by individual firms. For example, Amiti and Konings (2007) assume that all firms within the same industry use the same proportion of inputs in order to compute input tariffs using input-output tables. However,

doing this may generate measurement errors because firms within the same industry may use very different input bundles. In contrast, our analysis is at the most detailed level (firm×product×sourcing country×year). We match the applied MFN tariff rate at the 8-digit HS level to the specific 8-digit HS product that a firm imports.

Second, most studies rely on the over-time variation in tariffs to identify the tariff effect on imports. However, after year dummies are controlled for, the within-industry over-time variation in tariffs often becomes small. In contrast, our analysis has a clean control group. A feature of China's trade regime is that the tariff policies are differential toward processing and ordinary importers: unlike ordinary importers, processing importers do not face tariffs if the imported inputs are used for further processing and the finished goods are exported. Since processing importers are exempted from tariffs long before the WTO accession, tariff cuts after the WTO accession have no direct effects on processing importers. Moreover, some industry policies may affect both ordinary and processing traders. For example, the Chinese government provides favorable trade policies for the high-tech industries, certain regions, foreign invested enterprises, and firms that import high-tech equipment for technology upgrading. The use of processing importers as a control group can allow us to control for the effect of these common industry policy changes.

We look at the import response in terms of both intensive and extensive margins. The intensive margin is measured by the total value of imports, and the unit value and quantity of imports. The extensive margin is measured by an entry into or an exit from the import market at the firm-product-sourcing country level. Specifically, if firm f starts importing a new 8-digit HS input g or importing from a new sourcing country c in year t, the entry dummy (defined at the $f \times g \times c \times t$ level) is equal to one. Similarly, if firm f stops importing an 8-digit HS input g or importing from a sourcing country c in year t, the exit dummy (defined at the $f \times g \times c \times t$ level) is equal to one.

To examine the import response to tariff cuts, we use the following specification:

$$\begin{aligned} ImportMargin_{fgct} &= \alpha \cdot Ordinary_{fgct} \cdot Tariff_{gt} + \beta \cdot Ordinary_{fgct} \\ &\quad + Z_{f,t-1}\gamma + D_g + D_c + D_t + \varepsilon_{fgct}, \end{aligned} \tag{1}$$

where $ImportMargin_{fgct}$ is the import margin for firm f that imports good g from country c in year t; $Ordinary_{fgct}$ is an indicator for ordinary imports (i.e., non-processing imports); and $Z_{f,t-1}$ is a vector of firm characteristics, including an indictor for domestic firms, firm productivity, firm size (log employment), capital-labor ratio, average wage, and firm age; D_g, D_c and D_t represent product, sourcing country and year fixed effects; and ε_{fgct} is the error term. Note that since processing imports are exempted from tariffs, $Tariff_{gt}$ is dropped from specification (1). In addition, the log of real exchange rate is included to capture the exchange rate shocks. The real exchange rate is computed as nominal exchange rate of country c's currency (relative to RMB) divided by the relative CPI. The real exchange rate is normallized as 100 in 1999.

Table 4 presents the regression results for imports of intermediate inputs in response to tariff cuts. In column 1, the coefficient on the interaction between tariffs and the indicator for ordinary imports is significantly positive, suggesting that a 10 percentage point reduction in tariffs on average increases ordinary imports by 11.9%. Columns 2-3 decompose the total value of imports into the unit value and quantity of imports, respectively. The estimates suggest that a 10 percentage point reduction in tariffs increases the unit value of ordinary imports by 18% while reducing the quantity of ordinary imports by 6.1%. Since the unit value is positively related to the quality of inputs, the results suggest that in response to trade liberalization, firms have an incentive to upgrade their inputs. In addition, the increased total value of imports in response to tariff cuts mainly stems from a higher unit value rather than a larger volume of imports.

Columns 4-5 show the results for the extensive margin of imports. The estimates imply that reduced tariffs may increase the probability of entry into a new import market, i.e., importing a new product or importing from a new sourcing country. On the other hand, reduced tariffs decrease the likelihood of exiting from an existing import market, i.e., stops importing an existing product or stops importing from an existing sourcing country. Overall, we find strong evidence that ordinary imports increase substantially in response to tariff reductions, and both intensive and extensive margins move in the same direction.

We also include real exchange rate to control for the effect of exchange rate shocks on the imports of intermediate inputs. The results are mixed. According to our definition of

real exchange rate, an increase in the real exchange rate indicates a real appreciation of RMB against the foreign currency. The results suggest that a real appreciation of RMB by 10% may increase the volume of intermediate imports by 1.1%, and reduce the probability of exiting from the import market by 0.2%. On the other hand, a real appreciation of RMB may also reduce the unit value and total value of intermediate imports and reduce the likelihood of entry into a new import market.

The results for firm controls are largely consistent with the view that better firms import more intermediate imports. Specifically, firms that are more productive, bigger, more capital intensive, pay higher wages (a proxy for worker skills), and younger (a proxy for newer technology vintage) tend to import more.

Table 5 reports the results for core inputs. Core inputs are defined as those with the highest value of imports by a particular firm from a particular country. The results are very similar to those presented in Table 4.

4 Import, Export and Domestic Sales

Existing studies largely focus on the effect of increased imports on firm performance and firm productivity in particular. In our analysis, we will instead examine a firm's decision about export and domestic sales. We focus on ordinary traders because processing importers are obligated to export the finished products that contain the content of duty-free imported inputs. In contrast to processing traders, ordinary traders may have a greater effect on domestic industries through the input-output linkage along domestic value chains. In this section, we estimate the direct impact of increased imports on export and domestic sales. In the next section, we will study the indirect impact of increased imports in upstream industries on firm export in downstream industries.

We use the following specification:

$$Y_{ft} = a \cdot M_{ft} + Z_{f,t-1}b + D_i + D_t + \mu_{ft} \tag{2}$$

where Y_{ft} represents firm f's decision with regard to export and domestic sales in year t; M_{ft} represents firm f's total value of intermediate imports in year t; $Z_{f,t-1}$ is a vector

of firm characteristics; D_i and D_t are industry and year fixed effects; and μ_{ft} is the error term.

We note that M_{ft} may be endogenous. For example, import and export decisions may be determined simultaneously. Also, some unobserved firm characteristics may increase both import and export or domestic sales. To deal with the possible endogeneity of M_{ft}, we construct the firm-level tariffs as an instrument for import M_{ft}. Table 6 present the 2SLS estimates.

Column 1 shows a negative relationship between intermediate imports and total export for ordinary traders. However, as shown in columns 2-3, although the total value of exports is lower for firms that import more intermediates, both the share of exports to a new market and the probability of entering into a new high-income markets are higher for firms with more intermediate imports. Therefore, the results suggest that ordinary traders might adjust their product/market mix. This pattern is also consistent with the results in Tables 4-5 that the unit value of intermediate imports on average rises as a result of tariff cuts. All these results imply that these ordinary traders might upgrade their technology in response to trade liberalization.

Column 4 presents the result for domestic sales. The estimate suggests a very strong positive relationship between intermediate imports and domestic sales. A 10% increase in intermediate imports is associated with a 1% increase in domestic sales. Increased domestic sales associated with increased imports resulting from trade liberalization potentially can benefit downstream firms because the output of these firms is of higher quality compared to firms that only serve the domestic market. Consistent with this view, Table 6 also shows that more productive, more capital intensive, and younger firms expand domestic sales more than their export. As a result, the ratio of exports to total sales is lower for firms that import more intermediate inputs, and firms with higher productivity, capital-labor ratio, and more recent technology vintage.

Table 7 presents the results from robustness checks. First, we replace the total value of imports with a weighted sum of imports: $\Sigma_c SM_{fct} \cdot GDPC_c$ where SM_{fct} is the share of imports from country c in firm f's total imports for year t, and $GDPC_c$ is the log of GDP per capita of sourcing country c in 2000. If a firm imports more from higher-income

countries, this weighted sum of imports will have a higher value. Since imports from high-income countries tend to have a higher technology content, a higher value of the weighted sum of imports may indicate a higher technology content of imports. As shown in Table 7, the results are similar to those when the total value of imports is used. This is not surprising given the fact that Chinese imports are mostly from high-income countries.

We also experiment with an alternative measure of firm-level tariffs. In the above, we used a simple average of tariffs for the goods that a firm imports. Now we use a weighted measure where the weights are the share of imports of an input in a firm's total imports. That is, we give a bigger weight on the inputs with a larger share in a firm's total imports. Again, the results are very close to those presented in Table 6.

We also run OLS regressions by ignoring the possible endogeneity of M_{jt}. The key difference from the 2SLS estimates is that the OLS estimates suggest a positive relationship between imports of intermediates and total value of export. However, as pointed out above, the OLS results likely overestimate the impact of imports on export decisions because it is likely that unobserved firm characteristics may increase both import and export.

5 The Input-output Linkage and Export by Downstream Firms

Now we turn to the indirect impact of increased imports in upstream industries on firm export in downstream industries. This indirect impact through the input-output linkage along domestic value chains has not been examined in the literature. A key part of this analysis is to construct a variable that can capture the intensity of domestic sales by ordinary importers in upstream industries. The idea is borrowed from Voigtländer (1966) which examines how skill intensity in upstream industries may increase the skill demand by downstream industries. Let $X_i = \sum_{j \neq i} X_{ij}$ represent total (nominal) expenditures for manufacturing inputs purchased by industry i. Note that the use of inputs by the same industry is excluded in the sum. The intermediate input shares are then given by $a_{ij} = X_{ij}/X_i$, and computed using China's input-output tables for 2002. Then the

intensity of domestic sales can be calculated as $\sigma_{it} = \sum_j a_{ij} S_{jt}$, where S_{jt} is the ratio of domestic sales by ordinary importers over total domestic sales in industry j in year t. The value of σ_{it} will be higher if downstream industry i uses a higher share of input supplies from upstream industries with a higher ratio of domestic sales by ordinary importers over total domestic sales, that is, ordinary importers play a more important role in the domestic supplies.

To examine the impact of the input-output linkage along the domestic value chains, we augment specification (2) by including σ_{it}. We also add a control for industry i's import intensity (defined as a ratio of imported intermediates over total intermediate inputs). Note that industry i here represents firm f's industry affiliation. Furthermore, similar to Table 6, we instrument M_{ft} using firm-level tariffs (with equal weights on imported inputs).

The results are given in Table 8. The results suggest that σ_{it} is significantly and positively related to both intensive and extensive margin of export by firms in downstream industries. However, there is no effect of own industry's import intensity on firms' export behavior. The results for firms' own imports of intermediate inputs are almost unchanged after adding the two industry-level variables.

Overall, we find evidence that domestic sales by ordinary importers in upstream industries may benefit firms in downstream industries in terms of increased export activities.

6 Conclusion

In this paper we investigate the relationship between trade liberalization and the engagement in GVCs. We use a rich dataset that matches Chinese firms to their trade transactions for 2000-2006. Our sample covers the important period when China joined the WTO in December 2001. Our analysis addresses the following questions: how do input tariff reductions affect a firm's decision on the global sourcing of their intermediate inputs? What is the direct impact of intermediate import on a firm's decison on export and domestic sales? Does global sourcing of intermediate inputs by upstream firms facilitate export by downstream firms through domestic value chains?

Our main findings are as follows. First, we find strong evidence that ordinary importers substantially increase their intermediate imports in response to tariff reductions. Our estimates suggest that a 10 percentage point reduction in tariffs increases intermediate imports by 11.9% in general while increasing imports of core inputs by 21.8%. The unit value of imported intermediates increases as a result of tariff reductions. Furthermore, reduced tariffs increase the probability of global sourcing of intermediate inputs, while reducing the probability of exiting from the import market.

Second, we find that an increase in intermediate imports raises the probability of entry into new high-income markets and foreign sales to new high-income markets. However, the total value of exports is slightly lower for firms that import more as a result of input tariff reductions. On the other hand, firms with more ordinary imports sell more to the domestic market.

Third, we find strong evidence that more domestic sales by importers in upstream industries significantly increase the probability and value of export by firms in downstream industries. Our results suggest that the input-output linkage along domestic value chains may be an additional channel through while trade liberalization may promote firms' engagement in global value chains.

Appendix

A Matching Customs and NBS Firm Survey Datasets

The trade dataset from Chinese Customs includes monthly product level data of all Chinese firms' import and export from 2000 to 2006. Each firm is identified by a unique firm ID number and associated with detailed contact information including company name, address, zip code, contact person name, telephone number, and email. In addition, each firm is characterized by its ownership type – state-owned, privately-owned, or foreign-owned. Each trade transaction is recorded at the 8-digit HS level, and covers information on partner country, total value, and quantity of trade. The value of trade is denominated in the current month (and year) U.S. dollars. In addition, the data indicate the trade regime – ordinary or processing trade.

The NBS dataset includes annual financial and nonfinancial variables of all state enterprises and large-and medium-sized non-state enterprises (with sales above 5 million RMB) in the manufacturing sector from 1998 to 2007. Each firm is identified by a unique firm ID number and associated with detailed contact information similar to that of the Customs dataset. Each firm is characterized by its ownership type and a 4-digit Chinese Industry Code. Additional firm variables used in our analysis include capital stock, employment, gross output, value added, export value, domestic sales, and firm age

To be consist with the annual NBS Dataset, we use the monthly exchange rate between Chinese yuans and U.S. dollars to convert the value of trade in terms of RMB, and aggregate the monthly data to an annual value by firm, trade partner, product (8-digit HS), and year. Since the trade data and the panel data of firms use different ID numbers, we match these two datasets based on the contact information for firms. The vast majority of firms (94 percent) are matched by company names exactly. An additional 4 percent are matched by zip code and contact person exactly, and the remaining 2 percent of firms are matched by telephone number exactly. The matched sample covers about 70 percent of total manufacturing exports. The remaining 30 percent of exports are largely done through trading intermediaries.

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Table 1: Summary statistics of firm-level tariffs by 2-digit CIC industry

		2000					2006				
CIC	Industry label	mean	std	90%	50%	10%	mean	std	90%	50%	10%
13	Agro-food processing	0.230	0.247	0.419	0.171	0.040	0.095	0.084	0.161	0.085	0.030
15	Beverage	0.214	0.161	0.372	0.169	0.086	0.093	0.060	0.189	0.083	0.030
18	Textiles and garments, shoes, hat	0.211	0.066	0.277	0.211	0.122	0.110	0.040	0.160	0.100	0.075
14	Food	0.204	0.125	0.310	0.188	0.100	0.112	0.067	0.190	0.100	0.050
29	The rubber products	0.186	0.176	0.272	0.143	0.078	0.077	0.028	0.100	0.076	0.050
42	Handicrafts and other manufacturing	0.175	0.107	0.280	0.172	0.060	0.087	0.056	0.156	0.082	0.014
19	Leather, fur, feathers (velvet) and its products	0.173	0.059	0.250	0.180	0.090	0.092	0.040	0.140	0.087	0.051
16	Tobacco	0.173	0.106	0.290	0.123	0.081	0.036		0.036	0.036	0.036
24	Cultural Sporting Goods	0.173	0.051	0.243	0.175	0.100	0.084	0.051	0.156	0.082	0.005
23	Printing and record medium reproduction	0.165	0.054	0.220	0.153	0.120	0.076	0.041	0.109	0.075	0.030
21	Furniture	0.162	0.057	0.220	0.165	0.080	0.046	0.050	0.100	0.036	0.000
37	Transport Equipment	0.156	0.080	0.250	0.140	0.082	0.076	0.043	0.105	0.075	0.033
17	Textiles	0.154	0.087	0.222	0.149	0.080	0.108	0.092	0.218	0.080	0.050
30	Plastics	0.152	0.042	0.200	0.157	0.100	0.066	0.032	0.100	0.066	0.030
41	Instrumentation and culture, office machinery	0.135	0.046	0.200	0.126	0.083	0.055	0.040	0.100	0.056	0.003
39	Electrical machinery and equipment	0.133	0.045	0.181	0.127	0.080	0.066	0.040	0.100	0.066	0.010
28	Chemical fiber manufacturing	0.132	0.047	0.163	0.154	0.060	0.070	0.021	0.089	0.070	0.050
34	Fabricated metal products	0.129	0.050	0.195	0.121	0.080	0.076	0.037	0.112	0.077	0.030
31	Non-metallic mineral products	0.127	0.062	0.200	0.120	0.050	0.062	0.042	0.100	0.065	0.010
26	Chemical materials and chemical products	0.126	0.062	0.180	0.120	0.065	0.063	0.031	0.097	0.064	0.023
40	Computers, communications and other electronic equipment	0.122	0.041	0.170	0.119	0.079	0.042	0.036	0.086	0.040	0.000
35	General Equipment	0.120	0.043	0.173	0.116	0.078	0.070	0.031	0.100	0.073	0.030
36	Special Equipment	0.119	0.041	0.173	0.112	0.078	0.063	0.030	0.097	0.066	0.021
27	Pharmaceutical	0.117	0.050	0.163	0.110	0.076	0.064	0.040	0.100	0.060	0.030
22	Paper and paper products	0.115	0.077	0.194	0.130	0.014	0.042	0.038	0.083	0.050	0.000
20	Wood processing and wood, bamboo, rattan, palm and grass products	0.111	0.087	0.200	0.101	0.021	0.044	0.044	0.100	0.040	0.000
25	Petroleum processing, coking and nuclear fuel processing	0.100	0.046	0.150	0.100	0.056	0.055	0.031	0.080	0.062	0.000
32	Ferrous metal smelting and rolling processing	0.083	0.093	0.155	0.081	0.000	0.046	0.035	0.092	0.043	0.000
33	Non-ferrous metal smelting and rolling processing	0.081	0.055	0.160	0.080	0.020	0.046	0.039	0.097	0.049	0.000

Table 2: Import growth

	Total imports		Intermediate imports	
	processing imports	ordinary imports	processing imports	ordinary imports
2000	100.0	100.0	100.0	100.0
2001	107.3	127.7	103.0	114.9
2002	141.5	143.7	130.9	128.0
2003	185.7	219.8	168.4	196.2
2004	270.8	306.5	221.7	259.9
2005	314.4	313.8	270.2	280.6
2006	352.8	367.7	298.5	326.5

Table 3: The share of ordinary exporters that also have ordinary imports

	All markets	High-income markets	Low-income markets	# firms
2000	0.444	0.428	0.339	20555
2001	0.443	0.426	0.333	24018
2002	0.440	0.433	0.334	28931
2003	0.447	0.449	0.314	35256
2004	0.422	0.430	0.289	42384
2005	0.415	0.426	0.297	47323
2006	0.407	0.428	0.305	48741

Table 4: Intermediate imports in response to tariff cuts

	log_m	log_p	log_q	entry	exit
	(1)	(2)	(3)	(4)	(5)
TariffxOrdinary import dummy	-1.189***	-1.800***	0.611***	-0.320***	0.270***
	(0.193)	(0.102)	(0.203)	(0.0131)	(0.0271)
Ordinary import dummy	-0.849***	0.478***	-1.327***	0.0468***	0.0959***
	(0.0243)	(0.0163)	(0.0289)	(0.00151)	(0.00313)
Log (real exchange rate)	-0.0911**	-0.204***	0.113**	-0.0608***	-0.0173**
	(0.0396)	(0.0271)	(0.0447)	(0.00767)	(0.00764)
Domestic firm	0.240***	0.0521**	0.188***	0.0124***	0.0961***
	(0.0261)	(0.0207)	(0.0295)	(0.00244)	(0.00411)
Log(TFP)	0.118***	0.0535***	0.0644***	-0.00218***	-0.00174
	(0.00771)	(0.00812)	(0.00950)	(0.000587)	(0.00110)
Log(labor)	0.0994***	0.102***	-0.00250	0.00889***	-0.0131***
	(0.0109)	(0.00997)	(0.0120)	(0.000675)	(0.00126)
Log(capital/labor)	0.169***	0.153***	0.0165**	0.00102*	0.00857***
	(0.00685)	(0.00584)	(0.00815)	(0.000573)	(0.000897)
Log(average wage)	0.177***	0.225***	-0.0479***	0.00381***	-0.0261***
	(0.0128)	(0.0132)	(0.0158)	(0.00120)	(0.00191)
Log(age)	-0.132***	-0.0782***	-0.0539***	-0.0606***	-0.00526**
	(0.0142)	(0.0127)	(0.0168)	(0.00182)	(0.00205)
product FE	yes	yes	yes	yes	yes
country FE	yes	yes	yes	yes	yes
year FE	yes	yes	yes	yes	yes
Observations	3,349,174	3,349,174	3,349,174	6,573,405	3,019,992
R-squared with FE	0.240	0.617	0.483	0.0302	0.0749

Note : Robust standard errors in parentheses. Standard errors are clustered at the firm level.

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Imports of core inputs in response to tariff cuts

	log_m	log_p	log_q	entry	exit
	(1)	(2)	(3)	(4)	(5)
TariffxOrdinary import dummy	-2.179***	-0.353***	-1.827***	-0.236***	0.275***
	(0.208)	(0.0932)	(0.219)	(0.0148)	(0.0395)
Ordinary import dummy	-0.956***	0.155***	-1.112***	0.0256***	0.0650***
	(0.0244)	(0.0126)	(0.0268)	(0.00143)	(0.00376)
Log (real exchange rate)	-0.126***	-0.124***	-0.00201	-0.0300***	-0.0192
	(0.0481)	(0.0249)	(0.0521)	(0.00733)	(0.0119)
Domestic firm	-0.149***	0.105***	-0.254***	0.0163***	0.0746***
	(0.0196)	(0.0130)	(0.0228)	(0.00159)	(0.00437)
Log(TFP)	0.175***	0.0459***	0.129***	-0.000882	-0.00780***
	(0.00656)	(0.00454)	(0.00764)	(0.000627)	(0.00157)
Log(labor)	0.205***	0.0759***	0.129***	0.00428***	-0.00353*
	(0.00811)	(0.00575)	(0.00960)	(0.000679)	(0.00181)
Log(capital/labor)	0.220***	0.0805***	0.139***	0.00204***	0.000397
	(0.00624)	(0.00466)	(0.00745)	(0.000577)	(0.00143)
Log(average wage)	0.233***	0.134***	0.0991***	-0.00191	-0.0265***
	(0.0112)	(0.00874)	(0.0134)	(0.00119)	(0.00283)
Log(age)	-0.171***	-0.0402***	-0.131***	-0.0477***	0.00383
	(0.0118)	(0.00826)	(0.0134)	(0.00122)	(0.00291)
product FE	yes	yes	yes	yes	yes
country FE	yes	yes	yes	yes	yes
year FE	yes	yes	yes	yes	yes
Observations	345,758	345,758	345,758	728,881	295,380
R-squared with FE	0.276	0.878	0.663	0.0514	0.134

Note : Robust standard errors in parentheses. Standard errors are clustered at the firm level.

*** p<0.01, ** p<0.05, * p<0.1

Table 6: Imports, exports, and domestic

	Log(export)	Share of exports to a new market	Entry into a new high-income market	Log(domestic sales)	Exports/ Total sales
	(1)	(2)	(3)	(4)	(5)
Intermediate imports	-0.0322***	0.00486***	0.0155***	0.112***	-0.0240***
	(0.00448)	(0.00105)	(0.00131)	(0.00607)	(0.00116)
Domestic firm	-0.419***	0.158***	0.153***	0.823***	-0.228***
	(0.0215)	(0.00499)	(0.00623)	(0.0287)	(0.00548)
Log(TFP)	0.234***	-0.000530	0.0175***	0.413***	-0.0249***
	(0.00635)	(0.00147)	(0.00184)	(0.00786)	(0.00162)
Log(labor)	0.679***	0.000652	0.0132***	0.426***	0.0493***
	(0.00963)	(0.00220)	(0.00274)	(0.0124)	(0.00241)
Log(capital/labor)	0.107***	0.0106***	-0.0216***	0.367***	-0.0493***
	(0.00910)	(0.00210)	(0.00262)	(0.0117)	(0.00230)
Log(average wage)	0.139***	-0.0102***	-0.0184***	0.0402*	0.0297***
	(0.0155)	(0.00362)	(0.00452)	(0.0211)	(0.00397)
Log(age)	-0.405***	-0.0232***	-0.0524***	-0.0189	-0.0594***
	(0.0118)	(0.00277)	(0.00346)	(0.0145)	(0.00304)
Observations	48,011	54,137	54,137	43,404	54,054
Industry FE	yes	yes	yes	yes	yes
year FE	yes	yes	yes	yes	yes
R-squared	0.285	0.069	0.040	0.443	0.105

Note : Robust standard errors in parentheses. Standard errors are clustered at the firm level.

*** p<0.01, ** p<0.05, * p<0.1

Table 7: Robustness

	Log(export)	Share of exports to a new market	Entry into a new high-income market	Log(domestic sales)	Exports/ Total sales
	(1)	(2)	(3)	(4)	(5)
Panel A: Using firm-level tariffs (with equal weights) as an IV for intermediate imports					
Intermediate imports	-0.0322***	0.00486***	0.0155***	0.112***	-0.0240***
	(0.00448)	(0.00105)	(0.00131)	(0.00607)	(0.00116)
Observations	48,011	54,137	54,137	43,404	54,054
Weighted intermediate imports	-0.0363***	0.00552***	0.0176***	0.132***	-0.0273***
	(0.00507)	(0.00120)	(0.00150)	(0.00746)	(0.00136)
Observations	48,011	54,137	54,137	43,404	54,054
Panel B: Using firm-level tariffs (with unequal weights) as an IV for intermediate imports					
Intermediate imports	-0.0154***	0.00473***	0.0164***	0.0924***	-0.0188***
	(0.00439)	(0.00104)	(0.00130)	(0.00597)	(0.00112)
Observations	48,011	54,137	54,137	43,404	54,054
Weighted intermediate imports	-0.0177***	0.00546***	0.0189***	0.110***	-0.0217***
	(0.00504)	(0.00120)	(0.00151)	(0.00738)	(0.00133)
Observations	48,011	54,137	54,137	43,404	54,054
Panel C: OLS					
Intermediate imports	0.0131***	0.00189***	0.00258***	-0.00271***	0.0202***
	(0.00176)	(0.000454)	(0.000475)	(0.000412)	(0.00173)
Observations	58,670	54,884	54,884	54,884	54,007
R_squared	0.286	0.052	0.049	0.052	0.475
Weighted intermediate imports	0.0189***	0.00116**	0.00226***	-0.00492***	-0.00266
	(0.00160)	(0.000482)	(0.000500)	(0.000408)	(0.00191)
Observations	58,670	54,884	54,884	54,884	54,007
R_squared	0.287	0.051	0.049	0.056	0.472

Note : Robust standard errors in parentheses. Standard errors are clustered at the firm level.

*** p<0.01, ** p<0.05, * p<0.1

Table8: Input-output linkage and export by downstream firms

	Log(export)	Export dummy	Log(export)	Export dummy
	(1)	(2)	(3)	(4)
Domestic sales by upstream ordinary importers	0.539***	0.138***	0.429***	0.124***
	(0.129)	(0.0278)	(0.122)	(0.0265)
Intermediate imports	-0.0364***	-0.00522***		
	(0.00490)	(0.00105)		
Weighted intermediate imports			-0.0401***	-0.00580***
			(0.00542)	(0.00118)
Own industry import intensity	0.00115	0.000196	0.000978	0.000166
	(0.00295)	(0.000674)	(0.00296)	(0.000675)
Domestic firm	-0.428***	-0.0617***	-0.430***	-0.0623***
	(0.0221)	(0.00468)	(0.0224)	(0.00478)
Log(TFP)	0.237***	-0.00574***	0.225***	-0.00738***
	(0.00649)	(0.00138)	(0.00605)	(0.00128)
Log(labor)	0.682***	0.0394***	0.672***	0.0382***
	(0.00983)	(0.00205)	(0.00896)	(0.00189)
Log(capital/labor)	0.115***	-0.0109***	0.0974***	-0.0134***
	(0.00979)	(0.00206)	(0.00794)	(0.00168)
Log(average wage)	0.139***	0.0408***	0.120***	0.0382***
	(0.0156)	(0.00333)	(0.0140)	(0.00299)
Log(age)	-0.405***	-1.39e-06	-0.400***	0.000723
	(0.0119)	(0.00255)	(0.0119)	(0.00254)
Observations	48,011	54,137	48,011	54,137
R-squared	0.281	0.018	0.275	0.014

Note : Robust standard errors in parentheses. Standard errors are clustered at the firm level.

*** p<0.01, ** p<0.05, * p<0.1