

# Chinese Trade Reforms, Market Access and Foreign Competition

## The Patterns of French Exporters

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## Abstract

A unilateral trade reform generates two opposite effects: market access expansion and strengthening of competitive pressures in the liberalized market. Using detailed trade and firm-level data from France, the authors investigate how French firms' product scope and export sales changed after Chinese liberalization vis-à-

vis Asian liberalization. The findings suggest that lower Chinese import tariffs account on average for 7 percent of the new products exported by French firms, and for 18 percent of additional French export sales. These results are robust when accounting for foreign competition faced by French firms in the liberalized market.

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# Chinese Trade Reforms, Market Access and Foreign Competition: the Patterns of French Exporters

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## *INTRODUCTION*

Unilateral trade liberalization is at the core of economic reform packages implemented in several emerging economies in the last decades.<sup>1</sup> Microeconomic effects of trade reform episodes have received a lot of attention recently. Empirical works have concentrated on how trade openness shapes firms' productivity (Pavcnik (2002), Trefler (2004), Amiti and Konings(2007), Lileeva and Trefler (2010) and Bas and Ledezma (2010) among others). Bernard et al.(2010), using firm-product level data, also show that trade liberalization affects multi-product firms' export patterns.<sup>2</sup> However, there is scarce evidence on the different mechanisms through which unilateral trade liberalization in a country affects the export performance of firms located in other countries.

This paper sheds new light on intra-firm adjustments due to trade integration combining the unilateral trade liberalization process experienced by China at the end of the 90s with firm-product-destination data for French firms (1999-2005). After a unilateral trade reform involving asymmetric countries, two opposite forces are at stake: market access expansion and strengthening of competitive pressures in the liberalized market. The main contribution of this paper to the literature is to investigate this trade-off. On the one hand, tariff reductions increase foreign demand and induce firms to export more products to the liberalized markets. On the other hand, we also expect an intensification of foreign competition in each market. This channel is related to the tougher competition of third countries in the liberalized market that might affect negatively the expansion of French exports to that destination.

Addressing the trade-off between market access expansion and tougher competition, we can evaluate French firms' export strategies in the event of a unilateral trade liberalization.<sup>3</sup> We give specific attention to the France-China trade relationship so to account for the role of China in the global trading system and its trade policy commitment. Using French micro-level data, our empirical strategy consists in investigating how French firms' product scope and export sales changed as a consequence of China's largest unilateral tariff liberalization vis-à-vis Asian trade liberalization. We focus on a sample of Asian

countries as a group of comparison. This sample represents a homogeneous group of countries in terms of trade integration and geographical proximity.<sup>4</sup>

To capture the effect of market access expansion, we rely on changes in applied tariffs at HS6 level from TRAINS. These tariff measures are related to the firm, country and year level dimension. Since we are interested in unilateral trade liberalization episode, we use the Most Favorite Nation (henceforth MFN) applied tariffs set by each Asian country to the rest of the world. To enter the WTO, each country sets the same tariff cuts with respect to all countries according to a multilateral negotiation. For this reason, it is unlikely that French firms have influenced tariff cuts negotiations. Therefore, these tariff measures allow us to exploit an exogenous variation of tariff across firm-country pairs.

To account for the intensification of competition faced by each firm in the liberalized markets, we use three different measures of foreign competition at the firm-country level. The first competition measure is a firm-level Herfindahl index that captures competitive pressures at the extensive margin, where the number of foreign competitors is proxied by the number of countries exporting the same product line that the French firms towards the Asian markets. The second measure of foreign competition is also captured by a firm-level Herfindahl index, but in this case the number of foreign competitors is proxied by the number of French firms exporting the same product line towards the Asian markets. Finally, the third competition measure captures the intensive margin competition faced by French firms in each Asian market.

Our results present novel insights on product turnover associated to trade reforms. Our findings indicate that: the expansion of French exported products and sales to China after tariff cuts is stronger relative to other Asian destinations. All the specifications suggest that the increase in foreign competition in the liberalized market has a negative effect on the number and the value of products exported by French firms to the Asian countries. Once accounting for foreign competition in the liberalized market, our estimates indicate that the average Chinese tariff cuts is associated to a larger expansion in the number of exported products (7 percent) and in export sales (8.4 percent) for the average firm when compared to

the Asian sample.

We next investigate which are the exported products that firms are expanding the most. We split the sample into intermediate and final good products using the Broad Economic Category (BEC) classification from United Nations. Our findings suggest that Chinese liberalization has almost no effect on the subsample of firms exporting final goods. The Chinese tariff cuts have affected mainly the expansion of exports of intermediate goods. This result continues to hold when we control for foreign competition. These findings highlight the relevance of intermediate goods exports to China. This result can further be related to the predominant role of multinational firms. To explore this feature, we split the sample into a multinational firms subsample. Our point estimates imply that a 7 percentage points decline in Chinese MFN tariff increases more than twice the number of exported products by multinational firms located in France relative to other exporting firms.

Several sensitivity tests were performed. The findings are robust to alternative firm level controls such as firm size and labor productivity. In order to address the potential reverse causality issue between Asian tariff changes and French firms export patterns, we carry out robustness checks using an alternative weighted average tariff measure at the firm level using initial weights. Finally, we demonstrate that our findings are not driven by the countries selected in the control group. The results remain unchanged when we restrict the sample to Asian countries with a similar level of economic development by excluding Korea, Japan and Singapore.

Our paper contributes to the growing body of literature on micro-economic effects of trade liberalization. Recent developments in international trade theory focus on the patterns of multi-product firms and the “within-firm” adjustments to trade liberalization. Mayer et al. (2009) and Bernard et al. (2010) introduce multi-product firms in heterogeneous firms’ models based on the pioneering work of Melitz (2003).<sup>5</sup> Recent empirical studies using disaggregated data at the firm-product level focus on the impact of trade liberalization on export choices of multi-product firms. Iacovone and Javorcik (2010) study the patterns of the export boom of Mexican firms in 1994-2003. They find a huge product turnover within

firms, an expansion of the number of traded products and a growth in the volume of pre-existing products. Other works focus on how the Canada-US Free Trade Agreement (CUSFTA) has affected US firms' export patterns (Bernard et al., 2010) or Canadian firms' export product scope (Baldwin and Gu, 2009). Using French firm-product level data, Berthou and Fontagné (2009) investigate the role of a reduction of trade costs on the product mix of French exporters using the introduction of the euro as a proxy for trade barriers. Dhingra (2009) tests her monopolistic competition model of brand differentiation by examining Thai trade liberalization process (2003-2006).<sup>6</sup> The main contribution of this paper is to disentangle the effects of market access expansion vs. foreign competitive pressures after a unilateral trade liberalization episode in a fast growing developing country like China.

The rest of the paper is organized as follows. The next section presents the main mechanisms that are at stake after a unilateral trade liberalization episode between asymmetric countries. Section II provides stylized facts about China's trade liberalization and the patterns of French multi-product exporters. Section III presents the empirical strategy and Section IV depicts the econometric evidence based on firm-product-level data for French exporters. Section V presents robustness tests dealing with omitted variable concerns, potential endogeneity issues and country selection issues. Section VI concludes.

## *I. MICROECONOMIC EFFECTS OF UNILATERAL TRADE LIBERALIZATION*

Before analyzing the relationship between Chinese unilateral trade liberalization and French firms' export patterns, this section provides some insights on the potential effects of a unilateral trade liberalization episode on the export performance of firms exporting toward the liberalized market.

The empirical literature on international trade and heterogeneous firms has focused mainly on the effects of bilateral trade liberalization between symmetric countries. Baldwin and Gu (2009), by the means of plant-product level data for Canada, show that the Canada-US Free Trade Agreement (CUSFTA) has reduced the product diversification and size of non-exporting Canadian plants. Using also the

CUSFTA as a case of bilateral trade liberalization process, Bernard et al. (2010) test their model based on firm-product level data for the US using a difference-in-difference framework. Their findings show that firms concentrate their production in their core competencies (their best selling products) after trade liberalization. They find that firms that experienced larger Canadian tariff cuts (above the median) reduce the number of products they produced for the domestic market relative to firms experiencing below median Canadian tariffs reductions.

The nature of a unilateral trade liberalization episode is different than the bilateral trade liberalization. Under a bilateral trade agreement like the CUSFTA, both countries that undertake the reform will experience an increase in market access. Thereby, a bilateral trade reform between symmetric countries, affects mainly the market potential of exporting firms belonging to the FTA. Differently, the unilateral trade reform, by affecting all countries in the world, gives rise to two opposite mechanisms.

The first mechanism is related to market access expansion. The export patterns of foreign firms selling their goods to the liberalizing market are affected by the increase in the foreign demand. The second mechanism is related to the intensification of foreign competition in the liberalizing market. This paper aims at quantifying these two effects associated to a unilateral liberalization episode. More specifically, we propose to evaluate how Chinese unilateral trade liberalization affected the pattern of French exporters. Chinese import tariff reductions, by boosting import demand in China, should induce French firms to export more products toward the Chinese market. Nevertheless, since Chinese import tariff reductions were addressed to all countries, also firms located in other countries should have taken advantage from the new export opportunities in the Chinese market. This process enhances competitive pressures in the Chinese market and thus curbs exports by French firms.

In the econometric analysis, we disentangle these two channels by using different measures of foreign competition at the firm level. In the next section, we present some descriptive evidence on how Chinese tariff cuts might shape French firms' export patterns.



## II. A FIRST GLANCE AT THE DATA

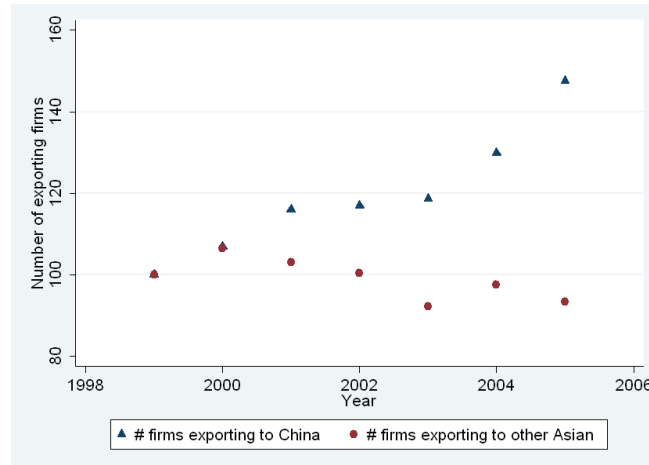
Unilateral trade liberalization took place in several Asian countries in the 1990s. All the Asian countries considered in this study entered the WTO in 1995 but China.<sup>7</sup> The main exception is China that joined the WTO at the end of 2001. The Chinese tariff reduction process started well before 2001 though. In fact, to join WTO, China has agreed to undertake a series of important commitments to open and liberalize its regime. This allowed China to be better integrated into the world economy and offer a more predictable environment for trade and foreign investment in accordance with WTO rules. This process started from the mid 1990s, when China gradually eliminated trade barriers and expanded market access to goods from foreign countries.<sup>8</sup>

Between 1999 and 2005, the average MFN tariff applied by China falls 7 percentage points, while the reduction in the average MFN tariff applied by the other Asian countries in our sample is of the order of 2 percentage points.<sup>9</sup> China has important trade relationships with European countries: Europe is China's largest export market and Europe's largest source of imports. During the 2000s, EU-China trade increased dramatically, doubling between 1999 and 2005. Despite China being one of the most important challenges for EU trade policy, little is known about the behavior of multi-product firms and the importance of product turnover *vis-à-vis* China's liberalization.

Figure 1 plots the average growth of the number of French firms exporting to China and to other Asian destinations during 1999-2005.<sup>10</sup> As one can easily remark, while the number of French exporting firms' to China increases by 60 percent between 1999 and 2005, the number of exporting firms to other Asian destinations decreases almost by 10 percent over the same period.

To understand the effect of Chinese trade reforms on the exporting behavior of French firms, Figures 2 and 3 relate the change in tariffs with the change in export sales and exported products between 2005 and 1999. Figure 2 plots export sales to China (other Asian countries) with respect to the average Chinese applied MFN tariff at firm level (average tariff of other Asian countries). Figure 3 presents a

Figure 1: Number of exporting firms (1999=100)



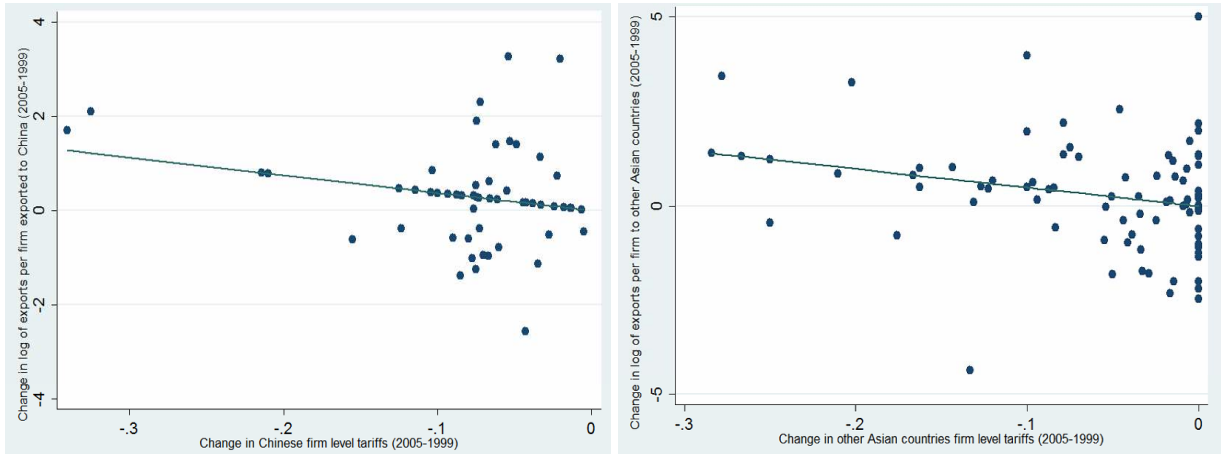
Note: authors calculations based on French customs dataset for 1999-2005, where the base year is 1999.

similar relation, but focusing on the number of exported products per firm to China (other Asian countries). These figures provide a preliminary evidence of French exports expansion towards the Chinese liberalizing market over the period under analysis.

However, French firms exporting to China might also suffer from tougher competition, due to the specificity of Chinese liberalization. To account for tougher competition, we use a concentration Herfindahl index at the firm level. In this measure, the number of foreign competitors is proxied by the number of countries exporting the same product line towards each of the Asian markets. Figure 4 shows the evolution of this measure over time with respect to China and to the other Asian destinations.<sup>11</sup> The Herfindahl index decreases more for China relative to other Asian destinations. Notice that a lower Herfindahl index implies less concentration and more competition (in terms of number of countries). This descriptive evidence indicates an increase in competitive pressures faced by French firms in the Chinese market after the unilateral trade liberalization.

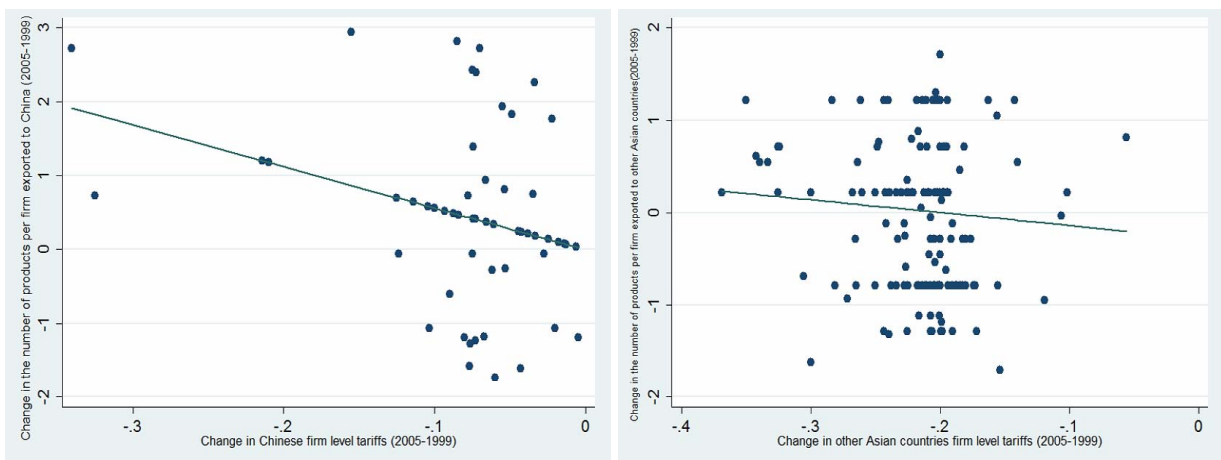
To sum up, this preliminary evidence highlights that French firms expanded their exports to China after Chinese unilateral trade reforms. Nevertheless, they also faced stronger competitive pressures in

Figure 2: Evolution of Intensive margin with respect to tariff cuts



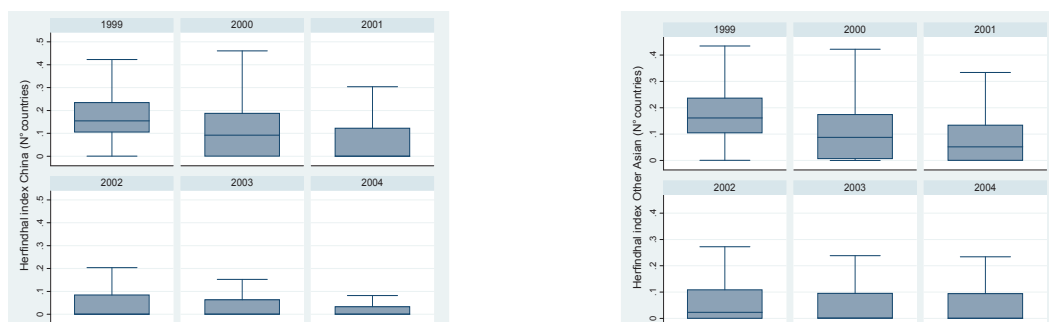
Note: authors calculations based on French customs dataset for 1999 and 2005. Chinese MFN tariffs are from TRAINS dataset.

Figure 3: Evolution of Extensive margin with respect to tariff cuts



Note: authors calculations based on French customs dataset for 1999 and 2005. Chinese MFN tariffs are from TRAINS.

Figure 4: Extensive margin of foreign competition (N countries) faced by French firms



Note: authors calculations based on BACI dataset and French customs dataset for 1999-2005.

China. To evaluate the net effect of Chinese unilateral liberalization on French firms' export patterns, we should take into account explicitly the role of foreign competition in the liberalized market.

### III. EMPIRICAL STRATEGY

#### *Data description*

We use individual export data on manufacturing goods for France, collected by French Customs.<sup>12</sup> These data contain the value of exports by product, firm and destination over the time period 1999-2005. This database classifies export flows at the firm level within 8 digit product categories. Our analysis is restrict to manufactured products.

We use MFN applied tariffs at the HS6 product level collected from TRAINS.<sup>13</sup> From this database, we consider the tariffs applied over the period 1999 to 2005 by our set of Asian countries, i.e. China, India, Indonesia, Korea, Japan, Pakistan, Philippines, Singapore and Thailand. We exclude Hong Kong and Taiwan from our analysis since they are financial and trade centers, where the wholesale activity is very important. The next section explains how we construct the firm level tariff. We also control for

country size using GDP from the Penn World Tables and the real exchange rate. We use the bilateral real exchange rate between France and other countries using producer prices of France and importer countries from the International Financial Statistics (IFS) of the IMF. Finally, to compute the proxy for foreign competition at the extensive and intensive margin, we use the BACI dataset at the HS6 product level by country of origin.<sup>14</sup>

In order to keep a constant sample throughout the paper and to establish the stability of the point estimates, we only consider firms that have information on all control variables. In the main specifications, this leaves us with around 4,900 firm-country pairs for the 9 Asian countries in the period 1999-2005, a total of 34,327 observations.

To perform the robustness check exercises, we use two additional firm level datasets. First, to identify French multinational firms, we match our main dataset with firm level dataset on multinational groups located in France from the *Enquete Echanges Internationaux Intra-Groupe* produced by the French Office of Industrial Studies and Statistics (SESSI). These data provide a good representation of the activity of international groups located in France. They account for around 82 percent of total trade flows by multinationals, and for 55 and 61 percent of total French imports and exports respectively. Second, to add information on firms' characteristics, we merge our main dataset with the Annual French Business Surveys (EAE), available from INSEE. The EAE survey is conducted every year and provides detailed firm-level information for all French firms with more than 20 employees whose main activity is in manufacturing. This survey allows us to have information on firms' employment and labor productivity (value added per worker).

### *Market Access: firm level tariff measures*

To identify the impact of Asian's trade liberalization on firms' export patterns, we use tariffs at the HS6 product level to construct a firm level measure of tariff which varies by year and country of origin.

For each firm  $f$  and country of destination  $j$ , we generate a simple average tariff over all HS6 products exported by that firm to that country in year  $t$ . To avoid possible endogeneity issues, we use the simple average of the tariffs faced by each firm in a particular country, instead of using the weighted average. In the last section we present a robustness test with an alternative tariff measure constructed using weighted average and fixing the weights at the beginning of the period. Tariffs for each firm-country-year,  $\tau_{fjt}$ , are computed in the following way:  $\tau_{fjt} = \frac{\sum_{g \in G} \tau_{gjt}}{N_{fjt}}$ , where  $G$  is the set of products exported by firm  $f$  and  $N_{fjt}$  is the number of products that firm  $f$  exports to country  $j$  in year  $t$ . Previous empirical works focus on tariff variations across industries where the firm produces. One of the few exceptions is the work of Teshima (2009), who uses plant-level tariffs to study import competition and R&D in Mexico.

The changes in firm-level tariff will then capture market access differences across firms. These differences depend on the type of HS6 products that each firm produces and exports. These tariff changes are most likely exogenous from the perspective of French firms. In fact, Asian's tariff changes were part of the negotiation process aimed at allowing entrance into WTO. We will thus exploit this exogenous variation in tariffs, to identify how changes in market access affect French firms' export patterns.

### *Foreign competition measures: at the firm-country level*

Our market access measure varies at the firm-country level. Thus, the foreign competition measure should also vary at the firm-country level. To control for the foreign competition at this level, we build three different measures. These measures, which capture different types of competition, are called: (i) extensive margin competition ( $N^\circ$  countries), (ii) extensive margin competition ( $N^\circ$  firms) and (iii) intensive margin competition.<sup>15</sup>

The first measure is a product-specific concentration measure, based on the number of countries. We compute this measure using import flows at the HS6 product level and country of origin from BACI for 198 developed and developing countries. This measure captures, product by product, the geographical

concentration of imports in each of the Asian countries. Said this differently, it measures from how many countries an HS6 product is imported by each of our possible destination countries. Using notations, this concentration measure indicates the number of exporting countries,  $k$ , from which a product  $g$  is imported in each of our possible destination countries,  $j$ , thus:

$$H_{gj} = \frac{\sum_{k=1}^{n_g} (s_g^{jk})^2 - 1/n_g}{1 - 1/n_g} \quad (1)$$

where time subscripts are omitted for simplicity. In this expression,  $s_g^{jk} = m_g^{jk}/m_g$ , and  $m_g^{jk}$  is the import value of product  $g$  imported by country  $j$  from country  $k$  and  $n_g$  is the total number of countries exporting the product  $g$ .<sup>16</sup>

To obtain a competition measure at the firm-country level, the next step is to match the above product-specific index with information on French exports at the firm-product-country of destination level over the period 1999-2005. This allows us to compute the average of the Herfindahl index at the firm level. To avoid compositional effects and potential endogeneity concerns, we take the average of this firm level index keeping constant the HS6 product range of French exporters at 1999, while allowing the concentration index to vary over time.<sup>17</sup>

In this first measure, the number of foreign competitors is proxied by the number of countries exporting the same product line towards the Asian markets. To account for the competitive pressures that could emerge from other firms selling the same product line to the same destination, a second measure of competition is needed. To proxy foreign competition suffered from other firms, we introduce a second measure that captures the degree of competition due to the mass of French firms selling the same HS6 product in the liberalized market.<sup>18</sup> Using French Customs export data at the firm-product-country of destination level, we construct an Herfindahl index that this time captures the concentration of export shares of other French firms exporting same product to same country. The inverse of this index captures the degree of competitive pressures generated by French firms selling in that country. Similar to the pre-

vious measure, we compute an average at the firm level of this index keeping constant the HS6 product range exported by each firm in 1999.

After a liberalization event, it might also happen that the number of countries or firms exporting a certain HS6 variety to destination  $j$  stays constant, while the volumes exported might change. This in turns would certainly have an impact on the export decisions of French firms. To capture this type of competition, we construct a measure of intensive margin competition faced by French firms in each Asian markets. To do so, we combine import data at HS6 product and country of destination level from BACI with the French customs dataset. Similarly to the other measures, we generate for each firm  $f$  and country of destination  $j$  the average of import volumes faced by each HS6 product  $g$  over all products exported by that firm to that country in year  $t$ . As usual, we keep constant the HS6 product range of each firm at year 1999.

### *Baseline Specification*

In this section we exploit the exogenous variation in tariffs across firm-country pairs to analyze the role of Chinese unilateral trade liberalization on French firms' export behavior relative to tariff changes in other Asian destinations. To capture these effects, we will then estimate the following equation:

$$\ln X_{fjt} = \alpha \tau_{fj,t-1} + \beta (\tau_{fj,t-1} \times \text{China}_j) + \gamma Z_{jt} + \mu_f + \kappa_j + v_t + \epsilon_{fjt} \quad (2)$$

where the dependent variable,  $X_{fjt}$ , is the number of products exported by firm  $f$  to country  $j$  in year  $t$ . In an alternative specification, we also explore how the intensive margin of trade is affected by Chinese tariff reductions using as a dependent variable firms' export sales.  $\tau_{fj,t-1}$  is the average tariff faced by firm  $f$  when exporting to country  $j$  in year  $t - 1$ .<sup>19</sup>  $\text{China}_j$  is a dummy variable equal to one if the country of destination,  $j$ , is China.  $\tau_{fj,t-1} \times \text{China}_j$  is an interaction term between the average lagged tariff faced by each firm and the dummy variable for China.  $Z_{jt}$  are controls at the country level that



vary over time.  $\mu_f$ ,  $\kappa_j$  and  $v_t$  are respectively a full set of firm, country and year fixed effects. Finally,  $\epsilon_{fjt}$  is the random error term.

The coefficient of the interaction term in equation (2),  $\beta$ , captures how China's trade liberalization affected French exports relative to the average effect of liberalization in other Asian destinations. The total impact of Chinese import tariff cut on French firms' product scope and export sales is captured by  $\alpha + \beta$ . Our subsample of Asian countries includes: India, Indonesia, Korea, Japan, Pakistan, Philippines, Singapore and Thailand. This sample represents a homogeneous group in terms of trade integration and geographical proximity.

Nevertheless, to ensure that the selection of countries is not affecting the results, several robustness tests are carried out. Sub-section titled *Alternative country samples* in Section V presents two sensitivity tests. The first test restricts the sample to least developed (henceforth LDC) Asian countries, excluding high income countries like Korea, Japan and Singapore. The other test consists in excluding one by one each of the Asian LDC countries in the sample.

The identification strategy in equation (2) disentangles the variation in the extensive (intensive) margin of exports due to changes in China's trade barriers. We expect a negative and significant  $\alpha$  coefficient: tariff reduction in destination  $j$  increases the number of products exported (extensive margin of trade) and export sales (intensive margin of trade) towards each Asian destination. For what concern, our other coefficient of interest,  $\beta$ , we also expect it to be negative and significant. This result will indicate that Chinese tariff reduction induces French firms to expand by a larger amount their exports towards China relative to the comparison group. Since our variable of interest (tariff measure) varies at the firm-country level, in all the estimations, disturbances are corrected for clustering across firm-country pairs.

We control for macroeconomic shocks, firm and destination unobservable characteristics that might affect French exports, by using year, firm and destination fixed effects. It is important to stress that the outstanding role of China in the world trading system is not only related to trade liberalization, but also to its remarkable economic growth which has taken place during the same period. Thus, failing to control

for country observable characteristics that might evolve over time can generate misleading results. To deal with this issue, we include the GDP and real exchange rates (RER) for each destination country. We control for variations in real GDP across countries over time using the logarithm of lagged real GDP to capture differences across countries in terms of economic development. Finally, we take into account the effect of bilateral variations in RER. To do this, we compute the bilateral real exchange rate between France and each Asian destination country using producer prices in France and in the importing country.

### *Controlling for Foreign Competition*

To account for third country competition effect faced by each firm in the destination country, the reduced form equation in (2), becomes:

$$\ln X_{fjt} = \alpha \tau_{fj,t-1} + \beta (\tau_{fj,t-1} \times \text{China}_j) + \gamma Z_{jt} + \rho FC_{fjt} + \mu_f + \kappa_j + v_t + \epsilon_{fjt} \quad (3)$$

where  $FC_{fjt}$  is a vector containing the three foreign competition measures at firm-country. As described in sub-section *Foreign competition measures* of Section III, these measures control for different types of competitive pressures that each French firm is facing in each destination market.

## *IV. RESULTS*

### *Baseline results: Market Access and Export Patterns*

In this section we present the results of the baseline estimations which explores how Asian tariff changes affect firms' export performance. Estimation results of equation (2) are reported in Tables 1 and 2. The former reports the results using the number of exported products as a dependent variable,

while the latter focus on export sales per firm. In every table presented we control for unobserved firm, destination and year fixed effects. We start with the extensive margin of exports.

Column (1) in Table 1 shows that tariff reductions increase the number of French exported products across all destinations. In columns (2) and (3) we include country level controls. Column (2) shows that our results are also robust to cross countries price variations, proxied by the real exchange rate at the country level (RER). The coefficient of RER is negative and significant as expected. Column (3) introduces real GDP to capture differences across countries in terms of economic growth, development and market size. As expected the coefficient of real GDP is positive and significant. The coefficient on tariffs remains stable and robust to the inclusion of country observable characteristics varying over time. This finding implies that tariff changes are not picking up effects of market size, economic growth or price variations across countries. The point estimate in column (3) indicates that the 3.5 percentage points decline in the average MFN tariff across Asian countries in our sample is associated to almost 1.6 percent expansion in the average firm export product scope.

Column (4) includes our main variable of interest: the interaction term between the average tariff at the firm level and the dummy equal to one when the importer country is China. The coefficient is negative and statistically significant, at the 1% confidence level. This result indicates that China's tariff cuts have, as expected, a positive effect on the amount of exported products towards this destination. The coefficient of the interaction term shows the impact of Chinese tariff cuts on French exports relative to the average effect of liberalization in other Asian destinations. The point estimate implies that a 10 percentage points fall in Chinese tariff results in almost 16 percent expansion more when a firm exports to China relative to the Asian sample. During our period of analysis, from 1999 to 2005, Chinese tariffs declined on average 7 percentage points. Thus, according to our results, this would imply that the average firm experiences an additional expansion of almost 11 percent in the number of products exported when exporting to China relative to other Asian destinations. The net effect of Chinese unilateral liberalization on French firms' product scope is captured by the sum of the coefficient on tariff and the interaction term

( $\alpha$  and  $\beta$  in equation (3)). In this case the quantification of the results is very similar.

Table 1: The impact of Chinese unilateral trade liberalization on the extensive margin of exports

Dependent variable	Log Exported products of firm $f$ in country $j$ in year $t$			
	(1)	(2)	(3)	(4)
Tariff $_{f,j,t-1}$	-0.492*** (0.136)	-0.497*** (0.136)	-0.453*** (0.137)	-0.167 (0.150)
Tariff $_{f,j,t-1} \times \text{China}_j$				-1.586*** (0.312)
RER $_{j,t-1}$		-0.311* (0.164)	-0.045 (0.170)	-0.141 (0.171)
GDP $_{j,t-1}$			0.316*** (0.094)	0.235** (0.096)
Firm fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	34,327	34,327	34,327	34,327
$R^2$	0.542	0.542	0.543	0.543

*Notes:* The regressions are OLS estimations of equation (2) for the period 1999-2005. The dependent variable is the logarithm of the number of products exported to country  $j$  in year  $t$  by firm  $f$ . Fixed effects by firm, country and year and a constant are included in all specifications. The destinations are China and other Asian countries that already integrate WTO such as India, Indonesia, Korea, Japan, Pakistan, Philippines, Singapore and Thailand. Tariff $_{f,j,t}$  is the tariff measure faced by firm  $f$  when exporting to country  $j$  in year  $t$ . Tariff $_{f,j,t} \times \text{China}_j$  is an interaction term between the firm level tariff measure and a dummy variable equal to one when the country of destination of exports is China and zero otherwise,  $\text{China}_j$ . GDP $_{j,t}$  is the natural log of the GDP of country  $j$  from the Penn World Tables. RER $_{j,t}$  is the bilateral real exchange rate between France and China and countries in the control group using producer prices of France and importer countries from the International Financial Statistics (IFS). Heteroskedasticity-robust standard errors clustered by firm-country pairs are reported in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1, 5 and 10 percent levels respectively.

Table 2 reports similar results for the intensive margin of exports. After controlling for observable country level characteristics in columns (2) and (3), the average reduction of Asian tariffs leads to almost 3 percent increase in French firms' export sales. The coefficient of the interaction term between the tariff measure with the China dummy variable in column (4) shows a larger effect due to Chinese liberalization relative to the average Asian tariff cuts. This allow us to conclude that China's tariff reductions increase by a larger amount export sales of French firms towards this destination relative to the others: Chinese tariff cuts boost by almost 19 percent (7 times  $\beta$ ) French export sales. While the net effect of Chinese liberalization on French firms export sales is 21 percent (7 times ( $\alpha + \beta$ )).

Table 2: The impact of Chinese unilateral trade liberalization on the intensive margin of exports

Dependent variable	Log Export sales of firm $f$ in country $j$ in year $t$			
	(1)	(2)	(3)	(4)
Tariff $_{fj,t-1}$	-0.868*** (0.182)	-0.876*** (0.182)	-0.834*** (0.184)	-0.350* (0.195)
Tariff $_{fj,t-1} \times \text{China}_j$				-2.678*** (0.416)
RER $_{j,t-1}$		-0.536** (0.212)	-0.279 (0.221)	-0.441** (0.221)
GDP $_{j,t-1}$			0.305*** (0.117)	0.169 (0.118)
Firm fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	34,327	34,327	34,327	34,327
$R^2$	0.574	0.574	0.574	0.576

Notes: The regressions are OLS estimations of equation (2) for the period 1999-2005. The dependent variable is the logarithm of firm  $f$ 's export sales to country  $j$  in year  $t$ . Fixed effects by firm, country and year and a constant are included in all specifications. The destinations are China and other Asian countries that already integrate WTO such as India, Indonesia, Korea, Japan, Pakistan, Philippines, Singapore and Thailand. Tariff $_{fjt}$  is the tariff measure faced by firm  $f$  when exporting to country  $j$  in year  $t$ . Tariff $_{fjt} \times \text{China}_j$  is an interaction term between the firm level tariff measure and a dummy variable equal to one when the country of destination of exports is China and zero otherwise,  $\text{China}_j$ . GDP $_{jt}$  is the natural log of the GDP of country  $j$  from the Penn World Tables. RER $_{jt}$  is the bilateral real exchange rate between France and China and countries in the control group using producer prices of France and importer countries from the International Financial Statistics (IFS). Heteroskedasticity-robust standard errors clustered by firm-country pairs are reported in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1, 5 and 10 percent levels respectively.

### *Unilateral Trade Liberalization and Foreign competition*

The findings presented in the previous section might suffer from an important omitted variable bias related to foreign competition faced by each firm in the destination market. To control for this issue, the baseline specification in (2) is extended to include our three firm-level measures of foreign competition.<sup>20</sup>

A positive and significant coefficient for both Herfindahl indexes implies that an increase in foreign competition in destination  $j$  faced by each firm (i.e. a reduction in the firm level Herfindahl concentration index) reduces the number of products exported and export sales to that destination. On the other hand, for the intensive margin competition measure, we expect a negative and significant coefficient. This measure captures the variation on the volume of imports by incumbent competitors towards the liberalized market. Chinese unilateral liberalization will increase the volume of imports of firms/countries

already selling in China. This in turn might reduce French firms exports towards that destination due to tougher competition at the intensive margin.

Tables 3 and 4 report the estimation results of equation (3) for the number of exported products and for export sales respectively. Columns (1) to (3) introduce the different measures of foreign competition. As expected the coefficients on both Herfindahl indexes (extensive margin competition proxies) are positive and significant in all specifications, suggesting that the higher the competitive pressures faced by the average French firm in a destination market, the lower will be the number of products exported and export sales to that destination. While the intensive margin competition proxy is negative and significant implying that the greater increase in the volume of imports of incumbent competitors of the same products to the same destination after the liberalization reduces French firms' export propensity. As a benchmark, column (4) and (6) report the baseline estimation results presented in column (3) and (4) of Table 1. Once we take into account the foreign competition pressures induced by the unilateral trade liberalization faced by French firms, the coefficient of the average Asian tariff cuts is negative but no longer significant (column 5) and the coefficient of interest is still negative and significant but the magnitude is reduced by 35 percent (column 7). The results presented in Table 4 for the intensive margin of exports are in the same line.

Findings in Tables 3 and 4 indicate that once we address the possible omitted variable issue, by controlling explicitly for foreign competition at the firm-country level, the 7 percentage points reduction of Chinese tariff cuts result in an additional expansion of almost 7 percent (instead of 11) in the number of products exported and 12 percent in export sales (instead of 19) by the average firm when exporting to China relative to other Asian destinations.

Table 3: Third country effects. Foreign competition measures at the firm-country level

Dependent variable	Log number of exported products						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Extensive margin competition $f_{jt}(N^{\circ} \text{ countries})$	1.080*** (0.093)	0.672*** (0.091)	0.889*** (0.093)		0.758*** (0.089)		0.752*** (0.089)
Extensive margin competition $f_{jt}(N^{\circ} \text{ firms})$		0.900*** (0.058)	1.024*** (0.059)		0.806*** (0.054)		0.807*** (0.054)
Intensive margin competition $f_{jt}$			-0.090*** (0.006)		-0.088*** (0.006)		-0.088*** (0.006)
Tariff $f_{j,t-1}$				-0.492*** (0.136)			0.002 (0.142)
Tariff $f_{j,t-1} \times \text{China}_j$						-1.586*** (0.312)	-1.041*** (0.293)
Country level controls	No	No	No	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	34,327	34,327	34,327	34,327	34,327	34,327	34,327
$R^2$	0.547	0.555	0.560	0.542	0.582	0.543	0.582

Notes: The regressions are OLS estimations of equation (3) for the period 1999-2005. The dependent variable is the logarithm of the number of exported products to country  $j$  by firm  $f$  in year  $t$ . Fixed effects by firm, country and year and a constant are included in all specifications. The destinations are China and other Asian countries that already integrate WTO such as India, Indonesia, Korea, Japan, Pakistan, Philippines, Singapore and Thailand.  $\text{Tariff}_{fjt}$  is the tariff measure faced by firm  $f$  when exporting to country  $j$  in year  $t$ .  $\text{Tariff}_{fjt} \times \text{China}_j$  is an interaction term between the firm level tariff measure and a dummy variable equal to one when the country of destination of exports is China and zero otherwise,  $\text{China}_j$ . The extensive margin competition  $f_{jt}(N^{\circ} \text{ countries})$  variable is the firm-level Herfindahl index, where the number of foreign competitors is proxied by the number of countries exporting the same product line that the French firms towards the Asian markets. The intensive margin competition  $f_{jt}(N^{\circ} \text{ firms})$  variable is the firm-level Herfindahl index, where the number of foreign competitors is proxied by the number of other French firms exporting the same product line towards the Asian markets. Finally, the intensive margin competition  $f_{jt}$  variable is the average import volumes at the product level faced by each firm in the destination markets.  $\text{GDP}_{jt}$  is the natural log of the GDP of country  $j$  from the Penn World Tables.  $\text{REER}_{jt}$  is the bilateral real exchange rate between France and China and countries in the control group using producer prices of France and importer countries from the International Financial Statistics (IFS). Heteroskedasticity-robust standard errors clustered by firm-country pairs are reported in parentheses. \*, \*\*, and \* indicate significance at the 1, 5 and 10 percent levels respectively.

Table 4: Third country effects. Foreign competition measures at the firm-country level

Dependent variable	Log export sales						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Extensive margin competition $_{fjt}(N^{\circ}$ countries)	2.039*** (0.121)	1.324*** (0.114)	1.441*** (0.117)	1.431*** (0.117)	1.431*** (0.117)	1.431*** (0.117)	0.594*** (0.095)
Extensive margin competition $_{fjt}(N^{\circ}$ firms)		1.579*** (0.079)	1.647*** (0.080)	1.647*** (0.080)	1.647*** (0.080)	1.647*** (0.080)	1.026*** (0.064)
Intensive margin competition $_{fjt}$			-0.049*** (0.008)	-0.049*** (0.008)	-0.049*** (0.008)	-0.049*** (0.008)	-0.010 (0.007)
Tariff $_{fj,t-1}$				-0.868*** (0.182)	-0.687*** (0.178)	-0.350* (0.195)	-0.601*** (0.159)
Tariff $_{fj,t-1} \times \text{China}_j$						-2.678*** (0.416)	-1.824*** (0.331)
Country level controls	No	No	No	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	34,327	34,327	34,327	34,327	34,327	34,327	34,327
$R^2$	0.585	0.599	0.600	0.574	0.601	0.576	0.593

Notes: The regressions are OLS estimations of equation (3) for the period 1999-2005. The dependent variable is the logarithm of the export sales in country  $j$  by firm  $f$  in year  $t$ . Fixed effects by firm, country and year and a constant are included in all specifications. The destinations are China and other Asian countries that already integrate WTO such as India, Indonesia, Korea, Japan, Pakistan, Philippines, Singapore and Thailand.  $\text{Tariff}_{fjt}$  is the tariff measure faced by firm  $f$  when exporting to country  $j$  in year  $t$ .  $\text{Tariff}_{fjt} \times \text{China}_j$  is an interaction term between the firm level tariff measure and a dummy variable equal to one when the country of destination of exports is China and zero otherwise,  $\text{China}_j$ . The extensive margin competition $_{fjt}(N^{\circ}$  countries) variable is the firm-level Herfindahl index, where the number of foreign competitors is proxied by the number of countries exporting the same product line that the French firms towards the Asian markets. The extensive margin competition $_{fjt}(N^{\circ}$  firms) variable is the firm-level Herfindahl index, where the number of foreign competitors is proxied by the number of other French firms exporting the same product line towards the Asian markets. Finally, the intensive margin competition $_{fjt}$  variable is the average import volumes at the product level faced by each firm in the destination markets.  $\text{GDP}_{jt}$  is the natural log of the GDP of country  $j$  from the Penn World Tables.  $\text{REK}_{jt}$  is the bilateral real exchange rate between France and China and countries in the control group using producer prices of France and importer countries from the International Financial Statistics (IFS). Heteroskedasticity-robust standard errors clustered by firm-country pairs are reported in parentheses. \*\*\*, \*\*, \* and \* indicate significance at the 1, 5 and 10 percent levels respectively.



## *Disentangling Input and Output trade liberalization*

A further question worthwhile exploring is related to the types of goods: which are the French exported products that are affected the most by Asian liberalization? To test the relationship between market access and types of traded products, we estimate equation (3) by splitting the sample into firms producing intermediate and final goods.

To classify HS6 products into intermediate and final products, we use BEC (Broad Economic Categories) classification from United Nations.<sup>21</sup> In line with the firm-level tariff built in section III, we construct a similar measure for both intermediate and final goods using information at the HS6 to classify products.

Table 5 reports the estimate results for our two subsamples of firms: firms exporting intermediate and final products respectively. When controlling for observable country characteristics and foreign competitive pressures, we find that Chinese tariff cuts are mainly significant for French exports of intermediate products (columns (1) and (3)). Our point estimate implies that a 10 percentage points fall in Chinese applied tariff, increases by almost 17 percent the number of intermediate products exported and by almost 28 percent French export sales to China relative to the other Asian destinations. When we restrict the sample to firms exporting only final goods, interestingly we do not find any significant effect of Asian or Chinese liberalization on French extensive margin (column (2)), while the effect on the intensive margin is only significant at the 10 percent level (column (4)).

These findings confirm the results found by a number of recent works on the increasing role of intermediate inputs in international trade and the effects of input liberalization on firm performance. Amiti and Konings (2007), using firm-level data for Indonesia, show that the effect of reductions on input tariffs on firm total factor productivity improvements is much important than the effect of reductions on final good tariffs. Goldberg et al. (2010), using firm level data for India, demonstrate that input tariff liberalization allows firms to expand their product scope for the domestic market. Bas and Strauss-Khan

(2011), using firm level data for France, show that using imported intermediate goods improves French firms export scope, the number of export destination countries and export sales. Along the same line, Bas (2012), using firm level data for Argentina, finds that input tariff cuts have a positive effect on firms' export decision.

Table 5: Robustness checks: alternative subsamples

Dependent variable	Log number of exported products		Log export sales	
	Intermediate products (1)	Final products (2)	Intermediate products (3)	Final products (4)
Tariff $_{f_j,t-1}$	-0.005 (0.300)	0.403 (0.246)	-0.499 (0.421)	0.041 (0.318)
Tariff $_{f_j,t-1} \times \text{China}_j$	-1.684** (0.725)	-0.664 (0.541)	-2.764*** (0.981)	-1.195* (0.654)
Extensive margin competition $_{f_jt}(N^\circ \text{ countries})$	0.909*** (0.164)	0.898*** (0.167)	1.651*** (0.198)	1.086*** (0.194)
Extensive margin competition $_{f_jt}(N^\circ \text{ firms})$	0.892*** (0.083)	0.936*** (0.148)	1.501*** (0.118)	1.406*** (0.180)
Intensive margin competition $_{f_jt}$	-0.056*** (0.010)	-0.067*** (0.012)	-0.023* (0.013)	-0.037*** (0.014)
Observations	11,375	8,973	11,375	8,973
$R^2$	0.601	0.656	0.639	0.688
	MNF	Non-MNF	MNF	Non-MNF
Tariff $_{f_j,t-1}$	-0.487* (0.268)	0.023 (0.181)	-0.603* (0.335)	-0.025 (0.227)
Tariff $_{f_j,t-1} \times \text{China}_j$	-2.229*** (0.673)	-1.131*** (0.336)	-3.141*** (0.861)	-2.213*** (0.455)
Extensive margin competition $_{f_jt}(N^\circ \text{ countries})$	0.714*** (0.148)	0.984*** (0.118)	1.650*** (0.201)	1.287*** (0.137)
Extensive margin competition $_{f_jt}(N^\circ \text{ firms})$	1.009*** (0.098)	1.018*** (0.070)	1.897*** (0.139)	1.443*** (0.090)
Intensive margin competition $_{f_jt}$	-0.119*** (0.012)	-0.076*** (0.007)	-0.081*** (0.015)	-0.030*** (0.009)
Observations	9,230	25,097	9,230	25,097
$R^2$	0.549	0.556	0.537	0.585
Country level controls	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

Notes: The regressions are OLS estimations of equation (3) for the period 1999-2005 for the subsample of firms exporting intermediate and final goods (in the bottom part of the table). In columns (1) to (3) the dependent variable is the logarithm of the number of exported products to country  $j$  by firm  $f$  in year  $t$ , and in columns (4) to (6) the dependent variable is the logarithm of the export sales in country  $j$  by firm  $f$  in year  $t$ . Control variables definitions are reported in table 4. Heteroskedasticity-robust standard errors clustered by firm-country pairs are reported in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1, 5 and 10 percent levels respectively.

## *The Role of Multinational Firms*

The evidence presented in the previous section emphasizes the importance of French intermediate goods exports during Chinese liberalization. This result can be explained by considering the predominant role of multinational firms and intra-firm trade in the world economy. To account for this important dimension, in this section we split our sample into multinational firms located in France which export to Asian countries on the one side, and the remaining exporting firms on the other side.<sup>22</sup>

Columns (1) and (3) in the bottom part of Table 5 show the results for the subsample of multinational firms located in France, and columns (2) to (4) for the subsample of ordinary exporters. Comparing the results of these two subsamples of firms, it is straightforward to notice the larger effect of both Asian and Chinese liberalization on multinational firms' extensive margin: the effect of liberalization is two times larger for MNFs. Our point estimate suggests that a 10 percentage points fall in Chinese tariff results in almost 22 percent expansion for products exported to China by multinational firms relative to other Asian countries (column (1)). While the amount of products exported by non-multinational exporters increases only by 11 percent more for the average exporting firm to China relative to Asian destinations (column (2)). Columns (3) and (4) present the results for the intensive margin of trade. In line with our previous findings, the effect of Chinese tariff reductions on export sales is more pronounced for multinational firms than for non-multinational exporting firms.

## *V. ROBUSTNESS CHECKS*

### *Firm level controls*

In this section we explicitly deal with potential omitted variable concerns that might affect the previous results. To test that our main variable of interest, firm-level tariff, is not picking up the effects of

observable firm characteristics which varies over time, we carry on an additional robustness check. In specification (3) we include two additional control variables: firms' size and labor productivity.<sup>23</sup>

Table 6 reports the results where we account for firms' size (employment) and firms' labor productivity. Despite the reduction in the number of observations, our coefficient of interest remains negative and significant implying that Chinese tariff reductions increase both the number of exported products (column (2)) as well as export sales (column (4)) to China relative to other Asian destinations. These findings confirm that the previous results do not suffer from omitted variable concerns.

### *Potential endogeneity issues and alternative tariff measures*

Tariff measure used in the previous estimations is constructed as a simple average of HS6 tariffs over all products exported by a firm to destination. In the estimation procedure, to avoid the potential endogeneity bias between tariff measure and the number of exported products at each point in time, we used tariffs lagged by one period. In this section we propose an alternative way of dealing with this endogeneity issue. The alternative tariff measure is a weighted average fixing the weights in the initial year, 1999. So this tariff measure is based on the basket of all HS6 products exported by each firm in 1999, to each specific destination. This strategy should avoid that the tariff changes as a result of the increase in export products.

Table 7 reports the estimation results.<sup>24</sup> Our results remain robust when using this alternative tariff measure. Once taking into account foreign competitive pressures, Asian and Chinese unilateral trade liberalization has a positive effect on both the number of products exported and export sales by French firms.

Table 6: Robustness checks: firm level controls

Dependent variable	Log number of exported products		Log export sales	
	(1)	(2)	(3)	(4)
Labor productivity $_{f,t-1}$	0.061* (0.034)	0.051 (0.034)	0.144*** (0.034)	0.128*** (0.034)
Size $_{f,t-1}$	0.115** (0.054)	0.111** (0.053)	0.249*** (0.065)	0.242*** (0.063)
Tariff $_{f,t-1}$		-0.077 (0.222)		-0.664** (0.284)
Tariff $_{f,t-1} \times \text{China}_j$		-2.482*** (0.548)		-3.980*** (0.900)
Extensive margin competition $_{f,jt}(\text{N}^\circ \text{ countries})$		1.006*** (0.131)		1.441*** (0.159)
Extensive margin competition $_{f,jt}(\text{N}^\circ \text{ firms})$		1.069*** (0.068)		1.799*** (0.095)
Intensive margin competition $_{f,jt}$		-0.094*** (0.008)		-0.060*** (0.011)
		(0.220)		(0.293)
Country level controls	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	17,241	17,241	17,241	17,241
$R^2$	0.511	0.536	0.529	0.565

Notes: The regressions are OLS estimations of equation (3) for the period 1999-2005. In columns (1) and (2) the dependent variable is the logarithm of the number of exported products to country  $j$  by firm  $f$  in year  $t$ , and in columns (3) and (4) the dependent variable is the logarithm of the export sales in country  $j$  by firm  $f$  in year  $t$ . Country level control variables definitions are reported in table 4. Firm size  $_{f,t}$  represents the logarithm of employment at the firm level and firm labor productivity  $_{f,t}$  is measured by value added per worker. Heteroskedasticity-robust standard errors clustered by firm-country pairs are reported in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1, 5 and 10 percent levels respectively.

Table 7: Robustness checks: alternative tariff measures

Dependent variable	Log number of exported products	Log export sales
	(1)	(2)
Tariff 99 <sub><i>fj,t-1</i></sub>	-0.172*** (0.061)	-0.552*** (0.126)
Tariff 99 <sub><i>fj,t-1</i></sub> × China <sub><i>j</i></sub>	-0.301** (0.150)	-0.806*** (0.301)
Extensive margin competition <sub><i>fjt</i></sub> (N° countries)	0.388*** (0.038)	0.513*** (0.078)
Extensive margin competition <sub><i>fjt</i></sub> (N° firms)	0.445*** (0.023)	0.970*** (0.050)
Intensive margin competition <sub><i>fjt</i></sub>	-0.054*** (0.003)	-0.019*** (0.006)
Country level controls	Yes	Yes
Firm fixed effects	Yes	Yes
Country fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	24,394	24,394
R <sup>2</sup>	0.596	0.613

Notes: The regressions are OLS estimations of equation (3) for the period 1999-2005. In columns (1) to (4) the dependent variable is the logarithm of the number of exported products to country *j* by firm *f* in year *t*, and in columns (5) to (8) the dependent variable is the logarithm of the export sales in country *j* by firm *f* in year *t*. Fixed effects by firm, country and year and a constant are included in all specifications. Tariff<sub>*fjt*</sub> is the tariff measure faced by firm *f* when exporting to country *j* in year *t*. Using HS6 product level tariff data from TRAINS, we construct the firm level tariff by taking the average of tariff over the basket of all the HS6 products exported by firm *f* in the initial year (1999) to country *j*. This basket is kept fixed over the period. Country level control variables definitions are reported in table 4. \*\*\*, \*\*, and \* indicate significance at the 1, 5 and 10 percent levels respectively.

### Alternative country samples

In the previous regressions, the sample of Asian countries selected as a group of comparison included countries that are homogeneous in terms of trade integration and geographical proximity, but they differ in terms of economic development. Since the export patterns of French firms might differ according to the income level of the destination country, in this section we carry out two additional sensitivity tests.

We first restrict the sample to LDC Asian economies and exclude the high-income Asian countries like Korea, Japan and Singapore. Table 8 reports these results. The previous findings are robust to the countries selected as a group of comparison. When we compare the results in columns (2) and (3), on the one hand, and columns (5) and (6), on the other, the effect of Chinese tariff liberalization relative to

other Asian countries liberalization on export scope and export sales of French firms is almost two times larger for the multinational firms relative to ordinary exporters.

Finally, we carry out a last sensitivity test to see whether our results are not driven by the inclusion of any particular country in the comparison group. Based on the subsample of least developed Asian countries, we start excluding one country at a time of the sample. Table 9 presents the results. The name of the country that is excluded from the estimation is presented in the heading of each column. The findings are robust to these changes in the country coverage, which affect neither the sign of the coefficients nor their significance.



Table 8: Subsample of French firms exporting to LDC Asian countries

Dependent variable	Log N° exported products			Log export sales		
	(1) Full sample	(2) MNF	(3) Non-MNF	(4) Full sample	(5) MNF	(6) Non-MNF
Tariff $f_{j,t-1}$	-0.216 (0.134)	-0.340 (0.239)	-0.048 (0.163)	-0.228 (0.191)	-0.694** (0.321)	0.155 (0.236)
Tariff $f_{j,t-1} \times \text{China}_j$	-0.782*** (0.262)	-1.372** (0.543)	-0.762*** (0.293)	-1.767*** (0.304)	-2.607*** (0.569)	-1.761*** (0.357)
Extensive margin competition $f_{jt}(\text{N}^\circ \text{ countries})$	0.459*** (0.092)	0.364*** (0.130)	0.550*** (0.127)	0.943*** (0.123)	1.070*** (0.185)	0.851*** (0.160)
Extensive margin competition $f_{jt}(\text{N}^\circ \text{ firms})$	0.945*** (0.067)	0.920*** (0.098)	0.927*** (0.093)	1.415*** (0.088)	1.592*** (0.138)	1.232*** (0.113)
Intensive margin competition $f_{jt}$	-0.065*** (0.008)	-0.072*** (0.014)	-0.059*** (0.010)	-0.018* (0.010)	-0.016 (0.018)	-0.017 (0.012)
Firm fixed effects	No	No	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,224	4,394	8,830	13,224	4,394	8,830
$R^2$	0.590	0.568	0.587	0.628	0.566	0.622

Notes: The regressions are OLS estimations of equation (3) for the period 1999-2005 for the subsample of least developed Asian countries: China, India, Indonesia, Pakistan, Philippines and Thailand. The dependent variable is the logarithm of the number of exported products to country  $j$  by firm  $f$  in year  $t$ . Fixed effects by firm, country and year and a constant are included in all specifications. Country level control variables definitions are reported in table 4. \*\*\*, \*\*, and \* indicate significance at the 1, 5 and 10 percent levels respectively.

Table 9: Sensitivity test to the selected group of LDC Asian countries

Dependent variable	Log number of exported products by firm $f$ to country $j$ in year $t$				
	(1) India	(2) Indonesia	(3) Pakistan	(4) Philippines	(5) Thailand
Tariff $_{f,j,t-1}$	-0.230 (0.145)	-0.074 (0.167)	-0.086 (0.140)	-0.044 (0.150)	-0.698*** (0.177)
Tariff $_{f,j,t-1} \times \text{China}_j$	-0.766*** (0.270)	-1.334*** (0.294)	-0.918*** (0.265)	-0.503** (0.255)	-0.579** (0.285)
$R^2$	0.611	0.621	0.596	0.605	0.589
	Log export sales by firm $f$ to country $j$ in year $t$				
Tariff $_{f,j,t-1}$	-0.318 (0.202)	-0.282 (0.230)	-0.114 (0.198)	-0.062 (0.211)	-0.153 (0.256)
Tariff $_{f,j,t-1} \times \text{China}_j$	-1.855*** (0.314)	-2.264*** (0.330)	-1.851*** (0.308)	-1.672*** (0.323)	-1.362*** (0.357)
$R^2$	0.652	0.670	0.634	0.646	0.636
Foreign competition measures	Yes	Yes	Yes	Yes	Yes
Country level controls	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	11,630	9,880	12,730	11,871	11,740

Notes: The regressions are OLS estimations of equation (3) for the period 1999-2005 for the subsample of least developed Asian countries: China, India, Indonesia, Pakistan, Philippines and Thailand. The name of the excluded country is presented in the heading of each column. The dependent variable is the logarithm of the number of exported products (export sales) to country  $j$  by firm  $f$  in year  $t$ . Fixed effects by firm, country and year and a constant are included in all specifications. Country level control variables definitions are reported in table 4. \*, \*\*, \*\*\*, and \* indicate significance at the 1, 5 and 10 percent levels respectively.

## VI. CONCLUDING REMARKS

This paper contributes to the literature on the microeconomic effects of trade reform by disentangling and identifying two channels through which a unilateral trade liberalization episode affects firms' export performance: the expansion of market access and the intensification of foreign competitive pressures. This paper quantifies the different effect of Chinese *versus* Asian tariff cuts on French exporters.

Our findings can be summarized as follows. First, we find a positive effect of Chinese unilateral liberalization on both the extensive and intensive margins of French exporting firms. Although this effect is reduced when controlling for specific foreign competitive pressures at the firm level in the destination market, there is still a net positive effect of Chinese tariff cuts on French firms exports relative to other Asian countries. Indeed, the number of exported products and export sales by French firms towards China increased by a larger amount when compared to other Asian destinations. Second, our findings suggest that the effect of Chinese tariff reductions is more important for firms exporting intermediate goods. Finally, in line with the previous finding, we show that multinational firms play a predominant role in explaining the positive effect of Chinese liberalization on the expansion of French firms' product scope.

## Notes

<sup>1</sup> Baldwin (2011) proposes a political economy study which disentangles the theoretical mechanisms through which a unilateral liberalization affects developing countries.

<sup>2</sup> Berthou and Fontagné (2009) also explore how firms adjust their product mix and exported value as a consequence of a reduction of trade costs.

<sup>3</sup> Our sample includes: China, India, Indonesia, Korea, Japan, Pakistan, Philippines, Singapore and Thailand.

<sup>4</sup> Several robustness tests demonstrate that our results are not driven by the countries included in the comparison group.

<sup>5</sup> Multi-product firms' models include Allanson and Montagna (2005), Baldwin and Gu (2009), Feenstra and Ma (2008), Eckel and Neary (2009), Nocke and Yeaple (2008), Bernard et al. (2009), Mayer et al. (2009), Arkolakis and Mundler (2008) and Dhingra (2009).

<sup>6</sup> Her findings point out that Thai tariffs cut has a negative effect on process and product innovation among exporters, while it has a positive effect on product innovation of less export-oriented firms.

<sup>7</sup> India, Indonesia, Japan, Korea, Philippines, Pakistan, Thailand and Singapore.

<sup>8</sup> For industrial goods the average bound tariff level will go down to 8.9 percent with a range from 0 to 47 percent.

<sup>9</sup> There is a lot of heterogeneity across other Asian destinations. For example, the average MFN tariff applied by Korea, Japan and Singapore is not changing over time, while Indonesia's and Philippines's average tariff falls by 3 p.p. and Pakistan and Thailand by around 1 p.p. and India's MFN tariff falls more than 10 p.p.

<sup>10</sup> Other Asian destinations includes: India, Indonesia, Korea, Japan, Philippines, Singapore, Pakistan and Thailand.

<sup>11</sup> This figure is based on BACI dataset and French customs dataset (1999-2005). To make the figure clearer the outliers observations are excluded. Similar figures for the alternative competition measures are available upon request.

<sup>12</sup> Export information is collected in the following way: exports outside EU are reported if firms' annual trade value exceeds 1,000 Euros or a weight of a ton.

<sup>13</sup> The source of MFN applied tariffs is TRAINS: <http://unctad-trains.org>.

<sup>14</sup> The BACI dataset is provided by the CEPII and constructed based on COMTRADE dataset from the UN. This dataset provides bilateral trade flows at the 6-digit product level (Gaulier and Zignago, 2010). From BACI dataset we take information on import flows in each of our destination country. BACI is downloadable from <http://www.cepii.fr/anglaisgraph/bdd/baci.htm>.

<sup>15</sup> We thank two anonymous referees for suggesting these two alternative measures of foreign competition (ii) and (iii).

<sup>16</sup> The assumption behind this measure of extensive margin competition is that equal HS6 varieties imported from different countries are perfect substitutes. This idea has been recently discussed by the trade literature on quality (e.g. Khandelwal,

2010).

<sup>17</sup>We thank an anonymous referee for suggesting this way of computing this measure.

<sup>18</sup>Ideally, we need a measure that captures the competitive pressures faced by French firms in each Asian market by other local and foreign firms. To compute such measure we will need firm-product level information on the HS6 products sold by local and foreign producers in each domestic market. To the best of our knowledge this disaggregated information at the firm-HS6 product level is not available for China and the other Asian countries in our sample.

<sup>19</sup> To further address the potential endogeneity issue between import tariff and export patterns, we use lagged tariff measures.

<sup>20</sup>Section III describes in detail how these measures are constructed.

<sup>21</sup> Serious missing information problems prevented us from considering a more disaggregated product level dimension.

<sup>22</sup>To identify multinational firms, we combine our main dataset with the *Enquete Echanges Internationaux Intra-Groupe* produced by the French Office of Industrial Studies and Statistics (SESSI). This latter dataset is based on a firm-level survey of manufacturing firms belonging to groups with at least one affiliate in a foreign country and with international transactions totaling at least one million euros for the year 1999.

<sup>23</sup> To add information on firms' characteristics, we match our main customs dataset with the Annual French Business Surveys (EAE), available from INSEE. This survey allows us to have information on firms' employment and labor productivity (value added per worker). Since this implies restricting the sample to exporters with more than 20 employees which have manufacturing as their main activity, the number of observations is reduced by a half. We have no firm-level information for the Food and Beverages industry (corresponding to ISIC 15). This restricted sample covers around 14,000 observations, while the main sample has almost 28,000 observations.

<sup>24</sup>Since the basket of products is kept constant over the period, the number of observations is reduced to almost 24,394.

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