

Product standards and margins of trade: Firm level evidence

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Abstract

In order to address the trade effect of restrictive product standards on the extensive and the intensive margin of trade this paper matches a detailed dataset of French firms exports for the period 1995-2005 with a new database on specific trade concerns raised in the TBT and SPS committees at the WTO. The advantage of using specific trade concerns as an index of the degree of restrictiveness of product standards is that it focuses only on those product standards that are perceived to represent a barrier to trade, thus overcoming a measure limitation of existing measures of non-tariff measures. We analyse the effects of product standards on three trade related aspects: (i) probability to export (firm-product extensive margin), (ii) value exported (firm-product intensive margin) and (iii) pricing strategy (upgrading versus pricing to market). Moreover we look at how firms' market shares, orientation of exports, and comparative advantage modify the effect of SPS. We find that SPS concern discourages the presence of French exporters in SPS-imposing foreign markets, this effect is amplified for big firms. On the other hand, intensive margin is not significantly affected.

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1. Introduction

The facial evidence on tariffs is that obstacles to trade are either negligible or predictable for most markets and products. Tariffs have been bound extensively and reduced consecutively. In 2007, the world average protection was 4.4% according to MacMap-HS6, and only 3.2% for manufactured products. Even if such average authorises tariff peaks up to more than 1,000%, the overall picture is that access to foreign markets is rather easy. Such image is hardly matching the levels of overall protection revealed by indirect measures like border effects (De Sousa et al., 2011). It also clashes with the perception of exporters confronted to important and changing regulatory obstacles.

How to reconcile the two views is difficult. The collection of de jure regulations in importing countries is an immense effort that has been pursued by UNCTAD in order to produce its TRAINs database. More recently, a new nomenclature of non-tariff measures, common to UNCTAD, ITC, WTO and the World Bank has been designed. It is now used as a guideline to collect such information. However such approach is a quest for the Holy Grail. The number of products, importing countries, regulations, makes the whole exercise very costly, and the information collected is rapidly outdated. One is even not sure that every measure is actually a barrier to trade: regulations might facilitate trade in presence of incomplete information on the attributes of credence goods. Alternatively, one might prefer conducting surveys on the perception by exporters of obstacles on foreign markets. ITC (UNCTAD-WTO) is engaged in such effort. But though very informative, such approach can hardly be considered as a systematic record of all binding measures.

Against this background we propose here a different approach. Our first choice is to restrict our analysis to the subset of regulatory measures affecting trade that is considered as sizeable barriers by exporters. "Sizeable" means that exporters manage to incentive their origin country to bring the case to Geneva and to raise a "concern" in one of the two committees, SPS and TBTs. A new WTO database on Specific Trade Concerns (STCs) on SPS is providing us the necessary information.

Doing so, we will indeed miss the minor obstacles to trade, but we will have a panoramic view of regulatory obstacles to trade in goods.

Next, we will consider the actual behaviour of exporters, in terms of export participation, quantity shipped and pricing strategy, when confronted to such regulatory barriers. We observe their behaviour instead of relying on their replies to a survey. How to observe the behaviour of exporters is not a trivial task. We must get information on individual exports, by destination market, product category, in quantity and value, over a period of time long enough to explore the consequences of the introduction and withdrawal of regulations. While the collection of information on regulatory barriers to trade is systematic and covers all products and importing countries, we must choose a single country in terms of exports, and use the observed behaviour of firms as an illustration of the underlying microeconomic decisions. To do so, we rely on individual firms export data provided by the French customs for 1995-2005. We observe the universe of French exporters, identified by an administrative ID. As there is a lot of churning, we use a panel whereby exporters are present for at least 5 years in at least one product-destination each year.

This paper adds to the literature assessing the impact of SPS on firms' trade pattern. The effect of Non Tariff Measures on aggregate trade flows has long been analysed by scholars. One of the most comprehensive studies on aggregate flows level by Moenius (2004) shows that imports-specific standards have a negative effect on imports in non-manufacturing sectors such as food, beverages, crude material and mineral fuels; while they have positive impact on imports in manufacturing sectors (namely oils, chemicals and machinery). Nevertheless, evidence based on aggregate flows does not allow to draw conclusions on how firms' specific pattern of trade are affected by NTMs ("New Trade Theory" highlights the importance of firm level analysis given the heterogeneity of firms within country and industry). Moreover, firm level data allow to analyse properly the nature of NTMs as trade cost; in fact, as highlighted by Baldwin (2001), NTMs can be thought as both fixed and variable costs for exporting firms. To the best of our knowledge only two works analyse the effect of NTMs at

firm level. Chen, Otsuki and Wilson (2006) and Reyes (2011) find an export detrimental effect of technical standards imposition.

However, both former papers rely on census data. Chen, Otsuki and Wilson (2006) use the World Bank Technical Barrier to Trade Survey 2002; which is a survey of 619 firms where NTM crucial variable comes from employers' answers to a questionnaire. Reyes (2011) uses the Census of Manufactures of the Longitudinal Research Database of the U.S. Census Bureau and focuses only on the electronics sector. Moreover both former papers do not consider firms' characteristics in analysing trade effect of NTMs. In this paper we use a large sample of French firms over a ten years time horizon in several HS-4 sectors and, according with New Trade Theory conclusions, we will stress the role of firms' size in affecting the trade effect of NTMs.¹

We find that SPS concerns have a negative effect on the extensive margins of trade, meaning that SPS represents a further fixed cost to entry the foreign market. According to our preferred estimation facing a SPS concern reduces the probability to export by 2%. SPS measures significantly increase the quality of exported goods and their quality.

The rest of the paper is organised as follows. Section 2 presents a survey of the existing literature of trade related effects of NTMs and the theoretical framework we refer to. Section 3 describes data and some stylised fact. Section 4 and 5 presents respectively our empirical strategy results. Final section concludes.

2. Survey of Literature

The effect of standards on trade has been long studied in the literature but a clear final conclusion has not yet been reached. The seminal work by Swann et al. (1996) finds a positive effect of standards on trade, in particular they estimate a 3.3 per cent increase in UK imports (from the rest of the world) as a consequence of a 10 per cent increase in the number of country-specific standards. Moenius (2004)

¹ More precisely, we observe statistical units defined by their administrative identifier (SIREN).

shows mixed effect of import-specific standards on imports. Using a gravity model approach on 12 OECD countries and 471 sectors, the author finds an import-enhancing effect of standards on manufacturing sectors and an import-detering effect for non-manufacturing sectors. The author argues that in some sectors (manufacturing), standards provide additional information about consumers' tastes and market preferences, enabling foreign firms to export more in such import-standards imposing countries. In other sectors, import standards simply increase the fixed cost of export.

Former works have been conducted at aggregate level missing some important consequences of import standards imposition. Indeed, the imposition of new import standard measure could affect both the probability to enter in a foreign market (extensive margins) and its associated exported value (intensive margins). Extensive and intensive margins of trade are properly analysed at firm level. Firm level analysis would also allow studying the effect of standards on the number of varieties exported by firms. Moreover, assuming the existence of a fixed cost to entry in a certain market, New Trade Models predicts that only the most productive firms in the industry will continue to export after an increase in such fixed cost. Although the importance of firm level analysis on NTMs effects on trade, relatively little has been done in literature.

Chen, Otsuki and Wilson (2006) study the effect of standards and technical regulation on firm's export performances in term of exported value and market diversification. Using the World Bank Technical Barrier to Trade Survey (2002) - including 619 firms in 17 developing countries – they find that testing procedures imposed by potential destination markets reduce export share² by 19 per cent. Moreover, they find that meeting standards hinders firms' entry into foreign markets, reducing the likelihood for firms to export to more than three markets.

Reyes (2007) examines the response of US manufacturing firms in only electronic sector to a reduction of NTMs by looking at the harmonization of European product standards to international

² In Chen, Otsuki and Wilson (2006) export share is the ratio between firm's exports and its total sales.

norms in the electronic sector. From a theoretical model he concludes that: (i) product standards harmonization increases the number of home exporting firms to a destination market (extensive margins of trade); (ii) new entrants are mainly drawn from the most productive set of firms; (iii) product standards harmonization decreases exports sales at existing exporters (intensive margins of trade). Using the same dataset as in Chen, Otsuki and Wilson (2006) author finds that product standards harmonization increases the probability that higher-productivity firms enter the EU market whereas tariff do not affect entry decision.

3. Data and Stylized Facts

This section presents the data sources used in the paper and some stylized facts about NTMs. Individual export data on French firms are provided by the French Custom for the period 1995-2005. A new WTO database on Specific Trade Concerns (STCs) on SPS provides information about Non Tariff Measures (NTMs), while tariff data come from the TARMAC dataset maintained by ITC-UNCTAD-WTO.

French firms' dataset includes exports records at firm, product and market level for the universe of French exporters. These records were provided by the French customs. The dataset classifies product categories using Combined Nomenclature at 8 digits (CN8). Moreover, since EU27 acts as a single country in WTO committees, we restrict our firm level sample to only extra-EU27 export flows. We take all but services sectors (98 and 99 in the HS classification) and only firms exporting at least five years into a certain market/product combination (this reduces the bias of using occasional exporters). The original information on exported products is using the CN8 (an 8-digit European extension of the HS6 comprising some 10,000 product categories). We aggregate this information within some 1,200 headings of the HS4 classification which is also used by the WTO to record the SPS and TBT concerns. The number of observations is very large: we have for each HS4 heading some 100,000 exporters, 200 destinations and 16 years. Accordingly, we must stick to the most relevant trade relationships. We sum exports by HS4-destination market over all firms (over the period). For each of

this product overall French export cumulated flows, we compute the median flow across destination countries (by product) in value terms. As the distribution of exports, in terms of destinations, is a function of gravity forces, conditional on products or sector, above the median are large markets for which it is worth paying the fixed cost of exports for a given product. We restrict our sample to these destinations. Importantly the sample of destinations varies across products. Zero aggregate flows are not informative as they may represent true zeros or small flows (below the median); however, within a product-destination pair, we will observe the extensive margin in terms of firms.

Firm level export data (compared with aggregate trade flows data) allow us to properly investigate the effect of NTMs on the intensive/extensive margins of trade, on the exit dynamics from foreign markets, on the number of varieties exported by firms. Moreover, it allows us to control for firms' characteristics in determining the effects of NTMs. Indeed large and highly productive firms might react to NTMs differently from small and low productive firms. However, such control must rely on a fixed effects strategy as we do not have information on turnover, employment or capital for the universe of French exporters.³

STCs dataset contains information on concerns raised in the SPS committee at the WTO by a claiming country against a potential trade partner, who imposes a non-tariff measure. The period covered is 1995-2010. For each concern, we have information on: (i) the claiming and the country imposing the measure, (ii) the product codes (HS 4-digit) involved in the concern, (iii) the year in which the concern has been raised to the WTO and (iv) whether it has been resolved and how. Most of the cases notified end up in a gentleman agreement whereby the importing and exporting countries manage to fix the problem without resorting to a panel.

The WTO dataset contains 312 concerns related to SPS measures, involving 203 HS 4-digit product lines. We find 89 claiming and 58 countries imposing at least one SPS measure. Given the panel

³ French firm level business survey cover only firm with more than 25 employees. Since more than 50% of exporting firms is smaller, and because we aim to observe the extensive margin of exports, we decided to not merge our dataset with that on French Firm characteristics.

structure of the dataset, a dummy variable activates when the concern is reported to the WTO and shifts to zero when (whether) the concern is resolved.

The advantage of using specific trade concerns as an index of the degree of restrictiveness of product standards is that it focuses only on those product standards that are perceived to represent a barrier to trade, thus overcoming a limitation of existing measures of non-tariff measures. Not all measures are equally impacting trade, and certain measures have been proved in the literature to even enhance trade (Fontagné et al., 2005-a).

The STCs database sheds new light on the use of SPS, and their perceived impact by exporters. Non-Tariff Measures negatively impacting trade have been increasingly used by importing countries (Figure 1) over the considered period. The number of countries imposing at least one SPS measure doubled in the period 1996-2005 while the number of countries complaining about a measure increased from 10 in 1996 to 86 in 2005⁴. Moreover, the total number of product lines (HS 4-digit) involved in at least one concern experienced a huge jump in the 1996-1997 (from 28 to 135 product lines involved). The number of affected product categories increased at a yearly 5 per cent average annual growth rate in the period 1998-2005.

Not all countries are evenly imposing SPS measures affecting trade. Complaints against importers are concentrated on a handful of countries. Table 1 shows the number of HS 4-digit lines yearly involved in SPS concerns by imposing countries. European Union, India, United States and Japan are the most often targeted importers in complaints related to SPS measures. According to the concerns raised in the WTO committees, in 2005 European Union had active SPS measures on 175 product lines, India on 85 products, United States and Japan on 81 and 62 product lines respectively. In total, 21% of the measures challenged in the committees were imposed by the European Union, while United States and Canada together represented 13% and Japan the 7.5%. Interestingly, advanced economies impose

⁴ In this section we focus on the time period 1996-2005 leaving aside the starting year because for the 1995 we only have information on the newly arisen concerns and not on the formers and still active concerns. From 1996 on, all our measures include formerly arisen and still active concerns.

almost 42% of the total NTMs in the world. Such descriptive evidence is not proving that the use of SPS measures for protectionist purposes is quite systematic in Europe or in the United States. It might well be the case that challenging a SPS measure is costly and that complaints focus on the largest markets whereby the complainant country can be rewarded by important additional sales in case of success of the concern. Thus, the database is not telling us that smaller economies are not enforcing SPS measures affecting trade: under resource constraint, exporting countries might well concentrate on the largest markets. Another explanation is that richer countries are more concerned by food safety and impose more stringent measures, hence the concentration of concerns on these countries. Also emerging countries (such as Brazil, China and India) widely use non tariff measure to protect food sector. In 2005 Brazil, China and India had respectively 17, 50 and 85 on-going SPS procedures To conclude, we must examine what is the conditional impact of the presence of challenged measures on the participation and volume of exports of individual firms. This is the purpose of our econometric exercise below.

There is also an interesting concentration among sectors involved in NTM concerns. Table 2 shows the number of countries imposing a measure against which a STCs has been raised for each HS 2-digit chapter. The most sensitive industry is Meat and Edible Meat sector: 29 countries had an active concern in this sector in 2005⁵ (i.e. the 18 per cent of the total imposing countries have a measure on Meat and Edible Meat sector). This result is in line with Fontagné et al. (2005-b), who report that the two HS2 chapters mostly affected by SPS measures in 2001 were Live animals (with a 74% coverage ratio) and Meat (resp. 68%).⁶ Other sensitive sectors are Edible fruits and nuts (chapter 8), Live animals (chapter 1), Birds' eggs and honey (chapter 4), Edible vegetable s (chapter 7). On the contrary, certain sectors prove to be not sensitive to NTMs. Only one imposing country was challenged in the committees for Product of milling industry (chapter 11), oil seeds (chapter 12),

⁵ In this table the sector HS 2-digit is considered under an active concern if at least one HS 4-digit line is involved within the chapter.

⁶ The corresponding measures were concentrated on 6 HS lines. See op. cit. Table 4 p. 1432. The ratio defines as imports in notifying countries over world imports in affected products. The most affected HS6 category was 029210 (bovine carcasses and half carcasses, frozen) with a coverage ratio of 98%.

sugar and sugar confectionery (chapter 17), pharmaceutical products (chapter 30), chemical products (chapter 38).

Figure 2 shows the distributions of the number of countries imposing a SPS for each product line (HS 4-digit) in years 1996 and 2005. In 1996, almost 40 per cent of product lines were free of NTMs while in 2005 only 8 per cent of products were free of measures. Moreover, the average number of imposing countries per product line increased from zero to two along time. Figure 2 also shows a huge increase in the dispersion of the distribution around the mean values, meaning that within the period, a lot of countries started to impose SPSs in a wider range of product lines.

The average time of resolution for solved concern is about three years with a small variance across maintaining countries. Figure 3 shows the average time of resolution within maintaining countries' regions; it shows a small variance among regions, with the exception of CIS countries that nevertheless, represent only the two per cent of the total observations in the sample.

4. Empirical strategy

We aim at explaining trade participation, intensity and unit value by a bunch of controls (including tariffs) and the presence of an SPS, at the product (HS4) and destination country level. Our crucial explanatory variable, addressing the presence of SPS, is a dummy equal to one if (when) there is an ongoing concern between a pair of countries.

We test the effect of the presence of such SPS on a set of dependent variables addressing the different dimensions of the behaviour of exporters in terms of participation, product scope, value shipped. As dependent variable we use (i) a dummy for positive trade flow into a certain product/market combination (firm-product extensive margin of trade, or participation); (ii) the exported values by firms in logarithm (intensive margin of trade)⁷; (iii) the quality of exported goods measured as Trade Unit Values; (iv) a dummy variable indicating whether the firm exits the product/market (dummy

⁷ We use $\ln(\text{export}+1)$ to take into account the zero trade flows problem.

equal to one if the firm does not export in the current year but exported the year before); (v) the number of varieties exported by firms in each product/market (i.e. number of HS 6-digit product lines within each 4-digit chapter exported into a certain market by firms).

As main control variable we use the applied preferential tariff level and indicators of market structure. Moreover time-fixed effects, sector fixed effects, destination fixed effects, time-sector fixed effect and country-time fixed effects have been included. Doing so, we control for unobservable trend, time invariant sector and destination country characteristics, country specific business cycle, and sector specific shocks common to all countries. Sectors are defined as HS2 chapters.

Thus the empirical models have the following form:

$$[1] y_{i,HS4,j,t} = \alpha + \beta_1 SPS_{HS4,j,t} + \beta_2 Size_{i,HS2,j,t} + \beta_3 (SPS_{HS4,j,t} * Size_{i,HS2,j,t}) + \beta_4 Tariff_{HS4,j,t} + \phi_t + \phi_{HS2} + \phi_j + \phi_{HS2,t} + \phi_{j,t} + \varepsilon_{i,HS4,j,t}$$

Where y represents the set of dependent variables described before and subscripts i , $HS4$, j and t stand respectively for firm, HS 4-digit sector (or 2-digit if HS2), destination country and year. Each regression includes unobservable variables that may be correlated with the residual.

We also include different measures of firm's size : (i) firm specific market share (*Size* in tables of results) computed as the total exports by firm over total French exports; (ii) sector specific firm's market share (*Sector specific Size* in tables of results) computed as total firm's export by sector over total French export in the same sector; (iii) sector-market specific firm's market share (*Sector-Market specific Size* in tables of results) computed as sector-market specific firm's export over French exports on that sector-market. The three market shares described above aim to control for different perspectives of firm size. Firm specific market size controls for the size of the firm in general, no matter neither the sector nor the destination market. However, it may be that a firm is a big exporter in a particular sector, thus we include the sector specific market share. Finally, since a firm can be big

exporters in a particular market but not in another, we include the sector-market specific measure of market share. Moreover we approximated firms' size as total export level (i.e. the higher the export level the bigger the firm). All former measures of firm size have been included as one year lagged since size (to our view) affects extensive and intensive margin for the year after.

Moreover, to investigate whether the effect of SPS measure changes with firms' size, we also include the interaction between firms' size measures (described before) and the SPS dummy variable. The underlying idea is that, high market share firms are big firms with high productivity levels (there is wide empirical evidence of the fact that big and highly productive firms have are also big exporters).

Given that European Union acts as a single country in WTO specific trade concerns, SPS measures could involve sectors and destination countries which are not relevant for French firms. Indeed, SPS measures might be imposed by foreign countries to prevent imports from European countries other than France; thus some measures might be irrelevant for French firms simply because the imposing country is not important for French exports. This would imply a bias towards zero in our SPS dummy coefficients. We fix this bias by including two further control variables. The first is a share between the sector-market specific French exports and the total French exports in that sector (*Mkt Share 1* in tables of results). It controls for the relevance of a certain destination market for French exporters (given a sector). The second control variable is the destination market specific share of imports from France (in each HS 2-digit sector), over the worldwide sectorial imports of that country (*Mkt Share 2* in tables of results). The latter variable controls for how important are imports from France for each destination market.

The first econometric complication here is the potential endogeneity of SPS concerns due to both omitted variables and reverse causality. The omitted variable bias is strongly reduced by the inclusion of a wide range of fixed effects controlling for most of the potential variables affecting export behaviour by firms. Firm size variables, being firm specific, capture the productivity effect of firms on their export performances (Mayer and Ottaviano 2007). Reverse causality arises if government in

destination market sets NTMs as response for huge import levels from a specific French firm. However, this channel appears not really plausible. In fact, governments in destination markets would set a SPS measure against a specific partner country if total imports from that country are too high, not just because a single firm is exporting a lot. Moreover, given that EU is considered as a single country in SPS concerns, destination market country could set a SPS measure against an EU country other than France; this crucially reduces the reversal causality problem (i.e. it makes the imposition of SPS measure orthogonal with respect French specific export performances). To further reduce the reversal causality problem we also estimate a specification including one year lagged SPS dummy.

The second econometric issue concerns the zero trade flows problem in the intensive margin estimation. Importantly, the zero trade flows is of a peculiar nature here. Remind that we have kept only destination markets (outside Europe) above the median. Zero trade flows therefore concern a firm not exporting a certain product to a destination market (being the destination market important for the overall French firms). Given the log specification of the model, the zero exporting firms would be dropped from the sample, implying biased estimation⁸. To avoid this problem we simply add one euro to all export values⁹.

Finally, although the dichotomous nature of some of our dependent variables (extensive margin and exit of firms) we prefer to rely on simple linear OLS estimator rather than a non-linear probit (logit). Indeed non linear models suffer the incidental parameter problem given the huge set of fixed effects included in the regressions.¹⁰

⁸ Final sample in this case would contain only exporting firms and leaving aside all those firms which do not export because of NTM.

⁹ We are aware of other different way to solve for this problem, Poisson estimation (Silva and Tenreyro 2006) or Heckman two stages approach (Helpman et al. 2008). But given the high number of fixed effects, Poisson estimation would suffer the incidental parameter problem. Moreover, we could not use the Heckman procedure since we did not find a plausible exogenous instrument for the first stage regression. In fact, widely used instrument for the first stage (for example common religion) are country pair specific and could not be applied in our setting since we only have France as reporter country. Another widely accepted instrumental variable for the first stage is five years lagged dummy variable for positive flows; but this would not be reliable in our case because the high share of temporary exporting firms.

¹⁰ The only drawback of linear probability model is the possibility of having predicted probabilities negative or greater than one; but it provides reasonable direct estimates of the sample average marginal effect,

5. Estimation results

We start by considering export participation. Heterogeneous firm will not all be able to cope with the stringency of the regulations, which represent a fixed cost of adaptation and/or a variable trade cost. Accordingly, the presence of a SPS (raising a concern) should impact negatively export participation by individual firms.

Results are reported in Table 3. We have 2,000,845 firm-product-destination-year observations. In Column (1), we observe the negative and highly significant negative impact of the presence of a SPS measure. This result holds also after the inclusion of tariff as control (column 2). How firm size and trade barriers interact is shown in Columns (3) to (8) in Table 3. The first finding is that big players (firms having a large market share for a given product in a given market) are more often targeted by SPS regulations (columns 3 and 8). The interacted firm size-SPS is negatively impacting the participation. Here the firm size is defined as the share of firm's exports in each HS2-market cell over total French firms' exports in the cell. Figure 4 panel (a) shows the negative effect of SPS on extensive margins associated with the changing firm's size: the bigger the firm's size the stronger is the negative effect of SPS on the extensive margins. The horizontal axis of figure 4 panel (a) reports the market share of firms (as defined before), while the vertical axis measures the overall effect of a SPS imposition. Thus the intercept of vertical axis in the graph simply represents the SPS dummy coefficient in table 3. A 50 per cent market share firm suffers two times the SPS effect than a 20 per cent market share firm.

The two other proxies for firm size (firm specific and sector specific market shares - *Size* and *Sector Specific Size* in tables of results) do not play a role on the SPS effect on extensive margins. This confirms the idea that firm size needs to be considered as sector-market specific. Nevertheless, when we use the total amount of exports per firm as proxy for firm size (column 6) we find a significant positive coefficient, suggesting that the higher the overall export by firm the lower the negative effect

moreover the OLS estimator does not suffer the incidental parameter problem. However we computed also non linear models and main results still hold (see appendix tables A1 and A2)

of SPS. Putting together results in columns (3) and (6) we can conclude that SPS affects with a lesser extend high exporting (big) than low exporting (small) firms; but, controlling for this first effect, if the firm is big in a particular sector-market (Sector-Mkt specific Size) the effect of SPS is magnified (meaning that big firms are targeted by government in destination country).

Former result on how sector-market specific size affects the extensive margins goes against a simple interpretation of the monopolistic theoretical settings where big players are more productive and more able to cope with standards. What we observe here is different. The larger the firm size in terms of its market-sector market share, the higher the negative impact of the presence of the SPS on firm's probability to participate in the market. Now, the big players have also more resources to bypass the barrier. And when they manage to do so, it increases their market share on the destination market, as opposed to small firms, because large firms get a larger share of a smaller market. What the theory is suggesting us is that the consumer in the importing country will pay the bill at the end. But for the moment we do not observe this.

We strengthen our former result by controlling with two new variables. The first one is a market share variable computed as the ratio between French exports into a given market over total French exports in all destination markets (*Mkt share 1* in tables of results); it captures the orientation of French exports in a given destination market. The second variable controls for the importance of France for the total imports of each partner country in a given sector (this variable - *Mkt share 2* in Table 3 – has been computed as the ratio between French exports over total destination market's imports). It controls for the sectorial comparative advantage of France with respect each destination market. These are additional controls when we consider the impact of SPS concerns of exporters of different size and market share. In column (7) Table 3 we examine the joint effect of size and *Mkt share 1* and their interactions with the presence of a SPS concern. We observe that the negative effect of SPS is attenuated for those firms exporting in markets which count a lot for French exports, meaning that SPS discourage mainly firms exporting in marginal destination countries. Horizontal axis in figure 4 panel (b) reports the share of French exports into a given market over total exports, while the vertical

axis measures the overall effect of a SPS. The figure shows that the negative effect of SPS on the extensive margins of trade applies only for firms exporting in “marginal market” for France; conversely the effect of SPS becomes positive for firms exporting in very important destination markets. For firms exporting in destination markets representing only the 10 per cent of total French exports, the imposition of a SPS concerns reduces by 1 per cent the probability to enter that market. If the imposition of SPS involves large destination markets, the overall SPS effect on extensive margins is positive: for markets representing the 50 per cent of French exports, the imposition of SPS stimulates French firms to export in that market by 3 per cent.

In column (8) (Table 3) we control for the second market share (*Mkt share 2*) computed as the ratio between French exports over total destination market's imports (in a given sector). We accordingly capture the importance of France for the total imports of every partner country. Results show that the main “French markets” are targeted by SPS imposed by importers and that SPS reduce the presence of French firms in this market overall, notwithstanding the redistribution of sales from small to big French firms in these destinations (notice that the overall effect on the exported value is not determined at this stage as we observe only participation). Figure 4 panel (c) shows that the effect of SPS is close to zero for firms exporting in destination markets where the share of imports from France is small; but the negative impact of SPS grows up to 20 per cent for firms exporting in markets where French exports counts more. We finally lag the SPS variable without changing the result; results for the lagged SPS dummy estimations are reported in table 4. We further re-estimated the former specification by using a non linear probit model (given the dichotomous nature of dependent variable) and results are mainly unchanged (appendix tables A1 and A2). Nevertheless, non linear model in presence of huge set of fixed effect suffer the incidental parameter problem, so we prefer to rely on the linear probability OLS estimation presented before.

- Table 3 about here –

- Table 4 about here -

To further strengthen our interpretation about the SPS effect on big firms we empirically test whether the firms have the possibility to export in another destination market (z) when a potential destination (j) imposes a SPS measure. To this end we define a dummy variable equal to one if the firm exports to at least one z destination market and not to j . Table 5¹¹ shows that the imposition of a SPS measure by country j increases the probability that the (French) firm has at least a third (z) destination market. This effect is magnified for big firms (having high sector-market specific market share) – column 2 Table 5.

- Table 5 about here –

All in all we can conclude that SPS concern (and its lagged value) discourages the presence of French firms in SPS-imposing foreign markets. This effect is robust across different specifications (control variables) and econometric model (OLS and probit estimation). Big exporters (i.e. firms exporting a lot in a certain market/product) have a higher probability to face a SPS, which however plays the role of barrier to entry for their French competitors. All in all this suggest that SPS measures might be set to discourage mainly big firm import penetration.

The next step is to examine the impact of the SPS concerns on the intensive margin of exports in Table 6. We now consider participants in the product-destination market and explain the log value of their annual sales in these markets. The first result is that the intensive margin is not significantly affected for most of our specifications. We were expecting this result, which is driven by the traditional composition effect in presence of fixed trade costs cum heterogeneous firms (Berthou and Fontagné, 2012). When the fixed cost of trade increases, small exporters disappear, large exporters stay in the market, with no clear effect on the mean value of exports of survivors. Interestingly, tariffs do not exhibit such property and have a negative and significant effect on the intensive margin. Controlling for exporters' size does not change this result in columns (3,4,5). But when we use the

¹¹ Also for this specification a OLS linear probability model has been used to avoid incidental parameter problem.

total value of exports by firm to control for the size of firms, the SPS coefficient turns to be negative and significant. The former negative effect of SPS is attenuated for highly exporting firms (column 6).

Controlling for the orientation of French exports in a given destination market restores the significance of SPS concerns. It means that SPS concerns are concentrated on markets that are important for French exporters as a whole, as opposed to marginal markets. But, SPS does not affect the intensive margin of exports in markets for which French export are “crucial”, as confirmed by the positive coefficient in the interacted term SPS*MktShare2 (column 8). Results are robust to lagging the SPS concern variable (table 7).

- Table 6 about here -

- Table 7 about here -

Given that our preferred measure of firm size is the market-sector specific one, in what follows we focus only on this measure.¹² As in any strategic interaction framework, imposing a barrier to entry leads to a redistribution of market shares among players and to a strategic response in terms of pricing. Under imperfect competition, the rent (higher price, lower quantities) created by the new barrier to entry is subject to distribution among agents (exporters versus domestic firms). Firms may well make decisions in order to capture part of this rent. This kind of response has been extensively documented in the case of VERs (Krishna, 1989). All in all, we expect upgrading by the survivors, and a higher price paid by the consumer on the destination market imposing the stringent SPS. We verify in column 1 (and 5) Table 8 that the presence of a SPS concern (and its lagged values) increases the unit value (a loose proxy of quality or market positioning) of firms’ exports, meaning that SPS is an incentive for firms to upgrading. Unexpectedly, this is not true for large players. This is particularly clear in columns 4 and 8 Table 8. We verify in these two columns that large players sell at cheaper prices and do not upgrade in presence of SPS (see the sum of the interacted SPS-market share variable and SPS variable). We finally observe in column 3 Table 8 that these mechanisms turn to be

¹² However results on the other proxies of firm size are available under request.

not significant after controlling for the importance of the market for French firms. Meaning that the quality upgrading effect is just for firms exporting in important destination markets (when the interaction $SPS * MktShare1$ positive and significant, SPS dummy has no effect).

- Table 8 about here -

The former result could be driven by an increase in value exported with constant quantity, or increased (constant) values and reduced quantity. To clarify this point we investigate the SPS effect on the quantity exported by firms. We find robust evidence of the detrimental effect of SPS on quantity exported by firms (table 9). Moreover, we find that big firms suffer the negative effect of SPS on quantity more than small firms (column 2 table 9).

- Table 9 about here -

The final bit of information to be extracted from our research strategy is about the deterrence effect of SPS and its effect on the number of varieties exported. Can we observe an increase in the probability of exit for exporting firms confronted to SPS on their exporting markets? Either the exporters cannot pay the fixed cost of adaptation to such SPS, or they reorient their exports (towards a third market) as the marginal cost of exporting to the destination imposing the SPS is increasing. Importantly, exits do not mean that firms stop exporting. They stop exporting in the market/sector imposing the SPS. Such evidence is provided in Table 10. We find overwhelming evidence of a positive effect of SPS on firms' probability of exit. SPS has an attenuated effect on the probability of exit in those markets in which imports from France are crucial (columns 4 and 8).

- Table 10 about here -

Finally we estimate the effect of SPS on the number of varieties exported by firms, as the number of exported lines (HS 6 digit) within each 4-digit chapter-destination market. Results in table 11 columns 2, 3, 6 and 7 show that SPS increases the number of exported varieties, meaning that the imposition of

a SPS measure stimulates firms to diversify exports in terms of varieties. Although our SPS measure is at HS 4 digit, it may be the case that the actual SPS imposition concerns a specific HS 6 line, it might stimulate firms to overcome this imposition by diversifying into similar not restricted lines (increasing the overall number of exported lines). The former effect is reversed for large firms (high sector-market specific market share) and still holds after controlling for the orientation of French exports in a given destination market (Mkt share 1 in table 11).

6. Conclusion

This paper studies the effects of SPS measures on export performance at firm level. Using an exhaustive sample on French firms' exports and an original dataset on SPS specific trade concerns raised at the WTO, we estimate the effect of SPS imposition (in a certain market and sector) on the intensive and extensive margins of trade. We also study the effect of SPS on trade unit values, firm's probability of exiting a certain market and on the total number of exported varieties.

The original contribution to the existing literature on the impact of SPS measures on trade concerns the fact that it analyse several dimensions of a firm's trade performance (volume of trade, market entry and exit, trade unit values and number of exported products), it accounts for firms characteristics and it uses a dataset of SPS measures that include only those measures that are perceived as a possible obstacle to trade.

Our results show that the imposition of SPS measures reduces the participation of firms in export markets. This negative effect is magnified for large exporters. This outcome seems to go in the opposite direction of a standard "heterogeneous firms" trade model. Our interpretation is twofold. One possibility is that SPS measures are targeted for big firms. Another one is that big firms use their flexibility to move to other markets and bypass the SPS measure.

With respect to the intensive margin of trade, the effect of SPS is unclear: we obtain a negative effect only after controlling for the relevance of the destination market, meaning that SPS measures affect the level of exports of firms operating in marginal markets. In addition, firm size does not play a role in the intensive margin estimation. We also find strong evidence of a detrimental effect of SPS on the quantity exported by firms, with a magnified (but weak) effect for big firms. We also find overwhelming evidence of a quality upgrading effect of SPS imposition. SPS represents an incentive for firms to upgrading the product in a certain destination market. This effect is stronger the higher the importance of the destination market for French exports.

Overall, our results show that SPS imposition is not just a trade deterring measure; it rather implies a complex set of effects including market participation, quality upgrading and product variety diversification. Moreover, the effect of SPS measures strictly depends on firms' characteristics.

References

- Baldwin, R. (2001). Regulatory Protectionism, Developing Nations and a Two-Tier World Trade System. CEPR discussion paper n.2574.
- Chen, M.X, T. Otsuki and J.S. Wilson. (2006). Do Standards Matter for Export Success. World Bank Research Working Paper 3809.
- De Sousa, J., T. Mayer and S. Zignago. (2011). Market access in global and regional trade. Working papers 358, Banque de France.
- Disdier A.-C., L. Fontagné and M. Mimouni. (2008), The Impact of Regulations on Agricultural Trade: Evidence from SPS and TBT Agreements. *American Journal of Agricultural Economics*, 90(2): 336–350.
- Disdier A.-C., L. Fontagné and O. Cadot (2012), North-South Standard Harmonization and International Trade, CEPR Discussion Paper #8767.
- Fontagné L., M. Mimouni and J.M. Pasteels. (2005-a), Estimating the Impact of Environmental SPS and TBT on International Trade. *Integration and Trade*, (22): 7-37.
- Fontagné L., F. von Kirchbach and M. Mimouni (2005-b), An Assessment of Environmentally-Related Non-Tariff Measures. *The World Economy*, 28 (10): 1417-1439.
- Helpman, E., M. Melitz and Y. Rubinstein. (2008). Estimating Trade Flows: Trading Partners and Trading Volumes. *The Quarterly Journal of Economics*, MIT Press, vol. 123(2), pages 441-487, 05
- Krishna K. (1989). Trade restrictions as facilitating practices. *Journal of International Economics*, 26(3–4): 251-270.
- Mayer, T. and G.I. Ottaviano. 2007. Happy few: the internationalisation of European firms New facts based on firm-level evidence. Open Access publications from Sciences Po.
- Moenius, J. (2004). Information versus Product Adaptation: The Role of Standards in

Trade. International Business & Markets Research Center Working Paper, Northwestern University

Shepherd, B. (2007). Product Standards, Harmonization, and Trade: Evidence from the Extensive Margin. World Bank Policy Research Working Paper 4390.

Silva, S. and S. Tenreyro (2006). The Log of Gravity. The Review of Economics and Statistics, MIT Press, vol. 88(4), pages 641-658, 09.

Swann, P., P. Temple and M. Shrumer. (1996). Standards and Trade Performance: the UK Experience. The Economic Journal, 106(September), 1297 - 1313.

Tables and Figures

Figure 1. Number of countries imposing a SPS measure, complaining countries and HS 4-digit lines involved in SPS concerns by year.

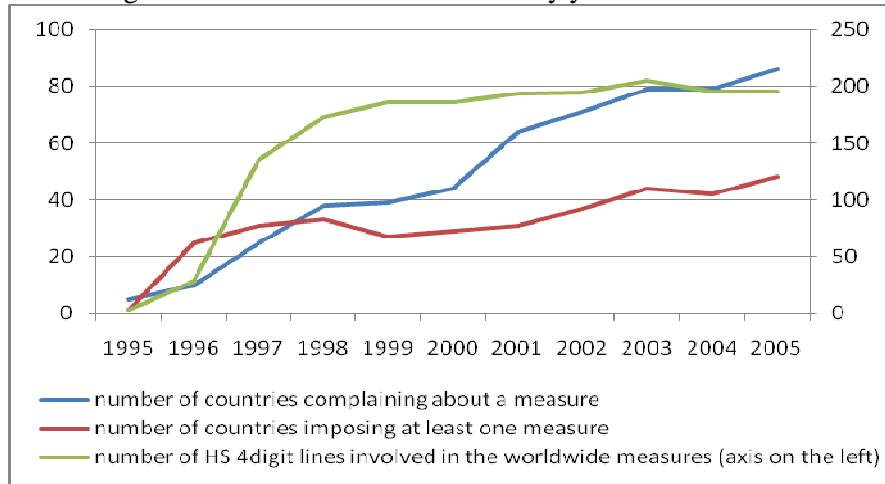


Figure 2. Distribution of the number of countries imposing a SPS measure of concern. Comparison 1996-2005

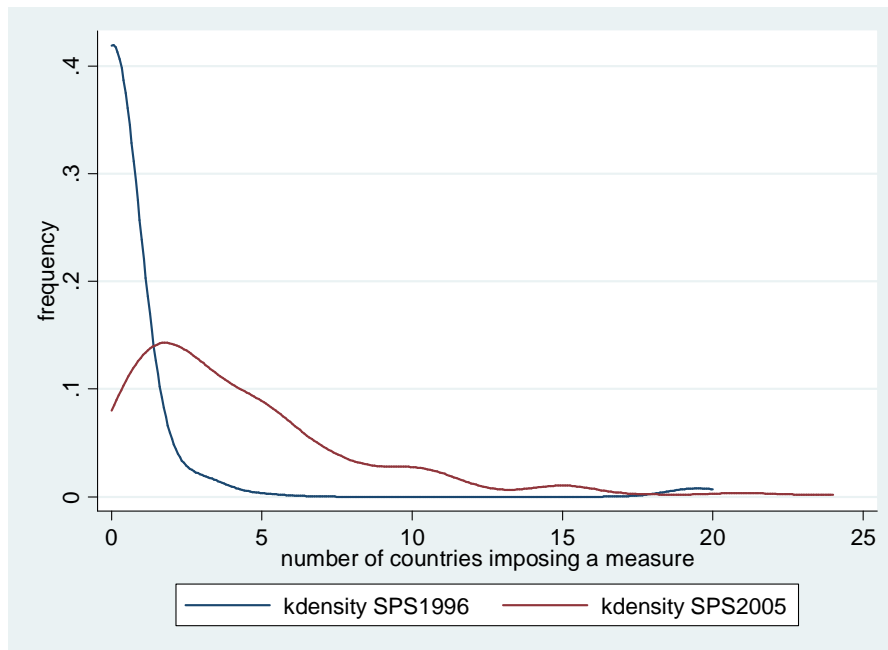


Table 1. Number of HS4 lines involved in SPS concerns by year and imposing country

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Argentina	4	4	5	12	12	14	27	27	27	27
Australia	11	11	14	10	4	9	9	10	11	12
Bahrain	0	0	0	0	0	0	0	1	1	1
Barbados	0	0	0	0	0	0	0	0	1	1
Venezuela	0	2	2	4	4	6	14	14	14	14
Bolivia	0	0	0	0	1	0	0	0	0	1
Brazil	6	7	11	7	7	6	22	25	7	17
Canada	13	21	21	21	21	21	21	21	21	25
Chile	5	27	27	23	23	25	26	26	23	23
China	0	0	0	0	0	0	71	43	50	50
Colombia	0	0	0	0	0	0	1	0	0	0
Costa Rica	0	0	0	0	0	0	0	0	0	14
Croatia	0	0	0	0	0	0	0	16	16	16
Cuba	0	0	0	0	0	1	4	4	1	1
Egypt	0	0	0	0	1	1	1	1	1	1
El Salvador	1	1	1	21	1	1	1	1	1	1
European Union	7	61	85	90	111	152	160	175	175	175
Guatemala	0	0	0	0	0	0	0	0	0	2
Honduras	1	2	2	2	2	1	2	2	2	2
Iceland	0	0	0	0	10	10	10	10	0	0
India	0	0	0	12	12	12	12	12	85	85
Indonesia	0	15	15	15	29	33	45	45	34	34
Israel	0	1	2	2	1	1	1	1	1	36
Japan	2	12	12	12	12	28	50	51	51	62
Korea	3	4	3	4	4	5	5	35	35	35
Kuwait	0	0	0	0	0	0	0	1	1	1
Mexico	0	1	1	2	2	2	1	4	4	5
Netherlands	4	4	4	0	0	0	0	0	0	0
New Zealand	0	0	1	1	0	6	4	4	4	4
Norway	2	2	0	0	0	0	0	0	0	0
Oman	0	0	0	0	0	0	0	1	1	1
Panama	0	1	1	1	3	2	12	12	18	20
Philippines	0	0	0	0	0	0	30	14	14	14
Qatar	0	0	0	0	0	0	0	1	1	1
Romania	4	4	4	0	0	0	15	15	15	15
Singapore	4	4	4	0	0	0	0	0	0	0
South Africa	0	0	1	1	1	1	3	3	3	3
Switzerland	0	10	22	22	22	22	22	22	0	0
Taipei	0	0	0	0	0	0	0	3	3	11
Thailand	0	0	0	0	0	0	0	0	0	2
Trinidad and Tobago	0	0	0	0	0	0	3	3	3	3
Turkey	0	0	18	18	19	20	20	20	18	18
United Arab Emirates	0	0	0	0	0	0	0	1	1	1
United States	4	8	38	37	37	39	42	42	54	81
Uruguay	0	0	0	0	0	0	10	10	10	10
<i>Total</i>	67	198	290	317	339	418	644	676	707	825

Table 2. Number of countries imposing a SPS measure of concern by year and sector

HS2 sector	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
01 Live animals.	0	0	2	2	2	4	8	9	11	12
02 Meat and edible meat offal.	21	25	27	17	18	21	29	29	25	29
03 Fish and crustaceans, molluscs and other aquatic invertebrates.	3	3	3	3	2	2	3	2	3	4
04 Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included.	20	20	22	9	7	10	15	13	11	11
05 Products of animal origin, not elsewhere specified or included	0	2	2	3	3	3	4	3	3	5
06 Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage.	0	1	2	2	2	4	3	3	3	5
07 Edible vegetables and certain roots and tubers.	1	2	4	4	4	4	6	10	9	11
08 Edible fruit and nuts; peel of citrus fruit or melons.	1	3	4	5	7	8	10	11	12	15
09 Coffee, tea, mate and spices.	0	0	0	0	0	0	0	2	2	3
10 Cereals.	0	5	5	6	6	6	6	8	7	9
11 Products of the milling industry; malt; starches; inulin; wheat gluten.	0	3	3	3	3	1	1	1	0	0
12 Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder.	0	1	1	1	1	1	1	1	1	1
13 Lac; gums, resins and other vegetable saps and extracts.	0	1	1	1	1	1	2	2	3	3
15 Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes.	0	1	1	1	1	1	1	6	7	7
16 Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates.	0	0	1	3	4	5	8	8	6	6
17 Sugars and sugar confectionery.	0	0	0	0	0	1	1	1	1	1

Table 2. Continue

20 Preparations of vegetables, fruit, nuts or other parts of plants.	1	3	4	4	4	4	6	7	8	10
21 Miscellaneous edible preparations.	2	3	4	6	5	4	8	7	7	7
22 Beverages, spirits and vinegar.	3	4	3	3	3	3	5	5	6	6
23 Residues and waste from the food industries; prepared animal fodder.	0	1	2	2	3	2	3	4	2	2
30 Pharmaceutical products.	0	1	1	1	1	1	1	1	1	1
33 Essential oils and resinoids; perfumery, cosmetic or toilet preparations.	0	1	1	1	1	1	2	2	3	3
38 Miscellaneous chemical products.	0	1	1	1	1	1	1	1	1	1
44 Wood and articles of wood; wood charcoal,	0	0	1	1	2	2	3	3	5	5
54 Man-made filaments.	0	1	1	1	1	1	2	2	3	3

Figure 3. Average time of resolution for solved SPS concerns, by region of maintaining country

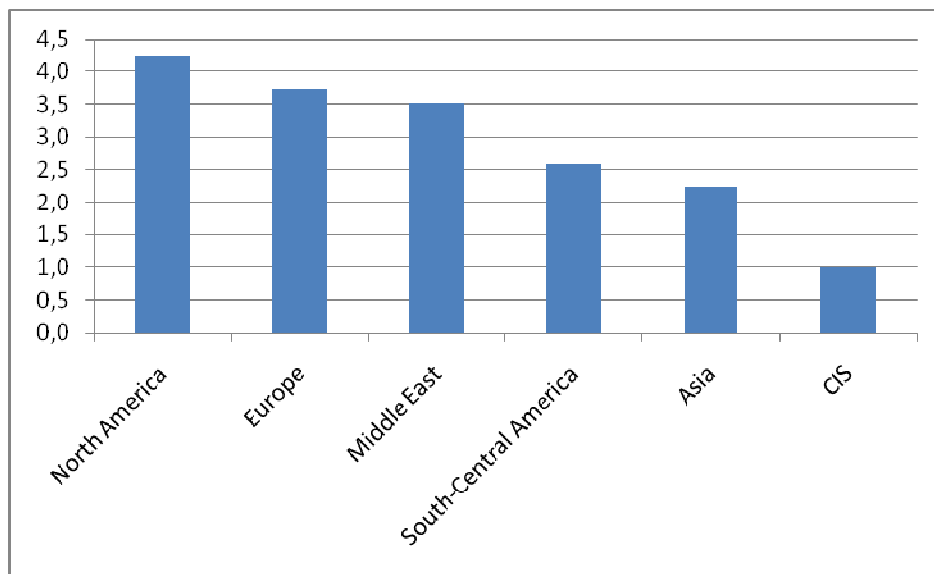


Table 3. Results for extensive margins estimations – OLS estimations

	<i>Dependent variable: extensive margins</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SPS	-0.016*** (0.005)	-0.015*** (0.005)	-0.012** (0.005)	-0.014*** (0.005)	-0.012** (0.005)	-0.027*** (0.006)	-0.023*** (0.007)	0.0027 (0.007)
Sector-Mkt Specific Size (lag)			0.994*** (0.007)				1.007*** (0.007)	0.998*** (0.007)
Sector-Mkt Specific Size (lag)*SPS			-0.105* (0.061)				-0.0599 (0.062)	-0.130** (0.061)
Size (lag)				10.90*** (0.181)				
Size (lag)*SPS				1.052 (4.492)				
Sector Specific Size (lag)					1.387*** (0.013)			
Sector Specific Size (lag)*SPS					-0.287 (0.235)			
Exports of firms (lag)						0.043*** (0.000)		
Exports of firms (lag)*SPS						0.011*** (0.003)		
Mkt Share 1 (lag)							0.110*** (0.004)	
Mkt Share 1 (lag)*SPS							0.102*** (0.033)	
Mkt Share 2 (lag)								106.7*** (5.886)
Mkt Share 2 (lag)*SPS								-158.8*** (58.80)
tariff		-0.0001*** (0,000)	-0.0001** (0,000)	-0.0001** (0,000)	-0.0001* (0,000)	-0.0001** (0,000)	-0.0001** (0,000)	-0.0001** (0,000)
Observations	2000845	2000743	1818135	1818857	1818857	1818857	1818135	1818135
R-squared	0.046	0.046	0.042	0.035	0.038	0.052	0.042	0.042

Robust standard errors in parentheses. All estimations include year, destination market, sector (HS2), year-destination market, year-sector fixed effects. *** p<0,01; **p<0,05; * p<0,1. Constant included and not reported

Table 4. Results for the extensive margins of trade (lagged value of SPS) – OLS estimations

	<i>Dependent variable: extensive margins</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SPS (lag)	-0.017***	-0.016***	-0.012**	-0.015***	-0.012**	-0.027***	-0.031***	0.011
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)
Sector-Mkt Specific Size (lag)			0.994***				1.006***	0.997***
			(0.007)				(0.007)	(0.007)
Sector-Mkt Specific Size (lag)*SPS(lag)			-0.126*				-0.070	-0.167**
			(0.071)				(0.072)	(0.071)
Size (lag)				10.90***				
				(0.181)				
Size (lag)*SPS(lag)				1.042				
				(4.813)				
Sector Specific Size (lag)					1.387***			
					(0.013)			
Sector Specific Size (lag)*SPS(lag)					-0.376			
					(0.268)			
Exports of firms (lag)						0.043***		
						(0.000)		
Exports of firms (lag)*SPS(lag)						0.011***		
						(0.003)		
Mkt Share 1 (lag)							0.107***	
							(0.004)	
Mkt Share 1 (lag)*SPS(lag)							0.162***	
							(0.036)	
Mkt Share 2 (lag)								97.53***
								(5.830)
Mkt Share 2 (lag)*SPS(lag)								-268.4***
								(65.81)
tariff		-0,0001***	-0,0001***	-0,0001***	-0,0001***	-0,0001***	-0,0001***	-0,0001***
		(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
Observations	1818950	1818857	1818135	1818857	1818857	1818857	1818135	1818135
R-squared	0.033	0.033	0.042	0.035	0.038	0.052	0.042	0.042

Robust standard errors in parentheses. All estimations include year, destination market, sector (HS2), year-destination market, year-sector fixed effects. *** p<0,01; **p<0,05; * p<0,1. Constant included and not reported

Table 5. Results for firms' probability to export into a third market – OLS estimations

	<i>Dependent variable: one if the firm exports in at least one different market</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SPS	0.016*** (0.003)	0.014*** (0.003)	-0.004 (0.005)	0.031*** (0.004)				
Sector-Mkt Specific Size (lag)*SPS		0.079* (0.046)	0.055 (0.047)	0.041 (0.047)				
SPS (lag)					0.016*** (0.004)	0.014*** (0.004)	-0.002 (0.006)	0.028*** (0.005)
Sector-Mkt Specific						0.095* (0.055)	0.070 (0.056)	0.065 (0.056)
Observations	2000743	1818135	1818135	1818135	1818857	1818135	1818135	1818135
R-squared	0.039	0.037	0.040	0.038	0.035	0.037	0.040	0.038

Robust standard errors in parentheses. All estimations include year, destination market, sector (HS2), year-destination market, year-sector fixed effects. *** p<0,01; **p<0,05; * p<0,1. Constant and tariffs included and not reported in alla specifications. Columns (3) and (7) include sector-makt specific size, mkt share 1 and its interaction with SPS. Columns (4) and (8) include sector-makt specific size, mkt share 2 and its interaction with SPS.

Table 6. Results for the intensive margins estimations– OLS estimations

	<i>Dependent variable: intensive margins (ln exports)</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SPS	-0.001 (0.004)	-0.000 (0.004)	0.003 (0.003)	-0.000 (0.003)	-0.004 (0.003)	-0.028*** (0.003)	-0.031*** (0.004)	0.014*** (0.005)
Sector-Mkt Specific Size (lag)			2.146*** (0.018)				2.188*** (0.018)	2.152*** (0.018)
Sector-Mkt Specific Size (lag)*SPS			-0.003 (0.189)				0.142 (0.191)	-0.018 (0.191)
Size (lag)				18.34*** (0.368)				
Size (lag)*SPS				10.01 (6.731)				
Sector Specific Size (lag)					3.463*** (0.035)			
Sector Specific Size (lag)*SPS					1.286** (0.553)			
Exports of firms (lag)						0.052*** (0.000)		
Exports of firms (lag)*SPS						0.026*** (0.004)		
Mkt Share 1 (lag)							0.373*** (0.003)	
Mkt Share 1 (lag)*SPS							0.319*** (0.030)	
Mkt Share 2 (lag)								199.4*** (4.669)
Mkt Share 2 (lag)*SPS								-68.88 (52.94)
tariff		-0.0001*** (0,000)	-0.0001*** (0,000)	-0.0001*** (0,000)	-0.0001** (0,000)	-0.0001*** (0,000)	-0.0001*** (0,000)	-0.0001*** (0,000)
Observations	2000845	2000743	1818135	1818857	1818857	1818857	1818135	1818135
R-squared	0.037	0.037	0.132	0.051	0.111	0.099	0.140	0.133

Robust standard errors in parentheses. All estimations include year, destination market, sector (HS2), year-destination market, year-sector fixed effects. *** p<0,01; **p<0,05; * p<0,1. Constant included and not reported

Table 7. Results for the intensive margins estimations (lagged SPS value) – OLS estimations

	<i>Dependent variable: intensive margins (ln exports)</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SPS (lag)	0.001 (0.004)	0.001 (0.004)	0.004 (0.003)	0.001 (0.004)	-0.002 (0.004)	-0.028*** (0.004)	-0.034*** (0.004)	0.017*** (0.005)
Sector-Mkt Specific Size (lag)			2.145*** (0.018)				2.185*** (0.018)	2.150*** (0.018)
Sector-Mkt Specific Size (lag)*SPS(lag)			0.091 (0.218)				0.236 (0.219)	0.0734 (0.219)
Size (lag)				18.35*** (0.368)				
Size (lag)*SPS(lag)				9.637 (7.170)				
Sector Specific Size (lag)					3.464*** (0.035)			
Sector Specific Size (lag)*SPS(lag)					1.343** (0.617)			
Exports of firms (lag)						0.052*** (0.000)		
Exports of firms (lag)*SPS(lag)						0.028*** (0.005)		
Mkt Share 1 (lag)							0.358*** (0.003)	
Mkt Share 1 (lag)*SPS(lag)							0.352*** (0.033)	
Mkt Share 2 (lag)								177.6*** (4.553)
Mkt Share 2 (lag)*SPS(lag)								-89.24 (57.04)
tariff		-0.000*** (0,000)	-0,000*** (0,000)	-0.0001*** (0,000)	-0,000** (0,000)	-0,000** (0,000)	-0.0001*** (0,000)	-0,000** (0,000)
Observations	1818950	1818857	1818135	1818857	1818857	1818857	1818135	1818135
R-squared	0.037	0.037	0.132	0.051	0.111	0.099	0.140	0.133

Robust standard errors in parentheses. All estimations include year, destination market, sector (HS2), year-destination market, year-sector fixed effects. *** p<0,01; **p<0,05; * p<0,1. Constant included and not reported

Table 8. Results for Trade Unit Values – OLS estimations

	<i>Dependent variable: trade unit value (ln)</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SPS	0.403*** (0.0177)	0.402*** (0.0184)	-0.00829 (0.0222)	0.604*** (0.0269)				
Sector-Mkt Specific Size (lag)*SPS		-0.0992 (0.262)	0.454* (0.267)	-0.496* (0.271)				
SPS (lag)					0.424*** (0.0192)	0.423*** (0.0200)	0.0109 (0.0237)	0.651*** (0.0293)
Sector-Mkt Specific Size (lag)*SPS(lag)						-0.126 (0.300)	0.433 (0.305)	-0.556* (0.310)
Observations	1335306	1246354	1246354	1246354	1246603	1246354	1246354	1246354
R-squared	0.449	0.447	0.448	0.448	0.447	0.447	0.448	0.448

Robust standard errors in parentheses. All estimations include year, destination market, sector (HS2), year-destination market, year-sector fixed effects. *** p<0,01; **p<0,05; * p<0,1. Constant and tariffs included and not reported in alla specifications. Columns (3) and (7) include sector-makt specific size, mkt share 1 and its interaction with SPS. Columns (4) and (8) include sector-makt specific size, mkt share 2 and its interaction with SPS.

Table 9. Results for quantity exported by firms – OLS estimations

	<i>Dependent variable: quantity exported</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SPS	-0.446*** (0.0335)	-0.390*** (0.0340)	-0.145*** (0.0413)	-0.478*** (0.0479)				
Sector-Mkt Specific Size (lag)*SPS		-1.602* (0.868)	-1.221 (0.883)	-1.386 (0.876)				
SPS (lag)					-0.467*** (0.0363)	-0.408*** (0.0370)	-0.174*** (0.0442)	-0.533*** (0.0524)
Sector-Mkt Specific						-1.312 (0.992)	-0.969 (1.004)	-1.040 (1.001)
Observations	1335306	1246354	1246354	1246354	1246603	1246354	1246354	1246354
R-squared	0.231	0.264	0.270	0.264	0.230	0.264	0.270	0.264

Robust standard errors in parentheses. All estimations include year, destination market, sector (HS2), year-destination market, year-sector fixed effects. *** p<0,01; **p<0,05; * p<0,1. Constant and tariffs included and not reported in alla specifications. Columns (3) and (7) include sector-makt specific size, mkt share 1 and its interaction with SPS. Columns (4) and (8) include sector-makt specific size, mkt share 2 and its interaction with SPS.

Table 10 Results for firms' exit probability –OLS estimations

	<i>Dependent variable: firm exit</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SPS	0.0142*** (0.00344)	0.0147*** (0.00357)	0.0232*** (0.00477)	0.00927* (0.00476)				
Sector-Mkt Specific Size (lag)*SPS		-0.0407 (0.0453)	-0.0653 (0.0456)	-0.0309 (0.0455)				
SPS (lag)					0.0138*** (0.00380)	0.0136*** (0.00394)	0.0229*** (0.00523)	0.00652 (0.00525)
Sector-Mkt Specific						-0.00645 (0.0557)	-0.0301 (0.0560)	0.00649 (0.0558)
Observations	2000743	1818135	1818135	1818135	1818857	1818135	1818135	1818135
R-squared	0.114	0.010	0.010	0.010	0.010	0.010	0.010	0.010

Robust standard errors in parentheses. All estimations include year, destination market, sector (HS2), year-destination market, year-sector fixed effects. *** p<0,01; **p<0,05; * p<0,1. Constant and tariffs included and not reported in alla specifications. Columns (3) and (7) include sector-makt specific size, mkt share 1 and its interaction with SPS. Columns (4) and (8) include sector-makt specific size, mkt share 2 and its interaction with SPS.

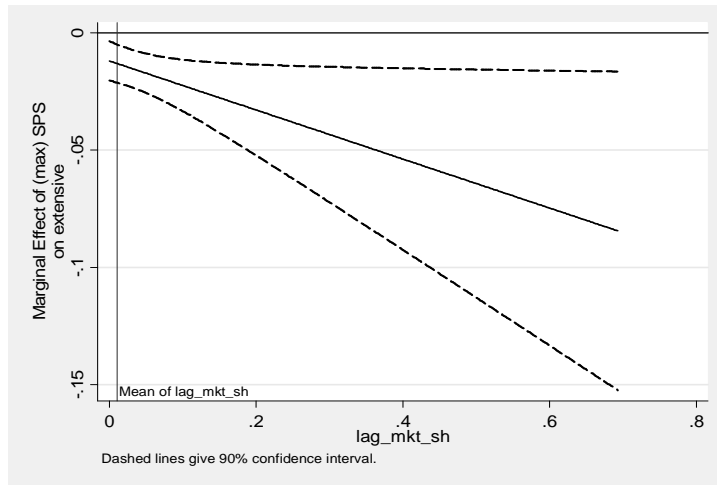
Table 11 Results for number of exported varieties by firms –OLS estimations

	<i>Dependent variable: number of exported varieties (hs6 lines within each hs4 chapter)</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SPS	0.016 (0.011)	0.047*** (0.011)	0.160*** (0.012)	-0.005 (0.017)				
Sector-Mkt Specific Size (lag)*SPS		-1.361*** (0.194)	-1.430*** (0.194)	-1.252*** (0.197)				
SPS (lag)					0.009 (0.011)	0.045*** (0.011)	0.154*** (0.013)	-0.004 (0.018)
Sector-Mkt Specific						-1.581*** (0.186)	-1.649*** (0.184)	-1.484*** (0.188)
Observations	1335306	1246354	1246354	1246354	1246603	1246354	1246354	1246354
R-squared	0.064	0.072	0.073	0.072	0.064	0.072	0.073	0.072

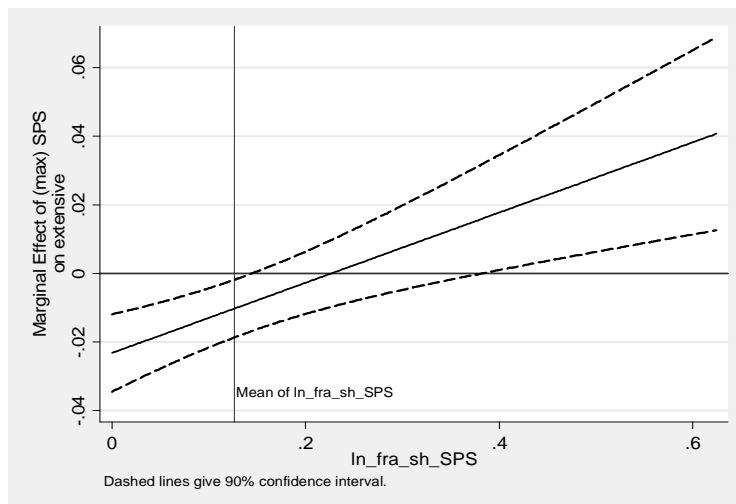
Robust standard errors in parentheses. All estimations include year, destination market, sector (HS2), year-destination market, year-sector fixed effects. *** p<0,01; **p<0,05; * p<0,1. Constant and tariffs included and not reported in alla specifications. Columns (3) and (7) include sector-makt specific size, mkt share 1 and its interaction with SPS. Columns (4) and (8) include sector-makt specific size, mkt share 2 and its interaction with SPS.

Figure 4. Graphics on interacted variables' interpretation (extensive margins estimation).

(a) SPS effect along firms' size (as sector-market specific size)



(b) SPS effect along the importance of destination market for French firms



(c) SPS effect along the importance of France for the overall import of importing country

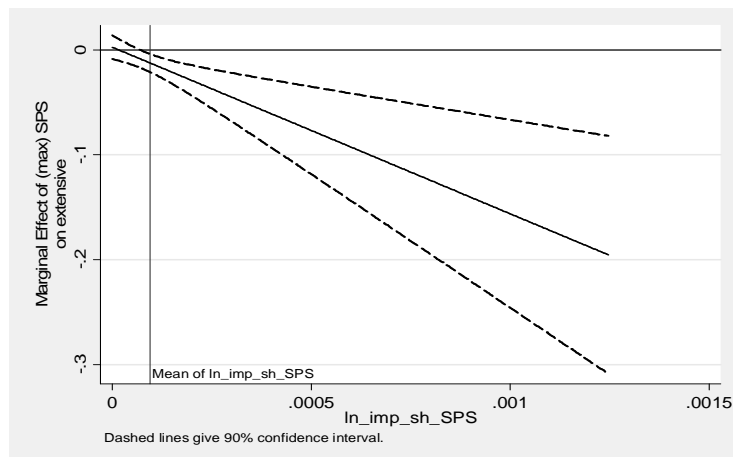
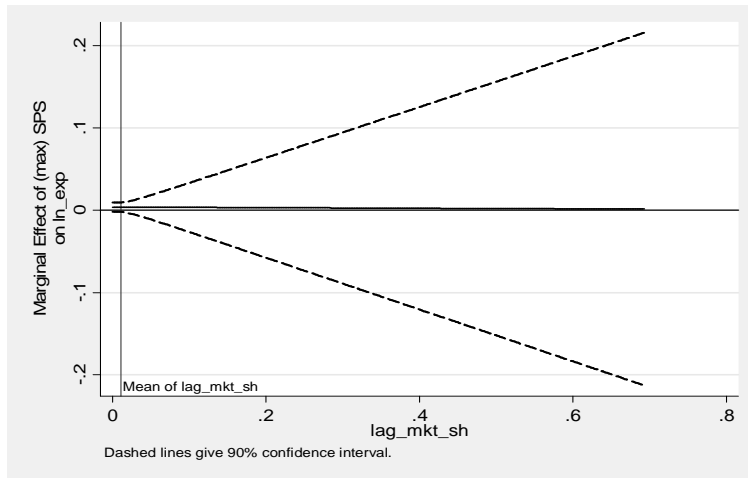
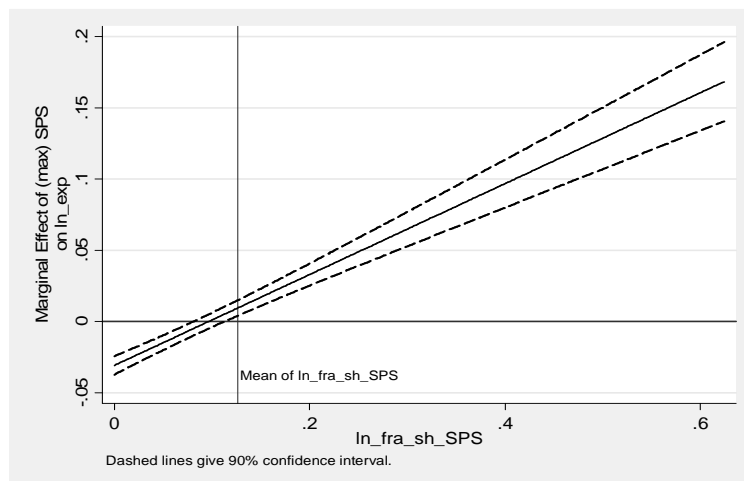


Figure 5. Graphics on interacted variables' interpretation (intensive margins estimation).

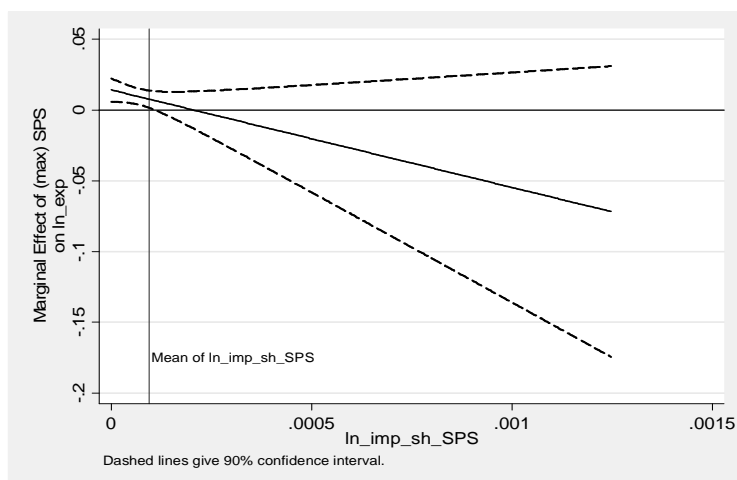
(a) SPS effect along firms' size (as sector-market specific size)



(b) SPS effect along the importance of destination market for French firms



(c) SPS effect along the importance of France for the overall import of importing country



Appendix

Appendix A1. Results for extensive margins estimations – Probit estimation

	<i>Dependent variable: extensive margins</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SPS	-0.078***	-0.071***	-0.082***	-0.068***	-0.044	-0.172***	-0.140***	-0.007
	(0.025)	(0.025)	(0.031)	(0.026)	(0.028)	(0.034)	(0.040)	(0.041)
Sector-Mkt Specific Size (lag)			11.71***				11.90***	11.79***
			(0.227)				(0.230)	(0.228)
Sector-Mkt Specific Size (lag)*SPS			3.215				3.964	2.651
			(3.501)				(3.643)	(3.454)
Size (lag)				68.33***				
				(1.413)				
Size (lag)*SPS				-0.906				
				(28.87)				
Sector Specific Size (lag)					13.70***			
					(0.286)			
Sector Specific Size (lag)*SPS					-4.731			
					(3.079)			
Exports of firms (lag)						0.237***		
						(0.001)		
Exports of firms (lag)*SPS						0.118***		
						(0.028)		
Mkt Share 1 (lag)							0.623***	
							(0.021)	
Mkt Share 1 (lag)*SPS							0.517***	
							(0.169)	
Mkt Share 2 (lag)								620.8***
								(30.45)
Mkt Share 2 (lag)*SPS								-792.6**
								(318.8)
tariff		-0.0001***	-0.0000**	-0.0001**	-0.0000	-0.0000**	-0.0000**	-0.0000**
		(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
Observations	2000845	2000743	1818135	1818857	1818857	1818857	1818135	1818135

Robust standard errors in parentheses. All estimations include year, destination market, sector (HS2), year-destination market, year-sector fixed effects. *** p<0,01; **p<0,05; * p<0,1. Constant included and not reported

Appendix A2. Results for extensive margins estimations – Probit estimation

	<i>Dependent variable: extensive margins</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SPS (lag)	-0.082*** (0.027)	-0.080*** (0.027)	-0.066** (0.033)	-0.072** (0.028)	-0.0428 (0.030)	-0.170*** (0.037)	-0.163*** (0.042)	0.054 (0.042)
Sector-Mkt Specific Size (lag)			11.72*** (0.227)				11.91*** (0.231)	11.80*** (0.229)
Sector-Mkt Specific Size (lag)*SPS(lag)			0.0964 (3.001)				0.809 (3.150)	-0.694 (2.871)
Size (lag)				68.33*** (1.413)				
Size (lag)*SPS(lag)				-0.970 (31.07)				
Sector Specific Size (lag)					13.71*** (0.286)			
Sector Specific Size (lag)*SPS(lag)					-6.108** (3.012)			
Exports of firms (lag)						0.237*** (0.001)		
Exports of firms (lag)*SPS(lag)						0.110*** (0.030)		
Mkt Share 1 (lag)							0.611*** (0.021)	
Mkt Share 1 (lag)*SPS(lag)							0.799*** (0.186)	
Mkt Share 2 (lag)								582.8*** (30.14)
Mkt Share 2 (lag)*SPS(lag)								-1397*** (336.5)
Mkt Share 3 (lag)								
Mkt Share 3 (lag)*SPS(lag)								
tariff		-0.0001*** (0,000)	-0.0000 (0,000)	-0.0001*** (0,000)	-0.0000 (0,000)	-0.0000** (0,000)	-0.0000** (0,000)	-0.0000* (0,000)
Observations	1818950	1818857	1818135	1818857	1818857	1818857	1818135	1818135

Robust standard errors in parentheses. All estimations include year, destination market, sector (HS2), year-destination market, year-sector fixed effects. *** p<0,01; **p<0,05; * p<0,1. Constant included and not reported

Appendix A.3. Results for exit probability of firms – Probit estimation

	<i>Dependent variable: firm exit</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SPS	0.148***	0.158***	0.258***	0.103**				
	(0.0362)	(0.0378)	(0.0509)	(0.0487)				
Sector-Mkt Specific		-0.898	-1.284	-0.749				
Size (lag)*SPS		(1.027)	(1.080)	(1.009)				
SPS (lag)					0.140***	0.139***	0.245***	0.0679
					(0.0391)	(0.0407)	(0.0546)	(0.0525)
Sector-Mkt Specific						-0.0921	-0.410	0.0788
						(0.945)	(0.980)	(0.925)
Observations	2000648	1818047	1818047	1818047	1818762	1818047	1818047	1818047

Robust standard errors in parentheses. All estimations include year, destination market, sector (HS2), year-destination market, year-sector fixed effects. *** p<0,01; **p<0,05; * p<0,1. Constant and tariffs included and not reported in alla specifications. Columns (3) and (7) include sector-makt specific size, mkt share 1 and its interaction with SPS. Columns (4) and (8) include sector-makt specific size, mkt share 2 and its interaction with SPS.