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TECHNICAL REGULATIONS AFFECT EXPORTERS' PERFORMANCE: FIRM LEVEL EVIDENCE FROM DEVELOPING COUNTRIES

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TRADE IMPACT FOR GOOD

Technical regulations affect exporters' performance: firm level evidence from developing countries.

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Abstract

This paper estimates the relation between technical regulations and firms' export dynamics using indicators from two novel datasets: the ITC NTM Business Surveys and the World Bank Exporters Dynamic Datasets. Merging indicators from two firm-level datasets for 18 Developing Countries over the 2010-2014 period, allows us to fill a gap in the literature. In fact, the paucity of cross country firm-level NTM data has thus far constrained most of the literature to focus on country specific analysis, or studies that focus on selected regulations, or selected sectors. By focusing on business perceptions, the ITC NTM Business Surveys focus on cases where regulations or procedures are perceived as trade barriers. Our results indicate that export markets where technical regulations are perceived as more burdensome are characterized by: a lower number of exporters, a lower value of exports, a higher exit rate, a higher concentration rate, and a higher fob price. These results are in line with the prediction of the heterogeneous firms trade theory, as per Melitz (2003): the inclusion of additional costs of exporting are expected to push some firms out of exporting, therefore reducing the total number of exporting firms and increasing concentration.

Key words: NTMs, Trade policy, Firm Heterogeneity, Intensive Margins, Extensive Margins

JEL codes: F14; L25

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I. Introduction

Technical regulations can have important economic effects on international trade. Two opposing messages arise from the literature on these potential effects. On one side, they can help address market 'failures' like co-ordination failures, externalities, and information asymmetries. Furthermore, they can help address public policy concerns by, for instance, establishing minimum levels of safety for products. On the other side, compliance with increasingly demanding regulations can force firms to commit resources they may not have to the adjustment of production processes, product labelling, packaging, etc. Moreover, exporters in developing countries are becoming concerned that Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT) could end up acting as barriers to trade.

Recent literature that tries to assess the effect of non-tariff measures (NTMs) on exporters' performance at the firm level have been constrained by the difficulty of acquiring cross country firm-level data on NTMs. As a result, previous studies have had to focus on specific countries, either on the export or import side, or on selected regulations, or selected sectors. By merging indicators from two firm-level datasets, the International Trade Centre (ITC) NTM Business Surveys and the World Bank Exporters Dynamic Datasets, for 18 Developing Countries, this paper contributes to fill this gap in the literature.

Only a few papers have already used firm-level data to assess how NTMs affect exporting firms' performance. Reyes (2011) analyse the effect of the harmonization of the standards by the EU countries on US manufacturing firms, finding a positive effect on the entrance of new firms in EU markets but a decreased export volumes of the incumbent firms. Fontagné et al. (2015) analyse the effect of TBT and SPS on the exports dynamics of French firms, using customs data and data on trade concerns. They find that SPS concerns discourage the presence of exporters and the intensive margins of trade (with attenuated effects in larger firms). Fernandes et al. (2015) use the World Bank Exporters Dynamics Dataset in conjunction with data on pesticide standards in food and agriculture products. They find that more restrictive standards in the importing country, relative to the exporting country, lower firms' probability of exporting as well as their export values and geographic diversification, with smaller exporters more negatively affected in their market entry and exit decisions than larger exporters. Finally, Besedina (2015) is the closest to this study, since she studies how technical regulations affect exports dynamics, using the World Bank Exporters Dynamics Database and the WTO data on trade concerns related to TBT and SPS measures. However she finds

no causal effect of the introduction of technical regulations on export concentration and firms' exit/entry rates.

This paper estimates the relation between firm level perceptions on technical regulations and firms' export dynamics. We use the classification adopted to collect the ITC NTM Business Surveys (Table 1) to define technical regulations as: technical requirements, conformity assessment and certification required by the exporting country.

Our preliminary results show that our proxy for how much technical regulations are perceived as burdensome - the frequency ratio of technical regulations, within an exporter-sector-importer triplet - is negatively and significantly correlated with the average export value of exporters within the same triplet (i.e. the intensive margin), controlling for sector (HS2 digit) fixed effects. This effect applies to entrants, survivors and incumbents, but it is inversely related to firm size: it affects exporting firms in the 25st percentile more than those in the 75th percentile. This is consistent with the findings from the literature, indicating that smaller firms react more strongly to changes in trade costs (Berman et al., 2012; Gopinath and Neiman, 2014; Spearot, 2013).

With regard to the extensive margins, the frequency ratio correlates positively with the exit rate of exporters, and negatively with the number of products per exporter (product diversification) (in line with Melitz, 2003). Interestingly, the frequency ratio is also positively and significantly correlated with the Herfindhal Index, and negatively and significantly correlated with the number of exporters per product.

Together these results suggest that the costs brought by standards and regulations may negatively affect the least competitive firms by pushing them out of the market, while strengthening the most competitive firms. This may contribute to an increase in concentration and a consequent decrease of (domestic) competition in the sector. Our results also show that the survival rate of entrants that have survived 2 or 3 years is positively related to the frequency ratio. This might indicate that, once the fixed costs of compliance have been paid and conditional on surviving in the first year after entry, the increasing "demand effect" brought by compliance prevails over the "cost effect".

The rest of the paper is structured as follows. Section II provides a review of the literature, while Section III describes the databases used in the analysis and presents summary statistics on the measures of interest. Section IV outlines the empirical model and provides economic intuition for

the expected signs of the variables of interest and choice of control variables. Results are presented in Section V which is followed by robustness check and concluding remarks.

II. Review of the Literature

Direct and indirect exporters have to deal with standards and regulations at every stage of their activity, both nationally and internationally. Firms need to obtain the information on the requirements and compliance, and once they are informed they can operate on adapting their production process. Third, firms must go through the certification process, and finally the certification must be recognized by the export destination country, leading to additional border-related and conformity assessment requirements (ITC, 2015a). All these steps imply costs but also provide benefits.

Typically standards and regulations try to address market 'failures', like co-ordination failures (network standards), externalities, and information asymmetries. Exporters in developing countries are particularly concerned with Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT), and the related procedural obstacles applied by developed countries (World Bank, 2005; UNCTAD, 2010, Basu, Kuwahara and Dumesnil, 2012; WTO, 2012; ITC, 2015b).

On one side, standards and regulations often increase fixed and marginal trade and/or production costs and can raise legitimate concerns about trade disruption (and/or distortion). The increase in costs is generally associated with improved production processes, investment in new technology, efficient trade infrastructure and the use of more expensive shipping methods, which are required to comply with regulations. The final result is generally an increase in price, due to compliance (Hornok and Koren, 2015, and Kelleher and Reyes, 2014, Fontagné et al., 2015), and/or quality increase.

Moreover, time-consuming custom procedures - related to both domestic and destination country requirements for importing and exporting activities – are associated with high costs. Similarly, trading firms might have to spend substantial resources to avoid obstacles to trade (sometimes related to state institutions failures). This implies the diversion of an important part of capital from productive activities, which in turn influences productivity and competitiveness on foreign markets (Clarke, 2005; Pokrivcak et al., 2013). In addition, regulative control system imperfections may lead

to under-investment into production capacities, which can negatively affect the quality of products (Grazia, Hammoudi, and Hamza, 2012).

On the other side, standards and regulations may in some case reduce trade costs by streamlining information regarding the safety, quality and specifications of products between trading partners and ultimately the information provided to consumers. For example, adopting standards may catalyse production upgrading (Maertens and Swinnen, 2009) and increase sales on the foreign markets (Masakure, Cranfield and Henson, 2010). This can also be the result of improved perception of the product by consumers, which increases demand for the product. At the same time, it might lead to technology advancement and innovation leading to structural change of the production processes. Additionally, compliance may decrease associate trade costs due to facilitated custom control regime (Latouche and Chevassus-Lozza, 2015; Volpe Martincus, Carballo and Graziano, 2015), as a result of the improved image of the company.

As a result, either a positive or a negative message may arise when describing the potential economic effect of non-tariff policy measures with respect to international trade and competition.[2] Moenius (2004) explains the result in terms of information costs. If the costs of adapting products to foreign markets are small relative to information costs, the benefits of standards overcome the adaptation costs. Since in some sectors information costs are likely to be high because of a high technological content, the benefits are expected to be greater than costs. More specifically, in non-manufacturing industries and in the agricultural sector, products are likely to be homogeneous, so informational requirements are low. In these sectors, compliance costs are likely to dominate information costs and thus standards have a negative effect on trade. For example, testing procedures and lengthy inspection processes seem to cause a larger adverse impact on agricultural products (Chen, Otsuki and Wilson, 2006), and high compliance costs are highlighted as the main impediment for the export of agricultural products, especially to rich markets, such as the EU (Sithamaparam and Devadason, 2011; Fontagné et al., 2015).

Technical regulations have heterogeneous effects on the different margins of trade, and such heterogeneity depends on different channels affecting different margins. Compliance with

[2] A neutral effect of the tightening of an EU SPS standard on aflatoxin in 2002 is found by Xiong and Beghin (2010): it had no effect on African exports of groundnuts, which were instead hampered by domestic supply constraints.

regulations in the destination where the exporter is trying to enter implies a fixed entry cost of penetration into that market (Bernard et al. 2011). Disdier, Fontagné and Mimouni (2008) find that resource demanding standardization procedures may be too costly for a firm to take the decision to start international activity or survive in the marketplace.

Nevertheless, variable costs might also be incurred every single time the firm exports to that destination, for example in the case where meeting the regulation requires the use of inputs of higher quality. In fact, compliance with trade related standards and regulations by a firm increases fixed and variable costs influencing market entry and post-entry trade volumes, presenting potentially one of the crucial mechanism altering trade patterns and competition (Kox and Nordås, 2007; Otsuki et al., 2014, Chaney, 2008, Bernard et al., 2011, and Crozet, Milet and Mirza, 2013).

Also, different types of measures have different effects on the trade margins. Kareem, Brümmer and Martinez-Zarzoso (2015) show that stricter pesticide control measures decrease both the probability to enter into and the export volumes to the EU market, whereas Chen et al. (2008) find that quality standards and labelling requirements are positively correlated with both firms intensive and extensive margins, in a study based on a World Bank survey of firms.

Harmonization is also found to play in favour of entry into exporting, in the study by Reyes (2011) on the harmonization of EU electronics regulations. In fact, country-specific standards result in increasing the marginal costs of entry (by increasing specialization and market segmentation) and thus firms do not find it profitable to diversify into a large number of markets (Chen et al., 2006). More restrictive standards in the importing country, relative to the exporting country, lower not only the probability of exporting and of entering new markets but also export values and quantities (Fernandes at al., 2015).

Finally the literature on the effect of regulations and standards on exporting firms emphasize heterogeneity of such effects across firms depending on size, productivity, and previous exporter status (Subervie and Vagneron, 2013; Holzapfel and Wollni, 2014; Fontagné et al., 2015; Shepotylo, 2015; Schuster and Maertens, 2015). On one side smaller firms have few resources to deal with trade barriers - for instance because they face higher borrowing costs than large firms - and are consequently more sensitive to them (Vossen, 1998). On the other side, compared to large firms, small firms respond more strongly to reductions in trade barriers other than fixed costs, which naturally have a more than proportionally positive effect on SMEs (Gopinath and Neiman's, 2014).

The literature on NTMs shows that only firms situated closest to the "efficiency" frontier benefit the most from compliance with NTMs (Augier et al, 2014). This is confirmed in a study focusing on environment standards legislation in India (Chakraborty, 2014). More specifically, legislation seems to induce investment into new production technologies and import of higher quality inputs and raw materials. Even though legislation positively affects the average export earnings of firms in the textile industry, it affects negatively small firms. These results are further confirmed by a study on the effect of TBTs on export performance of top-50 Pakistani exporters (Shah, Sajid and Ali, 2014), showing how TBTs positively affect the performance of the most productive firms. Fernandes et al. (2015) also confirm that smaller exporters are more negatively affected in their market entry and exit decisions by the relative stringency of standards than larger exporters.

III. Data and descriptive statistics

This paper uses firm-level data from the novel ITC NTM Business Surveys, together with indicators from the World Bank Exporters Dynamics Dataset.

Data

The **ITC NTM Business Surveys** are collected by ITC through a two-step approach. In the first stage exporting and importing companies are contacted by phone for a short interview. Phone screens consist of questions identifying the main sector of activity of companies, direction of trade, and whether they have experienced burdensome NTMs. The companies for the phone screen interviews are selected based on stratified random sampling, where the companies are first classified by sector and sample size calculated based on the size of the sector.

The second stage includes detailed face-to-face interviews with representatives of companies who reported burdensome NTMs and willingness to participate in the second stage. During this stage all products exported or imported by the company, together with the list of their partner countries are recorded, followed by identifying products affected and countries applying the measure. All of the affected product-destination cases are recorded in detail to identify the exact nature of the problematic regulation and why they are burdensome. Each burdensome measure and the related procedural obstacle (if any) is then classified according to the NTM classification reported in Table 1. This paper only focuses on the ITC NTM Business Surveys conducted on exporters, and on technical regulations.

The most disaggregated information from the ITC NTM Business Surveys is at the firm-product-destination level. The product is defined at the 6 digit level of the Harmonized System (referred to as HS). In other words, for each product-destination pair where a firm exports, we know if the firm faces a challenging regulatory or procedural obstacle associated with that regulation, or both regulatory and procedural obstacles.[3]

The **World Bank Exporters Dynamics Dataset** contains cross country comparable measures of exporter, product and market dynamics at different levels of aggregation.[4] This study uses several of the measures at the country-year-HS2digits-destination level, from a selection of 18 countries for the 2010-2014 period: we select only the countries and year that are also covered in the ITC NTM Business Surveys, as per Table 2. The World Bank Exporters Dynamics Dataset contains indicators that help measure different aspects of firm dynamics, firm-product and firm-destination dynamics, as well as exporter growth patterns, concentration, and diversification in the non-oil exporting sector.

We also use control variables from other datasets, such as CEPII (for distance, common border and common language), ITC Market Access Map[5] (for bilateral applied tariffs), and the World Development Indicators (for the GDP, PPP - constant 2011 international $).

We refer to Table 11 for a description of the indicators used in the analysis.

Descriptive statistics

After merging indicators at the country-HS2digit-destination level, we can use a dataset of 5690 observations, as per Table 2. The main indicators extracted from the NTM Business Surveys (and described in detail in section IV) is the frequency ratio, a country-sector-destination measure of the regulatory burden perceived by surveyed exporting firms. More specifically, it is the share of the product-destinations markets where firms report experiencing a regulatory or procedural obstacle

[3] More information about the ITC NTM Business Surveys can be found at : http://www.intracen.org/itc/market-info-tools/non-tariff-measures/business-surveys/ and in ITC (2015b)

[4] The sources for the data for each country and the cleaning procedure used to obtain the data are detailed in the Annex of Cebeci, Fernandes, Freund and Pierola (2012).

[5] Market Access Map, International Trade Centre, www.macmap.org and http://www.macmap.org/SupportMaterials/Methodology.aspx#method_B11

associated with a technical regulation over the total number of product-destination markets reported, within a country-sector-destination triplet. Table 2 shows that the average frequency ratio changes considerably by exporting country, but also that within country the frequency ratio is very heterogeneous (as for the reported standard deviations). Further checks show that the standard deviation of the frequency ratio is higher across sectors than across destinations, something that is not surprising. This simply indicates that technical regulations are highly sector specific, and consequently exporting firms from a country will likely have different perceptions on technical regulations depending on the sector they operate in, even across destinations.

This is confirmed by Figure 1, reporting the frequency ratio, averaged by sector. The difference in the average frequency ratio across sectors shows the importance of sectorial differences, and hence the importance of conducting the empirical analysis (as per section IV) within sectors (by using sector fixed effects). "Fresh foods" and "IT Consumer and electronics" sectors are those where firms from our sample of 18 countries report perceiving the highest share of burdensome cases related to technical regulations. This is not surprising since SPS are very concentrated in the food industry and TBT in manufacturing and electronics are an increasing share of it.

We also posit that firms of different size are affected differently by technical regulations (as the review of the scarcely available literature shows), and this is firstly confirmed by some descriptive statistics. Specifically, the frequency ratio averaged by firm size is reported in Figure 2. It clearly shows the importance of taking into account firm size when analysing the impact of technical regulations on exporting firms' performance. As expected, micro and small firms perceive technical regulations as more burdensome compared to medium-sized and large firms: the average frequency ratio reported by micro and small firms is close to 40% against 24% for large firms.

IV. Empirical strategy

The two different datasets used in this paper are available at different levels of aggregation: the data from the ITC NTM Business Surveys is available at the firm-product-destination level, while the World Bank Exporters Dynamics Database data is not publicly available at firm level. Hence, from the ITC NTM Business Surveys, we build the frequency ratio, a country-sector-destination measure of the regulatory burden perceived by surveyed exporting firms. This is defined as:

Equation 1

$$P_{isj} = w_{isj} * \frac{\sum_{i,s,j} TR^{B}_{isj}}{\sum_{i,s,j}(NTM^{B}_{isj}+NTM^{NB}_{isj})},$$

where i is the exporting country, s is HS 2 digit sector and j the importing country; $\sum_{i,s,j} TR^{B}_{isj}$is the sum of the HS 6 digit product-partner markets within a isj triplet where firms face a burdensome regulatory or procedural obstacle to trade associated with a technical regulation (we restrict the analysis to Chapter A, B and PA from Table 1). The superscript B stands for burdensome and NB for non-burdensome. $\sum_{i,s,j}(NTM^{B}_{isj} + NTM^{NB}_{isj})$ is the sum of both burdensome cases associated with technical and non-technical regulations and non-burdensome cases, within each isj triplet.

The frequency ratio is then weighted by w_{isj}. The weight w_{isj} indicates the restrictiveness of the burden associated with each NTM chapter. Ideally, the firm would rate the restrictiveness of each NTM chapter by affected line, however, such a question was not asked. Therefore, the restrictiveness - r_{NTM} - is calculated by NTM chapter using the number of cases where NTMs in a specific chapter totally impede exports.[6] For example, if a firm reports that a particular NTM resulted in no trade, then it is counted as a case in which trade is totally impeded. The restrictiveness is defined as r_{NTM} and the frequency of cases within each NTM chapter is placed into one of four groups (based on the distribution of r_{NTM}). The result is a categorical variable built as follows:

Equation 2

$$w_{NTM} = \begin{cases} 1 \text{ if } r_{NTM} = 0 \\ 2 \text{ if } r_{NTM} \leq 5 \\ 3 \text{ if } 5 < r_{NTM} \leq 10 \\ 4 \text{ if } r_{NTM} > 10 \end{cases}$$

The weight w_{isj} is then simply calculated as the median of w_{NTM} values within each isj triplet. In other words, within a isj triplet, each line at the firm level will contain a w_{NTM} value based on which NTM chapter the firm identified as the cause of the problem. The median of all these w_{NTM} is then taken and assigned to the triplet as a whole for the regression.

[6] This information is available only for a subsample of countries: (Cote d'Ivoire, Egypt, Indonesia, Kazakhstan, Senegal, Trinidad and Tobago, Tunisia, and Tanzania). We assume that the weights built for these countries can be generalised to all countries in the sample.

Data from the World Bank Exporters Dynamics Database contains measures at the country-sector-destination level, so the two datasets can be merged at this level. The sector is defined at the HS2 digits level. The countries finally merged and included in the analysis are reported in Table 2.[7]

Since it is important to disentangle the effects of restrictive measures on the different margins of trade, we use different dependent variables to assess how the exporters' dynamics are related with the perception exporters have on the regulatory environment in their countries. We use the following specification:

Equation 3 $$\ln(Y_{isj}) = \propto + \beta * \ln(P_{isj}) + \mathrm{X}_{ij} + \gamma * ln(GDP_j) + \delta_s + \varepsilon_{isj}$$

Where Y_{isj} is an indicator from the World Bank Exporters Dynamics Database at the level of the isj triplet (i being the exporting country, s the HS2 digit sector and j the importing country), regressed on the weighted frequency ratio P_{isj}, on a vector of controls X_{ij} (the logarithm of distance between the countries, whether the country pair share a common land border and language, and the logarithm of 1 plus the bilateral tariff) for the ij trading pair, and on the logarithm of GDP (PPP adjusted) of the importing country. Differences in exporter–importer specific characteristics are controlled for by including the vector of controls X_{ij}, while the GDP of the importing country j controls for differences in demand across destinations. Finally sector fixed effects δ_s are included to control for sector specific characteristics that do not vary across countries, and most importantly, to account for the sector specific nature of technical regulations. Finally ε is the error term.

As dependent variable, Y_{isj}, we use several measures of firms dynamics: number of exporters, entrants, exiters, survivors and incumbents; the average export value per exporter, as well the value for the 25th ,50th and 75th percentile, to proxy for firm size; measures of sector concentration and diversification; measures of firms entry, exit and survival; and finally the unit values.

Expected results

We posit a number of expectations based on the related theoretical and empirical literature on heterogeneous firms:

[7] The countries in the dataset are those that figure in both the ITC NTM Business Surveys and in the World Bank Exporters Dynamics Dataset.

- **Export base**: burdensome regulations are costly, and these costs (associated with the need to upgrade technology, or comply with the law, etc.) can be an impediment for firms to export, especially to the least productive or smallest firms. This would necessarily result in a smaller number of exporting firms in markets where technical regulations are perceived as more burdensome, and also in a smaller number of products exported.
- **Intensive margins**: if trade costs reduce the number of exported products, firms will likely export less in markets where technical regulations are perceived as more burdensome. Moreover, smaller firms are expected to react more strongly to changes in trade costs, accordingly to previous findings from the literature.
- **Concentration**: the reduced number of exporting firms in markets where regulations are perceived as burdensome would imply that exports become more concentrated among few (probably more productive and less financially constrained) exporters.
- **Firms Dynamics:** trade costs are expected to move the cut-off defined by Melitz (2003) and push the least productive firms out of the market, hence markets where technical regulations are perceived as more burdensome are expected to be characterized by higher exit rates from exporting. No clear predictions from the literature can be anticipated for survival rates.
- **FOB price**: variable trade costs can be internalized by the firm, in which case we could expect a less than proportional pass-through. However, if compliance with a regulation is associated with an increase in the quality of the product produced, or the firm cannot internalize the increased costs, an increase in price could be expected.

V. Results

a. Burdensome technical regulations affect the export base

The first regression uses as dependent variable a proxy for the export base, the number of exporters (Column 1,Table 3), which is negatively and significantly related to the weighted frequency ratio. In other words, within the same sector s, the ij trading pairs with a higher frequency ratio (as a proxy for a higher perception of burdensome technical regulations by exporters) have a lower number of exporters. The correlation applies to entrants, exiters, survivors and incumbents (as per Columns 2-5 in Table 3), but seems to be led by entrants: burdensome regulations are a barrier to entry into exporting. This is consistent with empirical evidence showing how new or recent exporters are more

sensitive to changes in trade costs than incumbent exporters (Berman and Héricourt, 2010; Fitzgerald and Haller, 2014).

The relationship between the number of exporters and the controls has the expected sign and significance: the number of exporters is lower between more distant pairs of countries, and higher between countries that share the same border and language; richer destinations also attract a higher number of exporters.

Interestingly the bilateral tariff, which is negatively related with the number of exporters, is significant only for entrants. This is an interesting preliminary finding, since it suggests that the applied tariff is a barrier to entry, mainly. This can be interpreted as follows: once the cost of entry has been paid for, the tariff is no longer perceived as a barrier to trade by incumbents. This is consistent with the findings from Nicita and Rollo (2015), where the bilateral tariff does not significantly affect the probability of the survival of pre-existing trade relationships (except for the case of intermediate products). The authors suggest that the bilateral tariff may not matter much for the probability of survival because of large sunk costs of exporting, which result in the incumbent firm internalizing the changes in the tariff (Albornoz, Calvo Pardo, Corcos, & Ornelas, 2012; Alessandria & Choi, 2007). This hypothesis is also confirmed by firm level studies such as Bernard and Jensen (2004) and Das, Roberts, and Tybout (2007).

b. Burdensome technical regulations affect the intensive margins

The results of the second regression, reported in Table 4, show that the export value per exporter, averaged across firms, is negatively correlated with the weighted frequency ratio of technical regulations (Column 1, Table 4). In order to assess if the relation between the two variables is size dependent, we can calculate the frequency ratio by the size, the information being reported in the ITC NTM Business Surveys.[8] However, since the measures from the World Bank Exporters Dynamics Database are not size dependent, we use the export value by percentile as a proxy for firm size. Accordingly, we regress the frequency ratio for micro and small firms, medium-sized firms and large firms on the 25th, 50th and 75th percentile of the export value, respectively. Interestingly, the resulting correlation decreases in magnitude as the size of the firm increases, an indication that micro and small firms are more affected by burdensome technical regulations. This is consistent with

[8] Definition of firm size used: micro (below 1-4) and small (5-20), medium (21-to-100), large (more than 100).

the findings from the literature, indicating that smaller firms react more strongly to changes in trade costs (Berman et al., 2012; Gopinath and Neiman, 2014; Spearot, 2013).

With regard to the control variables, we observe that distance and GDP of the importing country behave as expected (the first is negatively and the second positively related with the frequency ratio). Nevertheless, the other controls are either not significant in some columns or have an unexpected sign. The common border has the expected positive sign but is not significant in Columns 2-4. The common language is negatively related with the export value in Columns 2-4. The bilateral applied tariff is positively related with the export value, for SMEs only. This could be an indication of low market power, according to which SMEs have to pass any reduction in variables costs to the consumers in order to stay competitive.

c. Burdensome technical regulations affect concentration

The third regression correlates the frequency ratio with measures of market concentration, as per Table 5. The results show how ij trading pairs, within the same sector s, with higher frequency ratios are more concentrated: the frequency ratio is positively and significantly correlated with the Herfindahl Index (Column 1) and with the share of the top 1% exporters (Column 2), and negatively and significantly correlated with the number of exporters per product (Column 6). Few of the control variables remain significant in this specification, indicating that not all of them contribute to explaining market concentration. More specifically, more distant markets, within the same sector s, are more concentrated, while richer destinations attract a higher number of exporters per product and are consequently less concentrated, according to the Herfindhal Index, but the share of top exporters is higher than in markets with a lower GDP. Common border and language and bilateral tariffs do not seem to be correlated with measures of concentration.

d. Burdensome technical regulations affect firms' dynamics

The frequency ratio is also related with the extensive margins, as for Table 6. It is interesting to see that even though the frequency ratio is not significantly related with firms' entry rate (Column 1), it is positively related with firm's exit rate (Column 2). In other words, ij trading pairs, within the same sector s, where technical regulations are perceived as more burdensome experience higher exit rates of firms. At the same time, it is also interesting to observe that the survival rate of entrants that have survived 2 or 3 years is positively related to the frequency ratio (Column 4 and 5), while the same is not true for the survival rate in the first year (Column 3). This might indicate that once

the fixed costs of compliance have been paid and the firm has managed to survive, the increasing "demand effect" brought by complying with the regulation prevails on the "cost effect". This would be in line with Crivelli and Gröschl (2015), who find that, conditional on market entry, agricultural and food trade flows are positively affected by SPS measures.

With regard to the controls, sharing a common border or language does not seem to be related with the extensive margins. Exporting to more distant destinations is slightly correlated with a higher rate of exit, however the entrants that manage to survive in the second and third year have more chances to remain in the market. Richer destinations prove to be more difficult markets, where it is more difficult to enter, however entrants that manage to survive become more resilient. Finally, bilateral tariffs are a barrier to entry, but they also seem to reward those firms that manage to pay the costs in the first year.

e. Burdensome technical regulations affect the fob export price

Finally, we check if the frequency ratio correlates with the export price by using the free on board unit value. Table 7 shows that the frequency ratio is positively correlated with the average unit value. In other words, those ij trading pairs, within the same sector s, where technical regulations are perceived as more burdensome are characterized by higher unit values (Column 1). This effect is led by entrants (Column 2), firms that did not export in the previous year. This is consistent with empirical evidence showing how compliance with standards and regulations may restrain producers in accessing foreign markets since they incur in extra costs, both fixed and variable, and ultimately increase the product price (World Bank, 2005; Kox and Nordås, 2007; van Tongeren, Beghin and Marette, 2009; Van der Marel, Bauer and Lee-Makiyama, 2014; Asprilla et al, 2015).

More interestingly, the unit price of entrants is negatively related to tariffs, confirming a partial tariff pass-through: firms potentially internalise the tariff costs into their mark-up, by reducing their profit margin. However, they might not be able to internalize the cost of compliance with technical regulations, because this is likely associated with an increase in fixed costs of production (new technology, new production systems, etc.). The fact that the unit price of incumbent exporters (experienced exporters) is not affected by the frequency ratio confirms this interpretation: these firms have already payed the costs associated with compliance and consequently their price is no longer affected by technical regulations. This is consistent with Asprilla et al (2015), where tariffs are found to affect market structure through rent-shifting effects, while NTMs either have no effect on PTM or raise it for incumbents if they induce the exit of smaller firms, e.g. through higher fixed costs.

With regard to the controls, they mostly behave as expected. More distant and richer destinations are associated with higher unit values, while having a common border brings prices down. Speaking a common language is associated with higher prices, unexpectedly.

VI. Robustness checks

A concern regarding the robustness of the results presented thus far can relate to the way we have built the weight used with the frequency ratio, on one side, and with the use of the frequency ratio in logarithmic scale, one the other side. We can show in this section that the major results are robust to the use of different types of weights and to the removal of the weight as well to the modification of the logarithmic scale.

a. Different weights

The first concern may be related to the possibility that the choice of the thresholds used to build the categorical variable w_{NTM} affect the results. In order to check for this, we use different thresholds, namely, we use the quartiles of the distribution of r_{NTM} to define a new categorical variable built as follows:

Equation 4

$$w_{NTM}^{1} = \begin{cases} 1 \text{ if } r_{NTM} = 0 \\ 2 \text{ if } r_{NTM} \leq 2 \\ 3 \text{ if } 2 < r_{NTM} < 7 \\ 4 \text{ if } r_{NTM} \geq 7 \end{cases}$$

The weight w'_{isj} is then simply calculated as the median (or mean) of w_{NTM}^{1} values within each isj triplet. The results, reported in Table 8, remain consistent with our expectations and the results of the baseline specification.

As a further check, we have built the weight differently. Instead of building a categorical variable, we use the available data on the number of cases by NTM Chapter where trade is totally impeded:

$$r_{ntm}^{0}: \text{ number of "}trade\ restrictive\text{" cases } by\ NTM\ Chapter$$

We merge this information with the number of burdensome (not trade impeding) cases, for the same group of countries and by NTM Chapter:

$$r_{ntm}^{1}: \text{ number of burdensome cases } by\ NTM\ Chapter$$

And build a "restrictiveness share":

$$s_{ntm} = \frac{r^0_{ntm}}{r^1_{ntm}}$$

The new weight w''_{isj} is then simply calculated as the median (or mean) of s_{ntm} values within each isj triplet.

Once again, the results, reported in Table 9, remain consistent with our expectations as well as the results of the baseline specification.

a. Removing the weight and changing the logarithmic scale

As a further check, we completely remove the weight, so as to test that the results are not led by the inclusion of the latter. The results, reported in Columns 1 to 3 of Table 10, show that indeed this is not the case. We only report a small part of the results shown in Section V, but it is important to highlight that the evidence related with the decreasing importance of technical regulations as firm size increases (Table 4) is confirmed.

Finally, a last concern might be related to the fact that the use of the logarithmic scale on the frequency ratio implies that all the zeros (instances where no burdensome cases related to technical regulations are reported in a country-sector-destination triplet) are not taken into account. Consequently, the baseline regression only focuses on comparing triplets where the frequency ratio (or weighted frequency ratio) is higher with triplets where it is lower. If instead of using the logarithmic scale of the frequency ratio we used the logarithmic scale of frequency ratio plus 1, the question asked through the changed specification and consequent interpretation of the results would slightly differ. The results (where the number of observations is clearly higher) are reported in Columns 4 to 6 of Table 10. Triplets where technical regulations are perceived as more burdensome, within a sector, remain significantly associated with lower export values (with results related to firm size not reported but still holding) and with a higher concentration. The correlation with the number of exporters remains negative but not significant.

VII. Concluding remarks

This paper estimates the relation between technical regulations and firms' export dynamics using indicators from two novel datasets: the ITC NTM Business Surveys and the World Bank Exporters

Dynamic Datasets. We focus on technical regulations, as defined by the ITC NTM Business Surveys as: technical requirements, conformity assessments and certifications required by the exporting country. By focusing on business perceptions, the ITC NTM Business Surveys focuses on cases where regulations or procedures are perceived as trade barriers, either in the home or in the partner country.

Our preliminary results show that our proxy for how much technical regulations are perceived as burdensome - the frequency ratio of technical regulations, within an exporter-sector-importer triplet - is negatively and significantly correlated with the average export value of exporters within the same triplet (i.e. the intensive margin), controlling for sector (HS2 digit) fixed effects. This effect applies to entrants, survivors and incumbents, but it is inversely related to firm size: it affects exporting firms in the 25st percentiles more than those in the 75th percentile.

With regard to the extensive margins, the frequency ratio correlates positively with the exit rate of exporters, and negatively with the number of products per exporter. Interestingly, the frequency ratio is also positively and significantly correlated with the share of the top 1% of exporters, and negatively and significantly correlated with the number of exporters per product.

Together these results suggest that the costs brought by technical regulations may negatively affect the least competitive firms by pushing them out of the market, while strengthening the most competitive firms. This may contribute to an increase in concentration and a consequent decrease of (domestic) competition in the sector. Our results also show that the survival rate of entrants that have survived 2 or 3 years is positively related to the frequency ratio. This might indicate that once the fixed costs of compliance have been paid and the firm has survived, the increasing “demand effect” brought by compliance prevails over the “cost effect”.

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Annex I: Figures and Tables

Figure 1 - Frequency ratio averaged by sector, across countries and destinations

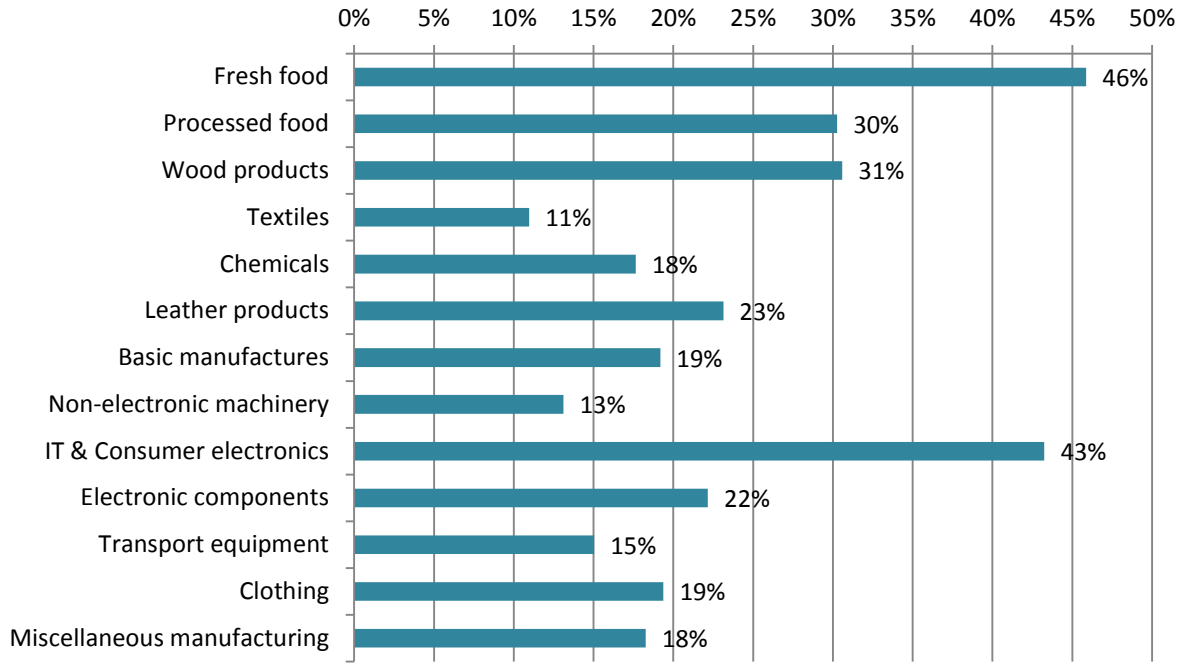

Figure 2 - Frequency ratio averaged by firm size, across countries, sectors and destinations

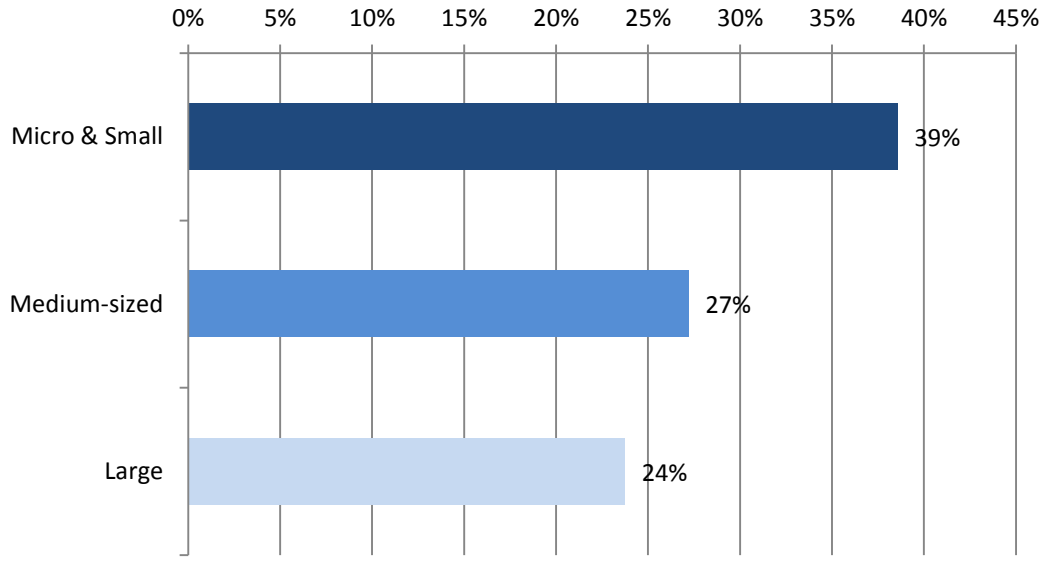

Table 1 - NTM classification

Import-related measures	Export-related measures
Technical Measures	**P. Export related measures**
A. Technical requirements	PA1. Export inspection
B. Conformity assessment	PA2. Certification required by the exporting country
Technical Measures	PA9. Other export technical measures
C. Pre-shipment inspection and other entry formalities	PB1. Export prohibitions
D. Charges, taxes and other para-tariff measures	PB2. Export quotas
E. Quantity control measures	PB3. Licensing or permit to export
F. Finance Measures	PB4. Export registration
G. Price control measures	PB9. Other export quantitative restrictions
H. Anti-competitive measures	PC0. Export taxes and charges
I. Trade related investment measures	PD0. Export price control measures
J. Distribution restrictions	PE0. Measures on re-export
K. Restriction of post-sales services	PF0. Export subsidies
L. Subsidies	PZ0. Other export related measures
M.Government procurement restrictions	
N. Intellectual property	
O. Rules of origin and related certificate of origin	

Table 2: Country coverage and descriptive statistics

Country	Year	Nr of observations	Number of destinations	Number of HS 2 dgt	Frequency ratio Mean	Frequency ratio SD	Weighted Frequency Mean	Weighted Frequency SD
Burkina Fa	2010	59	22	18	0.61	0.44	1.66	1.62
Cote d'Ivoi	2012	392	57	56	0.26	0.39	0.34	0.63
Colombia	2014	482	61	55	0.60	0.39	0.98	1.00
Egypt	2011	747	97	53	0.29	0.38	0.69	1.14
Guinea	2012	90	21	30	0.36	0.42	0.92	1.36
Kenya	2011	627	75	67	0.39	0.42	0.59	0.83
Cambodia	2012	183	48	25	0.12	0.24	0.34	0.84
Srilanka	2010	318	66	41	0.51	0.45	1.12	1.33
Morocco	2010	210	48	40	0.53	0.45	0.76	0.87
Madagasc	2011	222	38	42	0.54	0.43	0.73	0.76
Mauritius	2011	191	45	33	0.40	0.43	1.00	1.27
Peru	2010	356	51	49	0.60	0.40	0.94	0.99
Paraguay	2010	133	36	33	0.52	0.45	1.41	1.56
Rwanda	2011	100	24	24	0.55	0.42	1.68	1.67
Senegal	2012	272	44	50	0.45	0.44	0.57	0.66
Thailand	2014	799	75	66	0.38	0.44	1.19	1.57
Tanzania	2012	212	48	48	0.27	0.41	0.34	0.59
Uruguay	2011	297	70	41	0.44	0.43	1.08	1.36
		5690						

Table 3 – Number of Exporters, Entrants, Exiters, Survivors and Incumbents

	Dependent variable: ln(Number of exporters), within a isj triplet				
VARIABLES	Exporter	Entrant	Exiter	Survivor	Incumbent
	(1)	(2)	(3)	(4)	(5)
ln(weighted frequency ratio$_{isj}$)	-0.167***	-0.122***	-0.108***	-0.116***	-0.129***
	(0.032)	(0.029)	(0.029)	(0.030)	(0.034)
ln(distance$_{ij}$)	-0.507***	-0.520***	-0.420***	-0.451***	-0.413***
	(0.052)	(0.049)	(0.050)	(0.051)	(0.057)
border$_{ij}$	0.188*	0.051	0.257**	0.074	0.208*
	(0.108)	(0.098)	(0.101)	(0.102)	(0.114)
(common language)$_{ij}$	0.071	0.116*	0.013	0.045	0.043
	(0.074)	(0.067)	(0.067)	(0.071)	(0.079)
ln(GDPj)	0.332***	0.311***	0.279***	0.279***	0.327***
	(0.022)	(0.021)	(0.021)	(0.022)	(0.024)
ln(1+tariff$_{ij}$)	-0.347	-1.028**	-0.760*	-0.383	-0.415
	(0.434)	(0.422)	(0.453)	(0.481)	(0.519)
Fixed effects	HS2 digit	HS2 digit	HS2 digit	HS2 digit	HS2 digit
Observations	1,769	1,548	1,662	1,288	1,480
R-squared	0.360	0.406	0.387	0.334	0.344

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4 – The export value of SMEs decreases as the burden from technical regulations increases

	Dependent variable: ln(Export Value by Exporter), within a isj triplet			
VARIABLES	Mean Value	25% percentile	Median Value	75% percentile
	(1)	(2)	(3)	(4)
ln(weighted frequency ratio$_{isj}$)	-0.188***			
	(0.046)			
ln(weighted frequency ratio$_{isj}$)*Micro & Small		-0.319***		
		(0.104)		
ln(weighted frequency ratio$_{isj}$)*Medium sized			-0.260***	
			(0.080)	
ln(weighted frequency ratio$_{isj}$)* Large				-0.160**
				(0.072)
ln(distance$_{ij}$)	-0.249***	-0.341**	-0.223*	-0.359***
	(0.077)	(0.158)	(0.124)	(0.120)
border$_{ij}$	0.311**	0.231	0.038	-0.311
	(0.158)	(0.356)	(0.252)	(0.224)
(common language)$_{ij}$	-0.169	-0.746***	-0.436**	0.114
	(0.108)	(0.214)	(0.171)	(0.171)
ln(GDPj)	0.291***	0.197***	0.039	0.304***
	(0.033)	(0.066)	(0.052)	(0.056)
ln(1+tariff$_{ij}$)	1.316*	3.652***	2.205*	0.347
	(0.692)	(1.326)	(1.216)	(1.035)
Fixed effects	HS2 digit	HS2 digit	HS2 digit	HS2 digit
Observations	1,793	649	540	644
R-squared	0.315	0.343	0.525	0.429

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5 – Sector concentration is related to burdensome technical regulations

	Dependent variable: ln(Proxy for concentration), within a isj triplet					
VARIABLES	Herfindahl index	Share of Top 1 percent exporters	Share of Top 5 percent exporters	Share of Top 25 percent exporters	Number of products per exporter	Number of exporters per product
	(1)	(2)	(3)	(4)	(5)	(6)
ln(weighted frequency ratio$_{isj}$)	0.125***	0.058*	-0.007	-0.005	-0.026***	-0.106***
	(0.019)	(0.031)	(0.014)	(0.006)	(0.007)	(0.020)
ln(distance$_{ij}$)	0.228***	-0.030	-0.046*	-0.032***	-0.015	-0.168***
	(0.031)	(0.056)	(0.024)	(0.010)	(0.012)	(0.032)
border$_{ij}$	-0.034	0.040	0.038	0.040*	0.018	0.031
	(0.064)	(0.107)	(0.047)	(0.021)	(0.024)	(0.067)
(common language)$_{ij}$	-0.062	-0.038	-0.040	0.010	-0.008	-0.045
	(0.044)	(0.088)	(0.034)	(0.014)	(0.016)	(0.045)
ln(GDPj)	-0.148***	0.070***	0.039***	0.030***	0.002	0.167***
	(0.013)	(0.027)	(0.011)	(0.004)	(0.005)	(0.014)
ln(1+tariff$_{ij}$)	-0.245	-0.601	-0.220	-0.014	-0.105	0.122
	(0.281)	(0.711)	(0.225)	(0.093)	(0.104)	(0.290)
Fixed effects	HS2 digit	HS2 digit	HS2 digit	HS2 digit	HS2 digit	HS2 digit
Observations	1,793	278	922	1,608	1,609	1,609
R-squared	0.257	0.372	0.298	0.179	0.502	0.293

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6 – Firm dynamics are related to burdensome technical regulations

	Dependent variable: ln(Rate), within a isj triplet				
VARIABLES	Firm entry rate	Firm exit rate	Firm survival rate	2-year Firm survival rate	3-year Firm survival rate
	(1)	(2)	(3)	(4)	(5)
ln(weighted frequency ratio$_{isj}$)	0.012	0.045***	-0.017	0.043*	0.062**
	(0.012)	(0.012)	(0.014)	(0.023)	(0.028)
ln(distance$_{ij}$)	0.007	0.035*	0.045*	0.190***	0.157***
	(0.020)	(0.021)	(0.024)	(0.041)	(0.049)
border$_{ij}$	-0.051	-0.028	-0.089*	-0.005	0.040
	(0.041)	(0.042)	(0.048)	(0.072)	(0.086)
(common language)$_{ij}$	0.009	-0.023	0.050	-0.028	-0.077
	(0.027)	(0.028)	(0.034)	(0.052)	(0.063)
ln(GDPj)	-0.033***	-0.037***	-0.013	-0.068***	-0.086***
	(0.008)	(0.009)	(0.010)	(0.017)	(0.021)
ln(1+tariff$_{ij}$)	-0.333*	-0.346*	0.390*	1.060**	1.573**
	(0.173)	(0.189)	(0.217)	(0.419)	(0.722)
Fixed effects	HS2 digit	HS2 digit	HS2 digit	HS2 digit	HS2 digit
Observations	1,653	1,662	1,360	847	671
R-squared	0.158	0.147	0.190	0.344	0.324

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7 – Burdensome regulations are related with higher prices

Dependent variable: ln(Median unit value), within a isj triplet					
VARIABLES	Exporter	Entrant	Exiter	Survivor	Incumbent
	(1)	(2)	(3)	(4)	(5)
ln(weighted frequency ratioisj)	0.058**	0.087***	0.061*	0.073**	0.040
	(0.026)	(0.033)	(0.031)	(0.036)	(0.031)
ln(distance$_{ij}$)	0.089**	0.071	0.104**	0.049	0.082
	(0.043)	(0.053)	(0.051)	(0.059)	(0.050)
border$_{ij}$	-0.207**	-0.151	-0.195*	-0.183	-0.310***
	(0.090)	(0.108)	(0.104)	(0.121)	(0.102)
(common language)$_{ij}$	0.142**	0.144**	0.210***	0.251***	0.172**
	(0.060)	(0.073)	(0.071)	(0.081)	(0.069)
ln(GDPj)	0.063***	0.071***	0.079***	0.105***	0.094***
	(0.018)	(0.023)	(0.022)	(0.025)	(0.021)
ln(1+tariff$_{ij}$)	-0.980**	-0.979**	-1.596***	-0.964*	-1.038**
	(0.385)	(0.494)	(0.466)	(0.555)	(0.459)
Fixed effects	HS2 digit	HS2 digit	HS2 digit	HS2 digit	HS2 digit
Observations	1,608	1,481	1,479	1,350	1,434
R-squared	0.508	0.420	0.441	0.410	0.487

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8 – Building the weight using different thresholds

	w'_{isj} (mean)			w'_{isj} (median)		
VARIABLES	ln(nr of Exporters)	ln(Export Value)	Herfindahl index	ln(nr of Exporters)	ln(Export Value)	Herfindahl index
	(1)	(2)	(3)	(4)	(5)	(6)
ln(weighted frequency ratio$_{isj}$)	-0.139***	-0.177***	0.116***	-0.153***	-0.187***	0.120***
	(0.034)	(0.049)	(0.020)	(0.032)	(0.047)	(0.019)
ln(distance$_{ij}$)	-0.513***	-0.253***	0.231***	-0.508***	-0.249***	0.229***
	(0.053)	(0.077)	(0.031)	(0.052)	(0.077)	(0.031)
Border$_{ij}$	0.195*	0.317**	-0.038	0.193*	0.315**	-0.037
	(0.109)	(0.159)	(0.064)	(0.109)	(0.158)	(0.064)
(common language)$_{ij}$	0.083	-0.160	-0.068	0.074	-0.169	-0.063
	(0.075)	(0.108)	(0.044)	(0.075)	(0.108)	(0.044)
ln(GDPj)	0.336***	0.294***	-0.151***	0.333***	0.292***	-0.149***
	(0.022)	(0.033)	(0.013)	(0.022)	(0.033)	(0.013)
ln(1+tariff$_{ij}$)	-0.372	1.289*	-0.226	-0.365	1.300*	-0.231
	(0.435)	(0.693)	(0.282)	(0.435)	(0.692)	(0.281)
Fixed effects	HS2 digit	HS2 digit	HS2 digit	HS2 digit	HS2 digit	HS2 digit
Observations	1,769	1,793	1,793	1,769	1,793	1,793
R-squared	0.356	0.313	0.252	0.358	0.315	0.255

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9 – Using a different weight: the share of the number of trade impeding cases over the total number of problematic non trade impeding cases

	w''_{isj} (mean)			w''_{isj} (median)		
VARIABLES	ln(nr of Exporters)	ln(Export Value)	Herfindahl index	ln(nr of Exporters)	ln(Export Value)	Herfindahl index
	(1)	(2)	(3)	(1)	(2)	(3)
ln(weighted frequency ratio$_{isj}$)	-0.064*	-0.189***	0.063***	-0.075*	-0.153***	0.065***
	(0.033)	(0.045)	(0.020)	(0.043)	(0.058)	(0.025)
ln(distance$_{ij}$)	-0.492***	-0.343***	0.224***	-0.455***	-0.272***	0.165***
	(0.069)	(0.094)	(0.042)	(0.076)	(0.103)	(0.045)
Border$_{ij}$	0.378**	0.298	-0.083	0.474***	0.487**	-0.079
	(0.147)	(0.199)	(0.090)	(0.166)	(0.224)	(0.097)
(common language)$_{ij}$	-0.148	-0.194	0.025	-0.340***	-0.325**	0.094
	(0.104)	(0.139)	(0.063)	(0.122)	(0.163)	(0.071)
ln(GDPj)	0.347***	0.314***	-0.141***	0.331***	0.295***	-0.118***
	(0.031)	(0.042)	(0.019)	(0.034)	(0.046)	(0.020)
ln(1+tariff$_{ij}$)	-0.831	1.895**	0.005	-0.533	1.161	0.082
	(0.602)	(0.851)	(0.384)	(0.656)	(0.934)	(0.406)
Fixed effects	HS2 digit	HS2 digit	HS2 digit	HS2 digit	HS2 digit	HS2 digit
Observations	1,038	1,049	1,048	837	843	843
R-squared	0.387	0.366	0.264	0.407	0.390	0.256

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10 – Removing the weight and changing the logarithmic scale

	ln(frequency ratio$_{isj}$)			ln(1+frequency ratio$_{isj}$)		
VARIABLES	ln(nr of Exporters)	ln(Export Value)	Herfindahl index	ln(nr of Exporters)	ln(Export Value)	Herfindahl index
	(1)	(2)	(3)	(4)	(5)	(6)
ln(frequency ratio$_{isj}$)	-0.288***	-0.342***	0.199***	-0.125	-0.375***	0.157***
	(0.040)	(0.059)	(0.024)	(0.089)	(0.132)	(0.051)
ln(distance$_{ij}$)	-0.497***	-0.235***	0.222***	-0.509***	-0.305***	0.228***
	(0.052)	(0.076)	(0.031)	(0.040)	(0.059)	(0.023)
Border$_{ij}$	0.172	0.286*	-0.021	0.187**	0.171	-0.039
	(0.108)	(0.158)	(0.064)	(0.080)	(0.119)	(0.046)
(common language)$_{ij}$	0.066	-0.176	-0.061	-0.026	-0.110	-0.026
	(0.074)	(0.108)	(0.044)	(0.057)	(0.085)	(0.033)
ln(GDPj)	0.321***	0.276***	-0.140***	0.352***	0.329***	-0.156***
	(0.022)	(0.033)	(0.013)	(0.016)	(0.024)	(0.009)
ln(1+tariff$_{ij}$)	-0.319	1.344*	-0.247	-1.100***	-0.357	0.216
	(0.431)	(0.689)	(0.279)	(0.285)	(0.443)	(0.172)
Fixed effects	HS2 digit	HS2 digit	HS2 digit	HS2 digit	HS2 digit	HS2 digit
Observations	1,769	1,793	1,793	2,976	3,023	3,023
R-squared	0.369	0.322	0.267	0.330	0.276	0.225

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11 – Description of variables

Type	Variable	Definition	Source
Dependent variables	Number of Exporters in t	Number of firms that exports in year t	World Bank Exporters Dynamics Database
	Number of Entrants in t	Number of firms that do not export in year t-1 but exports in year t	World Bank Exporters Dynamics Database
	Number of Exiters in t	Number of firms that export in year t-1 but do not export in year t	World Bank Exporters Dynamics Database
	Number of Incumbents in t	Number of firms that export in both years t-1 and t;	World Bank Exporters Dynamics Database
	1st Year Surviving Entrant in t	Number of firms that do not export in year t-1 but export in both years t and t+1	World Bank Exporters Dynamics Database
	2nd Year Surviving Entrant in t	Number of firms that do not export in year t-1 but export in both years t, t+1 and t+2	World Bank Exporters Dynamics Database
	3rd Year Surviving Entrant in t	Number of firms that do not export in year t-1 but export in years t, t+1, t+2 and t+3	World Bank Exporters Dynamics Database
	Export Value per Exporter (mean)	Mean of export values per Exporter within a isj triplet	World Bank Exporters Dynamics Database
	Export Value per Exporter (25th)	Export value per exporter in the 25th percentile, within a isj triplet	World Bank Exporters Dynamics Database
	Export Value per Exporter (50th)	Export value per exporter in the 50th percentile, within a isj triplet	World Bank Exporters Dynamics Database
	Export Value per Exporter (75th)	Export value per exporter in the 75th percentile, within a isj triplet	World Bank Exporters Dynamics Database
	Herfindahl Index	Herfindahl Index within a isj triplet	World Bank Exporters Dynamics Database
	Top 5% Exporters	Share of top 5% Exporters in Total Export Value, within a isj triplet	World Bank Exporters Dynamics Database
	Top 10% Exporters	Share of top 10% Exporters in Total Export Value, within a isj triplet	World Bank Exporters Dynamics Database
	Top 25% Exporters	Share of top 25% Exporters in Total Export Value, within a isj triplet	World Bank Exporters Dynamics Database
	Number of products per exporter	Number of HS6 products per exporter within a isj triplet	World Bank Exporters Dynamics Database
	Number of exporters per product	Number of exporters per HS6 products, within a isj triplet	World Bank Exporters Dynamics Database
	Firm Entry Rate	Number of Entrants over number of Exporters, within a isj triplet	World Bank Exporters Dynamics Database
	Firm Exit Rate	Number of Exiters over number of Exporters, within a isj triplet	World Bank Exporters Dynamics Database
	Entrant 1st Year Survival Rate	Number of 1st year Surviving entrants over number of Exporters, within a isj triplet	World Bank Exporters Dynamics Database
	Entrant 2nd Year Survival Rate	Number of 2nd year Surviving entrants over number of Exporters, within a isj triplet	World Bank Exporters Dynamics Database
	Entrant 3rd Year Survival Rate	Number of 3rd year Surviving entrants over number of Exporters, within a isj triplet	World Bank Exporters Dynamics Database
	Median Unit price per Exporter	Median unit value (USD/KG) for Exporters, within a isj triplet	World Bank Exporters Dynamics Database
	Median Unit price per Entrant	Median unit value (USD/KG) for Entrants, within a isj triplet	World Bank Exporters Dynamics Database
	Median Unit price per Exiter	Median unit value (USD/KG) for Exiters, within a isj triplet	World Bank Exporters Dynamics Database
	Median Unit price per Surviving Entrant	Median unit value (USD/KG) for Surviving Entrants, within a isj triplet	World Bank Exporters Dynamics Database
	Median Unit price per Incumbent	Median unit value (USD/KG) for Incumbents, within a isj triplet	World Bank Exporters Dynamics Database
Independent variable	Weighted frequency ratio	Business perceived burden of technical regulations, within a isj triplet	ITC NTM Business Surveys
Controls	Distance	Distance between exporting and importing country, i and j	CEPII
	Border	Dummy indicating if countries i and j share a common border	CEPII
	Common language	Dummy indicating if countries i and j share a common language	CEPII
	GDP	GDP, PPP (constant 2011 international $)	World Development Indicators
	tariff	Average bilateral applied tariff, within a isj triplet	ITC Market Access Map

Note: An *isj* triplet reflects the *i* exporting country, the *s* HS 2 digit sector and the *j* the importing country.