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**Marco
Fugazza**

Division on
International Trade in
Goods and Services,
and Commodities,
UNCTAD

Marco.fugazza@unctad.org

**Marcelo
Olarreaga**

GSEM, University of
Geneva and, CEPR

marcelo.olarreaga@unige.ch

**Christian
Ugarte**

International Trade
Centre,
Geneva

ugarte@intracen.org



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On the heterogeneous effects of non-tariff measures: Panel evidence from Peruvian firms

Abstract

Non-Tariff Measures (NTMs) are prominent instruments of contemporary trade policy yet little evidence of their impact on exporting firms exists. This paper presents some novel results based on a unique dataset merging information about the implementation of NTMs in member countries of the Latin American Integration Association (LAIA) and Peruvian firms' exports during the period from 2000 to 2014. Large firms are found to benefit from the implementation of NTMs and in particular of Technical Barriers to Trade at the expenses of smaller firms. Both exports value and the probability of exporting increases for above median sized firms, while their probability to exit the export sector decreases. The reverse is true for below median sized firms.

Key words: Non-Tariff Measures, Firms, Exports, Peru, Margins of Trade

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Executive summary

With steadily diminishing tariffs, the focus of trade policy makers and analysts is logically turning towards Non-Tariff Measures (NTMs). Indeed, NTMs and in particular technical measures have become a prominent feature in the regulation of international trade in goods. While technical regulations were imposed on almost 37 per cent of tariff lines in 1999, the equivalent figure for 2015 is more than 60 per cent (UNCTAD, 2015).

The major aim of this paper is to assess how different types of NTMs would affect firms' exports allowing for heterogeneous effects along the firm size dimension. The Peruvian experience within the LAIA (Latin American Integration Association) country group is of particular relevance. Descriptive statistics reveal that the share of Peruvian exports directed to LAIA countries has been increasing since 2000. During the same period, the number of exporting firms to that region has been decreasing. A possible explanation could be an intensification of the implementation of NTMs and in particular of technical regulations.

This conjecture appears to be validated by empirical results. The latter suggest that firms of size above the median of exporting firms' size distribution have gained from the implementation of new measures (or the amendment of existing ones). This is true for all margins of trade considered in the paper. Their export values increase, the probability of export increases and the probability to leave the exports sector falls. These results are robust to changes in sampling and identification strategies.

From the exporting country point of view, the costs of exporting for its firms are directly impacted by the implementation of a technical regulation by a trade partner country. Trade costs are likely to have a fixed and a variable component. The latter could be either *ad valorem* or additive such as specific tariffs. Proportionally, changes in fixed and additive variable costs affect smaller firms more. Clearly any policy able to reduce the effects of changes in costs to export on small (and medium) firms may dampen the exclusion effect of technical regulations identified previously.

Several dimensions should be considered in implementing policies aimed at reducing the cost of compliance with NTMs and in particular technical regulations in specific international markets. The first dimension is the domestic business and production environment of small and medium enterprises. The second dimension is the customs procedural framework. The third dimension is the intergovernmental political platform.

Within the first dimension, policy could be designed on several complementary grounds. First, access to crucial information concerning export requirements for any specific product should be facilitated for all type of producers, with particular attention paid to smaller ones. Moreover, advisory services related to the implementation, production-wise, of any specific requirements should be made available. Facilitating access to finance is an additional necessary accompanying measure to be considered by policy makers. In addition to technical assistance and capacity building programs, private sector based initiatives should also be considered to promote the participation of small and medium enterprises in export markets.

Within the second dimension, the customs procedural framework, desirable policy actions have been identified extensively in the literature and several already put into practice. The most prominent is the Single Window for Foreign Trade, which aims to reduce the number of agencies at the border. This should reduce fixed business costs and therefore help SMEs expand their cross-border trade. Several countries have set up such single windows. Peru established a Single Window for Foreign Trade (VUCE) in 2010.

The third dimension relates to actions a government would be able to actively pursue beyond domestic borders. As technical regulations have primarily non-trade objectives, it would be misleading to look at technical regulations as we look at tariffs. Streamlining NTMs would consist of reform and harmonization, so as to maintain their objectives but at the lowest possible costs. In practice, streamlining NTMs will reduce

costs and increase the competitiveness of firms engaged in international trade. Governments should ensure that NTM requirements are scientifically based. In addition governments should agree on the conditions for the mutual recognition of certificates delivered by their respective conformity assessment bodies. Without such certificates and their recognition by competent authorities in destinations markets firms would not be able to conclude any transaction.

1. Introduction

With steadily diminishing tariffs, the focus of trade policy makers and analysts is logically turning towards Non-Tariff Measures (NTMs). Indeed, NTMs and in particular technical measures have become a prominent feature in the regulation of international trade in goods. While technical regulations were imposed on almost 37 per cent of tariff lines in 1999, the equivalent figure for 2015 is more than 60 per cent (UNCTAD, 2015).

Some studies argue that NTMs represent a major challenge to international trade policy-making, as they can undermine the progress made so far in liberalizing trade (Evenett and Fritz, 2015; Jensen and Keyser, 2012). Others argue that the impact of NTMs on trade flows remains ambiguous depending on the magnitude of their cost raising effects (Chen and Mattoo, 2008; Maertens and Swinnen, 2009). Finally, if welfare considerations are taken into account, negative trade effects may be very well associated with positive welfare effects (Disdier and Marette, 2010).

Broadly defined, NTMs include all trade-related policy costs incurred from production to final consumer, with the exclusion of tariffs. For practical purposes, NTMs are categorized depending on their scope and/or design and are broadly distinguished in technical measures (Sanitary and Phytosanitary Standards, SPS; Technical Barriers to trade, TBT; and pre-shipment inspection, PSI) and non-technical measures. These are further divided into hard measures (e.g. price and quantity control measures), threat measures (e.g. anti-dumping and safeguards), and other measures such as trade-related finance, anti-competitive and investment measures). In practice, NTMs are measures that have the potential to distort international trade, whether they are aimed to be protectionist or not. For example, measures such as quality standards, although generally imposed without protectionist intent, may be of particular concern to poor countries whose producers are often ill-equipped to comply with them. On the other hand, quality standards might help in information exchange between buyers and sellers, signaling product quality, and thus can reduce transaction costs and facilitate trade. Non-technical measures vary considerably by intent and scope. However, their effect on trade is generally more understood and easier to quantify. The effects of price control measures are relatively simple to measure, especially anti-dumping and safeguards. Quantity control instruments have been extensively examined in the analysis of quotas, tariff rate quotas and their administration (see Boughner, de Gorter, and Sheldon, 2000). Para-tariff measures can be analyzed as conventional tax instruments and their incidence is straightforward to capture. Finance, anti-competitive, and trade related investment measures have indirect effects on trade, and their actual impact is more difficult to assess.

What clearly emerges from the theoretical literature is the need to place the empirical analysis at the level of the firm. Since exporting firms can respond to the imposition of NTMs in numerous ways, it is necessary to explore all the likely reactions and evaluate the net impact of policy change. Evidence at the firm level however still remains very scarce. A major contribution is Fontagné and al. (2015). They consider the heterogeneous trade effects of restrictive Sanitary and Phyto-Sanitary (SPS) measures on exporters of different sizes, and the channels via which aggregate exports fall. In order to do so they matched a detailed panel of French firm exports to a recent database of SPS regulatory measures that have been raised as of concern in the dedicated committees of the WTO. Specific trade concerns refer to standards that are perceived essentially as trade barriers. They analyze their effects on three trade-related outcomes: (i) the probability to export and to exit the export market (the firm-product extensive margin), (ii) the value exported (the firm-product intensive margin), and (iii) export prices. SPS concerns are found to discourage the presence of exporters in SPS-imposing foreign markets. They are also found to affect negatively the intensive margins of trade. An additional important result is that the negative effects of SPS regulatory measures are attenuated in larger firms. Another important contribution is Fernandes and al. (2015). Compared to Fontagné and al. (2015), the set of regulatory measures considered is more specific but country coverage is significantly extended. The paper assesses the impact on firms' exports of pesticide standards using two novel datasets. The first covers all exporting firms in 42 developing countries. The second covers pesticide standards for 243 agricultural and food products in 63 importing countries. Their results show that pesticide standards significantly affect foreign market access of affected products. More restrictive standards in the importing country, relative to the exporting country, lower firms' probability of exporting as well as their export values and quantities. Moreover, they find evidence of heterogeneous effects amongst exporters.

Smaller exporting firms are more negatively affected in their market entry and exit decisions by the relative stringency of standards.

The major aim of this paper is to assess how different types of NTMs affect firms' exports, allowing for heterogeneous effects along the firm size dimension. The Peruvian experience within the LAIA (Latin American Integration Association) country group is of particular relevance. As shown later in the paper, the share of Peruvian exports directed to LAIA countries has been increasing since 2000. During the same period we observe that the number of exporting firms to that region has been decreasing. While the intensification of exports to LAIA countries could be associated with the economic and trade integration process at work in the region over the last fifteen years,¹ the increasing concentration of firms in the export sector remains puzzling. A possible explanation could be an intensification of the implementation of NTMs and in particular of technical regulations. Empirical results allow us to test the validity of this explanation.

The contribution of this paper is twofold. First, we construct a unique set of consistent data on public regulations during the period from 2000 to 2014 for LAIA country members.² This part of the contribution is non-negligible as sources of information on NTMs remain scarce. When available, information is either cross-sectional (with the reference year usually varying across countries) or restricted to some specific type of NTMs (e.g. SPS measures or TBTs) when pluri-annual. Our dataset offers a fifteen-(consecutive)-year coverage of exhaustive NTM regulations applied by a set of twelve countries. This is to our knowledge the largest panel of the sort ever used in empirical work. Second, we assess the impact of technical and non-technical NTMs at the firm level using information on exports of Peruvian firms also obtained for the 2000-2014 period. The novelty here is the inclusion of different types of NTMs within the same empirical set-up. Our dataset allows a clear identification of the impact of each of these types thanks to *inter alia* an almost inexistent overlap of measures.

Our baseline results show that NTMs do impact both margins of trade, and that in the case of technical regulations the impact differs according to firm size. Amongst technical regulations, the effect of Technical Barriers to Trade is the only one which is significant in all specifications. Sanitary and Phytosanitary measures only affect exit rates and Pre-Shipment inspections only affect the intensive margin. When the impact of technical regulations is significant, results further show that not only small exporters are more negatively affected than larger ones but that the latter can actually gain from the application of new or more stringent measures. Gains are observed in terms of export value, participation and duration, and survival. Results obtained from unit value regressions indicate that only TBTs have a significant effect and the latter is globally positive although decreasing with firm size.

The rest of the paper is organized as follows. Section 2 contains a brief review of insights from recent developments in trade theory, suggesting mechanisms consistent with heterogeneous effects of trade policy on firms' export performance, and a discussion of the most important empirical evidence on the impact of NTMs at the firm level. Section 3 presents our two datasets. Stylized facts characterizing these two datasets are shown and discussed in section 4. Section 5 introduces the empirical strategy used. Results are shown in section 6. The last section debates possible implications for policy making bearing in mind the specificity of the empirical exercise.

¹ Fugazza and McLaren (2014) show that a fifth of the increase of Peruvian exports directed to Mercosur countries is due to improvement in preference margins.

² LAIA country members are Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Cuba, Ecuador, Mexico, Paraguay, Peru, Uruguay and Venezuela (Bolivarian Republic of).

2. Heterogeneous effects of trade policy: Insights from trade theory

Fontagné and al. (2015) and Fernandes and al. (2015) both find empirical evidence that the effects of NTMs vary with exporting firms' size. These findings are corroborated by the results of this paper.

The rationale for a heterogeneous impact of trade shocks induced by policy reform put forward in the trade theory literature is not unique. We can distinguish two main classes of model. In order to generate heterogeneous effects one relies essentially on non-constant demand price elasticities and the other on some specific form of trade costs (either variable or fixed). All models however are based on a standard heterogeneous firm trade model, à la Melitz (2003) or Chaney (2008).

A major contribution belonging to the first class of theoretical frameworks is Spearot (2013). He shows that if import demand elasticities vary across product varieties, the liberalization of a common tariff has a natural disparate effect on the composition of aggregate trade flows. More precisely, the liberalization of a common tariff disproportionately increases imports of low revenue varieties, and in some cases, this increase comes at the expense of high revenue varieties within a wide class of demand systems that are consistent with empirical evidence. In other words, countries are less responsive to trade shocks when their exporting firms are relatively large. A major implication of this result is that the liberalization of a common ad-valorem tariff needs not increase bilateral imports of all product varieties.

As to the second class, modelling strategies rely either on some form of endogenous fixed costs or on a specific form of variable trade cost. Arkolakis (2010) presents a framework based on market penetration costs that are endogenous rather than fixed in the sense that paying higher costs allows firms to reach an increasing number of consumers in a given country. In that set up the elasticity of exports with respect to variable trade costs declines with firm size in a market. An important new prediction of the model is that a significant amount of new trade in the event of trade liberalization comes from exporting firms originally small, rather than new, exporters.

Although Arkolakis (2010) and Spearot (2013) reach similar equilibrium predictions, the Arkolakis (2010) framework guarantees that all firms gain from liberalization, which is not the case in Spearot (2013). Moreover, market penetration costs of Arkolakis (2010) are not necessarily easy to relate to or read into NTMs. Irarrazabal, Moxnes and Opromolla (2015) develop a quantitative analytical framework that features both additive and multiplicative trade costs. In this framework, as additive trade costs increase, the demand elasticity in a market becomes less negative and especially so among low price firms. Comparative statics results are thus comparable to those obtained in Spearot (2013) and Arkolakis (2010).

Additive trade costs are easily interpretable in terms of NTMs. For instance, any labelling requirement is likely to imply a cost which is unrelated to the price of the good to which the measure applies. Additive costs are not a new feature in trade theory. Alchian and Allen (1964) pointed out that additive costs imply that the relative price of two varieties of some goods will depend on the level of trade costs, and that relative demand for the high quality good increases with trade costs. Hummels and Skiba (2004) found strong empirical support for the Alchian-Allen hypothesis. Specifically, the elasticity of freight rates with respect to price was estimated to be well below the unitary elasticity implied by the iceberg assumption. Berman and al. (2012) show that the presence of additive trade costs is necessary to reconcile the most commonly used theoretical framework with the empirical finding that individual firms set higher free on board (f.o.b.) prices over long distances than over short ones, a sort of "reverse dumping".

Additivity proves to be an important feature of trade costs and corresponds to a large set of NTMs. For instance, testing and certification of inspection requirements represent an additive component of trade costs while complying with these requirements in the production process may act as a fixed component of trade costs.

Although our empirical set up does not allow for precisely accounting for the structure of trade costs, we will further explore additivity in the last section of the paper dedicated to implications for policy.

3. Data

The empirical investigation is based on two distinct core datasets. The first contains information on NTMs applied by LAIA countries during the period from 2000 to 2014. This is an exhaustive set of regulations and includes also regulations which took effect before the period under investigation. The second contains information on exports transactions collected by Peruvian customs.

NTM data are collected by the LAIA/LAIA secretariat for its 12 core members. Due to the change in the classification of NTMs as proposed by UNCTAD and other MAST member agencies,³ 2 sub-periods had to be considered (the 2000-2010 sub-period and the 2011-2014 sub-period), and the two respective NTM classifications reconciled. The pre-2012 UNCTAD classification focused on the distinction between core and non-core NTMs. The post-2012 UNCTAD/MAST classification is based on the distinction between technical and non-technical NTMs. As no official correspondence exists between the two classifications, we used an *ad hoc* classification provided by the LAIA/LAIA secretariat, based on their experience of collecting NTM data for the years 2011 and 2012 using both classifications. We used the new classification as the reference one and measures collected between 2000 and 2010 were thus reclassified at the chapter level (e.g. SPS measures versus TBTs).

Data on annual exports are from Peruvian Customs and the period of coverage corresponds to that of the NTM data. Information on transactions involving exporting Peruvian firms is reported by firm, year, product and destination. Information on export values is expressed in \$US and is fob (free on board). Corresponding exported quantities (supplementary quantity – WCO units- and net weight) are also reported, meaning that unit values can be computed.

Both NTM data and Peruvian firms' exports data are collected at the national tariff line (NTL, up to 10 digits). As NTL classifications are not easily reconcilable across countries, we first aggregate both datasets at the HS 6-digit level and then merge them. Attrition remains limited. Moving from the 10 to the 6-digit classification implies a reduction of about 6 per cent in the number of observations included in our reference sample. This reflects the fact that products exported by multi-product firms belong in most cases to different HS subheadings.

Our reference sample includes only firms that exported any product to a LAIA destination for at least four years during the time period under investigation. The main motivation for selecting this sub-sample is to minimize any bias from firms exporting only occasionally and from companies whose rationale for entering and exiting a destination are purely driven by competition at destination.

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