



# Effect of non-tariff measures on extensive and intensive margins of exports in seafood trade



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## ABSTRACT

This paper explores the effects of non-tariff measures (NTM) on extensive and intensive margins of global exports of seafood in 1996–2011. The main result of this study is the differential and opposite effect of SPS and TBT measures. While SPS measures largely increase extensive margins of export and reduce intensive margins, TBTs mostly reduce exports at extensive margins and increase exports at intensive margins. Specific trade concerns (STC) have larger effect on exports than SPS and TBT notifications, both economically and statistically. Finally, there is substantial heterogeneity of response of exports to NTMs across HS six digit product lines, but the central tendency remains the same as for aggregated data.

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## 1. Introduction

Non-tariff measures (NTM) have always been important elements of trade policy. With global reductions in tariff measures, they are becoming even more important policy tools shaping World Trade. NTMs come in different forms and address different policy concerns, which makes it very hard to evaluate unambiguously their effect on social welfare. While the consensus view on the tariff measures is in favor of reduction as the way to increase global social welfare, the view on NTMs is more nuanced.

Increased public concerns about health and safety issues stimulate governments to regulate quality and safety of goods by means of sanitary and phytosanitary (SPS) measures and technical barriers to trade (TBT). The number of tariff lines and share of trade covered by NTMs have considerably increased over the last two decades [20]. As the World Trade Report [20] points out, there is an upward trend in all types of NTMs, including SPS and TBT notifications and specific trade concerns (STC).<sup>1</sup> In particular, 2010 has shown both the maximum number of SPS and TBT notifications, while the highest number of STCs has been raised in 2014.

The effect of NTMs on trade is not straightforward. The direction

and size of the effect depends on whether NTMs discriminate against foreign producers. It also depends on the relative importance of NTMs for production and transportation costs. In the framework of Melitz [14], introduction of a non-discriminatory NTM may equally increase costs of production for domestic firms and foreign producers. Tougher technological or sanitary measures would tend to increase productivity thresholds for the least productive domestic firms on the market, causing them to shut down, which would make more room to import for highly productive foreign firms. If foreign firms are more productive relative to the domestic ones, the introduced NTM would have a smaller effect on foreign producers. It would result in a positive link between technical and sanitary requirements in a country that imposes the NTM and intensive (and potentially on extensive) margins of trade.

However, if the NTM is applied only against foreign firms, or if NTMs are applied selectively, the increase in production and transportation costs, caused by tougher regulations, would lead to the exit of the least productive foreign firms from the market, reducing extensive margins of trade. It would also force the remaining foreign firms to cut their imports, causing reduction of trade at intensive margins.<sup>2</sup>

<sup>2</sup> Moreover, even a non-discriminatory measure can be applied in a discriminatory way, if it is enforced only selectively and for reasons that are not related to consumer welfare concerns. According to Besedina and Coupe [4], Russia Federation is one of the most active users of non-tariff barriers in the world. They found statistical evidence that Russian NTMs are set for protection of domestic producers and, more importantly, for imposing political pressure appear on their trading partners. Over the last decades, depending on improving or worsening diplomatic relationships, Russian SPS authorities imposed bans of seafood from Latvia, mineral water from Georgia, chocolate from Ukraine, and tulips from The Netherlands.

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<sup>1</sup> Each WTO member has to notify the other members about introduction of new or any changes in the existing laws or regulations affecting their external trade. These notifications are recorded by the WTO and are included in the database of notifications. In addition, a WTO member can raise a specific trade concern (STC) about measures maintained by other members against its exports.

A negative effect on trade could occur if NTMs effect transportation costs more than production costs. For instance, an increase in the variable trade costs would lead to a reduction in imports per firm, but also would cause the least productive foreign producers to exit from the market, redistributing market shares towards more productive foreign and domestic firms. The overall effect on trade would be ambiguous.

In addition, other factors may play a role in determining changes in extensive and intensive margins of trade caused by new NTMs. An introduction of a barrier directed against a specific country will tend to divert trade leading to an increase on the extensive margins. The recent seafood trade ban, which Russia imposed against a group of countries that include Canada and Denmark, caused diversion of trade towards imports from Greenland, the Faroe Islands, and even Belarus, which is a landlocked country.<sup>3</sup> Finally, higher technical and safety barriers may increase demand from consumers who are concerned about quality and safety attributes of products. Firms that are able to overcome higher trade barriers would signal quality and safety improvements, which would lead to expansion of trade at both extensive and intensive margins.

Most studies have found a negative effect of NTMs on trade. (i.e. [8,16,17]). Debaere [6] has shown that the international differences in food-safety standards reduced Thai, Vietnamese, and Chinese shrimp exports to Europe and shifted them to the United States where standards were not as strict. Guillotreau and Peridy [9] looked at the effects of EU policies in seafood on imports to EU countries and found no significant effects of NTMs on imports. However, Jaffee and Henson [13] argue that NTMs can be barriers as well as catalysts to exports. For poor countries with lack of capacity to comply with the stringent regulations NTM can increase trade costs to the levels that effectively shut down their exports. However, other countries may use this to their advantage and capture a larger market share due to increased demand for safer and better quality products. Anders and Caswell [1] investigated the effect of a Hazard Analysis Critical Control Points (HACCP) food safety standard for seafood imports. Results indicate that HACCP had a negative impact on the overall imports. However, a decomposition of the effect by exporting countries' level of development brought highly heterogeneous results. The effect for developing countries was negative, while the effect for developed countries was positive. Regardless of the level of development, leading seafood exporters generally experienced a positive HACCP effect. The results can be explained within a framework of the heterogeneous producer model. The HACCP has imposed additional costs on all exporters, but it may have made costs prohibitively high for the least productive exporters, while allowing more productive ones to take the opportunity and expand their market share.

The focus of this paper is on the effect of SPS and TBT measures on extensive and intensive margins of seafood trade. The empirical approach is close to Crivelli and Gröschl [5] who have investigated the effect of the SPS measures on trade in agriculture and food using the methodology developed by Helpman et al. [12], (hereafter HMR). They found that conformity assessment related SPS measures have a negative impact on intensive margins of exports, while concerns related to product characteristics influence intensive margins of exports positively. The effect of SPS on the intensive margin of exports in their work is negative. Recently, Natale et al. [15] followed a similar methodological approach to look at determinants of the aggregate seafood trade, and found that seafood trade is driven by consumer preferences and by low labor costs. They also found that the determinants vary substantially

across products.

The high degree of heterogeneity of the impact of NTMs on trade and differential effects of SPS and TBT measures requires studying the effect of NTMs at high level of disaggregation, which requires a careful modelling of the binary decision about whether to export or not. To deal with this issue, the estimation methodology is mostly build on the HMR methodology, adding the panel dimension to their approach.<sup>4</sup> It also addresses the issue of endogeneity using the Hausman–Taylor approach of estimating a panel data model [10]. It treats NTMs as endogenous variables that largely depend on existing trade patterns. In particular, NTMs are more likely between countries that trade more intensively, that would generate a positive correlation between trade flows and NTMs.

The rest of the paper is structured as follows. Section 2 develops the methodology. Section 3 introduces data used in the study. Section 4 presents results. Section 5 concludes.

## 2. Theory and methodology

The model describing export decisions within the seafood industry should take into account the mechanism of selection of firms into exporters and unobserved firm-level heterogeneity, present in the data. It assumes that the seafood industry is monopolistically competitive. Consumer preferences are identical and homothetic across countries and are described by a constant elasticity of substitution utility function, with elasticity of substitution across different varieties of seafood,  $\sigma > 1$ . Exporting country  $i$  has  $N_k^i$  firms that produce differentiated products. Firms are heterogeneous in productivity.

The presence of fixed costs may introduce prohibitively high trade barriers, leading to zero trade flows that play a dominant role in highly disaggregated data. Moreover, some countries, i.e. landlocked countries, do not have sufficient capacity to produce seafood. Export from those countries is expected to be zero as well.<sup>5</sup> The HMR two-stage procedure allows to dissect the effect of NTMs on export into two components – the effect of NTMs on value of trade between two countries (intensive margins) and the effect of NTMs on the probability of a positive export (extensive margins). The latter is important because, as shown in the Melitz model, imposing new trade barriers causes the changes in extensive margins of trade.

The HMR estimation procedure is modified to introduce a time dimension of the data and control for endogeneity of policy variables by the Hausman–Taylor method [10]. It allows the NTM to be endogenous, and it is instrumented by the time-invariant bilateral characteristics (i.e. geographical distance, contiguity, common legal system etc.), deviations of exogenous variables from their means, as well as period-average values of time-varying variables (level of economic development, market size).

The probability of positive trade is defined as

$$\rho_t^{ij} = \Phi(\zeta_0 + \zeta_1 \ln w_t^i - \zeta_2 \ln dist^{ij} + R_t^{ij} \gamma + \phi^i + \phi^j + \kappa \phi^{ij}) \quad (1)$$

where  $w_t^i$  is marginal cost in exporting country  $i$  at time  $t$ ,  $dist^{ij}$  is distance between  $i$  and  $j$ ,  $R_t^{ij}$  is a vector of control variables, and  $\phi^i$ ,  $\phi^j$  and  $\kappa \phi^{ij}$  are country specific and country-pair specific fixed effects. Eq. (1) is a probit model with unobserved non-linear country-pair heterogeneity and potential autocorrelation in the

<sup>4</sup> See Shepotylo [18] for detailed discussion of the econometrics methodology.

<sup>5</sup> Practically, a country that does not produce seafood can re-export it. For instance after Russia imposed a ban on the EU food products in 2014, Belarus, which is a landlocked country and, together with Russia, a member of Eurasian Economic Union, started to export oysters to Russia.

<sup>3</sup> I would like to thank a referee for this comment.

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