6,7 y 8 SEPTIEMBRE 2023 ZARAGOZA

AEEA

ASOCIACIÓN ESPAÑOLA DE ECONOMÍA AGROALIMENTARIA

14 CONGRESO DE ECONOMÍA AGROALIMENTARIA

ESTRATEGIAS DE LOS SISTEMAS AGROALIMENTARIOS ANTE LOS DESAFÍOS GLOBALES

LIBRO DE ACTAS

ORGANIZAN:

CIHEAM ZARAGOZA

cita

Facultad de Economía y Empresa Universidad Zaragoza

ia2 Instituto Agroalimentario de Aragón

THE IMPACT OF SANITARY AND PHITOSANITARY MEASURES ON FRUITS TRADE REVISITED

Ana I. Sanjuán*, **Soumia Bekkouche**

Centro de Investigación y Tecnología Agroalimentaria de Aragón (CITA). UT de Economía Agroalimentaria.

Abstract

Sanitary and Phytosanitary (SPS) measures are imposed globally to guarantee the safety of food traded internationally. Nevertheless, compliance with such measures may be especially costly for certain exporters, jeopardising its international competitiveness. Furthermore, under the auspices of the Farm to Fork initiative of the European Union (EU), the expected implementation by third countries of "mirror clauses" in their production systems to guarantee level field with EU producers, might have additional trade costs and reconfigure trade flows to the EU. The current paper estimates the current cost of SPS measures in the international trade of fruits and aims at shedding light on the effect of regulatory heterogeneity using a structural gravity approach. Preliminary results show that reducing regulatory heterogeneity in behind the border SPS measures significantly reduces trade costs and favours those exporters already aligned with EU requirements.

Key Words: SPS, gravity equation, EU

1. Introduction

The EU's Farm to Fork initiative seeks to extend sustainable and fair food production practises globally, in part, by encouraging convergence with EU food standards, such as sanitary and phytosanitary measures (SPS). SPS measures are particularly prevalent in the fruits sector due to safety risks involved. The EU depends on its imports from extra-EU countries, as the net trade balance, contrary to the aggregate agrifood sector, is negative (around 13,087 million euros on average in the last five years according to EC (2022a)). The fruits sector accounts for 15% of extra-EU agrifood imports placing itself as one of the main agrifood categories imported (EC, 2022a). EU policies for the fruits (as other fresh products) sector have changed in several ways in recent years, and a high variety of domestic and border policy instruments is applied to this sector. Furthermore, in recent years, the EU has significantly expanded the preferences granted to selected third countries. According to EC (2022b), the EU applied 45 trade agreements with 77 partners in 2020, turning the value of EU agri-food trade under preferential agreements expanded more, in relative terms than total EU agri-food trade. Fruits are the main sector favoured, accounting for 24% of the total agrifood trade under preferential trade agreements (EC, 2022b).

In this context, the paper estimates the current cost of SPS measures in the international trade of fruits and aims at shedding light on the effect of regulatory heterogeneity with EU SPS regulations using a structural gravity approach.

2. Methodology

2.1. Data

Trade data from UN ComTrade and SPS data from the inventory recorded by UNCTAD TRAINS Global database on Non-Tariff Measures (NTM) (UNCTAD, 2018), are used. We focus on SPS 'behind the border measures' (*bb*), which apply to domestic producers, and which could be subject to harmonisation. Besides the *bb* aggregate, we evaluate separately the embedded categories A2: 'Maximum Residue Limits (MRLs) and restrictions of substances'; A3 or 'Labelling, marking and packaging requirements'; A4:'Hygienic measures'; A6: 'Production and post-production requirements'; and A8: "Conformity assessment". Strictly speaking, only one of the categories in A8 enters the *bb* composition: A820 "Testing requirements", while the remaining 10 (4-digit) categories can be better described as "at the border".

The sample for analysis covers 72 exporters and 111 importers, including the 28 EU Member States (MS), for the period 2010-2020. Exporters are selected amongst those with NTM data availability and that account up to 99% of international trade. The analysis is conducted on 44 H6 product-lines corresponding to fresh fruits (4-digit sections 0801 to 0810), which jointly account for 92% of fruits imports (chapter 08) of the EU.

To account for regulatory heterogeneity, for each bilateral flow, HS6 product and year, the SPSs applied by the importer are compared with those applied by the exporter to its imports, which in the absence of origin discrimination, will be the same as those applied domestically (UNCTAD, 2017). We aggregate the original 4-digit SPS information to 2-digits and 'bb', by simply signalling with a dummy if at least one SPS 4-digit category, within the SPS aggregation, applies in each observation (i.e. exporter-importer-HS6 product-year). This allows to build up the following dummy variables:

d_{ijst}^{k} = 1 if importer j applies at least one measure of category k (k=bb, A2, A3, A4, A6, A8) to exporter i in HS6 sector s and year t; = 0 otherwise.

$i\_d_{ijst}^{k}$= 1 if exporter i applies at least one measure of category k (k=bb, A2, A3, A4, A6, A8) to importer i in HS6 sector s and year t; = 0 otherwise

dh_{ijst}^{k} = 1 if $d_{ijst}^{k} - i\_d_{ijst}^{k}$= 1; and = 0 otherwise.

Thus dh_{ijst}^{k} captures the heterogeneous application of SPS measures, such as the importer applies them while the exporter does not. Nonetheless, we need to keep in mind the broad definition of the SPS categories.

Two additional policy variables are included to further control for bilateral trade frictions: bilateral tariffs, which vary across sectors from UNCTAD TRAINS and regional trade agreements information from CEPII.

2.2. Model specification

A structural gravity model is estimated, formulated as:

$$m_{ijht} = \exp\left[\alpha_0 + \beta_1 tar_{ijht} + \beta_2 rta_{ijt} + \beta_2 d_{ijht}^{k} + \gamma_{ist} + \gamma_{jst} + \gamma_{ij}\right] \times \varepsilon_{ijst} \quad (1)$$

where m_{ijht} is the value of imports from exporter i to importer j in HS6 product h and year t; tar_{ijht} is the tariff, introduced as $\ln(1+adv_{ijht})$ where adv is the bilateral ad-valorem applied tariff; rta_{ijt} is a dummy for regional trade agreement membership.

γ_{ist} and γ_{jst} are exporter- and importer-sector-year fixed effects to account for the outward and inward multilateral resistance terms, respectively (Anderson and van Wincoop, 2003) where sector is defined at the HS 4-digit level of aggregation. These account for any country-sector-year specific variables (eg. size, output value in the exporting, expenditure in the importing country, country specific geographical variables) as well as any time-varying supply or demand shocks. We define the sector in FE at HS4 digits, to allow exploitation of variation across HS6 products. To further control for possible endogeneity of SPS due either to omitted variables correlated with both SPS and trade or reverse causality, country pair fixed effects (γ_{ij}) are also included (Anderson and Yotov, 2016). Consequently, the identification of the SPS-coefficient relies on the sectoral (at HS6) and time variation within each country-pair, as well as the exploitation of the cross-partner variation within each importer (exporter)-hs4-year.

SPSs for intra-EU trade are set to 0 under the notion that a full harmonisation has been achieved in the common market or at least mutual recognition applies. Empirically, this allows the estimation with importer-sector-year FE, helping in the identification of the discriminatory impact of the SPS variable, even if designed as non-discriminatory.

Model (1) is estimated separately for each of the SPS categories mentioned above. Besides, the estimation is carried out for two subsamples: non-EU and EU importers, to better pinpoint the specific trade effects of SPS measures applied by the EU.

The different models are estimated using the Poisson pseudo-maximum likelihood (PPML) (Santos Silva and Tenreyro, 2006). The PPML not only allows the estimation of the gravity equation in its theoretical multiplicative form preserving zero-trade values, but also avoids inconsistent coefficient estimates in the presence of heteroscedasticity.

3. Results

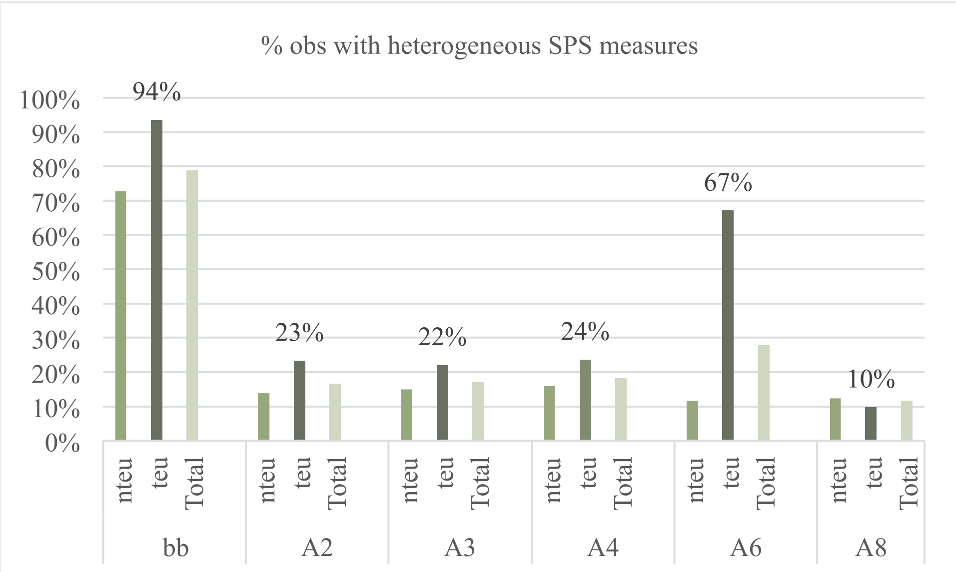
Main importers of fresh fruit in the EU in the period 2010-2020 were Germany, the Netherlands, the UK and France, accounting jointly for 65% of all EU imports originating in third countries (Table 1). Only 9 non-EU countries account for 66% of EU imports, being USA and South Africa (ZAF) the main external suppliers. Intra-EU trade accounts for 47% of the total value of EU imports, while main destinations for EU fruits are in the EU (88%).

Table 1. EU fresh fruits trade: main EU importers and suppliers. Extra-EU trade (2010-2020).

Main EU importers	% over EU imports value	Main exporters to EU	% over EU imports value
DEU	22%	USA	13%
NLD	18%	ZAF	10%
GBR	15%	TUR	9%
FRA	10%	CRI	8%
ESP	9%	CHL	7%
ITA	8%	ECU	6%
BEL	4%	COL	5%
POL	3%	PER	5%
AUT	2%	BRA	5%

Source: Own elaboration based on UN ComTrade. Excluding intra-EU trade.

Figure 1 describes the presence of heterogeneous measures in each subsample and per SPS category. For each category of SPS measures, as well as the aggregate, there is more similarity between the exporters' regulations and the non-EU importers than with the regulations imposed in the EU. The differences are particularly high in "production and post-production" requirements (A6), what leads to substantial differences in the aggregate of "behind the border".



Notes: `*nteu*': non-EU importers; '*teu*': EU importers.

Source: own elaboration based on UNCTAD (2018).

Table 2 shows the estimation results. Tariffs (tar) present the expected negative sign, and significant only in trade addressed to non-EU countries. The lack of significance for the tariff coefficient in the case of EU importers, can be explained by the beneficial impact of tariff concessions done under the different preferential trade agreements signed by the EU. This interpretation is further substantiated by the positive and significant impact of the the Regional Trade Agreement dummy (rta) in trade flows to the EU. For non-EU destinations, *rta* is also positive and statistically significant.

Moving to the main variable of interest, the presence of heterogeneous measures (*dh*) we observe a negative influence in most of the models, which is in coherence with the expected trade costs associated with heterogeneous regulations. Interestingly though, this negative effect becomes significant only when the EU is the importer. As observed earlier, more differences in regulations (even at this broad level of definition) exist in the sample with respect to the EU SPS rules, which in turn, become more trade depressing for the EU trade partners. Thus, on average, the presence of "behind the border" measures in the EU different from those applied by its trade partners decrease bilateral trade, on average, by 36% (i.e. exp (-0.455)-1). Differences in MRLs regulations (A2) and conformity assessment (A8) stand out as the most restrictive. Labelling rules (A3), on the other hand, even if not shared by the exporter, can have even a beneficial trade effect. While complying with MRL rules imply production adaptation costs that complicate adaptation, labelling rules may be easier to incorporate as does not affect the product itself. Despite the large difference in the application of SPS regulations on production and post-production (A6), these don´t seem to have a significant trade impact.

Table 2. Estimation results per category of SPS measures

	bb		A2		A3		A4		A6		A8	
	teu	nteu	teu	nteu	teu	nteu	teu	nteu	teu	nteu	teu	nteu
tar	-1.404	-3.840***	-1.578	-3.848***	-1.501	-3.854***	-1.469	-3.846***	-1.477	-3.849***	-1.548	-3.846***
	(2.467)	(0.945)	(2.513)	(0.950)	(2.495)	(0.951)	(2.494)	(0.951)	(2.494)	(0.948)	(2.532)	(0.950)
rta	0.148*	0.253***	0.147*	0.261***	0.146*	0.268***	0.147*	0.271***	0.146*	0.273***	0.147*	0.266***
	(0.078)	(0.070)	(0.078)	(0.076)	(0.078)	(0.076)	(0.078)	(0.076)	(0.078)	(0.076)	(0.078)	(0.075)
dh	-0.455*	-0.140	-0.462***	-0.159	0.169**	-0.096	0.045	-0.079	0.162	-0.120	-0.546***	-0.018
	(0.234)	(0.174)	(0.163)	(0.318)	(0.083)	(0.123)	(0.163)	(0.112)	(0.187)	(0.163)	(0.185)	(0.123)
Obs.	351,905	373,585	351,905	373,585	351,905	373,585	351,905	373,585	351,905	373,585	351,905	373,585
R^2	0.695	0.782	0.695	0.782	0.695	0.782	0.695	0.782	0.695	0.782	0.695	0.782

Notes: Robust standard errors clustered by exporter-importer in parentheses. *** p <0.01, ** p<0.05, *p<0.1. All models include exporter-sector-year, importer-sector-year and exporter-importer FE. R^2: McFadden pseudo R^2. Estimation is conducted in Stata, using the command *ppmlhdfe* by Correia, Guimarães and Zylkin (2020). 'teu': trade to the EU; 'nteu': trade to importers outside the EU.

4. Conclusions

The paper examines the trade impact of regulatory heterogeneity of SPS measures, focusing on the EU as importer. Significant trade gains could be generated amongst exporters of fresh fruits to the EU by closing the gap with the EU 'behind the border' regulations, especially in terms of MRLs. Conformity assessment regulations, most of which apply 'at the border', account for substantial restrictions on trade which could be surmounted by digitalising some of the procedures or facilitating inspections and testing at the country of origin.

References

Anderson, J. E. and van Wincoop E. (2003). Gravity with gravitas: a solution to the border puzzle, *American Economic Review*, 93: 170–92.

Anderson, J.E. and Yotov Y. (2016). "Terms of Trade and Global Efficiency Effects of Trade Agreements, 1990-2002". *Journal of International Economics* 99: 279-298.

EC (2022a). *Agri-food trade statistical factsheet, European Union-Extra EU27*. Directorate General for Agriculture and Rural Development, European Commission.

EC (2022b). *Monitoring Agri-trade policy MAP 2021-2*. Directorate General for Agriculture and Rural Development, European Commission.

Santos Silva, J.M.C. and Tenreyro, S. (2006). "The Log of Gravity". *Review of Economics and Statistics* 88(4): 641-658.

UNCTAD (2017). *Non-tariff measures in Mercosur: Deepening regional integration and looking beyond.* UNCTAD/DITC/TAB/2016/1. United Nations, New York and Geneva.

UNCTAD (2018). *UNCTAD TRAINS: The global database on Non-Tariff Measures User Guide* (2017, Version 2). UNCTAD/DITC/TAB/2017/3. United Nations, New York and Geneva. Accessed January 2023