



Agricultural trade face to Non-tariff barriers: A gravity model for the Euro-Med area

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Abstract

At first, Non-Tariff Barriers (NTBs) and environmental standards have been aimed at protecting human health, animal and plant safety as well as the environment, wildlife and human security. However, overbearing usage of NTBs can significantly restrict trade. In this regard, many experts hold the view that agricultural exports from developing countries are adversely affected by NTBs. With respect to the present study, the objective is to quantify the actual impact of non-tariff barriers on agricultural trade in the Euro-Med area for the two years 1996 and 2008. For this purpose, a Gravity model use multilateral resistance variables (BNT TTRI) has been applied. Moreover, we have opted for a cross-sectional estimate of bilateral flows between the set of countries making up our sample. Two "dummy" variables are then introduced to specify the non-tariff barriers effects on imports of each block apart. The achieved results show that the coefficients of the standard gravity equation turn out to be significant and bear the expected signs. These indices of trade restrictiveness appear to be significant and negative, reflecting the restrictive effect of tariff and nontariff barriers on these countries 'agricultural trade. Yet, these two variables evolution has shown a degradation of their effects on such a trade. It is also worth noting that the EU imports from the SEMC have proven to be affected by the first block imposed NTBs exclusively for the year 2008. As for the SEMC imposed on EU exports, they have had a negative and significant impact for the two years: 1996 and 2008.

Keywords: Agriculture; Euro-Med free Trade Area; Tariff and Non Tariff Barriers; Ad-valorem equivalents; Gravity model.

JEL classification: F13, Q17

1. Introduction

Among the barriers imposed on international trade, non-tariff barriers (NTBs) have significantly drawn the researchers' interest. More specifically, a non tariff barrier is "Any device or other governmental practice that directly impedes the entry of imports into a country, which discriminates against imports, but does not apply with equal strength to production or distribution" (Hillman, 1991). The intent of imposing such measures is to protect country's people and environment and ensure national welfare while correcting market failures. However, the use of non-tariff barriers is without significantly effects on trade, as highlighted by various studies, such as Hoekman and Nicita, (2008), Celia Disdier et al, (2007).

It is worth noting that the non-tariff barriers have more particularly affected the developing countries exports. Noteworthy, however, a large body of the economic literature has emphasized the fact that the products mostly affected by the non-tariff measures in these countries are mainly agricultural ones. This finding is supported by the developed countries imposition of trade barriers and the establishment of environmental standards. Nonetheless, this has led the developing countries encounter certain problems impending their, mainly insufficiency to assess the implications of the of developed countries requirements, low capacity to participate effectively in the dispute settlement procedures and the inability to demonstrate that the national measures are equivalent to the requirements of developed countries (Henson et al., 2000). Their major problem consists in the lack of access to the resources necessary for them to comply with product standardization as adopted by the developed countries. As the developing countries are generally, in shortage of scientific and technical skills, appropriate technologies, and exterior funding sources, they are exposed to bear a significant increase in the compliance costs, which also depends on the compliance period. Actually, many developing countries need longer time to be conforming to such rules because they do not have access to the compliance resources. This fact has been stressed by Henson et al. (2000) who found that governments in the developing countries have been slow in responding to

changes in product standards in export markets. These results limit their ability to export.

According to the same authors, the developing countries' access to information on the foreign markets requirements can itself be a problem just as crucial as the developed countries, such as the EU, have a good access to information. Another important problem for the developing countries is the level of awareness and understanding of the NTBs as well as the agreements with the World Trade Organization (WTO) in general. Considerable efforts have been provided by a number of international organizations such as the WTO, Food and Agriculture Organization (FAO) and United Nations Conference on Trade and Development (UNCTAD) regarding awareness of the developing countries' government officials about the importance of these measures (Henson et al., 2000). However, there is a growing discontent among WTO Members, especially the developing countries, on the very minor role played by them in dressing of international standards. They have always felt that the developed countries use these measures to require rigid and restrictive trading standards and restrictive. A number of developing countries considers these requirements, above all the sanitary and phytosanitary measures, as one of the greatest obstacles to trade mainly agricultural and food products imposed, in particular, by the European Union (Henson et al, (2000); Disdier et al,(2007)).

In this respect, the present study is designed to quantify the non-tariff barriers impact on agricultural trade in the Euro-Med area. This article is intended seeks answer to two major questions, manly: Do these measures significantly affect Euro-Med trade? Secondly, do they have the same impact on all trading partners?

This work is organized as follows: The upcoming section is devoted to present the selected model applied to estimate the non-tariff barriers' impact on the Euro-Med trade. As for the ultimate section it deals with the work's reached results and concluding remarks.

2. The gravity model specification

2.1 Historical Development

It should be noted that the concept of the gravity model is based on Newton's Law of Universal Gravitation, relating the attraction force between two objects to their combined mass and to the distance separating them. Noteworthy, applying gravity to the social sciences was initially proposed by James Stewart in the 1940s (Fitzsimons et al., 1999). Originally applied to international trade by Tinbergen (1962), the gravity model predicts bilateral trade flows between any two countries as a function of their size and the distance between them. Economic size is measured in terms of Gross Domestic Product (GDP), population or per capita income. Distance is measured by means of the distance separating the countries' capital cities. In some studies, this is replaced by measures of remoteness that weigh distances by GDP or measure bilateral distances relative to the country's average distance from all trading partners. The above described original gravity equation looks as follows:

$$X_{ij} = A_i \frac{Y_i^{\alpha_1} Y_j^{\alpha_2}}{Dist_{ij}^{\alpha_3}}$$

(1)

Where: $A, \alpha_1, \alpha_2, \alpha_3$ are the parameters to be estimated.

The equation's logarithmic transformation is given by:

$$\text{Log } X_{ij} = A_i + \alpha_1 \text{Log } Y_i + \alpha_2 \text{Log } Y_j + \alpha_3 \text{Log } Dist_{ij}$$

(2)

The gravity model has been widely applied in international trade studies. Its popularity is due several reasons, mainly, concept simplicity, its appropriateness to fit well the available data and the ease models' econometric estimation. Increasingly, the model specification has been augmented through the addition of other variables that are thought to have an influence on trade flows such as dummy variables for a common language, common borders or historical relationships among countries. The gravity model can also be used to evaluate policy analysis, for instance, to measure the effects on trade flows between member countries of trade agreements or common currency areas. A common extension of the gravity approach is to calculate the trade cost of different types

of barriers and various other restrictions (observed and unobserved) on trade flows by comparing the predicted as well as the actual levels of trade. With the growth of the gravity model's empirical application, the approach's theoretical foundations have also been developed. Beginning with Anderson (1979), who indicate that the gravity framework is consistent with a world trade model in which products are differentiated by the origin country (the Armington assumption), a series of other papers have shown the gravity model framework is consistent with a number of standard trade theories such as Heckscher-Ohlin and monopolistic competition. In this sense, Deardorff (1995) has gone as far as to state that "just about any plausible model of trade would yield something very like the gravity equation, whose empirical success is therefore not evidence of anything, but just a fact of life."

In the same context, Anderson and van Wincoop (2003) have shown that the gravity model estimation can be greatly improved by incorporating what they refer to as multilateral resistance measures. Trade between any two regions depends, negatively, on each region's trade barriers in respect of both relative regions' with all trade partners. If a country has a relatively high average trade barrier, it will be more likely to trade with a country with which it has a low bilateral barrier. Anderson and van Wincoop argue that multilateral resistance in this case cannot be measured through using remoteness variables based on measures of distance, as this does not capture border effects; rather, the gravity has be solved by taking into account the barriers impact on prices.

2.2 Specifying the empirical model

Agricultural products originating from the developing countries are negatively affected by non-tariff barriers (Hoekman & Nicita, 2008, Henson et al, 2000). Since the Southern Eastern Mediterranean Countries (SEMC)¹ are developing countries, so we are then interested in studying the flow of imports from these

¹ SEMC: Algeria, Egypt Arab Republic, Israel, Jordan, Lebanon, Morocco, Syrian Arab Republic, Tunisia Turkey.

countries with their main trading partner, the European Union (EU)². Agricultural products include branded products from code SH1-24.

In this study, two indices of trade restrictions were used, mainly: the tariff trade restrictiveness index (TTRI) and the overall trade restriction index (OTRI). Both indices (TTRI and OTRI) are equivalent uniform tariff-induced trade policies measures affecting a country's recorded imports (Kee, Nicita and Olarreaga, 2009). For the tariff equivalent of non-tariff barriers, the authors have firstly estimated the quantitative impact of non-tariff barriers on imports. Then, they have turned to the transformation of quantity effects in to price effects. The difference between these indices reflects the non-tariff barriers effect. These two indices are superior to other indicators such as the average rate or frequency of NTBs and coverage ratios, used in the gravity estimates (Hoekman and Nicita, 2008).

For the purpose of studying the bilateral flows of agricultural products involving all countries in the sample (consisting of the EU, and SEMC) for the years 1996 and 2008³, the gravity equation as inspired from the Anderson & Van Wincoop (2003) applied model, has been used. To this equation, we have some variables dubbed multilateral resistance (BNT TTRI). Our gravity equation is then formulated as follows: used by

$$\begin{aligned} \text{Log } M_{ij} = & \beta_i + \alpha_1 \text{Log } GDP_i + \alpha_2 \text{Log } GDP_j + \alpha_3 \text{Log } Dist_{ij} + \\ & \alpha_4 BNT_i + \alpha_5 TTRI_i + \alpha_6 \text{Commlang}_{ij} + \alpha_7 \text{Commfront}_{ij} + \xi_{ij} \end{aligned} \quad (3)$$

- M_{ij} stands for bilateral imports of agricultural goods from country i to its partner j . These values are extracted from the COMTRADE database (2012);

² EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom. Bulgaria, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia.

³ These two years are two major dates for the Euro-Med region. The first corresponds to the year following the establishment of the Euro-Med free trade area and the second is the year following the EU enlargement.

- BNT_i is the difference between TTRI and OTRI. Noteworthy, however, that this index is the weight of four gates, namely, technical regulations, quantitative restrictions, monopolistic measures, and other non-tariff measures to control prices;
- $TTRI_i$ represents the index of tariff restrictions to trade in the importing country i ;
- GDP_i represents the gross domestic product of the importing country I , at constant 2000 prices in US Dollars;
- GDP_j represents the gross domestic product in the exporting country j , at constant 2000 prices in US Dollars;
- $Dist_{ij}$ measure the geographic distance between the city of countries i and j ;
- $Commlang_{ij}$ is a dummy variable taking the value 1 if the partner countries speak the same language;
- $comfront_{ij}$ is a dummy variable taking the value 1 if countries have a common border;

Table 1: Correlation between trade restriction indices

	OTRI	TTRI	BNT
OTRI	1.0000		
TTRI	0.5969	1.0000	
BNT	0.5846	-0.3020	1.0000

At a first step, we have selected a cross-sectional estimate of bilateral flows between all countries subject of our sample (Model 1). This estimate would serve to compare the effects of tariff and nontariff barriers on trade between the partner countries belonging to both banks of the Mediterranean, in order to appreciate either the divergence or convergence. In a second step, we have reckoned it useful to specify the effects of non-tariff barriers on the imports of

each block apart (Model 2). For this sake, two other "dummy" variables have been added representing the multiplicative terms of non-tariff barriers applied by each block with the same block countries imports. These variables determine the interaction between non-tariff barriers and trade between partners:

- $M_{EU-SMEC} = m_{EU-SMEC} \times NTB_{EU}$, with: $m_{EU-SMEC}$ a dummy variable taking value 1 if the importing country is part of the EU while the exporter belongs to the SEMC and 0 otherwise;
- $M_{SEMC-EU} = m_{SEMC-EU} \times NTB_{SEMC}$, with : $m_{SEMC-EU}$ a dummy variable which take value 1 if the country belongs in the SEMC and the exporter is part of the EU and 0 otherwise ;

The new gravity equation is then formulated as follows: used used by

$$\begin{aligned} \text{Log } M_{ij} = & \beta_i + \alpha_1 \text{Log } GDP_i + \alpha_2 \text{Log } GDP_j + \\ & \alpha_3 \text{Log } Dist_{ij} + \alpha_4 BNT_i + \alpha_5 TTRI_i + \alpha_6 M_{EU-SMEC} \\ & + \alpha_7 M_{SEMC-EU} + \alpha_8 \text{Comm lang}_{ij} + \alpha_9 \text{Comm front}_{ij} + \xi_{ij} \end{aligned} \quad (4)$$

2.3 Results and interpretations

The achieved results (Table 2, M1) show that the effects of such factors as distance, of exporting and importing countries GDPs are consistent with the theoretical expectations relevance to the year's subject of the study. These results show that a 1% increase in the size of the exporting country is associated with an increase of 1.64% (1.13% in 2008) in the bilateral trade, while a 1% increase in the size of the importing country is associated with an increase of about 1.2% (0.72% in 2008) of bilateral agricultural trade. By cons, an increase of 1% distance, all things being equal, cause a decrease of about 1.21% (1.12% in 2008) of bilateral trade flows in agriculture. Regarding the coefficient of the variable cultural "common language", it is positive and significant, which means that this factor participates, greatly in trade. Still, the coefficient of the variable "border" has changed significance while keeping the same sign.

Table 2: Gravity equation results for the Euro-Med region trade partners

Variables	1996				2008			
	Coefficient	P	Coefficient	P	Coefficient	P	Coefficient	P
	M1	Value	M2	value	M1	value	M2	value
	M1	M2	M1	M2	M1	M2	M1	M2
LogGDP_i	1.209473	0.000	1.209473	0.000	.72266	0.000	.72266	0.000
LogGDP_j	1.637835	0.000	1.637835	0.000	1.13164	0.000	1.13164	0.000
LogDist_{ij}	-1.21721	0.000	-1.21721	0.000	-1.121352	0.000	-1.121352	0.000
Com								
Lang_{ij}	3.270811	0.000	3.270811	0.000	.3754875	0.032	.3754875	0.032
Com								
Front_{ij}	.2767807	0.683	.2767807	0.683	.9535609	0.040	.953560	0.040
NTB_i	-.011810	0.011	-.011810	0.011	-.0050346	0.062	-.0050346	0.062
TTRI_i	-.070171	0.007	-.070171	0.007	-.009364	0.055	-.009364	0.055
MSMEC-EU	-	-	-2.04387	0.001	-	-	-.526765	0.070
MEU-SMEC	-	-	.7275657	0.800	-	-	-.193070	0.000
Constant	- 47.549	0.000	- 47.549	0.000	-23.728	0.000	-23.728	0.000
N. of obs.	808		985		808		985	

It is worth noting that the coefficients of trade restrictiveness indices turn out to be highly significant. It is negative, highlighting the diminutive effect of tariff barriers on agricultural trade partner countries. In fact, a 1% increase in the index would certainly result in a reduction of the flow of agricultural imports by 7% and 0.9% for the years 1996 and 2008 respectively. Similarly, the effect of non-tariff barriers appears to be negative. However, the evolution of these two variables coefficients over time shows a remarkable deterioration in their effects on trade among the countries subject of the sample. This has its explanation in the one hand by the accession of the new member's countries to the EU and in the other hand new European proposal against the SEMC to harmonize their standards within the framework of the New Neighborhood Policy and, more recently, in the EU proposed project for the Mediterranean. Furthermore, it has

been discovered that bilateral trade among the Euro-Med partner countries is affected by the rates for non-tariff barriers.

Based on Table 2 results (M2) show that EU imports from the SEMC ($M_{UE} NTB_{UE}$) are penalized by non-tariff barriers established by the EU only in 2008. Indeed, non-tariff barriers SEMC exports decreased by 1.2 times. This result confirms those reached by Fontagné et al, (2007) and Moenius (2006). As non-tariff barriers imposed by the SEMC on exports to the EU ($M_{PSEM} NTB_{PSEM}$) have had a negative and significant coefficient for both years 1996 and 2008.

3. Conclusion

Throughout this paper, an analysis of the impact of Non-Tariff Barriers notified by importing countries on bilateral trade flows has been undertaken. Our empirical application focuses on the Euro-Med countries imports, specifically imports of agricultural products, and we use, inter alia, the ad valorem equivalent of non-tariff barriers. Our initial results suggest that non-tariff barriers have generally had a negative impact on trade in agricultural products. We have also shown that the SEMC are not significantly affected by these measures in their exports to their Euro-Med northern partners for the year 2008. On the other hand, and on conducting the analysis exclusively to the context of their exports to the Southern area, the negative impact of non-tariff barriers appear to be more sensitive for EU exports in 1996 than in 2008.

Noteworthy, however, our analysis suggests that much remains to be done to improve the situation of the SEMC agricultural trade within the Euro-Med zone especially after the accession of new member countries taking advantages of the European funding based on Common Agricultural Policy (CAP). Consequently, these countries are enticed to undertake further efforts to harmonize standards in conforming to the European norms in a bid to win the challenge of competitiveness. As pointed out of Josling et al. (2004), above all, the technical and financial assistance oriented to these countries to help them meet the requirements imposed by the measures of technical regulations or environmental rules and increase their participation in international standardization

organizations, should be a priority to ensure a more active and effective integration within the regional, or even global, agricultural trade.

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