

Are non-tariff measures a substitute for tariffs in agricultural trade?

Recent evidence from southern Mediterranean countries

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Abstract: *The significance of and interest in non-tariff measures (NTMs) have increased as a consequence of the reduction in agricultural tariffs. This paper analyses the relationship between NTMs and tariffs in southern Mediterranean countries (SMCs) through two complementary analyses. First, the authors construct a taxonomy of protection for products, distinguishing between high protection, transparent protection, low protection and disguised protection. The low protection category is most widely represented, and the disguised protection category is also important. Second, the policy substitution hypothesis between tariff and non-tariff protection is tested. This hypothesis appears in the literature as the possibility that countries implement NTMs for protection purposes, as a result of the progressive reduction in the tariffs levied. Policy substitution is found in some SMCs, which is consistent with an upward trend of non-tariff protection as tariff liberalization progresses in the region.*

Keywords: trade policy substitution; developing countries; **agro-food trade; trade liberalization** 

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As a result of the trade liberalization over the last few decades, tariffs play a less important role in determining agri-food trade flows. Therefore, more attention is being paid to the role of non-tariff measures (NTMs) in both academic research and the political arena. In fact, NTMs are now among the main obstacles remaining in agri-food trade, with legal coverage provided by the endorsement of the World Trade Organization (WTO) agreements on Sanitary and Phytosanitary Measures (SPS) and Technical Barriers to Trade (TBT) and the provisions agreed in bilateral arrangements. NTMs are employed for many purposes, including the correction of information asymmetries and market failures often related to food

safety concerns. When countries implement such measures, they are protecting values such as human, animal or vegetal health, or consumers' rights. However, they may also have potential protectionist purposes, as they can be used as a disguised protection aimed at restricting the entry of foreign products (Hoekman and Nicita, 2008; Nimenya *et al*, 2012). Fontagné *et al* (2005) reported that the trade-distorting effects of NTMs were very relevant in food trade; Disdier *et al* (2008) highlighted the fact that their restrictive effects mostly took place in developing countries' exports.

In this respect, several authors (Copeland, 1990; Ederington, 2001; Bagwell and Staiger, 2001) have

suggested the policy substitution hypothesis: with the agreed gradual tariff reduction, countries could implement NTMs in parallel as an alternative way of protecting their domestic production. In a 2012 report by the WTO, a comprehensive literature review was carried out, seeking empirical evidence for this phenomenon. As this evidence is mixed, the report states that 'TBT measures may have been used to take the place of tariffs, but there is very limited evidence of substitution between tariffs and SPS measures' (WTO, 2012, p 71). Some studies in the USA (Baylis *et al*, 2010) and EU (Jouanjean *et al*, 2012; Cadot *et al*, 2012) also suggest that food alerts (a type of NTM) are influenced by most favoured nation (MFN) tariffs. These are the custom duties applied by WTO members to other WTO members which do not benefit from preferential treatment. In practice, applied MFN tariff rates reflect the current usage of tariffs on third countries' products.

Given this context, this paper focuses on the relationship between tariffs and NTMs as protection tools in selected southern Mediterranean countries (SMCs). Specifically, we carry out an analysis that allows us to ascertain whether or not NTMs implemented by SMCs are dependent on tariffs and their evolution. Furthermore, we have accounted for sectoral differences in the restrictiveness of NTMs. We initially examine the literature concerning the effects of NTMs applied to agri-food trade in the Mediterranean region and then explain the methodology used to carry out the analysis, including the likely relationships between NTMs and tariffs. Finally, the results of the analysis, the main findings and the implications are discussed.

Effects of NTMs in the Mediterranean region

After a thorough analysis of NTMs applied by Egypt and Tunisia in all the sectors, Ghali *et al* (2013) identified that in Tunisia agri-food products (from Harmonized System (HS) sections I to IV) account for approximately 75% of NTMs, while in Egypt the NTMs for the same product categories represent less than 25%. Another difference highlighted was that for all the sectors, Egypt's NTMs belong predominantly to the TBT category, while Tunisia implements mainly SPS measures. Recent evidence indicates that various forms of NTM still play a trade-deterrent role in Mediterranean agri-food trade. Chemingui and Dessus (2008) highlighted the restrictiveness of quantitative constraints applied by Syria. De Wulf *et al* (2009) stated that the application of food standards by SMCs seemed to be stricter at the borders than in domestic markets. Emlinger (2010) analysed the 'border effect' which relates to the access for SMC fruit and vegetables to EU markets, including NTMs. Adopting a wider approach, Boulanger *et al* (2013) used a computable general equilibrium (CGE) model to simulate the impacts of a deep and comprehensive free trade area (DCFTA) in the Mediterranean, using the Kee *et al* (2009) estimates of non-tariff equivalents also used in this study. Boulanger *et al* (2013) showed that the projected trade increases after NTM reduction in the region were several times greater than in the case of tariff elimination only. With respect to this DCFTA framework, Gonzalez-Mellado *et al* (2010) and Rau and Kavallari (2013) showed that SMCs were at different stages of harmonization in terms of their respective NTMs.

Methodology

The countries examined in this study include Egypt, Jordan, Morocco, Lebanon, Algeria and Tunisia. With the exception of Lebanon and Algeria, these are all members of the WTO. All are part of the Euro-Mediterranean Partnership (EUROMED). Since 2004, Egypt, Jordan, Morocco and Tunisia have been members of the Agadir Agreement. This Agreement established a free trade area amongst Arab Euro-Mediterranean countries and was signed in Rabat on 25 February 2004 and then enforced on 6 July 2006. The Agreement aims to involve its members in a process of trade liberalization that goes beyond the multilateral agreements and also aims at harmonizing general and sectoral economic policies in relation to foreign trade. These countries, with the exception of Algeria, are also members of the Greater Arab Free Trade Area (GAFTA). Thus, they are involved in different stages of the trade liberalization processes. The products include the whole range of agri-food products at the 6-digit level of the Harmonized System (referred to as HS, Chapters 01 to 22). Data on NTMs and tariffs were first combined to allow for a description of the levels of protection provided in the products and countries considered. Then an econometric analysis was carried out to detect any relationships between tariffs and NTMs.

Data on tariffs and non-tariff measures

We needed a measure of the protection level provided by NTMs. For this, we used the *ad valorem* equivalents of NTMs (hereinafter referred to as non-tariff equivalents, NTEs) estimated by Kee *et al* (2009). The particular interest of this dataset is that it covers a wide range of products at the **HS 6 level**, that the number of HS lines considered in this study includes 583 products; it provides *ad valorem* equivalents of NTMs that are directly comparable with tariffs, and it provides estimates of the restrictiveness of each NTM, irrespective of its nature. Obviously, these estimates are not free from limitations. Deardorff and Stern (1998), Dean *et al* (2003) and Vaughan (2005) underlined the problem of NTE computation when imported and domestic goods are not close substitutes. Kee *et al* (2009) and Nimenya *et al* (2012) accounted for imperfect substitution, as recently shown by Sanjuán López *et al* (2013), who suggested an alternative way of measuring NTEs based on gravity equations. With regard to tariffs, we gathered the MFN applied tariffs at the HS 6-digit level from the World Integrated Trade Solution (WITS) database, corresponding to the same period as the NTEs that were available, including a previous period to compute the variation of tariffs required to test the impact of tariff variations on NTE. WITS is an online data consultation and extraction software. It contains import and export data from the United Nations COMTRADE database and tariff rates and non-tariff barriers from the UNCTAD TRAINS database. Historical MFN tariffs data can be accessed through the Quick Search menu by selecting Tariff – View and Export Raw Data sub-menu. Users can download an MS Excel spreadsheet with all information (<http://wits.worldbank.org/wits/>).

Taxonomy of protection

We defined the level of protection by combining two dimensions: first, whether it was low or high and, second,

by indicating how transparent the protection was. We consider that if NTEs and tariffs exceed a certain threshold, protection can be considered high. To define the threshold, we drew on the modalities document prepared by the Committee of Agricultural Negotiations (WTO, 2008). For developing countries, it suggests that substantial tariff reductions will be made for those products for which the bound tariff or their *ad valorem* equivalent is greater than 75%. Hence, we consider high protection via tariffs when that threshold is overcome. We extended this threshold to NTEs. On the other hand, the WTO considers tariffs as transparent measures, whereas in general terms NTMs are non-transparent protection measures. Thus four categories of products were defined:

- (1) high protection: products on which applied tariffs are high (above 75%) and NTEs are greater than 75%;
- (2) disguised protection: products on which tariffs are less than 75% and NTEs are over 75%;
- (3) low protection: products on which tariffs are less than 75% and NTEs are below 75%, and;
- (4) transparent protection: products on which tariffs are greater than 75% and NTEs are below 75%.

Do applied NTMs depend on tariffs?

While the previous analysis can provide insights into the relationships between NTMs and tariffs, a multiple regression analysis allows us to test policy substitution statistically. In other words, are NTEs statistically dependent on the tariffs levied? If that is the case, then what is the strength of that relationship? Equation (1) illustrates the general model in which the NTMs are dependent on tariffs and their evolution:

$$NTM = F(tariffs, \Delta tariffs) \tag{1}$$

The existence of policy substitution will be indicated by the sign of the first derivatives:

$$\frac{\partial NTM}{\partial tariff} \tag{2}$$

In this case, static policy substitution is suggested when Equation (2) < 0, as the higher the tariff, the less restrictive the NTM (and vice versa). With regard to Equation (2) > 0, this suggests ‘policy complementarity’ as there are possible underlying political and economic reasons, implying that both tariff and non-tariff protection tend to move in the same direction. Also, dynamic policy substitution could take place, considering the influence of previous tariff changes on current NTMs:

$$\frac{\partial NTM}{\partial \Delta tariff} \tag{3}$$

If Equation (3) < 0, this shows that restrictive NTMs are connected to decreasing tariffs in the previous period, indicating dynamic policy substitution. Dynamic complementarity appears when high NTMs result from previous tariff increases. To test the existence of policy substitution, the multiple regression model in equation (4) was estimated:

$$\ln NTE = \alpha + \beta_1 \ln T + \beta_2 \Delta \ln T + \sum \delta_j Z_j + \sum \sigma_j Z_j \ln T + \sum \rho_j Z_j \Delta \ln T + \sum \gamma_m f m + u \tag{4}$$

where $\ln NTE$ is the natural logarithm of *ad valorem*

equivalents of the NTMs, $\ln T$ is the natural logarithm of the tariffs, which are calculated as a simple average for the products included under each 6-digit heading. With Δ , we refer to the five-year differences between the logarithms of the tariffs, where the final year is the year for which the NTEs were available. Specific product effects Z_j are represented through dummies that correspond to the fixed effects for groups of products to capture product specificities, following the suggestion by Dean *et al* (2009). These groups are defined as belonging to Section I (Live animals and animal products), HS chapters 01 to 05 ($j = 1$), and Section II (Vegetal products), HS chapters 06 to 14 ($j = 2$). So, the expression $\sum \sigma_j Z_j \ln T$ is used to estimate the static policy substitution by sector and the expression $\sum \rho_j Z_j \Delta \ln T$ is used to estimate the dynamic policy substitution by sector over a five-year period. $f m$ is a set of dummy variables equal to 1 when the product belongs to the HS chapter m , and 0 otherwise, where $m = 1$ to $m = 21$ are the trade chapters (HS, 2 digits). Finally, u is the error term.

Apart from the dynamic substitution, it should be noted that considering the tariff variation allows us to deal with the endogeneity between tariffs and NTEs; in any case, we believe that endogeneity is not likely to take place as the evolution of tariffs is largely exogenous and mostly determined by previous multilateral political commitments and schedules.

Results and discussion

Depicting trade protection in SMCs

We first show the overall picture of agricultural protection. Table 1 depicts the simple average NTEs and the evolution of applied MFN tariffs between 1998 and 2003. These data show the relatively high level of agricultural protection in the selected SMCs. As Table 1 indicates, the evolution of applied tariffs is not the same across every country. Morocco and Tunisia increased their tariffs at the beginning of the century, and then lowered them in the following years. Egypt and Lebanon showed opposite trends, while Jordan and Algeria, with low initial levels, reduced many tariffs over time. Average NTEs calculated by Kee *et al* (2009) were about 50% for most countries, with the lowest level in Morocco. A similar pattern of changes in tariffs can be seen when considering specific sections. Table 2 shows the percentage of tariff lines with

Table 1. NTEs and change in agricultural tariffs for selected SMCs.

	MFN applied tariffs, simple average (%)			Non-tariff equivalents, simple average (%) ^a
	1995–99	2000–04	2005–08	2003–04
Egypt	65.8	45.0	66.5	48.7
Lebanon	11.8	17.1	19.1	50.7
Jordan	–	21.9	19.0	50.0
Morocco	43.0	50.8	44.5	38.6
Tunisia	34.6	71.5	56.3	55.5
Algeria	28.0	23.9	23.2	56.5

Sources: World Bank, World Trade Indicators 2009/10; ^aauthors’ calculations from Kee *et al* (2009).

Table 2. Percentage of tariff lines with positive and negative variations in applied MFN tariffs between 1998 and 2003 (HS 6 digits).

	Section I: Animal products (Chapters 1 to 5)		Section II: Vegetable products (Chapters 6 to 14)		Sections III and IV: Fats and oils, and prepared foodstuffs (Chapters 15 to 22)	
	> 0	< 0	> 0	< 0	> 0	< 0
Egypt	3.95	53.95	11.31	79.19	21.89	77.51
Lebanon	28.66	28.66	38.77	53.30	30.91	52.12
Jordan	0.00	43.28	0.00	11.11	12.50	87.50
Morocco	79.55	19.32	90.72	5.49	83.33	16.67
Tunisia	40.49	1.84	52.67	11.33	51.53	12.27
Algeria	15.38	78.11	27.04	50.21	18.75	71.02

Sources: WITS and authors' calculations.

Table 3. Taxonomy of agricultural trade protection (%).

Category of protection	Egypt	Jordan	Morocco	Tunisia	Lebanon	Algeria
High	1	0	2	9	0	0
Disguised	26	4	21	19	27	36
Low	71	95	71	48	71	64
Transparent	1	2	5	25	2	0

Sources: WITS and authors' calculations.

positive and negative variations in applied MFN tariffs between 1998 and 2003. As mentioned above, Morocco and Tunisia present the greater percentage of positive tariff variations, in contrast to the other four SMCs. However, considering that for all studied countries the low protection category is the most represented (Table 3), we could conclude that Morocco and Tunisia had very low protection levels at the beginning of the period. Table 3 shows the taxonomy of protection. Apart from the relevance of the low protection level in every country, the disguised protection is also noticeable in all countries. In addition, Tunisia can be mentioned as the country with highest percentage of tariffs in the transparent category (25%).

Policy substitution between NTMs and tariffs

Table 4 summarizes the model results testing the hypothesis of policy substitution. For each country, estimated coefficients and standard errors are shown for the explanatory variables, in which the sign of significant coefficients reveals the possible appearance of policy substitution. For Egypt, the main significant relationship between NTEs and tariffs takes place for vegetable products, with dynamic policy substitution taking place in HS Section II. As shown above, MFN tariffs were mainly reduced for these goods in the years before this study, which implied an upward pressure on NTMs. This happened in spite of the fact that the fixed effect coefficient for Section II products indicates a lesser level of NTEs than the other sections. Dynamic policy substitution in vegetable products is consistent with the relatively high count of disguised protection in the country (26% in Table 3). Dairy products showed a positive coefficient indicating higher NTEs than in the other products. For Lebanon, neither policy substitution nor complementarity between


tariffs and NTMs was detected. Several positive fixed effects are significant for specific sectors, notably dairy products and preparations of vegetables, and negative for Section II products. In Jordan, no significant relationships were found. In all cases, we considered statistical significance at the 5% threshold. The lack of results in the Jordan case could be related to the limited availability of data to carry out the regression analyses.

For Morocco, both static and dynamic policy substitution appear in Section I products. The dynamic policy substitution, together with the fact that Section I products' tariffs were mostly raised, indicates that NTMs have become less stringent, though they remain significant, as shown by the positive fixed effects estimated for Section I products. Preparations of vegetables (Chapter 20) also have a higher NTE level. In Tunisia, dynamic policy substitution occurs in Section II products. For these products, tariffs were mostly lowered, which indicates more restrictive NTMs in general. Likewise for the other countries analysed, significant and positive fixed effects took place for dairy products and preparations of vegetables. In Algeria, dynamic policy substitution also occurred, in this case for all the products. In addition, dairy products had significant and positive fixed effects.

Concluding remarks

Studies on trade policy reform frequently refer to the policy substitution hypothesis, which stems from a simple observation on the trends towards lower tariff values and enhanced NTMs (Hoekman and Nicita, 2008). Explicit tests of such relations are not conclusive in the literature. In this paper we tested this hypothesis based on the NTEs estimated by Kee *et al* (2009) and observed levels and changes in MFN tariff values in SMCs. Our results suggest

Table 4. Model results: non-tariff equivalents (NTEs) of non-tariff measures (NTMs) as a function of tariffs, tariff evolution and sector, for selected SMCs.

	Egypt	Lebanon	Jordan	Morocco	Tunisia	Algeria
In tariff						
General	-0.050639 (0.054263)	-0.35524 (0.26371)	2.5739 (1.6300)	0.637331 (0.324829)	0.12510 (0.27916)	-0.16965 (0.49464)
$\beta_1 \ln T$						
Animal products (Chapters 1 to 5)	-0.489631 (0.333822)	0.62568 (0.65878)	-3.2506 (1.6688)	-0.692212** (0.342265)	0.01239 (0.1420)	0.12841 (0.69957)
$\sigma_j Z_j \ln T$						
Vegetable products (Chapters 6 to 14)	0.510772 (0.310360)	0.54992 (0.43914)	-4.1088 (3.2481)	-0.310980 (0.375064)	0.32710 (0.15813)	0.87383 (0.55053)
$\sigma_j Z_j \ln T$						
$\Delta \ln$ tariff						
General	0.180000 (0.196469)	0.20790 (0.21235)	-0.1605 (1.4900)	-0.023661 (0.126876)	0.22204 (0.33576)	-0.71928** (0.31467)
$\beta_2 \Delta \ln T$						
Animal products (Chapters 1 to 5)	0.037064 (0.324016)	-0.38927 (0.59485)	1.1539 (1.7184)	-1.061362** (0.494023)	-0.23213 (0.26790)	0.90641 (0.46613)
$\rho_j Z_j \Delta \ln T$						
Vegetable products (Chapters 6 to 14)	-0.861594*** (0.327645)	-0.08102 (0.50644)	NA	-0.234740 (0.350363)	-0.84939*** (0.28039)	0.78359 (0.41675)
$\rho_j Z_j \Delta \ln T$						
Fixed effects 	f_4 0.162762** Z_1 0.007668 Z_2 -0.174813***	f_4 0.20192** f_{20} 0.16415** Z_1 -0.12191 Z_2 -0.11838**	f_4 0.2201 Z_1 0.5937 Z_2 0.3555	f_{20} 0.215844*** Z_1 0.389869*** Z_2 0.159060	f_4 0.27491*** f_{20} 0.16094**	f_4 0.18912** Z_1 -0.04250 Z_2 -0.24320
f_m and $\delta_j Z_j$						
Number of observations	532	545	75	583	467	568
p-value	0.04936	0.01045	0.01611	0.00005	0.00001	0.000105

Notes: ***, ** indicate significance at 1% and 5% respectively. Standard errors are in parentheses. The coefficients of non-significant fixed effects are omitted for reasons of space. = Section I (Animal products); : Section 2 (Vegetable products); 4 = Dairy products; 20 = Preparations of vegetables.



that NTMs substitute tariffs in four countries of the sample. Regarding how this phenomenon affects countries and sectors, some key points are: first, in the countries where policy substitution appears, it does so in a dynamic way. Static substitution is only significant for vegetable products in Morocco. This indicates that the restrictiveness of NTMs is influenced by the evolution of tariffs rather than by their current level. Second, countries seem to target specific groups of products when applied tariffs have been declining in favour of NTMs: only in Algeria is dynamic policy substitution accepted as applied to all the HS agricultural sections, while substitution is observed in Egypt and Tunisia only in vegetable products and in Morocco only in animal products. Therefore, we have detected different behaviour concerning policy substitution, which may respond to domestic sector determinants. A third conclusion is that policy substitution depends on the trade liberalization approach chosen by each country. Morocco and Tunisia mainly raised the applied MFN tariffs in the years before signing the Agadir Agreement, and hence then lowered the restrictiveness of their NTMs. As tariffs are the most transparent protection measure, it can be concluded that they were following the WTO philosophy of transparency and predictability in trade policies. In the same period, Egypt lowered tariffs and then raised the restrictiveness of its NTMs. Other findings from our analysis indicate that dairy products and, to a lesser

extent, preparations of vegetables, have more restrictive NTMs compared with other products. The analysis of factors explaining these facts would require a case-by-case assessment.

In spite of these results suggesting the possibility of policy substitution, there is a need for further evidence in order to define a general trend in developing economies, as our results contrast with opposing evidence in developed economies (see Baylis *et al*, 2010; and Jouanjean *et al*, 2012). An updated estimation of NTEs for SMCs could help confirm whether or not the substitution hypothesis is consistent. Moreover, it should be noted that the substitution effects are tested between multilateral NTEs and MFN tariffs. Taking into account the specific changes related to the bilateral relationship emerging from the association process between the EU and the Mediterranean countries would require a detailed analysis of the preferential tariffs, which is beyond the general trends identified in this paper. If policy substitution were confirmed in further research, trade liberalization in the Mediterranean region would imply increasing pressures on NTMs. As the literature has indicated, the lack of harmonization in the region hampers trade; hence, departing from multilateral protection and making progress at the regional level, and the creation of a DCFTA in the Mediterranean region should place emphasis on attempting to even up the restrictiveness of NTMs.

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