Standards and Market Power: Evidence from Tunisia

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Abstract – We develop a theoretical model and derive conditions under which firms with market power try to influence the setting of quality standards. The theoretical model yields the result that in sectors with a larger share of politically connected firms, or a higher degree of market power higher standards will prevail, especially if the market power is due to access to imports. We test our hypothesis using Tunisian data for the years 2002-2010. Indeed, we find a higher incidence of NTMs in sectors where State Trading Enterprises operate, or firms connected to former president Ben Ali have a higher share in imports. This association only holds for sectors with low tariff values.

Keywords: NTMs, market power, political economy, development, imports, Tunisia

JEL codes: F12, F13

0. Introduction

It is nowadays widely recognized that quality standards do not always play the role of non-tariff barriers to trade, but might in fact be trade-enhancing (cf. Maertens and Swinnen, 2008). The most frequently studied cases cover standards imposed by high-income countries. In particular, if standards are not set excessively high, they can serve as a signaling device increasing confidence in the quality of the product, and hence make products more marketable.

In such a setting, consumer preferences are supposed to determine the political economy outcome (Swinnen et al, 2015) and standards are high because they improve consumers' utility.[1]

Standards imposed by middle income-countries have been studied to a lesser extent than those imposed by the EU, US or other high-income countries. Especially, the literature on the political economy of standards in developing and emerging markets is scant. This paper makes an attempt to fill this gap. More specifically, we develop a variation of the theoretical model by Grossman and Helpman (1993) where we introduce different commercial interests of domestic market participants. If some actors have preferential access to high standard international products, they will prefer higher standards in their home country in order to increase their market share. The same holds for firms that for any reason find it relatively easy to comply with the rules of the standard. One such reason could be proximity to the political elite. In both cases it is less than obvious that increasing standards is in the interest of consumers.

We derive conditions under which standards are introduced even if they are not in consumer interest. For simplicity, we discuss the case of an import monopolist. Our theoretical results suggest that if products are imperfect substitutes (we assume a CES utility function) and an import monopolist faces no or negligible additional fixed cost to comply with the standard she will prefer a higher standard under generous conditions. The political economy equilibrium is likely to be closer to the state preferred by the monopolist if the elasticity of substitution is low, and imports are relatively important in the respective sector.

We will test the implications of our model using Tunisian data. The case of Tunisia is an interesting one for three reasons. First, Tunisia has greatly increased the number of non-tariff measures (NTMs) counted as barriers to trade during the last decade of the Ben Ali regime. Secondly, Baghdadi et al (2016a, 2016b) and Ghali et al (2013) have shown that in fact NTMs seem to increase Tunisian imports. Thirdly, Tunisia under Ben Ali was a country with a high degree of market power in many sectors. In particular, still today and with few exceptions only state enterprises are able to import agricultural products under preferential tariffs (cf. Minot et al 2010).

It seems that the importation of agricultural products has been highly concentrated in a few, politically connected hands, which import largely from Europe. In such a situation, it is likely that the import partners – namely Europe – will find it easy to comply with quality standards,

[1] Compare also Cadot and Ing (2015) who make the case, that NTMs can play an important role in ensuring quality.

while domestic producers will find it more difficult. Our hypothesis is, thus, that especially in agriculture, standards (de jure NTMs) have been introduced to protect the market power of the importers. This hypothesis is reinforced by the decline in agricultural subsidies observed in the same period (Minot et al 2010).

The remainder of this paper is organized as follows. Section 1 reviews the closely related literature, Section 2 outlines the theoretical model and the main hypothesis. Section 3 presents the data and the stylized facts and Section 4 specifies the empirical model that is applied to the Tunisian case. Section 5

1. Literature Review

Our paper is related to two strands of literature. First, there is the theoretical and empirical literature on the political economy of trade policy. In Grossman and Helpman (1994, henceforth GH) firms operating in different sectors influence trade policy – in particular tariffs – by making a campaign contribution to the incumbent political party. Goldberg and Maggi (1999) find empirical support for the GH model, but use NTM coverage ratios instead of tariffs or subsidies. Bombardini (2007) introduces firm heterogeneity *within* a given sector. In her model, due to fixed costs of lobbying, only sectors in which productivity is concentrated or average firm size is high will be able to influence policy in her model. Bombardini (2007) also tests the empirical implications of the model using NTM coverage ratios. However, since the equilibrium results for the level of protection, it hinges on the assumption that the barriers in question generate revenue for the state and there is a wedge between theory and empirics. Goldberg and Maggi (1999) address this by focusing on price-oriented measures only.

In their book, Swinnen et al (2015) apply the theoretical framework of GH to non-revenue generating standards for a variety of cases. In particular, they show that if consumers can influence political decision they may favor higher standards that in turn might even lead to higher imports.

Moreover, there are numerous empirical studies estimating the effect of higher standards imposed in developed countries on developing country performance (among them, Maertens and Swinnen 2008, 2009b). Augier et al (2014) provide a theoretical model and an empirical assessment of NTM harmonization in Morocco. They conclude that Harmonization might be driven by the wish to protect domestic producers from competitors from other developing countries.

As for studies concerning trade policy in Tunisia there are four studies closely related to our paper. Firstly, Rijkers et al (2015) study the effect of political connections and tariff evasion. They find that firms belonging to the family of former president Ben Ali are more likely to underreport import prices of products in order to lower their tariff duties. This indicates that political connections in fact matter for trade policy in Tunisia. Secondly, , two studies have documented a positive effect of NTMs on Tunisian imports. Baghdadi et al (2016a) and Ghali et al (2013) find this positive effect using sectoral trade data, while Baghdadi et al (2016b) confirm it at the firm level, in particular for large companies that engage both in exports and imports. Finally, Baghdadi et al (2016a) investigate the effect of changes in tariffs on prices and find that market concentration significantly limits the pass-through of tariffs to domestic prices.

2. The Model

In what follows, we will derive the formal conditions under which an import monopolist will prefer higher standards, if she competes with other domestic producers.

Assume a standard constant elasticity of substitution (CES) utility functions. For sake of clarity, assume that the standard does not enter the utility function. The standard only appears in production costs and, thus, affects prices.

The import monopolist can buy the product at international prices. Hence, her variable costs simply equal the price of the good on the international market and trade costs. Her profit is:

$$\Pi^M = \left(p_i^M - p_i^I \tau_i\right) q_i^M - f^M \tag{1}$$

Where p_i^M is the domestic price the monopolist charges. p_i^I is the international price, and τ_i are trade costs. q_i^M is demanded quantity, and f^M are fixed costs. International costs are a function of the standard: $p_i^M = p_i^M(s)$ and $\tau_i = \tau_i(s)$.

The standard CES results apply. I.e., the price charged is higher than the costs: $p_i^M = \frac{p_i^I \tau_i}{\rho}$, with a markup factor of $\frac{1}{\rho}$, where $\rho \equiv \frac{\sigma-1}{\sigma}$ and σ is the elasticity of substitution. p_i^M is a function of the standard, since the purchase costs depend on the standard.

Plugging in the CES demand function, we get the following profit function:

$$\Pi^M\left(p_i^I, \tau_i, P, E\right) = (1-\rho)\left(\frac{p_i^I \tau_i}{\rho P}\right)^{1-\sigma} E - f^M \tag{2}$$

Where P is the CES optimal price index: $P = (\sum_i {p_i}^{1-\sigma})^{1/1-\sigma}$. The standard affects the international price, trade costs (mainly through a change in trading partners), and the overall price index (also, due to the effect on other producers). We assume that the standard does not affect the importer's fixed costs. Then, the effect of the standard s on profits can be written as follows[2]:

$$\frac{\partial \Pi^M}{\partial s} = \rho \left(\frac{p_i^I \tau_i}{\rho P}\right)^{1-\sigma} E\left[\hat{P} - \hat{p}_i^I - \hat{\tau}_i\right] \tag{3}$$

This expression is positive iff:

$$\hat{p}_i^I + \hat{\tau}_i < \hat{P} \tag{4}$$

i.e. iff the relative change in the variable costs of the importer is smaller than the relative change in the overall price level. $\frac{dp_i^I}{ds}$ and $\frac{d\tau_i}{ds}$ are given. In order to see how the overall price level responds to a change in the standard we have to consider other market participants and their effect on P.

Instead of buying the product at world markets, domestic producers use the domestic production technique to produce them. They are subject to the marginal costs c_i. Assume that the rest of the world has a comparative advantage in higher quality products and hence, $\frac{dc_i}{ds} > \frac{dp_i^I}{ds}$. Again, the standard optimal price for domestic producers is at a markup over marginal costs, i.e. $p_i = \frac{c_i}{\rho}$.

In the local production market let there be free entry and exit, leading to n operating firms. Plugging the prices into the CES formula we get:

$$P = \frac{1}{\rho}\left((p_i^I \tau_i)^{1-\sigma} + n{c_i}^{1-\sigma}\right)^{\frac{1}{1-\sigma}} \tag{5}$$

Hence, the response of the price index to changes in the standard is:

$$\hat{P} = \left(\frac{p_i^I \tau_i}{\rho P}\right)^{1-\sigma} \left[\hat{p}_i^I + \hat{\tau}_i\right] + n\left(\frac{c_i}{\rho P}\right)^{1-\sigma} \left[\hat{c}_i + \frac{\hat{n}}{(1-\sigma)}\right] \tag{6}$$

[2] Where $\hat{}$ denotes rates of change with respect to s.

Note that $\frac{dP}{dn} < 0$. The reason is that the ideal price index takes the love of variety underlying the CES utility into account. A loss of variety, hence, is treated like an increase in the cost of living. To determine n we assume free entry and exit in the domestic market. I.e. the domestic firms do not make any profits.

$$\Pi^D = (1-\rho)\left(\frac{c_i}{\rho P}\right)^{1-\sigma} E - f^D = 0 \qquad \text{(ZPC)}$$

Solving for n and imposing $n \geq 0$ we get:

$$n = \max\left\{(1-\rho)\frac{E}{f^D} - \left(\frac{p_i^I \tau_i}{c_i}\right)^{1-\sigma}, 0\right\} \qquad (7)$$

Since the domestic producer cannot rely on existing trade relations, or political connections, fixed costs respond to increased standards. The response of n to higher standards is:

$$\frac{dn}{ds} = (\sigma-1)\left(\frac{p_i^I \tau_i}{c_i}\right)^{1-\sigma}\left[\hat{p}_i^I + \hat{\tau}_i - \hat{c}_i\right] - \frac{(1-\rho)E}{f^D}\hat{f}^D \qquad (8)$$

Plugging this expression into (6) and using the Zero Profit condition (ZPC) we get:

$$\hat{P} = \hat{c}_i + \frac{1}{\sigma-1}\hat{f}^D \qquad (9)$$

I.e. due to additional loss of variety the ideal price index increases by more than the change in marginal costs. The condition under which the import monopolist prefers higher standards is:

$$\hat{p}_i^I + \hat{\tau}_i < \hat{c}_i + \frac{1}{\sigma-1}\hat{f}^D \qquad (10)$$

Hence, even if the marginal costs of compliance are higher for the importer, she will prefer higher standards as long as the change in fixed costs for the domestic firms is sufficiently high. If c_i, p_i^I, τ_i and f^D are all exponential in s then if (10) holds for some value of s it holds for any value of s. In turn, as long as $n > 0$ the importer will prefer higher standards. If $n = 0$ the importer gets revenue E, while his costs increase in s.

The importer thus has an incentive to lobby for their preferred policy. Assume following Grossman and Helpman (1994), that firms can make donations C^M to influence the government's policies.

The truthful contribution scheme is:

$$C^M = \max\{0, \Pi^M(s) - b_0\} \tag{11}$$

where b_0 is the minimum profit the importer does not want to forfeit. In our context, it is plausible to assume $b_0 \geq \Pi^M(s=0)$. In order to derive a specific scheme, we would need parametric assumptions about the response of costs to changes in a standard. We decided to keep the model general, and derive general conditions and qualities of the equilibrium.

Since none of the domestic producers makes a profit, they cannot make a contribution. Moreover, in an autocratic regime consumers are unlikely to be organized, and contribute to the government budget. Hence, we assume that consumer organizations do not engage in lobbying.

The government, then, faces a trade-off between contributions and profits on the one hand and consumer utility on the other hand. We use the standard CES result that the indirect utility function is real consumption:

$$v(P,s) = \frac{E}{P} \equiv Q \tag{12}$$

Let the government objective function:

$$\Pi^G = \alpha_1 C^M + \alpha_2 \Pi^M + \alpha_3 Q \tag{13}$$

The first derivative is:

$$\frac{\partial \Pi^G}{\partial s} = (\alpha_1 + \alpha_2)\frac{\partial \Pi^M}{\partial s} + \alpha_3 \frac{\partial Q}{\partial s} \tag{14}$$

This is positive iff:[3]

$$\hat{p}_i^I + \hat{\tau}_i < \left[1 - \frac{\alpha_3}{(\alpha_1+\alpha_2)}\frac{1}{\rho}\frac{Q}{R^M}\right]\left\{\hat{c}_i + \frac{1}{\sigma-1}\hat{f}^D\right\} \tag{15}$$

Where $R^M \equiv E\left(\frac{p_i^I \tau_i}{\rho P}\right)^{1-\sigma}$ is importer revenue. The effect of the elasticity of substitution is ambiguous. Note that $\lim_{\sigma \to 1}\frac{1}{\rho} = \infty$ and $\lim_{\sigma \to \infty}\frac{1}{\rho} = 1$, i.e. a higher markup factor is always due to a

[3] Note that $\frac{\partial\left[1-\frac{\alpha_3}{(\alpha_1+\alpha_2)}\frac{1}{\rho}\frac{Q}{R}\right]}{\partial s} = -\frac{\alpha_3}{(\alpha_1+\alpha_2)}\frac{1}{\rho}\frac{Q}{R}\left[\sigma\left\{\hat{c}_i + \frac{1}{\sigma-1}\hat{f}^D\right\} + (\sigma-1)\{\hat{p}_i^I + \hat{\tau}_i\}\right] < 0$. Hence, if the costs are all exponential in s, the equilibrium value of s is smaller than the one preferred by the monopolist but bigger than the socially optimal value of $s = 0$. The same holds for additive costs, i.e. if costs are linear in s. This in turn means, that an interior equilibrium exists provided the difference $\hat{c}_i + \frac{1}{\sigma-1}\hat{f}^D - (\hat{p}_i^I + \hat{\tau}_i)$ is sufficiently small.

low elasticity of substitution. That, in turn, means that profits are not very responsive to changes in prices, because demand is inelastic. Hence, (15) implies that the lower the elasticity of substitution the stronger has to be the advantage of the importer in case of a higher standard. On the other hand, if the elasticity of substitution is low, fewer firms will exit the market, and the potential gain in terms of higher market share is also low. However, if real consumption is high compared to revenue the advantage has to be stronger.

While the model so far has been derived for an import monopolist, the important feature is preferential access to a technology that is more efficient at higher standards. More generally, such conditions may also be met in sectors where many politically connected firms operate.

Moreover, there is one more group that could additionally benefit from higher standards – especially harmonization with trading partners. If higher standards increase trust in the partner country and reduce transaction costs high productivity exporters can benefit even if fixed costs increase. A simple variation of the model by Helpman, Melitz and Yeaple (2004), for instance, can generate that outcome.

A number of testable theoretical implications are generated from the theory presented. There are three cases in which the prevalence of standard-like non-tariff measures should be high. Firstly, if there is an import monopolist or a state trading enterprise (i). Secondly, if there are many politically connected firms operating (ii) and finally if the share of exporters is high (iii).

3. Data, Variables and Stylized Facts

We estimate the implication of the model using data on Tunisia. Data for NTMs is from the World Bank (Malouche et al, 2013). Note that this database includes many more measures than those notified to the WTO[4].. According to Baccheta el al (2012) WTO notifications are incomplete by construction and hence, we rely on the broader World Bank dataset. Information on state trading enterprises (STEs) is from the WTO's Integrated Trade and Intelligence Portal (I-TIP). Additionally, we obtained tariff data from the World Integrated Trade Solutions (WITS) portal. Tariff data availability restricts our sample to the period from 2002 to 2010. Sector specific imports and exports are from UN COMTRADE.

From the Tunisian L'institute National da la Statistique (INS) we obtain Herfindahl indices of market concentration at the HS6 level, and sectoral value added.

[4] See Bacchetta et al (2012) for a discussion of the limitations of official data on NTMs.

Tunisia has many features that make it an interesting case study for the study at hand. First, STEs play an important role in trade (as documented by the US-Development Aid FAIRS COUNTRY Report, 2013**;** and by the WTO Trade Policy Review, 2005). Table 1 provides an overview of sectors in which there is an STE. STEs operate in important agricultural sectors such as the Grain Board, in petroleum, and in sensitive sectors, such as alcoholic beverages, tobacco and pharmaceutical products.

Table 1: STEs in Tunisia

DOT	In force	STE	Product description	HS
Imports	1927	National Alcohol Agency (RNA)	Extra fine rectified alcohol, Absolute alcohol, Non-rectified alcohol, Phlegma, Lees	220720, 230700
Imports	1962	Grain Board	Durum wheat, Common wheat, Barley	100110, 100190, 100300
Imports	1962	Tunisian Trade Board (OCT)	White sugar, Black tea, Green tea, Green coffee	090111, 090220, 090240, 170199
Imports/ Exports	1958	Pasteur Institute of Tunis (IPT)	Medicines and pharmaceuticals, vaccines, serums and allergens	30
Imports/ Exports	1960	Tunisian Refining Industries Corporation (STIR)	Heating oil, Petrol, Diesel fuel	271011, 271019
Imports/ Exports	1964	National Tobacco and Matches Agency (RNTA)	Cigarettes, Cigars, Pipe tobacco and tumbak, Gunpowder Playing cards, Matches, Snuff (Neffa), Leaf tobacco	240110, 240210, 240220, 240399, 360500, 950440
Imports/ Exports	1970	National Edible Oils Board (ONH)	Soya, Olive oil, Colza	150710, 150910, 151410

Imports/ Exports	1972	Tunisian Petroleum Enterprise (ETAP)	Crude oil, Diesel fuel, Heating oil, Kerosene, Natural gas, LPG, Jet fuel, Bitumen, Base stock	270900, 271000, 271119, 271320

Source: WTO I-TIP.
Notes: DOT denotes "Direction of Trade", i.e. whether the STE deals with exports and/or imports. In force denotes the year of initiation. STE reports the name of the enterprise, and Product description and HS refer to the product name and the HS code respectively.

Moreover, market concentration is high as reported in Table 2. The average for the Herfindahl index is 0.41, but there is considerable variation. Market concentration has an important impact on trade policy. Baghdadi et al (2016a) have shown that market concentration significantly limits the impact of tariff changes on domestic prices. In addition, during our period of study a fraction of firms were connected to the family of the leader Zine El Abidine Ben Ali. The data of Ben Ali connections (BA) are obtained from and were extensively studied by Rijkers et al (2015). Table 2 reports the share in import value due to firms connected to Ben Ali, first based on the firms' own reports, and secondly based on predictions using Input-Output tables.

Another aspect that makes Tunisia an interesting case is the comparatively high level of tariff duties. This is especially visible when looking at the weighted average tariff duty, which reaches a maximum of 230%. However, as documented in Baghdadi et al (2016a) tariffs have been in steady decline.

Table 2: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Herfindahl Index	43408	0.414	0.312	0.008	1
Share BA	47511	0.016	0.081	0	1
Share BA (predicted)	47511	0.001	0.010	0	0.790
Ad valorem Tariff (%)	45198	7.154	7.526	0	71.479
Tariff (weighted, %)	47511	18.268	21.478	0	230

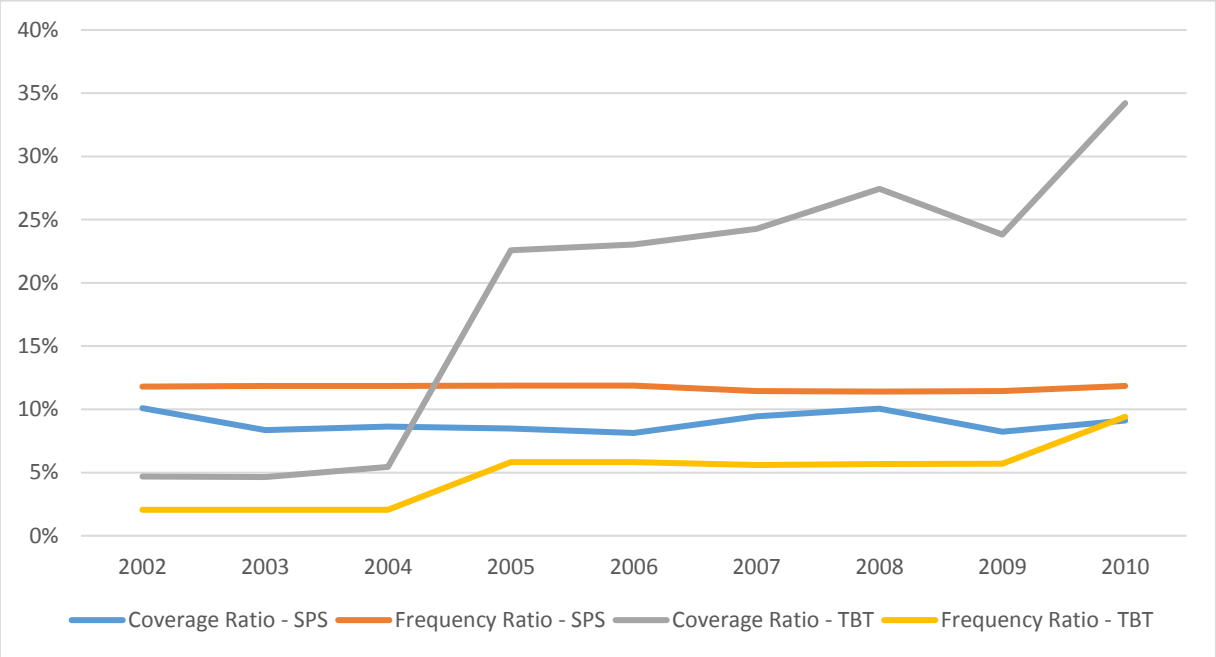
Note: Share BA denotes the share of Ben Ali connections.

Most relevant for the study at hand, a number of studies have found that NTMs tended to increase imports into Tunisia (Baghdadi et al, 2016a, 2016b; and Ghali et al, 2013).

In accordance with Maertens et al (2009a) and Swinnen et al (2015), in our empirical analysis we use non-tariff measure that according to the MAST classification fall under the heading

Sanitary and Phytosanitary measures (SPS) and Technical Barriers to Trade (TBT).[5] Figure 1 shows frequency ratios (i.e. the fraction of products affected) and coverage ratios (i.e. the share of imports affected) for both types of NTM.

Figure 1: Coverage Ratios and Frequency Ratios - Total



Note: SPS denotes Sanitary and Phytosanitary measures (SPS) and TBT denotes Technical Barriers to Trade. Source: World Bank (Malouche et al, 2013).

While throughout the sample more products were affected by SPS measures, the share of products subject to TBTs has increased over time and since 2005 more trade flows are subject to TBTs than to SPS measures. SPS measures have not been extended to more products, but as Baghdadi et al (2016b) report, the number of SPS measures for the given set of affected products has increased.

Table 3 presents average numbers of SPS and TBT measures for the most important HS 2-digit product categories and reports the share of HS6 products where STEs operate, and the share of imports controlled by Ben Ali firms. The products are ordered by their import value. Notably,

[5] See UNCTAD (2012) for the definition of the MAST categories.

the sector with the highest share of STE – pharmaceutical products – has a very low number of reported average TBS measure and no SPS measure. Similarly surprising are the figures for Tobacco products, which are not subject to any TBT and SPS, according to the data. However, in Tobacco domestic value added is relatively low, and in both cases market concentration is already high. For cereals, 21% on average are imported via the Grain Board STE. At the same time, SPS measures are relatively frequent. Around 21% of imports in vehicles (mostly cars) are due to Ben Ali firms, and we see one of the highest figures for TBT measuresy in this category. For Aircraft and Spacecraft around 28% of imports are due to Ben Ali firms, however, no SPS or TBT measure has been reported.

In sum, while some of these observations are consistent with our model, others are less so, which vindicates the need for a careful econometric analysis.

Table 3: NTMs and Political Connectedness

Product description	SPS	TBT	STE	BA
Mineral fuels, oils & product of their distillation; etc.	0	1.30	14.67%	0%
Cereals	30.34	1.60	21.57%	0.01%
Vehicles o/t railway/tramway roll-stock, parts & accessories	0	4.91	0%	21.49%
Pharmaceutical products.	0	0.17	99.72%	0%
Tobacco and manufactured tobacco substitutes	0	0	45.28%	0.10%
Sugars and sugar confectionery.	18.98	0	6.67%	0.08%
Cotton.	0	0	0%	0.49%
Electrical mchinery equip parts thereof; sound recorder etc.	0	1.05	0%	3.23%
Aircraft, spacecraft, and parts thereof.	0	0	0%	28.11%
Plastics and articles thereof.	0	0.06	0%	0.59%
Animal/veg fats & oils & their cleavage products; etc	11.42	0.55	7.47%	0%
Footwear, gaiters and the like; parts of such articles.	0	2.89	0%	0.42%
Residues & waste from the food industry; prepr ani fodder	40.38	0.02	3.68%	0%
Salt; sulphur; earth & ston; plastering mat; lime & cem	0.09	0.22	0%	0.42%
Nuclear reactors, boilers, machinery & mechanical appliance; parts	0	1.59	0%	1.15%
Copper and articles thereof.	0	0.08	0%	0.08%
Art of apparel & clothing access, not knitted/crocheted	0	0.52	0%	0.15%
Raw hides and skins (other than furskins) and leather.	1.35	0	0%	0%
Iron and steel.	0	0.13	0%	0.02%
Articles of iron or steel.	0	1.71	0%	0.53%

Source: Own calculations based on World Bank data, and Rijkers et al (2015). SPS= Sanitary and Phytosanitary measures, TBT= Technical Barriers to Trade, STE= State Trading Enterprises, BA=

share of Ben Ali connections. The figures reported for SPS and TBT refer to average number of measures in each sector.

4. Empirical Specification

A large part of the literature is inspired by Grossman and Helpman's (1994) seminal paper, in which firms influence tariff rates by offering campaign contributions. In particular, Bombardini's (2008) and Goldberg and Maggi (1999) base their empirical strategies on a theoretical framework, closely modelled after GH.

In the present context of standards this approach might be less than optimal. The reason being that the specification crucially depends on the assumption that the measure in question – the trade barriers – generates income for the government. This is much less plausible in the context of standards than for tariffs or other price measures.

We model the number of NTMs in a specific category (mostly standard like SPS and TBT measures , i.e. MAST categories A (SPS) and B (TBT)) using a Poisson specification:

$$NTM_{kt} = h\left(\alpha_0 + \alpha_1 STE_k + \alpha_2 HHI_{kt}^{M} + \alpha_3 BA_{kt} + \alpha_4 \ln(1+\tau_{kt}) + \beta X_{kt} + \epsilon_{kt}\right) \qquad (16)$$

where STE_k equals 1 if a STE operates in sector k. HH_{kt}^{M} refers to the concentration of importers in sector k at time t, measured with the Herfindal concentration index. BA_{kt} denotes the share of imports by firms that are politically connected. In this case, we use connections to the family of the former president Ben Ali. τ_{kt} are average tariff rates facing Tunisian imports in sector k at time t. X_{kt} are other control variables, namely industry value added, and import value.

Additionally, thee empirical specification includes interactions between measures of market concentration (STE) and political connectedness (BA) on the one hand and tariffs on the other. The reason – as emphasized in earlier research (e.g. GH) – is that tariffs could be an alternative trade policy that firms can affect. Hence, the magnitude of the tariffs might determine to what extent firms have an interest supporting the use of NTMs as an additional trade policy.

Given that we are dealing with count data, we are going to estimate (16) using a Poisson regression. I.e. we use a GLM model with a Poisson distribution and a log-link function. This is equivalent to defining the response function $h(\eta) \equiv \mathrm{e}^{\eta}$.

Since we are using a log-link function the interpretation of the coefficients is equivalent to log-linearized models. I.e., the tariff coefficient, α_4, can be interpreted as an elasticity and the coefficient of STE can be interpreted as a percentage effect of a change in the dummy variable

from zero to one, using the transformation: $(e^{\alpha_1} - 1) * 100\%$. Note that since BA_{kt} is a share, $\left(\frac{\alpha_3}{100}\right)$ can also be interpreted as an elasticity.

5. Results

5.1 Technical Barriers to Trade

Table 4 presents the first set of results for NTMs of type B, i.e. TBTs. All models are estimated using year fixed effects, and dummies for each Harmonized System chapter (i.e. 2-digit codes). Starting in column 1, with a specification that only includes TBT as explanatory variable, we add more control variables step by step. Results in column 1 show a positive and significant impact of STEs on the number of TBTs. The estimates in column 2, add tariffs and the interaction between tariffs and TBTs. The estimated coefficients indicate that for sectors in which tariffs are zero STEs increase the number of TBTs 31-fold. However, if the tariff increases beyond 22% the effect turns negative. At the same time in sectors where no STEs operate, tariffs and TBT seem to be complements. However, for sectors with STEs tariffs and NTMs seem to be substitutes. That is, in sectors in which there are STEs there is a negative correlation between the size of the tariff and the number of TBTs. An increase in the tariff factor of 1 percent is associated to a decrease in TBTs of 9.6 percent.

This relationship is robust to including more control variables. In column 3 we add the log of the import value to control for the importance of foreign trade in this sector. This serves as a proxy for R^M in the theoretical model. And, as expected, it has a positive and significant effect on the number of NTMs. Since import value is included in natural logarithm we lose around twenty percent of the observations for which there is no trade. In column 4 we include the Herfindahl Index of market concentration for importers. It exhibits a positive but non-significant effect on the number of TBTs. In column 5 we add a measure of value added to control for the importance of domestic producers. Value added exerts a negative and significant effect, indicating that sectors with higher value added have fewer NTMs, which is in line with the theory set out before. Finally, in column 6 we add another measure of political connectedness of importing firms. The share of import value due to firms connected to the Ben Ali (BA) family has a positive and significant influence on the number TBTs. The effect, however, is economically small. A 1%-point increase in the share of BA firms is linked on average to a 0.02% increase in the number of standards.

Quantitatively the results are affected by the addition of more control variables. Column 3 implies that with STEs the number of TBT is now merely 8 times higher. In column 4 STE is only significant at the 10% level. According to this specification, the number of TBTs is about

5 times higher. The point estimates are similar in columns 5 and 6 but not significant anymore. However, note that in both cases STE and the STE*tariff are jointly significant at the 10% level.

Table 4: Poisson Results for TBTs - STEs

VARIABLES	(1) TBT	(2) TBT	(3) TBT	(4) TBT	(5) TBT	(6) TBT
STE	1.765**	3.449***	2.189***	1.580*	1.542	1.569
	(0.736)	(0.663)	(0.775)	(0.904)	(1.003)	(0.999)
STE x Tariff		-16.83***	-16.31***	-15.75***	-16.00***	-16.02***
		(4.458)	(4.916)	(5.626)	(5.865)	(5.817)
Tariff		7.077***	4.171**	4.379*	4.817*	4.918*
		(1.787)	(1.912)	(2.653)	(2.699)	(2.617)
Import Value			0.283***	0.326***	0.321***	0.316***
			(0.0538)	(0.0778)	(0.0800)	(0.0783)
Herfindahl				0.252	0.285	0.278
				(0.340)	(0.348)	(0.351)
Value Added					-0.746***	-0.748***
					(0.208)	(0.206)
Ben Ali						1.192**
						(0.514)
Observations	39,169	31,050	27,762	23,076	22,171	22,171
R-squared	0.061	0.062	0.121	0.067	0.067	0.071
Year FE	YES	YES	YES	YES	YES	YES
HS2 FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5 provides similar results, now focusing more on the share of Ben Ali firms. The BA coefficient is always statistically significant and positively signed. The results are very similar compared to STEs. The interaction between BA, the Share of Ben Ali firms, and imports turns non-significant in column 5. In column 1 the turning point is at 7%, i.e. only for sectors with tariffs below 7% a higher share of Ben Ali firms is associated with a larger number of TBTs. One possible explanation is that –as Rijkers et al (2016) have shown– Ben Ali firms tended to evade tariffs. To the extent that this was easier for them, due to political connectedness, a high tariff could indicate that BA firms are already sufficiently shielded from competition.

Table 5: Poisson Results for TBTs – Ben Ali firms

VARIABLES	(1) TBT	(2) TBT	(3) TBT	(4) TBT	(5) TBT	(6) TBT
Ben Ali	0.829*	2.596***	1.715***	2.003***	2.071***	2.125***
	(0.433)	(0.534)	(0.527)	(0.739)	(0.760)	(0.741)
Ben Ali x Tariff		-40.53***	-31.09***	-22.47*	-21.78	-23.94*
		(12.64)	(10.92)	(12.96)	(13.73)	(13.83)
Tariff		7.607***	4.509**	4.619	5.047*	5.775**
		(1.693)	(1.908)	(2.934)	(3.020)	(2.919)
Import Value			0.279***	0.300***	0.293***	0.304***
			(0.0527)	(0.0819)	(0.0847)	(0.0817)
Herfindahl				0.0275	0.0485	0.173
				(0.349)	(0.364)	(0.372)
Value Added					-0.777***	-0.815***
					(0.212)	(0.210)
STE						-2.595**
						(1.233)
Observations	32,318	31,050	27,762	23,076	22,171	22,171
R-squared	0.057	0.059	0.117	0.071	0.069	0.077
Year FE	YES	YES	YES	YES	YES	YES
HS2 FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.2 Sanitary and Phytosanitary measures

Table 6 reports results for Sanitary and Phytosanitary measures (SPS). In sharp contrast to TBT there seems to be no connection between STEs and the number of SPS measures. The complementarity between tariffs and NTMs is also present for SPS measures. But in some specifications it is reversed, namely, in sectors where STEs operate. The results for value added are as before significantly negative. Interestingly, market concentration now exerts a negative and significant influence, whereas the share of Ben Ali firms does not show a significant influence on the number of SPSs.

Table 6: Poisson Results for SPS measures – STEs

VARIABLES	(1) SPS	(2) SPS	(3) SPS	(4) SPS	(5) SPS	(6) SPS
STE	0.0156	0.320	0.383	-0.150	-0.156	-0.146
	(0.387)	(0.505)	(0.732)	(0.840)	(0.841)	(0.834)

STE x Tariff		-4.962**	-6.728**	-4.148	-4.146	-4.186
		(2.348)	(3.163)	(3.377)	(3.379)	(3.372)
Tariff		5.836***	4.790***	4.127***	4.147***	4.128***
		(0.727)	(0.740)	(0.680)	(0.678)	(0.670)
Imports			0.0719***	0.0726**	0.0729**	0.0767**
			(0.0255)	(0.0323)	(0.0324)	(0.0327)
Herfindahl				-0.446**	-0.438**	-0.442**
				(0.221)	(0.221)	(0.222)
Value Added					-0.674*	-0.680*
					(0.386)	(0.387)
Ben Ali						0.334
						(0.284)
Observations	14,685	10,926	8,090	6,502	6,502	6,502
R-squared	0.152	0.226	0.230	0.302	0.302	0.303
Year FE	YES	YES	YES	YES	YES	YES
HS2 FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Similar results are obtained when focusing on the share of Ben Ali firms, as reported in Table 7. The coefficient of the BA variable is always small and often non-significant or only at the ten percent level. As before, tariffs and SPS measure seem to be complements in most cases. In line with the preceding results, the Herfindahl Index exerts a negative effect.

Table 7: Poisson Results for SPS measures –Ben Ali

VARIABLES	(1) SPS	(2) SPS	(3) SPS	(4) SPS	(5) SPS	(6) SPS
Ben Ali	0.311	0.665*	0.629	0.844*	0.851*	0.898**
	(0.230)	(0.342)	(0.409)	(0.442)	(0.443)	(0.443)
Ben Ali x Tariff		-5.622**	-4.534	-4.343	-4.391	-4.782
		(2.805)	(2.958)	(3.107)	(3.106)	(3.128)
Tariff		5.792***	4.681***	3.958***	3.982***	4.219***
		(0.735)	(0.799)	(0.752)	(0.751)	(0.737)
Imports			0.0660***	0.0630**	0.0632**	0.0767**
			(0.0251)	(0.0314)	(0.0314)	(0.0331)
Herfindahl				-0.586***	-0.579***	-0.467**
				(0.211)	(0.212)	(0.225)
Value Added					-0.678*	-0.698*
					(0.385)	(0.385)
STE						-1.100*
						(0.633)
Observations	11,639	10,926	8,090	6,502	6,502	6,502

R-squared	0.149	0.226	0.227	0.303	0.303	0.305
Year FE	YES	YES	YES	YES	YES	YES
HS2 FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Conclusion

Recent research emphasizes that NTMs are not necessarily impediments to trade, and might even be welfare enhancing. We add another perspective to the debate. In our theoretical model, we show that if access to imports or access to high-quality production technology are concentrated, standards can be used as a policy tool to secure the firms' market position that enjoy access. In that sense, NTMs are not necessarily protection against trade, but can also be protection against domestic competitors. This, of course, does not imply, that NTMs *necessarily* play this role, but might be especially important for emerging countries with a high degree of political connections and market power. We provide indicative evidence showing that the channel we describe is in fact at play in Tunisia. We find that sectors with a state trading enterprise, or with a higher share of firms linked to the Ben Ali family tend to have a higher number of Technical Barriers to Trade. Moreover, TBTs tend to predominate in sectors with high import value and the level of tariff protection is positively correlated with the number of TBTs, but only in sectors without STEs. Otherwise, in sectors with STEs tariffs are NTMs seems to be substitutes rather than complements.

In sectors with other type of NTMs, such as import quotas, it could be that STEs are distributing import quotas to Ben Ali connected firms and that to protect these connections even more, TBTs are also put in place. In this case, a cost effect could emerge if only firms with connections inside the government will have the exact information on the applied standards, which are constantly changing.

As an example, in the car sector there are not only TBTs but also a quota system and tariffs. This sector saw a push in its NTMs during the last two waves of data. Since data on quotas are not available, Ben Ali shares could be considered as a proxy for that, since import licenses are generally distributed to connections. In sectors with a STE and high BA shares in a product, the monopoly will import and distribute the quantity to a set of connected firms. We leave this issue for further research.

Finally, for we also plan as further research to compute the effect on the final price of the products most affected by trade protection and to compute a back-of-the-envelope welfare

effect for consumers and the government.

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