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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 and describe the political equilibrium. We show that in political equilibrium the positive association only holds for a restricted set of initial values of the firm's market share, if the government ascribes a positive value to consumer welfare. We test our hypothesis using Tunisian data for the years 2002-2010. In our main results, we find a higher incidence of SPS measures in sectors where firms connected to former president Ben Ali have a higher share in imports. However, this association only holds for sectors with high tariffs. For low tariff sectors, we find that Ben Ali firms are associated with more TBTs. A higher concentration of market power in itself does not lead to higher standards, leading us to the conclusion that political power is essential.

JEL Classifications: F12, F13

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

ملخص

نقوم بتطوير نموذجا نظريا ونستمد الظروف التي تحاول الشركات ذات القوة السوقية فيه التأثير على وضع معايير الجودة ووصف التوازن السياسي. وتبين لنا أن التوازن الإيجابي في التوازن السياسي لا يقتصر إلا على مجموعة محدودة من القيم الأولية لحصة الشركة في السوق، إذا كانت الحكومة تعطي قيمة إيجابية لرفاهية المستهلك. نختبر فرضيتنا باستخدام البيانات التونسية للسنوات 2002-2010. وفي نتائجنا الرئيسية، نجد أن هناك ارتفاعا في إجراءات الصحة والصحة النباتية في القطاعات التي ترتبط فيها الشركات المرتبطة بالرئيس السابق بن علي بحصة أكبر في الواردات. ومع ذلك، فإن هذا الارتباط يظهر فقط للقطاعات ذات التعريفات العالية. وبالنسبة لقطاعات التعريفة المنخفضة، نجد أن شركات بن علي ترتبط بمزيد من الشركات ذات العوائق الفنية أمام التجارة. إن زيادة تركيز القوة السوقية في حد ذاته لا يؤدي إلى معايير أعلى، مما يؤدي بنا إلى استنتاج مفاده أن السلطة السياسية ضرورية.

1. Introduction

In recent years, it is becoming increasingly recognized that product standards[1] 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), i.e., standards are high because they improve consumers' utility.[2] Moreover, other factors related to the context in which the standard is fixed, such as political factors, producer costs and consumer demand conditions might shape the effect of the standard more than the initial intent of the policy (Swinnen et al, 2015).

Despite the fact that in recent years most standards notifications are made by developing countries (60% of them from 2000-2015 according to Wilson, 2017), standards imposed by low and 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. In particular, 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 not always obvious that increasing standards is in the interest of consumers. We derive conditions under which standards are introduced for reasons unrelated to consumer interest. For simplicity, we discuss the case of an import monopolist.

We test the implications of the model using Tunisian data. Tunisia is an interesting case study for three reasons. First, the number of non-tariff measures (NTMs) –counted as barriers to trade– have increased considerably in the country 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 concentration of market power in many sectors. In particular, with few exceptions only state enterprises are able to import agricultural products under preferential tariffs (cf. Minot et al 2010). Moreover, the family of former president Ben Ali owned a number of firms in different sectors of the economy that enjoyed advantages in terms of bureaucratic costs (Rijkers et al 2014, 2015).

Our theoretical results suggest that if products are imperfect substitutes and an import monopolist faces no or negligible additional fixed cost to comply with the standard, then she will prefer a higher standard. The political economy equilibrium is likely to be closer to the state preferred by the monopolist if the imports are relatively important in the respective sector. If the cost advantage of the importer is low, however, a low standard equilibrium may arise against the interest of the importer. The main empirical results indicate that there is a higher incidence of product standards in sectors where firms connected to former president Ben Ali have a higher share in imports. This association specifically holds for sectors with high tariffs when the standards are related to sanitary and phytosanitary standards. For low tariff sectors, we find that Ben Ali firms are associated with more standards in the form of technical barriers

[1] We define "standards" as regulations (obligatory) that relate to risk, safety and/or environmental concerns implemented to protect consumers. Please refer to the UNCTAD classification of NTMs 2012 version.

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

to trade. A higher concentration of market power in itself does not lead to higher standards, leading us to the conclusion that political power is essential.

The remainder of this paper is organized as follows. Section 2 reviews the closely related literature, Section 3 outlines the theoretical model and the main hypothesis. Section 4 presents the data and the stylized facts and Section 5 specifies the empirical model that is applied to the Tunisian case. In section 6, we present our results. Finally, section 7 concludes.

2. Literature Review

In this Section, we focus on two strands of literature that are closely related to our theoretical model and in the corresponding empirical applications. The first strand studies the political economy of trade policy and is based on the seminal paper of Grossman and Helpman (1994, henceforth GH). In GH firms operating in different sectors influence trade policy –in particular tariffs– by making campaign contribution to the incumbent political party. Goldberg and Maggi (1999) find empirical support for the GH model by using NTM coverage ratios. Bombardini (2007) introduces firm heterogeneity *within* a given sector. In her model, due to the fixed costs of lobbying, only sectors in which productivity is concentrated or average firm size is high are able to influence trade policy. She also tests the empirical implications of her model using NTM coverage ratios. However, since the equilibrium that results for the level of protection hinges on the assumption that the barriers in question generate revenue for the state, there is a wedge between theory and empirics. Goldberg and Maggi (1999) address this by focusing on price-oriented measures only. In Swinnen et al (2015) the theoretical framework of GH is also applied, in this case to non-revenue generating standards. 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.

A second strand of related literature studies policy preferences and our model is related to the research focused on the consequences of raising the cost of the rival. In particular, Salop and Scheffman (1983) present a model with a homogenous good in which a dominant firm can use several cost raising strategies, in particular raising standards, in order to raise the costs of "fringe" firms. The authors fail to model the political economy aspect and focus only on domestic producers, whereas in this paper we stress the role of importers.

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

A number of studies focus on the Tunisian case. Rijkers et al (2014) provide an extensive discussion of the role of politically connected firms in Tunisia. In particular, they study how entry regulations on investment are linked to firm performance of politically connected firms. Using the same data on political connections, Rijkers et al (2015) study the effect of political connections on tariff evasion. They find that firms belonging to the family of former president Ben Ali are more likely to underreport import prices of products and thus lower their tariff duties. This indicates that political connections in fact matter for trade policy in Tunisia. As for NTMs, several studies have documented a positive effect of NTMs on imports, two of them using sectoral trade data (Baghdadi et al, 2016a; and Ghali et al, 2013) and Baghdadi et al (2016b) using firm level data, in particular for large companies that engage both in exports and imports. Baghdadi et al (2016a) mainly study the effect of changes in tariffs on prices. They find that market concentration significantly limits the pass-through of tariffs to domestic prices.

3. The Model

In what follows, we will derive the formal conditions under which an import monopolist will prefer higher standards, if he competes with other domestic producers. The importer is a monopolist in the sense that he has exclusive access to the international good. The basic assumption is that domestic firms face a different cost function than the importer. Note that this is only one of the settings in which the model can be derived. The same mechanism holds if one firm has a better importing technology than other firms. More precisely, the costs of importing could be lower for one firm, for instance if it enjoy close ties to the responsible authorities.

Consider a small sector with a single firm importing goods into the domestic market. 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, his variable costs simply equal the price of the good on the international market times the trade costs. His profit is given by:

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

where p_i^M is the domestic price the monopolist charges. p_i^I is the international price, and $\tau_i > 1$ are multiplicative iceberg trade costs. q_i^M is demanded quantity, and f^M are fixed costs. International costs are a function of the standard: $p_i^I = p_i^I(s)$ and $\tau_i = \tau_i(s)$.

The standard CES results apply, i.e., the price charged is higher than the marginal cost: $p_i^M = \frac{p_i^I \tau_i}{\rho}$, by 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:

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

Where P is the CES optimal price index: $P = (\sum_i {p_i}^{1-\sigma})^{1/1-\sigma}$, and E is expenditure on goods in the sector, that we take as exogenous. The standard affects the international price, trade costs (mainly through a change in trading partners), and the overall price index P (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:

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

where ˆ denotes rates of change with respect to s.

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 it. They are subject to marginal costs c_i, which also depend

on the standard. Again, the standard optimal price for domestic producers is at a markup over marginal costs, i.e. $p_i = \frac{c_i}{\rho}$.

We assume that in the local production market there is free entry and exit, leading to n operating firms. Plugging the prices into the CES formula we get:

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

Importantly, in (5) not only the marginal cost determinants p_i^I, τ_i, and c_i depend on s, but also n, since the standard affects the zero-profit condition, as we shall see below. Hence, the response of the price index to changes in the standard is:

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

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. n is determined by the zero-profit condition (ZPC):

$$\Pi^D = (1-\rho)\left(\frac{c_i}{\rho P}\right)^{1-\sigma} E - f^D = 0 \tag{7}$$

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

$$n = \max\left\{(1-\rho)\frac{E}{f^D} - \left(\frac{p_i^I \tau_i}{c_i}\right)^{1-\sigma}, 0\right\} \tag{8}$$

Since the domestic producer cannot rely on political connections or on importing (by assumption), fixed costs respond to increased standards. The response of n to higher standards is:

$$\frac{dn}{ds} = (\sigma-1)\left(\frac{p_i^I \tau_i}{c_i}\right)^{1-\sigma} [\hat{p}_i^I + \hat{\tau}_i - \hat{c}_i] - \frac{(1-\rho)E}{f^D}\hat{f}^D \tag{9}$$

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

$$\hat{P} = \hat{c}_i + \frac{1}{\sigma-1}\hat{f}^D \tag{10}$$

i.e. due to additional loss of variety related to the increase in fixed cost of domestic production, the ideal price index increases by more than the change in marginal costs. The condition under which the import monopolist prefers higher standards is:

$$\hat{p}_i^I + \hat{\tau}_i < \hat{c}_i + \frac{1}{\sigma-1}\hat{f}^D \tag{11}$$

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 exponential in s, then if (11) holds for some value of s it holds for any value of s. In turn, the importer prefers higher standards as long as $n > 0$. If $n = 0$ the importer gets revenue E, while his costs increase in s and the importer is not going to lobby for higher standards.

Note that the changes in costs do not necessarily pertain to the production process. They could include bureaucratic costs, for instance, or they could imply higher costs in terms of the retail network. I.e., even if the standard is not fully enforced in the country, it may make it harder to

sell a product that does not fulfill the standard. In that sense, for some firms, higher standards may also simply amount to higher bribes that they have to pay. Especially if the importer benefits from political connections, those may be plausible reasons why (11) would hold.

In the political equilibrium, however, (11) may not be the decisive rule when to increase standards, even in the case of Nepotism or other forms of political connections. There is a number of reasons, why governments would still care about their citizens' welfare. First, the government will want to stay in power, and reduce the risk of uprisings. Second, while it seems implausible to assume the government in an authoritarian regime to be entirely benevolent, it seems equally unlikely that they would disregard their citizens entirely. If not out of altruism, then for their reputation, and to make sure that citizens comply to a sufficient extent with its laws and lend it support to a sufficient degree.

Hence, we assume that the government faces a trade-off between consumer welfare the business interest of politically connected, possibly family-owned, firms. We use the following weighted government objective function:

$$\Pi^G = \alpha_1 \Pi^M + \alpha_2 v(P, s) \tag{12}$$

where $v(P,s)$ is consumers' indirect utility function, and $\alpha_1 > \alpha_2$ are the weights the government attaches to the connected firms' profits, and consumer utility respectively.[3] We use the standard CES result that the indirect utility function is real consumption:

$$v(P, s) = \frac{E}{P} \equiv Q \tag{13}$$

Then, the first derivative of the government objective function is:

$$\frac{\partial \Pi^G}{\partial s} = \alpha_1 \frac{\partial \Pi^M}{\partial s} + \alpha_2 \frac{\partial Q}{\partial s} \tag{15}$$

This is positive iff:

$$\hat{p}_i^I + \hat{\tau}_i < \left[1 - \frac{\alpha_2}{\alpha_1} \frac{1}{\rho} \frac{1}{\chi^M P}\right] \left\{\hat{c}_i + \frac{1}{\sigma - 1} \hat{f}^D\right\} \tag{16}$$

where $\chi^M \equiv \left(\frac{p_i^I \tau_i}{\rho P}\right)^{1-\sigma}$ is importer market share.[4] 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 low elasticity of substitution. A higher markup factor and a lower elasticity of substitution imply a smaller effect of the standard on profits of the monopolist because the induced price difference has little effect on relative demand. On the one hand, that lowers the potential benefits for the monopolist; but, on the other hand, if the elasticity of substitution is low, fewer firms will have to exit the market, which reduces the social costs of the standard. Additionally, if the importers' market share or the price level is high, then the conditions under which the government will enact higher standards are less stringent.

However, both revenue and consumption depend on the level of standard s. We can rewrite (16) as follows:

$$\frac{\hat{p}_i^I + \hat{\tau}_i}{\hat{c}_i + \frac{1}{\sigma - 1} \hat{f}^D} < \left[1 - \frac{\alpha_3}{(\alpha_1 + \alpha_2)} \frac{1}{\chi^M \rho P}\right] \tag{17}$$

[3] Note that a similar function arises in the lobbying model by Grossman and Helpman (1994) assuming truthful contributions.

[4] Note that there is minimum level for χ^M, such that $\chi^M \geq \frac{\sigma f^M}{E}$ to ensure $\Pi^M \geq 0$.

Note that $\frac{\partial\left[1-\frac{\alpha_3}{(\alpha_1+\alpha_2)\chi^M\rho P}\right]}{\partial s}=\frac{\alpha_3}{(\alpha_1+\alpha_2)}\frac{1}{\chi^M\rho P}\sigma\left[\hat{c}_i+\frac{1}{\sigma-1}\hat{f}^D-\rho(\hat{p}_i^I+\hat{\tau}_i)\right]>0$, if the import monopolist has a cost advantage for higher standards (recall that $\rho<1$). Also, $\frac{\partial^2\left[1-\frac{\alpha_3}{(\alpha_1+\alpha_2)\chi^M\rho P}\right]}{\partial s^2}<0$; i.e., the term is concave in s. That means that as the stringency of the standard increases – and, in turn, the market share of the monopolist – the conditions under which the government will increase the standard further become *less* stringent. That is, unless the cost advantage of the monopolist begins to diminish at some level of the standard.

Assuming that the left-hand side of (17) is constant, there are three possible scenarios for a given sector. The first scenario, a trivial case, occurs when the importer does not have a cost advantage in a higher standard environment. If that is the case, (17) should not hold in that sector for any level of s or χ^M. On the contrary, the second scenario is given in sectors in which the importer has a cost advantage with respect to local producers and thus (17) is always fulfilled. Finally, there is an intermediate case in which (17) holds for large values of χ^M and s, whereas for small values, the reverse of (17) holds. If we only allow standards to be changed gradually, this means there is a turning point, to the left of which the government would reduce standards, whereas to the right of it standards would increase. This is still true if the left-hand side of (17) is also increasing in s, as long as long as it does not increase faster than the right hand side. Thus, depending on the initial level of s or χ^M, the standard may either increase or decrease.

4. Data, Variables and Stylized Facts

We estimate the implications of the theoretical model outlined in the previous section using data on Tunisia. Data for NTMs is from the World Bank (Malouche et al, 2013). It is worth noting that this database includes many more measures than those notified to the WTO. Bacchetta et al (2012) discuss the limitations of official data on NTM and concludes that WTO notifications are incomplete almost by construction. Information on state trading enterprises 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 years 2002-2010. Sector specific imports and exports are from UN COMTRADE.

Herfindahl indices of market concentration at the HS6 level, and sectoral value added are from the Tunisian L'institute National da la Statistique (INS). . Herfindahl indices are defined as the sum of squares of firms' shares in total sectoral sales.

Tunisia has many features that make it an interesting case study for the study at hand. For instance, State Owned Enterprises (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.

Moreover, market concentration is high as reported in Table 2. The overall average of the Herfindahl index is 0.41, but there is considerable sectoral 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 the 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 Rijkers et al (2014) and were extensively studied by Rijkers et al (2014, 2015). Table 2 reports summary statistics of the main variables, including in the second and third row the shares in import values

for firms connected to Ben Ali, first based on the firms' own reports (Share BA), and secondly based on predictions using Input-Output tables (Share BA predicted).

Another aspect that makes Tunisia an interesting case is the comparatively high level of tariff duties in relation to other middle-income countries. This is especially visible when looking at the weighted average tariff, which reaches a maximum of 230%. However, as documented in Baghdadi et al (2016a) tariffs have been in steady decline in the 2000s.

It is relevant for our research to emphasize that several 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) we use NTMs 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.

While throughout the sample more products were affected by SPS measures, TBTs have increased in the share of products and since 2005 affect more trade flows than 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, and in fact more so than the number of TBTs.

One important aspect of the data is that in several consecutive years the number of NTMs stays the same. In our sample period, new NTMs of both categories are mainly enacted in 2002, 2005 and 2010. Additionally, there are new TBT measures introduced in 2008, and new SPS measures in 2009.

Table 3 presents average numbers of SPS and TBT measures for the most important HS 2-digit product categories and reports the share of sub-categories (HS6 products) in which STEs are present, and the share of imports due to Ben Ali firms. The products are ordered by their import value. Notably, the sector with the highest share of STE –pharmaceutical products– has a very low number of reported average TBS measures and no SPS measures. Similarly surprising are the figures for Tobacco products. However, in Tobacco domestic value added is relatively low, and in both cases (pharma and tobacco products) 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 imported vehicles (mostly cars) are due to Ben Ali firms, and this product presents one of the highest figures for TBT measures. For Aircraft and Spacecraft around 28% of imports are attributed 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.

5. Empirical Specification

In this Section, we present our empirical model. Since NTMs, and more specifically standards, do not generate an income for the government, we cannot use Bombardini's (2008) and Goldberg and Maggi's (1999) approach, which is based on tariffs. Our theoretical model explicitly deals with NTMs, instead of tariffs; but it does not yield an equation, that can directly be estimated. Instead, our empirical model is designed to test whether politically connected firms in fact have an influence on the occurrence, and the number of standards in a sector.

We model the number of NTMs in specific categories (standards, like categories A (SPS) and B (TBT)) introduced in a given sector at a given point in time using a two-part model (Mullahy

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

1998, Belotti et al. 2015; Santos Silva et al. 2015). We express the expected value for the number of NTMs as follows:

$$E[NTM_{hkt}|X_{hkt}] = \Pr(NTM_{hkt} > 0|X_{hkt}) \times E[NTM_{hkt}|NTM_{hkt} > 0, X_{hkt}] \quad (17)$$

where $\Pr(NTM_{hkt} > 0|X_{hkt})$ denotes the probability to observe positive counts conditional on the covariates. $E[NTM_{hkt}|NTM_{hkt} > 0, X_{hkt}]$ is the expected value of the number of NTMs given that there is a positive amount and given the covariates. The two-part model rests on the assumption that the process creating zeroes and the process generating counts are conditionally independent. Under this assumption, the log-likelihood of the underlying model is separable and the left and right terms in the right-hand side can be estimated separately. Thus, the count process is split into two stages. This is advantageous in our case for two reasons: First, a practical reason is that zeroes are frequent in our dataset, which may lead to overdispersion in a simple Poisson model (Alfò et al. 2010). Second, our NTM variable is merely a count variable, and does not capture the stringency of the regulations. The two-part model is more flexible in this regard than a one-part model. If a single regulation can be made sufficiently stringent, the political actor may be more interested in adding a single regulation, than in pushing through a higher number of NTMs. However, if the number of NTMs is related to the overall regulatory stringency of standards, one could obtain the opposite results. The two-part model can uncover both patterns, and prevents one of the processes from dominating the results.

We model the first part, the probability of obtaining a positive count, as a logit model:

$$\Pr(NTM_{hkt} > 0|X_{hkt}) = g(\alpha Q_{kt}^{Tar} \times PC_{kt} + \beta Z_{hkt} + \alpha_{h2} + \gamma_t) \quad (18)$$

where $g(\eta)$ denotes the logistic function.

The second part of (17) is modelled using a Poisson regression framework:

$$E[NTM_{hkt}|NTM_{hkt} > 0, X_{hkt}] = h(\alpha Q_{kt}^{Tar} \times PC_{kt} + \beta Z_{hkt} + \alpha_{h2} + \gamma_t) \quad (19)$$

where the response function is exponential $h(\eta) \equiv \mathrm{e}^{\eta}$, which is equivalent to using the canonical log-link function. NTM_{hkt} is the number of NTMs of the respective type introduced in sector k (belonging to HS2 category h) at time t, Q_{kt}^{Tar} is a vector of dummies indicating whether high, medium or low tariffs (defined as different quantiles of the distribution) prevail in the respective HS6 sector. PC_{kt} denotes the measure of political connectedness. We use three different proxies for the strength of political connections in a given sector: firstly, we study sectors in which a STE operates, secondly, we include the share of imports by firms belonging to the Ben Ali family, and finally, we include a Herfindahl Index of market concentration. All of these measures are available at the HS6-level. By allowing different coefficients for different quartiles of the tariff distribution, we account for the possibility that tariffs and standards may be complementary or substitutable means of protection. For instance, there is evidence that firms linked to Ben Ali paid less in tariffs (Rijkers et al. 2015). Such firm may thus already enjoy advantages vis-à-vis importing competitors. α_{h2} are HS 2-digit sector specific unobserved effects and γ_t are year-dummies. With the introduction of specific unobserved effects we control for potential selection bias, arising from sorting of politically connected firms into broad sectors with certain time invariant characteristics, e.g. profitability. The year dummies capture all country specific time varying variables, including shifts in policy priorities towards NTMs – taking into account that NTMs seem to be enacted in certain years only as reported above – or changes in the overall economic environment. Additional control

variables - Z_{hkt} – include the import value, and sectoral value added as controls for the importance of the sector in the domestic economy.

In the logit model given by (18) the exponential of the coefficients can be interpreted as an odds ratio. Note that Ai and Norton's (2003) critique concerning the interpretation of interactions in logit and Probit models does not apply here. The reason is that $Q_{kt}^{Tar} \times PC_{kt}$ is not strictly speaking an interaction term. Rather, PC_{kt} has heterogeneous coefficients. Hence, $e^{\alpha Q_{kt}^{Tar}}$ can be interpreted as odds ratios, given the value of the vector Q_{kt}^{Tar}. I.e., if $\alpha = (\alpha_l \quad \alpha_m \quad \alpha_h)$, then $e^{\alpha_l 0.01} - 1$ denotes the change in the odds of observing a positive amount of NTMs due to an increase of politically connected firms by 1% given that the sector in question belongs to the quantile with low tariffs.

Since we are using a log-link function the interpretation of the coefficients in (19) is equivalent to log-linearized models; i.e., as elasticities and semi-elasticities. Note that the functional form thus implies a multiplicative model structure. Hence, there are interaction effects with regard to the count.

6. Results

6.1 Main results

Table 4 presents the first set of results for NTMs belonging to the category of SPS measures. In columns 1 and 2 the share of imports going to Ben Ali related firms (BA) is included, as well as the Herfindahl Index defined in terms of sales as a measures of market concentration. For Ben Ali related firms, we see no statistically significant effect irrespective of the level of tariffs in the logit regression. However, in the Poisson regression in column 2 – i.e., for positive values – there is a significant positive effect of political connectedness on the number of NTMs if tariffs are high. That indicates that in the presence of Ben Ali firms, SPS measures and tariffs are complements. A potential explanation is based on Rijkers et al. (2015). They show that by reporting a lower unit value of imports, Ben Ali firms tend to pay lower tariffs. If that is true, high tariffs indicate a higher level of protection from competing importers. In fact, in our data the level of tariff protection is positively associated with the share of Ben Ali firms' import share. Hence, the higher the tariff is, the more likely there is scope for using standards to increase the costs of domestic competitors. We obtain the associated elasticity by multiplying the coefficient with $\frac{1}{100}$. Hence, if the share of Ben Ali firms' imports increases by 1% the number of SPS measure would be on average 0.02% higher in sectors that exhibit high tariffs. Thus, albeit significant, the results remain economically small.

As for market concentration as measured by the Herfindahl index, there is no evidence of a positive effect on the number of SPS measures. However, in the Logit model, for medium and high tariffs a higher degree of market concentration is linked to a significant reduction in the odds of observing a positive number.[6] In this sense, one can interpret the Herfindahl results as a Placebo test for the importance of explicit political connections. While Rijkers et al. (2014) show that Ben Ali firms tend to be related to higher market concentration, it does not seem to be the case that this is a relevant feature of Ben Ali dominated sectors that lead to a higher level of standards. On the contrary, market concentration seems to have no or opposing effects.

In Table 5 we report the same set of results for TBTs. The pattern here is noticeably different. Ben Ali firms are linked to higher odds of observing TBTs in the low and medium tariff segment in columns (1) and (3). For positive values, there is a positive effect of Ben Ali firms

[6] Note that while we used a two-part model here, the results for this first set of regressions do not hinge in this particular treatment of zeroes. We obtain qualitatively the same and quantitatively similar results using the Zero-Inflated Poisson (ZIP) on the same sample. Also, a one-part Poisson model yields the same results. The choice, hence, is only relevant for TBT measures reported below, where the presence of zeroes with many dummies makes it difficult to fit a one-part model, and also prevents the use of a ZIP model.

on the number of TBTs in the low tariff segment; but it loses significance when market concentration is not controlled for in column (4). As for market concentration, for low tariff values an increase leads to a significant reduction in the odds of observing positive NTM numbers (columns 1 and 5), and it also reduces the number of observed TBTs in columns 2 and 4. Contrary to our expectation, the presence of Ben Ali firms seems to be related to a lower count of TBTs in the high tariff segment. This may be somewhat less surprising when considering that when differentiating between different kinds of TBTs only 1% are standards in the strict sense. All other measures explicitly pertain to importers, including, for instance, registration requirements. For SPS measures, by contrast, around 30% of measures are standards. Hence, a possible explanation for these results is that for low levels of protection through tariffs more NTMs may protect Ben Ali firms from competition by other importers. For high tariffs on the other hand, they already enjoy a cost advantage vis-à-vis other importers and further import related measures would reduce their competitive stance vis-à-vis domestic producers. In that case, it would make little sense for them to push for more such measures.

Finally, for state trading enterprises (STEs) we do not find a significant relation to SPS measures as documented in columns 1 and 2 of Table 6. Also, note that for sectors with positive trade flows and low tariffs STEs are a perfect predictor of zero SPS measures. Results for technical barriers to trade are reported in the second panel (columns 3 and 4) of Table 6. We find at the binary stage –in the logit regression– that there is a significant positive effect (at the ten percent level) of STEs operating in the given sector for medium tariffs. However, for positive counts the effect is always negative, albeit only significant for low and high tariffs. One potential explanation for that pattern is that the presence of a state trading enterprise is a sufficient control mechanism for the state. Moreover, as argued above, STEs often operate in sectors with limited value added and are often granted exclusive importing rights, or at least very preferential conditions.

Summarizing, it seems that mainly political connections of private enterprises are linked to higher NTMs. Neither for sectors with a high degree of market concentration, nor in sectors with STEs do we find a strong positive effect on NTMs. On the contrary, in many cases the effect is even significantly negative. In Table A.1 in the appendix, we report the results including the year 2010, which was so far excluded. There are two reasons why we did not include 2010. First, the data for the Herfindahl Index and the Ben Ali firms' only ranges until 2009. In order to include NTMs implemented in 2010 we thus assume that the values for the Ben Ali firms' import shares did not change from 2009 to 2010. On the one hand, that seems plausible because the import share is in most cases reasonably stable over time. But on the other hand, 2010 may be a particular year. The Ben Ali regime was ousted as early as January 2011. Protests had started in 2010 already, and the economic situation was dire. Hence, legislation at that point in time may have followed a different rationale than in the preceding years. That being said, the results for TBTs are robust to including 2010. For SPS measures, the positive results are present now in the first (logit) part and for medium tariffs only.

6.2 Robustness: standard-like SPS measures

In this section, we try to establish to what extent the results obtained for SPS measures are due to actual standards, or more procedural provisions. We have argued before that judging by the subheadings SPS measures and TBT mainly include standard-like provisions. That includes for instance "Tolerance limits for residues and restricted use of substances", "Labelling, marking and packaging requirements", "Hygienic requirements", "Treatment for elimination of plant and animal pests and disease-causing organisms in the final product (e.g. postharvest treatment)", and "Other requirements on production or post-production processes" (UNCTAD, 2012). However, some measures are specifically targeted at importers. For instance, geographical or general "prohibitions/restrictions of imports for SPS reasons", "authorization requirements" for importers, or registration requirements. In Table 7, we distinguish the two

types of measures. While the results are qualitatively the same, for standards narrowly defined we get a much higher coefficient than for importer-specific measures. As before, the positive effect is only present in a high tariff environment and only for positive counts (i.e., in the Poisson regression).

7. 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 that the channel we describe is in fact at play in Tunisia. We find that sectors with a higher share of firms linked to the Ben Ali family tend to have a higher number of SPS measures if tariffs are high. We also find a positive association between the share of Ben Ali related firms on TBTs if tariffs are low.

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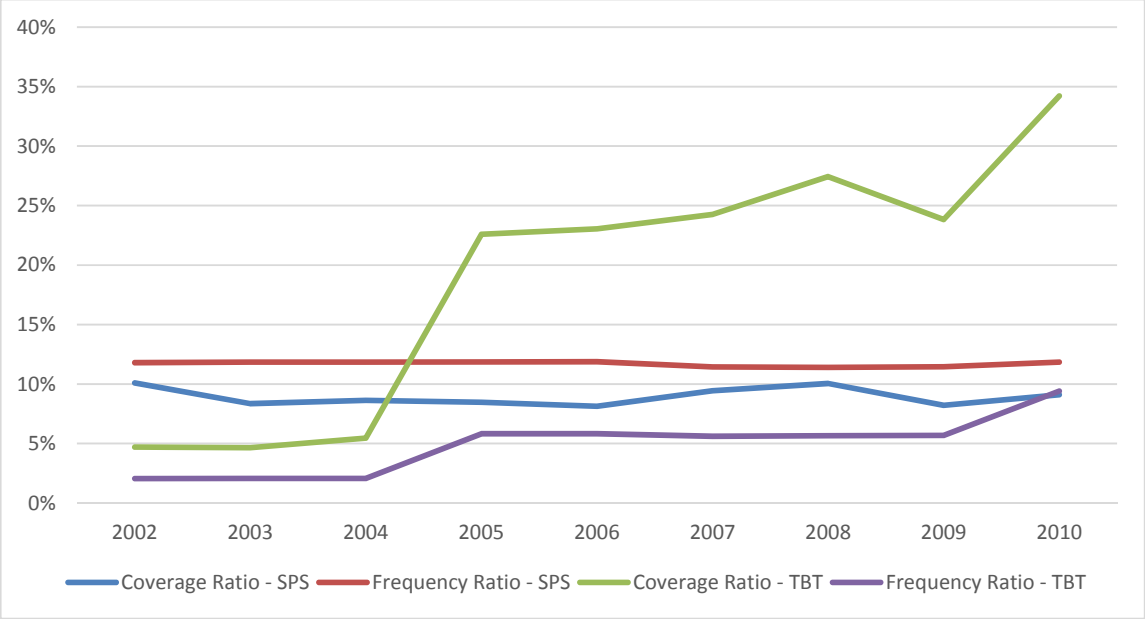
Figure 1: Coverage Ratios and Frequency Ratios - Total



Source: Own calculations based on data from World Bank and UN COMTRADE.

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

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.
Source: WTO I-TIP.

Table 2: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Herfindahl	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
Tariff (in %)	45198	7.154	7.526	0	71.479
Tariff (weighted, in %)	47511	18.268	21.478	0	230

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 railw/tramw roll-stock, pts & 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 mchy 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 indust; 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, mchy & mech 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)

Table 4: Two-part Model Results for SPS Measures

VARIABLES	(1) Logit	(2) Poisson	(3) Logit	(4) Poisson	(5) Logit	(6) Poisson
BA (low tar.)	0.611	0.357	0.540	0.194		
	(0.455)	(0.615)	(0.418)	(0.580)		
BA (med tar.)	0.469	1.030	0.450	1.103		
	(0.808)	(0.715)	(0.764)	(0.751)		
BA (high tar.)	-0.484	2.190***	-0.535	2.011***		
	(0.503)	(0.590)	(0.494)	(0.636)		
HHI (low tar.)	0.0655	-0.288			0.0919	-0.210
	(0.508)	(0.404)			(0.499)	(0.359)
HHI (med tar.)	-0.624**	-0.564			-0.621**	-0.595
	(0.301)	(0.467)			(0.302)	(0.495)
HHI (high tar.)	-0.725***	-0.618**			-0.730***	-0.478
	(0.226)	(0.286)			(0.225)	(0.322)
Med. Tariff	0.143	0.167	-0.173	0.0239	0.153	0.181
	(0.388)	(0.390)	(0.250)	(0.252)	(0.388)	(0.374)
High Tariff	0.287	0.866**	-0.0285	0.809***	0.276	0.889***
	(0.397)	(0.348)	(0.254)	(0.246)	(0.397)	(0.330)
Imports	0.0404*	0.0456*	0.0462**	0.0614**	0.0404*	0.0372
	(0.0215)	(0.0236)	(0.0212)	(0.0255)	(0.0214)	(0.0270)
Value Added	-0.986	-1.421	-1.040	-1.356	-1.008	-1.117
	(1.313)	(1.300)	(1.304)	(1.279)	(1.315)	(1.213)
Constant	4.452	15.19	5.047	14.36	4.732	12.82
	(11.31)	(10.99)	(11.24)	(10.80)	(11.32)	(10.28)
Observations	2,191	2,191	2,191	2,191	2,191	2,191
Year FE	YES	YES	YES	YES	YES	YES
HS2 FE	YES	YES	YES	YES	YES	YES

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

Table 5: Two-part Model Results for TBTs

VARIABLES	(1) Logit	(2) Poisson	(3) Logit	(4) Poisson	(5) Logit	(6) Poisson
BA (low tar.)	3.390***	1.613**	3.076***	1.254		
	(0.880)	(0.652)	(0.787)	(0.799)		
BA (med tar.)	1.692*	-0.565	1.711*	-0.538		
	(0.960)	(0.967)	(0.964)	(1.207)		
BA (high tar.)	1.972**	-2.068**	1.957**	-1.863**		
	(0.952)	(1.040)	(0.973)	(0.945)		
HHI (low tar.)	-1.879*	-1.809**			-1.677*	-1.363**
	(1.054)	(0.723)			(0.940)	(0.655)
HHI (med tar.)	0.179	0.186			0.216	0.199
	(0.566)	(0.725)			(0.559)	(0.769)
HHI (high tar.)	0.291	-0.422			0.252	-0.198
	(0.506)	(0.680)			(0.514)	(0.704)
Med. Tariff	0.328	-0.396	1.051***	0.0750	0.234	-0.794*
	(0.470)	(0.389)	(0.339)	(0.363)	(0.456)	(0.418)
High Tariff	1.260***	0.266	1.980***	0.493	1.221***	-0.402
	(0.441)	(0.449)	(0.365)	(0.408)	(0.429)	(0.429)
Imports	0.0883**	0.194***	0.0902**	0.201***	0.101**	0.217***
	(0.0449)	(0.0407)	(0.0442)	(0.0444)	(0.0449)	(0.0400)
Value Added	-0.293	1.304	-0.662	1.120	-0.336	0.991
	(0.612)	(1.100)	(0.592)	(1.120)	(0.603)	(1.224)
Constant	-19.50***	-10.03	-17.23***	-8.997	-19.06***	-7.458
	(4.778)	(8.481)	(4.783)	(8.584)	(4.759)	(9.429)
Observations	7,212	7,212	7,212	7,212	7,212	7,212
Year FE	YES	YES	YES	YES	YES	YES
HS2 FE	YES	YES	YES	YES	YES	YES

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

Table 6: Two-part Model Results for STEs

	SPS		TBT	
	(1)	(2)	(3)	(4)
VARIABLES	Logit	Poisson	Logit	Poisson
STE (low tar.)			1.492	-2.215***
			(1.198)	(0.497)
STE (med. tar.)	-0.904	0.473	1.932*	-0.299
	(0.658)	(0.403)	(1.009)	(0.391)
STE (high tar.)	0.444	-0.321	-0.300	-2.055**
	(0.364)	(0.911)	(0.469)	(0.856)
Med. Tariff	-0.436*	-0.203	0.626***	-0.294
	(0.252)	(0.298)	(0.172)	(0.207)
High Tariff	-0.399	0.703***	1.281***	-0.154
	(0.264)	(0.265)	(0.202)	(0.210)
Imports	0.0511**	0.0791***	0.0833***	0.192***
	(0.0216)	(0.0301)	(0.0300)	(0.0296)
Value added	-2.453***	1.852***	0.244	-0.300
	(0.531)	(0.391)	(0.335)	(0.217)
Constant	19.88***	-12.34***	-19.73***	2.287
	(4.482)	(3.418)	(2.974)	(1.483)
Observations	2,922	2,922	11,359	11,359
Year FE	Yes	Yes	Yes	Yes
HS2 FE	Yes	Yes	Yes	Yes

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

Table 6: Two-part Model Results Standard vs. Importer Specific SPS

	Standards, narrow def.		Importer Specific	
	(1)	(2)	(3)	(4)
VARIABLES	Logit	Poisson	Logit	Poisson
BA (low tar.)	0.578	0.380	0.359	0.128
	(0.445)	(0.624)	(0.489)	(0.573)
BA (med. tar.)	-4.537	-16.92	0.643	0.830
	(6.277)	(14.72)	(1.027)	(0.575)
BA (high tar.)	-0.654	4.685***	0.489	1.470**
	(0.832)	(1.209)	(0.778)	(0.594)
Med. Tariff	-0.104	0.102	-0.454	0.0334
	(0.413)	(0.313)	(0.283)	(0.255)
High Tariff	0.120	0.671**	-0.280	0.846***
	(0.413)	(0.316)	(0.298)	(0.241)
Imports	0.0685**	0.105***	0.0463*	0.0451*
	(0.0335)	(0.0290)	(0.0272)	(0.0262)
Value added	-5.440***	1.471	6.854***	-2.254
	(1.936)	(1.428)	(1.495)	(1.471)
Constant	43.08***	-11.14	-55.59***	20.21*
	(15.14)	(10.74)	(12.03)	(11.59)
Observations	947	947	1,426	1,426
Year FE	Yes	Yes	Yes	Yes
HS2 FE	Yes	Yes	Yes	Yes

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

Appendix

Table A.1: Results for BA Firms Including the Year 2010

	SPS		TBT	
	(1)	(2)	(3)	(4)
VARIABLES	Logit	Poisson	Logit	Poisson
BA (low tar.)	0.586	0.132	2.634***	1.039
	(0.471)	(0.607)	(0.569)	(0.680)
BA (med tar.)	1.132**	0.745	-0.491	-2.012*
	(0.514)	(0.562)	(0.941)	(1.193)
BA (high tar.)	-0.288	0.362	0.577	-1.576**
	(0.448)	(0.220)	(1.105)	(0.792)
Med. Tariff	-0.397	-0.198	0.757***	0.0949
	(0.258)	(0.305)	(0.176)	(0.204)
High Tariff	-0.273	0.670**	1.366***	0.227
	(0.267)	(0.269)	(0.206)	(0.215)
Imports	0.0426**	0.0849***	0.0778***	0.186***
	(0.0212)	(0.0301)	(0.0288)	(0.0279)
Value Added	-2.437***	1.882***	0.181	-0.589***
	(0.527)	(0.394)	(0.314)	(0.202)
Constant	19.68***	-12.67***	-19.34***	4.014***
	(4.445)	(3.467)	(2.803)	(1.409)
Observations	2,926	2,926	11,359	11,359
Year FE	Yes	Yes	Yes	Yes
HS2 FE	Yes	Yes	Yes	Yes

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