Protection for Sale with Consumer Externalities: an Application to Non Tariff Measures

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Abstract

In this paper, we investigate the effect of lobbying and consumers' externality on the pattern of protection through non-tariff barriers to trade (NTMs) across US manufacturing sectors. We first extend the Grossman and Helpman (1994) model, "Protection for Sale", incorporating consumer externality. Externality is intended, in our framework, as the concern of a government for consumers' safety and the environment, which should result in icreased protection through standards and technical measures. We test our model using a novel database on 2014 stock of NTMs. We measure political organization of industries through lobbying expenditures data, and we identify sectors where government cares the most about consumers' well-being using media sources. Our results suggest that both pressure from interest groups and concerns about safety and environmental issues lead to an increase in the pattern of protection across US manufacturing sectors.

1 Introduction

Over the last two decades, besides a general trend of trade protection reduction, the world has witnessed a change in the pattern of protection of countries. Indeed, tariffs have progressively left their place to non-tariff measures (NTMs). This category of policies consists of a diverse and complex array of measures: besides direct restrictions to import, such as quotas or anti-dumping measures, it includes the so-called technical measures (Sanitary and Phytosanitary Standards, SPS; and Technical Barriers to trade, TBT). The latter category of measures have seen a particularly consistent increase in the last years. Technical NTMs, by comparison with those manifestly employed as instruments of commercial policy (the so called non-tariff barriers to trade, or NTBs), are also put in place for consumers' safeguard purposes, being often related to safety of products and environmental protection (UNCTAD (2013)). Within international

trade literature, it has been often argued that NTMs are set as a substitute or complement to tariffs with a similar protectionist purpose (see, for example, Hoekman and Nicita (2011) and Beverelli et al. (2014)). However, within recent literature, some authors have pointed out that technical measures substantially differ from tariffs and NTBs, given their important function of mitigating negative externalities and protecting consumers' safety and the environment (see Van Tongeren et al. (2009) and Beghin et al. (2015)). In this respect, as shown by Beghin et al. (2015), NTMs are not always trade protectionist, but, in some cases, they can be even trade facilitating and welfare enhancing. This happens when these measures succeed in addressing negative externalities mitigation (or positive externalities accentuation) puposes. If this is the case, consumers may perceive the quality of imports protected by standards as higher, then increasing their purchases or switching their preferences towards these products.

Given the complexity and the different purposes of NTMs, it is important to study their political economy determinants. The Grossman and Helpman (1994) model ("Protection for Sale"), which has been applied and extended in several directions, shows how government shapes tariffs (and non-tariff barriers) as a response of lobbies from the industry on one side, and attention towards consumers' welfare on the other side. According to this framework, interest groups from manufacturing sectors lobby the government asking for higher protection, while consumers are interested in loosening protection to have access to lower priced goods. Being originally thought for tariffs and non-tariff barriers such as quotas, the Grossman and Helpman (1994) model (GH hereafter) does not take consumer externality component into account. Some recent literature has moved steps forward to fill this gap. Swinnen and Vandemoortele (2008), focusing on nutrition and health standards on food products, develop a general political economy model that accounts for the "externality effect" of standards. Yu (2005), who adapt the Grossman and Helpman (1994) model to the case of environmental policy, integrate the disutility of pollution into consumer's utility function, which is then taken into consideration by the government when having to set the policy. These two models share a common element, namely the importance of risks for consumers as a fundamental political economy determinant of standards and environmental regulations. Consumers' preferences, which may be influenced by media or by specific groups' action (e.g. consumers' associations), can be an important driver of the policies decided by a government.

Despite the two models cited above represent a theoretical alternative to the traditional GH, no paper to date, to the best of our knowledge, has tested the impact of consumer preferences (consumer externality) on the level of standards set by the government. Our work attempts to fill the gap, by extending the traditional Grossman and Helpman (1994) model to the inclusion of an externality component and by empirically testing such extension. According to our framework, the externality is considered by the government when consumers are sensitive to the impact that some products can have on their health,

safety or the environment. The fact that some products are associated with higher health risks or potential environmental damages than others should be considered as a determinant, together with lobbying pressures, of the pattern of protection across industries. We test such teoretical framework on the United States, considering all manufacturing industries at a detailed level of disaggregation (NAICS 6-digit). We use the most recent avilable data on NTMs (2014 stock) and we define political organization based on lobbying expenditures data from the *Federal Election Commission*. Applying the Grossman and Helpman (1994) model on recent NTMs data is a novelty *per se*. Indeed, most of the empirical applications based on the GH framework (e.g. Goldberg and Maggi (1999), Gawande and Bandyopadhyay (2000), Gawande and Robbins (2006)) were carried out on non-tariff barriers data from 1983. However, the pattern of protection has considerably changed since then, making it interesting to study whether the "Protection for Sale" framework is still valid. Moreover, we build a more accurate measure of sectoral lobbying activity than the ones used in previous works, using data on trade-related lobbying expenditures at a detailed level of disaggregation. As a proxy for consumers' externality, we build a variable taken from *Lexis Nexis*, a comprehensive database including articles from all the main newspapers, journals and reviews from around the world. By classifying US news by sector and selecting the articles associated to topics such as "safety" and "environmental protection", we construct our externality variable. In our view, the attention of media towards safety, health or environmental issues can be a proxy for consumer externality across products and sectors. This is in line with some recent literature on the political economy of media (see Prat and Strömberg (2011)) arguing that media attention across issues creates a bias in policy responses by influencing the government and raising its attention.

The first interesting finding coming out of our results is that the main prediction from the Grossman and Helpman (1994) model is still valid nowadays, when recent lobbying data and non-tariff measures are taken into account. Indeed, the average number of NTMs turns out to be significantly higher in politically organized sectors (namely, when industries spend a considerable amount of money for lobbying activities). In addition to this, we find that consumer externality is an important determinant of the pattern of NTMs across sectors: when consumers are more sensitive towards safety and potential risks coming from products, the average number of NTMs is, *ceteris paribus*, significantly higher. These results shed some light on the legitimacy of non-tariff measures, which are not only set by the government as a trade protectionist policy, but also as a response to the need to protect consumers' safety and the environment.

The remainder of the paper is organized as follows. Paragraph 2 reviews the literature that is most connected to our work. Paragraph 3 presents our theoretical framework, which consists of a modified version of the model by Grossman and Helpman (1994). Paragraphs 4 and 5 describe the empirical strategy and the econometric methodology used in our empirical application, which is aimed at testing our theoretical

model. Paragraph 7 presents and discusses the main results coming out of our empirical application, and paragraph 8 draws some final remarks.

2 Discussion of Related Literature

This paper relies on several strands of literature investigating the political economy determinants of trade protection and studying the trade and welfare effects of NTMs.

Our theoretical framework is based on the model by Grossman and Helpman (1994), titled "Protection for sale". In the GH framework, the government sets trade policies (import and export taxes and subsidies) maximizing a weighted sum of social welfare and contributions received by interest groups (lobbies), which represent domestic industries' interests. Lobbies give contributions to the government with the aim of raising import taxes, sice they want to protect the sectors they represent from import competition. According to the model, when an import-competing industry is politically organized, it is able to "buy" protection and make the government raise tariffs. By contrast, when an industry in unorganized, the government will only take consumers' welfare into account, penalizing the internal sector with import subsidies. The Grossman and Helpman (1994) model identifies three main determinants of protection: the level of import competition; import demand elasticities - according to the Ramsey rule, goods with low import demand elasticity are taxed more, since taxing high elasticity goods would bring about a bigger welfare loss - and whether or not an industry is politically organized.

The GH model was first applied by Goldberg and Maggi (1999) and Gawande and Bandyopadhyay (2000), who brought the main predictions by Grossman and Helpman (1994) to an empirically testable equation. Their works use US political contributions data from the 1980s, testing whether politically organized industries are affected by a different pattern of protection with respect to unorganized sectors. Both works find support for the predictions outlined by the theoretical model: everything else equal, the level of non-tariff barriers (NTBs) turns out to be higher in politically organized industries with respect to unorganized ones.

The popularity of the Grossman and Helpman (1994) framework remained unchanged over time. In more recent years with respect to its first applications, the model has been extended and modified in several directions. The aim of these extensions has been to attenuate some sources of bias in the original GH model, as well as to account for some aditional determinants of protection.

Facchini et al. (2006), for example, modified the model taking into account that NTBs, unlike tariffs, allow the government to only partially capture rents from protection. For this reason, according to the authors, the coefficients from traditional GH are biased when applying the model to non-tariff barriers.

In respose to this issue, Facchini et al. (2006) augment the original framework including the degree of rent capturing, which modifies the main model's parameters.

An important work for our framework is the one by Ederington and Minier (2008), who argued that the traditional applications of Grossman and Helpman (1994) may suffer from some bias. The authors identify, among the sources of the bias, the fact that a correct specification of the model should include some extraneous political factors. According to Ederington and Minier (2008), these factors should be included in the objective function of the government, and would allow protection to increase in some sectors for other reasons than lobbying from interest groups. Our framework partially draws from Ederington and Minier (2008), identifying the consumer externality as an additional variable affecting the pattern of protection. Similarly to Ederington and Minier (2008), we argue that, even in politically unorganized industries, protection could increase when government has consumers' safeguard purposes.

In addition to the works mentioned above, other extensions of the Grossman and Helpman (1994) model have been theoretically build and tested. Gawande et al. (2006) consider, besides internal lobbies, also foreign interest groups, which may put pressure on the government to decrease the level of protection. Belloc and Guerrieri (2008) adapt the GH framework to European trade policies, taking into account lobbying at both national and European level. Finally, Bombardini and Trebbi (2012) argue that firm size matters in determining the pattern of protection: in sectors where firms are larger, lobbies are formed more efficiently, and protection will be easier to obtain.

Our paper is also related to other works incorporating consumer externality within a political economy framework.

The model by Aidt (1998) shows that environmental policy is a product of lobbying activities, and that political competition is a source of internalization of economic externalities. The author argues that some lobby groups (e.g. trade unions and consumers associations) modify their demand to take account of environmental concerns.

Similarly, the work by Yu (2005) models the political economy of environmental policies including consumers' "disutility of pollution" (negative externality) in a GH-like framework. The environmental damage depends on the beliefs of individuals, and can be influenced by environmental groups through persuasion activity. This indirect lobbying activity of environmentalists is in contrast with direct lobbying from industrial groups, which ask for less strict environmental regulations instead. Both forces are taken into account by the government when it sets the optimal environmental policy. Although the frameworks by Yu (2005) and Aidt (1998) are mainly thought for emission standards, our model is partly related to theirs, since we also take account of potential damages on consumers' safety or the environment coming

from imported products not compliant with adequate standards. Our paper stresses that this element is considered by the government when setting the level of protection, representing, together with lobbying activity from the industry, an important determinant of trade protection.
Consumer externality is also inluded in the model by Swinnen and Vandemoortele (2008), who focus on the political economy determinants of health and nutrition standards. Their framework includes consumer externality in the government objective function as a cost (negative externality) or a benefit (positive externality) coming from consumption of goods. Moreover, their model allows for the fact that not only producers, but also consumers can be politically organized and lobby the government giving contributions.

In addition to the political economy literature presented above, our research is related to some recent works which analyze the trade and welfare effect of NTMs, and, in particular, of technical measures such as SPS and TBT (see, for example, Marette and Beghin (2010); Disdier and Marette (2010); Beghin et al. (2015)). Overall, these works argue that NTMs substantially differ from tariffs, since they may lead to an increase in consumer welfare by mitigating negative externalities. Disdier and Marette (2010) measure the impact of non-tariff measures through a welfare approach, identifying potential damages coming from imported products as one of the elements taken into account by the regulator. Their paper shows that stricter standards, despite being trade restricting, can lead to an increase in both domestic and international welfare though a reduction in damages. Marette and Beghin (2010) concentrate on the trade effect of standards, showing that standards are not always protectionist, but may be anti-protectionist sometimes. This happens when foreign producers are more efficient than domestic ones in meeting the standard. Finally, the paper by Beghin et al. (2015) measures the *ad valorem* equivalent of NTMs (AVEs) by taking into account that non-tariff measures can, in some cases, mitigate negative externalities and enhance foreign products' safety and quality, being thus trade facilitating. Beghin et al. (2015), through their results, show that about 39% of the product lines affected by NTMs exhibit negative AVEs, having thus trade-facilitating and welfare-enhancing effects.

Finally, our decision to approximate the attention towards consumer externality with a variable measuring media coverage is in line with some recent literature on the political economy of mass media. This literature, summarized by Prat and Strömberg (2011) in a survey, argue that news can influence government policy. The literature review cites some case studies confirming the above hypothesis. Eisensee and Strömberg (2007) studied the US government response to natural disasters, showing that relief was higher when the events were newsworthy. Similarly, Snyder Jr and Strömberg (2010) show that congressmen who are more covered by local press work more for their constituency: they are more likely to stand

witness before congressional hearings and to vote against the party line. Relying on these findings, we proxy attention towards consumer externalities with a variable of journal coverage on safety and environmental issues. We hypothesize that policies set by governments may be more responsive in sectors that are covered by the news.

3 Theoretical Framework

Our theoretical framework relies on Grossman and Helpman (1994). Their model has the structure of a common agency framework, that is, a situation where several principals (the interest groups) induce an agent (the government) to take an action that may be costly for him. We make a simple extension of GH, including consumer externality in the government objective function. In our model, externality is intended as potential damage coming from importing risky products.

In our framework, a small economy is populated by individuals with identical preferences, whose utility function is represented by:

$$U = c_0 + \sum_{i=1}^{n} u_i(c_i) \tag{1}$$

Where c_0 is consumption of the numeraire good, 0, and c_i is consumption of goods $i = 1, 2, ..., n$.

Good 0 is assumed to be produced by labor alone, and free traded internationally. As in Grossman and Helpman (1994), goods $i = 1, 2, ..., n$ are produced using labor and a sector-specific input, and traded internationally.

In this framework, the government is only allowed to implement policies (tariffs, subsidies, non-tariff measures) that drive a wedge between domestic and world prices. A tariff or a protectionist NTM leads to higher domestic price with respect to world price: $(p_i - p_i^* > 0)$.

The government maximizes the following linear objective function:

$$G = \sum_{i \in L} C_i(p) + aW(p) - b \sum_{i=1}^{n} Ext_i(p) \tag{2}$$

Where $p = (p_1, p_2, ..., p_n)$ is a vector of prices of the nonnumeraire good. C_i represents contributions received from sector i, and L represents the subset of sectors where the specific-factor owners are organized in a lobby. W represents aggregate welfare, and a is a constant accounting for the weight that government places on welfare as compared to contributions. The novelty of our framework, with respect to GH, is the term Ext_i, which represents the potential damage coming from the consumption of imported product from industry i. The parameter b represents the weight that the government puts on externality as compared to political organization. As in Disdier and Marette (2010), we associate the externality to

foreign products only, and we model it as the risk for consumers to purchase a defected product from abroad and to be thus affected by damage. Ext_i is defined as follows:

$$Ext_i(p) = m_i(p)\omega_i * \gamma_i \tag{3}$$

In the above equation, m_i is consumption of good i imported from abroad, given by $m_i = Nd_i - y_i$, where y_i is domestic output of good i, d_i is the individual demand, and N is the number of consumers. ω_i is the per-unit damage brought by products in sector i ($\omega \geq 0$), and γ_i is the probability of products in sector i to be contaminated ($0 \leq \gamma_i \leq 1$).

The aggregate social welfare results from the sum of aggregate income, revenue from trade taxes and consumer's surplus, as in GH:

$$W(p) = l + \sum_{i=1}^{n} \pi_i + N[r(p) + s(p)] \tag{4}$$

Where l is the total labour supply. Since GH assume that wage is equal to one, l is also equal to total labor income. The term π_i is the aggregate reward to the specific factor used in producing good i. $s(p)$ is consumer surplus derived from consumption of nonnumeraire goods, and $r(p)$ is the net revenue from trade policies, which is redistributed across consumers and is expressed as:

$$r(p) = \sum_{i=1}^{n} (p_i - p^*)\big[d_i(p_i) - \frac{1}{N} y_i p_i\big] \tag{5}$$

Following Goldberg and Maggi (1999), we assume a Nash bargaining game, where trade policies are set to maximize the sum of the surpluses of the involved parties (the government and the lobbies):

$$\Omega = \sum_{i \in L} W_i(p) + aW(p) - b \sum_{i=1}^{n} Ext_i(p) \tag{6}$$

Where the welfare of lobby i is given by:

$$W_i = l_i + \pi_i(p_i) + \alpha_i N[r(p) + s(p)] \tag{7}$$

Were α_i accounts for the number of voters who are represented by lobby i.

If we differentiate the joint welfare Ω with respect to the price of good j, and we sum over all lobbies, we obtain:

$$\frac{\partial \Omega}{\partial p_j} = (I_j - \alpha_L) y_j(p_j) + (a + \alpha_L)(p_j - p^*) m_j'(p_j) + bExt_j' = 0 \tag{8}$$

Rearranging:

$$-(a + \alpha_L)(p_j - p^*) m_j'(p_j) = (I_j - \alpha_L) y_j(p_j) - bExt_j' \tag{9}$$

Where Ext'_j can be expressed as $Ext_j = m'_j(p_j)\omega_j\gamma_j$. Isolating the price wedge on the left hand side and re-arranging it in terms of *ad valorem* equivalent:

$$\frac{(p_j - p^*)}{p_j} = \frac{(I_j - \alpha_L)}{(a + \alpha_L)} \frac{y_j}{(-p_j m'_j)} - \frac{b}{(a + \alpha_L)} \frac{Ext'_j}{(-p_j m'_j)} \tag{10}$$

Which can in turn be re-expressed as follows:

$$\frac{(p_j - p^*)}{p_j} = \frac{(I_j - \alpha_L)}{(a + \alpha_L)} \frac{y_j}{(-p_j m'_j)} + \frac{bext'}{(a + \alpha_L)} \frac{y_j}{(-p_j m'_j)} \tag{11}$$

Where ext'_j is the absolute value of Ext'_j, rescaled by the value of production y_j. The positive sign in front of the last term of equation 11 is given by the fact that $Ext'_j = m'_j\omega_j\gamma_j$ carries a negative sign, driven by $m'_j < 0$.

As in Grossman and Helpman (1994), we can express equation 11 in terms of elasticity and import penetration, dividing and multiplying each term by m. The resulting specification will be as follows:

$$\frac{(p_j - p^*)}{p_j} = \frac{(I_j - \alpha_L + bext'_j)}{(a + \alpha_L)} \frac{z_j}{e_j} \tag{12}$$

Where z_j is the inverse import penetration, and e_j is the absolute import demand elasticity.

Equation 12 can be interpreted as follows. As in Grossman and Helpman (1994), the relationship between $\frac{z_j}{e_j}$ and the level of protection is predicted to be positive when sector j is organized in a lobby, namely when $I_j = 1$. The positive relationship between the inverse ratio of imports to internal output can be interpreted as follows: the higher the 'stakes from protection', the more the government will increase protectionist policies when a sector is organized.

In addition to the above prediction, protection is expected to increase with the absolute derivative of the externality, as shown by the positive sign in front of $bext'_j$. Given that the last term of equation 11 always carries a positive sign, and that $bext'_j$ depends on $\omega_j\gamma_j$, with $\omega_j\gamma_j \geq 0$, we can draw the following general prediction. When the government does not perceive any damage coming from imported products from sector j ($\omega_j\gamma_j = 0$), then the relationship between $\frac{z_j}{e_j}$ will be the same as in GH, being positive when sector j is organized in a lobby, and negative when sector j is unorganized. When, instead, $\omega_j\gamma_j > 0$, there will be an additional force, dependent on consumer externality, positively conditioning the relationship, which will be increasing in ext'_j. Therefore, in politically unorganized sectors, the negative relationship of $\frac{z_j}{e_j}$ will be mitigated by a positive sign carried by that relationship when the government perceives a risk for consumers and the environment. In other words, the level of protection can be raised also in sectors which are considered unorganized by the traditional Grossman and Helpman (1994) model if the government cares about environmental, health, safety or other risks for consumers in that sector.

In the above equations, we have expressed all terms as function of the inverse of import penetration over the elasticity ($\frac{z_i}{e_i}$). Another way to express equations 10 - 12 is the following:

$$\frac{(p_j - p^*)}{p_j} = \frac{(I_j - \alpha_L)}{(a + \alpha_L)} \frac{y_j}{(-p_j m'_j)} - Ext_j \frac{m'_j}{(-p_j m'_j)} \tag{13}$$

Where externality is not weighted by the value of internal production. After simplification, we will obtain:

$$\frac{(p_j - p^*)}{p_j} = \frac{(I_j - \alpha_L)}{(a + \alpha_L)} \frac{y_j}{(-p_j m'_j)} + \frac{Ext_j}{(p_j)} \tag{14}$$

Where the last term of equation 14 carries a positive sign. The term $\frac{Ext_j}{p_j}$ represents a ratio between the valuation of externalities from products in sector j and the price p_j of these products.

Equation 14 confirms the overall predictions of the model: besides the effect of political pressures from interest groups, there is an additional factor positively conditioning protection, which is increasing in the perceived damage that consumers have from imported products (negative externality).

4 Empirical Strategy

Our empirical strategy has the purpose of testing the extension of the Grossman and Helpman (1994) model illustrated in the theoretical section of the paper. Despite the original model has been thought for tariffs, we test it using NTMs, employing a novel dataset on US non-tariff measures in force in 2014.

As in previous applications of the model, the choice of applying our model to the United States is driven by data availability. Indeed, the US is the only country where it is possible to obtain detailed lobbying expenditures data, due to strict rules on the disclosure of interest groups' activity.

Using recent NTMs is interesting in several respects. First, and most importantly for our purpose, our extension includes the externality component. Being NTMs (technical regulations in particular) often tied to safety, quality or environmental concerns, the externality should be more relevant here than when dealing with tariffs and nTBs. Moreover, testing the GH model on tariffs and NTBs nowadays would not be as relevant as it was in the early applications of the model. Indeed, as outlined in the introduction, NTMs have been progressively replacing tariffs in many countries over the last decades. In addition to this, testing the GH model on NTMs is interesting per se, irrespectively of our extension including externalities. Indeed, the uncertain protectionist effect of technical NTMs makes it particularly interesting to study their political economy determinants. Indeed, given their double nature (as explained in the paragraphs above, they can be trade protectionist in some cases, but trade facilitating and welfare enhancing in other cases), we cannot predict with certainty whether the GH predictions will be confirmed when the model is tested on these measures.

Our theoretical model predicts that protection should depend on the level of externalities. Indeed, the higher the perceived risk for consumers, the higher the level of protection set by the government. However, finding a good proxy for externality is not straightforward, since the risk for consumers' depends, in our framework, on policy makers' concern about health and the environment, which is hard to measure. Given this problem, we decide to approximate externality with a variable coming from US newspapers, which is built by counting, for each manufacturing sectors, how often products from that industry recur in the news associated with topics such as consumer safety and environmental protection.

Since we can't measure ext_i with precision, we simplify predictions from our model so as to make it easier to test. Looking at equation 12, we can state that, if perceived risk for consumers is zero, then the last term of the equation will disappear. By contrast, if $ext_i > 0$, then the level of protection will be higher, and the negative relatioship between $\frac{z_i}{m_i} * \frac{1}{e_i}$ and NTMs will be mitigated. To test this prediction, we estimate the following equation:

$$NTM_i = \beta_1(\frac{z_i}{m_i} * \frac{1}{e_i}) + \beta_2(I_i * \frac{z_i}{m_i} * \frac{1}{e_i}) + \beta_3(E_i * \frac{z_i}{m_i} * \frac{1}{e_i}) + \epsilon_i \tag{15}$$

Where the dependent variable, NTM_i, accounts for the average number of non-tariff measures affecting products in sector i, computed as a prevalence score index, as we will explain in details in the data section. As in GH, β_2 is expected to be positive: when a sector is politically organized ($I_i = 1$), the level of protection is expected to display a positive relationship with $\frac{z_i}{m_i} * \frac{1}{e_i}$. With a similar logic, β_3 is expected to carry a positive sign. The term E_i is a dummy variable accounting for whether products imported from abroad and produced by sector i are perceived as bearers of a potential damage to consumers and derives from our proxy for externality. β_1 is, instead, predicted to be negative: if industry i is not politically organized and its products are not perceived as relevant in terms of safety, quality or environmental characteristics, then the the level of protection is on average lower, and decreasing with an increase in $\frac{z_i}{m_i} * \frac{1}{e_i}$. Finally, ϵ_i is the error term, accounting for unobserved industry-level characteristics affecting industry i.

5 Econometric Methodology

We estimate equation 15 using the econometric methodology proposed by Gawande and Bandyopadhyay (2000) and later adopted in other applications of extended versions of the GH framework (e.g. Gawande et al. (2006), Bombardini (2008)). The econometric strategy consists of a two-stage least squares procedure, which accounts for the potential endogeneity of import penetration, political organization and

our externality measure. The fact that lobbying and the level of protection could be simultaneously determined has been already pointed out by previous works (e.g. Goldberg and Maggi (1999), Gawande and Bandyopadhyay (2000)). Lobbies' more intense activity in some sectors could be a reaction to higher or lower level of protection, making the sign of the bias uncertain. Import penetration could be also endogenously determined with respect to NTMs, as first recognized by Trefler (1993). Indeed, trade policies may lead to a change in import flows, which would reflect into a change in the ratio of internal consumption over imported goods. Finally, our additional variable accounting for the potential risk (negative externality) for consumers could suffer for endogeneity as well. Since our variable derives from the media, one can argue that the attention of journals towards specific products or classes of products could increase as a response to stricter (or looser) policies set by the government on those products.
To solve the concerns outlined above, our econometric strategy is made of four different equations, where each dependent variable is treated as endogenous:

$$NTM_i = \beta_0 + \beta_1 \frac{z_i}{e_i} + \beta_2 \frac{z_i}{e_i} I_i + \beta_3 \frac{z_i}{e_i} E_i + \epsilon_1 \tag{16}$$

$$\frac{1}{z_i} = \eta_0 + \eta_1 NTM_i + X_{P_i} + \epsilon_3 \tag{17}$$

$$ln \frac{Lobbying_i}{Va_i} = \gamma_0 + \gamma_1 lnNTM_i + \gamma_2 ln \frac{1}{z_i} + \gamma_3 lne_i + x_{Li} + \epsilon_2 \tag{18}$$

$$ln \frac{E_i}{Va_i} = \theta_0 + \theta_2 lnNTM_i + \theta_3 ln \frac{1}{z_i} + x_{I_i} + \epsilon_3 \tag{19}$$

Where equation 16 is aimed at testing the main predictions of the model, and derives from equation 15. NTM_i is a measure taking account of the number of non-tariff measures in sector i; z_i is the inverse import penetration variable, computed as the value of output over imports, and e_i is the import demand elasticity. Finally I_i is our political organization variable, and E_i is our proxy for externality, being both expressed as indicators assuming the value of 0 or 1.
Equation 17 is the import penetration equation and includes NTM_i as dependent variable and a vector of exogenous instruments, X_{Pi}. To instrument import penetration, we use some of the variables suggested by Trefler (1993), selecting them according to their correlation with z_i. The selected instruments are variables accounting for the structure of the labour market: percentage of white collar workers, unskilled workers and semiskilled workers. Indeed, the government may want to protect some types of jobs more than others, and the pattern of protection may thus depend on the structure of protection across sectors. As pointed out by Trefler (1993), these variables, at least in the short run, are relatively invariant to changes in trade policy.

Equation 18 is the lobbying equation, where lobbying expenditures over value added ($ln\frac{Lobbying_i}{Va_i}$) are regressed on the log. of import penetration, NTM and elasticity, as well as instrumented with an exogenous variable, x_{Li}. We use, as exogenous instruments for lobbying expenditures on trade issues, those lobbying expenditures that are not related to trade. Indeed, when trade policies are not the focus of lobbyists, it is very unikely that lobbying expenditures are conditioned by the numbr of NTMs. In order to select the lobbying expenditures that are truly exogenous to trade policy variables (and, in general, to NTMs), we select only lobbying records whose issues are far away from trade. For a list of the issues selected to build the instrument, see table 8.

Finally, in equation 19 the externality indicator variable taken from $LexisNexis$ and weighted by value added, $\frac{E_i}{Va_i}$, is regressed on the other model's variables, NTM and import penetration, and on its exogenous instrument x_{I_i}. To instrument the number of articles on US journals related to consumers' safety and environment, we use the number of articles from non US journals, excluding safety and environment as issues. With a similar logic as the one pplied to lobbying, it is very unlikely that generic articles not related to consumers' health and environment are correlated with the level of trade policies.

In our system of equations, variables are regressed one to each other in a nonlinear fashion. Indeed, political organization and externality are measured as dummy variables and interacted with the inverse ratio of import penetration to elasticity in the NTM equation, but expressed as continuous variables in the import penetration and externality equation. The lobbying and the externality equations are in *log*, while the other two equations are in level. Moreover, import penetration enters equation 16 as z_i, and equations 18-19 as $\frac{1}{z_i}$. Finally, z_i and e_i enter equation 16 interacted with each other and with the dummy variables, and the other equations alone.

Because of these nonlinearities, the estimation by normal two-stage or three stage least square would return biased structural coefficients. For this reason, as in Gawande and Bandyopadhyay (2000), we implement the two-stage least squares estimator proposed by Kelejian (1971). This method consists of regressing the nonlinear expressions on linear, squared and first-order cross products of the exogenous variables. Kelejian (1971) shows that, in this way, a traditional two-stage least squares can be used and has the desirable properties of consistency and asymptotic efficiency.

In addition to the baseline specification shown in equations 16-19, we also implement an extended version of our model, where additional determinants of protection are included in the NTM equation.

6 Data Sources

6.1 Non-Tariff Measures

As anticipated in the above paragraphs, the GH framework has been originally created for tariffs. The protection measure conceived by Grossman and Helpman (1994), indeed, creates a wedge between domestic price and world price. However, the majority of the papers applying the GH model to real data (Goldberg and Maggi, 1999; Gawande and Bandyopadhyay, 2000; Gawande and Robbins, 2006) have used non-tariff barriers (NTBs) instead of tariffs. This choice had been mainly driven by the fact that tariffs were mainly set cooperatively, being thus not ideal for testing a model based on a non-cooperative game such as the GH framework. The extension of the Grossman and Helpman (1994) model presented here is applied on NTMs instead. These measures, by comparison with NTBs used in previous applications of GH, do not have a declared protectionist intent, and include technical measures (SPS and TBT). Therefore, they are appropriate to test the GH extension that includes consumer externality. Moreover, testing the model on NTMs is more reasonable nowadays than 20 or 30 years ago, given the consistent decrease tariffs have been affected by in all manufacturing sectors (see Figure 1).

In order to measure NTM coverage across industries, we exploit a new database taken from UNCTAD, relative to 2014 [1]. These data comprehend the 2014 stock of non-tariff measures imposed from the United States to all the world partners, each measure being associated to the covered sectors according to the Harmonized System (HS) classification at 6-digit level of disaggregation (HS-6). As we can see from figure 2, NTMs are classified into technical and non-technical. The focus of our analysis is mainly on technical ones. Indeed, in our database, almost the totality of NTMs is represented by categories SPS (category A, 30% of the total) and TBT (category B, 65% of the total).

Since the concordance between HS and NAICS exists at HS-10 level of disaggregation (see Pierce and Schott, 2012), we expand the NTM dataset to such level. To do this, we assume that, when a HS6 sector is covered by one NTM, then all the underliying HS-10 sub-sectors are affected. [2]

In order to quantify NTM at sectoral (e.g. NAICS 6 digit) level, previous GH applications have used NTM coverage ratio, which measures the percentage of products covered by at least one NTM. Coverage ratio is based on a dummy variable assuming the value of 1 if a product is covered by at least one meaure, and 0 otherwise. However, the NTM structure has considerably changed from 1983 to 2014, and the majority

[1] I thank a lot Marco Fugazza and Alessandro Antimiani for providing us this new data source.

[2] The original database is restricted to non-tariff measures imposed on all the World trade partners. To associate HS-10 sectors to NAICS 6-digit industries, we exploited the conversion produced by Pierce and Schott (2012). This classification is partially incomplete, since the last available year is 2009 and some HS10 have been removed and added since then. We thus classify by hand the remaining sectors, basing on their official description.

of sectors turns out to be covered by at least one non-tariff measure. We would thus have absence of variation in NTMs across sectors. In order to obtain a measure taking account of the number of NTMs by NAICS sector, we compute a prevalence score using the approach proposed by Gourdon et al. (2014):

$$NTM_i = \frac{\sum_{j \in i} N_j * IMP_j}{IMP_i} \tag{20}$$

Where i is the specific NAICS 6-digit sector whose prevalence score we want to compute, and the subsectors j are, in our case, the HS-10 sectors associated to the NAICS industry i. N_j is the number of NTMs covering HS-10 product j, and IMP is the value of general imports from all the partners in the world to the United States. Being the majority of products subject to more than one regulatory measure, the score NTM_i gives the average number of NTMs affecting imports in sector i. Basing our analysis on this measure, we assume that, the higher the number of NTMs applied to a product, the more regulated the commerce of that product is.

Despite prevalence ratio is a more precise indicator with respect to coverage ratio, we are aware that the number of NTMs might not be exactly proportional to their protectionist effect. Given our theoretical framework, which intends trade policies as measures that drive a wedge between domestic and world price, the ideal dependent variable would be *ad valorem* equivalent of NTMs. Such variable would quantify the price effect of NTMs, allowing us to distinguish the measures that have a protectionist effect from the ones that don't. However, *ad valorem equivalent* are not easy to measure, and have not been estimated for recent years. Therefore, we limit our analysis to prevalence ratio, leaving the estimation of *ad valorem equivalent* to possible future developments of this research.

6.2 Political Organization

The data used to define the political organization indicator represent one of the elements of novelty of our analysis. The authors who tested the GH model on 1983 data (e.g. Goldberg and Maggi (1999); Gawande and Bandyopadhyay (2000); Bombardini (2008)) defined political organization of sectors using data on contributions from Political Action Committees (PACs). Contributions, however, are not attributable to any specific issue, making it difficult to understand which PACs lobby the government on trade policy issues. For our analysis, we use instead industry-level data on lobbying expenditures. This data is available since 1998 and consist of money spent by firms and association to hire lobbyists, who carry out lobbying activities directed to members of the United States Congress. This type of activity has been often defined as "informational lobbying", since interest groups mainly act through providing information to members of the government. Despite the original Grossman and Helpman (1994) model was thought for political contributions, using informational lobbying data to define the degree of po-

litical organization of sectors has some advantages with respect to the use of PACs. First, differently from PACS data, lobbying data give the opportunity to select the specific issues on which the lobbying activities are carried out. We can thus select only those firms that lobby on trade issues, having a more precise measure than the one obtained from PACs. Moreover, expenditures for lobbying activities are much higher than money spent for lobbying contributions. Figure 3 shows the amount of total lobbying expenditures, trade-related lobbying expenditures and contributions from PACs for the period considered by our analysis. From the graph, we can notice that firms and organizations allocate to lobbying spending more than 3 billion dollars a year, which is much higher than the amount donated by PACs as political contributions. Moreover, trade-related lobbying expenditures represent around one third of the total, meaning that trade is a relevant issue for interest groups.

Besides the advantages of using lobbying expenditures data, we believe that interactions between industry groups and the government work in a similar way for informational lobbying with respect to political contributions. First, there is evidence that the two activities (lobbying and campaign contributions) are stricly related. Grossman and Helpman (2001) argue that contributions often have the role of buying access to politicians or strenghtening the credibility of interest groups, which then influence decision makers through the use of information. Moreover, like contributions, informational lobbying activities represent a cost from the interest groups' perspective, since they involve hiring lobbyists. By contrast, for policy makers, information is an important resource, since it helps them learning about technical details, shaping policies and maintaining relationships with industry and with relevant trade associations and organizations.

Data on lobbying come from the *Center for Responsive Politics* and have been downloaded from the *Opensecrets* webpage. The database allows obtaining annual registration records, where each "Registrant" (the company carrying out lobbying activities) is linked to a "Client" (the firm, association or organization hiring the lobbyists). We cover the period from 2008 to 2014. Differently from PACs contributions, lobbying data are available every year, since they are not strictly linked to congressional cycles. Being our specific interest is on trade policy, we select only those records listing "TRADE" or "TARIFF" among the issues of interest. This is, in our view, a much more precise measure of trade-related lobbying activity than the one coming from the use of PACs. Previous works using PACs had, instead, assumed proportionality between total PACs and trade-related PACs (e.g. Goldberg and Maggi (1999)), or implemented econometric procedures to link general PACs to trade policies (Gawande and Bandyopadhyay (2000)).

In order to get sectoral lobbying expenditures, we classified manually every Client into a 6-digit NAICS sector. When it was not possible to match a client to a precise NAICS-6, we linked it to lower level of

disaggregation (5- 4- or 3-digits). To obtain a measure of lobbying intensity in each sector, we divide lobbying expenditures by the number of firms and we weight them by the industry's value added (Va_i). Since our model, as we can see from equation 15, requires a dummy variables to distinguish between organized and unorganized sectors (I), we use thresholds of $\frac{Lobbying}{Va}$ to define the cutoff. As shown in the results section, since the threshold is based on an arbitrary decision, we use different values of $\frac{Lobbying}{Va}$ to define our indicator variable I, with the purpose of testing for the sensitivity of our results to the definition of political organization.

6.3 Consumer Externality

In the extension of GH presented by this work, consumer externality plays a major role in determining the pattern of protection across sectors. In our framework, the number of NTMs covering a specific sector should depend on government's perception about consumer safety or environment-related risk coming from consumption of imported goods. Being externality very hard to measure, in our empirical analysis we approximate it with a categorical variable accounting for consumers' sensitivity to specific characteristic of products. We build this variable using US jornal articles related to safety or environmental issues. The idea of using media to approximate the attention of politicians towards consumers' well being and the environment is line with a strand of literature studying the political economy of media and, in particular, the policy effects of media coverage (see Prat and Strömberg (2011) for a survey). This literature studies the co-movement over time in coverage of an issue in the media, the importance attached by the public to that issue and policy responses. Indeed, media are sometimes able to create a policy bias, favoring policy responses on issues that get higher press coverage.

To define our externality indicator variable, we first build an index of journal coverage by sector, making use of the online platform *Lexis Nexis Academic*. *Lexis Nexis Academic* contains full-text news reporting from 1980 to present from major national and international sources[3]. The use of *Lexis Nexis* presents, for our purpose, two important advantages. First, the platform itself classifies the articles from the news by industry or product. Secondly, the industry classification of *Lexis Nexis* is based on the NAICS classification, allowing us to match the media variable with the other data we use in our analysis. Second, the articles are also classified by topic. Among the listed topics, *Lexis Nexis* includes "Safety" and "Environment", which are the ones selected for our analysis.

To define our E dummy variable, we implemented the following strategy. All the manufacturing industries

[3]As for the United States, which is the case study analysed by our work, all the major US journals are included, except for the *Wall Street Journal*

and products listed by *Lexis Nexis* were matched to a NAICS 4-digit category [4]. Since the classification operated by *Lexis Nexis* is, in some cases, less refined than the NAICS, we decided to build the externality variable at 4-digit level. For those industries or products not precisely corresponding to a NAICS sector, we helped ourselves with the official website `http://siccode.com/`, which provide a detailed description of all NAICS codes. Then, for each sector, we ran our search on the online platform, obtaining a count the number of articles associated with each industry and product category. This count was done multiple times, filtering *Lexis Nexis* according to different criteria: first, we picked articles from all US newspapers associated to the topics labeled as "Safety" an "Prouct Safety"; second, we specifically selected the reviews *Consumer Report* and *Consumer Report - Health*; third, we selected as topics "Environment" and "Environmental Protection".

In our analysis, the number of safety or environment-related articles represents a proxy of the sensitiveness of consumers about a specific product category. We proxy consumer externality with the a dummy variable (E), which is equal to one when the articles number exceeds a certain threshold. With a similar logic as the one used to define the organization I, we first take the median and then change thresholds in order to test for the robustness of our results.

6.4 Elasticities and Other Variables

Import demand elasticities are taken from Kee et al. (2008), who estimated them at HS-6 digit level of disaggregation. We matched these estimates with the HS-10 products included in each HS-6. Then, the mean of elasticities by NAICS-6 digit sector was computed. Since elasticity an estimated variable, its reliability may be limited. For this reason, following Gawande and Bandyopahdyay (2000), we decided to exclude the elasticity values with the highest standard errors (s.e.$>$ 9), as well as the ones with positive sign. This leads us to exclude part of the observations, ending up with a smaller sample size with respect to the original database (277 NAICS 6-digit sectors instead of 316).

The other variables included in our empirical specification are the exogenous instruments for the Import Penetration equation, as well as the control variables included in the main equation when testing the extended version of the GH model. These variables were obtained from different sources.

The value of imports comes from the *United States Census Bureau* (UCB) and was downloaded at both

[4] To obtain the best correspondence between industry and product codes in *Lexis Nexis* and the NAICS classification, we manually selected all codes that can be linked to manufacturing industry. Specifically, we selected the whole "manufacturing" category, as well as the other following categories: "Defense and Aerospace", "Electronics", "Consumer Products", "Chemicals", "Automotive", "Fashion and Apparel", "Food and Beverage", "Paper and Packaging", "Pharmaceuticals", "Computer and Information Technology".

NAICS 6-digit and HS-10 level. This variable is used to compute import penetration, as well as to weight the number of NTMs in our prevalence ratio index (see equation 20).

All the stuctural characteristics of sectors (value added, employment, capital expenditures, etc.) are taken from the *Annual Survey of Manufacture* (ASM), which can be found on UCB. The Concentration Index is taken from UCB and represents the percentage of value added held by the 4 largest firms. The latest data available are the ones from 2007. When these variables were not available for all NAICS-6 digits sectors, we computed the mean over the NAICS-4 for the missing observations. The number percentage of Union Members over total workers is taken from Unionstats, which draws these data from the *Current Population Survey* (CPS). The occupation categories are taken from the *Bureau of Labour Statistics* (BLS). Following Trefler (1993), we grouped BLS categories into 5 broader groups of employees: engineers and scientists, white collars, skilled workers, semiskilled workers, and unskilled workers.

Finally, the percentage of final goods over total output is taken from input-ouput account data from the *Bureau of Economic Analysis* (BEA). We compute this variable from the *Use* table, which shows how each industry's output is shared between final consumption and intermediate use. The BEA sectors are matched to the NAICS classification through specific correspondence tables.

7 Results

7.1 Main Results

Table 1 displays summary statistics for our main variables of interest. NTM prevalence ratio has a sample mean of 20.18, meaning that NAICS sectors used in our analysis are covered, on average, by around 20 non-tariff measures. Of primary interest are also the import penetration and its inverse (z_i), which show sample mean of 0.82% and 13.8%, respectively, and import demand elasticity, with an average absolute value of 2.29. The variable entering our main specification is the inverse ratio of import penetration over the absolute elasticity, $\frac{z_i}{e_i}$, which has a sample mean of 37.17. We also show summary statistics for lobbying expenditures at the beginning and at the end of our considered period, and for lobbying weighted by sectoral value added, that we use to create our political organization indicator. Moreover, table 1 displays summary statistics for our baseline variable from *Lexis Nexis* counting the articles related to safety from 2004 to 2014, that are on average 910. Finally, summary statistics for the control variables used in the extended version of the model are also reported.

We first test the baseline Grossman and Helpman (1994) model, without taking account of consumer externality. Table 2 shows results coming from the application of GH, using NTM prevalence ratio as

Table 1: I Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
NTM Prevalence Ratio	20.18	18.93	4	224.19
Import Penetration	0.82	2.12	0.00	22.60
Elasticity	2.29	2.50	0.03	30.38
z_i	13.80	55.26	0.04	767.05
$\frac{z_i}{e_i}$	37.17	130.42	0.09	1540.06
LOBFIRM (2008)	2935908	6361033	0	3.14e+07
LOBFIRM (2014)	1578937	2296770	0	1.75e+07
LOBFIRM/Va (2008)	0.90	3.08	0	34.95
LOBFIRM/Va (2014)	0.38	0.52	0	3.36
Safety Related Articles	910.63	2661.26	0	22000
Concentration Index	43.62	20.66	0	97.37
% Union Members	9.65	6.17	0	30.40
Capital-Labor Ratio	0.26	0.30	0.03	2.77
Scale	31.33	104.56	0.92	1512.24

dependent variable. As in Gawande et al. (2006), the indicator variable I is equal to one when lobbying expenditures weighted by sectoral value added are above a certain threshold in all considered years (2008-2014). We run the same regression using four different thresholds, of which the lowest corresponds to the 10th percentile and the highest to the 40th percentile.

Our results are consistent with the Grossman and Helpman (1994) framework, which predicts that the ralationship between trade protection and import penetration (or better, its inverse) depends critically o whether an industry is politically organized or not. Indeed, the estimated coefficients β_1 and β_2 have positive and negative sign, respectively, with $\beta 2 > \beta 1$. The cofficient β_1 is statistically significant at the 0.01 level only for the lowest threshold (10th percentile). By contrast, β_2 is positive and significant for all thresholds, showing that the main prediction coming from the Grossman and Helpman (1994) model and found by previous works is still valid nowadays, using NTMs as dependent variable and defining political organization based on recent trade-related lobbying data. Indeed, our results tell us that, *ceteris paribus*,

Table 2: I Baseline GH model with different thresholds for political organization

	(1)	(2)	(3)	(4)
	10th Percentile	20th Percentile	30th Percentile	40th Percentile
NTM_i				
$\frac{z_i}{e_i}$	-0.307**	-0.0541	-0.0572	-0.0570
	(-2.34)	(-1.30)	(-1.37)	(-1.44)
$\frac{z_i}{e_i} * I_i$	0.354***	0.133**	0.139**	0.150***
	(2.64)	(2.48)	(2.55)	(2.79)
Constant	20.79***	18.76***	18.84***	19.16***
	(11.59)	(12.56)	(12.52)	(12.47)
N	277	277	277	277
% I=1	0.80	0.70	0.60	0.46
Model F	4.38**	4.17**	4.31**	4.92***

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

NTMs tend to be numerically higher in politically organized sectors than in unorganized ones.

Table 3 shows results obtained by testing equation 15, where the externality complonent is added to the GH equation. The variable $\frac{z_i}{e_i}$ is interacted not only with the political organization dummy variable, but also with the externality indicator. For our baseline analysis, we use the 50th percentile of our externality variable, obtained as number of safety-related articles from *Lexis Nexis* weighted by value added, to discriminate between sectors where $E = 0$ and sector where $E = 1$. Since, similarly to political organization, we use an arbitrary threshold to identify those sectors where the government is actually concerned about safety of consumers, we also test the model with higher and lower thresholds as a robustness check. Our results are in line with the predictions coming out of our theoretical framework. The relationship between import penetration and protection through non-tariff measures depends not only on whether the industry is politically organized, but also on whether the government is concerned about consumers' safety. The coefficient β_1 is negative, showing that, when there is neither political activity from industry nor government's concern about potential externalities, NTM prevalence ratio depends negatively on the inverse of import penetration. By contrast, both β_2 and β_3 carry a positive sign, showing that the above relationship is mitigated when either lobbying pressure from industry is

Table 3: I Parsimonious Specification: GH Model Including Externalities

	(1)	(2)	(3)	(4)
	10th Percentile	20th Percentile	30th Percentile	40th Percentile
NTM_i				
$\frac{z_i}{e_i}$	-0.249*	-0.195***	-0.192***	-0.156***
	(-1.83)	(-2.84)	(-2.84)	(-2.59)
$\frac{z_i}{e_i} * I_i$	0.219	0.135**	0.138**	0.121**
	(1.15)	(2.24)	(2.26)	(2.07)
$\frac{z_i}{e_i} * E_i$	0.0944	0.190***	0.185***	0.157**
	(0.92)	(2.72)	(2.65)	(2.24)
Constant	20.87***	20.16***	20.20***	20.30***
	(12.37)	(11.48)	(11.55)	(11.74)
N	277	277	277	277
% I=1	0.80	0.70	0.60	0.46
% E=1	0.50	0.50	0.50	0.50
Model F	3.67**	4.43***	4.48***	4.27***
AIC	15.85	16.01	16.00	15.98

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

high or consumers are subject to health or safety risks coming from imported products. Note that, even if the negative relationship between the inverse ratio of import penetration to elasticity is softened by the existence of both political organization and attention towards consumer safety, the negative sign on $\frac{z_i}{e_i}$ is never reversed. Indeed, if we sum β_1 and β_2, the resulting effect of $\frac{z_i}{e_i}$ on NTMs is still negative for politically organized sectors, even if much less strong than for unorganized ones. The same happens when summing β_1 and β_3, which turn out to be very close in magnitude. In general, we can draw from our results that government tends to set a higher number of NTMs in industries that are more affected by foreign imports. This results is in line with findings from other papers on the political economy of trade protection (see, for example Maggi and Rodrıguez-Clare (2000), Lee and Swagel (1997) and Herghelegiu (2016)).

Table 4: I Extended Specification: GH Model Including Externalities

	(1)	(2)	(3)	(4)
	10th Percentile	20th Percentile	30th Percentile	40th Percentile
NTM_i				
$\frac{z_i}{e_i}$	-0.252*	-0.207***	-0.203***	-0.166***
	(-1.86)	(-2.95)	(-2.96)	(-2.74)
$\frac{z_i}{e_i} * I_i$	0.209	0.140**	0.141**	0.124**
	(1.11)	(2.25)	(2.27)	(2.11)
$\frac{z_i}{e_i} * E_i$	0.103	0.197***	0.191***	0.162**
	(1.03)	(2.80)	(2.73)	(2.31)
Concentration Index	-0.111	-0.134*	-0.132*	-0.128*
	(-1.60)	(-1.76)	(-1.75)	(-1.72)
% Union Members	0.156	0.0899	0.0782	0.109
	(0.69)	(0.36)	(0.31)	(0.44)
$\frac{K}{L}$	2.523	2.433	3.065	3.028
	(0.42)	(0.37)	(0.47)	(0.47)
Scale	0.0264	0.0301	0.0289	0.0299*
	(1.56)	(1.64)	(1.58)	(1.66)
Constant	22.92***	23.75***	23.69***	23.30***
	(6.20)	(5.95)	(5.97)	(5.99)
N	277	277	277	277
% I=1	0.80	0.70	0.60	0.46
% E=1	0.50	0.50	0.50	0.50
Model F***	2.64**	2.79***	2.82***	2.78***
AIC	15.56	15.73	15.72	15.70

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

More importantly for our framework, we can state that, all else held constant, NTMs are higher both in industries represented by organized lobbies and in sectors where the attention towards consumers' safety is high. The thresholds for I are the same as in table 2: as shown at the bottom of the table, the higher the threshold, the lower the percentage of NAICS industries considered as politically organized. All three coefficients of interest are statistically significant for all thresholds, with the exception of the lowest one. Table 4 adds some control variables to our baseline specification with externality. Following previous literature (e.g. Trefler (1993), Gawande and Bandyopadhyay (2000), Gawande and Robbins (2006)), we include some explanatory variables which could influence the level of protection through NTMs: the concentration index of sectors; the percentage of workers who is part of a union; capital-labor ratio; the average firm size (scale). The coefficients on these variables turn out to be almost always statistically insignifican, with the exception of the concentration index. More importantly, our coefficients of interest $\beta 1$, $\beta 2$ and $\beta 3$ are only affected by very small changes when the additional regressors are included. Akaike information criterion (AIC) is reported to compare the parsimonious specification with the extended specification. According to such criterion, which is appropriate for nested models, the "best" model is the one with minimum AIC. By comparing table 3 with table 4, we can conclude that the extended specification performs somewhat better than the parsimonious one, being the AIC values slightly lower in the former than in the latter.[5] In our words, we can state that the fit of our beseline model is not damaged by including additionl regressors.

Our estimates allow us to draw some considerations about the magnitude of the effect of both political organization and presence of consumer externality on NTM prevalence ratio. Consider, for example, results from column 2 of table 4. Looking at our main coefficients of interest, we can infer that an increase of 1 in the inverse of import penetration over elasticity leads to a decrease of 0.20 in NTM prevalence ratio for politically unorganized sectors. The same increase in the inverse ratio of import penetration to import elasticity leads to a 0.06 decrease in NTMs when a sector is politically organized (given by $\beta_1+\beta_2$), and to a 0.01 decrease in NTMs when the government cares about consumer externality. Looking at our summary statistics, which show a mean value of 37 for our inverse ratio of import penetration to elasticity, we can conclude that the presence of an organized sector leads, on average, to a 5.18 (37*0.14) increase in NTM prevalence ratio. With the same logic, we can say that, in sectors where some concern about consumer externality exists, NTM prevalence ratio increases by 7.29 on average with respect to

[5]The Akaike information criterion is computed as $\frac{-2(lnL-k)}{N}$, where lnL is the log of the maximum likelihood, k are the degrees of freedom, and N is the sample size. The other possible test to compare models is the Shwartz criterion (SIC) (see Gawande and Bandyopadhyay (2000)). In our model comparison, the Shwartz criterion gives the same results as the Akaike. Values of the test are not reported, but are available upon request.

sectors where such concern does not hold.

Given these numbers, we can conclude that our estimates find an economically significant effect of both political organization and attention towards consumer safety on the number of NTMs. This sheds some light on the dual nature of NTMs: on one side, they are aimed at protecting domestic manufacturing industry; on the other side, they also have te objective of protecting consumers from the risk of negative externalities coming from imported products.

Unlike previous applications of the GH framework, we do not aim here at inferring the weight attributed by the government to social welfare, lobbies and consumer's externality. Indeed, the original Grossman and Helpman (1994) model is microfounded, allowing retrieving precise values of α_L (the fraction of people organized into a lobby) and a (the weight that government places on social welfare as compared to lobbying). In our model, externality in included as an additional factor in government's function, multiplied by the weight b, which is the relative importance of externality for the government with respect to political contributions (see equation 12). Given the structure of our model, inferring the exact value of b would only be possible if we were able to compute the precise value of the externality (and of its derivative) at sectoral level. However, as mentioned in the data section, externality is unmeasurable, and our empirical strategy consists in an approximation of the model, where a dummy variable indicates whether a risk for consumers exists or not in a certain sector. Therefore, the weights a and b cannot be precisely inferred. The purpose of our empirical test is instead to investigate whether government's concern about health and potential risks for consumers, besides lobbying pressure from industries, is a relevant motivation for increasing the number of non-tariff measures.

7.2 Additional Results

In this section, we present some additional results, showing the first stage of our two-stage least squares model, as well as some robustness checks that we performed to test for the sensitivity of our results. Table 5 reports results of the import penetration, political organization and externality equations, where all three potentially endogenous variables are regressed on their exogenous instruments, as well as on the other model's variables, as shown in equations 18-19. Results from all three equations show that all selected instruments are strongly correlated with the endogenous variables. Moreover, the positive and statistically significant coefficient on NTMs in both the lobbying equation and the externality equation is an indication of the existence of an endogenous relationship, showing also the direction of the bias, which turns out to be positive in both cases.

Table 6 shows our first robustness check, which consists in using alternative definitions of the externality

indicator variable E. In the first two columns of the table, the dummy variable is still based on the number of articles taken from *Lexis Nexis*, selecting articles from all US journals associated to the topic labeled as "Environment" instead of "Safety". Since NTMs are often associated, besides health and safety of consumers, to protection from environmental risks, it is interesting to test whether environmental concerns actually push the government to increase the number of non-tariff measures. The third and fourth column of table 6, instead, show results with the externality dummy variable built using only the reviews *Consumer Reports* and *Consumer Reports Health*. These two reviews are published by Consumers Union, a non-profit organization dedicated to product testing and consumer-oriented research. Therefore, by selecting these media sources, we are sure that we are restricting the articles on which our externality dummy variable is based to topics related to consumer safety and product quality. Results in table 6 confirm our main findings. [6] For all definitions of E, the ratio $\frac{z}{e}$ shows a positive relationship with the number of NTMs in sectors where products are associated with externalities for consumers. At the same time, the coefficient on organized sectors remains positive and significant.

Table 7 presents results obtained defining the variable E with different thresholds with respect to the one used in our main specification. While results shown in subsection 7.1 use the 50th percentile of our externality variable taken from *Lexis Nexis* to identify industries whose products are associated with consumers' safety and quality issues, we use here the 40th and 60th percentiles, to test whether our results are sensitive to decreasing and increasing the threshold. Results prove to be robust to this sensitivity test, being the coefficient β_3 similar in sign, significance and magnitude to its estimate is table 4.

Finally, table 8 displays results from our extended model obtained by excluding those sectors whose output is manly employed as intemediate goods as opposed to final consumption. Indeed, being externality often related to a damage (if negative) or a benefit (if positive) for consumers, it is reasonable to think that intermediate products are unlikely to raise concerns related to product safety. Therefore, it is interesting to test whether our results change when we restrict our analysis to those sectors where the ratio between final and intermediate products is sufficiently high. As explained in the data section, we build the ratio of final goods over total output using the BEA *use* tables and then matching the BEA classification with the NAICS one. Then, we test results from our extended model by excluding those sectors where the percentage of output used for final consumption is lower than the 10th and 20th percentile value, respectively. Results confirm the predictions of our model. After restricting the sample, the coefficient β_2, relative to politically organized sectors, is still positive and significant at 0.5 or 0.1 level. More

[6] For this robusteness check, as well as for the other sensitivity analyses shown in this subsection, we only show two of the four used thresholds for the political organization variable. However, results from the other thresholds also confirm previous findings and are available upon request.

interestingly, the coefficient β_3 on sectors raising concerns about consumers' externalities is substantially bigger here than in our baseline results, and further increases when we switch from the 10th to the 20th percentile as threshold to restrict our sample. This indicates that comparing sectors where consumer externality is relevant with sectors where it is not is even more important when a sufficient fraction of products are employed in final consumption.

8 Summary and Conclusions

With the progressive increase of non-tariff measures as trade policy instrument, studying the political economy determinants of these measures has become of primary relevance. In particular, when considering technical measures such as standards and labelling requirements, it is important to take account that they reflect public policy goals. Indeed, they are set with the intention of ensuring consumers' health and safety and protectiong the environment. However, they may be also be applied in a way that restricts trade, resulting sometimes into a protectionist effect.

Our paper extends the "Protection for Sale" model by Grossman and Helpman (1994) to the inclusion of consumer externality. In our framework, the government sets trade policies taking account of political contributions, public welfare, and the concern about the potential damage coming from imported products and affecting consumers (negative externality). The model predicts that protection should increase, on average, both when a sector is politically organized, and when consumers and the environment are exposed to risk of damages.

We test the predictions of our framework using 2014 data on non-tariff measures imposed by the United States on all the World partners. Given the consumer safeguard purpose of NTMs, these measures represent the ideal trade policy instrument to test our Grossman and Helpman (1994) model with consumer externality. Our application represents a novelty with respect to previous empirical literature (e.g. Goldberg and Maggi (1999), Gawande and Bandyopadhyay (2000)) in several respects. First, we use recent data on non-tariff measures instead of non-tariff barriers to trade. Second, we measure political organization using data on trade-related lobbying expenditures instead of generic contributions from Political Action Committees. Finally, we augment our empirical specification with a measure of consumer externality, using US journals to build a proxy for the attention towards safety and health issues across products from manufacturing sectors.

Our results confirm predictions from our theoretical framework. In line with the Grossman and Helpman (1994) model, we find a negative relationship between the inverse ratio of import penetration to absolute elasticity and the average number of NTMs across industries. However, this relationship is mitigated

when an industry is politically organized, a well as when consumers and the environment are exposed to risks according to our externality measure. Overall, we find that NTMs significantly increase in number in presence of both interest groups' political pressure and government's concern about potential damages for consumers.

Our work brings some new insight to research on the political economy of NTMs, suggesting that governments' decisions on these measures may be driven by a protectionist intent, as well as concerns about consumers' well being and the environment. This topic may lead to further research. In the future, it might be interesting to estimate the trade effect of NTMs more precisely, with the aim of understanding whether the political economy determinants differ between protectionist and non-protectionist measures. Furthermore, we may also try to extend our theoretical framework, internalizing externality in consumers' utility function, thus envisaging its direct impact on demand.

Table 5: I First Stage Results

	Import Penetration	$ln\frac{Lobbying}{Va}$	$ln\frac{Safety}{Va}$
NTM	0.00627		
	(0.34)		
Perc. White Collar	9.433***		
	(7.67)		
Perc. Semiskilled	6.660***		
	(7.00)		
Perc. Unskilled	-33.40**		
	(-2.77)		
ln NTM		0.177*	0.923***
		(2.38)	(5.66)
ln(Elasticity)		-0.0195	0.0213
		(-0.67)	(0.31)
$ln\frac{1}{z_i}$		0.0224	0.0922
		(0.87)	(1.55)
$ln\frac{LobbyingOrth.}{Va}$		0.330***	
		(8.05)	
$ln\frac{NonUSNonSafety}{Va}$			0.0932***
			(12.93)
Constant	-5.406***	-0.324*	-2.364***
	(-5.69)	(-1.68)	(-5.43)
Model F	18.63***	24.08***	49.98***
N	277	277	277

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: I Robustness Check: Alternative definition of the "Externality" indicator variable

	Environment		*Consumer Reports*	
	20th Percentile	40th Percentile	20th Percentile	40th Percentile
NTM_i				
$\frac{z_i}{e_i}$	-0.285**	-0.301**	-0.171***	-0.168***
	(-2.41)	(-2.51)	(-2.76)	(-2.80)
$\frac{z_i}{e_i} * I_i$	0.188**	0.209***	0.0962*	0.114**
	(2.36)	(2.62)	(1.65)	(2.03)
$\frac{z_i}{e_i} * E_i$	0.263**	0.282**	0.161**	0.151**
	(2.15)	(2.20)	(2.45)	(2.27)
Concentration Index	-0.104	-0.118	-0.0920	-0.100
	(-1.14)	(-1.24)	(-1.36)	(-1.47)
% Union Members	0.0277	0.0537	0.131	0.137
	(0.09)	(0.17)	(0.57)	(0.59)
$\frac{K}{L}$	4.405	5.344	2.750	3.255
	(0.55)	(0.64)	(0.46)	(0.54)
Scale	0.0228	0.0232	0.0264	0.0269
	(1.02)	(0.99)	(1.58)	(1.60)
Constant	21.84***	22.56***	21.09***	21.51***
	(4.65)	(4.57)	(6.01)	(6.07)
% I=1	0.70	0.46	0.70	0.46
% E=1	0.50	0.50	0.50	0.50
N	277	277	277	277
Model F***	1.79*	1.90*	2.86***	3.04***
AIC	18.32	18.41	18.01	18.02

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: I Robustness Check: Alternative thresholds for the "Externality" indicator variable

	(1)	(2)	(3)	(4)
	20th Percentile	40th Percentile	20th Percentile	40th Percentile
NTM_i				
$\frac{z_i}{e_i}$	-0.229***	-0.175***	-0.175***	-0.146***
	(-2.89)	(-2.68)	(-2.95)	(-2.74)
$\frac{z_i}{e_i} * I_i$	0.196***	0.174***	0.109*	0.0992*
	(3.11)	(3.17)	(1.86)	(1.68)
$\frac{z_i}{e_i} * E_i$	0.196**	0.148**	0.169***	0.146**
	(2.53)	(2.09)	(2.86)	(2.32)
Concentration Index	-0.121*	-0.118*	-0.0964	-0.0962
	(-1.71)	(-1.72)	(-1.38)	(-1.38)
% Union Members	0.137	0.145	0.132	0.143
	(0.58)	(0.63)	(0.56)	(0.61)
$\frac{K}{L}$	2.263	3.164	2.534	2.992
	(0.37)	(0.53)	(0.41)	(0.49)
Scale	0.0302*	0.0299*	0.0292*	0.0291*
	(1.76)	(1.80)	(1.70)	(1.70)
Constant	23.57***	23.16***	21.33***	21.29***
	(6.28)	(6.39)	(5.91)	(5.90)
% I=1	0.70	0.46	0.70	0.46
% E=1	0.40	0.40	0.60	0.60
N	277	277	277	277
Model F	2.84***	2.97***	3.07***	2.99***
AIC	15.60	15.54	15.61	15.60

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: I Robustness Check: Exclusion of sectors with the lowest proportion of final goods over total output

	Excluding 10th percentile		*Excluding 20th Percentile*	
	20th Percentile	40th Percentile	20th Percentile	40thPercentile
NTM_i				
$\frac{z_i}{e_i}$	-0.233***	-0.221***	-0.258**	-0.244**
	(-2.71)	(-2.64)	(-2.51)	(-2.45)
$\frac{z_i}{e_i} * I_i$	0.113**	0.108*	0.110*	0.104*
	(1.97)	(1.86)	(1.80)	(1.70)
$\frac{z_i}{e_i} * E_i$	0.239***	0.230***	0.261***	0.250***
	(3.01)	(2.95)	(2.78)	(2.72)
Concentration Index	-0.0739	-0.0718	-0.0750	-0.0720
	(-0.96)	(-0.94)	(-0.89)	(-0.86)
% Union Members	0.130	0.125	0.251	0.243
	(0.52)	(0.50)	(0.88)	(0.86)
$\frac{K}{L}$	1.403	1.447	1.846	1.938
	(0.21)	(0.22)	(0.22)	(0.23)
Scale	0.0330*	0.0341*	0.0292	0.0307
	(1.84)	(1.90)	(1.40)	(1.48)
Constant	20.12***	20.25***	19.81***	19.87***
	(5.12)	(5.15)	(4.53)	(4.56)
% I=1	0.70	0.46	0.73	0.50
% E=1	0.50	0.50	0.50	0.50
N	250	250	221	221
Model F	2.89***	2.86***	2.50**	2.48**
AIC	14.20	14.19	12.93	12.97

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: *L*ist of lobbying issues selected to create the instrumental variable ("Orthogonal Issues")

EXOGENOUS ISSUES
ACCOUNTING
ADVERTISING
ALCOHOL AND DRUG ABUSE
ARTS/ENTERTAINMENT
BANKING
BANKRUPTCY
BUDGET/APPROPRIATIONS
CIVIL RIGHTS/CIVIL LIBERTIES
COMMUNICATIONS/BROADCASTING/RADIO/TV
CONSTITUTION
DISASTER PLANNING/EMERGENCIES
DISTRICT OF COLUMBIA
EDUCATION
ENERGY/NUCLEAR
FAMILY ISSUES/ABORTION/ADOPTION
FINANCIAL INSTITUTIONS/INVESTMENTS/SECURITIES
GAMING/GAMBLING/CASINO
GOVERNMENT ISSUES
HOMELAND SECURITY
HOUSING
INDIAN/NATIVE AMERICAN AFFAIRS
INSURANCE
INTELLIGENCE
LAW ENFORCEMENT/CRIME/CRIMINAL JUSTICE
MEDIA (INFORMATION/PUBLISHING)
MEDICAL/DISEASE RESEARCH/CLINICAL LABS
MEDICARE/MEDICAID
MINTING/MONEY/GOLD STANDARD
POSTAL
RAILROADS
REAL ESTATE/LAND USE/CONSERVATION
RELIGION
RETIREMENT
ROADS/HIGHWAY
TAXATION/INTERNAL REVENUE CODE
URBAN DEVELOPMENT/MUNICIPALITIES
UTILITIES
VETERANS
WASTE (HAZARDOUS/SOLID/INTERSTATE/NUCLEAR)
WELFARE

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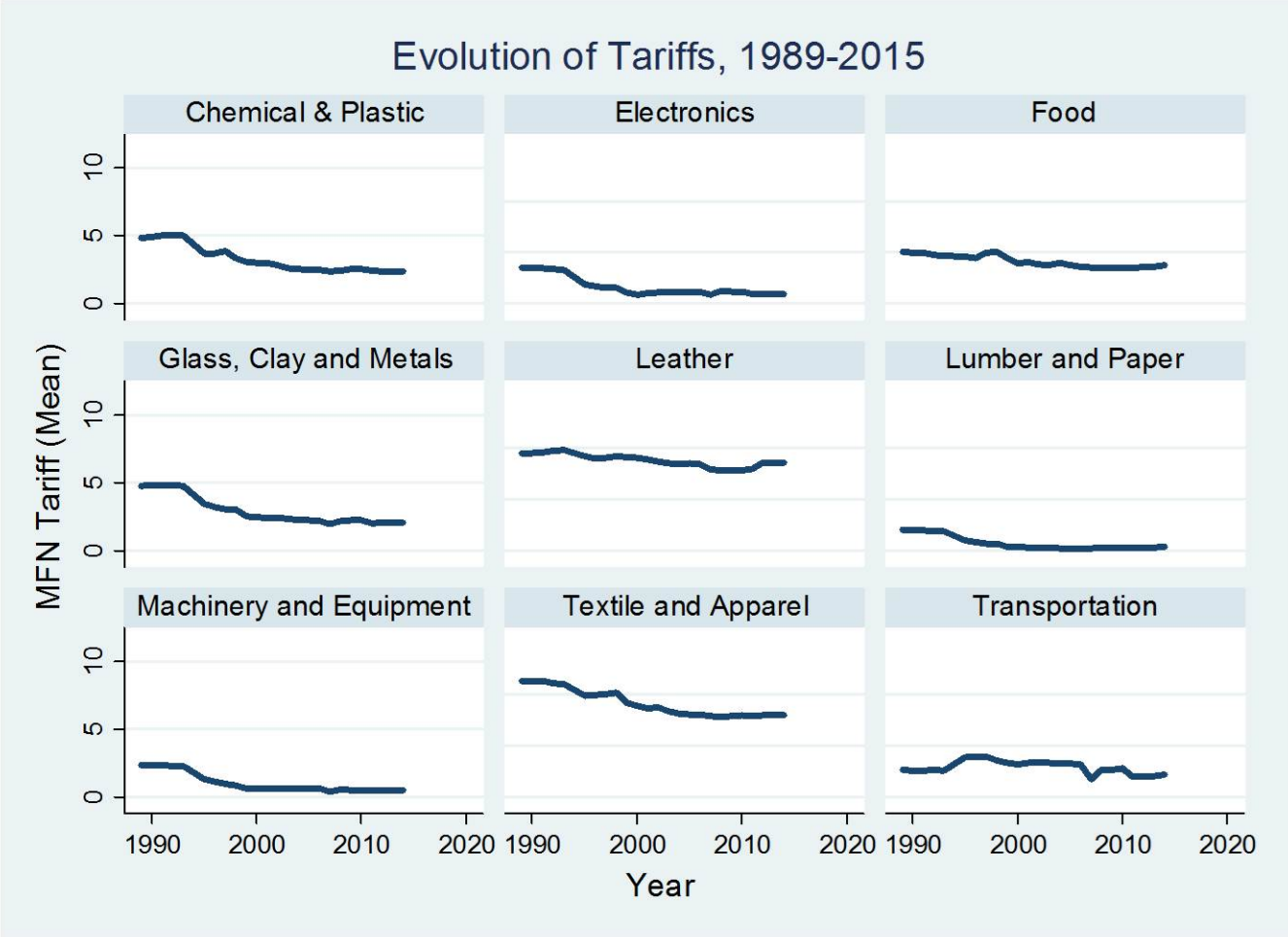

Figure 1: Evolution of tariffs

Imports	Technical measures	A SANITARY AND PHYTOSANITARY MEASURES
		B TECHNICAL BARRIERS TO TRADE
		C PRE-SHIPMENT INSPECTION AND OTHER FORMALITIES
	Non technical measures	D CONTINGENT TRADE-PROTECTIVE MEASURES
		E NON-AUTOMATIC LICENSING, QUOTAS, PROHIBITIONS AND QUANTITY-CONTROL MEASURES OTHER THAN FOR SPS OR TBT REASONS
		F PRICE-CONTROL MEASURES, INCLUDING ADDITIONAL TAXES AND CHARGES
		G FINANCE MEASURES
		H MEASURES AFFECTING COMPETITION
		I TRADE-RELATED INVESTMENT MEASURES
		J DISTRIBUTION RESTRICTIONS
		K RESTRICTIONS ON POST-SALES SERVICES
		L SUBSIDIES (EXCLUDING EXPORT SUBSIDIES UNDER P7)
		M GOVERNMENT PROCUREMENT RESTRICTIONS
		N INTELLECTUAL PROPERTY
		O RULES OF ORIGIN
	Exports	P EXPORT-RELATED MEASURES

Figure 2: Non tariff measure classification by chapter, official international classification by UNCTAD. Source: UNCTAD (2012)

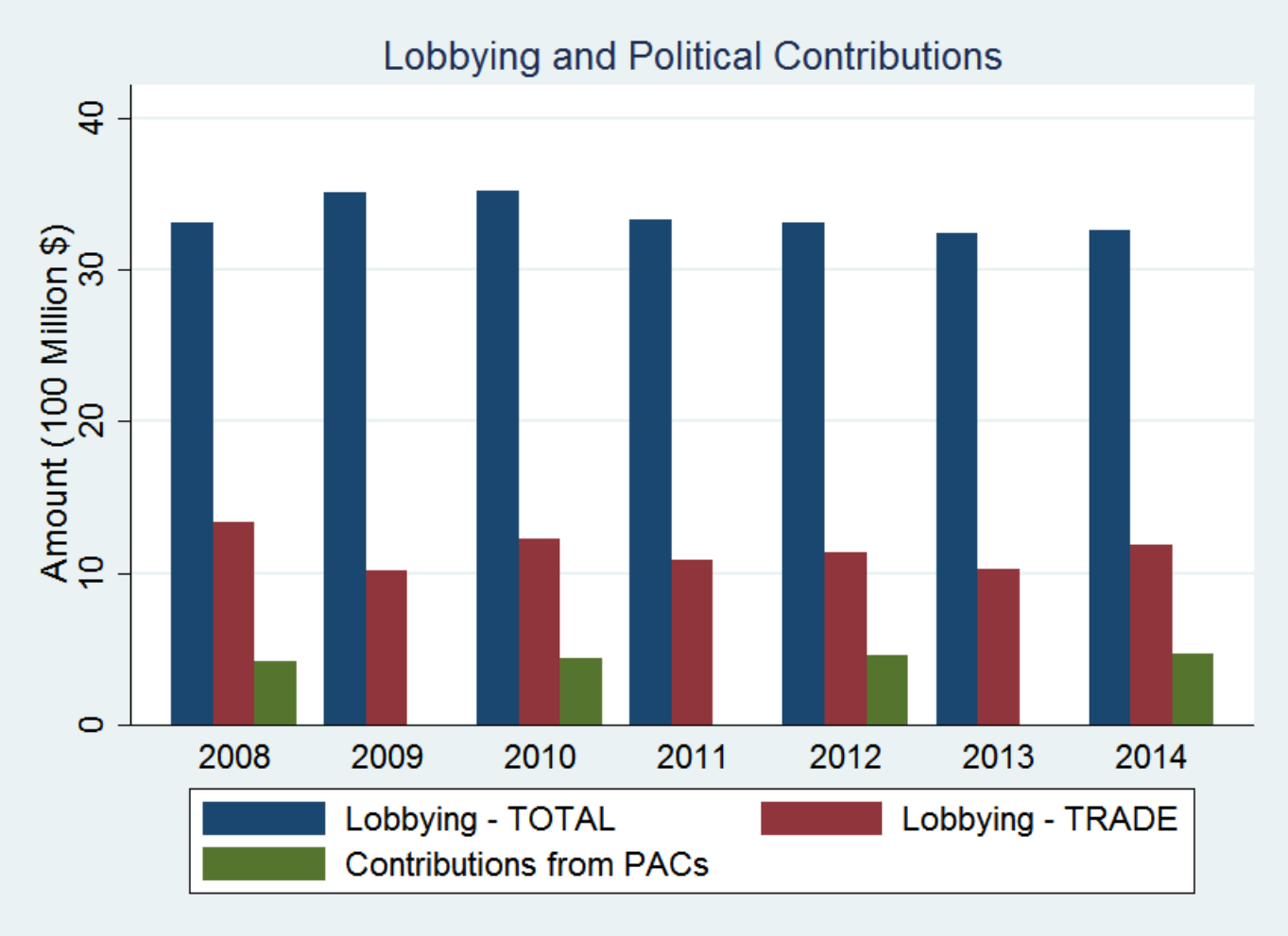

Figure 3: Source: Authors own calculations using data from *Opensecrets*