UNIVERSITY OF SUSSEX
ECONOMICS

Working Paper Series

No. 04-2017

Trade Policy & Lobbying Effectiveness: Theory and Evidence for India

Amrita Saha*
University of Sussex
Amrita.Saha@sussex.ac.uk

Abstract: The objective of this paper is to quantify *Lobbying Effectiveness* for trade policy. I introduce this measure into Grossman and Helpman's (1994, American Economic Review 84: 833–850) model of protection-for-sale (PFS). Two alternate factors are suggested to explain differences in lobbying effectiveness across sectors; first, predisposition of the government to supply protection (owing arguably to a perception bias to certain lobby groups that present their policy stance better); and second, the ability to organize and lobby for protection (based on market structure). Applying this framework to Indian data, I begin by estimating the traditional PFS model with a new measure of political organization. Then using panel data, I estimate lobbying effectiveness measures for the manufacturing sector. Additionally, I examine the political economy determinants of lobbying effectiveness in the context of Indian trade policy. The findings are a first for India and suggest an overall strong competition effect than any free-riding in lobbying for trade policy. First, for the most effective sectors, a high output to import ratio translates to higher trade protection; for the least effective/ineffective sectors, higher output to import ratio translates to lower trade protection. Second, sectors with geographically concentrated firms are more effective in lobbying, and effectiveness declines with an increase in product substitutability within sectors.

JEL classification: F13; F14; F5

Key words: Lobbying Effectiveness, Trade Policy, India

---

* Support from the Commonwealth Scholarship Commission in the UK is gratefully acknowledged. I thank my PhD supervisors Prof. L. Alan Winters and Dr. Ingo Borchert for invaluable feedback at every stage of the research; I also acknowledge advice from Prof. Kishore Gawande, and my thesis examiners Prof. Marcelo Olarreaga and Dr Dimitra Petropoulou. Any remaining errors are entirely mine.

1 INTRODUCTION

Trade theory prescribes free trade, yet in practice we observe protection often governed by political circumstances and development realities. Literature in political economy of trade policy has provided evidence on these choices[1], but quantifying effectiveness in lobbying for trade policy outcomes has met with limitations, especially for developing countries[2].The objective of this paper is to motivate a framework that can explain and estimate measures of lobbying effectiveness. Understanding and quantifying the effectiveness of lobbying in obtaining policy outcomes has been a challenging task. de Figueiredo and Richter (2014) in a very useful review of the literature on lobbying discuss the econometric identification issues that make it problematic to ascertain causal mechanisms for lobbying effectiveness on trade policy[3]. In this light, the PFS model provides a potentially clean structural framework to examine lobbying effectiveness.

The paper begins by discussing the traditional Grossman and Helpman (1994) (American Economic Review 84: 833–850, GH henceforth) model of *Protection for Sale* (PFS henceforth). It seeks to explain the political economy forces that drive trade liberalization, providing evidence for India uisng a new measure of political organization in PFS. I then introduce a new measure into PFS to analyse how differences in lobbying effectiveness affects the trade protection outcome. In the PFS model, the ability to lobby is specified in terms of political organization across industries and is given exogenously. The distinction is dichotomous such that the classification is into those industries that are fully organized and those that are unorganized. All fully organized industries exhibit the same relationship between import penetration and trade protection, while the unorganized industries show the opposite relationship. There exist no differences in this effect within the set of organized or unorganized industries[4]. The exogenous and dichotomous distinction is known to suffer from limitations when taken to empirical data[5]. First, political contributions have been used to assign the exogenous political-organization dummies. These contributions are actually endogenous and there exist differences across sectors in the contribution offers forwarded to the government. Second, there exist unobserved factors that can discriminate in lobbying ability across industries. The assumption of all industries

[1]Grossman and Helpman's (1994, American Economic Review 84: 833–850) protection-for-sale (PFS) hypothesis for instance has been examined by a number of studies that include Goldberg and Maggi (1997) (GM henceforth) and Gawande and Bandyopadhyay (2000) (GB henceforth) for the United States. Estimates for other countries include Mitra et al. (2002) for Turkey; McCalman (2004) for Australia; Belloc (2007) for the EU; and Bown and Tovar (2011) and Cadot et al. (2007) for India. This empirical literature has focussed on checking the predictions of the model and estimating its structural parameters, as a strict test of the PFS model would require a well-specified alternative hypothesis to explain trade protection as argued in GM. Further, the absence of data on political contributions or lobbying for developing countries such as India makes it hard to appropriately identify political organization when estimating the model for such countries.

[2]Gawande et al. (2015) outline limitations of the PFS literature for emerging and less developed countries. de Figueiredo and Richter (2014) discuss issues with quantifying lobbying effectiveness.

[3]This includes a significant omitted variable problem as not all political instruments for influence can be observed such as ability to lobby. The omitted variables correlated with the included terms can result in biased parameter estimates and incorrect causal inference.

[4]Any differences in intra-industry free rider problems are also assumed away such that those industries that overcome the free rider problem are organized while others are not.

[5]Discussed in Goldberg and Maggi (1997) and Imai et al. (2009) among others.

being politically organized or not however does not account for any such differences in lobbying. I find that there is only limited direct evidence on this issue within the PFS literature, and less so for developing countries.

In the literature, most industries are found to make some amount of political contributions. In this light, it has often been assumed that all industries are fully organized as in Gawande and Magee (2012). This assumption seems to make the binary measure of the PFS model somewhat redundant. However, I argue that while it is plausible that all industries make some amount of contributions, there are varying degrees of lobbying that affects the amount of contributions or information that can be supplied to the government across sectors. Following similar logic, Gawande and Magee (2012) allow for another class of partially-organized industries, that creates three categories of political organization but it does not fully account for differences in lobbying across all sectors. Endogenizing the binary measure of political organization, Mitra (1999) showed that industry groups organize according to some dominant kind of heterogeneity that addresses the demand side component of protection but again identifies the binary measure of organization across sectors. However, not much has been said about the effectiveness of lobbying within the PFS model.

I introduce *Lobbying Effectiveness* to replace the exogenous political organization variable in the traditional PFS model to capture differences in lobbying across sectors. The ability of interest groups to organize politically and cooperate for lobbying can have an obvious effect on the trade policy outcome. Asserting potential heterogeneity in lobbying for a trade policy outcome across sectors, I explore the question of what can generate these differences and how to introduce this into the theoretical framework of the traditional PFS model. The measures of lobbying effectiveness are then derived from the data such that heterogeneity is based on the idea that government preferences and/or the market structure of the industry leads to differences in the effectiveness in lobbying.

To provide theoretical motivation for pursuing this line of reasoning, I explore two different approaches within the traditional PFS setting. On the supply side of protection, there can be potential bias from the government to a particular lobby[6]. This is based on government preferences such that the weight government puts on different sectors is not the same (not all dollar contributions are equal when coming from different sectors). On the demand side of sectors lobbying for protection, the iceberg cost component[7] is introduced on lines of differences in market structure that can lead to lobbying advantages or disadvantages. These may include inherent resource advantages across sectors say in terms of geographical location that can enable easier and more effective lobbying by certain groups than others. It may also be determined by factors such as the sum of exporter and importer lobbying interests in each sector or foreign ownership versus

[6] I find such biases have found various explanations in the existing literature. For example, Baldwin and Robert-Nicoud (2007) relate this to the ability of expanding and contracting industries to appropriate the benefits of lobbying such that government policy is likely to pick losers. Fernandez and Rodrik (1991) use the notion of identity bias to account for a potential reluctance of governments to adopt changes in policies. Often the government can be committed to protect its infant industries in earlier stages of development.

[7] It is based on paying the cost of lobbying with a portion of the lobbying resources.

domestic lobbying in a given industry.

Following the theoretical motivation, empirical estimates on lobbying effectiveness are derived using a panel dataset for India from 1999-2007. I estimate varying degrees of lobbying effectiveness across sectors[8]. To further explore the demand side of protection, I ask the question of what determines lobbying effectiveness in terms of potential resource advantages across sectors. The main aim of the empirical exercise here is to obtain estimates on lobbying effectiveness for India and to examine the determinants of these measures to explain the differences across sectors.

The remainder paper is organized as follows. Section 2 provides the background for the paper on PFS, lobbying effectiveness and political economy of Indian trade policy. Section 3 outlines the details of the traditional PFS model, including a discussion of selected literature on estimating PFS with empirical data, select theoretical extensions of PFS relevant to this study, empirical issues in estimation of the PFS, and identification of political organization in the model. Section 4 outlines the theoretical framework on the modified PFS with lobbying effectiveness. Section 5 presents the econometric models, data and methodology. Finally, Section 6 concludes.

2 BACKGROUND

2.1 Protection for Sale

The PFS model is a popular approach to endogenous trade policy. The model provides micro foundations to the behaviour of organized lobby groups and the government to derive the level of endogenous protection. It explains the differences in protection across sectors with the inverse import-penetration ratio, the import elasticities and whether or not the industry is politically organized[9]. The distribution of firms within the sector does not matter for the determination of trade policy in the traditional PFS setting. Protection is derived as positively related to inverse import penetration for politically organized sectors and negatively related for the unorganized ones. Equilibrium tariffs are based on the joint maximization of welfare for the government and special interest groups. I begin by discussing the interpretation and derivation of the traditional PFS model.

Second, I estimate traditional PFS where I attempt to deal with various empirical issues outlined in the existing literature on PFS and provide new evidence for India using data from 1990 to 2007. This estimation does not significantly detach from the original theoretical model. A unique dataset that combines trade, industry and lobbying information is compiled for analysis. Consistency is determined by examining if the signs of the coefficients are in line with the predictions of the model. If the consistency check is

[8]The main aim is to use the variation in the dataset to estimate the theoretical measure of lobbying effectiveness based on the political economy framework of modified PFS.

[9]The level of 'industry' and 'sector' is used alternatively in the PFS to imply the same unit of analysis that is the sector such that the decision to lobby and how much to contribute is made at this level.

satisfied, the structural parameters can be calculated using the coefficients.

Third, the attempt is to deal with the absence of data on political contributions and lobbying for India. In India, membership to associations are often seen as a more legitimate means of lobbying where associations have close ties to the government and are seen a means of crucial information for policy. These associations include especially the apex bodies of CII and FICCI that sponsor and participate in general policy debates as outlined in Kochanek (1996).I construct a new indicator for political organization in India based on data from the *World Bank Enterprise Survey* (WBES) which has not been used in estimating the PFS model before.

Finally, I undertake a structural interpretation of the political economy factors of trade liberalization in India along the lines of changes in government preferences across time based on the findings of the model. The parameter values can then be used to explain the tariff liberalization process that was undertaken in India.

What are the unique contributions here? To the best of my knowledge, this is the first attempt estimating the PFS model using a dataset that combines trade, industrial data across a time period of 1990-2007 with lobbying information for the Indian manufacturing sector. The two papers that have estimated the PFS model for India, have restricted their analysis for only select years. Second, I construct a new indicator of political organization in India based on firm lobbying in each sector within the letup of the traditional model. Finally, I offer a structural interpretation of political economy of Indian trade liberalization for several years.

The main findings are the following. First, using the cross-sectional data for each year, PFS hypothesis finds strong support for MFN tariff protection in India for the select years 1999, 2000, 2001 and 2004. Second, I find support for the GH findings using the entire pooled dataset that includes trade protection across nine years since liberalization. Third, I no longer find the GH findings in terms of the traditional set-up when I control for time or sector fixed effects. Fourth, I present a more realistic structural interpretation of the political economy of Indian trade policy that gives evidence on the political economy of trade protection such that the Indian government seems to attach importance both to social welfare and producer concerns. Finally, I restrict my pooled dataset for 2000 onwards and find strong support for the argument that MFN applied trade protection was in fact for sale.

2.2 Lobbying Effectiveness

Empirical evidence on the PFS with pooled data suggests that applied MFN protection has been for sale only from 1999-2004. However, as argued above, organization as in the PFS model is only a discrete story which has limitations in capturing how differences in actual lobbying affect the influence on trade policy. Also, political organization does not necessarily imply actual lobbying. Thereby, the empirical evidence on the traditional PFS motivates the need of a measure to incorporate differences in lobbying across sectors. I believe that such a modification can add value to the GH hypothesis, reflecting actual lobbying abilities across sectors.

What is new is allowance for the fact that different kinds of lobbying which are hitherto unexplained in the PFS model can vary in their effectiveness of achieving favourable influence for policy-making. But why one should explore this question requires further depth. A primary explanation follows from the basic premise of PFS that is the fact that an interest group can influence the outcome of trade policy, however in practice it is observed that the level of trade protection obtained by groups can vary immensely. These are not simply restricted to being politically organized versus unorganized as in the traditional framework. This motivates the need to understand why different interest groups have different impact on policy outcomes and therefore achieve different effectiveness in their lobbying efforts when interacting with the government.

Heterogeneity in lobbying effectiveness has been suggested in the previous literature. Hillman et al. (2001) has explored the possibility of an ex-ante decision to invest in lobbying activity. He shows that the industry equilibrium is influenced by lobbying technology, establishing that an index of concentration is related to effectiveness of collective action of the industry. Further, Hillman (1989) has argued that heterogeneity among firms in terms of a fixed stock of resources and distribution of market shares plays a major role in political allocations of firms to influence endogenous economic policies.

Long and Soubeyran (1996) provides theoretical support for the idea that degree of heterogeneity within a pressure group is an important determinant of the group's influence. In their paper, heterogeneity is defined in terms of differences in unit costs of production. In the cooperative lobbying case, an increase in heterogeneity will lead to an increase in total lobbying expenditures if in equilibrium the elasticity of demand curve is negative. In the non-cooperative lobbying case, an increased tariff tends to benefit large firms relative to small firms, and the bias is more pronounced if the variance of the unit costs is higher.

Bombardini (2008) builds a model with heterogeneous firms in the presence of a fixed cost of channelling political contributions. A continuous measure of organization is developed where the equilibrium share of total output is the continuous measure that characterizes firms. However, it builds on the PFS assumption that some industries perfectly overcome the free rider problem and therefore organize, other industries are unorganized. The focus of her paper is to examine how differences in firm size affects the propensity to lobby. However, the empirical evidence still includes the binary sectoral political organization variable. The government is assumed to place equal weights on welfare and contributions where the estimates for the weight on welfare are found extremely high. Interpreting the measure a has in fact met with several problems in the literature with often implausibly large estimates. In Mitra et al. (2002), they argue that plausible (i.e. low) estimates of the policy maker weight on social welfare a are obtained if the fraction of population represented by an industry lobby is close to 90 percent. If the lobby groups and the population in a given country have comparable influence on policy-makers, then this measure should be approximately 1. Thee empirical analysis in this paper will assume

$a = 1$ to estimate the variable of interest in this case being measures on lobbying.

Assuming differences across sectors in terms of government preference would imply different weights on different components. Additional weights for political strength have also been included in government preferences in the literature following different reasoning than in this paper. In Maggi and Rodrıguez-Clare (2000), the government objective is taken as the sum of the consumer surplus, the producer surplus weighted by a different factor (interpreted as the valuation of rent to specific factor owners relative to consumer surplus), the rents from importers weighted by another factor (interpreted as capturing political strength of importers) and the tariff revenue also assigned a different weight. The weight attached to producer rents is of interest to my work, however there is no empirical evidence on this measure as the model is not estimated with data.

Swinnen and Vandemoortele (2011) postulate a political economy model of public standards where the government objective function is a sum of the contributions of producers with a factor attached (interpreted as lobbying strength of producers), contributions of the consumers (also assumed to be organized into interest groups) with another factor (interpreted as lobbying strength of consumers) and welfare. In their paper, the government preferences are altered to reflect differences between groups of producers, consumers or importers assigning additional weights for lobbying strengths. However, again there is no empirical evidence and the exposition does not address heterogeneity across different producer lobby groups.

On lines of the above, different weights are also adopted more recently in Gawande et al. (2015) to examine cross-country heterogeneity in government preferences. Their paper develops a broad theoretical framework that derives predictions on three determinants: consumer welfare, producer interests, and tariff revenue. They obtain quantitative estimates of underlying parameters describing the relative weights that government places on the three factors. A high degree of cross-country heterogeneity is observed in the estimates of the absolute weights placed by governments. Their results suggest that developing countries with weak tax systems have higher valuation for tariff revenue, while more developed countries value producer interests the most. Finally, they find that very few countries hold consumer welfare dear. An understanding of these weights hold importance for the underlying determinants of trade policy reform especially for developing countries to formulate policy prescriptions. In this light, this paper attempts to provide evidence on government valuation of lobbying that can differ by industries providing empirical evidence for India.

The primary aim here is to provide original estimates on lobbying effectiveness for the manufacturing sector in India. I use a simple modification of the structural framework of the PFS to derive theoretically consistent empirical measures of lobbying effectiveness. Asserting potential heterogeneity in terms of differences in lobbying for a trade policy outcome across sectors, the natural questions to ask are the following. First, how to introduce this into the theoretical framework of the traditional PFS model? Second, what can generate these differences?

The differences in lobbying for trade policy influence are introduced using a measure of lobbying effectiveness that varies across sectors where heterogeneity derives from the idea that lobbies have different influence on the equilibrium policy. It has been implicitly assumed in much of the literature on PFS that lobbies only differ in terms of organization that misses on several dimensions of potential heterogeneity in actual lobbying. To analyse the impact of lobbying effectiveness on trade protection, I build a framework that follows the environment in GH and makes the assumption that there may be two alternate factors that can influence effectiveness in lobbying. This includes the predisposition of the government to supply protection (owing arguably to a perception bias to certain lobby groups that present their policy stance better) or the ability of a lobby to organize and make a case for protection (Baldwin (1989); Pincus (1975)). This simple modification gives us the framework of **Modified PFS with Lobbying Effectiveness**.

Finally, I examine the question: *"What determines Lobbying Effectiveness in the Indian manufacturing sector?"*. I use the estimates derived from the modified framework and examine these in terms of the sector ability to lobby given by the geographical location, similar or differentiated goods produced in the sector, opportunity to interact with the government among others. The evidence suggests that sectors with geographically concentrated firms are more effective in lobbying and the effectiveness declines with an increase in similarity of goods produced in the sector. Further, for sectors where firms produce differentiated goods, lobbying effectiveness increases with an increase in geographical spread. This suggests an overall competition effect that seems to dominate any free-riding effects.

2.3 Political Economy of Indian Trade Policy

The political economy of Indian trade policy is interesting on account of a unique institutional framework. The mechanisms of this structure seem dynamic, yet have not been not very well-defined in the past (Yadav (2008); Saha (2013)). Trade policies in India have been the subject of strong political economy arguments. The interaction between the manufacturing industry and the government has been a topic of wide debate with a seemingly likely impact on India's stance in multilateral forums.

Until economic liberalization in the 1990s, domestic interaction for trade policy was only at the margin. By 2000, the policy scenario was transformed such that domestic producer interests could effectively determine negotiating positions by communicating with the apex organization of MOCI overseeing Indian trade policy as outlined in Narlikar (2006). The increased engagement of India in international negotiations stimulated overlaps across its fragmented ministries and sectors that further demanded greater domestic interactions and meetings for mediation of differences across sectors.

Bodies such as the Confederation of Indian Industry (CII) and the Federation of Indian Chambers of Commerce and Industries (FICCI) became very active during the decade of 2000s. That associations sought to combine the interests of domestic business with the imperatives of economic liberalization faced by India is asserted in Baru (2009). Government response to domestic business concerns grew as industry was also actively involved in multilateral negotiations at the WTO; in turn government participated in business association meetings at home to inform its multilateral agenda.

Another reason why it is interesting to examine political economy of Indian trade policy owes to historically one of the highest trade barriers in the world. Figure 1 shows the average Most Favoured Nation (MFN) tariffs (at the 4-digit of National Industrial Classification)[10] for the manufacturing sector stood at a high of 85 per cent in 1990. Post the IMF mandate in 1991, these tariffs reduced to 44 per cent by 1996. I find that the standard deviation of tariffs dropped by half during the same period but remained quite high between 32-36 per cent. The nature of these changes in applied MFN protection across 1990-2007 (observed below) present the case of these tariffs as a potentially interesting question to examine the extent to which political economy factors can be used to understand the determinants of this specific trade policy in India. This enables an investigation of whether these tariffs align closely with the well-known predictions of existing political economy models.

Figure 1: MFN Applied Tariffs in India

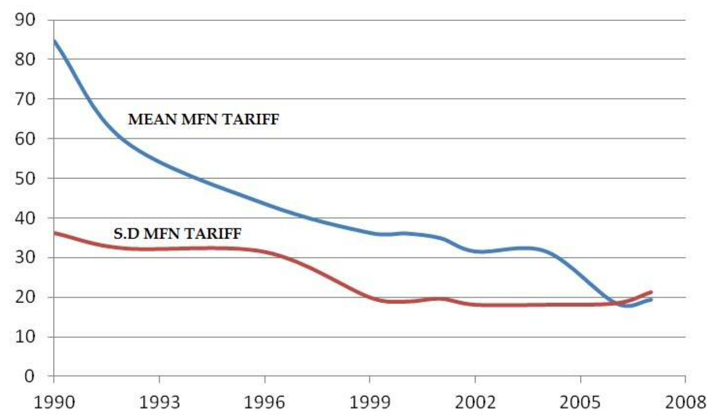

Figure 1 shows the Mean and Standard Deviation (S.D.) for the MFN Applied Tariffs in India from 1990-2007.

India has aligned to the importance of international trading systems while having a degree of independence in its trade policy formulation. This stance is often linked to the domestic set-up that has constantly expressed the specific needs of developing countries. How this domestic political economy of trade policy evolved since liberalization deserves attention. Figure 2 outlines the linear relationship between the pre-reform MFN applied tariff levels and the tariff changes in the period immediately after liberalization from 1991-1996 for the manufacturing sectors. This uniformity is evidence that the tariff changes in this period were in fact exogenous.

[10]Figures 1, 2, 3, and 4 are based on my own calculations using data at 4-digit of NIC, following a similar analysis in Topalova (2007).

Figure 2: Pre-reform MFN tariff changes 1990-1996

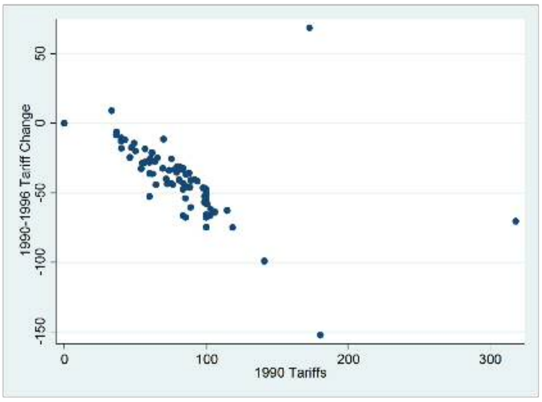

Figure 2 shows a linear relationship between Pre-Reform MFN tariff and tariff changes from 1990-1996.

Figure 3: MFN tariffs and tariff changes 1999-2001

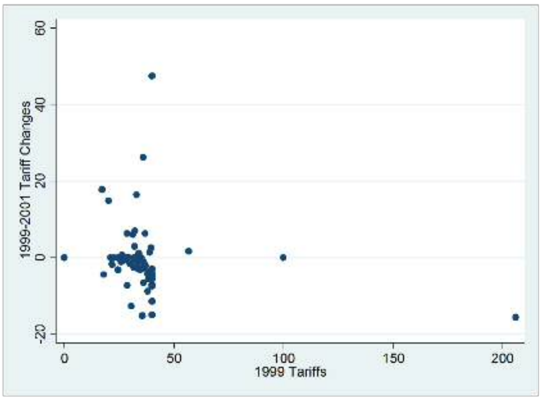

Figure 3 shows a non-linear relationship between 1999 MFN tariffs and tariff changes from 1999-2001.

Figure 4: MFN tariffs and tariff changes 2001-2007

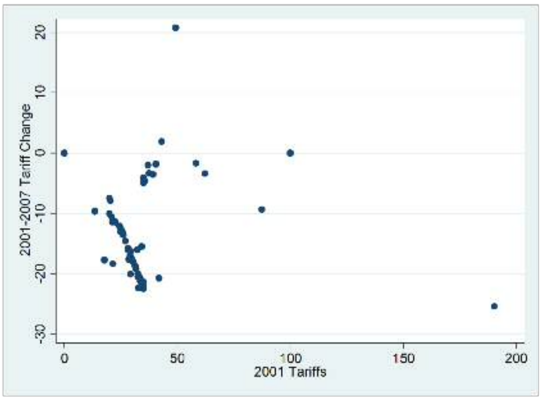

Figure 4 shows further non-linear relationship for 2001 MFN and tariff changes from 2001-2007.

After 1997, the sectors were characterized by uneven levels of liberalization, explained in part by domestic interests fearful of market-oriented reforms as found in Topalova (2007). This suggests trade protection may have been used selectively after 1997 to meet certain objectives such as protection of less efficient industries or to meet other political economy objectives. In fact, I find a non-linear relationship between the immediate post-reform tariff levels in 1999 and tariff changes across from 1999 to 2001 in Figure 3 and a similar picture for the tariff changes for 2001-2007 in Figure 4. This is evidence of the endogeneity in tariff protection assigned across manufacturing sectors in India that warrants an understanding of the political economy changes over the entire period of 1990-2007.

Kochanek (1996) outlines the post-independence economy of India subject to heavy government regulation weighted towards the dominance of the public sector. Indian policy-makers followed import-substitution industrialization as the chosen model of development with extensive regulatory controls as asserted in Sinha (2007). High levels of trade protection were in place to protect infant industries considered vital to the country's economic growth. Milner and Mukherjee (2011) suggest that trade policies in India before 1991 were often held hostage to the interests of few big business houses that were able to influence the content of trade policies. This was the era of central planning when the state retained autonomy of agenda. I therefore argue that it is likely that individual lobbying during that time was more effective than any kind of collective effort as these businesses were lobbying for their specific concerns. Industries only occasionally reacted to policy decisions and resorted to lobbying the government directly for specific benefits. This is also evidenced by findings in the literature and in interviews with the policy-makers that all point to a narrow group of large business houses that constituted the most influential groups sharing a close relationship with the state. Yadav (2008) terms it as an opaque and unrepresentative system where access only in few hands with money or strong political connections. It can be said that the policy regime in place during this period was not conducive to collective action and there were no associations lobbying for policy influence. Policy seemed skewed to favour those who contributed to the political party in power as stated in Piramal (1996).

The IMF support to India in the face of an external payment crisis of 1991 came conditional on an adjustment program of structural reforms. Chopra (1995) outlines that for trade policy this included a reduction in the level and dispersion of tariffs, removal of quantitative restrictions on imported inputs and capital goods for export production. As a result import and export restrictions were eased and tariffs were drastically reduced such that the data on average *Most Favoured Nation* (MFN) tariffs suggests a decline from approximately 85 percent in 1990 to 44 percent by 1996 across the National Industrial Classification (NIC) 4-digit manufacturing industries. This was in accordance with the guidelines outlined in the report of the Tax Reform Commission constituted in 1991. Also, as alluded to in the introduction, the standard deviation of tariffs dropped by half during the same period but remained quite high between 32-36 per cent. A linear relationship was observed in Figure 2 between the pre-reform tariff levels and the tariff changes in the period immediately after liberalization from 1991-1996 which is known to be an exogenous shock.

Milner and Mukherjee (2011) outline the interaction between the government and industry immediately after the 1991 reforms. Confronted with the need to raise funds to finance the ruling party's campaign for the 1994 state elections, the incumbent government turned to large industrial houses for financial support as argued in Kochanek (1996). The business groups in turn formed an organization called the *Bombay Club* consisting of a group of prominent Indian industries to voice their concerns against trade reforms that sought their reversal and demanded more protection for their industries from the surge in import competition as outlined in Kochanek (1996) and Kochanek and Hardgrave (2006). This seems to have marked the beginning of a transformation in collective influence of business from individual business to associations.

The elimination of licensing and introduction of competition accompanied by an emerging pattern of coalition governments could have potentially reduced the pay-offs to individual lobbying. At this stage there started evolving a duality in business and industry dealings with the government that consisted of organised industry associations in addition to direct individual lobbying. Also, Indian business began to look at market opportunities abroad including overseas investment as highlighted by Baru (2009). India continued on the path of further trade liberalization in the post reforms era. However, after 1997 tariff movements were not as uniform. Topalova (2007) shows that Indian sectors were characterized by uneven levels of liberalization owing partly to domestic interests fearful of market-oriented reforms. This suggests trade protection measures may have been used selectively such as to protect less efficient industries during 1999-2001. This is evidence of the endogeneity in tariff protection assigned across manufacturing sectors in India that warrants an understanding of the political economy changes over the entire period. In fact, I found a non-linear relationship between the immediate post-reform tariff levels in 1997 and the tariff changes across the manufacturing sector from 1999 to 2001 in Figure 3. A similar picture was also observed for the tariff changes in 2001-2007 in Figure 4.

Further, there is an emphasis to understand the extent to which these changes in tariffs reflected the lobbying power of the industry. Sinha (2007) outlines the policy scenario during this time when the power and status of the nodal Ministry of Commerce and Industry (MOCI) was enhanced and new institutions of trade policy compliance were created with radically reformed policy processes and policy–expert networks. This strengthened the creation of new policy practices such that the number of officials devoted exclusively to trade policy in the MOCI increased significantly.

3 PROTECTION FOR SALE

3.1 The Traditional Model

The PFS is a specific factors model in a multi-sector framework. Individuals have identical preferences and differ in their specific factor endowments. Interactions between the government and lobbying groups takes the form of a menu auction as outlined in Bernheim and Whinston (1986). The government weighs each dollar of contributions equally such the government objective is a weighted sum of the contributions C_i from the set of organized sectors $i \in L$ and the aggregate welfare W as shown below [11].

$$G = \sum_{i \in L} C_i + aW \tag{1}$$

In the first stage, each lobbying group presents the government with a contribution schedule; in the second stage the government selects the policy to maximize its objective function. The equilibrium set of contribution schedules is a policy vector that maximizes the objective function of the government. In this game, the contribution schedule is set so that the marginal change in the gross welfare of the lobby for a small change in policy equals the effect of the policy change in contribution i.e. each lobby makes locally truthful contributions that reflects true preferences of the lobby.

A sub game-perfect Nash equilibrium of the trade-policy game is outlined where the equilibrium is characterized as a joint maximization of welfare net of lobbying cost. GH use Bernheim and Whinston (1986) to define a truthful contribution function [12], that statees the equilibria supported by truthful strategies are the only stable and *coalition-proof* strategy. Coalition-proof means non-binding communication among players that implies an equilibrium such that players bear no cost from playing truthful strategies[13].

Re-writing the traditional GH equation (48 in Appendix 7.1) gives the following estimable form, where the ratio of output to imports X_i/M_i equals z_i[14]:

$$\frac{t_i}{1+t_i} = \left(\frac{I_i - \alpha_L}{a + \alpha_L}\right)\frac{z_i}{e_i} \tag{2}$$

Here t_i is the ad-valorem tariff in equilibrium, I_i is an indicator variable that equals 1 if sector i is organized, the parameter $\alpha_L > 0$ is the fraction of the population organized into any lobby and the parameter a is the weight that the government places on aggregate welfare relative to political contributions. Finally z_i is the inverse import penetration ratio that equals the ratio of output to imports, and e_i is the import demand elasticity.

From equation (2), I observe that for organized sectors the term $\frac{1-\alpha_L}{a+\alpha_L}$ is positive where $I_i = 1$. Sectors that are politically organized are thereby granted positive rates of protection. The level of protection is positively related to the ratio of domestic outputs to imports for such organized sectors. $\frac{-\alpha_L}{a+\alpha_L}$ is negative for unorganized sectors such that those sectors that are not organized face negative rates of protection. This implies that

[11] The details of the PFS model are attached in Appendix 7.1

[12] GH argue that this contribution schedule reflects the true preferences of the lobby. However, I argue that this approach from Bernheim and Whinston (1986) describes individual behaviour in menu auctions. The GH is however an application of the cumulative group behaviour of individuals. Therefore, the notion of truthfulness in this game may at least be questionable.

[13] Goldberg and Maggi (1997) proposed a Nash bargaining game as the simplified mechanism that they argue gives the same trade policy outcome such that at the Nash bargaining solution, trade policies are selected to maximize the joint surplus of both groups. Therefore, the first-order condition for the GH approach and that of GM are shown to be the same. However, to the best of my knowledge, the proof showing the equivalence of the two approaches is not available.

[14] I replace j with i which is only a notation for the empirical estimation.

protection is negatively related to the ratio of domestic outputs to imports for the unorganized sectors.

GM outlined the free trade equilibrium in this set-up where the PFS model predicts free trade as the equilibrium outcome if all industries are organized such that I_i is one for all sectors and the entire population owns specific factors and α_L is also one. This gives the ad-valorem tariff as zero that is the free trade outcome. Values of a above one show that the government favours welfare of the population very highly compared to the contributions, while values below one show evidence of favour to lobby groups. The model also predicts that protection for organized industries increases with the weight the government attaches to political contributions relative to welfare and falls with the fraction of voters that belong to an organized lobby group.

3.2 Literature on Protection for Sale

The GH hypothesis has been tested considering different countries and using various econometric techniques. The earliest study to test the predictions of the GH hypothesis was GM. Their paper considers the following form of the government objective function shown below where β captures the weight on welfare. In this case, a the relative weight on welfare in the PFS model is now replaced by $\frac{\beta}{1-\beta}$.

$$G = \beta W + (1-\beta)\sum_{i \in L}^{n} C_i \tag{3}$$

GM deviates from the GH menu auction and assume a Nash bargaining solution such that trade policies maximize the joint surplus of the government and the lobby groups. Their maximization yields the equation shown below.

$$\frac{t_i}{1+t_i} = \frac{I_i - \alpha_L}{\frac{\beta}{1-\beta} + \alpha_L}\frac{z_i}{e_i} + u_i \tag{4}$$

The econometric estimation takes the elasticity to the left hand side and an error term is added[15]:

$$\frac{t_i}{1+t_i}e_i = \gamma\frac{X_i}{M_i} + \delta I_i\frac{X_i}{M_i} + v_i \tag{5}$$

Where,

$$\gamma = \frac{-\alpha_L}{\frac{\beta}{(1-\beta)} + \alpha_L}$$

$$\delta = \frac{1}{\frac{\beta}{(1-\beta)} + \alpha_L}$$

[15]Conceptualised as a composite of variables potentially affecting protection and the error in the measurement of the dependent variable.

Using maximum likelihood on data aggregated up to the 3-digit SIC level, GM use coverage ratios of non-tariff barriers to find the pattern of protection as broadly consistent with the predictions of the GH hypothesis. The import demand elasticities are from Shiells (1991). Political contributions are at the 3-digit of the Standard Industrial Classification (SIC) and a threshold level of $100,000,000$ USD is used to assign the political-organization dummy. This threshold was chosen on account of a natural break in the data around that point. To investigate the model predictions, GM used two set of criteria. First, if the signs of coefficients in the equation above were as predicted by theory. Second, the structural parameters were derived to check the admissible range between 0 and 1. GM also did additional robustness checks by adding more variables in the estimation to test for better fit.

The results show the signs and t-statistics of the coefficients are consistent with the predictions of PFS. The structural estimates include the weight on welfare β found to be 0.986, 0.984 and 0.981 that are many times larger than that of the contributions while fraction of the population represented by a lobby α_L is found to be 0.883, 0.858 and 0.840 respectively. These are significantly different from zero and also fall in the admissible range even without any restrictions on the empirical specification by GM. Thereby, GM concludes that United States was relatively open to trade even when non-tariff barriers were accounted for. The observed low protection levels can be explained by the large estimated weight on welfare and the lesser importance of political contributions.

Gawande and Bandyopadhyay (2000)(GB henceforth) also tested the predictions of GH for the United States. A modified PFS model is set-up including new variables on intermediate goods: an average tariff on intermediate goods in an industry and the average Non-Tariff barrier (NTB) coverage of intermediate goods. The dead weight loss (DWL) from protection is also analysed where the greater the DWL, the greater is political spending. GB considers the case in which members of lobbies are a small fraction of the population where actions of any lobby do not affect other lobbies. This simplifies the menu auction into a set of independent principal-agent relationships where each lobby compensates according to the DWL times the weight on welfare for the corresponding amount of protection. Lobbying competition is measured by the bargaining strength of downstream users and upstream producers.

The intermediate input is assumed to be produced under constant returns to scale and used by some or all industries. Now there are two parameters α_L and α_X, the fraction of population organized into final good (L) and intermediate goods (X) lobbies respectively. The government attaches a weight a to welfare relative to both contributions. Protection in an industry is an increasing function of the tariff on intermediate input t_x. A system of equations is estimated by GB that include the protection equation, the first stage for import penetration and the effects of the DWL on lobbying spending. The two-stage least-squares estimator proposed by Kelejian (1971) is employed.

The empirical evidence strongly confirms the main prediction that in politically organized industries protection varies directly with z and inversely with e. The measure of weight on welfare in the government's objective is however quite large and similar to

GM that suggests welfare considerations figure prominently than political contributions. The fraction of population represented by a lobby group is reported as one. The overall prediction is the rate of protection on intermediates positively influences the rate of protection for the final good. On the whole, GB concludes that the U.S. pattern of protection is influenced by lobbying such that protection is for sale.

Mitra et al. (2002) investigate the predictions of the PFS model for Turkey using various protection instruments: nominal protection rates, effective rates of protection and NTB coverage ratios. The period under investigation is four different years from 1983 to 1990. Lobbying is mapped to one of the most important Turkish industrialist organizations (the Turkish Industrialists and Businessmen Association or the TUSIAD). The identification is then validated using statistical discriminant and probit estimation techniques. The findings augment support to the fundamental predictions of PFS, they find that politically organized industries receive higher protection than unorganized ones. Tariff rates are decreasing in the import-penetration ratio and the absolute value of the import-demand elasticity for organized industries, while they are increasing for unorganized sectors.

McCalman (2004) estimated the PFS model for Australia using ad-valorem tariff on final goods, domestic output and imports for the two periods 1968/69 and 1991/92. Following GM, he also moved the elasticities to the left of the equation to control for measurement error. He endogenizes political organization and uses 2-stage least squares (2-sls) to deal with endogeneity in political organization and import penetration ratio. The results find signs of statistically significant coefficients confirming the GH hypothesis. The proportion of population represented by lobbies is 0.88 in 1968/69 increases to 0.96 in 1991/92 and is similar to the finding in GM.

Imai et al. (2009) estimate a modified version of the PFS model where it does not require industries to be classified as organized or unorganized. They use instrumental variables quantile regression presenting results that question the findings of the PFS model. They argue that using a binary identification of organization can lead to misclassification of industries that lead to inconsistent estimates of the PFS model. Their findings challenge the traditional GH hypothesis and suggests the need to address the empirical inconsistencies in estimating the PFS.

Mitra (1999) extended the PFS model by adding a new stage where interest groups decide whether or not to incur the costs of getting organized. An industry being organized is a consequence of several aspects in an industry. The level of protection in turn depends on industry characteristics and other political and economic factors. He begins with the second stage in PFS and solves the model by backward induction. In the second stage, the government sets trade policy to maximize a weighted sum of political contributions and overall social welfare. The first stage includes the decision of creating a lobby. Here he concludes that the equilibrium ad-valorem tariff for an organized sector is no longer always positively related to the government's weight on political contributions. Also, larger groups benefit less than the smaller groups from organizing.

To the best of my knowledge there are two papers that have estimated the PFS model with Indian data for specific years: Cadot et al. (2014) and Cadot et al. (2007) for 1997 and Bown and Tovar (2011) for 1990 and 2000-2002 averages.

Cadot et al. (2007) were the first that applied the PFS to estimate determinants of Indian import protection. They present results for the GH hypothesis at the 4-digit International Standard Industrial Classification (ISIC) Revision 2 for 81 sectors using tariffs for 1997. Their results are qualitatively consistent with the PFS predictions. The empirical estimation presents a method to identify jointly the driving forces behind the observed patterns of trade protection and which sectors find it profitable to organize for trade policy influence.

They identify the politically organized industries using trade and production data in a multi-stage iterative procedure based on a grid-search procedure to generate a variable that can define the cut-off between the organized and unorganized sectors. The first stage consists of a standard GH equation without distinguishing between organized and unorganized sectors to obtain the endogenous tariffs as functions of import penetration rates. The first stage residuals are used to rank industries where sectors with high residuals are assumed to be organized. A cut-off value is set based on this ranking and the magnitude of the residuals is taken to indicate how successful each lobby was in obtaining protection. This cut-off value is used to determine political organization I_i. The cut-off value that yields the absolute minimum of the residual sum of squares is chosen to give a binary sectoral political organization vector. The political organization measures are then introduced into a stochastic unconstrained version of the estimating equation and the coefficients are re-estimated. The procedure is iterated until the system minimizes the residual sum of squares.

The structural estimates are then used to derive estimates of lobbying contributions. The weight put by the Indian government on contributions is a third ($a = 3.09$) of social welfare is much lower than that estimated later by Bown and Tovar (2011) and the identified organized sectors are also very low at $\alpha_L = 0.12$.

Bown and Tovar (2011) later used the PFS model to estimate structural determinants on India's import protection. Pre-reform tariff data from 1990 is found broadly consistent with the GH hypothesis. Immediately post liberalization, the cross-product variation in import tariffs no longer supports the findings of the model. This is explained by India's 1991–1992 IMF arrangement which is known to be an exogenous shock to its tariff policy. The estimates using the post-reform average cross-product variation in import protection from 2000–2002 restores the significant determinants of the PFS model.

The unit of observation is an imported product at the 6-digit Harmonized System (HS) level in 1990 or averaged for 2000–2002. Indian applied ad-valorem tariff data is used. The sum of the applied tariff and an anti-dumping ad-valorem equivalent is also employed as an alternative. Their combined results indicate that tariffs moved away from the GH equilibrium with the 1991 reform. However, after 1997 it seems that the overall level of protection was back to a new post-reform political–economy equilibrium consistent with the PFS model.

Several papers use coverage ratios for non-tariff barriers to measure protection in the PFS model. However, the PFS model strictly interpreted should be estimated with tariffs data. Bown and Tovar (2011) estimate the following equation, where the dependent variable τ is defined as the applied tariff only or the tariff plus an anti-dumping measure:

$$\tau_{i,t} = \beta_0 + \beta_1 I_i \frac{z_i}{\epsilon_i} + \beta_2 \frac{z_i}{\epsilon_i} \tag{6}$$

The paper finds the estimates from 1990 to be consistent with the GH hypothesis such that organized sectors receive more tariff protection than unorganized ones. The estimated weight of welfare $a = 833$ was found very high and the fraction of organized lobby at $\alpha_L = 0.28$. Their estimates on immediate post-1990s were found inconsistent with the model predictions[16]. For $2000 - 2002$, the significance of the estimates using post-reform tariffs and additional Anti Dumping (AD) ad-valorem equivalent were restored. However, the estimates of $a = 537$ and 397 were again very high (though lower than 1990), while $\alpha_L = 0.98$ was much higher than 1990.

3.3 Empirical Issues

A number of empirical studies (Baldwin (1989), Trefler (1993)) found a positive relationship between import-penetration ratios and the level of protection. The logic being that industries with high import-penetration reflect higher comparative disadvantage such that these industries tend to lobby harder than others for trade protection. The GH model predicts a different relationship between equilibrium protection and the import penetration ratio (in GH, it is the ratio of the domestic output to imports which is the inverse import penetration) for organized sectors vs. unorganized ones. For the former, the relationship is positive (hence negative between protection and import penetration, as noted above), and for the latter, it is the reverse.

GM argues that protection levels being inversely related to import penetration is contrary to the traditional view of trade protection. The estimating equations employed in earlier literature introduced import-penetration and political-organization variables additively on the right-hand side. Estimating the protection equation without interacting import penetration with political organization would be expected to document a positive relation between import penetration and trade protection.

Another puzzle when taking the PFS model to data is that most industries classified as unorganized receive positive levels of trade protection from the government[17]. The lack of negative levels of protection cannot be taken as a refutation of the PFS model. It may simply be evidence for extraneous factors that can potentially influence the equilibrium

[16] On lines of India's 1991-92 IMF arrangement interpreted as an exogenous shock to its tariff policy.

[17] Often discussed in the empirical literature such as in GM and GB, one of the basic predictions is that unorganized industries should receive import subsidies and export taxes. However, in reality, such instruments are rarely observed.

level of trade protection. Empirically, this is typically dealt by introducing a constant term as in GB, while an additive error term is introduced in GM who describe the error as a composite of variables potentially affecting protection left out of the theoretical model. But the main estimations in GM do not include a constant term which confirms to the strict structural set-up of PFS. The trade protection equation is however derived by the maximization of the joint welfare function of the lobbies, the government and additional terms that imply deviations from welfare-maximizing behaviour. In this light, GM suggest that political factors can be introduced into the model only by adding them into the welfare functions.

The predictions of PFS also depend on the nature of protective instrument analysed such that tariffs and quantitative restrictions can produce different predictions (Maggi and Rodrıguez-Clare (2000)). The nature of changes in applied MFN protection in India across 1990-2007 present the case of these tariffs as a potentially interesting question to examine the extent to which the PFS model can be used to understand the determinants of this specific trade policy in India. This enables an investigation of whether these tariffs align closely with the assumptions of the PFS model. Further, Cadot et al. (2014) argue that estimating the PFS for India is not subject to the same critique of the model as using United States data, shown by estimates in Kee et al. (2008) where non-tariff barriers arguably explain as high as 75 per cent of trade restrictiveness in the United States, but less than 20 per cent in India.

The trade price elasticity e_i that enters the PFS model is an estimate and could thereby suffer potential measurement errors. One strategy to deal with this has been to move the elasticity on the left-hand side as in GM and McCalman (2004) . GB and Mitra et al. (2002) use instrumental variables estimation for the elasticities keeping it on the right-hand side. To deal with the possible measurement error in this thesis, I follow the strategy in GM and move the e_i estimates to the left-hand side. However, it must be noted that the dependent variable is an estimated variable where the estimated elasticities are multiplied by the ad-valorem MFN tariffs. This presents a potential problem of heteroskedasticity as also pointed out by GM such that I perform tests for heteroskedasticity in my estimations.

The logic of endogeneity here points to a high level of imports as a cause of protection when protection is in turn directed to reduce imports. As argued by Trefler (1993), this can disguise the relationship between protection and imports. The import penetration ratio is thereby endogenously determined in the PFS model as tariff levels can in turn have an effect on import penetration ratios. The method of estimation used in various empirical papers on PFS have attempted to deal with this endogeneity.

GM used a reduced form equation for the inverse penetration ratio using maximum likelihood in their estimation of the PFS. GB, McCalman (2004), Gawande and Hoekman (2006) used instrumental variables (2-SLS). These methods helped deal with the endogeneity in import penetration ratio. I instrument for import penetration using variables motivated in the PFS literature presented in the following sections.

Gawande and Li (2009) discuss the problem of weak instruments in the 2-SLS estimation of the PFS. They show that if the correlation of the instrumental variables with the endogenous variable is weak then the parameter remains invalid. Thereby instrument diagnosis needs to be included with F-tests to validate the results. The method of LIML is presented as the more reliable method than the 2-SLS with weak instruments for PFS.

The estimation of the PFS model depends on the identification of the binary political organization measure I_i. This is an exogenous identification in the PFS model. There are several methods that have been used to determine this measure for various countries. For the United States, the construction of this measure has relied mainly on what are called political action committee (PAC) contributions. Such data on contributions for lobbying is well documented. However, the absence of such contributions data for several other countries has prompted the use of various methods to identify organization. In the case of India for instance, Cadot et al. (2007) used an iterative procedure to identify 17 out of their 81 ISIC Revision 2 sectors as organized[18]. I attempt to use new data to identify politically organized manufacturing sectors in India.

The PFS model classifies every sector as either fully organized or completely unorganized. The politically organized sectors are inferred by looking at the level of political contributions for the United States such that if the contribution is positive, the sector should be organized. Empirical papers on PFS have used various methodologies to determine this indicator.

A widely used method is information on political action committee (PAC) contributions to proxy for the existence of a lobby. However, GM and GB that use PAC contributions differ in their classification of sectors for the United States. In GM an absolute cut-off for the contributions data made by firms is selected such that those above the cut-off are considered organized. It can be seen that the sectoral contribution levels are all positive for the 3-digit SIC sectors. However, it has been argued that not all contributions are made to influence trade policy. This is put forth as a basis for the chosen threshold level at $100,000,000$ USD. GB on the other hand regress the contributions on bilateral import penetration interacted with 20 two-digit dummies that cover the total sample of 242 four-digit SIC industries, where the organized industries are identified based on positive coefficients. All four-digit SIC codes within the two-digit code get the same level of binary sectoral political organization.

Mitra et al. (2002) map individual members of a Turkish association to respective sectors and use a cut-off to classify 12 of the 37 sectors as organized. The paper considers a democratic versus an autocratic political regime. The political organization variable was constructed in two steps. First, the membership data for the Turkish association was used to determine the organized sectors. Second, discriminant analysis methods and probit regressions were used to statistically validate the choice in the first step.

McCalman (2004) identified political organization using information on Australian trade policy institutions namely the operation of an independent advisory body known as the Tariff Board. After 1960, tariffs emerged as the major protective instrument such

[18]This method is discussed in detail in the following section.

that industries were able to initiate inquiries to have tariffs revised. The analysis is undertaken for seven industry classes (groups) for Australia. If an industry was able to initiate a request for tariff revision to the Australian Tariff Board and a report was prepared between 1960 and 1969, it was defined as politically organized. The number of politically organized classes was aggregated and divided by the number of total classes within each group.

Bohara et al. (2004) estimated the PFS for Mercosur using various methods to construct political organization. It is assumed that industries with total imports above the sample mean are politically organized. Four other methods were also analysed to statistically validate the binary partitioning of organized and unorganized sectors. First, all industries were assumed organized. Second, industries with total imports from the world exceeding the 85th percentile were considered politically organized. Third, the industries with total imports exceeding the 90th percentile were considered politically organized. Finally, a combination of a mean cut-off on imports and a 25th percentile cut-off on output was used.

Another method used is to assume that all sectors are politically organized to the same degree is also used in the literature. Looking at equation (2) and assigning the value 1 for political organization gives the following equation.

$$\frac{t_i}{1+t_i} = \frac{1-\alpha_L}{a+\alpha_L}\frac{z_i}{e_i} \tag{7}$$

This equilibrium tariff is also referred to as the cooperative lobbying outcome in Gawande et al. (2012), and it is argued as evidence of perfect cooperation between sector-specific capital owners in their lobbying behaviour. It is important to note here that assuming all industries are organized is different from any assumption on the fraction of population represented by organized lobby groups (α_L). Given political organization of sectors there can still be a substantial proportion of the population that are not sector owners and hence are politically unorganized and are absent from α_L. Mitra et al. (2002) argue that using an empirical specification tied more tightly to the theoretical model and classifying all sectors as politically organized can produce more sensible estimated parameter combinations. According to the PFS model, all organized sectors obtain positive protection while the unorganized ones are given negative protection. However, all sectors in United States and the Turkish datasets have positive or at least non-negative protection. Further, given the positive amounts of political contributions for the United States observed for all sectors there seems a strong possibility that all are politically organized.

Gawande et al. (2009) also assumes all sectors are politically organized at the aggregation level of 3-digit ISIC industries. They argue that this is true of manufacturing sectors in most advanced countries where political action committees and industry associations lobby their governments and also for similar industry coalitions prevalent in developing countries. Further, as the analysis is at the aggregated level of twenty-eight ISIC at three-digit level industries, the assumption is stated as being empirically reasonable. Using this assumption, PFS is estimated to compare the welfare-mindedness of the government across fifty-four countries.

Belloc (2007) tests the PFS for the European Union as one entity. She identifies the sectors that are organized as lobbies with regard to trade policy. The Civil Society Dialogue-External Trade (European Commission DG-Trade) is used as a means of constructing the political organization indicator. This body holds regular meetings on external trade matters between the European Commissioner for Trade, senior Commission officials and trade negotiators. She incorporates a feature of the EU institutional arena where lobbying is mainly at the early stages of the policy formation by information provision to and negotiations with the European Commission. Using this information the organizations are coded according to the ISIC Rev. 2 system at the 3-digit level. If, in a given sector, there are at least five European-wide organizations registered in the Civil Society Dialogue External Trade, political organization is set equal to 1, and zero otherwise. A concordance is used from ISIC Rev. 2 corresponding to 6-digit HS as the estimation uses data at this level. Political organization is thereby more aggregated than the trade variables. This is justified on grounds of advantages from lobbying by organizing at the industry level and more variation in protection across industries rather than within them. The identification is validated using a discriminant function analysis, cluster analysis and probit estimation techniques.

Bown and Tovar (2011) and Cadot et al. (2007) construct indicators on political organization for India. Bown and Tovar (2011) used data about organizations from World Guide to trade associations for 1995[19], where an industry is organized if it lists membership to at least five organizations. Cadot et al. (2007) identify the politically organized industries using trade and production data in a multi-stage iterative procedure. The identified organized sectors are only 17 out of 81. They estimate the mean equilibrium contributions using the PFS equations at 33 million USD per sector. When I examined the identified 17 sectors, it seems to have missed out on several very important sectors that are active in lobbying. This may partly owe to the fact that the data refers to 1997 which was still early in the era of organization and lobbying in India.

Political organization can be determined by other factors besides political contributions. Imai et al. (2009) state that a particular threshold of campaign contribution to distinguish between politically organized and unorganized industries as in GM is inconsistent and results in misclassification of political organization of an industry. PAC contributions can understate or overstate trade-related influence activities and this can affect the cut off between organized and unorganized ones. They argue that on reclassifying the politically organized industries, one would obtain parameter estimates which no longer support the PFS hypothesis. To show this, artificial data is generated from a simple equilibrium model of trade where the political organization is purely random and government imposes a quota on politically organized industries uniformly such that there was no protection for sale effect. Estimating the simulated model, the coefficients were found consistent with the PFS model. It is assumed that there are 100 industries and each industry has 64 sub-industries. Each sub-industry is politically organized with a probability allowing for

[19]There are limitations to this information that may not reflect accurately the actual membership or lobbying behaviour of the domestic trade policy in India. I was unable to obtain the mentioned data and check the validity of this information.

some variation in the political organization probability across industries. They replicate GB and GM using simulated data from the model above. It is shown that the PFS results can come from a model where quotas can be obtained and these could be either binding or non-binding but the imposition depends on organization: politically organized sectors get them, others do not. Furthermore, import penetration and equilibrium campaign contributions are shown negatively correlated in GM, which is exactly the opposite of the relationship assumed by GB that classify industries as politically organized when the import penetration and the PAC contributions per value added are positively correlated.

I use new data to identify political organization in the PFS model. This data is on membership to trade associations from the WBES of 2005. As a means of comparison, I also take the political organization indicators from Cadot et al. (2007), obtained from the authors.

3.4 Political Organization

Determining the status of being politically organized is complex and there exist several approaches un the literature. Gawande and Magee (2012) assert that identification of political organization in PFS using a binary measure is problematic. This owes to the fact that every industry has positive campaign contributions in the datasets for United States that are commonly used. Using a modified version of the PFS model, their paper allows for what are termed as partially-organized industries. The binary organization variable is dropped and every industry is assumed to be partially organized defined as the ability of an industry to overcome the free-rider problem. This tackles the empirical issue of classifying industries as either fully organized or completely unorganized to an extent. However, one equilibrium tariff is the cooperative lobbying outcome based on perfect co-operation between sector-specific capital owners by assuming the political organization indicator as equal to 1. The other equilibrium outcome is classified as the non-cooperative outcome where there is greater free-riding. This identification is quite useful but may not fully capture differences in the ability to lobby across industries.

A threshold level of contributions is often used below which industries are assumed to be unorganized as in Goldberg and Maggi (1997) (GM henceforth). Further, they argue that the menu auction set-up in PFS yields the same equilibrium output as the joint maximization in a Nash bargaining game. Using this reasoning, the equilibrium in the GM paper is obtained through the maximization of the joint welfare of the lobbies and the government with respect to the tariff. A connected question concerns if the truthful Nash equilibrium in GH and the joint maximization of GM lead to the same estimable specification to study the effect of organization on the protection outcome. In the PFS model, the equilibrium policy for the government and lobby groups is pinned down using the common agency framework of Bernheim and Whinston (1986). It is demonstrated that playing truthful strategies is the best-response for lobby groups and this set always contains a truthful strategy. Also, this equilibrium is coalition proof, such that this being the only one that is stable against non-binding communication among the players.

Preliminary regressions have also been used to divide industries into organized and unorganized, as in Gawande and Bandyopadhyay (2000). The reduced-form equation included a set of traditional political-economy regressors that include concentration indices, minimum efficient scale, unionisation, and geographical concentration termed as natural instruments for contributions and organization dummies, estimated using OLS regressions to examine correlations. The organization variable is assigned the value 1 for those industries where the relationship between campaign spending and trade flows is positive. The finding is that all else held constant, on average tariffs are higher in industries represented by organized lobbies. Going further, I find that there is also literature that proves otherwise, such as Imai et al. (2009) who have argued that using such an identification of organization can lead to misclassification of industries as politically organized and unorganized that will give inconsistent estimates of the PFS model. They do a quantile regression of the protection measure on the inverse import penetration ratio divided by the import demand elasticities and show that the results do not provide any evidence to favour the model.

Mitra (1999) uses industry characteristics to determine whether a sector is organized or not in the PFS, such that industry groups organize according to the dominant kind of heterogeneity across sectors. He endogenized the binary indicator for political organization in the PFS model specifying a reduced form equation using industry characteristics to determine whether an industry is organized or not such that political organization is according to a dominant kind of heterogeneity across sectors. This includes high capital stock levels, low levels of geographical dispersion, and fewer members, while the groups with the opposite characteristics will remain unorganized in equilibrium. The question that is answered in the above analysis is how the organized lobbies come into existence. Owners of specific factors decide whether to incur the fixed cost of forming a lobby. Organization depends on the condition that the benefit to form a lobby is greater than the cost of organizing. In this approach, it can be argued that the sectors are black boxes where actual lobbying by firms does not play any role. In fact it is an implicit assumption that firms are all identical and coordinate to reach the organization outcome.

There is even limited evidence to account for varying lobbying ability in the PFS model for India. In Cadot et al. (2014) and Cadot et al. (2007), sectors are endogenously partitioned into organized versus unorganized using an iterative procedure where the first stage estimates a standard GH equation with all sectors as unorganized. This is used to determine the endogenous tariffs as a function of import penetration rates. The first stage residuals are then used to rank the industries, those with higher residuals being more likely to be organized than others and a cut-off value is used. In Bown and Tovar (2011), the binary organization measure is determined using data on organizations listed in the World Guide to Trade Associations in 1995[20].

Therefore, the existing literature asserts various ways to deal with identifying political organization, a dominant method being industries as fully organized. Moving beyond the binary identification, I aim to analyse the steps following organization where firms in an industry actually lobby the government for trade policy influence and there are differences

[20]This is an international directory of trade associations.

in their effectiveness to lobby across sectors.

4 PROTECTION FOR SALE WITH LOBBYING EFFECTIVENESS

Quantifying lobbying effectiveness in obtaining policy outcomes has been a challenging task as discussed by de Figueiredo and Richter (2014). In this light, the PFS model provides a potentially clean structural framework to examine lobbying effectiveness. I use a simple modification of the structural framework of the model to derive theoretically consistent empirical measures of lobbying effectiveness.

To analyse the impact of effectiveness in lobbying on trade protection, I consider a modification of the standard PFS model. The framework follows PFS by making the assumption that there can be two factors that influence effectiveness in lobbying. This includes the predisposition of the government to supply protection[21] and the ability of sectors to organise and make a case for protection (Baldwin (1989); Pincus (1975)). In my model, I will demonstrate that lobbying effectiveness can be explained by either of these two factors, presenting a methodologically isomorphic framework. First, it can be explained by being observationally equivalent to different weights associated by the government to political contributions coming from different lobby groups. The government weighs different sectors differently (not all dollar contributions are equal when coming from different sectors) explained by the idea that there may be some perception bias from the government to certain lobby groups that present their policy stance better. Second, it can arise from differences in the ability of groups to lobby in a given sector that in turn depend on a sum of various factors that include geographical location, similar or differentiated goods produced in the sector, the opportunity to interact with the government[22] among others.

In the PFS model, the government sets trade policy that is independent of any differences across the lobbies. The lobby groups are the principals and the government is the agent. The menu auction induces lobbies to design a contribution schedule that reflects truthfully the effect of the trade policy on their welfare driven by import competition. The equilibrium trade policy is pinned down using the truthful equilibrium of Bernheim and Whinston (1986). The truthful contribution schedules induce the government to behave as if it were maximizing a social-welfare function that weights different members of society differently, with those sectors represented by a lobby group receiving a weight of $(1 + a)$ and those not so represented receiving the smaller weight of a. However, I argue that the approach in Bernheim and Whinston (1986) essentially describes individual behaviour in menu auctions, while the GH is an application of the cumulative group behaviour of individuals that constitute the lobby groups. While, individuals play truthful strategic games, the cumulative behaviour of such individuals will not always translate to satisfy

[21]In GH, this is explained in terms of the relative weight of contributions and aggregate welfare

[22]Other underlying factors can include exporter versus importer interests, foreign ownership vis-a-vis domestic lobby groups etc.

truthful revelations in terms of contributions made by a group of such individuals. So far to the best of my knowledge, none of the existing empirical tests of the GH suggest any alternatives to the truthful Nash equilibria concept.

Heterogeneity in this paper is based on the idea that not all lobbies have the same influence on the equilibrium policy. I make the assumption that industries engage in *Co-operative Lobbying*[23] that is conducted by interest groups to maximize the welfare of the entire group. There exists no private incentive to lobby the government in this scenario as the underlying fixed costs of lobbying are greater than any gain from lobbying privately. I consider that all industries are organized[24] and engage in some form of cooperative lobbying alone. Following political organization, these industries decide to lobby when they are able to overcome the free rider-problem to different degrees which can make them more or less effective in lobbying.

In terms of government preferences, given the offers of lobby groups, the government can maximize its welfare by choosing a set of trade policy. The contribution schedule will allow the government to know the contribution level associated to a particular policy such that the government has varying preferences across sectors. Therefore, there can exist a bias wherein the government may value lobbying by one sector more than another. Another motivation to explain differences in lobbying is the ability to lobby such that the heterogeneity is in the method to put forth the dollars of contribution to the government. This derives from potential differences in market structure of industries that can imply inherent resource advantages for the ability to lobby. Both cases are examined in detail below.

4.1 Government Preferences

An important element of success in securing protection depends on the predisposition of the government to supply protection as in Baldwin (1989). This section considers the effectiveness of lobbying in terms of government preferences across sectors. One assumption of the PFS model consists that the government weighs lobby groups equally in terms of the dollars of contributions made by them. This means that government is not concerned about the identities of the lobby groups as any dollar of contribution is of the same value. However, it is expected that government preferences for contributions will differ across sectors when interest groups can send a signal regarding some information they possess and the policy makers observe the signal before setting the trade policies. Following this, I can assume the weight the government puts on lobbying by different sectors is not the same[25] (not all dollar contributions are equal when coming from different sectors). The weight the government puts on contributions from different sectors is used to define the measure of lobbying effectiveness in this section.

[23]This term is used by Gawande and Magee (2012).

[24]This can be related to the case of all industries being fully organized in traditional PFS.

[25]In terms of truthful revelation where a change in contributions equals change in welfare, this would imply that the government prefers benefits for some sectors more than others.

To develop the empirical specification, I treat lobbying effectiveness to depend on the predisposition of the government to supply protection. The government objective function is characterized as a sum of the contributions of producer lobby groups weighted by γ_i that represents their lobbying effectiveness and the aggregate voter welfare weighted by a that represents the weight attached by the government to welfare:

Governments maximize their objective G in terms of industry contributions C_i and (anonymous) utilitarian social welfare W:

$$G = aW + \sum_{i=1}^{n} \gamma_i C_i \tag{8}$$

Each sector i receive a different weight given by $(a + \gamma_i)$. So if $a = 1$, this weight reduces to $1 + \gamma_i$. This approach differs from previous literature as I define lobbying effectiveness in terms of government valuation of lobbying contributions, accounting for various degrees of lobbying effectiveness. γ_i is the lobbying effectiveness that translates into a high valuation of the political contribution in government preferences.

Substituting for W defined in terms wages at 1, the returns to specific factor π_i, tariff revenue from a specific import tariff t_i with imports given as $M_i = d_i - y_i$ and the consumer surplus s_i, and C_i in the government objective, where $C_i = W_i - B_i$ as in GH, gives:

$$G = a\left[1 + \sum_{i=1}^{n} \pi_i + \sum_{i=1}^{n} (t_i M_i + s_i)\right] + \sum_{i=1}^{n} \gamma_i \left[\pi_i + \alpha_i \left(1 + \sum_{j=1}^{n} (t_j M_j + s_j)\right) - B_i\right] \tag{9}$$

Expanding gives:

$$\begin{aligned} G &= a + a\sum_{i=1}^{n} \pi_i + a\sum_{i=1}^{n} (t_i M_i + s_i) + \sum_{i=1}^{n} \gamma_i \left[\pi_i + \alpha_i + \alpha_i \sum_{j=1}^{n} (t_j M_j + s_j) - B_i\right] \\ &= a + \sum_{i=1}^{n} a\pi_i + a\sum_{i=1}^{n} (t_i M_i + s_i) + \sum_{i=1}^{n} \gamma_i \pi_i + \sum_{i=1}^{n} \gamma_i \alpha_i + \sum_{i=1}^{n} \gamma_i \alpha_i \sum_{j=1}^{n} (t_j M_j + s_j) - \sum_{i=1}^{n} \gamma_i B_i \end{aligned}$$

I can bring $\sum_{j=1}^{n} (t_j M_j + s_j)$ to the front of $\sum_{i=1}^{n} \gamma_i \alpha_i$, hence:

$$G = a + \sum_{i=1}^{n} a\pi_i + a\sum_{i=1}^{n} (t_i M_i + s_i) + \sum_{i=1}^{n} \gamma_i \pi_i + \sum_{i=1}^{n} \gamma_i \alpha_i + \left(\sum_{j=1}^{n} (t_j M_j + s_j)\right) \sum_{i=1}^{n} \gamma_i \alpha_i - \sum_{i=1}^{n} \gamma_i B_i$$

Replacing j with i in $\left(\sum_{j=1}^{n} (t_j M_j + s_j)\right)$has no impact since it is just a label and is isolated by a bracket, so:

$$G = a + \sum_{i=1}^{n} a\pi_i + a\sum_{i=1}^{n} (t_i M_i + s_i) + \sum_{i=1}^{n} \gamma_i \pi_i + \sum_{i=1}^{n} \gamma_i \alpha_i + \left(\sum_{i=1}^{n} (t_i M_i + s_i)\right) \sum_{i=1}^{n} \gamma_i \alpha_i - \sum_{i=1}^{n} \gamma_i B_i$$

Clustering terms gives:

$$G = a + \sum_{i} (a + \gamma_i)\, \pi_i + \left(a + \sum_{i=1}^{n} \gamma_i \alpha_i\right) \left(\sum_{i=1}^{n} (t_i M_i + s_i)\right) + \sum_{i=1}^{n} \gamma_i\, (\alpha_i - B_i)$$

Replacing i with j in $(a + \sum_{i=1}^{n} \gamma_i \alpha_i)$ again has no impact since it is just a label and is isolated by a bracket, so:

$$G = a + \sum_{i=1}^{n} (a + \gamma_i)\, \pi_i + \left(a + \sum_{j=1}^{n} \gamma_j \alpha_j\right) \left(\sum_{i=1}^{n} (t_i M_i + s_i)\right) + \sum_{i=1}^{n} \gamma_i\, (\alpha_i - B_i) \tag{10}$$

Differentiating (10) with respect to t_i (equivalent to differentiating w.r.t. p_i), gives[26]

$$\frac{\partial G}{\partial t_i} = (a + \gamma_i)\, X_i + \left(a + \sum_{j=1}^{n} \gamma_j \alpha_j\right) (t_i M_i' + M_i - d_i) = 0 \tag{11}$$

Substituting and solving for t_i gives:

$$t_i = -\left(\frac{\gamma_i - \sum_{j=1}^{n} \gamma_j \alpha_j}{a + \sum_{j=1}^{n} \gamma_j \alpha_j}\right) \frac{X_i}{M_i'} \tag{12}$$

I can re-write this in terms of the import demand elasticity e_i and assuming the import penetration ratio $\frac{X_i}{M_i}$ equals z_i:

$$\frac{t_i}{1 + t_i} = \frac{\gamma_i - \sum_{j=1}^{n} \gamma_j \alpha_j}{a + \sum_{j=1}^{n} \gamma_j \alpha_j} \frac{z_i}{e_i} \tag{13}$$

Now, interpreting (13), the term $\sum_{j=1}^{n} \gamma_j \alpha_j$ is the sum of lobbying effectiveness times the fraction of sector-specific capital owners across all j sectors. Let $\gamma_j \alpha_j = \gamma$ understood as the mean lobbying effectiveness for all sectors. Therefore, $\frac{\gamma_i - \sum_{j=1}^{n} \gamma_j \alpha_j}{a + \sum_{j=1}^{n} \gamma_j \alpha_j}$ is the weighted deviation of the lobbying effectiveness measure for each sector γ_i from the mean effectiveness for all sectors γ. I can now test the hypothesis that the effect of inverse import penetration on the trade protection outcome can be explained significantly by deviations from mean lobbying effectiveness across sectors.

In the GH, opposite relationships were hypothesized for organized versus unorganized sectors. Note that my model differs from the straightforward interpretation in traditional GH. There is now a disperse component in the overall relationship between inverse import penetration and trade protection explained by lobbying effectiveness. I test the following hypothesis for very effective versus ineffective sectors:

[26]Note that the derivative of total consumer surplus s_i with respect to trade protection is minus the level of consumption d_i, that for producer surplus π_i is the level of domestic production X_i, and the derivative of revenue $t_i M_i$ equals the level of imports M_i plus the level of the tariff times the change in imports $t_i M_i^{'}$.

Hypothesis: For the most effective sectors i.e. higher the deviation in lobbying effectiveness of a given sector from the mean effectiveness $\gamma_i - \gamma > 0$, a higher inverse of import penetration will translate to higher trade protection such that $\frac{\gamma_i - \sum_{j=1}^{n} \gamma_j \alpha_j}{a + \sum_{j=1}^{n} \gamma_j \alpha_j} > 0$. For the least effective/ineffective sectors i.e. lower the deviation in lobbying effectiveness from mean effectiveness$\gamma_i - \gamma < 0$, a higher inverse import penetration will translate to lower trade protection, such that $\frac{\gamma_i - \sum_{j=1}^{n} \gamma_j \alpha_j}{a + \sum_{j=1}^{n} \gamma_j \alpha_j} < 0$.

Further, for (13):

- If $\gamma_i = 1$ for all i, then the equation collapses to traditional GH:

$$\frac{t_i}{1 + t_i} = \frac{1 - \sum_{j=1}^{n} \alpha_j}{a + \sum_{j=1}^{n} \alpha_j} \frac{z_i}{\epsilon_i} = \frac{1 - \alpha_L}{a + \alpha_L} \frac{z_i}{\epsilon_i} \tag{14}$$

  If it were the case that additionally $\alpha_L = 1$, I get the standard free trade outcome.

- If $\gamma_i = \gamma$ for all i, then:

$$\frac{t_i}{1 + t_i} = \frac{\gamma - \gamma \sum_{j=1}^{n} \alpha_j}{a + \gamma \sum_{j=1}^{n} \alpha_j} \frac{z_i}{\epsilon_i} = \frac{\gamma - \gamma \alpha_L}{a + \gamma \alpha_L} \frac{z_i}{\epsilon_i} = \frac{1 - \alpha_L}{\frac{a}{\gamma} + \alpha_L} \frac{z_i}{\epsilon_i} \tag{15}$$

  If $\gamma < 1$, then:

$$\frac{1 - \alpha_L}{\frac{a}{\gamma} + \alpha_L} \frac{z_i}{\epsilon_i} < \frac{1 - \alpha_L}{a + \alpha_L} \frac{z_i}{\epsilon_i} \tag{16}$$

  If $\gamma > 1$, then:

$$\frac{1 - \alpha_L}{\frac{a}{\gamma} + \alpha_L} \frac{z_i}{\epsilon_i} < \frac{1 - \alpha_L}{a + \alpha_L} \frac{z_i}{\epsilon_i} \tag{17}$$

  So tariff is lower than in GH if contributions have a lower weight ($\gamma < 1$) and tariff is higher if contributions have a higher weight ($\gamma > 1$). This is equivalent to changing the weightings on W and $\sum_{i=1}^{n} C_i$ in the GH Government objective function.

4.2 Lobbying Costs

I examine an alternate approach to the government preferences in this section. In the locally truthful framework of PFS, around the equilibrium a change in welfare W equals the change in contribution, C with respect to the policy. This is the PFS game in which lobbies determine the policy level that maximizes their welfare. Now, to include heterogeneity in terms of the lobbying costs, I can assume that each firm maximizes its profit with respect to the contribution schedule itself and not to the policy. This is again based on the reasoning that not all lobbies have the same influence on the equilibrium policy but I explain this in terms of costs to lobby.

In PFS, the lobbies commit to a contribution contingent on which the government selects policy. This section appeals to the money-buys-access idea as in Ansolabehere et al. (2003) such that I assume the lobby groups commit to organizing campaigns for the government that involves a certain lobbying expense. This expense is no longer contingent on the future policy chosen by the government. It is now the means to obtain access to the government. Based on this idea, the dollars of contributions raised by the interest groups involves a dissipation of resources on the way by means of paying for campaigns etc. such that only a part of those dollars actually reach the government and achieves influence for the policy.

In this context, I can define the actual cost to lobby the government that is incurred at two points. The lobby cost to raise the offerings is a fixed cost across the sectors. However, access costs can be defined in terms of lobbying effectiveness such that the access cost is γ_i times the actual lobby cost. This implies that lobbying effectiveness determines what part of offerings actually reach the government. A less effective lobby pays a higher access cost to lobby while a more effective lobby group pays a lower cost to access. I can now define the total lobby cost faced by an interest group in terms of the actual cost to lobby comprising the cost to raise the offerings and an access cost to forward the offerings.

In PFS, each organized interest group offers a contribution schedule to the government allowing it to know the contribution level associated to a particular policy. The contribution schedule is also assumed to be locally differentiable. The PFS assumption of truthful strategy by lobby groups implies that competition between the lobbies is choice of a scalar amount that remains with the lobbies. If I assume that lobbies have to bear an access cost in the second stage, now in addition to the scalar amount, the lobbies vary in their effectiveness to put forth the dollars of contribution to the government. An additional stage can be included into the PFS framework. In the first stage, the interest groups decide to organize. This decision is based on a fixed cost component. All sectors that meet this cost organize into lobbies and raise dollars of contributions to organize campaign support. In the second stage, the lobbies meet the access costs and make the final offers in the form of contribution schedules. Finally, the government sets trade policy.

The access cost say ζ_i is assumed to be a dissipation of resources on lines of Topalova and Khandelwal (2011) for each sector. The government does not consider this cost incurred by lobby groups and weighs each dollar of contributions equally. However, once the access costs are incurred, let the contributions that actually reach the government are $1 - \zeta_i$ raised by lobby groups where lobbying effectiveness is $\gamma_i = 1 - \zeta_i$. I can define the government objective as a weighted sum of the contributions and aggregate welfare below:

$$G = aW + \sum_{i=1}^{n} (1 - \gamma_i) C_i \tag{18}$$

This means that the dollars of contributions raised by lobby groups is C_i. However, the access costs incurred by each lobby finally determines the amount that effectively reaches the government. Defined in terms of costs, an effective lobby group would incur only a small access cost and would have a higher γ_i. A not so effective lobby would have to incur a very high access cost and have lower γ_i. This is lobby effectiveness as it determines the effective dollars of contributions to reach the government. The government is concerned about the total amount of contributions it receives from each sector.

If I substitute for W and C_i in the government objective and follow the same maximization as above, I arrive at a similar specification as in equation 13. This owes to the fact that both the changes in terms of government preferences and market structure of lobbying are introduced into the government objective function[27].

Altering the contributions technology itself is in violation of the truthful criteria. An important underlying question is therefore if the truthful relationship between contributions by lobby groups and the level of protection continues to hold. This can potentially account for why some lobbies achieve a more influential relationship with policy-makers than others[28]

5 ECONOMETRIC MODELS, DATA & METHODOLOGY

5.1 Econometric Models

I estimate two types of models, the traditional PFS model and Modified PFS with Lobbying Effectiveness .

First, I estimate equation (2), by adding an error term such that the equation can be re-written as:

$$\frac{t_i}{1+t_i} = (\frac{I_i - \alpha_L}{a + \alpha_L})\frac{z_i}{e_i} + u_i \tag{19}$$

Where i represent 4-digit NIC/ISIC Rev. 3 industries. In my sample, I have 98 manufacturing industries at this level. The dependent variable is the applied ad-valorem Most Favoured Nation (MFN) tariff protection. To deal with the measurement error in the estimates of import demand elasticities, following once again the empirical approach of

[27]Therefore, note that the two representations of the model lead to the same estimable equation and are expressed as being isomorphic. This is true for the case where say for every dollar raised the state acts as if it received the γ cents, so while the contributions are in fact one dollar, the trade policy decisions are as if less were contributed. However, there may be an alternative interpretation where lobbies fail to raise enough or where there are costs (more or less) for trade advocacy, then there will be a real resource cost somewhere in the economy (or higher profits for free-riding firms.

[28]The truthful contributions criteria implies that the contribution schedule is set so that the marginal change in the lobby's gross welfare for a small change in policy equals the effect of the policy change in contribution i.e. each lobby makes locally truthful contributions that reflects true preferences of the lobby. I have explored altering the contributions technology to introduce costs of lobbying that violates this assumption, I argue that the original Bernheim and Whinston (1986) essentially describes individual behaviour in menu auctions, while the GH is an application of the cumulative group behaviour of individuals constituting the lobby groups. Individuals play coalition-proof (non-binding communication among players) truthful strategic games, but the cumulative behaviour of such individuals may not always translate to satisfy truthful revelations in terms of contributions made by a group of such individuals. Another line of reasoning is on lines of miscalculations on parts of lobbies when stating their contributions which again links to truthful contributions. Goldberg and Maggi (1997) argues that their joint maximization is equivalent to the truthful Nash equilibrium concept, however I found no mathematical proof for this. Further, the existing theoretical advances do not suggest any alternatives to the truthful revelations.

GM, I take the elasticities to the left hand side[29] :

$$\frac{t_i}{1+t_i}e_i = (\frac{I_i - \alpha_L}{a + \alpha_L})z_i + \epsilon_i \tag{20}$$

Second, I obtain the estimates on effectiveness of lobbying that vary across the sectors. Using the modified PFS framework motivated above, introducing heterogeneity within the traditional PFS model enables an empirical estimation of the effectiveness measures consistent with the underlying model of PFS. Again, to deal with the measurement error, I take the elasticities to the left hand side. Time-variation is introduced such that the stochastic version of the equation can now be written as:

$$\frac{t_{it}}{1+t_{it}}e_i = (\frac{\gamma_i - \sum_{j=1}^{n}\gamma_j\alpha_j}{a + \sum_{j=1}^{n}\gamma_j\alpha_j})z_{it} + u_{it} \tag{21}$$

For empirical ease in estimating the effectiveness measures, I assume that $a = 1$, and the mean lobbying effectiveness is now given by $\sum_{j=1}^{n}\gamma_j\alpha_j = \gamma$. So, the term $\frac{\gamma_i - \sum_{j=1}^{n}\gamma_j\alpha_j}{a+\sum_{j=1}^{n}\gamma_j\alpha_j}$ can be written as $\frac{\gamma_i - \gamma}{1+\gamma}$. The estimates of β can be interpreted to measure deviation from the mean effectiveness. The β estimates can be normalized [30] into a unit interval $(0, 1)$. Now, if the fraction of specific factor owners is negligible such that if I assume $\sum_{j=1}\alpha_j = 0$, then the estimated β collapse to direct measures of lobbying effectiveness. To obtain the estimates on lobbying effectiveness γ_i, I need a panel dataset as β varies by sector i. The estimates of β by sector can be obtained by the interaction of a sector dummy with the inverse of the import penetration for each sector. This generates interaction terms for every sector that gives the variation to obtain the estimates of lobbying effectiveness that vary across sectors.

As discussed earlier, Trefler (1993) showed that tariff levels have an effect on import penetration ratios. This suggests that the inverse of import penetration must be treated as endogenous as it enters the PFS equation. The determination of import penetration is on lines of the specific factors model as also in GM. Thereby, z is an endogenous regressor which means that z and the error term are correlated and a random shock to the dependent variable also affects the regressor. To solve this issue, I specify a first stage model for the endogenous regressor as shown below.

$$z_i = \delta Y + \epsilon_i \tag{22}$$

The exogeneity assumption is that the set of instrumental variables Y is uncorrelated with the error term. For the instrumental variables estimator to be consistent, the instruments must satisfy the following two conditions[31]. First, the instruments must be exogenous

[29]Taking the elasticities to the left hand side gives the errors as say ϵ that is $\frac{u_i}{e_i}$. The measurement errors for the elasticities are now arguably in the error term.

[30]$coef - r(min))/(r(max) - r(min))$

[31]Wooldridge (2010) for details.

such that the variable should impact the dependant variable (tariff protection) only in its effect on the endogenous explanatory variable (inverse import penetration). The J-test for over identifying restrictions can however be undertaken to check if all instruments are exogenous. Second, excludability implies that the instruments influence the inverse import penetration rates and do not have any direct effect on the MFN tariffs or any effect through omitted variables. It is also important to rule out any reverse effect of the MFN tariffs on the instrumental variables. Finally, the instruments must be correlated with the inverse import penetration that implies it must be relevant. The relevance condition can be tested by computing the t-statistics in the first stage regression and testing for joint significance of instrumental variables.

Exogenous variables motivated in the literature are used to instrument for the inverse import penetration. This follows the import equation of Trefler (1993) where the import-penetration is a function of factor shares in each sector namely the measures of the amounts of capital and labour. Here, I discuss the instrumental variables that are used in the following estimation. First, I use inventories as a measure of physical capital. Second, labour-intensive sectors that are exposed to higher imports can potentially receive relatively higher trade protection. It is thereby expected that there is a comparative advantage for India in terms of unskilled workers measured by the number of workers in production. I use the number of production workers as a measure of labour intensity across sectors to instrument for inverse import penetration. Historically, India exports both labour-intensive and capital-intensive goods but imports less labour-intensive ones.

Based on the presumption that India is labour abundant with capital being relatively scarce in India, one would expect the Ordinary Least Squares (OLS) coefficients to be biased upwards compared to Instrumental Variables (IV) estimates. However, the dependent variable in my model may suffer from measurement error owing to the estimated elasticties[32]. This could create an attenuation bias that leads to an opposite downward bias of the OLS coefficients. In this case, the IV estimator can potentially correct for both problems. Given that the excluded instruments are uncorrelated with the measurement error, the IV procedure corrects for both endogeneity and attenuation bias. Depending on the extent of each bias, it is quite conceivable for IV estimates to increase/decrease once the attenuation bias is removed.

The endogenous variable in the modified PFS model enters as an interaction with the sector fixed effects[33] I adopt the standard approach suggested in literature to include an

[32] We take the elasticities to the left-hand side to deal with errors in these estimates. But the left hand variable is now an estimate that suggests potential measurement errors in coefficients.

[33] To instrument for an endogenous variable and its interaction with another exogenous variable, I find two approaches discussed in the literature. First, given a vector of valid instrumental variables, the interaction term is treated as exogenous and included as part of the instrument set. This can however lead to under identification as shown in Maurice and Teresa (2014). Second, the interaction term is treated as a second endogenous regressor, such that the instrument set should include interactions of the instrumental variables with the exogenous variables in order to satisfy the necessary rank condition for IV estimation. The literature does not agree on one accepted way to deal with this. However, the second approach is suggested as the most natural approach. Some headway in this direction is in Hatice and Bent (2013) that provides empirical observation on the validity of the instruments in this case.

interaction of the instrumental variable with the exogenous variable as another exclusion restriction.

Gawande and Li (2009) highlight the weak instruments (WIs) problem in the empirical testing of PFS. On the whole, for estimators to possess a low bias, the instruments must be strongly correlated with the endogenous regressor. The strength of the instruments can be diagnosed using the F-Statistics on excluded instruments compared with the Stock and Yogo (2005) critical values to check for the extent of bias. The Limited Information Maximum Likelihood (LIML) estimator is suggested as better suited to exact inference with WIs. LIML has better small sample properties than 2SLS with weak instruments. To investigate the quality of instruments, I check the F-statistic from the first-stage regressions on the IVs and present the LIML estimations[34]. The Pagan and Hall test for heterogeneity is undertaken for the instrumental variables and the fitted values of the dependent variable. I find that the null of homoskedasticity is rejected such that I use robust standard errors in my estimations.

5.2 Data

To estimate the models, I used data on imports and output to calculate the import penetration ratio, data on MFN tariffs, industry characteristics and information on political organization. The dataset spans from 1990–2007 with gaps. The time frame is a total of nine years: 1990, 1992, 1996, 1999, 2000, 2001, 2004, 2006, 2007. The main data is summarized in Appendix 7.2.

5.2.1 Industry Data

The industry data for India is taken from the All India Survey of Industries (ASI) compiled by the Central Statistical Organisation (CSO) at the National Industrial Classification (NIC). The NIC underwent several revisions from 1990 − 2007. For the scope of the selected time period, I deal with four revisions of the NIC namely: NIC-1987, NIC-1998, NIC-2001 and NIC-2004. In 1998, 4-digit of ISIC Revision 3 was folded into NIC-1998 and these 4-digits were extended up to 5-digits based on national needs for NIC. After release of the ISIC Rev. 3.1 in 2002, NIC-1998 was updated keeping consistent with ISIC Rev 3.1 and the updated version, namely NIC-2004 was adopted. I map all revisions to NIC-1998. An important point to note here is that there exists a perfect one-to-one correspondence between NIC-1998 and the ISIC Revision 3 of All Economic Activities of the United Nations at the 4-digit level. This helped achieve correspondence between the tariffs and industry data.

The ASI data covers only the registered sectors. It consists of compiled time series data on industry characteristics from 1998-99 to 2007-08 generated from the detailed results of ASI for the corresponding year. The tables are by 2-digit, 3-digit and 4-digit industry

[34] I did the 2SLS estimates and compared the results with the LIML estimations. LIML is used as the preferred method for small samples and potentially weak instruments.

division for each State/UT. All data for the years 1999-2000 and 2001-2007 consisted of 127 manufacturing sectors each at the four-digit classification of the NIC. For 1990-1996 there are 98 manufacturing sectors. The differences in the number of observations across the changes in classifications owe to the revisions across the years. The data had to be mapped across these to NIC-1998 for comparability across the years. Finally, the 98 sectors were selected for all the estimations to compare the results (Details on Mappings are available in author's PhD thesis: http://sro.sussex.ac.uk/65085/).

5.2.2 Trade and Tariffs Data

The tariffs and imports data are from WITS TRAINS and WTO IDB. These contain tariff data from 1990-2011 with gaps in the years. This database contains comprehensive information on Most Favoured Nation (MFN) applied and bound tariffs at the standard codes of the Harmonized System (HS) and ISIC for all WTO Members. This information on tariffs and trade is compiled at the 4-digit level of NIC. Both output and imports are measured at domestic prices shown in Figure 5 below. Since 1990s, the increase in average output across the 4-digit sectors is clearly higher than that of the average imports in the same period.

Figure 5: Output and Imports in Indian Manufacturing

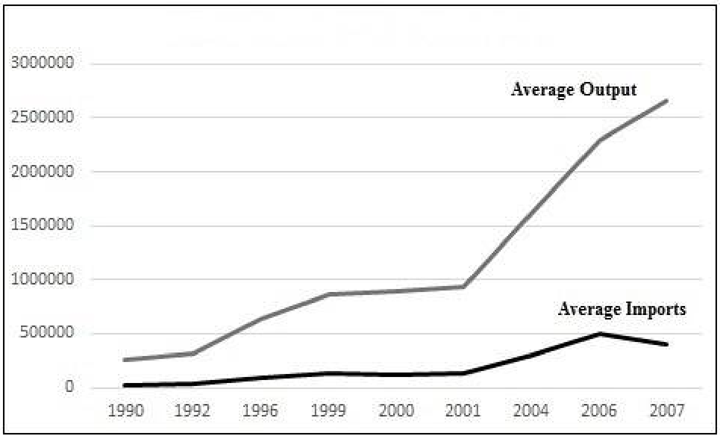

Figure 5 shows the average output and average imports for the Indian Manufacturing sector based on the 98 sectors of the 4-digit of NIC/ISIC Rev. 3

5.2.3 Elasticities

Elasticities are from Kee et al. (2008). They provide a systematic estimation of import demand elasticities at a much disaggregated level for various countries. It uses a semi-flexible translog GDP function approach to formally derive import demands and their elasticities which are estimated with data on prices and endowments.

5.2.4 Political Organization

Identification of political organization has for long been an issue in the empirical literature on PFS. I construct a new measure of political organization for India using data from WBES. Additionally, I take the organization indicators from Cadot et al. (2007) who identify the politically organized industries using trade and production data in a multi-stage iterative procedure[35]

Using information from the WBES, I construct a new measure of Political Organization (I_{WBES}) for Indian manufacturing sectors. This is based on the share of firms that are members of associations in each 4-digit sector. The number of sectors varying in terms of this share (from <0.20 upto 1) is shown in Table 1. Based on the shares of firms as members of associations, I created four quantiles for the shares taking the percentiles of 0.74, 0.82, 0.85 and 0.89 (LM I- LM IV) as different thresholds to construct the political organization indicator. I found the threshold of 0.75 gives the most variation to identify differences by organized and unorganized sectors. I find that with the other thresholds higher than the share of 0.75 do not fit the model. I use this threshold as the cut-off measure for the political organization indicator in my estimations[36]. Finally, the WBES data is based on information collected over the period of 2000-2004, such that this is potentially good reflection of organization for the decade of 2000s.

Table 1: Percentage of organized firms and 4-dgt sectors

% of Firms Members	No. of Sectors at 4-dgt
<0.20	1
0.20-0.30	0
0.30-0.40	0
0.40-0.50	8
0.50-0.60	0
0.60-0.70	10
0.70-0.80	16
0.80-0.90	44
0.90-1	19
Total	98

Note: Table 1 shows the various brackets of shares of firms that are members of associations in each sector (<0.20-1) with the corresponding number of sectors in each bracket. Note that the highest number of 44 sectors fall in the bracket of 80-90 per cent firms as members of associations.

[35]They identify 17 out of 81 industries as organized at ISIC Revision 2. This is mapped to the 4-digit level of NIC in my study that corresponds to 4-digit of ISIC Revision 3. I identify 47 out of the 98 manufacturing industries as politically organized when I use their classification.

[36]This will be discussed in detail in section 3.7.3 on robustness. The PFS model was estimated with each threshold. 0.75 was then selected as the cut-off owing to greater variation in the organization indicator such that the data fits the PFS model.

5.3 Methodology

5.3.1 PFS with Full Organization

First, I begin by estimating the traditional PFS model with the assumption that $I_i = 1 \forall i$, i.e. all industries are organized[37]

$$\frac{t_i}{1+t_i} e_i = \left(\frac{1-\alpha_L}{a+\alpha_L}\right) z_i + \epsilon_i \tag{23}$$

Note that I do not include a constant term in my estimations. I drop the constant following GM such that I seek to explain trade protection strictly within the PFS framework[38]. For consistency with the GH hypothesis, the expected sign on $(\frac{1-\alpha_L}{a+\alpha_L}) > 0$. The underlying implication is that if domestic output is larger, specific-factor owners have more to gain from an increase in the domestic price, while (for a given import-demand elasticity) the economy has less to lose from protection if the volume of imports is lower. If the coefficient is also significant, it is seen as evidence on support of the GH hypothesis.

Re-writing equation (23) above, I get the following specification termed as **PFS Model 1**. I estimate this using the cross-section data across the years, where ρ is defined in terms of the underlying parameters a and α_L. I check the expected sign and significance for the coefficient $\rho > 0$:

$$\frac{t_i}{1+t_i} e_i = \rho z_i + u_i \tag{24}$$

$$\rho = \frac{1-\alpha_L}{a+\alpha_L}$$

I begin by testing the model using MFN applied tariffs in 1990, the year prior to India's trade policy reform and follow by testing the findings for each of the years following immediately after the reform[39].

Table 6 presents the results from estimating Model 1 in equation (24) using *Ordinary Least Squares* (OLS) and those for exact identification with IV using *Limited Information Maximum Likelihood* (LIML)[40]. The F-statistic on the excluded instruments are quite

[37] This follows Gawande et al. (2015) at the 4-digit.

[38] The inclusion of constant term can be understood as explaining the following. First, as in Ederington and Minier (2008) explains this as deviations from welfare-maximizing behaviour. Second, as in Gawande et al. (2012) it reflects the fact that industries may have non-zero trade barriers in practice even when the right-hand side variables are zero.

[39] I check the OLS with the IV specification using a Durbin Wu Hausman (DWH) which is an augmented regression test suggested by Davidson and MacKinnon (1993) to confirm the endogeneity in inverse import penetrationn. This is undertaken by including the residuals of the endogenous variable as a function of all the exogenous variables in a regression of the original model. I get a small p-value that indicates that OLS is not consistent and supports the use of the instrumental variables.

[40] Table 13 in Appendix 7.7 presents the results for Model 1 using OLS and those for over-identification with IV using LIML.

small in all cases such that I present the LIML results[41]. The IV results from exact identification are used to interpret the findings of the model[42]. The F-statistics are more than 10 for the years of 2000 and 2001 where the model finds strong support.

I find only weak support for the GH hypothesis with the Indian MFN tariffs in 1990. This is shown in column (I) of Table 6. The coefficient has the correct sign in all cases. However, I find strong significance only for the years 1999-2004, while it is insignificant for the years 1990, 1992, 1996, 2006 and 2007. This is opposed to findings in Bown and Tovar (2011) discussed above that find strong evidence for the GH findings using tariffs for 1990 at the 6-digit of the HS. The empirical evidence that I consider here also includes the years 1992 and 1996 in addition to 1990. Tariff reductions under the reforms in India were mostly undertaken between 1991 and 1996. It is observed that for 1992 and 1996 again the coefficient has the expected sign but is insignificant in columns (II) and (III) in Table 6. Thereby, the GH findings find support for the Indian manufacturing MFN tariffs for only a few years.

The lack of support PFS in 1990 can be explained in terms of cross-sectional differences in MFN trade protection changes. This is argued based on the fact that policy-makers were not very selective in setting tariffs such that the cross-sectional variations in changes of protection were not really based on economic and political factors. Prior to liberalization in India, most manufacturing industries were publicly owned such that it can be asserted that political economy factors may not have played an eminent role in setting trade protection. Further, there is a linear relationship between the pre-reform tariff levels in 1990 and the decline in tariffs across the manufacturing sector from 1990 to 1996 such that the movements in tariffs were strikingly uniform until 1997 (Figure 2 in the introduction).

The results for 1999 however confirm to the findings for PFS observed in column (IV). I also check the model for the selected years from 2000 onwards in columns (V)-(IX). Bown and Tovar (2011) shows that the GH hypothesis holds for tariffs plus an anti-dumping (AD) equivalent for averages in 2000-2002. However, here I observe that the GH findings hold even with the ad-valorem MFN tariff protection in each of the years 2000, 2001 and also 2004. The coefficients are significant in columns (V) - (VII). Again in 2006 and 2007, it is observed in columns (VIII) and (IX) that the coefficients are not significant. This is explained on lines of a similar argument as above of cross-sectional differences being less pronounced for MFN tariffs after 2004.

On the whole, the results are evidence of the political economy influences on India's import tariff protection over the selected years. The PFS model finds support for the years 1999, 2000, 2001 and 2004 in my period of investigation since liberalisation. This can be explained by the fact that cross-sectional variations in changes of protection were based

[41] I estimated the model using 2SLS, and chose LIML as giving better results with weak instruments.

[42] I also examine with other sets of instruments such as the combination of workers and inventories, however I discuss the ones with exact identification as they provide a better fit. The results for over-identification are attached in Table 13 of Appendix 7.7. The criteria for preference was the first stage F-statistic. It can be argued that with a small cross-section, the exact identification case with LIML provides better estimates.

on economic and political factors before 1991. This was followed by the exogenous reform in 1991 such that MFN tariffs reductions were undertaken until 1997. The GH hypothesis no longer holds for the MFN tariffs for the years after 2004 as most cross-sectoral changes were already undertaken. Indian trade policy was now looking more to the increased use of other barriers in combination with MFN tariffs that still reflected political economy objectives but to a lesser extent.

To provide a structural interpretation of Indian MFN trade protection for the years where the GH hypothesis holds, I use the results from exact identification (IV1) in Table 6 (assuming all industries are organized) to estimate the structural parameter a across the years where the coefficients are of correct sign and are significance. Additionally, assume [43] $\alpha_L = 0$ as a means of empirical ease, such that the estimated coefficients are [44] $\frac{1}{a}$. I find the estimate for government weight on welfare for each year shown in Figure 6 below. The estimates suggest that government weight on welfare was 20 times the weight on contributions for 1999[45]. This weight rose to 45 times in 2000 before declining again to less than 15 times by 2004. These estimates on a are significant and much lower than those observed in Bown and Tovar (2011).

Figure 6: Relative weight on Welfare in India across the years

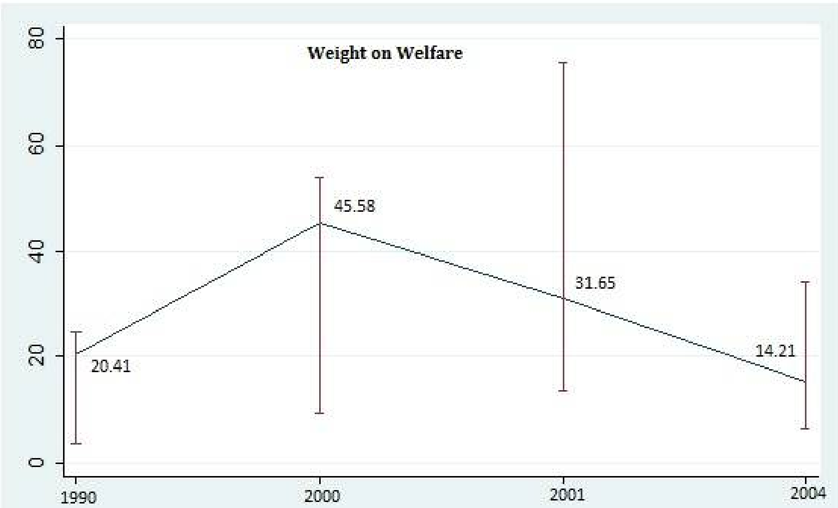

Figure 6 shows the weight attached to welfare relative to contributions of Indian manufacturing sector.

Now, re-writing equation (24) above including the time dimension, I get the following equation that can be estimated using the pooled dataset for all years.

$$\frac{t_{it}}{1 + t_{it}} e_i = \rho z_{it} + \epsilon_{it} \tag{25}$$

[43]This assumption implies that the share of the population that are organized specific factor owners is negligible.

[44]This follows Gawande et al. (2015) among others.

[45]These are comparable to estimates for India for the cross-country model for 1988–2000 in Gawande et al. (2015).

The results are presented in Table 2 by pooling the data across $1990-2007$ where column (I) presents the results with OLS, column (II) outlines the results when the model is over-identified and columns (III)-(VI) presents results with alternate IV strategies outlined in the corresponding first stage estimates in Table 8 of Appendix 7.4.

Table 2: Pooled Cross-Sections: OLS and IV

	(I)	(II)	(III)	(IV)	(V))
Model	OLS	IV1	IV2	IV3	IV4
X/M	0.003***	0.020***	0.021***	0.018***	0.018***
	(0.000)	(0.004)	(0.005)	(0.004)	(0.004)
N	876	876	876	876	876

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Note: Table 2 shows the results from Limited Information Maximum Likelihood for the pooled dataset. The results are presented for IV strategies I-V presented in Table 8 of Appendix 7.8.

I use various combinations of the lagged value of workers, lagged values of inventories and the square of workers to further alleviate endogeneity concerns in the pooled dataset, where IV3 using the lagged values of inventories and workers squared gives the best fit in terms of the F-statistic (12.46). The coefficients are statistically significant and of expected sign[46]. I check the t-statistics on the instrumental variables to examine if they are significantly different from zero with signs supporting the identification story. The Cragg-Donald Wald F-statistic on the excluded instruments is more than 10 for IV strategies in columns (III) and (IV) (10 is desirable as in Stock and Yogo (2005))[47].

The estimates from the pooled data can be biased and inconsistent due to correlation of regressors with the error terms in other periods. This is based on the logic that there are unobserved characteristics that are common to all sectors of Indian manufacturing but vary across time, one example being changes in governments since 1990 to 2007. I use time fixed effects and include dummies for all years that allows the intercept to have a different value in each period. Both the dependent variable and X/M varies across time and across sectors[48]:

$$\frac{t_{it}}{1+t_{it}}e_i = (\frac{1-\alpha_L}{a+\alpha_L})z_{it} + \lambda_t \tag{26}$$

[46] The 2-SLS results are slightly lower than LIML estimates.

[47] There may be a potential weak instrument problem when IV is biased towards OLS and the bias is worse when there are many over-identifying restrictions (many instruments compared to endogenous regressors as in my case). I attempt to deal with this problem of weak instruments in my estimations using the LIML. I also attempted to use other instrumental variables such as the theoretically consistent Gross Fixed Capital and semi-skilled workers and additionally profits and the lag of import penetration as an exogenous source of identification in my specification. However, these emerged weak instruments for inverse import penetration and were also found insignificant.

[48] Note if there was any variable that varies only across time will be collinear with the dummy variables and its effect cannot be estimated

The results are presented in Table 14 of Appendix 7.7. On comparing with results from the specification without any fixed effects, it is observed that the coefficient sizes are much lower. Controlling for differences in lobbying for the sectors that vary across time also changes the structural interpretation of the model estimates, as I capture the political economy factors controlling for unobserved effects over the years. This may include changes in governments and are correlated with the explanatory variables. Next, I estimate the PFS model where I include the political organization indicators to examine the political economy of Indian trade protection.

5.3.2 Has Protection really been for Sale in India?

Now, re-writing equation (20), I get the estimable equation:

$$\frac{t_i}{1+t_i}e_i = \rho z_i + \beta(I_i z_i) + u_i \tag{27}$$

$$\rho = \frac{-\alpha_L}{a+\alpha_L}$$
$$\beta = \frac{1}{a+\alpha_L}$$

When the time dimension t is included in this model, the specification can be written as shown below for **PFS Model 2**:

$$\frac{t_{it}}{1+t_{it}}e_i = \rho z_{it} + \beta I_i z_{it} \tag{28}$$

I employ a new approach to identify political organization across the manufacturing sectors in India. Interest groups often organize themselves into producer or trade associations that lobby the government for industry-level tariffs. Trade associations such as the CII and FICCI in India provide a common lobbying organization that can handle the concerns of industry in a more effective manner than if the firms/industries lobbied themselves. This is arguably on lines of cooperative lobbying as in Gawande et al. (2012), if these industries achieve full organization. Political organization in the PFS model across sectors can be identified using such information on membership to these associations. Data on such membership is available at the firm-level from the WBES. At the industry-level, this survey identifies 24 sectors[49].

Lobby membership is thereby identified at the firm level, using the response from the following question of the WBES: *"Is your firm a member of a producer or trade association?"*. A positive answer is coded 1, while the value of 0 is assigned to a negative

[49] Of these we drop two sectors with respect to the scope of the manufacturing sector sample such that it now consists of a total of 22 sectors. These sectors can be matched with the selected sample of 98 industries here at the 4-digit NIC using product descriptions. Each NIC sector is matched to one sector from the Enterprise survey (Available on request).

answer. To reach identification of political organization at the level of 4-digit ISIC, I first aggregate the membership of the firms in each sector. This is defined as the share of member firms for each of the 22 sectors as shown in Table 1. The percentage of organized firms that are members of these associations is observed to be quite high in each sector. I use this data to construct the political organization indicator. Four different thresholds were set in terms of the quantiles for the percentage organized firms across sectors. This is to set a threshold to identify political organization across the ISIC 4-digit sectors. Using this threshold, each industry is identified as organized or unorganized. I constructed four indicators named *Lobby Membership* (LM) defined as LM I, LM II, LM III and LM IV based on the thresholds of 0.75, 0.82, 0.84 and 0.89 from quantile values respectively shown in Table 10 of Appenidx 7.5. I estimate the PFS model based on these measures of LM across industries, shown in Table 16 in Appendix 7.5. The results for thresholds above 0.75 differ in terms of signs on coefficients and in terms of significance. On the whole, this confirms to the argument in Imai et al. (2009) that on reclassifying politically organized industries, the estimates may no longer support the GH hypothesis. I select the threshold of 0.75 to construct the political organization indicator for the following analysis[50].

Now, I estimate the PFS with political organization. Both the dependent variable and X/M varies across time and sectors, but political organization varies only across sectors. The following quantitative implications are now testable. First, ρ, the coefficient on X/M for unorganized sectors is negative ($\frac{-\alpha_L}{a+\alpha_L} < 0$). Second, β, the coefficient on X/M for organized sectors is positive ($\frac{1}{a+\alpha_L} > 0$). Second, the sum of the coefficients is positive $\frac{I_i-\alpha_L}{a+\alpha_L} > 0$. If these quantitative findings are confirmed, the GH hypothesis finds support. If the GH hypothesis is found to hold, then the structural estimates can be derived. This includes the weight on government welfare a and also the fraction of population organized as lobbies α_L. I check if these are within the expected values of 0 and 1 and are statistically significantly different from 0.

The results are outlined in Table 3 where I estimate the baseline in column (I) using the pooled dataset from 1990-2007. I use the IV strategy from Table 2 (IV3 was argued as the preferred strategy). Simple robustness checks are in columns (II)-(IV), where (II) shows the results dropping the maximum tariff, (III) shows the results for the data with a restricted sample for the years 2000 onwards. I also check this specification including time dummies[51] such that (IV) shows the results with time dummies.

[50]To statistically validate this identification I use probit estimation. The political organization dummy is the dependent variable and the right-side variables include the import penetration ratio and the import demand elasticity. This validation follows Mitra et al. (2002) where all the variables on the RHS include the import-related variables only. The variables are jointly significant and have the expected signs (negative for both the import demand elasticity and import penetration. I now predict the probability of being politically organized using the mean values of the predictors at 0.76. This is used to construct an ex post classification by categorizing a sector as organized if the predicted probability of being organized using the estimated probit regression) is 0.76 or higher. The average percentage error is around 11 per cent.

[51]It can be argued that when I include political organization in the PFS and estimate with the pooled data, controlling for unobserved characteristics that vary across time will also wipe out any sector specific characteristics that need to be captured to explain the cross-sectional endogeneity in trade protection

Table 3: Pooled Cross-Section with Political Organization I_{iWBES}

	(I) Pooled *Baseline*	(II) Drop Outlier *Robustness*	(III) Restricted Sample *Robustness*	(IV) Pooled with Time Dummies *Robustness*
X/M	-0.131**	-0.091**	-0.210**	0.006**
	(0.053)	(0.042)	(0.099)	(0.003)
$X/M * I_{iWBES}$	0.158***	0.114***	0.252***	0.005*
	(0.053)	(0.041)	(0.097)	(0.003)
yr1				3.119*
				(1.738)
yr2				1.141
				(1.698)
yr3				2.697***
				(1.045)
yr4				3.291***
				(0.679)
yr5				3.102***
				(0.722)
yr6				3.463***
				(0.624)
yr7				3.389***
				(0.592)
yr8				1.860***
				(0.648)
yr9				1.778**
				(0.691)
N	876	867	490	876

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 3 shows the results for the pooled cross-section with the new political orgaization measure. (I) shows the results for the pooled data, (II) shows the results dropping the maximum tariff, (III) shows the results for the data for years 2000 onwards, finally (IV) shows the results with time dummies.

The GH hypothesis finds strong support such that the basic quantitative findings are confirmed where ρ is negative and significant at -0.131 and β is positive and significant at 0.158, and the sum of the coefficients is also found positive and statistically significantly different from zero. The first stage estimates for each estimation is outlined in Table 9 of

across periods.

Appendix 7.4 where the F-statistics are greater than 10 for the models IV1-IV3, introducing time dummies seems to take away from the explanatory power of the model.

The robustness checks in (II)-(IV) suggest that the GH hypothesis is robust to the outlier observation. Further, I restrict the sample for 2000 onwards, I find the coefficients are higher when I restrict the time-period of my estimation and the corresponding Shea R-squares are the highest for the corresponding fit of the first stage estimates. It is important to note that the political organization indicator uses the information from the WBES that collected information from 2000 onwards such that these are arguably more reflective of the political economy set-up in that period.

Finding support for the PFS model using the pooled dataset with the new political organization indicator warrants a comparison with previous political organization indicators available for India. I undertook this comparison with the political organization indicator from Cadot et al. (2007) that was available[52].

I estimate the structural parameters a and α_L using the results in Table 3 for the pooled cross-section. Finding strong support for the restricted sample, I use data for 2000 onwards such that the results can be interpreted as averages for the decade of 2000. The estimated coefficients ρ and β can be used to calculate the parameters such that $\alpha_L = \frac{\rho}{\beta}$ and $a = \frac{1+\rho}{1+\rho+\beta}$. Table 4 shows that the relative weight on welfare with respect to industry interactions (political contributions in terms of the PFS model) for the government in India was 0.758 for the period of 2000 onwards. This means that the government weighs industry interactions along with welfare when formulating trade policy. The estimate of α_L is approximately 0.832 that implies a very high proportion of specific factor owners are organized as members of associations in India.

Table 4: Implied a, α_L and Sum of Coefficients

Structural Parameters	Estimates (Data 2000 onwards)
a	0.758*** (0.094)
α_L	0.832*** (0.078)
Sum of Coefficients	0.042*** (0.009)

Note: Table 4 shows the structural parameters. The estimated coefficients ρ and β are used to calculate the parameters such that $\alpha_L = -\frac{\rho}{\beta}$ and $a = \frac{1+\rho}{1+\rho+\beta}$, where ρ=-0.210 and β=0.252.

[52]This data was kindly provided by Marcelo Olarreaga and Jean-Marie Grether. A simple comparison reveals that 63 out of 98 industries are politically organized for my set of industries using this indicator[53]. I believe that the Cadot et al. (2007) measures are reflective of the year 1997 only, also the year of estimation in their sample. This measure misses out on crucial information that shows actual organization of manufacturing industries in India for the years 1999 onwards as more industries started interacting with the government. This is significantly higher than the 47 industries identified in the paper by Cadot et al. (2007)

The structural estimates suggest that there is a high proportion of sector specific owners that are organized. The next step is in the direction of examining potential heterogeneity in terms of actual lobbying behaviour across sectors. In fact, if it is the case that at the industry-level most of the population engaged in the manufacturing sectors are politically organized, the variation would thereby be expected in terms of the lobby behaviour. These estimates therefore imply that even though the government cares about social welfare, it is still open to industry opinion and corresponding producer welfare also owing to the fact that a large fraction of the population are specific factor owners who can organize to lobby the government.

5.3.3 Estimating Lobbying Effectiveness

I estimate the Modified PFS using two different specifications to enable comparison and ascertain the best fit of the data:

Modified PFS Model 1 is estimated as:

$$\frac{t_{it}}{1+t_{it}}e_i = \beta_{1i} z_{it} + u_{it} \tag{29}$$

Here, the parameter β_{1i} can be estimated across the sectors using variation of the interaction of z_{it} with the sector dummies for each sector where β_{1i} is defined as:

$$\beta_{1i} = \frac{\gamma_i - \sum_{j=1}^{n} \gamma_j \alpha_j}{a + \sum_{j=1}^{n} \gamma_j \alpha_j} \tag{30}$$

It estimates the effect of inverse import penetration on trade protection across the sectors. This relationship given by the coefficient β_1 which varies by the sectors i.

Estimates from the pooled data can be biased and inconsistent due to correlation of regressors with the error terms in other periods. Unobserved effects over the years can include changes in governments for instance that are correlated with the explanatory variables. To address this, year fixed effects can be employed to capture any pattern that the sectors exhibit as a group over the years. To control for this, I now introduce time fixed effects into the earlier specification and estimate **Modified PFS Model 2** that includes time dummies and is written as:

$$\frac{t_{it}}{1+t_{it}}e_i = \beta_{0t} + \beta_{1i}(z_{it} D_i) + u_{it} \tag{31}$$

Here, β_{0t} are the time fixed effects. The parameters β_{0t} is included in addition to β_{1i} . The effect of inverse import penetration on trade protection differs across sectors. This relationship is now given by the coefficient β_1 which is identified off the variation across the sectors controlling for any unobserved effects across the years that maybe correlated with the explanatory variable.

The identifying assumption for the political economy parameter (lobbying effectiveness) in my model is time-invariance, following Gawande et al. (2015), who adopt a similar logic focussing on lobbying estimates as an average across their period of study, I present the effectiveness estimates for 1990-2007. This is a good starting point for India as it underwent major economic and trade reforms during the period under study. The aim of the empirical analysis is thereby to obtain lobbying effectiveness estimates as the average parameters during the entire period controlling for any unobserved effects over the years of study (examples include change in governments and so on) that can be correlated with the explanatory variables. This in turn allows us to use the variation in trade protection and inverse import penetration over the period to identify lobbying effectiveness across the sectors. Fitting with my objective, **Moified PFS Model 2** is thereby the baseline that is compared with Modified PFS Model 1 estimated without any fixed effects.

I use an instrumental variables approach using *Limited Information Maximum Likelihood* (LIML). The instrumental variables therefore include the lag of inventories as a measure of physical capital, the lag of number of production workers as a measure of labour intensity across sectors and the interaction of lagged workers with the sector dummies. I use the lagged values of the instruments to alleviate any additional endogeneity concerns. The IV strategy is different for each model on account of time dummies. Table 17 presents a summary of the estimated coefficients for all the Models using IV and the over-identification tests in the relevant case. The Anderson-Rubin Statistics tests the joint significance of the endogenous regressor in the main equation such that over-identifying restrictions can be argued as valid in IV1 and IV2; in both Models the null cannot be rejected. The corresponding IV results are outlined in Table 18, the corresponding product descriptions can be read from Table 7.6 of Appendix 7.5. The estimated coefficients reflect the individual correlation of the dependent variable with the inverse import penetration across sectors. All else equal, this examines the relationship between trade protection and the penetration of imports in Indian manufacturing. A negative and significant coefficient suggests a higher inverse import penetration is associated with lower MFN trade protection while a positive sign is evidence for the opposite relationship to hold. Each model is examined in terms of the first stage results of the IV and compared in terms of the IV and corresponding OLS estimates to examine the extent to which the IV corrects for the bias in the OLS.

In examining the estimated coefficients across columns (I)-(II), my interest was to obtain estimates on lobbying effectiveness that in the model are given as γ_i. In the baseline results in column (2), the coefficient estimates explains one sector receiving higher protection vis-a-vis another controlling for changes across time. The first stage estimates for the models are attached in Table 19 of Appendix 7.8 which presents the First stage F-Statistics and the Shea Partial R-Squares for all the interactions across the 98 sectors. The F-test show good fit for the models where it is more than 10 for most sectors. LIML is used as the better estimation method with any problem of weak instruments in small samples, however I use the criteria of the F-test to select the preferred model.

Column (I) of Table 18 shows the coefficient estimates obtained from the Modified PFS Model 1 with the pooled dataset. This identifies the coefficient β_{1i} that serves as the benchmark for the competing models. Comparison of the OLS results (OLS1) and the IV (IV1) is presented in Figure 7. There are arguably endogeneity issues and an attenuation bias working in opposite directions in the OLS estimations. First, an upward bias on account of endogeneity in estimating the relationship between trade protection and the ratio of output to imports. Second, there may also be a downward bias on account of measurement error in the dependent variable that includes the estimated import demand elasticities. This was discussed such that if the excluded instruments are uncorrelated with any measurement error, the IV procedure corrects for both bias. On account of the bias being in opposite directions however, I expect the IV estimates may be higher or lower than the OLS estimates depending on the correction across sectors.

Column (II) outlines the results for Modified PFS Model 2. Comparison of the OLS (OLS2) and (IV2) reveals that in this Model, the IV estimates are a clear correction over the OLS bias. The distribution of the coefficient estimates (with time fixed effects) that are identified off the cross-sector variation are shown in Figure 8. Note that there is a clear left shift in the distribution for IV2 as compared to IV1 that owes to the fact that the coefficient estimates in IV2 explains one sector receiving higher protection vis-a-vis another controlling for changes across time.

Figure 7: Kernel Density estimates for coefficients from OLS1 and IV1

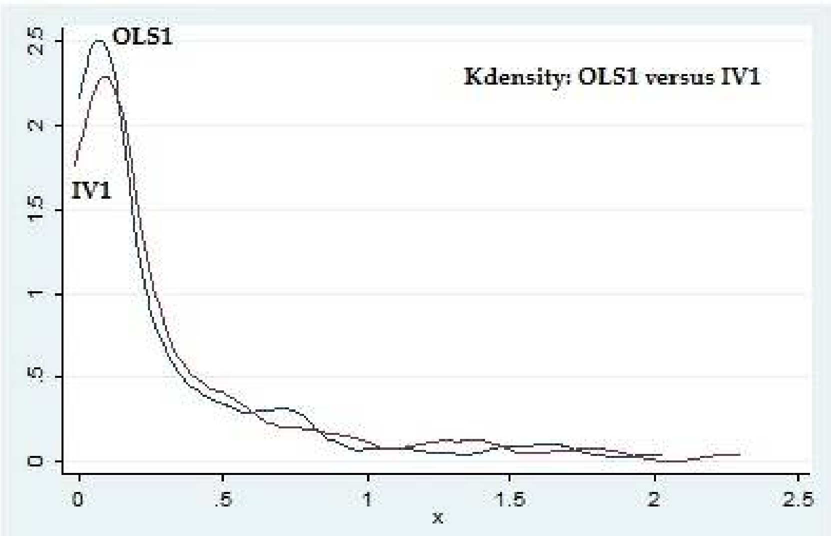

Figure 7 shows the coefficient estimates from Model OLS1 and IV1 for the modified PFS.

Figure 8: Kernel Density estimates for coefficients from OLS2 and IV2

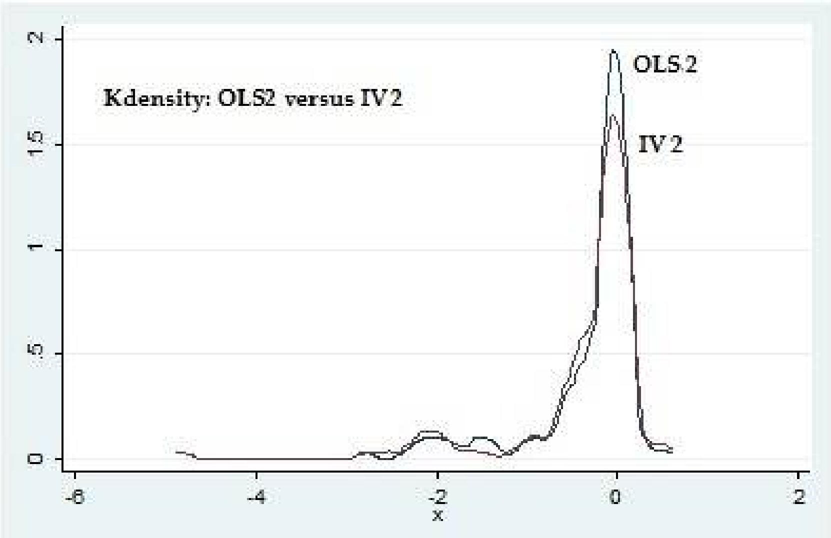

Figure 8 shows the coefficient estimates from Model OLS3 and IV3 for the modified PFS.

It is important to note that there are both positive and negative signs on the coefficients for interactions of the inverse import penetration. This can be understood on lines of the GH hypothesis such that opposed relationships are found for organized versus unorganized sectors. The interaction term gives the disperse component in the overall relationship between the inverse import penetration and trade protection explained by what I termed as lobbying effectiveness γ_i. Table 20 presents the coefficients of interaction terms from Modified PFS Model 2 that are used to derive lobbying effectiveness and the corresponding estimates of lobby effectiveness. Using this method, the effectiveness estimates are derived as relative to each other and as a deviation from the mean effectiveness in manufacturing shown in Figure 9.

Figure 9: Lobbying Effectiveness

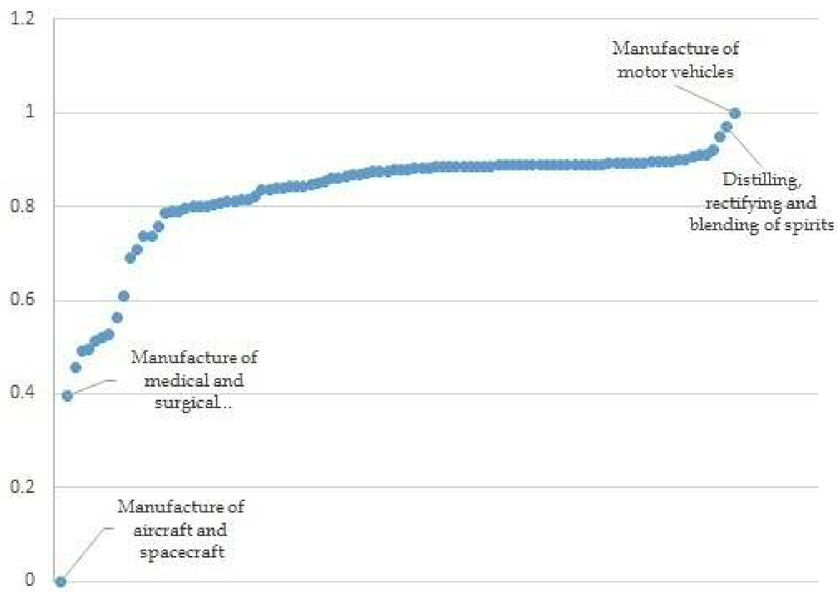

Figure 9 shows the lobbying effectiveness estimates at the 4-digit of the NIC/ISIC Rev. 3. Among the most effective sectors, I also observe the one with the highest tariffs being the ISIC sector *1551* defined as the *Distilling, rectifying and blending of spirits*.

5.4 What determines Lobbying Effectiveness in India?

In this section, I discuss the most effective and least effective sectors based on the estimated relative lobbying effectiveness measures above. I find the industries of *Manufacture of motor vehicles* and *Distilling, rectifying and blending of spirits*as the most effective lobby groups and that of *Manuf. of aircraft and spacecraft* and *Medical, surgical and orthopaedic equipment* the least effective in terms of lobbying effectiveness over the period 1990-2007. It is important to note that these effectiveness measures reflect the relative effectiveness of each sector in comparison to the mean for the period of 1990-2007. The underlying theoretical framework implies this as the government weight on these sectors relative to aggregate welfare. The ten most effective sectors compared to the mean show an effectiveness measure between 0.90 to 1, while the ten least effective ones range from 0.61 to 0. Across all the 4-digit NIC/ISIC sectors, the average effectiveness is found quite high at 0.82 interpreted as the average lobbying effectiveness of the Indian manufacturing sector between 1990-2007.

I also compare my estimates on lobbying effectiveness from the PFS model with the political organization measures constructed for India in the literature[54]. I find that the most effective sector of *Manufacture of motor vehicles* is labelled as organized using my measure of organization but identified as unorganized in Cadot et al. (2007) while the least effective sector of *Manuf. of aircraft and spacecraft* is identified as being politically

[54]Outlined in table 7.6 of Appendix 7.5, political organization from Cadot et al. (2007) is presented corresponding to the effectiveness estimates. The estimates in Cadot et al. (2007) for ISIC Revision 2 were mapped to the 4-digit sectors of NIC/ISIC Revision 3 in my study for comparison.

organized in both measures. This suggests support for the earlier argument that political organization alone does not imply actual lobbying, while some sectors can be organized they may be very ineffective at lobbying. Thereby, the natural question is to examine what determines this effectiveness in the next section.

Why are some industries more effective in lobbying for trade protection than others? Whether or not firms are successful in securing protection depends on their ability to organise and make a case for protection. A fundamental issue is what characteristics determine the ability of influence interests groups to lobby for protection. There is only scarce evidence on this question with few empirical papers that have looked at the effectiveness of lobbying in shaping policy outcomes[55] with no empirical evidence whatsoever in the context of lobbying effectiveness for trade policy in India. I am therefore interested to examine the determinants of the measures on lobbying effectiveness for trade policy using a set of traditional political-economy regressors.

It is widely accepted that industry characteristics determine lobbying for trade policy influence[56] where individual firms play an important role the structure of protection across sectors[57]. These factors have been shown to predict the ability of an industry to organize and lobby the government for trade policy. In this section, I explain effectiveness of lobbying using the demand side of trade policy in terms of the underlying costs and benefits of lobbying[58]. The success of these sectors in securing protection will in turn depend on several political economy factors.

Trefler (1993) provides certain criteria relevant to predict whether an industry will achieve sectoral political organization and obtain favourable legislation. The country-specific empirical literature for Australia, Turkey and the United States uses trade specific characteristics such as imports and exports to identify political organization. Gawande and Bandyopadhyay (2000) use some of these trade oriented variables, along with additional ones such as political contributions, value added, composition of employees and firm concentration that are not strictly trade oriented to explain political organization. These determinants that have been used in the PFS framework to explain political organization may also affect lobbying effectiveness.

The evidence on how geographic location determines effectiveness in lobbying for policy is at best mixed[59]. If firms in a given industry are spread across all the country, then

[55]One study in this area is by De Figueiredo and Silverman (2006) who statistically estimate the returns to lobbying by universities for educational earmarks. They find that for a university with representation in the House or Senate appropriations committees, a 10 per cent increase in lobbying yields a 3 to 4 per cent increase in earmark grants obtained by the university.

[56]In the traditional PFS setting, examples include Mitra (1999).

[57]The role of firms in shaping protection for a sector has been explored in Bombardini (2008).

[58]In my theoretical framework, effectiveness is linked to the preferences of the government on the supply side of protection as one alternative. The estimated effectiveness measures are now explained with empirical data on demand specific determinants of effectiveness.

[59]I find two opposing views that are discussed at length in Busch and Reinhardt (1999). The relationship between geographic concentration and protection has been explained using the idea of a closed group with no incentive to free-ride on one hand and the logic of broad political representation on the other.

their influence on the government decision-making process can potentially be stronger as they would exert their influence through different channels. This implies broad political representation with a potentially greater voice in trade politics. At the same time, it has been suggested in the literature that it could be harder/expensive for firms that are spread out to organize and lobby. This is based on the idea of a closed group that implies the costs of organization and monitoring effective lobbying is lower such that there is less incentive to free-ride. The geographical concentration of firms in a given industry is therefore an important determinant of the effectiveness in lobbying. However, I argue that this relationship may be dependent on the nature of goods produced in a given sector in terms of being similar or differentiated varieties. Firms in a given sector that produce similar goods cooperate to lobby effectively when they are concentrated, these firms may also lobby effectively when they are geographically dispersed that can translate to better political representation.

It is often suggested that as size of the group increases, it can lead to greater lobbying by the group. Bombardini (2008) shows that the characteristics of size distribution of firms are important in explaining the pattern of protection across industries in the PFS model such that larger firms in a given sector are more likely to lobby. She shows that the share of total output in a sector produced by firms that lobby is increasing with the average firm size and firm size dispersion within the sector. A more unequal distribution of firm size, implies a larger industry-level of lobbying for a given output that can get a higher level of protection. Thereby to study lobbying effectiveness, one must account for unequal size distribution of firms in a given sector. Following this line of analysis, I control for the idea that unequal size distribution of firms may result in lower effectiveness. Given that the average size of firms in a given sector is an important factor that can determine lobbying effectiveness, I control for the average size of firms and output concentration in a given sector in the specification below.

The dependent variable is the lobbying effectiveness measure γ_i estimated above that lies between 0 and 1. Using pooled OLS, I test the hypothesis that a sector with geographically concentrated firms is more effective in lobbying by achieving cooperation to effectively influence the government decision-making process. Additionally, I will test if the relationship between geographical concentration and lobbying effectiveness varies in terms of the elasticity of substitution in a given sector. Taking into account the bounded nature of the response variable, I will use a fractional logit model with lobbying effectiveness in the (0,1) interval as a dependent variable (Papke and Wooldridge (1996)) as a robustness check.

I include the following set of political economy determinants to examine the impact on lobbying effectiveness:

$$\gamma_i = \alpha_0 + \alpha_1 G + \alpha_2 Elasticity + \alpha_3 G * Elasticity + \beta B + u_i \tag{32}$$

Where *Geography* (G) is the geographical concentration in a particular sector (that is time-invariant) taken from Lall et al. (2003). *Elasticity* is the elasticity of substitution in a given sector from Broda and Weinstein (2004). The effect of geography of lobbying effectiveness is potentially heterogeneous such that I argue this differs by the similarity or differences in the types of products produced in a sector.

A higher elasticity of substitution (which also implies smaller economies of scale in equilibrium) works against regional divergence as asserted in Krugman (1990). Therefore, the interaction of geographical concentration with the elasticity of substitution i.e. *G*Elasticity* is included[60]. The control variables B include output concentration measured as the share of output produced by the four largest firms in a given sector and the average size of a sector (in terms of number of firms that proxy for lobby strength in numbers.) from the WBES. Additionally, the effectiveness in lobbying can also be affected by the opportunity for direct interactions with the government that will affect the ability to lobby effectively. I construct a measure using data on the following question on average time spent by firms on direct interactions with the government (scaled by the output of the given sector) from the WBES to control for this effect:

"In a typical week over the last year, what percentage of total senior management's time was spent in dealing with requirements imposed by government regulations including dealings with officials, completing forms, etc.?"

The fractional logit model can be represented as the following equation:

$$E[y|x] = \frac{exp(X\beta)}{1 + exp(X\beta)} \tag{33}$$

Where y is the dependent variable lobbying effectiveness and X is the vector of explanatory regressors. Both results from the pooled OLS and fractional logit are presented in Table 21. I find the results are qualitatively similar for both the estimations. In all columns (I)-(V), the results suggest evidence for the hypothesis that geographical concentration is a positive and significant determinant of lobbying effectiveness in Indian manufacturing. The more concentrated the firms in a given industry, more effective is the industry in lobbying for trade policy. This effect also depends on the elasticity of substitution i.e. the similarity or differentiated varieties produced in the sector evidenced in the positive and significant coefficient for elasticity. Being geographically concentrated and producing similar varieties of goods is found to translate to lower costs of lobbying that determines lobbying effectiveness significantly such that I find a negative and significant coefficient for the interaction term. Overall, I find a significant interaction for *Geography* and the *Elasticity* that indicates that the effect of geographical spread on lobbying effectiveness differs by the elasticity of the industry that also confirms Krugman (1990). This implies that for Indian manufacturing sectors producing differentiated goods will be more effective in lobbying the government when firms are geographically concentrated.

[60]Note that elasticity of substitution among the products in a given sector differs from the elasticity of import demand faced by the firm that was included in the PFS estimations earlier.

6 CONCLUSION

This paper provides evidence on the traditional PFS model using a unique dataset for India and motivates a simple modification to the framework. Across the selected time period of study, I find the traditional GH hypothesis holds for only few years. In this light, *Has Protection really been for Sale in India?*. The answer to this question is that protection has been for sale in India since 1999 with increase in political organization in the decade of 2000s. The modified PFS with lobbying effectiveness is then used to estimate lobbying effectiveness measures for Indian manufacturing.

First, assuming full organization in Indian manufacturing, I find that for applied MFN tariff protection, the GH hypothesis holds only for 1999, 2000 and 2001. The findings for 1990 are in contradiction to Bown and Tovar (2011) which can be explained in terms of the cross-sectional differences in protection were less explained by political economy factors as most sectors had high public ownership before the reforms. The results also differ for 2000-2002 averages such that it can be argued that the GH hypothesis holds even in explaining MFN protection without Anti-dumping equivalents for 2000 and 2001. I find only weak support for the PFS model in early 1990s and post 2004.

Second, political organization is identified using the WBES data for India. The PFS model with the new measure of political organization for the Indian manufacturing industries explains the observed pattern of MFN tariff protection. I find very strong evidence for the model using the data from 2000 onwards. However, organization as in the PFS model is a discrete story which has limitations in capturing actual lobbying or variations in lobbying strategies. Organization alone does not imply that a firm or industry will necessarily lobby the government. On the whole, the empirical evidence on the original PFS presented here motivates a continuous measure to reflect heterogeneity in lobbying across sectors.

Third, political organization is thereby useful as a discrete story but lobbying in terms of a continuous measure adds value to the GH hypothesis reflecting actual lobbying abilities across sectors. The origin of heterogeneity in PFS is then explained using the idea of lobbying effectiveness. I provide new empirical evidence on India in terms of estimates on lobbying effectiveness for trade policy that have been non-existent for India. Further, I used the estimates to examine determinants of lobbying effectiveness in terms of market structure. The findings suggests that sectors with geographically concentrated firms are likely to be more effective in lobbying, the effectiveness will decline with an increase in similarity of goods produced in the sector which implies they are likely to be competitors.

References

Ansolabehere, S., de Figueiredo, J. M., and Snyder, J. M. (2003). Why is there so little money in politics? Working Paper 9409, National Bureau of Economic Research. 29

Baldwin, R. E. (1989). The political economy of trade policy. *The Journal of Economic Perspectives*, pages 119–135. 8, 18, 25, 26

Baldwin, R. E. and Robert-Nicoud, F. (2007). Protection for sale made easy. *Discussion Paper No. 800*. 3, 59

Baru, S. (2009). The influence of business and media on indian foreign policy. *India Review*, 8(3):266–285. 8, 12

Belloc, M. (2007). Protection for sale in the eu. *Working Paper - Department of Public Economics*, 100(July):1–30. 2, 22

Bernheim, B. D. and Whinston, M. D. (1986). Common agency. *Econometrica*, 54(4):923–942. 12, 13, 23, 25, 31, 60

Bohara, A. K., Gawande, K., and Sanguinetti, P. (2004). Trade diversion and declining tariffs: evidence from mercosur. *Journal of International Economics*, 64(1):65–88. 21

Bombardini, M. (2008). Firm heterogeneity and lobby participation. *Journal of International Economics*, 75(2):329–348. 6, 50, 51

Bown, C. P. and Tovar, P. (2011). Trade liberalization, antidumping, and safeguards: evidence from india's tariff reform. *Journal of Development Economics*, 96(1):115–125. 2, 17, 18, 22, 24, 38, 39, 53

Broda, C. and Weinstein, D. E. (2004). Globalization and the gains from variety. Technical report, National Bureau of Economic Research. 51

Busch, M. L. and Reinhardt, E. (1999). Industrial location and protection: The political and economic geography of u.s. nontariff barriers. *American Journal of Political Science*, 43(4):1028–1050. 50

Cadot, O., Dutoit, L., Grether, J.-M., and Olarreaga, M. (2007). Endogenous tariffs in a common-agency model: a new empirical approach applied to india. *University of Geneva*. 2, 17, 20, 22, 23, 24, 36, 44, 49

Cadot, O., Laure, D., Grether, J.-M., and Olarreaga, M. (2014). Endogenous tariffs in a common-agency model: A new empirical approach applied to india. *La Revista de Economía y Estadística*, Volume LI:pp.25–52. 17, 19, 24

Chopra, A. (1995). *India: economic reform and growth*, volume 134. International monetary fund. 11

Davidson, R. and MacKinnon, J. G. (1993). Estimation and inference in econometrics. *OUP Catalogue*. 37

de Figueiredo, J. M. and Richter, B. K. (2014). Advancing the empirical research on lobbying. *Annual Review of Political Science*, 17(1):163–185. 2, 25

De Figueiredo, J. M. and Silverman, B. (2006). Academic earmarks and the returns to lobbying. *The Journal of Law Economics*, 49(2):597–625. 50

Ederington, J. and Minier, J. (2008). Reconsidering the empirical evidence on the grossman-helpman model of endogenous protection. *The Canadian Journal of Economics / Revue canadienne d'Economique*, 41:501–516. 37

Fernandez, R. and Rodrik, D. (1991). Resistance to reform: Status quo bias in the presence of individual- specific uncertainty. *The American Economic Review*, 81(5):1146–1155. 3

Gawande, B. K., Krishna, P., and Olarreaga, M. (2012). Lobbying competition over trade policy*. *International Economic Review*, 53(1):115–132. 21, 37, 41

Gawande, K. and Bandyopadhyay, U. (2000). Is protection for sale? evidence on the grossman-helpman theory of endogenous protection. *Review of Economics and statistics*, 82(1):139–152. 2, 15, 24, 50

Gawande, K. and Hoekman, B. (2006). Lobbying and agricultural trade policy in the united states. *International Organization*, 60(03):527–561. 19

Gawande, K., Krishna, P., and Olarreaga, M. (2009). What governments maximize and why: The view from trade. *International Organization*, 63(3):491–531. 21

Gawande, K., Krishna, P., and Olarreaga, M. (2015). A political-economic account of global tariffs. *Economics Politics*, 27(2):204–233. 2, 7, 37, 39, 46

Gawande, K. and Li, H. (2009). Dealing with weak instruments: An application to the protection for sale model. *Political Analysis*, 17(3):236–260. 19, 34

Gawande, K. and Magee, C. (2012). Free riding and protection for sale1. *International Studies Quarterly*, 56(4):735–747. 3, 23, 26

Goldberg, P. K. and Maggi, G. (1997). Protection for sale: An empirical investigation. *American Economic Review*, 89:1135–1155. 2, 13, 23, 31

Grossman, G. and Helpman, E. (1994). Protection for sale. *American Economic Review*, 84(4):833–50. 2

Hatice, B. and Bent, S. (2013). Interaction effects in econometrics. *Empirical Economics*, 45. 33

Hillman, A. L. (1989). *The political economy of protection*. Harwood Academic Publisher, Chur, London and New York. 6

Hillman, A. L., Van Long, N., and Soubeyran, A. (2001). Protection, lobbying, and market structure. *Journal of International Economics*, 54(2):383–409. 6

Imai, S., Katayama, H., and Krishna, K. (2009). Protection for sale or surge protection? *European Economic Review*, 53(6):675–688. 2, 16, 22, 24, 42

Kee, H. L., Nicita, A., and Olarreaga, M. (2008). Import demand elasticities and trade distortions. *The Review of Economics and Statistics*, 90(4):666–682. 19, 35

Kelejian, H. H. (1971). Two-stage least squares and econometric systems linear in parameters but nonlinear in the endogenous variables. *Journal of the American Statistical Association*, 66(334):373–374. 15

Kochanek, S. and Hardgrave, R. (2006). *India: Government and Politics in a Developing Nation*, volume 7th Rev Ed edition. Wadsworth. 12

Kochanek, S. A. (1996). Liberalisation and business lobbying in india. *Journal of Commonwealth and Comparative Politics*, 34(3):155–173. 5, 11, 12

Krugman, P. (1990). Increasing returns and economic geography. Working Paper 3275, National Bureau of Economic Research. 52

Lall, S. V., Jun, K., and Chakravorty, S. (2003). Diversity matters - the economic geography of industry location in india. Technical report, The World Bank. Policy Research Working Paper Series. 51

Long, N. V. and Soubeyran, A. (1996). Lobbying for protection by heterogeneous firms. *European Journal of Political Economy*, 12(1):19–32. 6

Maggi, G. and Rodrıguez-Clare, A. (2000). Import penetration and the politics of trade protection. *Journal of International Economics*, 51(2):287–304. 7, 19

Maurice, J. G. B. and Teresa, D. H. (2014). Ols and iv estimation of regression models including endogenous interaction terms. *University of Amsterdam Discussion Paper*, 2. 33

McCalman, P. (2004). Protection for sale and trade liberalization: an empirical investigation. *Review of International Economics*, 12(1):81–94. 2, 16, 19, 20

Milner, H. V. and Mukherjee, B. (2011). *Democracy and Trade Policy in Developing Countries: Particularism and Domestic Politics with a Case Study of India.* 11

Mitra, D. (1999). Endogenous lobby formation and endogenous protection: a long-run model of trade policy determination. *American Economic Review*, pages 1116–1134. 3, 16, 24, 50

Mitra, D., Thomakos, D. D., and Ulubaşoğlu, M. A. (2002). "protection for sale" in a developing country: Democracy vs. dictatorship. *Review of Economics and statistics*, 84(3):497–508. 2, 6, 16, 19, 20, 21, 42

Narlikar, A. (2006). Peculiar chauvinism or strategic calculation? explaining the negotiating strategy of a rising india. *International Affairs*, 82(1):59–76. 8

Papke, L. E. and Wooldridge, J. M. (1996). Econometric methods for fractional response variables with an application to 401(k) plan participation rates. *Journal of Applied Econometrics*, 11(6):619–632. 51

Pincus, J. J. (1975). Pressure groups and the pattern of tariffs. *Journal of Political Economy*, 83(4):757–778. 8, 25

Piramal, G. (1996). Business maharajas (viking penguin india, new delhi). 11

Saha, A. (2013). Make lobbying legal. *Economic and Political Weekly*, 48(30). 8

Shiells, C. R. (1991). Errors in import-demand estimates based upon unit-value indexes. *The Review of Economics and Statistics*, 73(2):378–382. 15

Sinha, A. (2007). Global linkages and domestic politics trade reform and institution building in india in comparative perspective. *Comparative Political Studies*, 40(10):1183–1210. 11, 12

Stock, J. H. and Yogo, M. (2005). Testing for weak instruments in linear iv regression. *Identification and inference for econometric models: Essays in honor of Thomas Rothenberg*. 34, 40

Swinnen, J. F. M. and Vandemoortele, T. (2011). Trade and the political economy of food standards. *Journal of Agricultural Economics*, 62(2):259–280. 7

Topalova, P. (2007). *Trade liberalization, poverty and inequality: Evidence from Indian districts*, pages 291–336. University of Chicago Press. 9, 11, 12

Topalova, P. and Khandelwal, A. (2011). Trade liberalization and firm productivity: The case of india. *Review of Economics and statistics*, 93(3):995–1009. 30

Trefler, D. (1993). Trade liberalization and the theory of endogenous protection: an econometric study of us import policy. *Journal of Political Economy*, pages 138–160. 18, 19, 32, 33, 50

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*, volume 1. MIT press. 32

Yadav, V. (2008). Business lobbies and policymaking in developing countries: The contrasting cases of india and china. *Journal of Public Affairs*, 8(1-2):67–82. 8, 11

7 Appendix

7.1 PFS Theoretical Setup

The model assumes a small economy with $n+1$ goods. Let the goods be produced across i sectors where $i = 0, \ldots, n$. Let 0 is the numeraire and n be the number of non-numeraire sectors.

The population size in the economy is normalized to 1. Let the model comprise m individuals with identical quasi-linear preferences. This assumption eliminates general equilibrium considerations stemming from income effects. Individuals differ in specific factor endowments.

Each individual maximizes his/her direct utility function u shown in the equation below. The preferences are separable by sector that eliminates any cross-price effects on demand.

$$u = x_0 + \sum_{i=1}^{n} u_i(x_i) \tag{34}$$

Where, x_0 is consumption of the numeraire and x_i is consumption of good in sector i. u_i is the sub-utility that is an increasing concave function. As the utility function is separable by sector, the demand in each sector depends only on the price of the good in that sector. Let the demand function d_i for sector i be defined as: $d_i(p_i)$ and consumption be defined as $x_i = d_i(p_i)$.

Now, the indirect utility v of an individual with income E and the sector-specific consumer surplus $s_i(p_i)$, takes the following form:

$$v = E + \sum_{i=1}^{n} s_i(p_i) \tag{35}$$

Where $s(p) = u(d(p)) - pd(p)$ and $s_i^{'}(p_i) = -d_i$. Maximizing u subject to $x_0 + \sum_{i=1}^{n} p_i x_i \leq E$, can be formulated as the maximization problem below:

$$L = x_0 + \sum_{i=1}^{n} u_i(x_i) - \lambda(x_0 + \sum_{i=1}^{n} p_i x_i - E)$$

This gives the folowing:

$$\frac{dL}{dx_0} = 1 - \lambda = 0$$

$$\frac{dL}{dx_i} = u_i^{'}(x_i) - \lambda p_i = 0$$

The above equations imply $u_i^{'}(x_i) = p$, such that $x_i = d_i(p_i) = [u_i^{'}(x_i)]^{-1}$. Therefore, the demand function d_i is the inverse of $u_i^{'}(x_i)$. The demand for numeraire can be written as $x_0 = E - \sum_i p_i d_i(p_i)$

In GH, an almost partial equilibrium demand structure implies that the consumer surplus perfectly captures the welfare impact of price changes. The numeraire is manufactured from labour alone with constant returns to scale and an input-output coefficient of 1. Wages are fixed at 1 in a competitive equilibrium. Production of the non-numeraire good requires labour and a sector-specific input for each sector[61]. The technology for these also exhibits constant returns to scale with inelastic supply of the specific inputs. With wage at 1, the aggregate reward to the specific factor depends only on domestic price. Let the returns to specific factor used in sector i be denoted by π_i and by Hotelling's lemma, $y_i(p_i) = \pi_i^{'}(p_i)$ where $y_i(p_i)$ is the supply function of good in sector i. World prices are exogenous at p_i^* such that domestic price is $p_i = p_i^* + t_i$, where t_i represents a specific import tariff if the good is imported[62]. Government redistributes revenue from trade policy in lump-sums equally to all citizens. Net imports are given as $M_i = d_i - y_i$.

An individual derives income from wages, government transfers, and from ownership of sector specific input. Summing indirect utilities over all k individuals across i sectors, aggregate welfare in the economy equals:

$$W = 1 + \sum_{i=1}^{n} \pi_i + \sum_{i=1}^{n} t_i M_i + \sum_{i=1}^{n} s_i \tag{36}$$

Those who own a specific input will have a direct interest in the tax applicable to trade in the good[63]. The owners of specific factors can choose to organize their interests into lobby groups for political activity[64], where lobby existence is exogenous. It is assumed in the model that only $i \in L$ sectors, the owners of specific factors are able to form lobbies. α_i is the fraction of population that owns the factors. Gross-of-contributions joint welfare of members of a lobby group in sector i, can be defined as:

$$W_i = \pi_i + \alpha_i(1 + \sum_{j=1}^{n}(t_j M_j) + \sum_{j=1}^{n}(s_j)) \tag{37}$$

The contribution schedule of a lobby group in sector i can be defined as shown below (as in Baldwin and Robert-Nicoud (2007)):

$$C_i = [\pi_i + \alpha_i(1 + \sum_{j=1}^{n}(t_j M_j) + \sum_{j=1}^{n}(s_j))] - B_i \tag{38}$$

This shows the contributions of a lobby group in sector i should be directly related to its rents π_i , the first term in the equation above. Contributions are reduced by a constant term B_i, as it does not require lobbies to contribute all their rents to the government and allows the lobby to retain some fruits of their lobbying as outlined in Baldwin and Robert-Nicoud (2007). The second term assumes that lobbies maximise the utility of

[61]On the supply side, a Ricardo-Viner set-up is assumed, that eliminates general equilibrium supply side effects because labour's price now depends on productivity in the numeraire sector and each sector-specific factor is paid the Ricardian rent. This means that expenditure for a typical consumer equals labour income, share of tariff revenue and payment to the sector-specific factors owned.

[62]It can represent an export subsidy if the good is exported and exports are also considered.

[63]This goes beyond the general consumer interest in trade policies that affect domestic prices.

[64]This collective action has to overcome free-rider problems.

the owners of industry-specific factors who are also consumers. This is included in the contribution schedule as it includes elements of the owner's indirect utility function that involve prices in other j sectors–the per-capita distribution of tariff revenue $\sum_{j=1}^{n}(t_j M_j)$, the per capita consumer surplus $\sum_{j=1}^{n} s_j$, and the per capita labour endowment. This term is multiplied by α_i, to represent the share of lobby i of the social gains/losses due to these factors.

The government objective is a weighted sum of the contributions C_i from the set of organized sectors $i \in L$ and the aggregate welfare W as shown below.

$$G = \sum_{i \in L} C_i + aW \tag{39}$$

The political equilibrium is the two-stage non-cooperative game, where first each lobbying group presents the government with a contribution schedule and in the second stage the government chooses the policy to maximize its objective function. The equilibrium set of contribution schedules is a policy vector that maximizes the objective function of the government. In this game, the contribution schedule is set so that the marginal change in the gross welfare of the lobby for a small change in policy equals the effect of the policy change in contribution i.e. each lobby makes locally truthful contributions that reflects true preferences of the lobby.

GH assume the interaction between the government and lobby groups takes the form of a menu auction as in Bernheim and Whinston (1986). $(C_i^0)_{i \in L}, p_0$ is outlined as a sub game-perfect Nash equilibrium of the trade-policy game where C_i^0 is the equilibrium contribution that is feasible for all $i \in L$. In this setting, p_0 maximizes the joint welfare of lobbies and the government. The interaction between lobby groups and the government has the structure of a menu-auction problem following which the equilibrium is characterized as a joint maximization of welfare net of lobbying cost. The maximization of government welfare in GH outlines the following first-order condition:

$$\sum_{i \in L} \bigtriangledown C_i^0(p) + a \bigtriangledown W(p^0) = 0 \tag{40}$$

GH use Bernheim and Whinston (1986) to define a truthful contribution function as shown below. The government is paid for any policy p that is the excess of the gross welfare of lobby j at this price relative to a base level of welfare for some scalar amount B_j:

$$C_j^T(p, B_j) = max[0, W_j(p) - B_j] \tag{41}$$

Bernheim and Whinston (1986) state that the equilibria supported by truthful strategies are the only stable and *coalition-proof* strategy. Further, the truthful Nash equilibria is focal among the set of Nash equilibria. This assumption implies that the government maximizes a social-welfare function where the individuals represented by a lobby group are weighted by $(1 + a)$ and those not represented receiving the smaller weight of a.

GH assume that lobbies set contribution functions that are differentiable around an equilibrium price say p^o. Finally, the characterization of equilibrium trade policies is in terms of this differentiable contribution function shown below:

$$\sum_{i\in L} \bigtriangledown W_i(p^0) + a \bigtriangledown W(p^0) = 0 \tag{42}$$

The change in welfare across all organized lobby groups $i \in L$ and change in aggregate welfare from the change in price/tariff in (42) can be written as[65]:

$$\begin{aligned}\sum_{i\in L}^{n} \delta_{ij} X_i + \sum_{i\in L}^{n} \alpha_i (M_i + t_i M_i^{'} - d_i)] \\ +aX_i + a[M_i + t_i M_i^{'} - d_i] = 0\end{aligned} \tag{43}$$

Where δ_{ij} is an indicator variable that equals 1 when $i = j$ and 0 otherwise.

$$\begin{aligned}\sum_{i\in L}^{n} \delta_{ij} X_i + \sum_{i\in L}^{n} \alpha_i (M_i + t_i M_i^{'} - d_i)] \\ +aX_i + a[M_i + t_i M_i^{'} - d_i] = 0\end{aligned} \tag{44}$$

This is simplified in GH, by assuming that $I_j = \sum_{i\in L} \delta_{ij}$ is an indicator variable that equals 1 if the industry j is organized and 0 if it is not organized. $\alpha_L = \sum_{i\in L} \alpha_i$ is the fraction of total population represented by a lobby group.

$$I_j X_i + \alpha_L(-X_i + t_i M_i^{'})] + a + a t_i M_i^{'} = 0 \tag{45}$$

Substituting and solving for t_i gives:

$$t_i = -\left(\frac{I_j - \alpha_L}{a + \alpha_L}\right) \frac{X_i}{M_i} \tag{46}$$

Multiplying on both sides of the equation:

$$\frac{M_i}{p_i} t_i = \left(\frac{I_j - \alpha_L}{a + \alpha_L}\right) \frac{X_i}{-M_i^{\prime} \frac{p_i}{M_i}} \tag{47}$$

Let the positive values of the elasticity of import demand e_i equals $-M_i^{\prime} \frac{p_i}{M_i}$ and $p_i = p_i^* + t_i$

[65]Note that the change in total consumer surplus s_i is minus the level of consumption d_i , the change in producer surplus π_i is the level of domestic production X_i, and the derivative of revenue $t_i M_i$ equals the level of imports plus the level of the tariff times the change in imports in response to a domestic price change:

$$s_i^{'}(p_i) = d_i$$

$$\pi_i^{'}(p_i) = X_i$$

$$(t_i M_i(p_i)) = M_i + t_i M_I^{'}$$

where international prices p_i^* are assumed equal to[66] 1. Substitution gives:

$$\frac{t_i}{1+t_i} = \left(\frac{I_j - \alpha_L}{a + \alpha_L}\right)\frac{X_i}{M_i}\frac{1}{e_i} \tag{48}$$

[66]As p_* equals 1, the ad-valorem tariffs and specific tariffs are easily equated.

7.2 Summary Statistics

Table 5: Summary Statistics by Years

Variable	1990		1992		1996	
	Mean	SD	Mean	SD	Mean	SD
Tariff	84.61	36.09	59.42	32.29	43.51	31.39
t/1+t	0.441	0.096	0.357	0.088	0.286	0.090
Import Demand Elasticity	15.46	16.33	15.46	16.33	15.46	16.33
Output (X in Rs Lakhs)	265740.00	490250.60	323287.60	546612.10	643002.20	1021357.00
Imports (M in Rs Lakhs)	25479.34	60135.34	35271.05	87494.62	91821.57	230574.70
X/M (Rs Lakhs)	385.35	1251.97	466.16	1744.09	232.91	792.02
Workers	53751.54	113891.00	56509.16	115956.80	61753.63	116945.70
Inventories	36881.09	75337.71	56166.04	97248.94	94672.22	155715.70
Variable	1999		2000		2001	
Tariff	36.16	20.01	36.04	19.00	34.85	19.73
t/1+t	0.257	0.067	0.256	0.068	0.249	0.071
Import Demand Elasticity	15.46	16.33	15.46	16.33	15.46	16.33
Output (X in Rs Lakhs)	862037.30	1301237.00	896164.50	1404715.00	933621.30	1531384.00
Imports (M in Rs Lakhs)	132369.20	326822.10	123997.40	301809.10	137303.30	320044.30
X/M (Rs Lakhs)	115.03	338.26	137.37	469.84	86.41	196.11
Workers	59336.74	107800.60	58185.84	105608.40	56802.05	101885.20
Inventories	162381.40	271251.40	170176.10	314749.40	167874.30	323319.60
Variable	2004		2006		2007	
	Mean	SD	Mean	SD	Mean	SD
Tariff	31.51	18.21	18.40	18.59	19.28	21.36
t/1+t	0.230	0.071	0.142	0.091	0.145	0.097
Import Demand Elasticity	15.46	16.33	15.46	16.33	15.46	16.33
Output (X in Rs Lakhs)	1618978.00	3382978.00	2300029.00	4873125.00	2657099.00	5715065.00
Imports (M in Rs Lakhs)	302604.70	688638.50	506018.70	1071660.00	397520.40	898767.50
X/M (Rs Lakhs)	63.06	159.95	86.96	380.63	103.24	410.77
Workers	62480.14	102477.20	74172.18	116810.40	77405.94	119382.30
Inventories	242219.80	422042.70	346800.20	613800.70	423931.90	752664.60

7.3 PFS: OLS versus IV

Table 6: Protection for Sale across the Years: OLS vs Exact Identification

	(I) 1990		(II) 1992		(III) 1996	
Model	OLS	IV1	OLS	IV1	OLS	IV1
X/M	0.004***	0.021	0.002	0.009	0.003	0.025
	(0.001)	(0.011)	(0.001)	(0.005)	(0.001)	(0.011)
N	94	94	96	96	98	98

	(IV) 1999		(V) 2000		(VI) 2001	
Model	OLS	IV1	OLS	IV1	OLS	IV1
X/M	0.010**	0.049**	0.007**	0.022**	0.018**	0.032**
	(0.003)	(0.017)	(0.002)	(0.008)	(0.004)	(0.011)
N	98	98	98	98	98	98

	(VII) 2004		(VIII) 2006		(IX) 2007	
Model	OLS	IV1	OLS	IV1	OLS	IV1
X/M	0.016**	0.070**	0.004*	0.010	0.004**	0.010
	(0.004)	(0.027)	(0.001)	(0.007)	(0.001)	(0.006)
N	98	98	98	98	98	98

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Note: Table 6 shows the results for PFS assuming all industries are organized. Limited Information Maximum Likelihood is used that is shown to provide better estimates with weak instruments. I find strong support in 1999, 2000, 2001 and 2004. Robust standard errors in parentheses.

7.4 PFS First Stage Estimates

Table 7: First Stage Estimates: IV

	(I)	(II)	(III)
	1990	1992	1996
Model	IV	IV	IV
Inventories	0.00163	0.00276	0.00050
	(0.001)	(0.002)	(0.000)
Observations	94	96	98
Shea R-squared	0.011	0.030	0.012
F-Statistic	1.458	1.818	2.578

	(IV)	(V)	(VI)
	1999	2000	2001
Model	IV	IV	IV
Inventories	0.00016*	0.00029***	0.00019***
	(0.000)	(0.000)	(0.000)
Observations	98	98	98
Shea R-squared	0.019	0.046	0.100
F-Statistic	3.712	10.29	11.79

	(VII)	(VIII)	(IX)
	2004	2006	2007
Model	IV	IV	IV
Inventories	0.00006*	0.00020	0.00019
	(0.000)	(0.000)	(0.000)
Observations	98	98	98
Shea R-squared	0.033	0.137	0.145
F	3.864	1.463	1.643

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

Table 8: Pooled First Stage Estimates: IV1-IV4

Model	(I) IV1	(II) IV2	(III) IV3	(IV) IV4
Lag Inventories	0.00152***	0.00226*	0.003444***	0.00639***
	(0.000)	(0.001)	(0.001)	(0.002)
Lag Workers		-0.00065		-0.00223**
		(0.001)		(0.001)
Workers Squared			-0.00336***	-0.00406***
			(0.001)	(0.001)
Observations	876	876	876	876
R-squared	0.045	0.046	0.073	0.082
F	14.88	12.25	12.46	10.87

Note: Table 8 shows the first stage results for the pooled dataset assuming all industries are organized. Limited Information Maximum Likelihood is used that is shown to provide better estimates with weak instruments. Robust standard errors in parentheses.

Table 9: Pooled Cross-Section with Political Organization I_{iWBES}: First Stage

	IV1		**IV2**		**IV3**		**IV4**	
Dependent Variables:	X/M	X/M*I_i	X/M	X/M*I_i	X/M	X/M*I_i	X/M	X/M*I_i
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Model	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Lag Inventories	0.0032***	0.0029***	0.0032***	0.0029***	0.0028***	0.0025**	0.0028***	0.0030***
	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0009)	(0.0009)	(0.0008)	(0.0008)
Workers Square	-0.0031***	-0.0028 ***	-0.0031***	-0.0028***	-0.0033**	-0.0029**	-0.0028***	-0.0029***
	(0.0008)	(0.0008)	(0.0008)	(0.0007)	(0.0010)	(0.0010)	(0.0007)	(0.0008)
Org. Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	No	No	No	No	No	No	Yes	Yes
Observations	876	876	876	876	876	876	876	876
Shea R-squared	0.0012	0.0013	0.0012	0.0013	0.0028	0.0030	0.0608	0.0903
First Stage F-Stat.	10.68	10.78	10.52	10.60	15.14	19.48	6.73	9.92
Anderson-Rubin (p-values)	**0.932**		**0.939**		**0.118**		**0.118**	

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

Note: Table 9 shows the first stage estimates for the IV strategy above.

7.5 Political Organization

Table 10: Thresholds to define Organization

Thresholds to define Organization

Percentiles	Percent	Cum.	Organized Sectors	Unorganized Sectors
0.75	25	25	79	19
0.82	25	50	63	35
0.84	25	75	47	51
0.89	25	100	21	77

Table 11: Summary of Political Organization Measures

Organization	Years	Organized	Unorganized
I (WBES)	All	79	19
I (Cadot)	All	47	51

7.6 Comparison

Table 12: Comparison of Political Organization Measures

NIC498	Description	Political Org. (WBES)	Cadot et al Measure
1511	Production, processing and preserving of meat and meat products.	1	1
1512	Processing and preserving of fish and fish products	1	0
1513	Processing and preserving of fruit, vegetables and edible nuts	1	0
1514	Manuf. of Vegetable and animal oils and fats	1	0
1520	Manuf. of dairy product [production of raw milk is classified in class 0121]	1	0
1531	Manuf. of grain mill products	1	0
1532	Manuf. of starches and starch products	1	0
1533	Manuf. of prepared animal feeds	1	0
1541	Manuf. of bakery products	1	0
1542	Manuf. of sugar	1	0
1543	Manuf. of cocoa, chocolate and sugar confectionery	1	0
1544	Manuf. of macaroni, noodles, couscous and similar farinaceous products	1	0
1551	Distilling, rectifying and blending of spirits	1	0
1552	Manuf. of wines	1	1
1553	Manuf. of malt liquors and malt	0	0
1554	Manuf. of soft drinks; production of mineral waters	0	1
1600	Manuf. of tobacco products	1	0
1711	Preparation and spinning of textile fiber including weaving of textiles	1	0
1721	Manuf. of made-up textile articles, except apparel	1	0
1722	Manuf. of carpet and rugs other than by hand	1	0
1723	Manuf. of cordage, rope, twine and netting	1	0
1729	Manuf. of other textiles n.e.c.	1	1
1730	Manuf. of knitted and crocheted fabrics and articles	1	0
1810	Manuf. of wearing apparel, except fur apparel	1	1
1820	Dressing and dyeing of fur; Manuf. of articles of fur	1	0
1911	Tanning and dressing of leather	1	0
1912	Manuf. of luggage, handbags, and the like, saddlery and harness	1	1
1920	Manuf. of footwear.	0	0
2010	Saw milling and planing of wood	0	0
2021	Manufacture of veneer sheets; plywood, laminboard, particle board	0	0

Comparison of Political Organization Measures

NIC498	Description	Political Org. (WBES)	Cadot et al Measure
2022	Manufacture of builders' carpentry and joinery	0	0
2023	Manufacturing of wooden containers	0	0
2029	Manufacture of other products of wood, manufacture of articles of cork	0	0
2101	Manufacture of pulp, paper and paper board	1	1
2102	Manufacture of corrugated paper and paperboard	1	0
2109	Manufacture of other articles of paper and paperboard	1	1
2212	Publishing of newspapers, journals and periodicals	1	0
2219	Other publishing	1	1
2221	Printing	1	1
2222	Service activities related to printing	1	0
2310	Manufacture of coke oven products	1	0
2320	Manufacture of refined petroleum products	1	1
2411	Manufacture of basic chemicals except fertilizers and nitrogen compounds	1	1
2412	Manufacture of fertilizers and nitrogen compounds	1	1
2413	Manufacture of plastics in primary forms and of synthetic rubber.	0	1
2422	Manufacture of paints, varnishes and similar coatings,printing ink and mastics	0	1
2423	Manufacture of pharmaceuticals, medicinal chemicals and botanical products	1	1
2424	Manufacture of soap and detergents, cleaning and polishing preparations	0	0
2429	Manufacture of other chemical product n.e.c.	1	1
2430	Manufacture of man-made fibers	1	1
2511	Manufacture of rubber tyres and tubes; retreading and rebuilding of rubber tyres	1	0
2519	Manufacture of other rubber products	1	1
2520	Manufacture of plastic products	0	1
2610	Manufacture of glass and glass products	1	0
2691	Manufacture of non-structural non-refractory ceramic ware	1	0
2692	Manufacture of refractory ceramic products	1	0
2694	Manufacture of cement, lime and plaster	1	0
2695	Manufacture of articles of concrete, cement and plaster	1	0
2696	Cutting, shaping and finishing of stone	1	0
2699	Manufacture of other non-metallic mineral products n.e.c.	1	0
2710	Manufacture of basic iron and steel	1	0
2720	Manufacture of basic precious and non-ferrous metals	1	1

Comparison of Political Organization Measures

NIC498	Description	Political Org. (WBES)	Cadot et al Measure
2811	Manufacture of structural metal products	1	0
2812	Manufacture of tanks, reservoirs and containers of metal	1	0
2813	Manufacture of steam generators, except central heating hot water boilers	1	1
2893	Manufacture of cutlery, hand tools and general hardware	1	1
2899	Manufacture of other fabricated metal products n.e.c.	1	1
2912	Manufacture of pumps, compressors, taps and valves	1	1
2919	Manufacture of other general purpose machinery	1	1
2921	Manufacture of agricultural and forestry machinery	1	0
2922	Manufacture of machine-tools	1	1
2924	Manufacture of machinery for mining, quarrying and construction	1	1
2925	Manufacture of machinery for food, beverage and tobacco processing	1	1
2930	Manufacture of domestic appliances, n.e.c.	1	1
3000	Manufacture of office, accounting and computing machinery	1	1
3110	Manufacture of electric motors, generators and transformers	1	1
3130	Manufacture of insulated wire and cable	1	0
3140	Manufacture of accumulators, primary cells and primary batteries	1	0
3150	Manufacture of electric lamps and lighting equipment	1	1
3190	Manufacture of other electrical equipment n.e.c.	1	1
3210	Manufacture of electronic valves and tubes and other electronic components	1	1
3220	Manufacture of television and radio transmitters and apparatus for line telephony	1	1
3230	Manufacture of television and radio receivers, sound or video recording	1	1
3311	Manufacture of medical and surgical equipment and orthopedic appliances	1	1
3320	Manufacture of optical instruments and photographic equipment	1	1
3330	Manufacture of watches and clocks	1	1
3410	Manufacture of motor vehicles	1	0
3511	Building and repairing of ships	1	1
3520	Manufacture of railway and tramway locomotives and rolling stock	1	1
3530	Manufacture of aircraft and spacecraft	1	1
3591	Manufacture of motorcycles	0	0
3592	Manufacture of bicycles and invalid carriages	0	1
3599	Manufacture of other transport equipment n.e.c.	0	1
3610	Manufacture of furniture	0	0

Comparison of Political Organization Measures

NIC498	Description	Political Org. (WBES)	Cadot et al Measure
3691	Manufacture of jewellery and related articles	0	1
3692	Manufacture of musical instruments	0	0
3693	Manufacture of sports goods	0	0
3694	Manufacture of games and toys	1	1

7.7 PFS Robustness

Table 13: Protection for Sale across the Years: OLS vs 2 IVs

	(I) 1990		(II) 1992		(III) 1996	
Model	OLS	IV2	OLS	IV2	OLS	IV2
X/M	0.004***	0.024**	0.002	0.008	0.003*	0.022
	(0.001)	(0.008)	(0.001)	(0.004)	(0.001)	(0.013)
R^2	0.21	-5.25	0.15	-0.96	0.08	-3.32
N	94	94	96	96	98	98

	(IV) 1999		(V) 2000		(VI) 2001	
Model	OLS	IV2	OLS	IV2	OLS	IV2
X/M	0.010**	0.031*	0.007**	0.017*	0.018**	0.037**
	(0.003)	(0.012)	(0.002)	(0.008)	(0.004)	(0.009)
N	98	98	98	98	98	98

	(VII) 2004		(VIII) 2006		(IX) 2007	
Model	OLS	IV2	OLS	IV2	OLS	IV2
X/M	0.016**	0.065**	0.004*	0.018	0.004**	0.013
	(0.004)	(0.022)	(0.001)	(0.029)	(0.001)	(0.013)
R^2	0.15	-1.33	0.06	-0.83	0.08	-0.29
N	98	98	98	98	98	98

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Note: Table 13 shows the results for PFS assuming all industries are organized. Robust standard errors in parentheses.

Table 14: Pooled Cross-Sections with Time Dummies: IV

	(I) IV1	(II) IV2	(III) IV3	(IV) IV4
X/M	0.015***	0.012***	0.011***	0.012***
	(0.005)	(0.004)	(0.004)	(0.004)
yr1	1.374	2.447	2.977	2.441
	(2.548)	(2.136)	(1.902)	(2.049)
yr2	-0.902	0.396	1.038	0.389
	(2.231)	(1.868)	(1.701)	(1.875)
yr3	1.431	2.080	2.401*	2.076
	(1.620)	(1.359)	(1.259)	(1.370)
yr4	2.668***	2.988***	3.147***	2.986***
	(0.870)	(0.785)	(0.754)	(0.785)
yr5	2.371**	2.754***	2.943***	2.752***
	(0.969)	(0.865)	(0.828)	(0.868)
yr6	3.012***	3.253***	3.372***	3.252***
	(0.705)	(0.666)	(0.652)	(0.663)
yr7	3.051***	3.227***	3.314***	3.226***
	(0.639)	(0.611)	(0.603)	(0.614)
yr8	1.487*	1.729**	1.848***	1.727**
	(0.769)	(0.685)	(0.643)	(0.678)
yr9	1.335	1.623**	1.765**	1.621**
	(0.830)	(0.736)	(0.690)	(0.728)
N	876	876	876	876

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Note: Table 14 shows the results from Limited Information Maximum Likelihood for the pooled dataset with time dummies. The results are presented for IV strategies 1-4.

Table 15: Pooled Cross-Sections with Time Dummies: First Stage

Model	(1) OLS	(2) OLS	(3) OLS	(4) OLS
Lag Inventories	0.00097**	0.00276**	0.00276***	0.00595***
	(0.000)	(0.001)	(0.001)	(0.002)
Lag Workers		-0.00164**		-0.00254***
		(0.001)		(0.001)
Workers Squared			-0.00270***	-0.00334***
			(0.001)	(0.001)
Observations	876	876	876	876
R-squared	0.090	0.095	0.104	0.115
First Stage F-Stat.	9.062	8.314	7.931	7.259
Anderson-Rubin statistic (Over-identification test)	.	.	.	.

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

Note: Table 15 shows the first stage estimates for the IV strategy in Table 14.

Table 16: PFS with various Thresholds

	(I)	(II)	(III)	(IV)
X/M	-0.131*	0.003	0.002	0.011***
	(0.053)	(0.005)	(0.004)	(0.003)
X/M*LM I	0.158**			
	(0.053)			
X/M*LM II		0.025**		
		(0.082)		
X/M*LM III			0.035***	
			(0.007)	
X/M*LM IV				0.024**
				(0.007)
N	876	876	876	876
F	21.01	20.31	19.54	13.12

Note: Table 16 shows the results for PFS with different political organization measures constructed with the thresholds of 0.75 (LM I), 0.82 (LM II), 0.84 (LM III) and 0.89 (LM IV). Limited Information Maximum Likelihood is used that is shown to provide better estimates with weak instruments. Robust standard errors in parentheses.

7.8 Modified PFS with Lobbying Effectiveness

Table 17: Summary of Estimates

Variable	IV1	IV2
Summary		
Obs	98	98
Mean	0.311	-0.371
Std. Dev.	0.448	0.784
Min	-0.011	-4.899
Max	2.301	0.618
Instrumental Variables		
IV	lag workers, lag inventories	lag workers, lag inventories
Interactions	lag workers*D_i	lag workers*D_i
Time Dummies	No	Yes
Overidentification		
Sargan Statistic	5.74	1.86
p-value	0.219	0.603
Descriptives		
Significant Coefficients	34	31
Positive Coefficients	96	28

Note: Table 17 shows the descriptives for the estimated coefficients and first stage statistics for each Model. It also outlines the over-identification tests in the relevant case. The Sargan Statistic tests the joint significance of the endogenous regressor in the main equation such that over-identifying restrictions can be argued as valid; in both Models the null cannot be rejected.

Table 18: Modified PFS: IV Estimates

Variables	(I) Model 1 (IV1)	(II) Model 2 (IV2) *Baseline*
NIC 1511	1.28100*	0.03465
	(0.711)	(0.604)
NIC 1512	0.01793*	-0.00339
	(0.011)	(0.009)
NIC 1513	0.01446**	0.00367
	(0.007)	(0.005)
NIC 1514	0.40268***	0.11210
	(0.136)	(0.129)
NIC 1520	0.03413***	0.01526*
	(0.009)	(0.008)
NIC 1531	0.01870***	0.00986**
	(0.004)	(0.004)
NIC 1532	0.06347***	0.01607
	(0.024)	(0.021)
NIC 1533	0.00813	-0.06804**
	(0.040)	(0.035)
NIC 1541	0.00043	-0.00781**
	(0.004)	(0.004)
NIC 1542	0.00230***	0.00103*
	(0.001)	(0.001)
NIC 1543	0.04211	-0.01410
	(0.032)	(0.027)
NIC 1544	0.04096	-0.01072
	(0.025)	(0.023)
NIC 1551	0.49764***	0.45106***
	(0.022)	(0.021)
NIC 1552	0.22015***	0.17072***
	(0.024)	(0.022)
NIC 1553	0.00431**	0.00047
	(0.002)	(0.002)
NIC 1554	0.00334	-0.00155
	(0.003)	(0.002)
NIC 1600	0.02016***	0.01703***
	(0.001)	(0.001)
NIC 1711	0.14148***	0.03260
	(0.052)	(0.049)
NIC 1721	0.10731	-0.00253
	(0.079)	(0.059)
NIC 1722	0.13149**	0.03264
	(0.059)	(0.044)

Modified PFS: IV Estimates (cont.)

Variables	(I) Model 1 (IV1)	(II) Model 2 (IV2) *Baseline*
NIC 1723	0.09719	-0.01148
	(0.059)	(0.051)
NIC 1729	1.82261	-0.22942
	(1.152)	(0.974)
NIC 1730	0.12692***	0.04495
	(0.045)	(0.041)
NIC 1810	0.01090**	0.00749**
	(0.004)	(0.004)
NIC 1820	0.20153	-0.04156
	(0.173)	(0.138)
NIC 1911	0.13582	-0.55774*
	(0.325)	(0.311)
NIC 1912	0.07037	-0.06786
	(0.072)	(0.062)
NIC 1920	0.05937	-0.04127
	(0.050)	(0.045)
NIC 2010	0.84837***	0.33233
	(0.234)	(0.235)
NIC 2021	0.19127**	0.00752
	(0.087)	(0.082)
NIC 2022	0.02861***	0.01468**
	(0.007)	(0.006)
NIC 2023	0.10933***	0.05485**
	(0.026)	(0.024)
NIC 2029	0.49974***	0.10633
	(0.184)	(0.175)
NIC 2101	0.43978	-0.48515
	(0.438)	(0.415)
NIC 2102	0.04010	-0.01382
	(0.028)	(0.025)
NIC 2109	0.21149	-0.44885
	(0.354)	(0.307)
NIC 2212	-0.00003	-0.01409**
	(0.007)	(0.006)
NIC 2219	0.57991	-2.37177*
	(1.401)	(1.341)
NIC 2221	0.00377	-0.00960
	(0.006)	(0.006)
NIC 2222	0.09899	-0.36030*
	(0.228)	(0.208)
NIC 2310	0.07179	-0.42340*

Modified PFS: IV Estimates (cont.)

Variables	(I) Model 1 (IV1)	(II) Model 2 (IV2) *Baseline*
	(0.298)	(0.254)
NIC 2320	-0.01147	-0.20857**
	(0.130)	(0.103)
NIC 2411	0.53260	-2.16366*
	(1.279)	(1.200)
NIC 2412	0.12324	-0.48868*
	(0.288)	(0.273)
NIC 2413	0.10296	-0.72402*
	(0.401)	(0.371)
NIC 2422	0.03446	-0.10422*
	(0.065)	(0.062)
NIC 2423	0.06604	-0.26789*
	(0.165)	(0.151)
NIC 2424	0.04458	-0.11580
	(0.078)	(0.072)
NIC 2429	0.24728	-0.84300*
	(0.513)	(0.487)
NIC 2430	0.43249*	-0.06195
	(0.234)	(0.221)
NIC 2511	0.00539	-0.03222*
	(0.018)	(0.017)
NIC 2519	0.08421	-0.49775*
	(0.283)	(0.261)
NIC 2520	0.08703	-0.15774
	(0.123)	(0.111)
NIC 2610	0.77928**	0.11215
	(0.324)	(0.304)
NIC 2691	0.15571	-0.06358
	(0.103)	(0.097)
NIC 2692	0.36850**	0.06705
	(0.160)	(0.144)
NIC 2694	0.00740***	0.00575***
	(0.001)	(0.001)
NIC 2695	0.02360**	-0.00088
	(0.010)	(0.009)
NIC 2696	0.00847	-0.00177
	(0.005)	(0.005)
NIC 2699	0.20486*	-0.05918
	(0.122)	(0.121)
NIC 2710	0.25000*	-0.07982
	(0.145)	(0.145)

Modified PFS: IV Estimates (cont.)

Variables	(I) Model 1 (IV1)	(II) Model 2 (IV2) *Baseline*
NIC 2720	2.30107	-1.08151
	(1.548)	(1.475)
NIC 2811	0.12931***	0.04698
	(0.041)	(0.038)
NIC 2812	0.05729**	0.00521
	(0.024)	(0.023)
NIC 2813	0.15790	-0.27987
	(0.216)	(0.201)
NIC 2893	0.09893	-0.40725*
	(0.237)	(0.227)
NIC 2899	0.55133	-0.25073
	(0.511)	(0.415)
NIC 2912	1.32276	-0.48968
	(0.886)	(0.816)
NIC 2919	0.14191	-0.13320
	(0.133)	(0.130)
NIC 2921	0.02499	-0.01796
	(0.020)	(0.019)
NIC 2922	1.73735	-2.06251
	(1.770)	(1.744)
NIC 2924	0.67472	-1.00013
	(0.792)	(0.753)
NIC 2925	0.65600	-1.54121
	(1.021)	(0.979)
NIC 2930	0.12611**	-0.00456
	(0.061)	(0.058)
NIC 3000	0.48626	-1.78995*
	(1.111)	(1.066)
NIC 3110	0.20389	-0.45735
	(0.315)	(0.292)
NIC 3130	0.07197	-0.15255
	(0.127)	(0.120)
NIC 3140	0.11929	-0.25762
	(0.186)	(0.166)
NIC 3150	0.26195	-0.10145
	(0.183)	(0.162)
NIC 3190	1.01819	-0.84484
	(1.076)	(0.904)
NIC 3210	0.35429	-1.98821*
	(1.294)	(1.114)
NIC 3220	0.06935	-0.19233

Modified PFS: IV Estimates (cont.)

Variables	(I) Model 1 (IV1)	(II) Model 2 (IV2) *Baseline*
	(0.134)	(0.122)
NIC 3230	0.21134	-0.42968
	(0.315)	(0.286)
NIC 3311	1.51585	-2.71078
	(2.141)	(1.933)
NIC 3320	0.87293	-2.19333
	(1.570)	(1.394)
NIC 3330	0.32375	-0.25087
	(0.268)	(0.260)
NIC 3410	0.83882***	0.61762***
	(0.115)	(0.103)
NIC 3511	1.12389	-2.02978
	(1.522)	(1.429)
NIC 3520	0.14069	-0.26663
	(0.215)	(0.207)
NIC 3530	1.37176	-4.89945*
	(2.993)	(2.903)
NIC 3591	0.01331***	0.00439
	(0.005)	(0.004)
NIC 3592	0.12566***	0.04142
	(0.039)	(0.038)
NIC 3599	0.00259	-0.00102
	(0.002)	(0.002)
NIC 3610	0.05932	-0.02498
	(0.042)	(0.037)
NIC 3691	0.27740	-0.41410
	(0.344)	(0.323)
NIC 3692	0.25853	-0.54856
	(0.379)	(0.378)
NIC 3693	0.18826	-0.54021
	(0.409)	(0.345)
NIC 3694	0.34491	-0.28777
	(0.334)	(0.292)
Year FE		Yes
Observations	876	876

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Table 18 shows coefficients from the estimation of the models. In the baseline results in column (2), the coefficient estimates explains one sector receiving higher protection vis-a-vis another controlling for changes across time. LIML is used as the better estimation method with any problem of weak instruments in small samples.

Table 19: First Stage Estimates Summary

Variable	IV1 Shea Partial R2	IV1 F	IV2 Shea Partial R2	IV2 F
X/M*1511	0.9089	75.73	0.8111	28.62
X/M*1512	0.0534	0.44	0.5417	7.88
X/M*1513	0.0759	0.71	0.3936	4.33
X/M*1514	0.4679	6.68	0.2411	2.12
X/M*1520	0.7798	26.89	0.0625	0.44
X/M*1531	0.7407	21.85	0.7936	25.63
X/M*1532	0.3649	4.37	0.1561	1.23
X/M*1533	0.2864	3.05	0.4211	4.85
X/M*1541	0.4475	6.15	0.5503	8.16
X/M*1542	0.4201	5.55	0.235	2.05
X/M*1543	0.1422	1.26	0.175	1.41
X/M*1544	0.8289	37.09	0.4811	6.18
X/M*1551	0.7001	17.72	0.1282	0.98
X/M*1552	0.8576	45.7	0.298	2.83
X/M*1553	0.2403	2.4	0.2134	1.81
X/M*1554	0.1299	1.14	0.4593	5.66
X/M*1600	0.5423	9.01	0.0707	8.51
X/M*1711	0.9292	113.84	0.7912	213.57
X/M*1721	0.1398	1.31	0.3852	4.18
X/M*1722	0.0447	0.36	0.3984	4.41
X/M*1723	0.5741	10.24	0.0702	0.5
X/M*1729	0.7197	19.61	0.0169	0.11
X/M*1730	0.4803	7.58	0.0025	0.02
X/M*1810	0.3107	4.91	0.4027	9.58
X/M*1820	0.8896	61.15	0.7668	21.92
X/M*1911	0.8771	54.17	0.1223	0.93
X/M*1912	0.2864	3.06	0.584	9.36
X/M*1920	0.6285	12.94	0.4935	6.5
X/M*2010	0.8217	34.97	0.0175	0.12
X/M*2021	0.6548	14.39	0.0122	0.08
X/M*2022	0.1293	1.13	0.1337	1.03
X/M*2023	0.3073	3.37	0.0172	0.12
X/M*2029	0.7554	23.44	0.3588	3.73
X/M*2101	0.9292	99.74	0.0012	0.01
X/M*2102	0.9557	163.86	0.5367	7.72
X/M*2109	0.7106	18.64	0.5273	7.44
X/M*2212	0.7714	25.61	0.6059	10.25
X/M*2219	0.7554	23.45	0.1175	0.89
X/M*2221	0.6664	15.16	0.0885	0.65

Table 19: First Stage Estimates Summary

Variable	IV1 Shea Partial R2	IV1 F	IV2 Shea Partial R2	IV2 F
X/M*2222	0.4402	5.97	0.1614	1.28
X/M*2310	0.1698	1.57	0.0057	0.04
X/M*2320	0.8109	38.81	0.7857	49.93
X/M*2411	0.9194	86.65	0.0532	0.37
X/M*2412	0.9149	81.57	0.0048	0.03
X/M*2413	0.8187	34.26	0.0921	0.68
X/M*2422	0.7747	26.1	0.416	4.75
X/M*2423	0.8882	61.14	0.0102	0.07
X/M*2424	0.7256	20.08	0.3616	3.78
X/M*2429	0.9423	123.83	0.024	0.16
X/M*2430	0.7351	21.06	0.0001	0
X/M*2511	0.7313	20.66	0.1887	1.55
X/M*2519	0.7971	29.82	0.2284	1.97
X/M*2520	0.6834	16.77	0.7645	21.65
X/M*2610	0.7889	28.49	0.1995	1.66
X/M*2691	0.6979	17.53	0.0272	0.19
X/M*2692	0.5917	11.91	0.4561	5.59
X/M*2694	0.4065	5.2	0.0663	0.47
X/M*2695	0.278	3.32	0.65	12.38
X/M*2696	0.1356	1.2	0.2759	2.54
X/M*2699	0.9473	136.54	0.7301	18.04
X/M*2710	0.9053	74.75	0.4674	5.85
X/M*2720	0.5126	8.01	0.6777	14.02
X/M*2811	0.4655	6.71	0.006	0.04
X/M*2812	0.7104	18.61	0.3177	3.1
X/M*2813	0.9614	189.29	0.5146	7.07
X/M*2893	0.8198	34.53	0.2579	2.32
X/M*2899	0.7859	28.23	0.2972	2.82
X/M*2912	0.9221	89.96	0.3583	3.72
X/M*2919	0.3226	3.61	0.166	1.33
X/M*2921	0.505	7.74	0.1528	1.2
X/M*2922	0.8681	49.92	0.4932	6.49
X/M*2924	0.9034	70.97	0.0047	0.03
X/M*2925	0.8711	51.28	0.0425	0.3
X/M*2930	0.6234	12.56	0.2063	1.73
X/M*3000	0.7473	22.44	0.537	7.73
X/M*3110	0.6194	12.53	0.3117	3.02
X/M*3130	0.5128	8.11	0.0939	0.69
X/M*3140	0.3892	4.84	0.9348	95.58
X/M*3150	0.4148	5.38	0.243	2.14

Table 19: First Stage Estimates Summary

Variable	IV1 Shea Partial R2	IV1 F	IV2 Shea Partial R2	IV2 F
X/M*3190	0.9412	121.68	0.7039	15.85
X/M*3210	0.9621	192.76	0.7493	19.92
X/M*3220	0.4514	6.24	0.1637	1.31
X/M*3230	0.7094	18.59	0.0248	0.17
X/M*3311	0.9226	90.53	0.063	0.45
X/M*3320	0.6595	14.7	0.0001	0
X/M*3330	0.9108	77.44	0.583	9.32
X/M*3410	0.9201	92.16	0.2156	1.83
X/M*3511	0.6262	12.71	0.1291	0.99
X/M*3520	0.6413	13.71	0.1684	1.35
X/M*3530	0.4125	5.33	0.0964	0.71
X/M*3591	0.6036	11.67	0.0014	0.01
X/M*3592	0.8783	54.74	0.366	3.85
X/M*3599	0.5709	10.1	0.2383	2.09
X/M*3610	0.1536	1.38	0.4472	5.39
X/M*3691	0.1753	1.85	0.2872	2.69
X/M*3692	0.3036	3.31	0.237	2.07
X/M*3693	0.5595	9.65	0.0079	0.05
X/M*3694	0.8076	31.89	0.0397	0.28

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 19 shows the first stage estimates for the models, examined in terms of First stage F-Statistics and the Shea Partial R-Squares for all the interactions across 98 sectors. The F-test shows a good fit for both Models where it is more than 10 for most sectors.

Table 20: Lobbying Effectiveness

NIC/ISIC	Estimated Coefficients	Effectiveness
1511	0.035	0.894
1512	-0.003	0.887
1513	0.004	0.889
1514	0.112	0.908
1520	0.015	0.891
1531	0.010	0.890
1532	0.016	0.891
1533	-0.068	0.876
1541	-0.008	0.887
1542	0.001	0.888
1543	-0.014	0.885

Lobbying Effectiveness (cont.)

NIC/ISIC	Estimated Coefficients	Effectiveness
1544	-0.011	0.886
1551	0.451	0.970
1552	0.171	0.919
1553	0.000	0.888
1554	-0.002	0.888
1600	0.017	0.891
1711	0.033	0.894
1721	-0.003	0.888
1722	0.033	0.894
1723	-0.011	0.886
1729	-0.229	0.846
1730	0.045	0.896
1810	0.007	0.889
1820	-0.042	0.881
1911	-0.558	0.787
1912	-0.068	0.876
1920	-0.041	0.881
2010	0.332	0.948
2021	0.008	0.889
2022	0.015	0.891
2023	0.055	0.898
2029	0.106	0.907
2101	-0.485	0.800
2102	-0.014	0.886
2109	-0.449	0.807
2212	-0.014	0.885
2219	-2.372	0.458
2221	-0.010	0.886
2222	-0.360	0.823
2310	-0.423	0.811
2320	-0.209	0.850
2411	-2.164	0.496
2412	-0.489	0.799
2413	-0.724	0.757
2422	-0.104	0.869
2423	-0.268	0.839
2424	-0.116	0.867
2429	-0.843	0.735
2430	-0.062	0.877
2511	-0.032	0.882
2519	-0.498	0.798
2520	-0.158	0.859
2610	0.112	0.908

Lobbying Effectiveness (cont.)

NIC/ISIC	Estimated Coefficients	Effectiveness
2691	-0.064	0.877
2692	0.067	0.900
2694	0.006	0.889
2695	-0.001	0.888
2696	-0.002	0.888
2699	-0.059	0.877
2710	-0.080	0.874
2720	-1.082	0.692
2811	0.047	0.897
2812	0.005	0.889
2813	-0.280	0.837
2893	-0.407	0.814
2899	-0.251	0.843
2912	-0.490	0.799
2919	-0.133	0.864
2921	-0.018	0.885
2922	-2.063	0.514
2924	-1.000	0.707
2925	-1.541	0.609
2930	-0.005	0.887
3000	-1.790	0.564
3110	-0.457	0.805
3130	-0.153	0.860
3140	-0.258	0.841
3150	-0.101	0.870
3190	-0.845	0.735
3210	-1.988	0.528
3220	-0.192	0.853
3230	-0.430	0.810
3311	-2.711	0.397
3320	-2.193	0.491
3330	-0.251	0.843
3410	0.618	1
3511	-2.030	0.520
3520	-0.267	0.840
3530	-4.899	0
3591	0.004	0.889
3592	0.041	0.896
3599	-0.001	0.888
3610	-0.025	0.884
3691	-0.414	0.813
3692	-0.549	0.789
3693	-0.540	0.790

Lobbying Effectiveness (cont.)

NIC/ISIC	Estimated Coefficients	Effectiveness
3694	-0.288	0.836

Note: Table shows the coefficients and corresponding effectiveness measures. I assume that $a = 1$, the mean lobbying effectiveness is given by $\sum_{j=1}^{n} \gamma_j \alpha_j = \gamma$. So, the term $\frac{\gamma_i - \sum_{j=1}^{n} \gamma_j \alpha_j}{a + \sum_{j=1}^{n} \gamma_j \alpha_j}$ can be written as $\frac{\gamma_i - \gamma}{1+\gamma}$. The estimates of β measure deviation from the mean effectiveness. β will be normalized [67] into a unit interval $(0, 1)$. Now, if the fraction of specific factor owners is negligible such that $\sum_{j=1} \alpha_j = 0$, then the estimated β collapse to direct measures of lobbying effectiveness.

[67] $coef - r(min))/(r(max) - r(min))$

Table 21: Determinants of Lobbying Effectiveness

	Ordinary Least Squares on Pooled data					Robustness: Fractional Logit Regression				
Variables	(I)	(II)	(III)	(IV)	(V)	(I)	(II)	(III)	(IV)	(V)
Geography	0.4550***		0.5401***	0.6731***	0.6794***	3.2358***		3.7970***	4.7277***	4.7786***
	(0.0742)		(0.0760)	(0.1271)	(0.1270)	(0.5286)		(0.5233)	(0.9093)	(0.9066)
Elasticity		0.0012***	0.0013***	0.0020***	0.0020***		0.0109***	0.0120***	0.0165***	0.0169***
		(0.0001)	(0.0001)	(0.0003)	(0.0003)		(0.0009)	(0.0010)	(0.0028)	(0.0028)
G*Elasticity				-0.0202*	-0.0211**				-0.1458*	-0.1538*
				(0.0104)	(0.0104)				(0.0799)	(0.0802)
Opportunity					0.0001***					0.0006***
					(0.0000)					(0.0001)
Controls										
Concentration	0.0005**	0.0007***	0.0002	0.0002	0.0002	0.0041**	0.0053***	0.0013	0.0019	0.0018
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0017)	(0.0015)	(0.0016)	(0.0018)	(0.0018)
Avg. Size	0.0003***	0.0002***	0.0003***	0.0003***	0.0003***	0.0019***	0.0016***	0.0019***	0.0019***	0.0019***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Constant	0.7678***	0.7776***	0.7543***	0.7499***	0.7494***	1.1648***	1.2101***	1.0568***	1.0258***	1.0218***
	(0.0109)	(0.0092)	(0.0112)	(0.0124)	(0.0124)	(0.0667)	(0.0582)	(0.0683)	(0.0770)	(0.0770)
N	882	882	882	882	877	882	882	882	882	877

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Note: Table 21 examines the determinants of lobbying effectiveness. Columns (I)-(V) for each OLS and Fractional Logit regressions control for output concentration of the sector and average size of the sector in terms of number of firms. All columns also include a constant term in the regression.