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# Essays in Indian Trade Policy

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# Declaration

I hereby declare that this thesis has not been and will not be submitted in whole or in part to another University for the award of any other degree.

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# Essays in Indian Trade Policy

## Summary

My thesis explores the political economy of trade protection in India. The first essay outlines the political economy of trade protection in India. My second essay asks: Has Protection really been for Sale in India? To answer this question, I use a unique dataset to explain the political economy of trade protection since liberalisation. The traditional Grossman and Helpman (1992) (GH henceforth) model of Protection for Sale (PFS henceforth) is used with a new measure of political organization. I undertake cross-sectional analysis for several years from 1990-2007 and use the pooled dataset. The third essay outlines the modified PFS framework that introduces a new measure of lobbying effectiveness to analyse how heterogeneity in lobbying affects trade protection. The underlying framework is based on the idea that government preferences or the market structure of the industry can influence lobbying effectiveness. The empirical evidence provides estimates on effectiveness and examines its determinants. The fourth essay explores: Is Protection still for Sale with Lobbying Effectiveness? I undertake an estimation of the modified PFS model against the conventional results presented in my second essay. I examine if differences in lobbying effectiveness can explain the variation in tariff protection levels across Indian manufacturing sectors and construct a direct measure of lobbying effectiveness for Indian manufacturing. Finally, I include additional political factors of importance to Indian trade policy. The fifth essay asks: Join Hands or Walk Alone? I examine the factors that affect the choice of lobbying strategy of Indian manufacturing firms for trade policy and consider the exclusive use of a single strategy, to lobby collectively (Join hands) and lobby individually (Walk Alone), along with the possibility of a dual strategy i.e. a combination of collective and individual lobbying using information from a primary survey across 146 firms. The results are new for India and reveal the overall preference of a dual lobbying strategy.

# Acknowledgements

The journey of my thesis has been one of ups and downs; a concoction of awe and questioning of self-beliefs has characterized its life span of four years. Nonetheless, in hindsight it is a sojourn that I will cherish forever. I am grateful to several individuals as without their support I would not have reached this stage.

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# Chapter 1

# Introduction

Trade policy is important especially in its role of securing balanced outcomes across disparate needs in the economy. Discerning trends in trade policy across countries has been a topic of interest both in economics and politics. It is widely acknowledged that trade policy is governed by complex set of interactions, one crucial aspect being government-industry correspondence having a profound impact on the development and design of trade policy reform. To a large extent, such interactions ascertain if the underlying determinants of trade policy are economically appropriate and feasible in addition to being politically acceptable.

The political economy literature in the context of trade policy has served the specific aim of explaining the factors that have shaped different outcomes. Examples include Grossman and Helpman (1994), Bhagwati and Srinivasan (1982), and Gawande et al. (2015) among others. This literature has recognized differences in examining trade policy for developed countries versus developing ones. However, I find only limited empirical research to explain the forces that shape trade policy in developing countries. This thesis seeks to contribute towards this gap in the literature by examining the case of India.

Trade theory prescribed free trade, yet in practice we observe protection. Political circumstances and development realities often govern this trade policy choice. This links back to the complex interplay of interactions shaping such outcomes. Political economy of trade policy has endeavoured to offer insights on these choices. The analysis of trade policy with a political economy dimension finds one established and popular framework in the model of Protection for Sale (PFS henceforth) by Grossman and Helpman (1994) (American Economic Review 84: 833–850, GH henceforth). PFS describes trade policy outcomes as the result of interactions between the government and special-interest groups.

The model has been traditionally estimated for the United States using a binary measure of political organization that is identified using information from contributions data.

Estimating the PFS model for developing countries has limitations that include at least the following. First, the absence of data on contributions (as available for the United States) for developing countries makes it hard to appropriately identify the binary measure of political organization. Second, the political economy of trade policy can differ significantly in developing countries. This finds acknowledgement also in Gawande et al. (2015) among others who argue that there exist factors specific to explaining the political economy of trade policy in developing countries that are not incorporated in PFS.

The arguments presented raise an important question, how do economic and political factors determine trade policy formulation in India? My thesis is devoted to seeking meaningful answers. Government-industry interaction in developing countries can bring crucial information to domestic trade policy formulation. I exploit variation in trade, tariffs and political organization for the manufacturing sector to examine the link between trade protection and political economy factors. The thesis begins with **Chapter 2** that discusses the political economy of trade policy in India and its evolution since independence. Chapters 3-6 seek answers to the question posed above by examining a set of hypotheses and testing them against the widely developed empirical evidence for the United States.

One key ingredient in my story is that the interaction between the government and industry, termed as *"Lobbying"* in the political economy literature, is a complex process in the absence of any quantifiable political contributions, and is compared to the political economy of trade policy in the United States. I adopt a structural approach in my thesis that follows the PFS environment. The empirical analysis undertaken is based on a simple intuitive modification of this framework that is arguably suited to examining the model for India taking into explicit account the cross-sectional variation in protection across the years since liberalization.

In applying the PFS model to India, an issue of importance is to incorporate specific features from Indian policy making. This motivates one of the primary aims of the **Chapter 3** which is to examine the question **"Has Protection really been for Sale in India?"**. I estimate the standard model of PFS using a new and unique dataset that

combines trade and industry data. To enable comparison with two existing studies on India, I first estimate PFS using cross-sectional data. Using data for each of the nine years 1990, 1992, 1996, 1999, 2000, 2001, 2004, 2006, and 2007, I find that protection has been for sale only for 1999, 2000, 2001 and 2004. This goes in contradiction to Bown and Tovar (2011), who find support for the model in 1990. There are at least two explanations for this finding. First, the cross sector endogeneity in tariff changes prior to 1991 is very weak (shown earlier) explained in part by the large public ownership of industries before the reforms. Second, I examine the model using 4-digit industrial data, while I believe there were changes at the product-level of 6-digit classifications used in Bown and Tovar (2011), but are much less attributable to being politically organized and more to commitments to protect its infant industries at an early stage of development.

The estimation of the PFS model depends on the crucial identification of a binary political organization measure. The absence of political contributions data for several other countries has prompted the use of various methods to identify political organization to estimate the PFS with data. However, the literature remains divergent on the correct method to construct this measure. In the PFS model, the organized groups put forth political contributions that are valued by the government to finance election campaigns. On the other hand, political organization in developing countries is often a means of communication and information exchange between policy-makers and industry. It can also be argued that political organization does not necessarily imply actual lobbying.

Political organization can arise for different purposes in different countries. For example, Mitra et al. (2002) uses information on individual members of one Turkish association to respective sectors and uses a cut-off to construct organization, while McCalman (2004) identifies political organization using information on the operation of an independent advisory body known as the Tariff Board in Australia. Also, it is often assumed that all sectors are politically organized as in Gawande et al. (2009). However, making the assumption that all industries are organized eliminates the binary identification of differences in achieving trade protection. At the same time, it is arguably a reasonable one as most industries are organized where organization implies membership to associations. This is evidenced in positive contributions across all industries in the United States and information on membership for other countries. Finally, with a binary measure there is no way to account for further differences in lobbying that can achieve more or less favourable influence

for policy-making. Thereby, it can be contested that moving forward with the assumption of full organization, the further step is to incorporate differences in lobbying and examine how this disperse lobbying component affects the influence on protection across sectors.

Next, Chapter 3 uses the pooled data across all years with a new measure of political organization arguably more reflective for the case of trade policy in India as defined in the framework of GH. This estimation is undertaken to study the period as a whole and derive structural estimates as averages to explain the political economy of protection from 1990-2007. 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). In this light, I construct a new binary indicator for political organization based on data from the World Bank Enterprise Survey (WBES) that identifies firms that are members of associations and has not been used in estimating the PFS model before. I begin by using this information to construct the binary indicator in the traditional model. The WBES data was collected from 2000-2004 and can be argued as a more appropriate measure for the decade of 2000. 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.

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 that leads to the next chapter of the thesis.

What is new in **Chapter 4** of my thesis 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.

An understanding of the sources of such differences can allow me to offer insights into the political economy conditions that generate higher effectiveness in Indian manufacturing. Quantifying lobbying effectiveness in obtaining policy outcomes has been a challenging task as discussed by de Figueiredo and Richter (2014) in a very useful review on the literature on lobbying. In this light, the PFS model provides a potentially clean structural framework to examine lobbying effectiveness. Chapter 4 begins with the primary aim 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**.

The chapter concludes by examining 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 that will be examined further in Chapter 5 of the thesis.

Accounting for differences of lobbying effectiveness in the PFS model can explain the variation of trade protection across sectors. The primary question of interest is now to examine how the differences in political economy factors explain the variation in trade protection data across Indian manufacturing sectors. I attempt to construct a direct measure of lobbying effectiveness for the modified PFS framework developed in Chapter 3. As stated earlier, the industry dealings with the Indian government for trade policy are often facilitated by associations in turn accompanied by rising government responsiveness in industry association meetings. This information was used to construct a binary indicator in Chapter 2 to estimate the traditional PFS model. The modified PFS model allows to construct measures based on the information on firms that are members of industry associations in each sector as proxy measure of lobbying effectiveness.

Using this in **Chapter 5**, I ask **"Is Protection still for Sale with Lobbying Effectiveness?"**. The aim of this chapter is to examine if the traditional PFS model holds with heterogeneity in lobbying effectiveness. The motivation for this chapter derives from examining the estimates of the modified PFS framework with that of the traditional model. I find that for the PFS model with lobbying effectiveness, protection is for sale but only for those sectors that are very effective in lobbying the government.

In the traditional PFS, the government maximizes industry contributions and utilitarian social welfare and there is no scope for additional factors. However, there exist other political factors that can influence government maximization that include employment in marginal constituencies and other forms of representation. I control for additional factors to account for any other political economy factors particular to Indian trade policy that may be transferred to the government. This evidence further re-instates that for lower

measures of additional political economy factors (in addition to lower values of effectiveness), the PFS relationship between trade protection and inverse import penetration is found reversed. Therefore, protection is not for sale for sectors with lower lobbying effectiveness and lower additional factors that influence protection.

Finally, the reason for writing **Chapter 6** titled **"Join Hands or Walk Alone?"** is to complement the structural analysis in this thesis with original information on the actual trade policy process in India. I examine the choice of lobbying strategy that includes collective lobbying (*Join Hands*) by a group of firms or individual lobbying (*Walk Alone*) by a single firm. Milner and Mukherjee (2011) suggest that trade policies in India before 1991 were often held hostage to the interests of few big business houses. The IMF support to India in 1991 came conditional on an adjustment program of structural reforms that included a reduction in the level and dispersion of tariffs. This was followed by the elimination of licensing and introduction of competition that potentially reduced the pay-offs to individual lobbying. I therefore argue that it is likely that individual lobbying prior to the reforms were more effective as sectors were dealing with specific concerns. Post 1997, there started evolving a duality in industry dealings with the government that consisted of organized industry associations in addition to individual lobbying.

However, there exists an informal mechanism of government-industry interaction for trade policy such that the earlier literature has argued that the exact role of these interactions is not well defined. In this light, an understanding of various lobbying strategies can motivate a clear mechanism for both industry associations and firms to interact with the government. Overall, I find that Indian manufacturing firms join hands while walking alone to lobby the government such that this constitutes a dual strategy. I find that the likelihood of lobbying collectively is higher in sectors characterized by low concentration (in relation to chapter 3 these are expected to be less effective) that suggests competition effects clearly dominate any free-riding for Indian manufacturing firms and re-instate the findings on lobbying effectiveness earlier in Chapter 3. The unique finding is the preference of a dual strategy over the use of each exclusive single strategy by Indian firms.

The thesis concludes by outlining the results of examining the political economy of Indian trade policy. I highlight the unique contributions that this thesis set out to make. This includes explaining Indian trade protection in a new framework, estimating unique

measures of lobbying effectiveness that derive from the preceding relationship and finally studying lobbying strategies that is a first for India. Policy implications are brought to the spotlight with the aspiration of reaching out to stakeholders. Finally, I identify avenues for further research that emerge from the analysis.

# Chapter 2

# Political Economy of Indian Trade Policy

The political economy of Indian trade policy is interesting on account of a unique institutional framework. My own experience of working at the Ministry of Commerce and Industry (MOCI) in India led me to explore the mechanisms of this structure that seemed dynamic yet 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 as-

sociation 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 2.1 shows the average Most Favoured Nation (MFN) tariffs (at the 4-digit of National Industrial Classification)[1] 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 2.1: MFN Applied Tariffs in India

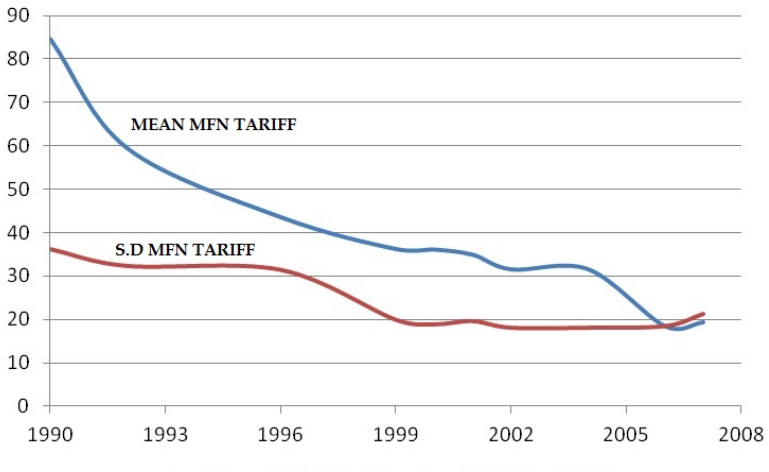


Figure 2.1 shows the Mean and Standard Deviation (S.D.) for the MFN Applied Tariffs in India from 1990-2007.

India has always 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 2.2 outlines the linear relationship between the pre-reform MFN applied

[1]The following figures 2.1, 2.2, 2.3, and 2.4 are based on my own calculations using data at 4-digit of NIC, following a similar analysis in Topalova (2007).

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. 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 2.3 and a similar picture for the tariff changes for 2001-2007 in Figure 2.4. 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.

Figure 2.2: Pre-reform MFN tariff changes 1990-1996

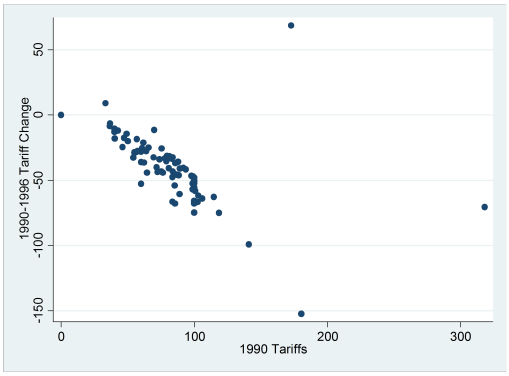


Figure 2.2 shows a linear relationship between Pre-Reform MFN tariff and tariff changes from 1990-1996.

Figure 2.3: MFN tariffs and tariff changes 1999-2001

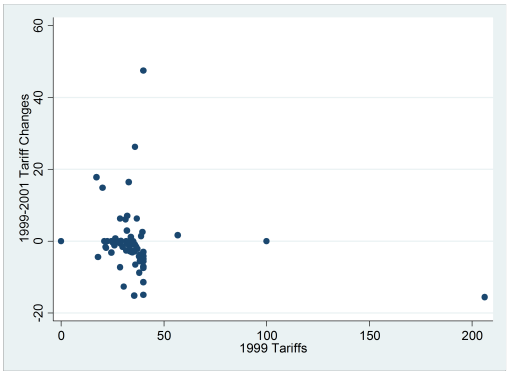


Figure 2.3 shows a non-linear relationship between 1999 MFN tariffs and tariff changes from 1999-2001.

Figure 2.4: MFN tariffs and tariff changes 2001-2007

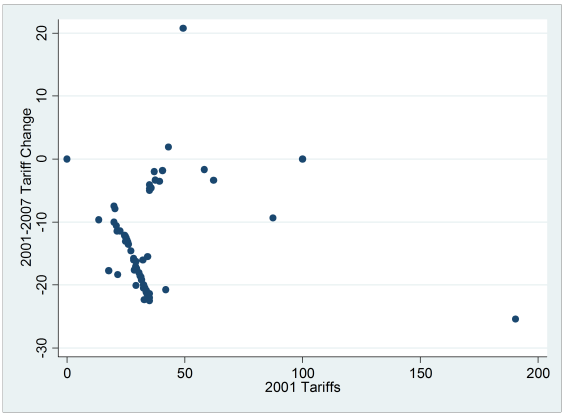


Figure 2.4 shows further non-linear relationship for 2001 MFN and tariff changes from 2001-2007.

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 2.2 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 in-

dustry 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 2.3. A similar picture was also observed for the tariff changes in 2001-2007 in Figure 2.4.

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. Following this, Baru (2009) outlines that the

*Council on Trade and Industry* was also created for partnership between the government and business in this period.

My own experience of working at the MOCI suggests the importance that the WTO and its trade policy review seems to have played in the transformation that fostered policy–expert networks.The trade policy review created increased opportunities of trade and industry consultations within the domestic trade policy set-up. In light of this, domestic trade policy witnessed several changes to adhere to rules in Geneva which received participation from industry at home and their representation abroad.

The increased engagement of India in international negotiations stimulated overlaps across its fragmented ministries and sectors that further demanded greater interactions and meetings for mediation of differences. This was the time when bodies such as the CII and the *Federation of Indian Chambers of Commerce and Industries* (FICCI) became very active. Baru (2009) outlines that these bodies started representing industry views on compromise formulas between sectors that would combine the interests of domestic business with the imperatives of economic liberalization. Government response to business concerns grew as industry was actively involved in WTO negotiations. In turn government participated in business association meetings. CII and FICCI organized such regular meetings with government officials to discuss policy and other matters. Individual lobbying became more of informal personal access as it seems likely that it had lost steam with trade and industry associations gaining influence in interaction with the government. These bodies emerged as industry-led and industry-managed organizations consisting of several members drawn from both public and private firms in India. The CII became actively involved in projecting Indian interests abroad and in pursuing diplomacy both at home and abroad as asserted in Baru (2009). Other sector-level associations also rose during this period such as the Confederation of Indian Textile Industry(CITI), Council for Leather Exports among others[2].

[2]A further step would be to delineate association lobbying in terms of national associations and the sector-level ones. This is not dealt with in this Chapter as there is no available information and the scale of the survey did not allow me to cover this. I therefore consider the overall decision of association vs individual lobbying.

# Chapter 3

# Has Protection really been for Sale in India?

## 3.1 Introduction

The *Protection for Sale* (PFS) model by Grossman and Helpman (1994) (GH henceforth) has been traditionally estimated for the United States. However, the political economy of trade policy can differ significantly in developing countries. Lobbying for trade policy in India for instance rose in importance in the last two decades with a unique institutional framework. The objective of this chapter is to put forth new empirical evidence on the standard GH hypothesis as the first step to motivate potential modifications of the model reflecting actual trade policy set-up for the Indian case in the following chapters.

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[1]. 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.

[1]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.

The model assumes binary sectoral political organization where groups are either unorganized or fully organized to lobby for protection. Import-competing producers have an incentive to organize politically to lobby the government for tariffs on imports. The owners of specific factors in each sector thereby organize to form interest groups to lobby the government. In the model, such lobby groups put forth political contributions that are valued by the government to finance election campaigns etc. The government in turn cares both about social welfare and the contributions and seeks to maximize their weighted sum. The lobby groups seek to maximize private returns in terms of their producer rents, and their labour incomes, surplus and redistributed revenues as consumers.

The GH hypothesis 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.

In this chapter, I discuss the traditional model of PFS and use it to provide an interpretation of the political economy forces that have driven the Indian experience of trade liberalization. The analysis attempts to deal with various empirical issues outlined in the existing literature on PFS and provides new evidence for India using data from 1990 to 2007. The estimation does not significantly detach from the original theoretical model. In applying the model to India, I attempt to incorporate specific features from Indian policy making. A unique dataset that combines trade, industry and lobbying information is compiled for analysis. A new empirical measure of political organization is constructed which is based on the lobbying behaviour of firms in each sector within the set-up of the traditional model. The empirical strategy attempts to overcome the weaknesses of previous empirical tests using better political organization indicators. The estimation is undertaken particularly for the manufacturing sector as the changes in political economy of trade protection have undergone interesting transformation in previous years.

The predictions of the model also depend on the nature of protective instrument analysed[2] as argued in Maggi and Rodriguez-Clare (2000). An important question dealt with in this chapter is to what extent the PFS model can be used to understand the determinants of the specific trade policy of MFN applied tariffs. This enables an investigation of the specific question of whether the particular trade policy aligns the tariffs closely with the assumptions of PFS. Also, as observed in Figure 2.1, the MFN applied tariffs have undergone several changes in the period under study until the late 2000s.

The structural estimates of the model include weight on welfare in the government's objective function relative to the weight on political contributions and the fraction of population that owns specific factors. There are issues in interpreting the weight on welfare as several previous studies such as GB find large values for this parameter. The large values of the weight on welfare documented in literature seem associated to large estimates of the other parameter that is the fraction of population who are owners of specific factors. This seems to be a contradiction, as if a large fraction of the voting population is organized when the weight on welfare is much larger than one, there is doubt whether the government that places such a huge weight on welfare is then exposed to the political pressures from lobby groups (Mitra et al. (2002)). The structural estimates obtained from the estimation of the PFS model in this Chapter are argued as being reasonable with the trade policy setting in India. This provides evidence to the fact that the government cares both about social welfare and producer interests reflected in lobbying interests in India.

Previous estimates on the PFS for India are found in Bown and Tovar (2011) and in Cadot et al. (2014) and Cadot et al. (2007) that undertake estimations for India for select years that are 1990, 1997 and 2000. In this chapter, I examine the PFS for various years from 1990-2007 as a means of comparison with the two existing studies. Further, I attempt to use the pooled dataset that spans the entire period. One potential advantage of the pooled data for the PFS set-up is the use of time fixed effects that can capture the effect of political economy factors controlling for unobserved effects across the years. This could be on lines of changes in political parties that can potentially alter the government preferences for social welfare versus producer interests. I estimate the PFS model with time fixed effects to control for any such effects.

[2]Tariffs and quantitative restrictions can produce different predictions

In the PFS set-up, trade flows and import penetration are determined as in the specific-factors model. Import penetration can however be correlated with the error term because of endogeneity with respect to the tariff (GM, GB). This is solved using instrumental variables correlated with import penetration but not correlated with the error. I use variables similar to the import equation in Trefler (1993), where the import-penetration ratio is a function of factor shares in each sector that include the measures of capital and labour. I attempt to analyse the estimation of PFS with a new set of instruments examining their excludability. I present estimates using the method of *Limited Information Maximum Likelihood* (LIML)[3].

The first aim of this chapter is to discuss the interpretation and derivation of the traditional model and examine the empirical issues in estimation by putting forth relevant data concerns. The selected literature on the PFS and its extensions are also laid out for the scope of the theses. Second, I examine the model using a new dataset for India, where 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 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. 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. The indicator is based on lobbying behaviour of firms in each sector within the framework of the traditional model. 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 of this Chapter? 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 polit-

[3]These were compared with the Two-Stage Least Squares (TSLS) method. However LIML is know to give better estimates with potentially weak instruments. This will be argued in the following sections and I will discuss the results using this method.

ical 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 of this chapter 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. Finally, 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.

The remainder of the chapter is organized as follows. Section 2 discusses the PFS model briefly focusing on specific interpretations. Section 3 includes a discussion of selected literature on estimating PFS with empirical data and select theoretical extensions of PFS that are relevant to the scope of my thesis. Section 4 presents details on two papers that have undertaken estimations of PFS for India. The empirical issues in estimation of the PFS are discussed in Section 5, while Section 6 focuses on identification of political organization in the model in detail. Section 7 outlines the data followed by the empirical evidence in Section 8 using the cross-section and pooled data for India. Finally, Section 9 concludes the chapter setting the ground for following chapters.

## 3.2 Protection for Sale

The PFS is a specific factors model in a multi-sector framework. Individuals have identical preferences and differ in their specific factor endowments. The interaction between the government and lobbying groups takes the form of a menu auction. It is a two stage non-cooperative game. In the first stage, each lobby can present the government with a contribution schedule. In the second stage, the government sets trade policy. The details of the PFS model are attached in Appendix A.2.1

In PFS, the government weighs each dollar of contributions equally such the govern-

ment 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.

$$G = \sum_{i \in L} C_i + aW \tag{3.1}$$

The political equilibrium is a two-stage non-cooperative game. In the first stage, 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.

In the original PFS model, GH assume the interaction between the government and lobby groups takes the form of a menu auction as outlined in Bernheim and Whinston (1986). A sub game-perfect Nash equilibrium of the trade-policy game is outlined. 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. GH use Bernheim and Whinston (1986) to define a truthful contribution function [4] Bernheim and Whinston (1986) state that 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[5].

Re-writing the traditional GH equation (A.15 in Appendix A.2.1) gives the following estimable form, where the ratio of output to imports $X_i/M_i$ equals $z_i$[6]:

[4] 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 be questionable.

[5] 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.

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

$$\frac{t_i}{1+t_i} = \left(\frac{I_i - \alpha_L}{a + \alpha_L}\right)\frac{z_i}{e_i} \tag{3.2}$$

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 (3.2), 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 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. The PFS model will predict 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 implies $\alpha_L$ is also one. This gives the ad-valorem tariff as zero implies the free trade outcome. As discussed earlier 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 relative weight the government attaches to political contributions relative to welfare and falls with the fraction of voters that belong to an organized lobby group.

## 3.3 Literature on Protection for Sale

The GH hypothesis has been tested considering different countries and using various econometric techniques. This section discusses selected literature on the PFS model in detail to outline the theoretical and empirical issues that are dealt with in this thesis. In particular,

I take up the first empirical investigations of the PFS by GM and GB. The two papers that estimate the PFS with India are also discussed in detail.

### 3.3.1 Selected estimations of PFS

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 $\beta$ captures the weight on welfare. In this case, $a$ the relative weight on welfare in the PFS model is now replaced by $\frac{\beta}{1-\beta}$.

$$G = \beta W + (1-\beta)\sum_{i \in L}^{n} C_i \tag{3.3}$$

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.

$$\frac{t_i}{1+t_i} = \frac{I_i - \alpha_L}{\frac{\beta}{1-\beta} + \alpha_L}\frac{z_i}{e_i} + u_i \tag{3.4}$$

The econometric estimation takes the elasticity to the left hand side and an error term is added[7]:

$$\frac{t_i}{1+t_i}e_i = \gamma\frac{X_i}{M_i} + \delta I_i\frac{X_i}{M_i} + v_i \tag{3.5}$$

Where,

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

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

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

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

(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 $\beta$ 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 $\alpha_L$ 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 $\alpha_L$ and $\alpha_X$, 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 **?** 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.

### 3.3.2 Indian Protection for Sale

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 $\tau$ is defined as the applied tariff only or the tariff plus an anti-dumping measure:

$$\tau_{i,t} = \beta_0 + \beta_1 I_i \frac{z_i}{\epsilon_i} + \beta_2 \frac{z_i}{\epsilon_i} \tag{3.6}$$

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[8]. 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.

## 3.4 Empirical Issues

This section presents a discussion of various empirical issues on estimating PFS in the existing literature.

### 3.4.1 Functional Form

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.

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

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[9]. 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 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. This argument holds importance in Chapter 4 where I introduce heterogeneity in lobbying by introducing changes into the welfare function of the government.

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 Rodriguez-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 ar-

[9]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.

guably explain as high as 75 per cent of trade restrictiveness in the United States, but less than 20 per cent in India.

### 3.4.2 Measurement Error

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.

### 3.4.3 Endogeneity

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.

### 3.4.4 Organization

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[10]. I attempt to use new data to identify politically organized manufacturing sectors in India.

## 3.5 Political Organization

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.

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

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 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 (3.2) and assigning the value 1 for political organization gives the following equation.

$$\frac{t_i}{1+t_i} = \frac{1-\alpha_L}{a+\alpha_L}\frac{z_i}{e_i} \tag{3.7}$$

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 ($\alpha_L$). 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 $\alpha_L$. 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 Ex-

ternal 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[11], 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 some variation in

[11]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.

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.

In this chapter 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.

## 3.6 Data and Mapping

To estimate the PFS model I needed data on imports and output to calculate the import penetration ratio, data on MFN tariffs, industry characteristics and information on political organization. The dataset in this chapter 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 A.2.2.

### 3.6.1 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 for my thesis, 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 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 in Appendix A.1.1).

### 3.6.2 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 3.1 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 3.1: Output and Imports in Indian Manufacturing

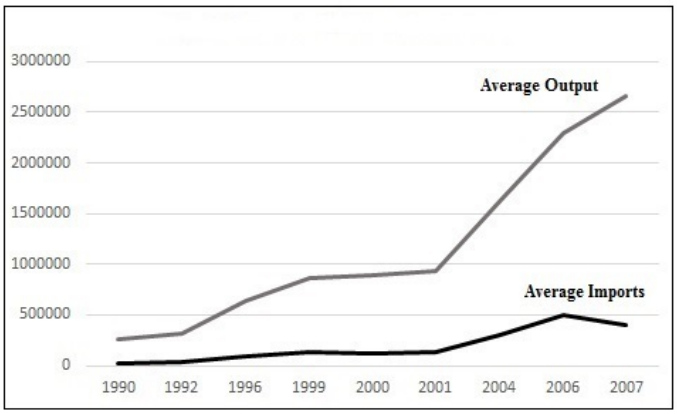


Figure 3.1 shows the average output and average imports for the Indian Manufacturing sector based on the 98 sectors of the 4-digit of NIC/ISIC Rev. 3

### 3.6.3 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.

### 3.6.4 Political Organization

Identification of political organization has for long been an issue in the empirical literature on PFS. This study constructs 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[12]

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 3.1 below. 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

[12]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.

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[13]. 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 3.1: 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 3.1 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.

## 3.7 Methodology

Tying the empirical work in this chapter closely to the theory, I estimate equation (3.2), by adding an error term such that the equation can be re-written as:

$$\frac{t_i}{1+t_i} = \left(\frac{I_i - \alpha_L}{a + \alpha_L}\right)\frac{z_i}{e_i} + u_i \tag{3.8}$$

[13]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.

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. The average MFN tariffs across the sectors are shown in Figure 3.2 showing a noticeable decline. Also, the maximum MFN tariff has declined from a peak of more than 300 per cent to around 150 per cent.

To deal with the measurement error in the estimates of import demand elasticities, following once again the empirical approach of GM, I take the elasticities to the left hand side[14] :

$$\frac{t_i}{1+t_i}e_i = (\frac{I_i - \alpha_L}{a + \alpha_L})z_i + \epsilon_i \tag{3.9}$$

Figure 3.2: Tariffs, Output and Imports in Indian Manufacturing

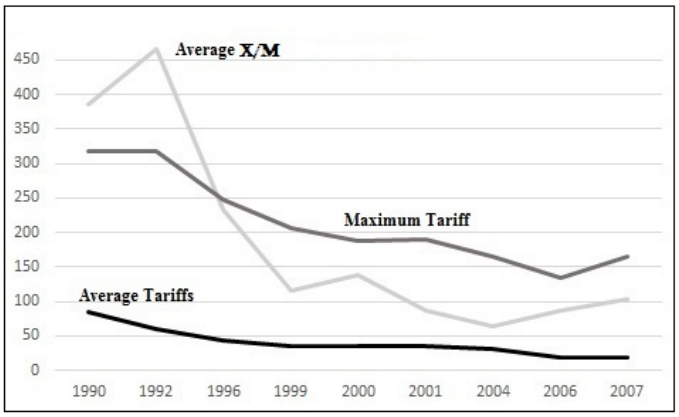


Figure 3.2 shows the Average Tariffs, Maximum Tariffs and the Ratio of Average Output to Average Imports for the Indian Manufacturing sector based on 98 sectors at the 4-digit of the NIC/ISIC Rev. 3. The maximum tariffs are observed for the sector *1551* defined as the *Distilling, rectifying and blending of spirits*. This sector is dropped for robustness checks for the baseline regressions.

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 in this thesis 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

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

the dependent variable also affects the regressor. To solve this issue, I specify a first stage model for the endogenous regressor as shown below.

$$z_i = \delta Y + \epsilon_i \tag{3.10}$$

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[15]. First, the instruments must be exogenous 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 in this chapter. 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

[15] Wooldridge (2010) for details.

biased upwards compared to Instrumental Variables (IV) estimates. However, the dependent variable in my model may suffer from measurement error owing to the estimated elasticities[16]. 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.

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[17]. 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.

### 3.7.1 PFS with Complete Political Organization

First, I begin by estimating the PFS model with the assumption that $I_i = 1 \forall i$, i.e. all industries are organized[18]

$$\frac{t_i}{1+t_i} e_i = (\frac{1-\alpha_L}{a+\alpha_L}) z_i + \epsilon_i \tag{3.11}$$

Note that I do not include a constant term in my estimations. I drop the constant

[16] 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.

[17] I did the 2SLS estimates and compared the results with the LIML estimations. The chapter will focus on LIML estimations as the preferred method for small samples and potentially weak instruments.

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

following GM such that I seek to explain trade protection strictly within the PFS framework[19]. 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 (3.11) above, I get the following specification termed as **Model 1**. I estimate this using the cross-section data across the years, where $\rho$ is defined in terms of the underlying parameters $a$ and $\alpha_L$. I check the expected sign and significance for the coefficient $\rho > 0$:

$$\frac{t_i}{1+t_i} e_i = \rho z_i + u_i \tag{3.12}$$

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

I begin by testing the PFS 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[20].

Table 3.2 presents the results from estimating Model 1 in equation (3.12) using *Ordinary Least Squares* (OLS) and those for exact identification with IV using *Limited Information Maximum Likelihood* (LIML)[21]. The first stage estimates are attached in Table A.3 of Appendix A.2.3. The F-statistic on the excluded instruments are quite small in all cases such that I present the LIML results[22]. The IV results from exact identification are used to interpret the findings of the model[23]. The F-statistics are more than 10 for the years of

[19]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.

[20]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.

[21]Table A.6 in Appendix A.2.4 presents the results for Model 1 using OLS and those for over-identification with IV using LIML.

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

[23]I also examine with other sets of instruments such as the combination of workers and inventories,

2000 and 2001 where the model finds strong support.

Table 3.2: Protection for Sale across the Years: OLS vs Exact Identification

| | (I) | | (II) | | (III) | |
|---|---|---|---|---|---|---|
| | 1990 | | 1992 | | 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) | | (V) | | (VI) | |
|---|---|---|---|---|---|---|
| | 1999 | | 2000 | | 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) | | (VIII) | | (IX) | |
|---|---|---|---|---|---|---|
| | 2004 | | 2006 | | 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 3.2 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.

I find only weak support for the GH hypothesis with the Indian MFN tariffs in 1990. This is shown in column (I) of Table 3.2. The coefficient has the correct sign in all cases.

however I discuss the ones with exact identification as they provide a better fit. The results for over-identification are attached in Table A.6 of Appendix A.2.4. 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.

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 in this thesis 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 3.2. 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 2.2 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

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 3.2 (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 [24] $\alpha_L = 0$ as a means of empirical ease, such that the estimated coefficients are [25] $\frac{1}{a}$. I find the estimate for government weight on welfare for each year shown in Figure 3.3 below. The estimates suggest that government weight on welfare was 20 times the weight on contributions for 1999[26]. 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 3.3: Relative weight on Welfare in India across the years

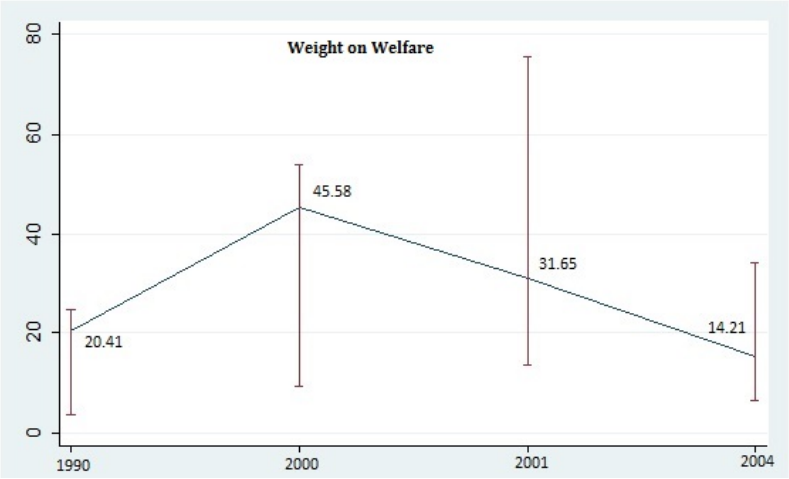


Figure 3.3 shows the weight attached to welfare relative to contributions of Indian manufacturing sector.

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

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

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

Table 3.3: Cross-Sectional Structural Estimates

| Years | 1999 | 2000 | 2001 | 2004 |
|---|---|---|---|---|
| 1/a | 0.049** | 0.022** | 0.032** | 0.065** |
| Implied a | 20.410** | 44.584** | 31.654** | 14.212** |
| S.E. | 7.156 | 15.8 | 11.453 | 5.424 |

Note: Table 3.3 shows the structural estimates $\frac{1}{a}$ and Implied $a$ based on coefficients from Table 3.2 assuming all industries are organized, across the years where the coefficients are of correct sign and are significant. Additionally, assume $\alpha_L = 0$ as a means of empirical ease, such that the estimated coefficients are [a] $\frac{1}{a}$. I find strong support in 1999, 2000, 2001 and 2004.

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

Now, re-writing equation (3.12) above including the time dimension, I get the following equation that can be estimated using the pooled dataset for all years.

$$\frac{t_{it}}{1+t_{it}} e_i = \rho z_{it} + \epsilon_{it} \tag{3.13}$$

The results are presented in Table 3.4 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 A.4. 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[27]. 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))[28].

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

[28]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.

Table 3.4: 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 3.4 shows the results from Limited Information Maximum Likelihood for the pooled dataset. The results are presented for IV strategies I-V presented in Table A.4 of Appendix A.3.2.

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[29]:

$$\frac{t_{it}}{1+t_{it}}e_i = (\frac{1-\alpha_L}{a+\alpha_L})z_{it} + \lambda_t \tag{3.14}$$

The results are presented in Table A.7 of Appendix A.2.4. 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. However, including such time fixed effects changes the interpretation of standard PFS and requires a different approach that will be taken up in the empirical section of Chapter 4. Next, I estimate the PFS model where I include the political organization indicators to examine the political economy of Indian trade protection.

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

### 3.7.2 Has Protection really been for Sale in India?

Now, re-writing equation (3.9), I get the estimable equation:

$$\frac{t_i}{1+t_i}e_i = \rho z_i + \beta(I_i z_i) + u_i \tag{3.15}$$

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

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

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

$$\frac{t_{it}}{1+t_{it}}e_i = \rho z_{it} + \beta I_i z_{it} \tag{3.16}$$

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[30].

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 answer.

[30] 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 in this thesis at the 4-digit NIC using product descriptions. Each NIC sector is matched to one sector from the Enterprise survey (Attached in Appendix A.1.2).

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 3.1. 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 A.9 of Appenidx A.2.5. I estimate the PFS model based on these measures of LM across industries, shown in Table A.12 in Appendix A.2.5. 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[31].

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, $\rho$, the coefficient on X/M for unorganized sectors is negative ($\frac{-\alpha_L}{a+\alpha_L} < 0$). Second, $\beta$, 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 $\alpha_L$. 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 3.5 where I estimate the baseline in column (I) using the pooled dataset from 1990-2007. I use the IV strategy from Table 3.4 (IV3 was argued

[31] 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.

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[32] such that (IV) shows the results with time dummies.

The GH hypothesis finds strong support such that the basic quantitative findings are confirmed where $\rho$ is negative and significant at $-0.131$ and $\beta$ 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 A.5 of Appendix A.3.2 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.

[32]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 across periods.

Table 3.5: Pooled Cross-Section with Political Organization $I_{iWBES}$

| | (I) Pooled | (II) Drop Outlier | (III) Restricted Sample | (IV) Pooled with Time Dummies |
|---|---|---|---|---|
| | *Baseline* | *Robustness* | *Robustness* | *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 |

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

Note: (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 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 under take this comparison with the political organization indicator from Cadot et al. (2007) that was available[33]. A simple comparison (attached in Table A.14 in Appendix A.2.6) reveals that 63 out of 98 industries are politically organized for my set of industries using this indicator, lets call it $I_{Cadot}$[34]. This is significantly higher than the 47 industries identified in the paper by Cadot et al. (2007).

In addition, I estimate the PFS on my dataset using the measures $I_{Cadot}$, the results are attached in Table A.2.5 in Appendix A.13. I find that the GH hypothesis does not find support when I use the $I_{Cadot}$ indicator with my pooled dataset. There are two potential explanations for this. First, their estimations are based on data from 1997 and it can be argued that the organization measure reflects the period for 1995-1997 when industries were not very organized. Second, when I map their measures from ISIC Revision 2 to NIC/ISIC Revision 3 at the 4-digit, I find that there is not enough variation in the organization measure.

I estimate the structural parameters $a$ and $\alpha_L$ using the results in Table 3.5 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 $\rho$ and $\beta$ can be used to calculate the parameters such that $\alpha_L = \frac{\rho}{\beta}$ and $a = \frac{1+\rho}{1+\rho+\beta}$. Table 3.6 shows that the relative weight on welfare with respect to industry interactions (political contributions in terms of the PFS model) for the government

[33]This data was kindly provided by Marcelo Olarreaga and Jean-Marie Grether.

[34]The results are attached in Table A.13 in Appendix as a means of comparison only. 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.

in India was 0.758 for the period of 2000 onwards[35]. This means that the government weighs industry interactions along with welfare when formulating trade policy. The estimate of $\alpha_L$ is approximately 0.832 that implies a very high proportion of specific factor owners are organized as members of associations in India.

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.

Table 3.6: Implied $a$, $\alpha_L$ and Sum of Coefficients

| Structural Parameters | Estimates (Data 2000 onwards) |
|---|---|
| $a$ | 0.758*** (0.094) |
| $\alpha_L$ | 0.832*** (0.078) |
| Sum of Coefficients | 0.042*** (0.009) |

Note: Table 3.6 shows the structural parameters. The estimated coefficients $\rho$ and $\beta$ are used to calculate the parameters such that $\alpha_L = -\frac{\rho}{\beta}$ and $a = \frac{1+\rho}{1+\rho+\beta}$, where $\rho$=-0.210 and $\beta$=0.252.

### 3.7.3 Robustness

In this section, I examine the robustness of my findings. This was achieved using the following methods that are discussed briefly.

Taking into account the nature of the estimated dependent variable used in my model (trade protection interacted with the estimated import demand elasticities), I undertake two robustness checks. First, I use weighted least squares using the inverse standard errors

[35]Note the interpretation of this estimate is now different from that discussed in Table 3.3 as I also consider political organization

of the elasticity estimates from Kee et al. (2008). I use the inverse standard errors of the import demand elasticities to weight my estimates. Second, I bootstrap the standard errors for the dependent variable in my instrumental variable estimations. In both cases, the qualitative findings of the model were found unchanged.

To examine robustness of the main findings in this chapter, I also considered alternate definitions of my political organization dummy constructed using the WBES data. I created four quantiles for the shares of firms that are members of associations, 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. The threshold of 0.75 gives the most variation to identify differences by organized and unorganized sectors. The results are attached in Table A.12 in Appendix A.2.5. I find that the signs of coefficients fail to support the primary findings above with higher thresholds to identify organization, while I also lose in terms of significance of the coefficients. This owes to the fact that organization measures constructed with the higher alternate thresholds did not give enough variation to identify the effect of being organized. Therefore, I select the organization measure with the preferred threshold of 0.75 for the share of firms as organized in every sector in the sections above.

## 3.8 Conclusion

The chapter provides evidence on the traditional PFS model using a unique dataset for India. It is observed, that across the selected time period of study, the 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.

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. Political organization is thereby useful as a discrete story but lobbying in terms of a continuous measure can add value to the GH hypothesis reflecting actual lobbying abilities across sectors. This argument is motivation for the next chapter of the thesis where I explore a simple modification of PFS to include differences in lobbying across sectors.

# Chapter 4

# Trade Protection and Lobbying Effectiveness

## 4.1 Introduction

This chapter examines the impact of differences in effectiveness to lobby across industries for trade policy. I introduce a new measure of lobbying termed henceforth as *Lobbying Effectiveness* into the Grossman and Helpman (1994) (American Economic Review 84: 833–850, GH henceforth) model of *Protection for Sale* (PFS henceforth) to analyse how heterogeneity in lobbying effectiveness affects the trade protection outcome. The underlying theoretical framework is based on the idea that government preferences and/or the market structure of the industry leads to differences in the effectiveness in lobbying. Additionally, I examine the political economy determinants of lobbying effectiveness in the context of Indian trade policy.

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. The effect of lobbying on the equilibrium policy thereby derives from only an identification of being politically organized or not. This effect is homogeneous such that 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 across the set of organized or unorganized industries. 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.

The exogenous and dichotomous distinction of political organization is known to suffer from limitations when taken to empirical data often discussed in the literature on PFS[1]. 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 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.

In this chapter, I introduce a new measure of *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 not all sectors have the same influence on the equilibrium policy.

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. Gawande and Magee (2012) allow for another class of partially-organized industries. This additional classification 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.

[1] In Goldberg and Maggi (1997) and Imai et al. (2009) among others.

However, not much has been said about the effectiveness of lobbying within the PFS model.

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[2]. In this light, the PFS model provides a potentially clean structural framework to examine lobbying effectiveness. However, the implicit assumption that lobbies only differ in terms of being organized or unorganized misses on several dimensions of potential heterogeneity in actual 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[3]. This is based on government preferences such that the weight the 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[4] 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 domestic lobbying in a given industry.

Following the theoretical motivation, this chapter provides empirical estimates on lobbying effectiveness using a panel dataset for India from 1999-2007. I estimate varying degrees of lobbying effectiveness across sectors[5]. To further explore the demand side of

[2]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.

[3]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.

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

[5]The main aim of this chapter 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. Note that I examine the predictions of the modified PFS framework in terms of the expected signs of the coefficients in Chapter 5.

protection, I ask the question of what determines lobbying effectiveness in terms of potential resource advantages across sectors. I use the same dataset as in Chapter 3 of my thesis. 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 of this chapter is as follows. Section 2 outlines the relevant literature to motivate this study followed by Section 3 where I outline the theoretical framework. Section 4 will present the empirical evidence. Finally, Section 6 will conclude the chapter.

## 4.2 Literature

The effectiveness of interest groups in lobbying the government to obtain policy outcomes has been of much interest in the area of international trade. This literature has recognized that policy outcomes are influenced by lobbying activities of groups in pursuit of their own interests to secure trade protection. Issues with empirical data availability and econometric identification make the causal mechanisms for lobbying effectiveness on trade policy hard to discern. This section presents the literature that has dealt with political organization and lobbying in GH and discusses possible sources of heterogeneity in lobbying that emerges from the existing literature.

Political organization in the PFS model gives the exogenous structure of lobby groups where some industries are organized while others are not. It gives the exogenous partition of interest groups where the producers in organized sectors can influence the policy outcome. However, this indicator does not account for potential heterogeneity in actual lobbying across industries. Political organization of the interest groups to form a lobby is assumed to have an impact on the policy outcome. Government preferences are given such that a dollar of the underlying political contributions by an organized lobby has the same effect irrespective of identity. However, in practice political organization differs from actual lobbying wherein organized groups may engage in lobbying or may choose to not lobby at all. The identification of sectors as being organized and unorganized in the model does not reflect this actual variation in lobbying that suggests an endogenous selection of interest groups.

### 4.2.1 Literature on PFS

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 cooperation 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)[6]. The reduced-form equation included a set of traditional political-economy regressors that include concentration indices,

[6]The methodology is discussed at length in Chapter 3

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. As outlined in Chapter 3, 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[7].

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 in their effectiveness to lobby across sectors.

### 4.2.2 Heterogeneity in Lobbying

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

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

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. Providing further support in this direction, Chapter 3 of my thesis provides estimates for India that are close to 1. Following this, the empirical analysis in this Chapter will assume $a = 1$ to estimate the variable of interest in this case being measures on lobbying.

### 4.2.3 Government Welfare

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 thesis. In Maggi and Rodriguez-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 chapter attempts to provide evidence on government valuation of lobbying that can differ by industries providing empirical evidence for India.

## 4.3 The Model

To analyse the impact of effectiveness in lobbying on trade protection, I consider a modification of the standard PFS model. The framework follows the environment in 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[8] or 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. 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

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

with the government[9] 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 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 chapter 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*[10] 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[11] 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

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

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

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

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.

### 4.3.1 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[12] (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.

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 $\gamma_i$ 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 $W$:

[12] 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.

$$G = aW + \sum_{i=1}^{n} \gamma_i C_i \tag{4.1}$$

I assume $a = 1$ for estimating $\gamma_i$ later. In this set-up, each sector $i$ receive a different weight given by $(a + \gamma_i)$. This approach differs from previous literature as I define lobbying effectiveness in terms of government valuation of lobby contributions, accounting for various degrees of lobbying. $\gamma_i$ is the lobbying effectiveness that translates into a high valuation of the political contribution in government's preferences.

Substituting for $W$ defined in terms wages at 1, the returns to specific factor $\pi_i$, 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:

$$G = a\left[1 + \sum_{i=1}^{n} \pi_i + \sum_{i=1}^{n} (t_i M_i + s_i)\right] + \sum_{i=1}^{n} \gamma_i \left[\pi_i + \alpha_i \left(1 + \sum_{j=1}^{n} (t_j M_j + s_j)\right) - B_i\right] \tag{4.2}$$

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:

$$G = a + \sum_{i=1}^{n} (a + \gamma_i)\, \pi_i + \left( a + \sum_{j=1}^{n} \gamma_j \alpha_j \right) \left( \sum_{i=1}^{n} (t_i M_i + s_i) \right) + \sum_{i=1}^{n} \gamma_i \, (\alpha_i - B_i) \tag{4.3}$$

Differentiating (4.3) with respect to $t_i$ (equivalent to differentiating w.r.t. $p_i$), gives[13]

$$\frac{\partial G}{\partial t_i} = (a + \gamma_i)\, X_i + \left( a + \sum_{j=1}^{n} \gamma_j \alpha_j \right) \left( t_i M_i' + M_i - d_i \right) = 0 \tag{4.4}$$

Substituting and solving for $t_i$ gives:

$$t_i = - \left( \frac{\gamma_i - \sum_{j=1}^{n} \gamma_j \alpha_j}{a + \sum_{j=1}^{n} \gamma_j \alpha_j} \right) \frac{X_i}{M_i'} \tag{4.5}$$

Hence, following Chapter 3, 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 $z_i$:

$$\frac{t_i}{1 + t_i} = \frac{\gamma_i - \sum_{j=1}^{n} \gamma_j \alpha_j}{a + \sum_{j=1}^{n} \gamma_j \alpha_j} \frac{z_i}{e_i} \tag{4.6}$$

Now, interpreting (4.6), 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 $\gamma_i$ from the mean effectiveness for all sectors $\gamma$. 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.

[13] 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 $\pi_i$ 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 $t_i M_i^{'}$.

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:

*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 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 (4.6):

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

$$\frac{t_i}{1+t_i} = \frac{1 - \sum_{j=1}^{n} \alpha_j}{a + \sum_{j=1}^{n} \alpha_j} \frac{z_i}{\epsilon_i} = \frac{1 - \alpha_L}{a + \alpha_L} \frac{z_i}{\epsilon_i} \tag{4.7}$$

  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:

$$\frac{t_i}{1+t_i} = \frac{\gamma - \gamma \sum_{j=1}^{n} \alpha_j}{a + \gamma \sum_{j=1}^{n} \alpha_j} \frac{z_i}{\epsilon_i} = \frac{\gamma - \gamma \alpha_L}{a + \gamma \alpha_L} \frac{z_i}{\epsilon_i} = \frac{1 - \alpha_L}{\frac{a}{\gamma} + \alpha_L} \frac{z_i}{\epsilon_i} \tag{4.8}$$

  If $\gamma < 1$, then:

$$\frac{1 - \alpha_L}{\frac{a}{\gamma} + \alpha_L} \frac{z_i}{\epsilon_i} < \frac{1 - \alpha_L}{a + \alpha_L} \frac{z_i}{\epsilon_i} \tag{4.9}$$

  If $\gamma > 1$, then:

$$\frac{1 - \alpha_L}{\frac{a}{\gamma} + \alpha_L} \frac{z_i}{\epsilon_i} < \frac{1 - \alpha_L}{a + \alpha_L} \frac{z_i}{\epsilon_i} \tag{4.10}$$

  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.

### 4.3.2 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 $\gamma_i$ 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 $\zeta_i$ 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:

$$G = aW + \sum_{i=1}^{n}(1 - \gamma_i)C_i \tag{4.11}$$

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 $\gamma_i$. A not so effective lobby would have to incur a very high access cost and have lower $\gamma_i$. 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 4.6. 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[14].

Altering the contributions technology itself is in violation of the truthful criteria. An

[14]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 $\gamma$ 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.

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[15]

## 4.4 Methodology

This section will outline the data used and the empirical analysis in this chapter.

### 4.4.1 Data

The estimation of Equation 4.6 requires data on imports, elasticity of import demand and tariff preferences by the 4-digit NIC/ISIC Revision 3 Industry for India. The dataset is the same used in Chapter 3 of the thesis from All India Survey of Industries (ASI) and covers the years from 1990 to 2007 with gaps. The issues related to the data will be discussed at length in the following sections.

### 4.4.2 Estimating Lobbying Effectiveness

This section presents the empirical framework to examine heterogeneity in lobbying effectiveness across industries and its impact on trade policy outcomes. The empirical approach consists of two steps, first to estimate lobbying effectiveness measures, second to examine the determinants of these measures.

First, I obtain the estimates on effectiveness of lobbying that will vary across the sectors. Using the theoretical model motivated above, introducing heterogeneity within the

[15]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.

traditional PFS model enables an empirical estimation of the effectiveness measures consistent with the underlying model of PFS. To obtain the estimates on effectiveness from equation (4.6), the first econometric issue is the measurement error in the estimates of import demand elasticities. To deal with this, I take the elasticities to the left hand side (as in Chapter 3). Time-variation is introduced such that the stochastic version of the equation can now be written as:

$$\frac{t_{it}}{1+t_{it}}e_i = (\frac{\gamma_i - \sum_{j=1}^{n}\gamma_j\alpha_j}{a+\sum_{j=1}^{n}\gamma_j\alpha_j})z_{it} + u_{it} \tag{4.12}$$

I assumed that $a = 1$ (earlier in this Chapter), 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 $\beta$ measure deviation from the mean effectiveness. $\beta$ will be normalized [16] 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 $\beta$ collapse to direct measures of lobbying effectiveness.

Therefore, in this approach I am interested to obtain the estimates on lobbying effectiveness $\gamma_i$. To estimate this equation, I need a panel dataset as $\beta$ varies by sector $i$. The estimates of $\beta$ 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. I estimate four different specifications to enable comparison across the models and ascertain the best fit of the data:

**Model 1** is estimated as:

$$\frac{t_{it}}{1+t_{it}}e_i = \beta_{1i}z_{it} + u_{it} \tag{4.13}$$

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

$$\beta_{1i} = \frac{\gamma_i - \sum_{j=1}^{n}\gamma_j\alpha_j}{a+\sum_{j=1}^{n}\gamma_j\alpha_j} \tag{4.14}$$

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

It estimates the effect of inverse import penetration on trade protection across the sectors. This relationship given by the coefficient $\beta_1$ which varies by the sectors $i$.

The type of sector can significantly affect the ability to lobby such that different sectors may show different propensities to lobby for protection. In this context some sectors maybe more effective than others for lobbying the policy-makers. If certain factors associated to lobbying propensity are time invariant, say owing to some comparative advantage/disadvantage, sector fixed effects provide a means for controlling for such omitted variable bias with time-invariant values. The fixed effects capture political economy factors that do not vary substantially across years. This could involve the ability to lobby the government for trade protection where some industries may easily organize and lobby for protection. To the extent that few industries may systematically receive more protection is also captured by these fixed effects. However, note that the sector fixed effects also remove the cross-sectional variation used in the estimation of traditional PFS. **Model 2** includes the sector fixed effects and is written as:

$$\frac{t_{it}}{1+t_{it}}e_i = \beta_{0i} + \beta_{1i}z_{it} + u_{it} \tag{4.15}$$

Here, $\beta_{0i}$ are sector dummies that is included in addition to $\beta_{1i}$, both vary by sector $i$. Model 2 allows the effect of inverse import penetration on trade protection to be identified off the variation across years. This relationship is given by the coefficient $\beta_1$ controlling for any unobserved effects across the sectors that are correlated with the explanatory variable.

The estimates from the pooled data can also 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 **Model 3** that includes time dummies and is written as:

$$\frac{t_{it}}{1+t_{it}}e_i = \beta_{0t} + \beta_{1i}(z_{it}D_i) + u_{it} \tag{4.16}$$

Here, $\beta_{0t}$ are the time fixed effects. The parameters $\beta_{0t}$ is included in addition to $\beta_{1i}$ . The effect of inverse import penetration on trade protection differs across sectors. This relationship is now given by the coefficient $\beta_1$ which is identified off the variation across the sectors controlling for any unobserved effects across the years that maybe correlated with the explanatory variable.

Finally, **Model 4** includes sector and time dummies and is written as:

$$\frac{t_{it}}{1+t_{it}}e_i = \beta_{0i} + \beta_{1i}(z_{it}D_i) + \beta_{0t} + u_{it} \tag{4.17}$$

Here, $\beta_{0t}$ are the time fixed effects. The parameters $\beta_{0i}$ and $\beta_{0t}$ are included in addition to $\beta_1$ . The relationship between inverse import penetration and trade protection is now given by the coefficient $\beta_1$ which is identified off the variation across the sectors controlling for any unobserved heterogeneity across the sectors and years that maybe correlated with the explanatory variable. However, note that this estimation places huge demands on the dataset.

The identifying assumption for the political economy parameter (lobbying effectiveness) in my model is time-invariance. This may be a problem for developing countries as often there are several changes in the political economy across years. But following Gawande et al. (2015), who adopt a similar logic focussing on lobbying effectiveness 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, **Model 3** is thereby the baseline that is compared with the other models that are estimated without any fixed effects, with sector fixed effects and including both sector and time fixed effects.

Another econometric issue in the estimation is that import penetration is determined

endogenously with trade protection. The endogenous variable here enters as an interaction with the sector fixed effects. I will use an instrumental variables approach on lines of Chapter 3 using *Limited Information Maximum Likelihood* (LIML). The instrumental variables include the lag of inventories and workers and the interaction of the instrument lag of workers with the sector dummies. The IV strategy is different for each model on account of the sector or time dummies that gives exact identification in IV2 and IV4. Table 4.1 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 IV3; in both Models the null cannot be rejected. The corresponding IV results are outlined in Table 4.2, the corresponding product descriptions can be read from Table A.14 of Appendix A.2.6 in Chapter 3. 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. The OLS results are outlined for Models 1-4 in Table A.15 in Appendix A.3.1.

In examining the estimated coefficients across columns (I)-(IV), my interest was to obtain estimates on lobbying effectiveness that in the model are given as $\gamma_i$. In the baseline results in column (3), 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 A.16 of Appendix A.3.2 which presents the First stage F-Statistics and the Shea Partial R-Squares for all the interactions across the 98 sectors. The F-test shows better fit for Models IV1 and IV3 where it is more than 10 for most sectors, while the F-statistic is lower than 10 for several sectors in IV2 and IV4 that include the sector fixed effects. LIML is used as the better estimation method with any problem of weak instruments in small samples (as in Chapter 3), however I use the criteria of the F-test to select the preferred model.

Table 4.1: Summary of Estimates: Models 1-4

| Variable | IV1 | IV2 | IV3 | IV4 |
|---|---|---|---|---|
| *Summary* | | | | |
| Obs | 98 | 98 | 98 | 98 |
| Mean | 0.311 | -0.382 | -0.371 | 0.127 |
| Std. Dev. | 0.448 | 6.539 | 0.784 | 1.878 |
| Min | -0.011 | -56.971 | -4.899 | -5.897 |
| Max | 2.301 | 21.981 | 0.618 | 15.207 |
| *Instrumental Variables* | | | | |
| IV | lag workers, lag inventories | lag workers, lag inventories | lag workers, lag inventories | lag workers, lag inventories |
| Interactions | lag workers*$D_i$ | lag workers*$D_i$ | lag workers*$D_i$ | lag workers*$D_i$ |
| Sector Dummies | No | Yes | No | Yes |
| Time Dummies | No | No | Yes | Yes |
| *Overidentification* | | | | |
| Sargan Statistic | 5.74 | Exact | 1.856 | Exact |
| p-value | 0.219 | Identification | 0.603 | Identification |
| *Descriptives* | | | | |
| Significant Coefficients | 34 | 0 | 31 | 0 |
| Positive Coefficients | 96 | 69 | 28 | 60 |

Note: Table 4.1 shows the first stage results for each Model IV1-IV4 for the endogenous variable.

Table 4.2: Modified PFS: IV Estimates

| Variables | (I) Model 1 (IV1) | (II) Model 2 (IV2) | (III) Model 3 (IV3) | (IV) Model 4 (IV4) |
|---|---|---|---|---|
| | | | *Baseline* | |
| NIC 1511 | 1.28100* | -0.06205 | 0.03465 | 0.22075 |
| | (0.711) | (1.710) | (0.604) | (1.735) |
| NIC 1512 | 0.01793* | 0.00070 | -0.00339 | -0.00021 |
| | (0.011) | (0.005) | (0.009) | (0.005) |
| NIC 1513 | 0.01446** | 0.00183 | 0.00367 | 0.00123 |
| | (0.007) | (0.004) | (0.005) | (0.005) |
| NIC 1514 | 0.40268*** | 0.03911 | 0.11210 | 0.04748 |
| | (0.136) | (0.334) | (0.129) | (0.268) |
| NIC 1520 | 0.03413*** | 0.03975 | 0.01526* | 0.01893 |
| | (0.009) | (0.108) | (0.008) | (0.117) |
| NIC 1531 | 0.01870*** | -0.00003 | 0.00986** | 0.00152 |
| | (0.004) | (0.010) | (0.004) | (0.011) |
| NIC 1532 | 0.06347*** | 0.01476 | 0.01607 | 0.01556 |
| | (0.024) | (0.073) | (0.021) | (0.070) |
| NIC 1533 | 0.00813 | 0.00119 | -0.06804** | -0.01243 |
| | (0.040) | (0.064) | (0.035) | (0.066) |
| NIC 1541 | 0.00043 | 0.00013 | -0.00781** | -0.00129 |
| | (0.004) | (0.007) | (0.004) | (0.008) |
| NIC 1542 | 0.00230*** | -0.00029 | 0.00103* | -0.00043 |
| | (0.001) | (0.001) | (0.001) | (0.002) |
| NIC 1543 | 0.04211 | 0.00611 | -0.01410 | 0.00252 |
| | (0.032) | (0.045) | (0.027) | (0.037) |
| NIC 1544 | 0.04096 | -0.02341 | -0.01072 | -0.00762 |
| | (0.025) | (0.094) | (0.023) | (0.100) |
| NIC 1551 | 0.49764*** | 0.13711 | 0.45106*** | 0.11882 |
| | (0.022) | (0.139) | (0.021) | (0.120) |
| NIC 1552 | 0.22015*** | -0.05672 | 0.17072*** | -0.05442 |
| | (0.024) | (0.124) | (0.022) | (0.100) |
| NIC 1553 | 0.00431** | 0.00016 | 0.00047 | -0.00045 |

Modified PFS: IV Estimates (cont.)

| Variables | (I) Model 1 (IV1) | (II) Model 2 (IV2) | (III) Model 3 (IV3) | (IV) Model 4 (IV4) |
|---|---|---|---|---|
| | | | *Baseline* | |
| | (0.002) | (0.004) | (0.002) | (0.003) |
| NIC 1554 | 0.00334 | 0.00029 | -0.00155 | 0.00021 |
| | (0.003) | (0.003) | (0.002) | (0.002) |
| NIC 1600 | 0.02016*** | -0.00083 | 0.01703*** | -0.00100 |
| | (0.001) | (0.008) | (0.001) | (0.006) |
| NIC 1711 | 0.14148*** | 0.13535 | 0.03260 | 0.11727 |
| | (0.052) | (0.202) | (0.049) | (0.219) |
| NIC 1721 | 0.10731 | 0.06867 | -0.00253 | 0.05373 |
| | (0.079) | (0.093) | (0.059) | (0.090) |
| NIC 1722 | 0.13149** | 0.01874 | 0.03264 | 0.01539 |
| | (0.059) | (0.029) | (0.044) | (0.026) |
| NIC 1723 | 0.09719 | 0.24966 | -0.01148 | 0.18317 |
| | (0.059) | (0.489) | (0.051) | (0.441) |
| NIC 1729 | 1.82261 | 21.98081 | -0.22942 | 15.20661 |
| | (1.152) | (36.617) | (0.974) | (35.582) |
| NIC 1730 | 0.12692*** | 1.10218 | 0.04495 | 0.87030 |
| | (0.045) | (1.290) | (0.041) | (1.174) |
| NIC 1810 | 0.01090** | 0.00393 | 0.00749** | 0.00273 |
| | (0.004) | (0.006) | (0.004) | (0.006) |
| NIC 1820 | 0.20153 | -0.25010 | -0.04156 | -0.20049 |
| | (0.173) | (0.369) | (0.138) | (0.299) |
| NIC 1911 | 0.13582 | -0.02572 | -0.55774* | 0.17670 |
| | (0.325) | (3.173) | (0.311) | (2.327) |
| NIC 1912 | 0.07037 | 0.03222 | -0.06786 | 0.01097 |
| | (0.072) | (0.109) | (0.062) | (0.118) |
| NIC 1920 | 0.05937 | 0.06478 | -0.04127 | 0.03230 |
| | (0.050) | (0.185) | (0.045) | (0.170) |
| NIC 2010 | 0.84837*** | -7.08433 | 0.33233 | -5.89724 |
| | (0.234) | (7.597) | (0.235) | (8.736) |

Modified PFS: IV Estimates (cont.)

| Variables | (I) Model 1 (IV1) | (II) Model 2 (IV2) | (III) Model 3 (IV3) | (IV) Model 4 (IV4) |
|---|---|---|---|---|
| | | | *Baseline* | |
| NIC 2021 | 0.19127** | -0.39366 | 0.00752 | -0.15172 |
| | (0.087) | (1.467) | (0.082) | (1.013) |
| NIC 2022 | 0.02861*** | 0.00691 | 0.01468** | 0.00489 |
| | (0.007) | (0.010) | (0.006) | (0.009) |
| NIC 2023 | 0.10933*** | 0.12267 | 0.05485** | 0.11018 |
| | (0.026) | (0.188) | (0.024) | (0.136) |
| NIC 2029 | 0.49974*** | 0.07934 | 0.10633 | -0.01251 |
| | (0.184) | (0.655) | (0.175) | (0.460) |
| NIC 2101 | 0.43978 | 12.59152 | -0.48515 | 5.00262 |
| | (0.438) | (81.197) | (0.415) | (61.784) |
| NIC 2102 | 0.04010 | -0.09653 | -0.01382 | -0.06217 |
| | (0.028) | (0.190) | (0.025) | (0.203) |
| NIC 2109 | 0.21149 | 0.46846 | -0.44885 | 0.02130 |
| | (0.354) | (2.220) | (0.307) | (2.267) |
| NIC 2212 | -0.00003 | 0.00000 | -0.01409** | 0.00335 |
| | (0.007) | (0.019) | (0.006) | (0.017) |
| NIC 2219 | 0.57991 | 0.48306 | -2.37177* | -0.50440 |
| | (1.401) | (13.213) | (1.341) | (9.060) |
| NIC 2221 | 0.00377 | 0.00562 | -0.00960 | -0.00520 |
| | (0.006) | (0.045) | (0.006) | (0.039) |
| NIC 2222 | 0.09899 | 0.06097 | -0.36030* | -0.03566 |
| | (0.228) | (0.776) | (0.208) | (0.589) |
| NIC 2310 | 0.07179 | -0.02097 | -0.42340* | -0.35507 |
| | (0.298) | (2.782) | (0.254) | (2.583) |
| NIC 2320 | -0.01147 | -0.01836 | -0.20857** | 0.01994 |
| | (0.130) | (0.242) | (0.103) | (0.227) |
| NIC 2411 | 0.53260 | 1.80816 | -2.16366* | -2.74697 |
| | (1.279) | (30.876) | (1.200) | (30.782) |
| NIC 2412 | 0.12324 | -0.92435 | -0.48868* | 1.24826 |

Modified PFS: IV Estimates (cont.)

| Variables | (I) Model 1 (IV1) | (II) Model 2 (IV2) | (III) Model 3 (IV3) | (IV) Model 4 (IV4) |
|---|---|---|---|---|
| | | | *Baseline* | |
| | (0.288) | (18.961) | (0.273) | (13.871) |
| NIC 2413 | 0.10296 | -0.22685 | -0.72402* | 0.30281 |
| | (0.401) | (3.640) | (0.371) | (3.760) |
| NIC 2422 | 0.03446 | 0.01251 | -0.10422* | 0.01653 |
| | (0.065) | (0.208) | (0.062) | (0.165) |
| NIC 2423 | 0.06604 | 1.04867 | -0.26789* | -1.23460 |
| | (0.165) | (11.722) | (0.151) | (12.046) |
| NIC 2424 | 0.04458 | 0.05724 | -0.11580 | 0.00328 |
| | (0.078) | (0.365) | (0.072) | (0.338) |
| NIC 2429 | 0.24728 | -0.70967 | -0.84300* | 1.29132 |
| | (0.513) | (18.231) | (0.487) | (17.765) |
| NIC 2430 | 0.43249* | -2.64842 | -0.06195 | -0.51529 |
| | (0.234) | (46.389) | (0.221) | (17.937) |
| NIC 2511 | 0.00539 | 0.00522 | -0.03222* | -0.01084 |
| | (0.018) | (0.101) | (0.017) | (0.104) |
| NIC 2519 | 0.08421 | 0.16293 | -0.49775* | -0.23138 |
| | (0.283) | (2.027) | (0.261) | (2.112) |
| NIC 2520 | 0.08703 | 0.10324 | -0.15774 | 0.00277 |
| | (0.123) | (0.515) | (0.111) | (0.552) |
| NIC 2610 | 0.77928** | 0.49720 | 0.11215 | 0.99869 |
| | (0.324) | (4.044) | (0.304) | (3.618) |
| NIC 2691 | 0.15571 | 0.27024 | -0.06358 | 0.19327 |
| | (0.103) | (1.344) | (0.097) | (0.924) |
| NIC 2692 | 0.36850** | 0.36478 | 0.06705 | 0.32570 |
| | (0.160) | (0.665) | (0.144) | (0.530) |
| NIC 2694 | 0.00740*** | 0.00343 | 0.00575*** | 0.00297 |
| | (0.001) | (0.003) | (0.001) | (0.003) |
| NIC 2695 | 0.02360** | 0.00724 | -0.00088 | 0.00509 |
| | (0.010) | (0.015) | (0.009) | (0.015) |

Modified PFS: IV Estimates (cont.)

| Variables | (I) Model 1 (IV1) | (II) Model 2 (IV2) | (III) Model 3 (IV3) | (IV) Model 4 (IV4) |
|---|---|---|---|---|
| | | | *Baseline* | |
| NIC 2696 | 0.00847 | 0.00300 | -0.00177 | 0.00185 |
| | (0.005) | (0.006) | (0.005) | (0.005) |
| NIC 2699 | 0.20486* | 0.15284 | -0.05918 | 0.10815 |
| | (0.122) | (0.437) | (0.121) | (0.472) |
| NIC 2710 | 0.25000* | 0.19709 | -0.07982 | 0.11071 |
| | (0.145) | (1.351) | (0.145) | (0.965) |
| NIC 2720 | 2.30107 | 1.26729 | -1.08151 | 0.66861 |
| | (1.548) | (3.006) | (1.475) | (3.109) |
| NIC 2811 | 0.12931*** | 0.50815 | 0.04698 | 0.40107 |
| | (0.041) | (0.754) | (0.038) | (0.521) |
| NIC 2812 | 0.05729** | 0.02115 | 0.00521 | 0.02209 |
| | (0.024) | (0.078) | (0.023) | (0.068) |
| NIC 2813 | 0.15790 | -0.15858 | -0.27987 | 0.07340 |
| | (0.216) | (1.543) | (0.201) | (1.094) |
| NIC 2893 | 0.09893 | -0.00824 | -0.40725* | 0.11026 |
| | (0.237) | (1.204) | (0.227) | (0.930) |
| NIC 2899 | 0.55133 | -1.41123 | -0.25073 | -0.88918 |
| | (0.511) | (3.196) | (0.415) | (3.175) |
| NIC 2912 | 1.32276 | 6.16343 | -0.48968 | 3.33211 |
| | (0.886) | (16.217) | (0.816) | (15.948) |
| NIC 2919 | 0.14191 | 0.05483 | -0.13320 | 0.03859 |
| | (0.133) | (0.281) | (0.130) | (0.276) |
| NIC 2921 | 0.02499 | 0.01464 | -0.01796 | 0.00387 |
| | (0.020) | (0.074) | (0.019) | (0.055) |
| NIC 2922 | 1.73735 | 1.61463 | -2.06251 | 1.20606 |
| | (1.770) | (6.353) | (1.744) | (6.448) |
| NIC 2924 | 0.67472 | -3.42895 | -1.00013 | 1.01518 |
| | (0.792) | (51.059) | (0.753) | (38.268) |
| NIC 2925 | 0.65600 | 0.66451 | -1.54121 | 0.31128 |

Modified PFS: IV Estimates (cont.)

| Variables | (I) Model 1 (IV1) | (II) Model 2 (IV2) | (III) Model 3 (IV3) | (IV) Model 4 (IV4) |
|---|---|---|---|---|
| | | | *Baseline* | |
| | (1.021) | (19.087) | (0.979) | (14.135) |
| NIC 2930 | 0.12611** | 0.04809 | -0.00456 | 0.05409 |
| | (0.061) | (0.211) | (0.058) | (0.166) |
| NIC 3000 | 0.48626 | 0.08102 | -1.78995* | -0.08159 |
| | (1.111) | (2.661) | (1.066) | (2.394) |
| NIC 3110 | 0.20389 | 0.10782 | -0.45735 | -0.18345 |
| | (0.315) | (1.635) | (0.292) | (1.485) |
| NIC 3130 | 0.07197 | 0.03702 | -0.15255 | -0.06870 |
| | (0.127) | (0.812) | (0.120) | (0.788) |
| NIC 3140 | 0.11929 | 0.03736 | -0.25762 | -0.00661 |
| | (0.186) | (0.275) | (0.166) | (0.285) |
| NIC 3150 | 0.26195 | 0.13409 | -0.10145 | 0.03725 |
| | (0.183) | (0.535) | (0.162) | (0.504) |
| NIC 3190 | 1.01819 | -2.01219 | -0.84484 | -1.21429 |
| | (1.076) | (5.135) | (0.904) | (5.316) |
| NIC 3210 | 0.35429 | -1.09934 | -1.98821* | -0.23674 |
| | (1.294) | (5.429) | (1.114) | (5.569) |
| NIC 3220 | 0.06935 | 0.01071 | -0.19233 | 0.04756 |
| | (0.134) | (0.373) | (0.122) | (0.285) |
| NIC 3230 | 0.21134 | 0.10587 | -0.42968 | -0.56871 |
| | (0.315) | (6.231) | (0.286) | (5.817) |
| NIC 3311 | 1.51585 | -11.63940 | -2.71078 | -0.83967 |
| | (2.141) | (58.431) | (1.933) | (55.052) |
| NIC 3320 | 0.87293 | -56.97120 | -2.19333 | -3.86902 |
| | (1.570) | (306.879) | (1.394) | (237.271) |
| NIC 3330 | 0.32375 | 0.22553 | -0.25087 | 0.16215 |
| | (0.268) | (1.069) | (0.260) | (0.962) |
| NIC 3410 | 0.83882*** | -2.00261 | 0.61762*** | -1.77377 |
| | (0.115) | (1.326) | (0.103) | (1.235) |

Modified PFS: IV Estimates (cont.)

| | (I) | (II) | (III) | (IV) |
|---|---|---|---|---|
| Variables | Model 1 (IV1) | Model 2 (IV2) | Model 3 (IV3) | Model 4 (IV4) |
| | | | *Baseline* | |
| NIC 3511 | 1.12389 | -0.33013 | -2.02978 | 0.53256 |
| | (1.522) | (6.986) | (1.429) | (5.487) |
| NIC 3520 | 0.14069 | 0.12718 | -0.26663 | -0.00943 |
| | (0.215) | (1.247) | (0.207) | (1.335) |
| NIC 3530 | 1.37176 | 0.57359 | -4.89945* | 0.35758 |
| | (2.993) | (10.415) | (2.903) | (9.064) |
| NIC 3591 | 0.01331*** | 0.01438 | 0.00439 | 0.06038 |
| | (0.005) | (0.215) | (0.004) | (0.177) |
| NIC 3592 | 0.12566*** | 0.09745 | 0.04142 | 0.10299 |
| | (0.039) | (0.190) | (0.038) | (0.159) |
| NIC 3599 | 0.00259 | -0.00054 | -0.00102 | -0.00127 |
| | (0.002) | (0.007) | (0.002) | (0.006) |
| NIC 3610 | 0.05932 | 0.01952 | -0.02498 | 0.01296 |
| | (0.042) | (0.040) | (0.037) | (0.040) |
| NIC 3691 | 0.27740 | 0.13832 | -0.41410 | 0.05516 |
| | (0.344) | (0.481) | (0.323) | (0.472) |
| NIC 3692 | 0.25853 | 0.08971 | -0.54856 | -0.02426 |
| | (0.379) | (0.627) | (0.378) | (0.752) |
| NIC 3693 | 0.18826 | 1.59730 | -0.54021 | -0.10808 |
| | (0.409) | (8.844) | (0.345) | (9.121) |
| NIC 3694 | 0.34491 | -2.02034 | -0.28777 | -1.13888 |
| | (0.334) | (5.293) | (0.292) | (5.874) |
| Sector FE | | Yes | | Yes |
| Year FE | | | Yes | Yes |
| Observations | 876 | 876 | 876 | 876 |

Standard errors in parentheses

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

Note: Table shows the coefficients from the estimation with the models.

Column (I) of Table 4.2 shows the coefficient estimates obtained from Model 1 with the pooled dataset. This identifies the coefficient $\beta_{1i}$ that serves as the benchmark for the competing models. Comparison of the OLS results (OLS1) and the IV (IV1) is presented in Figure 4.1. 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 in Chapter 3, 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 Model 2 that includes the sector fixed effects in the estimation. Including the sector fixed effects wipes out the cross-sector variation traditionally used in the PFS. This reveals the expected change in trade protection associated with a one unit of within-sector change in import penetration, all else equal. Next, the results for the baseline Model 3 are outlined in column (III). Comparison of the OLS (OLS3) and (IV3) 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 4.2. Note that there is a clear left shift in the distribution for IV3 as compared to IV1 that owes to the fact that the coefficient estimates in IV3 explains one sector receiving higher protection vis-a-vis another controlling for changes across time. Finally, Model 4 includes both time and sector fixed effects. The significance of most of the coefficients are wiped out such that this model controls for both changes across sectors and time.

Figure 4.1: Kernel Density estimates for coefficients from OLS1 and IV1

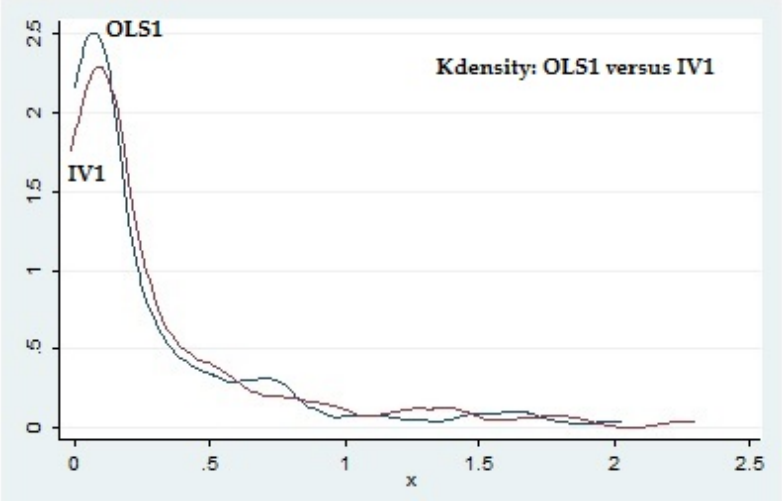


Figure 4.1 shows the coefficient estimates from Model OLS1 and IV1 for the modified PFS.

Figure 4.2: Kernel Density estimates for coefficients from OLS3 and IV3

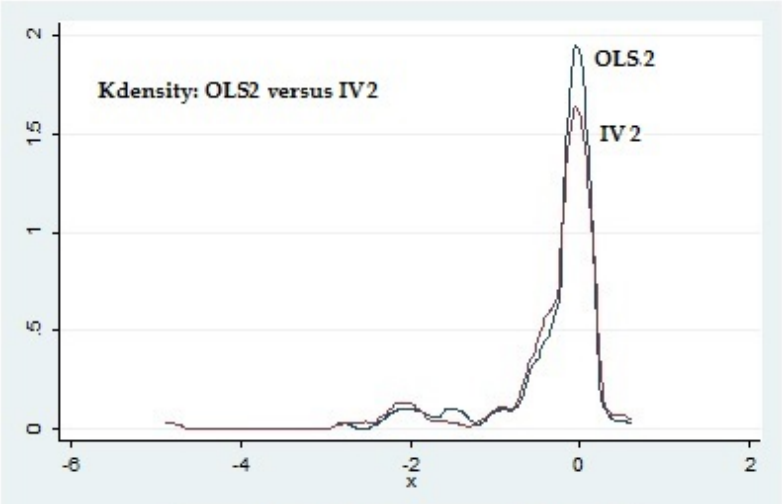


Figure 4.2 shows the coefficient estimates from Model OLS3 and IV3 for the modified PFS.

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 $\gamma_i$.

Table 4.3 presents the coefficients of interaction terms from Model 3 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 4.3.

Table 4.3: 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 |
| 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 |

Lobbying Effectiveness (cont.)

| NIC/ISIC | Estimated Coefficients | Effectiveness |
|---|---|---|
| 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 |
| 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 |

Lobbying Effectiveness (cont.)

| NIC/ISIC | Estimated Coefficients | Effectiveness |
|---|---|---|
| 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 |

Lobbying Effectiveness (cont.)

| NIC/ISIC | Estimated Coefficients | Effectiveness |
|---|---|---|
| 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 |
| 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 $\beta$ measure deviation from the mean effectiveness. $\beta$ will be normalized [17] 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 $\beta$ collapse to direct measures of lobbying effectiveness.

Figure 4.3: Lobbying Effectiveness

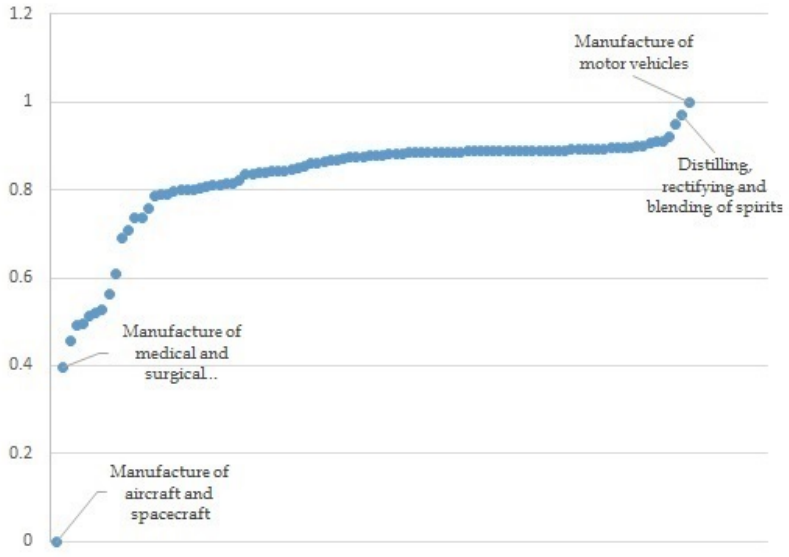


Figure 4.3 shows the lobbying effectiveness estimates at the 4-digit of the NIC/ISIC Rev. 3. Among the most effective sectors, I also observe the one with the highest tariffs being the ISIC sector *1551* defined as the *Distilling, rectifying and blending of spirits*.

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

### 4.4.3 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 NIC 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 list of ten most effective and least effective sectors are listed in Tables 4.4 and 4.5.

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.

Table 4.4: Most Effective Sectors

| NIC/ISIC | Description | Effectiveness |
|---|---|---|
| 3410 | Manufacture of motor vehicles | 1 |
| 1551 | Distilling, rectifying and blending of spirits | 0.9698111 |
| 2010 | Saw milling and planing of wood | 0.9482902 |
| 1552 | Manuf. of wines | 0.9189974 |
| 1514 | Manuf. of glass and glass products | 0.9083804 |
| 2029 | Manuf. of Vegetable and animal oils and fats | 0.9083728 |
| 2023 | Manuf. of other products of wood | 0.9073268 |
| 2811 | Manuf. of refractory ceramic products | 0.9002057 |
| 2610 | Manuf. of wooden containers | 0.8979955 |

Note: Table 4.4 shows the most effective sectors.

Table 4.5: Least Effective Sectors

| NIC/ISIC | Description | Effectiveness |
|---|---|---|
| 3530 | Manuf. of aircraft and spacecraft | 0 |
| 3311 | Manuf. of medical and surgical equipment | 0.3967087 |
| 2219 | Other publishing | 0.4581567 |
| 2922 | Manuf. of optical instruments and photographic equip. | 0.4905004 |
| 3320 | Manuf. of basic chemicals | 0.4958775 |
| 2411 | Manuf. of machine-tools | 0.514211 |
| 3511 | Building and repairing of ships | 0.520144 |
| 3210 | Manuf. of electronic valves and tubes | 0.5276788 |
| 3000 | Manuf. of office, accounting machinery | 0.5636151 |
| 2925 | Manuf. of machinery for food, beverage processing | 0.6087002 |

Note: Table 4.5 shows the least effective sectors.

I also compare my estimates on lobbying effectiveness from the PFS model with the political organization measures constructed for India earlier in Chapter 3 and in the literature[18]. 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 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.

### 4.4.4 What determines Lobbying Effectiveness?

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 effect-

[18] Outlined in table A.14 of Appendix A.2.6, 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.

iveness of lobbying in shaping policy outcomes[19] 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[20] where individual firms play an important role the structure of protection across sectors[21]. 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[22]. 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 discussed in Chapter 3 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[23]. If firms in a given industry are spread across all the country, then 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

[19] 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.

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

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

[22] 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.

[23] 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.

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 $\gamma_i$ 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:

$$\gamma_i = \alpha_0 + \alpha_1 G + \alpha_2 Elasticity + \alpha_3 G * Elasticity + \beta B + u_i \tag{4.18}$$

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[24]. 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:

$$E[y|x] = \frac{exp(X\beta)}{1 + exp(X\beta)} \tag{4.19}$$

Where $y$ is the dependent variable lobbying effectiveness and X is the vector of explanatory

[24]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.

regressors. Both results from the pooled OLS and fractional logit are presented in Table 4.6. 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[25]. 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[26].

[25] This will also be taken up in Chapter 6 where I examine how elasticity of substitution determines collective versus individual lobbying.

[26] In Chapter 6, I will show evidence that suggests if firm dispersion is higher, firms will be likely to lobby using a *Dual Strategy* that is arguably more effective.

Table 4.6: 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 4.6 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.

## 4.5 Conclusions

This paper suggests the origin of heterogeneity in lobbying in PFS using the idea of lobbying effectiveness. It provides new empirical evidence on India in terms of estimates on lobbying effectiveness for trade policy that have been non-existent for India.

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.

In the next chapter, I examine that if introducing such a measure changes the well-known implications and results of the PFS model.

# Chapter 5

# Is Protection still for Sale with Lobbying Effectiveness?

## 5.1 Introduction

The modified framework of *Protection for Sale* (PFS) introduced the idea of lobbying effectiveness into the traditional model. This leads me to examine if the introduction of such a measure changes the well-known implications and results of the traditional model. In this light, the motivation for this Chapter is to examine the following: **"Is Protection still for sale with Lobbying Effectiveness?"**. The primary objective is to examine how the differences in political economy factors in terms of lobbying effectiveness explain the variation in trade protection across Indian manufacturing sectors.

The modified framework allows to account for differences in lobbying effectiveness across sectors to explain the variation in trade protection. To estimate this model with data, I need a proxy for the new measure of lobbying effectiveness $\gamma_i$ defined in Chapter 4. The trade policy set-up in India consists of the apex government body i.e. *Ministry of Commerce and Industry* (MOCI) that oversees trade policy formulation. This leads to the premise that the interactions of the manufacturing industry with the MOCI has important implications for the hypothesis discussed by means of the modified PFS framework. I have information on firm membership to associations that have close ties to the government and are perceived as a legitimate means of lobbying[1]. In Chapter 3, I used this information taken from the *World Bank Enterprise Survey* (WBES) to identify a binary measure of

[1]The associations developed close ties to the government and are perceived as a legitimate means of lobbying with detailed information and corresponding awareness of international trade negotiations as discussed in Narlikar (2006).

political organization in traditional PFS. Now, I use the same data on firms that are members of industry associations in each sector to construct the proxy measure of lobbying effectiveness

I recognize two qualifications that are worth mentioning. First, membership alone may not fully capture the extent of actual lobbying. Firms can lobby more or less effectively by means of their membership. This implies a sector with a lower share of firms as members can be more effective in lobbying than another sector with a higher share of members. If this argument is true, it will lead to a downward bias when examining the impact of lobbying effectiveness on trade protection[2]. Second, there may be additional political economy factors at work besides interactions by means of membership to associations that can help explain the variation in trade protection in the model. Such factors can be potential substitutes or complements to lobbying by means of membership. I believe the nature of this relationship will depend on the trade policy instrument under study[3].

The arguments made above inform the empirical analysis of this Chapter where I attempt to meet the primary objective of using a direct measure of lobbying effectiveness and then try to deal with each of the arguments above. I construct the proxy measure of lobbying effectiveness and estimate PFS with lobbying effectiveness as the baseline model. The underlying motivation is to measure effectiveness based on the actual set-up of Indian trade policy. The industry dealings with the government are often facilitated by industry associations that include especially the national bodies of *Confederation of Indian Industries* (CII) and *Federation of Indian Chambers of Commerce and Industry* (FICCI). The associations sponsor and participate in general policy debates as emphasized in Kochanek (1996) and have played a significant role in Indian trade policy as outlined in Sagar and Madan (2009). This has in turn been accompanied by rising government responsiveness in industry association meetings. Thereby, I use the data on firms that are members of industry associations as the proxy measure of lobbying effectiveness.

[2]I recognize that one may further argue that membership to associations may not always imply lobbying only for trade policy influence. Associations can also represent interests for industrial policy. If one believes that the associations lobby more for industrial policy than trade policy, the measure of effectiveness based on membership will suffer from a potential measurement error. This argument is found in the existing literature on PFS for the United States in the context of political organization where political contributions are not always for trade policy influence Gawande and Bandyopadhyay (2000). I have undertaken an additional estimation using an IV for lobbying effectiveness for India. The qualitative results are similar such that I believe that this argument does not affect the findings of this Chapter. This owes primarily to the fact that the national associations in India engage majorly in trade lobbying while lobbying for industries is only at the margin.

[3]This is a motivation for examining different lobbying strategies in Chapter 6 of my thesis.

It is a fair argument that membership to associations does not imply actual lobbying that can bias the impact of effectiveness on trade protection downwards. This leads to the first robustness check for the baseline estimation. I take the measures of lobbying effectiveness constructed above and use a binary equation to estimate the likelihood of a firm to lobby effectively for trade policy influence using its membership to an association. A set of firm and industry characteristics are used to explain this likelihood with the aim to reduce the bias. This gives a predicted measure of lobbying effectiveness such that the PFS model is estimated using the predicted measure as a robustness check for the qualitative findings of the baseline.

The second qualification to my framework finds discussion in Goldberg and Maggi (1997) who have extended the empirical specification of PFS to include variables that may affect protection but were left out of the model. They include employment size, sectoral unemployment rate, measures of unionisation, changes in import penetration, and buyer and seller concentration. The conclusion was that some variables have additional explanatory power that can significantly improve the fit of the model. Following this line of thought, one can contest that there maybe additional political economy factors that can influence the equilibrium level of trade protection specific to developing countries and more so for India that may still be left out of the theoretical model. This leads to the next robustness check for my baseline model where I add another factor that can help explain the variation in trade protection in the model. To achieve this however, I choose to drive the empirics using a theoretically consistent specification derived by another simple alteration to the functional form of the modified PFS framework.

The remainder of the chapter is organized as follows. In Section 2, I present a discussion of relevant literature, followed by Section 3 where I will outline the theoretical framework and build the hypothesis for analysing the data outlined in section 4. Section 5 then outlines the Methodology. Section 6 summarizes the overall findings. Finally, Section 7 outlines concluding remarks.

## 5.2 Literature

The literature on PFS has recognized the limitations for undertaking this estimation for developing countries. Issues with the availability of data has made it hard to discern the extent to which political economy factors determine trade policy for these countries. This section presents the literature that has attempted to deal with such issues and identifies possible ways forward.

Weymouth (2012) uses the WBES data for 2002-2005 for over 42 developing and transition countries to examine the determinants of lobbying and perceived policy influence. He argues that firm-level heterogeneity explains political behaviour while political institutions shape the incentives of policy-makers to respond to business interests. On the whole, the estimates give support to the hypotheses that lobbying and influence increases with the firm size and market power in these countries. However, India is not included in this study because WBES data for India is not comparable with the global dataset. This warrants a case specific study of India using the WBES data that is undertaken in this chapter.

Chen (2013) shows firm-level heterogeneity determines the nature of firm engagement with government officials in China. A Chinese firm-director panel dataset is used to examine the matching of heterogeneous firms and politicians using $36,308$ detailed observations. The results show that the more productive firms are the ones paired with more powerful politicians. The preference for political capital relative to human capital increases with firm dependence on external financing and the inefficiency of local governments. This provides further evidence on the importance of industry-government interactions and lobbying in developing countries.

Olarreaga et al. (1999) conclude that industrial lobbies had an important influence on the determination of Mexican trade policy. They conduct a survey with Mexican business executives and conclude that only three percent of the executives think that it is useless to attempt and influence government policy. This shows the importance attached to lobbying as a means of influence on trade policy for Mexico. It is shown that foreign firms may in fact have a higher influence than domestic firms in Mexico as the industries with a higher concentration of foreign firms are likely to achieve greater trade protection. The influence of foreign firms versus domestic firms in lobbying for trade policy of a country has emerged as an important element of policy processes for developing countries.

The determinants of association membership have received significant attention in the lobbying literature. One important factor is firm size that is expected to be positively correlated with the likelihood of lobbying as shown in Kerr et al. (2014). One reason cited is that larger firms offer greater potential pay-off to support policy-makers such that firms with more employees provide politicians with a greater pool of potential support. For example, if policy-makers aim to reduce unemployment with a policy outcome, firm expectations of lobbying success will potentially increase with size. While, smaller firms often lack sufficient scale to cover the fixed costs of becoming a member of a lobby association. This proposition is examined in the context of the firm decision to be a member of a lobbying association in India.

Campos and Giovannoni (2007) provide evidence on lobbying and influence for 25 transition countries. Their results suggest that firm size and ownership are amongst the most important determinants of lobby membership even for less developed countries. Further, if a firm is foreign-owned it is more likely to be a member of a lobby group and in turn to attract foreign investment, governments could also be particularly attentive to requests from foreign investors. Foreign firms in India are subject to greater trade regulations than domestic firms such that foreign ownership could imply that they must lobby harder to achieve the same influence. It can also be hypothesized that firms with foreign ownership are also likely to have an advantage in negotiating with foreign partners in international negotiations such that they would leverage this by taking membership in domestic lobbying associations for a better stance at lobbying the policy-makers.

If firms in a given industry are spread across the country, then their influence on the government's decision-making process can potentially be stronger as they would exert their influence through different channels Facchini et al. (2006). This can in addition be linked to greater political representation across different locations in the country. At the same time, it has been suggested in earlier literature that it could be harder/expensive for firms that are spread out to organize and lobby. As argued in Chapter 4, this is based on the idea of a closed group that implies lower costs of organization and correspondingly lower incentive to free-ride. The concentration of firms in geographical locations can have important implications for cooperation in lobbying. To explain effectiveness in terms of membership to associations, this reasoning would imply that firms in sectors with lower geographical

concentration would be more likely to achieve effectiveness in lobbying by means of its membership.

To examine the political economy of trade protection in India, the next section presents the structural model to guide the analysis of PFS accounting for differences in lobbying effectiveness and the underlying set up to examine membership of firms to associations.

## 5.3 Theoretical Framework

This section outlines the theoretical framework in two steps. First, I present the model motivated earlier in Chapter 4 and use a direct measure to proxy for lobbying effectiveness to estimate the baseline model. To check robustness of the findings to the concern that membership may not always imply actual lobbying effectiveness, I predict the likelihood of a firm being lobbying by means of its membership of an association and construct the second proxy measure for effectiveness. Second, I introduce additional political factor into the PFS framework with lobbying effectiveness.

### 5.3.1 PFS and Lobbying Effectiveness

Chapter 3 outlines the fact that the original PFS model explains the trade policy outcome when the industry is organized and when it is not organized. A heterogeneous measure of lobbying effectiveness $\gamma_i$ was introduced in Chapter 4 to replace the binary identification that gave Equation 4.12. Assume that the $\sum_{j=1}^{n} \alpha_j \gamma_j$ is given by a constant $A$ that shows the product of the proportion of a country's population that is politically organized and the lobbying effectiveness measure as aggregated across the $j$ sectors[4]. The stochastic version of the equation with time-variation is shown below[5].

$$\frac{t_{it}}{1+t_{it}} e_i = \left(\frac{\gamma_i}{a+A} - \frac{A}{a+A}\right) z_{it} + u_{it} \tag{5.1}$$

Separating the two terms, the equation can be re-written as:

[4] $A$ is summed over the product of $\alpha_j$ which represents the proportion of of specific factor owners that are organized and the lobbying effectiveness measure for the other j sectors

[5] To deal with the measurement error in the estimates of import demand elasticities, I have taken the elasticities to the left hand side as in Chapter 3.

$$\frac{t_{it}}{1+t_{it}}e_i = (\frac{1}{a+A})\gamma_i z_{it} - (\frac{A}{a+A})z_{it} + u_{it} \tag{5.2}$$

With reference to *Cooperative Lobbying* in Chapter 4, a requisite for such lobbying is membership to trade associations. This form of cooperative lobbying seems to have also been more effective in India as discussed above on lines of Narlikar (2006). The literature on collective action has often repeated that trade associations provide a common lobbying organization that can handle the concerns of industries in a more effective manner than if the firms lobbied themselves as argued in Olson (1971). The national associations in India also seem to have a significant say in policy formulation of the government. I construct direct measures of lobbying effectiveness $\gamma_i$ using information about the membership of firms to associations across industries[6] I also argued that following political organization, the industries were able to overcome the free rider-problem to different degrees to lobby such that they are more or less effective in lobbying. To test this proposition, I construct $\gamma_i^a$ that is the proportion of firms that are members of associations in every industry. This measure can potentially account for the extent of cooperation versus free riding in every sector. The specification will constitute the baseline for PFS with heterogeneity in lobbying effectiveness.

Then, I check the robustness of the baseline findings to the concerns that membership may not always imply actual lobbying effectiveness. I construct another measure by introducing a preliminary stage where I examine the determinants of membership to associations to lobby effectively for trade policy influence. Consider the decision of a firm $j$ in sector $i$ to become a member of an association as $Membership_{ji}$. The trade association lobbies the government on behalf of its members. The members consist of firms within each industry that seek membership to the association. As noted before, lobbying by means of such membership is seen as more legitimate and can provide advantages by way of greater information about the costs and benefits associated to a particular policy. In addition to lobbying for trade policy influence, it is a source of political support for vote-maximizing politicians. Membership with an association may thereby increase the political activity and influence of the firm as emphasized in Weymouth (2012). There is a cost $f_{ji}$ for

[6]It is important to note that there is no existing data on actual lobbying by association members for India. I collect original information on lobbying in Chapter 6.

membership to the lobby association. In turn, a member of an association then derives a benefit $b_{ji}$. Both the lobbying costs and benefits depend on firm and industry-level characteristics as evidenced in the existing literature. This can be defined as a function of the membership cost and the benefit to be derived from the membership as shown below:

$$Membership_{ji} = f(f_{ji}, b_{ji}) \tag{5.3}$$

The decision to lobby by means of membership to an association now depends on the benefit outweighing the cost. Let the decision be based as a latent variable formulation such that the unobserved (latent) continuous variable $y^*$ represents the excess utility derived by lobbying as a member compared to not lobbying via membership in the association. The observed decision takes a value of 1 (becomes a member) if the excess utility from lobbying via membership to associations compared to not doing sp (value 0) is positive.

$$Membership_{ji} = \begin{cases} 1 \, if \; y^* > 0 \\ 0 \;\; otherwise \end{cases} \tag{5.4}$$

This decision to lobby by means of membership of an association is taken by the firm, such that in every sector there are a number of firms that lobby as members of associations and some firms that are members but do not actually use their membership to lobby. Membership brings benefits when firms cooperate in a given sector and lobby the government through the association. If all firms in a given sector lobby the government as members of associations, they have solved the free-rider problem and all firms cooperate to lobby effectively. While, as stated earlier not all membership is to lobby and may in fact be just to serve the purpose of political support. Therefore, if some firms join the association but do not actually lobby as members, this would mean that such firms free-ride and that would make a sector less effective than a sector where all firms are lobbying as members of associations. Thereby, I predict the likelihood of firms to lobby effectively as members of trade associations to achieve influence on trade policy. The predicted probabilities for firms will be collapsed by sectors of the WBES by taking an average across all firms that map to each sector. Therefore, such a predicted measure can be understood as the likelihood of firm lobbying as members of associations in terms of cooperation in lobbying versus free riding which then gives the lobbying effectiveness of the sector.

### 5.3.2 Additional Political Factors

There are specific arguments relevant for Indian trade policy that may be left out in the empirical specification for protection in the PFS and the modified framework. As mentioned earlier, there is no usable data on lobbying in India such that information on direct industry and government interactions are not available. Direct interactions between the government and industry can take various forms which in the traditional PFS set-up can be attributed to the additional error term in the empirical estimation. I seek to include such interactions by introducing an additional factor in the government objective.

Goldberg and Maggi (1997) introduced such variables into the PFS[7]. This argument was taken forward by Ederington and Minier (2008) who included additional terms into the trade policy equation, arguing that this can actually reverse some of the fundamental predictions of the model[8]. It can be argued that in the traditional PFS, the government maximizes industry contributions and (anonymous) utilitarian social welfare and there are no scope for additional factors. However, there can be other political factors that can influence government maximization. Examples include employment in marginal constituencies and other forms of representation.

In terms of the strict structural interpretation of the model, import-penetration, trade elasticities and a measure for lobbying can explain protection and no other additional variables should be included. Following the explanation in Goldberg and Maggi (1997) and Ederington and Minier (2008), I estimate Model 3 with the additional political economy factor that can potentially affect trade protection in India. The empirical extension derives from a well-specified alternative hypotheses, suggesting the additional regressor and its functional form that enables a further check on the robustness of the findings in the baseline.

To include additional political economy factors, the government objective can be characterized as a sum of the contribution schedules of lobby groups weighted by lobbying effectiveness $\gamma_i$, the aggregate voter welfare $W$ (anonymous) weighted by $a$, and an additional factor. This new factor is introduced as an additional term $L_i$ that could potentially

[7]These included employment size, sectoral unemployment rate, measures of unionisation, changes in import penetration, buyer and seller concentration among others.

[8]To the best of my knowledge, while the PFS including additional explanatory variables has been estimated with empirical data, the estimation of a modified framework of PFS with additional factors has not been attempted

affect the trade policy outcome for the manufacturing industry in India[9]. In my framework, the government attaches a relative weight of $b$ to this additional factor, which implies the government weighs every individual by the weights attached to the overall welfare, their effectiveness in lobbying as producers and any other political factor $(a + \gamma_i + b)$:

$$G = aW + \sum_{i=1} \gamma_i C_i + b \sum_{i=1} L_i \tag{5.5}$$

In terms of the traditional PFS, the government maximization implied that a change in the contribution schedule equals the change in welfare weighted by $a$:

$$\frac{\partial C_i}{\partial t_i} = -a \frac{\partial W_i}{\partial p_i} \tag{5.6}$$

Now, with an additional political economy factor, the government maximization is now given as follows:

$$\frac{\partial C_i}{\partial t_i} = -a \frac{\partial W_i}{\partial p_i} - \frac{\partial L_i}{\partial p_i} \tag{5.7}$$

Substituting for $W$ and $C_i$ in the government objective, where $C_i = W_i - B_i$ as in PFS, gives:

$$G = a \left[ 1 + \sum_{i=1}^{n} \pi_i + \sum_{i=1}^{n} (t_i M_i + s_i) \right] + \sum_{i=1}^{n} \gamma_i \left[ \pi_i + \alpha_i \left( 1 + \sum_{j=1}^{n} (t_j M_j + s_j) \right) - B_i \right] + b \sum_{i=1} L_i \tag{5.8}$$

Maximizing this government welfare function with respect to trade protection $t_i$ (that is equivalent to differentiating with $p_i$ gives the following:

$$\frac{\partial G}{\partial t_i} = (a + \gamma_i) X_i + \left( a + \sum_{j=1}^{n} \gamma_j \alpha_j \right) \left( t_i M_i' + M_i - d_i \right) + b \frac{\partial L_j}{\partial t_i} = 0 \tag{5.9}$$

I make the simplifying assumption that there are no cross-price effects across the sectors for the additional political factors $(\frac{\partial L_i}{\partial t_j} = 0 \ \forall_{j \neq i})$[10].

[9] Ederington and Minier (2008) discuss two means of integrating such factors into the PFS model. First, by defining the government objective in terms of contributions and non-anonymous social welfare in each industry. Second, they discuss the theoretical model in terms of appending an additional term into the government's welfare function when the industries are either organized or unorganized. However, there is no formal test with empirical data in the paper.

[10] This can also be thought on lines of additional political factors that come into play primarily from the

Now, substituting $M_i - d_i = -X_i$ and separating the terms, I get:

$$\frac{\partial G}{\partial t_i} = (a + \gamma_i) X_i + \left( a + \sum_{j=1}^{n} \gamma_j \alpha_j \right) t_i M_i' - \left( a + \sum_{j=1}^{n} \gamma_j \alpha_j \right) X_i + b \frac{\partial L_i}{\partial t_i} = 0 \tag{5.10}$$

Simplifying and re-arranging, I get the following specifications:

$$- \left( a + \sum_{j=1}^{n} \gamma_j \alpha_j \right) t_i M_i' = \gamma_i X_i - \left( \sum_{j=1}^{n} \gamma_j \alpha_j \right) X_i + b \frac{\partial L_i}{\partial t_i} \tag{5.11}$$

$$t_i = \frac{\gamma_i X_i - \left( \sum_{j=1}^{n} \gamma_j \alpha_j \right) X_i + b \frac{\partial L_i}{\partial t_i}}{\left( a + \sum_{j=1}^{n} \gamma_j \alpha_j \right)} \frac{-1}{M_i'} \tag{5.12}$$

Assume $l_i$ is the additional political economy factor defined above that is transferred to the government. The marginal effect of the additional political economy factor now enters the structural determination of trade protection.

$$t_i = \frac{\gamma_i - \left( \sum_{j=1}^{n} \gamma_j \alpha_j \right) + b(l_i / X_i)}{\left( a + \sum_{j=1}^{n} \gamma_j \alpha_j \right)} \frac{-X_i}{M_i'} \tag{5.13}$$

Multiplying on both sides of the equation:

$$\frac{M_i}{p_i} t_i = \frac{\gamma_i - \left( \sum_{j=1}^{n} \gamma_j \alpha_j \right) + b(l_i / X_i)}{\left( a + \sum_{j=1}^{n} \gamma_j \alpha_j \right)} \frac{X_i}{-M_i' \frac{p_i}{M_i}} \tag{5.14}$$

producer end and do not include any consumption externalities (for producers) in relation to price changes in other sectors. This effect is so small that it can be well approximated to zero. The original approach in Grossman and Helpman (1992) article calls such an approximation as *Example* 3 which is employed here.

Let elasticity of import demand $e_i$ equals $-M_i' \frac{p_i}{M_i}$ and $p_i = p_i^* + t_i$ where international prices $p_i^*$ are assumed equal to one. Substitution gives:

$$\frac{t_i}{1+t_i} = \frac{\gamma_i - \sum_{j=1}^{n} \gamma_j \alpha_j + b(l_i/X_i)}{(a + \sum_{j=1}^{n} \gamma_j \alpha_j)} \frac{z_i}{e_i} \tag{5.15}$$

A question of importance in terms of the PFS framework is how the interest groups would choose between cooperative lobbying and other factors. For the total offerings forwarded to the government in the PFS model, firms in an industry could choose to divert resources from cooperative lobbying to additional political factors[11].

For this specification, note that if $\gamma_i = 1 \forall i$, and $l_i$ is zero, then Equation 5.15 will collapse to standard PFS that implies the following:

$$\frac{t_i}{1+t_i} = \frac{1 - \sum_{j=1}^{n} \alpha_j}{a + \sum_{j=1}^{n} \alpha_j} \frac{z_i}{\epsilon_i} = \frac{1 - \alpha_L}{a + \alpha_L} \frac{z_i}{e_i} \tag{5.16}$$

If $\gamma_i$ equals 1 such that all sectors are equally effective in lobbying by means of associations and the only differences in lobbying arise from the additional lobbying factor ($l_i$ is not zero), then:

$$\frac{t_i}{1+t_i} = \frac{1 - \alpha_L + b(l_i/X_i)}{a + \alpha_L} \frac{z_i}{e_i} \tag{5.17}$$

[11] There are two ways to think about this. First, government may receive this additional political resource such that these are employment in marginal constituencies and there are no associated cost for the firms in every sector. Second, the additional political economy factors in PFS could imply that the lobbies may potentially follow non-truthful strategies. The competition between the firms would no longer be limited to the choice of a scalar amount. The additional factor would in turn depend on the producer returns. It has been shown in Grossman and Helpman (1992) working paper that every lobby can always substitute a truthful strategy for a non-truthful strategy and achieve the same net pay-off after the substitution as in the non-truthful equilibrium. Truthful contributions as outlined in the PFS is discussed in Chapter 3 of the theses.

## 5.4 Data

This section explains the data employed in the empirical section. One contribution of this study is to assemble a dataset that combines industry, trade and lobbying data for the Indian manufacturing sector. I use industry data from *All India Survey of Industries* (ASI). The Indian Industrial Classification is the National Industrial Classification (NIC) developed following the ISIC Revision 3 of classifying data according to the kind of economic activity. The industry sample consists of 98 sectors ($i$) at the 4-digit of manufacturing industries. The firm-level characteristics are from the WBES in 2005 for 2,286 firms ($j$), but these are categorized into 22 sectors ($k$). The distribution of firms across the WBES sectors is attached in Table A.18 of Appendix A.4.1. However, there is no standard identifier for firms in the WBES to match to sector identifiers of NIC. To overcome this, the 22 sectors in the WBES are manually matched to the 98 sectors in the ASI by careful examination of product descriptions attached in Table A.1.2 of Appendix A.1.1.

Using the firm-level data from WBES, measures are constructed across the 22 sectors and then matched with the 98 NIC sectors using product descriptions[12]. To the best of my knowledge, this is the first study that attempts to measure the effects of lobbying using the WBES data[13] combined with trade and industry data for India. Following a probit estimation for firm membership using the WBES data in the following sections, the predictions will collapsed at the level of 22 sectors to construct measures of lobbying reflecting variation within each sector.

### 5.4.1 Lobbying Effectiveness $\gamma_i^a$

The first proxy measure for lobbying effectiveness is $\gamma_i^a$ measured as the proportion of firms that are members of associations in each sector. This is a potential measure to account for heterogeneity in lobbying effectiveness across various sectors. It is constructed using information identified from the WBES, the following question is asked for each firm:

[12] The selection of sectors in the WBES represented the largest manufacturing sectors in India in terms of employment and output shares. The count distribution of firms is presented as a reliable estimate for the proportion of firms by sectors for the scope of the conducted interviews. Note that some sectors are populated by fewer firms. However, constructing average measure of lobbying effectiveness should not be affected by this as I attempt to construct the measures using proportion of firms and average time spent by firms in a particular sector. This gives an idea of within sector lobbying dynamics based on the sample of WBES.

[13] Details on WBES are included in Chapter 3.

*"Is your firm a member of a producer or trade association?"*

A positive answer is coded as 1, while the value of 0 was assigned to a negative answer that gives a binary variable termed as *Membership* at the firm-level. Using this identification, I get the number of firms that are members of associations in every sector across the 22 sectors of the WBES. I construct a measure based on the proportion of firms that are members in each sector. The 22 sectors are mapped to the corresponding 98 4-digit sectors of NIC using the concordance developed above. Each 4-digit sector is then allocated the measure of the corresponding sector of the WBES. Therefore, the measures $\gamma_i^a$ are constructed as the proportion of firms that are members of associations across the 4-digit sectors, shown in Table 5.1 at the end of this section.

Approximately 77 per cent of the firms in the WBES sample (2,286 firms) said they were members of an association. The sectors of *Textiles* and *Electrical Appliances* are found to have the highest percentage of firms as members of associations. It is important to note that in this Chapter, I consider the first measure of effectiveness in terms of collective lobbying where firms seek membership to associations for lobbying the government.This definition of lobbying effectiveness identifies sectors in terms of differences in their capability to lobby as an organized group.

### 5.4.2 Predicted Lobbying Effectiveness $\widehat{\gamma}_i^b$

The second measure for lobbying effectiveness is denoted by $\widehat{\gamma}_i^b$ that consists of the predicted probability values (of the likelihood of firm membership to lobby effectively for trade policy) from a probit regression for the binary measure of *Membership* defined above. It is explained by the following firm-level and the sector-level determinants discussed in the literature above.

*Firm Size* is measured as the log of average number of workers for each firm from the WBES survey. The information is identified using the following question on the number of permanent workers: *"Average number of workers during fiscal year 2002. Permanent workers are defined as all paid workers that are employed for a term of one or more years and/or have a guaranteed renewal of their employment contract."*

A dummy for foreign ownership *Foreign Ownership* is constructed across firms using percentage foreign ownership calculated across sectors using the following question: *"What percentage of your firm is private foreign ownership?"*

*Competitors* is the number of competitors faced by a firm from the WBES using the question: *"Thinking of your firm's major product line in the domestic market, how many competitors do you face?"*

Finally, the sector level determinants that enter the probit estimation include geographic concentration *Geog. Concentration* from Lall et al. (2003) that provide estimates on concentration across the states of India in a given sector. Output concentration is denoted as *Output Concentration* measured as the share of output produced by the four largest firms in a given sector i using data from the ASI and mapped to the 22 sectors of the WBES.

### 5.4.3 Additional Political Factors $E_i$

Next, I define a potential measure of additional political economy factors for Indian trade policy. While $\gamma_i$ reflects the collective lobbying effectiveness of sectors, there can be firm-specific individual lobbying that may be a substitute for collective lobbying. If additional political factors can be understood as the firm-specific strength of a sector, the measure for such factors can be seen as the opportunity for firms to interact with the government directly. I argue that such interactions do not occur by means of cooperative lobbying that is undertaken via the association and are firm-specific. I measure this using information from the WBES on the following question:

*"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.?"*

This is taken as the mean for each sector across the 22 sectors of the WBES to construct the proxy measure for additional political economy factors $E_i$ that may impact trade protection. Taking the average value per sector allows to interpret the additional factors as an average measure of time spent by the firms in each sector. The measures for the WBES

sectors are mapped to the 4-digit sectors where similar to the method to construct $\gamma_i^a$, each 4-digit sector is allocated the measure of the corresponding sector of WBES. This measure can be seen as the opportunity to interact with the government directly, shown in Table 5.1.

Table 5.1: Lobbying Effectiveness and Additional Political Factors

| **S. No.** | **Industry** | **Firms** | $\gamma_i^a$ | $E_i$ |
|---|---|---|---|---|
| 1 | Textiles | 222 | 1.000 | 0.159 |
| 2 | Electrical Appliances inc. white goods | 155 | 0.944 | 0.129 |
| 3 | Paper & paper products | 24 | 0.903 | 0.329 |
| 4 | Rubber & rubber products | 38 | 0.891 | 0.320 |
| 5 | Electronics inc. Cons. Durables | 100 | 0.867 | 0.178 |
| 6 | Food Processing | 155 | 0.855 | 0.178 |
| 7 | Leather & leather products | 74 | 0.842 | 0.270 |
| 8 | Other chemicals | 112 | 0.840 | 0.192 |
| 9 | Machine tools, Mach. & parts | 195 | 0.833 | 0.146 |
| 10 | Drugs & Pharma | 165 | 0.821 | 0.149 |
| 11 | Mineral processing | 32 | 0.817 | 0.128 |
| 12 | Mining | 3 | 0.816 | 0.145 |
| 13 | Marine food processing | 14 | 0.792 | 0.180 |
| 14 | Structural metals and metal products | 303 | 0.786 | 0.087 |
| 15 | Agro processing | 26 | 0.766 | 0.130 |
| 16 | Garments | 275 | 0.745 | 0.361 |
| 17 | Paints and varnishes | 20 | 0.680 | 0.203 |
| 18 | Plastics & plastics products | 122 | 0.667 | 0.175 |
| 19 | Auto Components | 218 | 0.614 | 0.143 |
| 20 | Wood and furniture | 16 | 0.466 | 0.733 |
| 21 | Sugar | 4 | 0.462 | 0.147 |
| 22 | Cosmetics and toiletries | 13 | 0.188 | 0.157 |
| | Total | 2,286 | | |
| | Pearson Correlation | | | -0.213 |

Note: Table shows the sectors and corresponding measures of Lobbying Effectiveness $\gamma_i^a$ and the measure for Additional Political Factors $E_i$, the average time firms in a sector spend on direct interactions with the government.

$E_i$ is an average measure of how much time firms in a sector spend on direct interactions with the government. The sector of *Garments* and *Wood and Furniture* seem to be spending the most time on average in such interactions. By way of construction of this empirical measure, I believe these are substitutes to the previous lobbying effectiveness measures which are in the nature of lobbying by means of membership to associations.The additional factor is firm-specific such that it represents individual lobbying by firms in a given sector. The correlation between the two measures appear in Table 5.1 which shows evidence of these being substitutes. However, a natural question here is that if such individual lobbying could complement association lobbying. I argue that the nature of this relationship would be determined by the specific policy instrument and will be examined at the firm-level in Chapter 6.

Figure 5.1 outlines the correlation between the lobbying effectiveness measure $\gamma_i^a$ and the additional political factors $E_i$. *Textiles* is the sector that is most effective in terms of $\gamma_i^a$, while the use of additional factors is quite low for that suggests this sector is very effective in lobbying by means of membership to associations and does not resort very much to additional political factors for influence on trade protection. Therefore, these seem to be substitutes. On the other hand, I draw attention to the sector *Wood* for which I find the highest use of additional political factors and correspondingly low lobbying effectiveness in terms of $\gamma_i^a$. At the same time, I also find sectors such as *Paper* and *Leather* that are not only very effective in lobbying but also using substantial additional factors. This suggests a weak negative correlation such that this choice needs careful examination at the firm-level both in terms of specific policy instruments and its determinants [14].

[14]The evidence in this paper can therefore be read as motivation for Chapter 6 where I collect primary information on these choices.

Figure 5.1: Lobbying Effectiveness and Additional Political Factors

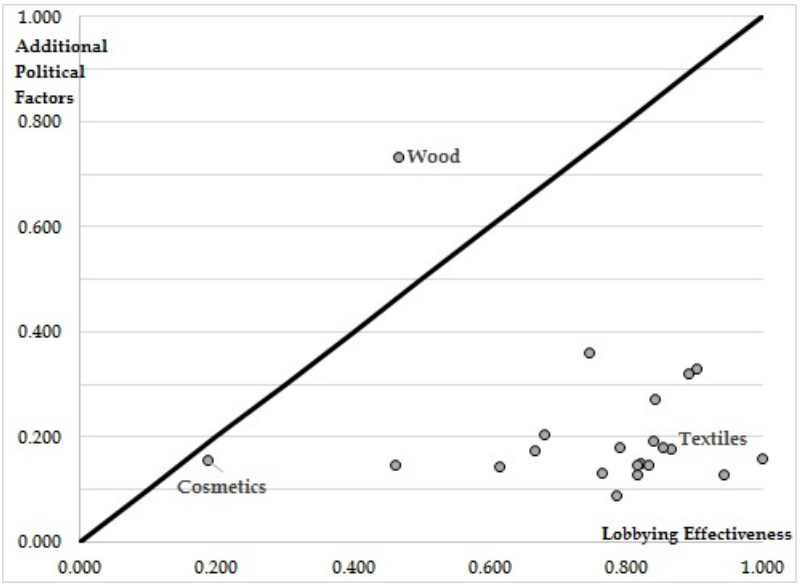


Figure 5.1 shows lobbying effectiveness and additional political factors across the WBES sectors.

## 5.5 Methodology

I discuss the methodology and corresponding empirical results in this section. A specific focus is to examine the findings of the modified PFS in terms of interpretation and the IV strategy that builds on the approach from Chapter 3 of the thesis. I estimate the model derived from the PFS framework in Chapter 4 termed as Model 1 using the measure $\gamma_i^a$ which outlines the baseline result. Additionally, Model 2 tests the robustness of the baseline by using predicted values of lobbying effectiveness. The results from estimating both Models 1 and 2 are outlined in Table 5.4 to enable comparison across the estimates.

### 5.5.1 PFS with Lobbying Effectiveness

In Chapter 3, I used the data from the WBES to identify a binary measure of political organization to estimate the traditional PFS model. Now, I use the same data to construct a proxy for the measure of lobbying effectiveness motivated in the PFS framework outlined in Chapter 4.

Model 1 includes $\gamma_i^a$ the lobbying effectiveness measure defined as the proportion of firms that are members of associations for each 4-digit level of the NIC[15]. Lobbying ef-

[15]Note that the WBES data is on the number of firms that are members of associations in each of the 22 sectors. This was mapped to the 98 sectors at the 4-digit of NIC.

fectiveness is interacted with import penetration where the parameter $\beta$ will test if the relationship between inverse import penetration and trade protection is homogeneous or depends on the lobbying effectiveness of the sector below. Re-writing equation 5.2 above, I get the following estimable equation[16]:

$$\frac{t_{it}}{1+t_{it}} e_i = \rho z_{it} + \beta(\gamma_i^a . z_{it}) + u_{it} \tag{5.18}$$

Here $\rho$ and $\beta$ are comparable to Chapter 3 and defined in terms of the underlying parameters $a$ and $A$:

$$\rho = \frac{-A}{a+A}$$

$$\beta = \frac{1}{a+A}$$

The partial derivative of trade protection with respect to inverse import penetration is the sum $\rho + \beta\gamma_i^a$. Therefore, the interpretation of the coefficient $\rho$ is the partial derivative of trade protection with respect to inverse import penetration if $\gamma_i^a = 0$. The coefficients $\rho$ and $\beta$ can be estimated using the variation in $z_{it}$ and its interaction with $\gamma_i^a$.
Empirical estimation of equation 5.18 yields the coefficients $\rho$ and $\beta$. The structural parameters $a$ and $A$ can then be derived as point estimates using the non-linear combinations of the parameter estimates. Calculation of point estimates for (possibly) non-linear combinations of parameter estimates after any Stata estimation command are based on the delta method that is an approximation. However, with the modified model the interpretation of the structural findings cannot be compared with the traditional PFS and is not the primary purpose in this chapter. I discuss these briefly in section 5.7.

As outlined in the earlier chapters, the tariff levels have an effect on import penetration ratios that must be treated as endogenous. I adopt a similar IV strategy to Chapter 3. The instruments used for import penetration include the lagged values of inventories for each sector (as a measure for physical capital) and the square of the number of production workers for every sector (as a measure of the labour intensity across sectors). I use a similar strategy to enable comparison with previous results. As observed in Chapter 3, following Gawande and Li (2009), the *Limited Information Maximum Likelihood* (LIML) estimator

[16] Note that I do not include lobbying effectiveness as an additional explanatory variable in this specification as it derives from the structural model. To check the robustness of the results, I will examine the findings if lobbying effectiveness enters as an exogenous variable in addition to its interaction term.

is used to enable inference with weak instruments owing to better small sample properties than *Two Stage Least Squares* (2SLS).

In Model 1, there are two endogenous variables, the inverse import penetration ratio and its interaction term. First, the inverse of the import penetration ($X/M$) is endogenous with respect to tariff protection that can in turn affect penetration. Second, the interaction of the inverse import penetration with the proportion of members of trade associations ($X/M * \gamma_i^a$) is potentially endogenous as it is an interaction of the endogenous variable with the proxy measure $\gamma_i^a$ that is assumed exogenous. To instrument for an endogenous variable and its interaction with another exogenous variable, a standard approach suggested is to include the interaction of the instrumental variable with the exogenous variable as another instrument[17].

I instrument for the two endogenous variables using a set of instrumental variables $F_i$[18] that includes *Lag Inventories* and *Workers Squared* and another instrumental variable *Lag Workers*$*\gamma_i^a$[19]. Therefore, I adopt an approach where the interaction of $\gamma_i^a$ with the lagged measure of *Workers* is used as an IV. Lobbying effectiveness in terms of the proportion of firms that are members of associations in every sector is assumed exogenous to trade protection where effectiveness depends on the underlying costs and benefits to seek membership for lobbying. Membership to associations enters the structural framework only in its interaction with the endogenous variable.

Therefore, the final set of empirical equations for Model 1 are as shown below:

$$\frac{t_{it}}{1+t_{it}} e_i = \rho z_{it} + \beta(\gamma_i^a z_{it}) + u_{it} \tag{5.19}$$

$$z_{it} = \zeta_1' F_i + e_{1it} \tag{5.20}$$

[17] To deal with this endogeneity issue, 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.

[18] I use lag values of the instruments to further alleviate endogeneity concerns.

[19] When estimating the empirical model, the complete set of three instruments have to be specified for both the endogenous variables such that the set of instruments are identical for both endogenous variables.

$$\gamma_i^a z_{it} = \zeta_2' F_i + e_{2it} \tag{5.21}$$

In the earlier specification, I assumed lobbying effectiveness in the PFS model is given exogenously. This was constructed using intra-sector variation of firms. A further step is to account for the issue that membership to associations may not imply actual lobbying that can bias the impact of effectiveness in the resulting model. The results will be compared with the baseline Model 1. I estimate Model 2, where I use a binary equation to estimate the likelihood of firm lobbying via its membership of associations. This is undertaken using the set of firm and industry characteristics (discussed above) to construct a proxy measure for lobbying effectiveness $\widehat{\gamma}_i^b$.

The firm decision to lobby as a member of an association is directly linked to producer returns and the costs of lobby membership. The dependent variable $Membership_{ji}$ is binary that indicates whether or not a firm $j$ in a given sector $i$ is a member of a lobby association. An appropriate econometric methodology to study the likelihood of lobbying via this membership is the probit estimation. The unit of observation here is the firm $j$ from the WBES (distributed across the 22 sectors of the WBES matched to the 4-digit sector $i$. $Membership_{ji}$ is explained by both firm-level and industry characteristics based on the underlying assumption of homogeneity across firms. This can be specified as shown below.

$$P(Membership_{ji}) = \phi(\theta D_{ji} + \pi C_{ji}) \tag{5.22}$$

Here, $D_{ji}$ represents the main variables of interest that includes $FirmSize$ of each firm $j$, the measure for geographic concentration *Geographic* for firms in every sector $i$, and foreign ownership is *Foreign* for every firm $j$. $C_{ji}$ is the vector of controls on competition that includes the *Concentration* in a given sector $i$ and *Competition* which is the number of competitors faced by each firm $j$. $\phi$ is the cumulative standard normal distribution function. The predicted values based on the marginal effects is used to construct the lobby effectiveness measure aggregated by each sector $i$ from the following equation:

$$\gamma_{ji}^b = \phi(\theta D_{ji}' + \pi C_{ji}') \tag{5.23}$$

The predicted values are then used to proxy for lobbying effectiveness as $\hat{\gamma_i^b}$, that enters the structural framework of PFS as an interaction with the endogenous variable $X/M$. The IV strategy is similar to Model 1, such that I instrument for the two endogenous variables using the set of instrumental variables $F_i$ that includes *Lag Inventories* and *Workers Squared* and the interaction variable *Lag Workers*$*\widehat{\gamma_i}^b$ as another IV.

The final set of equations for Model 2 include the following:

$$\frac{t_{it}}{1+t_{it}} e_i = \rho z_{it} + \beta(\widehat{\gamma}_i^b z_{it}) + u_{it} \tag{5.24}$$

$$z_{it} = \zeta_1' F_i + e_{1it} \tag{5.25}$$

$$\widehat{\gamma}_i^b z_{it} = \zeta_2' F_i + e_{2it} \tag{5.26}$$

Predicted probabilities from equation 5.23 are used in the specifications 5.24-5.26.

Table 5.4 presents the results from estimating Model 1 and Model 2. It is important to note that introducing the heterogeneous measures of lobbying effectiveness changes the interpretation of the coefficients of the traditional PFS model while the overall predictions are preserved[20]. The first stage statistics are attached in Table A.19 of Appendix A.4.2 where the F-statistics are heteroskedasticity-robust. The Weak Identification Test examines the null hypothesis that the equation is weakly identified where the Kleibergen-Paap rk Wald F statistic is more than 10 in both Models for each endogenous variable. The Anderson-Rubin Statistics tests the joint significance of endogenous regressors in the main equation such that over-identifying restrictions are valid and in both Models.

In the original model, the partial derivative of trade protection with respect to inverse import penetration would be $\rho$ for sectors that were politically unorganized (binary measure of political organization being 0) and $\rho+\beta$ for sectors that were fully organized (binary measure being 1). Thereby, if $\rho+\beta$ is positive and significant for $\gamma_i = 1$, the estimates seem to be in line with the findings of the PFS model. Further, in my model the partial derivative of trade protection with respect to the inverse import penetration is the sum $\rho + \beta\gamma_i$, that means this relationship is no longer homogeneous and differs by the value of lobbying effectiveness. This relationship is depicted in Figure 5.2 for different sectors. It shows an

[20]The modified PFS framework is a simple alteration of traditional PFS to incorporate differences in lobbying.

upward sloping relationship for the most effective sector of *Textiles* (Effectiveness=1) that can be said to correspond to full organization as defined in traditional PFS. For the least effective sector of *Cosmetics*, the downward sloping relationship is comparable to being unorganized in traditional PFS.

Figure 5.2: Traditional PFS versus PFS with $\gamma_i^a$

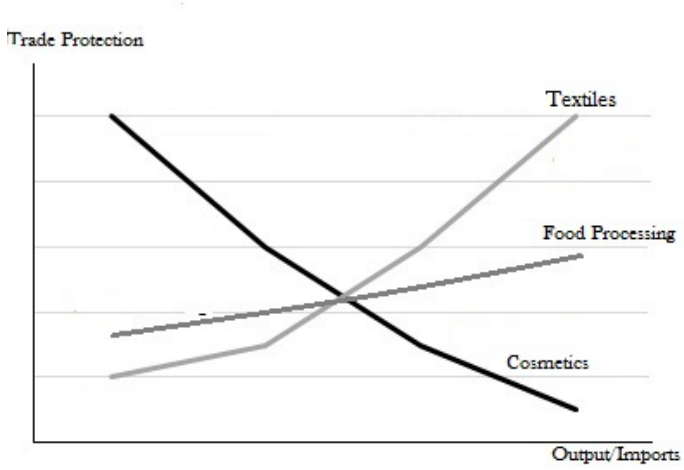


Figure 5.2 shows the sum $\rho+\beta\gamma_i$, the relationship between trade protection and inverse import penetration is no longer homogeneous and differs by the value of lobbying effectiveness for different sectors. It shows an upward sloping relationship for the most effective sector of *Textiles* (Effectiveness=1) that can be said to correspond to full organization as defined in traditional PFS. For the least effective sector of *Cosmetics*, the downward sloping relationship is comparable to being unorganized in traditional PFS.

Model 1 presents the results of the baseline for PFS with lobbying effectiveness measures $\gamma_i^a$. The coefficient for lobbying effectiveness $\gamma_i^a$ interacted with import penetration shows a positive relationship between tariff protection and inverse import penetration that is found increasing in lobbying effectiveness $\gamma_i^a$. To check the robustness of the baseline, I estimate Model 2. To examine the likelihood of *Membership*, I rely on findings of previous studies discussed above to inform the specification outlining the main variables of interest. Table 5.2 presents the results for the probit estimation on the determinants of membership to associations. Columns (1) to (4) include controls on competition and output concentration and standard errors are robust and clustered by 22 sectors of WBES. I find evidence that supports the fact that lobbying via association membership is increasing with firm size and foreign ownership, while firms in more concentrated sectors are less likely to seek membership to lobby via associations. These results are not surprising in terms of firm size and are in line with the existing literature. Lobbying by foreign owned firms seem

in confirmation with Olarreaga et al. (1999) for Mexico. Further, this lends support to the hypothesis that if firms are geographically concentrated, the costs of organizing by themselves is lower and they are less likely to join an association for lobbying. The finding implies that in these sectors, firms may be lobbying using other channels. I attempt to incorporate these as additional political factors that can be used to lobby the government in the following section. The predicted probabilities are used to construct $\widehat{\gamma}_i^b$.

Table 5.2: Determinants of Effectiveness in Lobbying using Membership

| Variables | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Firm Size | 0.253*** | | | 0.237*** |
| | (0.070) | | | (0.065) |
| Foreign Ownership | | 1.164*** | | 0.787** |
| | | (0.376) | | (0.382) |
| Geog. Concentration | | | -0.269*** | -0.224*** |
| | | | (0.079) | (0.077) |
| **Controls** | | | | |
| Output Concentration | -0.207 | -0.013 | -0.046 | -0.247 |
| | (0.14198) | (0.057) | (0.062) | (0.160) |
| Competitors | -0.0001 | -0.000 | -0.000 | -0.000 |
| | (0.00010) | (0.000) | (0.000) | (0.000) |
| Constant | 0.107 | 0.788*** | 1.350*** | 0.583** |
| | (0.262) | (0.096) | (0.174) | (0.262) |
| N | 892 | 1,052 | 1,052 | 892 |
| Psuedo R-Square | 0.039 | 0.017 | 0.021 | 0.057 |
| Log Likelihood | -432.450 | -534.582 | -528.998 | -424.256 |

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

Note: Table 5.2 examines the determinants of membership to associations for manufacturing firms in India using data from the WBES for 2005. Columns (1)-(4) include control variables on Competition and Output Concentration. Probit coefficients are reported and the marginal effects are used to construct lobby effectiveness. This is undertaken with the underlying intuition that lobbying by means of associations is potentially more effective than any other means in India. Individual correlations are observed in column (1) to (3). Robust standard errors clustered by 22 sectors of WBES in parentheses.

Figure 5.3 outlines the correlation between lobbying effectiveness measure $\gamma_i^a$ and the

predicted measures $\widehat{\gamma}_i^b$ that exhibits the differences in membership and actual lobbying across sectors. The lobbying effectiveness measures $\gamma_i^a$ and the predicted estimates $\widehat{\gamma}_i^b$ are compared in Table 5.3 below. I find only weak correlation between these measures. This aligns with the first qualification made in the introduction regarding membership not being the same as lobbying by means of this membership. Therefore, I check the baseline model to check for robustness to these differences. The predicted measures suggests that the coefficients for the effect on trade protection in the modified PFS framework are expected to change. However, it is important to examine if this changes the overall findings of the model.

Figure 5.3: Lobbying Effectiveness and Predicted Effectiveness

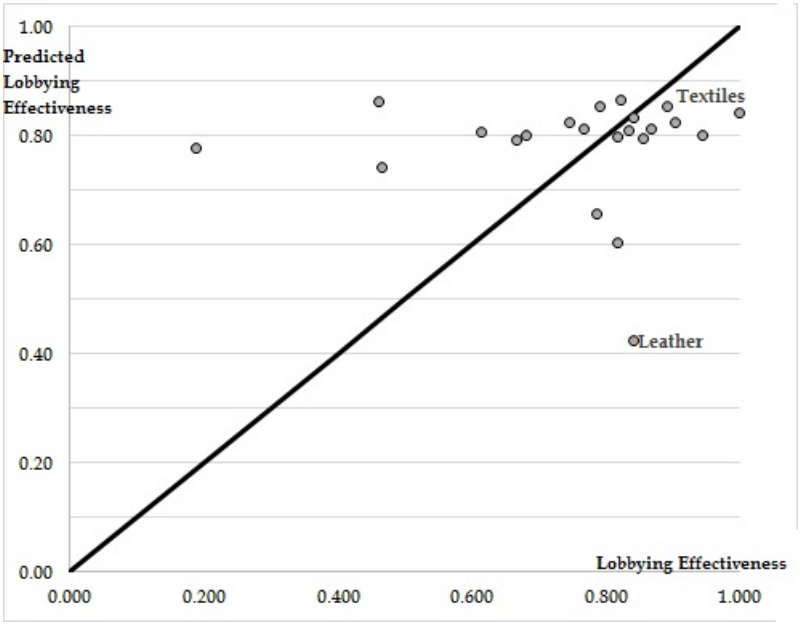


Figure 5.3 shows lobbying effectiveness and predicted effectiveness across the WBES sectors.

Table 5.3: Lobbying Effectiveness and Predicted Effectiveness

| **S. No.** | **Industry** | **Firms** | $\gamma_i^a$ | $\widehat{\gamma}_i^b$ | $\gamma_i^*$ |
|---|---|---|---|---|---|
| 10 | Textiles | 222 | 1.000 | 0.843 | 0.891 |
| 13 | Electrical Appliances inc. white goods | 155 | 0.944 | 0.799 | 0.584 |
| 20 | Paper & paper products | 24 | 0.903 | 0.823 | 0.792 |
| 2 | Rubber & rubber products | 38 | 0.891 | 0.852 | 0.840 |
| 12 | Electronics inc. Consumer Durables | 100 | 0.867 | 0.813 | 0.781 |
| 18 | Food Processing | 155 | 0.855 | 0.793 | 0.897 |
| 16 | Leather & leather products | 74 | 0.842 | 0.423 | 0.858 |
| 3 | Other chemicals | 112 | 0.840 | 0.832 | 0.727 |
| 14 | Machine tools inc. Machinery & parts | 195 | 0.833 | 0.810 | 0.730 |
| 11 | Drugs & Pharma | 165 | 0.821 | 0.865 | 0.839 |
| 5 | Mineral processing | 32 | 0.817 | 0.797 | 0.890 |
| 4 | Mining | 3 | 0.816 | 0.603 | 0.831 |
| 6 | Marine food processing | 14 | 0.792 | 0.853 | 0.891 |
| 22 | Structural metals and metal products | 303 | 0.786 | 0.656 | 0.835 |
| 7 | Agro processing | 26 | 0.766 | 0.811 | 0.899 |
| 1 | Garments | 275 | 0.745 | 0.825 | 0.871 |
| 23 | Paints and varnishes | 20 | 0.680 | 0.799 | 0.869 |
| 19 | Plastics & plastics products | 122 | 0.667 | 0.793 | 0.808 |
| 15 | Auto Components | 218 | 0.614 | 0.806 | 0.850 |
| 9 | Wood and furniture | 16 | 0.466 | 0.743 | 0.902 |
| 17 | Sugar | 4 | 0.462 | 0.863 | 0.888 |
| 24 | Cosmetics and toiletries | 13 | 0.188 | 0.776 | 0.867 |
| | | Total | 2,286 | | |
| | Pearson Correlation | | | -0.017 | -0.356 |

Note: Table shows the sectors with corresponding measure of lobbying effectiveness and predicted lobbying effectiveness measures, and compares them with lobbying effectiveness estimates from Chapter 4.

In Table 5.4, I observe a negative and significant coefficient of $-0.103$ for $\rho$ in column (1), that suggests the corresponding inverse relationship for inverse import penetration and tariff protection when the measure of lobbying effectiveness is zero. This relationship turns positive at the value of lobbying effectiveness of 0.745 for the sector *Garments*. For the most effective sector ($\gamma_i = 1$), the sum of the coefficients $\rho$ and $\beta$ is positive and significant at 0.04 that suggests an overall positive relationship with the inverse of import penetration. The higher the ratio of output to imports, higher is the lobbying effectiveness for positive influence on tariff protection. In Model 1, *Textiles* which is the most effective sector in terms of $\gamma_i^a$ exhibits a positive relationship with the ratio of output to imports. This is similar to the observed finding for fully organized sectors in traditional PFS. If I pick another sector of *Food Processing* which is effective but has a lower effectiveness than Textiles with $\gamma_i^a = 0.85$, I observe a positive relationship but with a lower marginal effect of 0.02 than the most effective sector as also highlighted in Figure 5.2 above. Therefore, for the very effective industries, a higher output to import ratio maps to higher trade protection. The relationship between import penetration and trade protection is thereby not homogeneous and depends on the lobbying effectiveness of the sector.

Table 5.4: Protection for Sale with Lobbying Effectiveness

| | | **Model 1** | **Model 2** |
|---|---|---|---|
| | | **Baseline** | **Robustness** |
| Variables | | (I) | (II) |
| X/M | | -0.103** | -0.840* |
| | | (0.037) | (0.347) |
| X/M*$\gamma_i^a$ | | 0.143** | |
| | | (0.047) | |
| X/M*$\widehat{\gamma}_i^b$ | | | 1.051* |
| | | | (0.432) |
| *Instrumental Variables* | | Lag Inventories, Workers Squared, $\gamma_i^a$.Lag Workers | Lag Inventories, Workers Squared, $\widehat{\gamma}_i^b$.Lag Workers |
| **Weak identification test** | | | |
| *Kleibergen-Paap rk* | X/M | 10.80 | 11.86 |
| *Wald F statistic* | X/M*$\gamma_i$ | 10.20 | 11.77 |
| **Overidentification** | | | |
| *Anderson Rubin Statistics* | | 0.243 | 0.774 |
| *Chi-square P-values* | | 0.62 | 0.37 |
| N | | 876 | 876 |

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

Note: Table 5.4 shows the results from the estimation of the PFS using LIML as it gives better inference with potentially weak instruments. Robust standard errors in parentheses. First-stage F-statistics are heteroskedasticity-robust. The Weak Identification Test has Ho: equation is weakly identified, gives the Kleibergen-Paap rk Wald F statistic as more than 10 in both Models for each endogenous variable. The Anderson-Rubin Statistics tests the joint significance of endogenous regressors in main equation such that over-identifying restrictions are valid. In both Models, the null cannot be rejected.

Model 2 presents the results for robustness of PFS using the predicted lobbying effectiveness measure $\widehat{\gamma_i^b}$. The signs of the coefficients $\rho$ and $\beta$ are robust such that I observe that the relationship between trade protection and inverse import penetration is increasing in the predicted probability of lobbying by means of being a member of an association. This reaffirms the finding that the higher the import penetration, the more intense is the association lobbying for positive influence on tariff protection. The marginal effect for $X/M$ (when $\gamma_i^b = 0$) is however lower at $-0.084$ compared to Model 1, while the overall relationship is more positive (for $\gamma_i^a = 1$). This suggests that even if the qualitative findings of the model are robust, the donward bias in the interaction term is reduced by the predicted measure of effectiveness. Examining the first stage estimates in Table A.19 of Appendix A.4.2, I find that the partial R-square is slightly higher for the interaction term.

However, in terms of the traditional PFS, the findings are preserved in both Models 1 and 2. This suggests that the overall results of the baseline model holds even when I use alternate measures of effectiveness. The overall picture provides evidence that introducing heterogeneity in the PFS model in terms of differences in lobbying effectiveness helps understand the non-homogeneity in the nature of relationship between import penetration and trade protection. In our modification of the PFS model, this relationship is found to depend on the lobbying effectiveness of the sector. Introducing different measures of effectiveness further re-iterates this evidence. The findings also confirm to the overall positive correlations observed between protection and import penetration in Trefler (1993) and Baldwin (1989) across industries. Finally, using the estimated coefficients $\rho$ and $\beta$ from Model 1, I examine the resulting relationship between trade protection and lobbying effectiveness in terms of the sum of coefficients $\rho + \beta\gamma_i^a$ across various values of lobbying effectiveness in Figure 5.4.

This leads to the next question of how the lobbying effectiveness measures in Chapter 4 compare to the lobbying effectiveness measures in this Chapter. Table A.4.4 in Appendix A.4.4 compares the estimated effectiveness measures from Chapter 4 with lobbying effectiveness $\gamma_i^a$. While, lobbying effectiveness in Chapter 4 reflects an overall measure of effectiveness derived from actual protection and inverse import penetration across sectors, this Chapter attempts to construct direct measures of effectiveness based on information on lobbying via membership associations. A noteworthy observation includes the finding that the most effective sectors in terms of lobbying by means of associations membership

Figure 5.4: Sum of Coefficients versus Lobbying Effectiveness

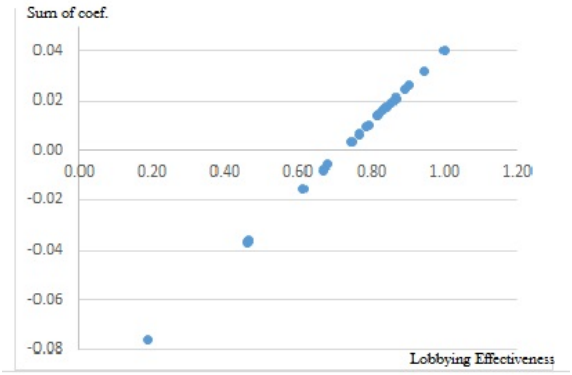


Figure 5.4 shows the resulting relationship between trade protection and lobbying effectiveness in terms of the sum of coefficients $\rho + \beta\gamma_i^a$ across various values of lobbying effectiveness.

(under *Textiles*) are different from the ones that are the most effective in terms of overall effectiveness in Chapter 4 (such as *Distilling of spirits* and *Manufacture of Motor Vehicles*). This further re-instates additional political economy factors for the modified PFS framework in the next section[21]

### 5.5.2 PFS with Lobbying Effectiveness & Additional Political Factors

Now for equation 5.15, I adopt the earlier assumption of $\sum_{j=1}^{n} \alpha_j \gamma_j$ equals the constant $A$ from *Chapter* 4. Taking elasticities to the left and separating the three terms gives the following equation:

$$\frac{t_i}{1+t_i} e_i = (\frac{1}{a+A})\gamma_i z_i - (\frac{A}{a+A}) z_i + \frac{b(l_i/X_i)}{a+A} z_i \tag{5.27}$$

Assume that the additional political factor is the opportunity to interact with the government in the structural model given by $E_i = l_i/X_i$ that varies across sectors. $E_i$ can be interpreted as an additional political economy factor of importance to the trade policy process in India. This enters as an interaction with the inverse import penetration in the final specification that follows from the model. I test the hypothesis that industries with

[21] I also observe that the least effective sector in terms of overall effectiveness is still quite effective in terms of association membership. This is explained by my first qualification to the effectiveness measure that they reflect firm membership and may not necessarily imply actual lobbying. I checked for robustness to this issue that changed the size of the coefficients but the qualitative findings are preserved.

higher import penetration achieving higher protection can be further explained by additional political economy factors that vary by the sector. Re-specifying the equation and introducing time variation, I get the following stochastic version of the estimable equation:

$$\frac{t_{it}}{1+t_{it}}e_i = \rho z_{it} + \beta(\gamma_i z_{it}) + \delta(E_i z_{it}) + u_{it} \tag{5.28}$$

$\rho$, $\beta$ and $\gamma$ are defined in terms of the underlying terms $a$, $A$ and $b$:

$$\rho = \frac{-A}{a+A}$$

$$\beta = \frac{1}{a+A}$$

$$\delta = \frac{b}{a+A}$$

The partial derivative of trade protection with respect to inverse import penetration is now the sum $\rho+\beta\gamma_i^a+\delta E_i$. I have three coefficients $\rho$, $\beta$ and $\delta$ that are estimated off the variation in $z_{it}$ and its interaction with $\gamma_i$ and $E_i$ respectively. Note, $\delta$ is estimated using the interaction of $E_i$ with $z_{it}$. Empirical estimation of equation 5.28 yields the coefficients $\rho$, $\beta$ and $\delta$. The structural parameters $a$, $A$ and $b$ can then be derived as point estimates using the non-linear combinations of the parameter estimates. However, as mentioned above these structural parameters cannot be compared to those from the traditional PFS. I present these later as a means of possible understanding of relative weights in the government objective.

Now, I have three endogenous variables, the inverse import penetration and two interaction terms for import penetration. Again $X/M$ is endogenous with respect to tariff protection and the interaction terms $X/M*\gamma_i^a$ and $X/M*E_i$ are also endogenous as they are interactions of the endogenous variables with proxy measures $\gamma_i^a$ and $E_i$ that are exogenous by assumption. The instrumental variables include the measure *Lag Inventories*, *Workers Squared* and additionally the interactions $\gamma_i^a$ * *Lag Workers* and $E_i$* *Lag Inventories* as two IVs. The opportunity for direct interactions with the government enters the structural set-up of PFS only in its interaction with the endogenous variable.

Therefore, the final set of equations for Model 3 include the following:

$$\frac{t_{it}}{1+t_{it}}e_i = \rho z_{it} + \beta(\gamma_i^a z_{it}) + \delta(E_i z_{it}) + u_{it} \tag{5.29}$$

$$z_{it} = \zeta_1' F_i + e_{1it} \tag{5.30}$$

$$\gamma_i^a z_{it} = \zeta_2' F_i + e_{2it} \tag{5.31}$$

$$E_i z_{it} = \zeta_3' F_i + e_{3it} \tag{5.32}$$

The results are outlined in Table 5.5 when $E_i$ is interacted with import penetration. The relationship of trade protection is now defined in terms of the inverse import penetration and two interaction terms. This relationship between tariff protection and the ratio of output to imports now depends on lobbying effectiveness and additional political factors. The first stage results attached in Table A.20 in Appendix A.4.2 show the F-statistics that are lower than the baseline model.

The overall positive relationship between tariff protection and inverse import penetration still holds when there are no additional factors such that $E_i = 0$. However, this relationship is reversed when the additional political economy factors are high. This suggests that lobbying effectiveness in terms of association membership and the opportunity for direct interactions with the government may in fact be substitutes as lobbying strategies.

Table 5.5: PFS with Additional Political Factors

| | | **Model 3** |
|---|---|---|
| | | *Lobbying Effectiveness* |
| Variables | | (I) |
| X/M | | -0.074** |
| | | (0.037) |
| X/M*$\gamma_i^a$ | | 0.142*** |
| | | (0.044) |
| X/M*$E_i$ | | -0.132* |
| | | (0.077) |
| *Instrumental Variables* | | Lag Inventories, Workers Squared, $\gamma_i^a$.Lag Workers $E_i$.Lag Inventories |
| **Weak identification test** | | |
| *Kleibergen-Paap rk* | X/M | 8.87 |
| *Wald F statistic* | X/M*$\gamma_i$ | 8.52 |
| | X/M*$E_i$ | 7.67 |
| **Overidentification** | | |
| *Anderson Rubin Statistics* | | 0.001 |
| *Chi-square P-values* | | 0.978 |
| N | | 876 |

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

Note: Table 5.5 shows the results from the estimation of the *Protection for Sale* (PFS) using *Limited Information Maximum Likelihood* (LIML) as it gives better inference with potentially weak instruments. Model 3 uses the additional political economy factors in every sector to proxy for lobbying effectiveness in the modified PFS model. The specification derives from the structural model of PFS. Robust standard errors in parentheses. First-stage F-statistics are heteroskedasticity-robust. The Weak Identification Test has Ho: equation is weakly identified, gives the Kleibergen-Paap rk Wald F statistic as more than 10 for each endogenous variable. The Anderson-Rubin Statistics tests the joint significance of endogenous regressors in main equation such that over-identifying restrictions are valid. The null cannot be rejected.

## 5.6 Overall Findings

Table 5.6 summarizes the marginal effects for the baseline Model 1 and in addition Model 3 from the empirical analysis above. This is interesting as a means of comparison of different kinds of lobbying. Given the estimated overall positive relationship between trade protection and inverse import penetration, the evidence suggests that higher lobbying effectiveness is associated with higher trade protection. However, in Model 1 this depends on lobbying effectiveness while in Model 3 in addition to effectiveness, it depends on other political factors. So, is *"Protection still for Sale with Lobbying Effectiveness?"*. In light of the findings above, I conclude that protection is still for sale with Lobbying Effectiveness, but the traditional findings of the GH model will differ by the values of the heterogeneous measure of effectiveness.

I find that the traditional PFS hypothesis in terms of the sum of the coefficients $\rho + \beta$ for Model 1 and $\rho + \beta + \delta$ for Model 3 is positive for higher values of lobbying effectiveness and in addition the political factor respectively. These estimates seem to confirm to the traditional findings of the PFS model. However, it is interesting to note that for lower values of effectiveness and higher measures of additional political economy factors, the sum of coefficients is no longer positive. For lower values of these heterogeneous measures, the relationship between trade protection and inverse import penetration is found reversed.

Therefore, for the PFS model with lobbying effectiveness, protection is for sale but only for those sectors that are very effective in lobbying the government. In terms of the empirical measure, this implies that the sectors with a greater number of firms that lobby by means of their membership to associations are very effective in lobbying and are successful in achieving positive trade protection. Controlling for additional political economy factors in this model, further re-instates this finding but factors in a substitute in terms of lobbying strategy. This observation leads to the objective of examining different lobbying strategies in the next Chapter.

Table 5.6: Overall Findings

| | **Model 1** | | **Model 3** | |
|---|---|---|---|---|
| Industry | $\gamma_i^a$ | $\rho + \beta\gamma_i^a$ | $E_i$ | $\rho + \beta\gamma_i^a + \delta E_i$ |
| agro processing | 0.766 | 0.006546 | 0.130 | 0.017609 |
| auto components | 0.614 | -0.01522 | 0.143 | -0.00565 |
| cosmetics and toiletries | 0.188 | -0.07619 | 0.157 | -0.06807 |
| drugs & pharm | 0.821 | 0.01443 | 0.149 | 0.022947 |
| electrical appliances inc. white goods | 0.944 | 0.032056 | 0.129 | 0.043125 |
| electronics inc. consumer durables | 0.867 | 0.020933 | 0.178 | 0.025546 |
| food processing | 0.855 | 0.0192 | 0.178 | 0.023789 |
| garments | 0.745 | 0.0036 | 0.361 | -0.01578 |
| leather & leather products | 0.842 | 0.017421 | 0.270 | 0.009939 |
| machine tools inc. machinery & parts | 0.833 | 0.016167 | 0.146 | 0.02506 |
| marine food processing | 0.792 | 0.010208 | 0.180 | 0.014609 |
| mineral processing | 0.817 | 0.01383 | 0.128 | 0.025057 |
| mining | 0.816 | 0.013735 | 0.145 | 0.022773 |
| other chemicals | 0.840 | 0.01719 | 0.192 | 0.019966 |
| paints and varnishes | 0.680 | -0.00576 | 0.203 | -0.00424 |
| paper & paper products | 0.903 | 0.026161 | 0.329 | 0.010881 |
| plastics & plastic products | 0.667 | -0.00767 | 0.175 | -0.00245 |
| rubber & rubber products | 0.891 | 0.0244 | 0.320 | 0.010269 |
| structural metals and metal products | 0.786 | 0.009357 | 0.087 | 0.026131 |
| sugar | 0.462 | -0.037 | 0.147 | -0.0279 |
| textiles | 1.000 | 0.04 | 0.159 | 0.047051 |
| wood and furniture | 0.466 | -0.0364 | 0.733 | -0.10466 |

Note: Table compares the coefficients across the models.

I have stated above that the structural parameters in my specifications do not have any direct meaning as in the theoretical framework of traditional PFS. However, I attempt to interpret these in the context of the proxy measures of lobby effectiveness in the baseline Model 1 and additional political economy factors for Indian trade policy in Model 3. The non-linear transformations of the estimated parameter vector from the fitted models can be calculated to obtain the structural parameters $a$, $A$ and $b$ as shown in Table 5.7 with their standard errors. The weight on welfare is found lower at 0.862 and 0.867 in Models 1 and 3 as compared to Chapter 3.

Table 5.7: Structural Estimates from the PFS models

| Structural Estimates | (I) Model 1 | (II) Model 3 |
|---|---|---|
| Weight on Welfare ($a$) | 0.862*** | 0.867*** |
| | (0.040) | (0.040) |
| $A$ | 0.716*** | 0.522*** |
| | (0.130) | (0.130) |
| Additional Political Factor ($b$) | | 0.560 |
| | | (0.478) |

Note: Table 5.7 presents the structural estimates from the PFS estimations for Models 1 and 3. In each case the interpretation of the structural estimate is different and derived from the underlying set-up. In Model 1, the empirical estimation yields the coefficients $\rho$ and $\beta$ defined in terms of the underlying parameters $a$ and $A$: $\rho = \frac{-A}{a+A}$ and a$= \frac{1}{a+A}$. The structural parameters $a$ and $A$ can then be derived as point estimates using the non-linear combinations of the parameter estimates. Calculation of point estimates for (possibly) non-linear combinations of parameter estimates after any Stata estimation command are based on the delta method that is an approximation. In each case, the estimated coefficients are used to calculate the parameters such that $A = -\frac{\rho}{\beta}$ and $a = \frac{1+\rho}{1+\rho+\beta}$. Similarly, $\rho$, $\beta$ and $\gamma$ are defined in terms of the underlying terms $a$, $A$ and $b$: $\rho = \frac{-A}{a+A}$, $\beta = \frac{1}{a+A}$, and $\delta = \frac{b}{a+A}$. Now, the parameters are calculated such that $A = -\frac{\rho}{\beta}$, $b = \frac{\rho}{\delta}$ and $a = \frac{1+\rho}{1+\rho+\beta+\delta}$.

In each model, the interpretation of the structural estimate is different and derived

from the underlying set-up. The interpretation of the government weight on welfare is relative to the weight on contribution in Model 1 and relative to contributions and additional political economy in Model 3. In both models, $a$ is significant and approximately close to 1 that suggests the government weight on welfare is comparable to that for political contributions. The aggregate lobbying effectiveness times the specific factor owner share of the population is approximately 0.762 when I estimate Model 1. Using the predicted probabilities in Model 3, the measure of $A$ is found quite low at 0.522. The role of $A$ is less clear and needs further examination.

## 5.7 Conclusion

This chapter provides evidence on political economy of protection in India. Lobbying effectiveness is proxied using measures on membership to associations that seem the more effective mechanism to lobby the government in India. Additional political factors may enter the government objective in explaining trade protection in India. The findings of the model confirm to traditional findings of PFS but differ in terms of interpretation on lines of heterogeneity in lobbying effectiveness.

# Chapter 6

# Join Hands or Walk Alone? Evidence on Lobbying for Trade Policy in India

## 6.1 Introduction

The choice of lobbying strategy includes collective lobbying (*Join Hands*) by a group of firms or individual lobbying (*Walk Alone*) by a single firm[1]. The existing literature on lobbying has identified the two strategies as a means of influence for the policy choice of the government[2]. However, the analytical evidence on this specific choice is only limited, with one useful framework outlined in Bombardini and Trebbi (2012) (BT henceforth) that provides evidence for the United States, while there are limitations in examining such specific questions on lobbying for developing countries mainly due to the lack of data. The main objective of this chapter is to provide primary evidence on the choice of lobbying strategy for India.

While public discussion on lobbying for trade policy in India seems widespread[3], academic research has been limited owing to little or no data. The model of *Protection for Sale*(PFS) by Grossman and Helpman (1994) estimated by Bown and Tovar (2011) and Cadot et al. (2014) provides some political economy evidence for India[4], but it remains an open question as to what extent the existing studies reflect actual lobbying in India.

[1] Lobbying is defined in terms of attempts to communicate information to political actors following de Figueiredo and Richter (2014)

[2] Examples include the work of Stigler (1971) and Olson (1994)

[3] Saha (2013) draws attention to lobbying in India.

[4] As observed in previous chapters of my thesis, no actual lobbying data is available for India. Bown and Tovar (2011) used data on organizations from World Guide to trade associations in 1995 and identify an industry in India is organized if it lists at least five organizations, while Cadot et al. (2014) and Cadot et al. (2007) identify politically organized industries using trade and production data in a multi-stage iterative procedure.

The objective of this paper is to address the obvious gap in the context of lobbying in developing countries by investigating the choice of lobbying strategy for trade policy in India. The paper seeks to answer the following questions:

- What lobbying strategies do firms use for trade policy influence?
- How do lobbying strategies link to specific trade policy outcomes?

An understanding of the factors that affect the choice of lobbying strategy for trade policy has important implications for democratic policy-making by offering evidence to recognize the types of lobbying strategies and their influence across different instruments of trade policy. Further, the link between lobbying strategies and trade policy outcomes is important to assess the resources used and potential benefits for each strategy[5]. Collective lobbying can provide the advantage of lower costs to each firm[6] and greater legitimacy especially in developing countries as also observed for India by Narlikar (2006). An individual lobbying strategy on the other hand is expected to be more viable when fixed costs are low and the output includes product-specific policy across firms. Following the line of argument on collective lobbying above, government support for collective lobbying would be more forthcoming, while firm-specific outcomes maybe supported only in particular circumstances.

My analysis proceeds in two steps. I begin by outlining the details of a primary survey that was undertaken specifically for this study. There are two prior surveys that attempt to capture general industrial lobbying in India. First, Yadav (2008) provides a useful examination of the various stages of the lobbying process. However, a limitation to her study is that she interviews only members of business associations. Second, the *World Bank Enterprise Survey* (WBES) in 2005 asked one question on membership to industry associations which does not however directly imply actual lobbying. In the absence of data on lobbying specifically for trade policy in India, I designed and implemented a primary survey to collect original information across 146 manufacturing firms interviewed from the period of July 2013 to November 2014. Following the outline of the survey, I use the primary data to examine the choice of lobbying strategy for manufacturing firms.

[5] Olson (1994) provides a discussion on the use of political strategies by firms and expected outcomes.

[6] The fixed cost of collective lobbying is the membership fees of an association. Once the fixed cost is paid, there is a variable cost shared by the members that cooperate to lobby as a group.

The survey identified that Indian manufacturing firms prefer the use of a *dual strategy i.e.* a combination of collective and individual lobbying. In light of this stylized finding, I set up a broad framework to motivate the empirical evidence. The main objective was to explore the possibility of adopting a dual strategy to lobby for trade policy. BT provide empirical evidence for the United States using individual lobbying expenditures, output concentration and product substitutability, where an increase in concentration has two effects, the *Competition Effect* that would imply that for sectors with higher concentration firms lobby more individually (sectors with a lower output concentration, firms choose to lobby together), and the *Free-Riding Effect* such that a higher concentration creates higher incentive to lobby via associations when the larger firm can internalize a higher fraction of the total return from an increase in the sector-wide outcome. Their estimates show that lower concentration in the product market can deliver more cooperation in lobbying for protection[7] that is the competition effect. I confirm findings for the competition effect also for India such that the competition effects are clearly dominating any free-riding effects for Indian manufacturing firms.

Second, I examine an underlying assumption (also made in BT) that firms are more likely to adopt a collective lobbying strategy for sector-wide trade policy in the nature of public goods while they are likely to lobby individually for product-specific outcomes for India. Examining lobbying strategies with regard to specific trade policy derives from the argument that each policy outcome requires a group to convey to policy-makers different types of information[8]. This suggests there are differences between the use of each lobbying strategy. I argue that certain firms with higher stakes in the specific policy are likely to adopt a dual strategy and lobby individually in addition to collective lobbying[9]. The premise of such differences between the use of each single strategy and a dual strategy lends itself to examine the use of lobbying strategies across trade policy choices. Finally, the unique finding is the overall preference of the dual strategy over each exclusive single strategy by Indian firms.

The remainder of this paper is organized as follows. Section 2 outlines the motivation

[7]However, the empirical literature on lobbying has shown ambiguity in results that connect firm concentration to political influence.

[8]Hojnacki and Kimball (1998) argue that while collective lobbying helps communicate preferences of a group (in my case the industry), direct interactions on the other hand allow interest groups to provide specialized and discrete information to policy-makers.

[9]Hojnacki and Kimball (1998) also provide empirical evidence to show that when lobbying for change in a policy, groups are likely to lobby using both kinds of lobbying, while a single strategy is sufficient to defend an existing policy.

and specific details on the survey. Section 3 outlines stylized facts on the choice of manufacturing firms to lobby the government for trade policy. In Section 4, I motivate the hypothesis for analysing the survey data. This is followed by Section 5 that presents the empirical analysis. Finally, Section 6 concludes the paper by providing a discussion on policy implications and further research.

## 6.2 Survey

This section summarizes the multi-stage stratified random sampling that I implemented to collect the data. The *Confederation of Indian Industries* (CII) was the starting point for my survey. A list of target firms was provided from the member directories of the CII. A questionnaire was designed carefully incorporating views from preliminary interviews with industry associations and a pilot survey. I initiated the survey with a pilot for 20 firms[10]. Preliminary findings were recorded and changes made to the sample questionnaire incorporating certain additional elements. Sensitive questions can discourage respondents from answering openly such that any questions on informal payments were also dropped. Finally, the survey asked the firms their responses on lobbying in a typical year across 2010-2014 in particular, and how lobbying evolved for them since liberalisation in 1991. A copy of this questionnaire is attached in Figure A.1 in Appendix A.5.1, outlining the list of questions and corresponding choices for the firms.

The survey scheme comprised five stages in total. Table 6.1 presents a summary of each stage along with the criteria followed. It begins with a sampling reference and then undertakes stratified sampling. The attempt was to make the sample representative to include both association members and non-members. The sampling procedure is randomized and the final target sample consists of 250 firms that eventually gave 146 eligible responses[11].

[10] No specific criteria was used for the pilot and these interviews were not included in the final interviews. The 20 firms were taken from the lists provided by CII.

[11] This is arguably a reasonable representation of the population of firms I am studying, the sample being roughly ten per cent of the population.

Table 6.1: Survey Summary

| **Detail/Stage** | **Numbers** | **Sources/Task** | **Criteria** | **Target Precision (Reduce Possible Bias)** |
|---|---|---|---|---|
| Sampling Reference | 508+913 =1421 | Lists from Associations & Phone Directories | Sectoral weights from World Bank Enterprise Survey | By Economic Sectors |
| Stratification | 1032 | Comparison of Lists | Drop overlapping firms (389) | By Association Members & Non-Members |
| Randomization | 508+524 =1032 | Lists Re-arranged in descending order | Distribution of firms by size. | By Firm Size (Number of Workers) |
| | 350 | Random Selection | Draw one firm at fixed intervals of size + Budget (Optimum Allocation) | By Strata |
| E-Mails | 320 | Potential Respondents | Sectoral weights from World Bank Enterprise Survey (30 Firms dropped) | By Economic Sectors |
| Final Appointments | 250 | Target Coverage | Follow-ups + Contribution to economic activity + Budget | By Economic Sectors |
| Actual Interviews | 146 | Actual Coverage | Complete and eligible responses | By Economic Sectors |

Note: Table shows the summary of sampling scheme for the survey.

### 6.2.1 Survey Design and Sampling Reference

Lists from associations have been traditionally used for lobbying surveys as in Yadav (2008). However, there is a potential drawback in interviewing only association members. I aimed to target a more representative sample of firms that would include both members and non-members of trade associations. This is important as the objective of my study was to examine different strategies of lobbying, these being collective and individual lobbying. While, association members can lobby individually in addition to their collective membership, it is important to include non-members who might decide to lobby the government only individually. In this light, while the members directories of CII is a good starting point, I aimed to capture other firm lobbying behaviour usually left out in existing studies. Following this, a systematic sampling procedure was chosen with two strata, the list from CII and list of non-members from phone directories in major cities in India.

With the assistance of carefully monitored and trained local survey teams based in New Delhi, details regarding the survey were sent out via personalised emails to potential respondents. The target respondents were trade specialist officers at the firms such that they were fully aware of lobbying strategies of their organization. Not all firms in my sample had specialist officers dealing with trade activities. In those cases, the high-level managers were targeted. Appointments were then sought for face-to-face interviews. Interviews in Delhi and NCR were conducted in person, for the remaining geographical locations, we used telephone conversations and voice over internet protocol (IP) to avoid transportation costs.

The first contact emails were sent in late May 2014 followed by telephone conversations to brief the respondents about the nature of the survey. Reminders were sent two weeks later for those who had not yet responded to the requests. There were follow-ups when appointments were made and interviews carried out. Guarantees of anonymity were provided to the firms and thorough advance information supplied in all cases.

### 6.2.2 Stratified Sampling

The first step was to create a reliable reference for the sampling. The closest and most relevant reference in my case was the WBES conducted in India in 2005. The distribution of firms across the 20 sub-sectors was taken as the reference for the sampling. The selection of these sectors in the WBES is claimed as representative of the largest manu-

facturing sectors in India in terms of employment and output shares by 2005. The aim was to sample the same proportions such that the count distribution of firms in each sector was taken as the reference estimate for the proportion of firms to be drawn across the sectors. This count distribution is attached in the Figure A.2 in Appendix A.1 for reference.

Following this reference, I constructed a base list of firms distributed across the 20 manufacturing sub-sectors of the WBES classification. For this I used stratified sampling using two strata, first the list from CII and second the list based on various phone directories. I began with a list of 508 firms that was provided by CII, compiled as a random sample based on the WBES count distribution of firms in each sector. I believe this sample is a reasonable representation of the population of firms who are members of associations, the sample drawn being roughly ten per cent of the population of firms. Second, the phone directories in the major cities of India were used to build another list. The second list was constructed by an initial draw of a list of firms from the phone directories, of which 913 were kept based on the criteria of working contact details[12]. This was followed by dropping any overlapping firms as there was the possibility that the ones from the phone directories could be members of associations. Overlapping firms were dropped from the second list (389 firms were dropped) that finally consisted of 524 member fims that were not on the CII lists. Therefore, each stratum was made mutually exclusive. The purpose of using these two lists was to attempt to draw a representative sample of firms such that the broad target population comprised both the association members and non-members. Using this stratified sampling frame as the base, the next objective was to enable random selection of a sample of firms to be included in the survey.

The two lists together consisted a total of $1,032$ firms. Note two important points about the final list of firms. First, the manufacturing sector is complicated by firms that are active in more than one sector for more than one product. For this analysis, all the designated sectors of activity and products were used when compiling the final list of firms. Therefore, multi-sector firms can appear more than once in a few cases[13]. Second, I adopted a disproportionate random sampling technique as there was no *a priori*[14] for the distribution of firms across the two strata in my survey. This means that the sampling

[12]This included a working phone number. In several cases, where the phone number was not working, an internet search for an e-mail address and/or a website was done.

[13]Roughly 10 per cent of the firms appear more than once.

[14]To the best of my knowledge there is no existing survey that interviews members and non-members of associations on lobbying in India.

fraction for each stratum will be different such that the criteria are discussed in the next section.

### 6.2.3 Randomization

Following this broad sampling procedure, in the third stage the complete list of firms were arranged in descending order of firm size expressed in terms of number of workers. The sampling was then randomized such that firms were selected at random from the re-arranged lists. One firm was drawn at fixed intervals (ranking size) from the entire distribution to create a target list for the survey interviews. This enabled random selection and covered the entire range of firms in terms of size (in my list) than mostly from any one end of the distribution. This was done to deal with the potential problem of large firms being over-represented in the sample.

I use a disproportionate sampling procedure outlined in Table A.23 in Appendix A.1. This consists of using a different sampling fraction to each stratum.Following this approach, I set the final sample size (distributed across the two different strata) taking into account two important aspects of costs and precision. The precision is targeted at the level of economic sub-sectors and contribution to economic activity. Using optimum allocation, the number of elements selected from each stratum were made directly related to the standard deviation of the firm size in the stratum. The greater the variability in the stratum, higher sample size of the stratum should be. Moreover, taking into account data collection costs, the higher the data collection costs of a stratum, the lower the targeted sample size. Note that data collection costs were lower for firms in member directories than in the phone directories[15]. Costs (c) for the two lists were 20 USD and 5 USD per firm respectively. The distribution of the sample sizes for the two strata takes into account these varying data collection costs. Standard deviations of size (s) were 6.4 and 5.2 for member directories and phone directories each. The resulting list consisted of 350 firms drawn randomly from the distribution of firms.

[15]Interviews with member directories were facilitated by CII and did not incur a very high cost.

### 6.2.4 Potential and Target Respondents

Of the randomly selected firms, local survey teams were instructed to target a total of 320 potential respondents. 30 firms were dropped based on the WBES count of firms across all the sectors discussed above. This enabled coherence with the reference for the sampling frame in stage one of the sample selection procedure. Following this, the local survey teams sent out personalized e-mails with the survey details to the potential respondents. Appointments were sought and follow-ups were done with all potential respondents. Finally, of the 320 potential respondents, 250 were finalised for the interviews. This target was based on the following criteria, first being the responses from the follow-ups and second based on contribution to economic activity from All India Survey of Industries for 2010[16].

The process so far was therefore based on the following set of criteria. First, being the budget and response to the e-mails and follow-ups. Not all firms responded to the e-mails and telephone calls. Reasons being unavailability of the high-level officers for interview. The response rate remained fairly even across all the follow-ups such that for every five firms that responded there was on average one non-responsive firm[17]. Second, the distribution of the initial 350 firms between the two stratum were based on optimum allocation for disproportionate sampling discussed above. Third, the distribution of the final 320 potential respondents is based on the WBES count across sectors. Finally, the target sample size was set at 250 firms across the manufacturing sectors based on the contribution to economic activity and response to follow-ups.

### 6.2.5 Final Sample and Limitations

At this stage, there were incomplete and no responses to questions in a few cases such that some interviews did not give usable information. In total, the survey rendered 146 useful responses, representing a final response rate of 58 per cent (146/250)[18]. I find some firms were unwilling to divulge part or full information on lobbying strategies and refused

[16]The data on contribution to economic activity across the ASI sectors is attached in Table A.24 in Appendix A.1 that were adjusted for the scope of the sectors in the survey (this was done using correspondence between the 20 sectors in the World Bank with the National Industrial Classification sectors for India). The primary reason for this is that the sampling reference is based on the WBES that was conducted in 2005 while my interviews were done in 2013-2014. Therefore, in an attempt to update the distribution in light of changes across the years I use this criterion.

[17]I find no significant differences between responsive and non-responsive firms by firm size and economic sector

[18]Table A.25 of Appendix A.1 contains a comparison of the target and actual coverage to examine the response rates across the sectors.

to participate in the survey. The reasons given for this were lack of willingness to reveal information to a foreign university student, refusal to comment on few questions and lack of knowledge. I believe these reasons were unrelated with the lobbying behaviour of the firms and thus should not bias the results[19]. The sectors recording lowest responses were Electrical Appliances, Auto Components and Sugar. Owing to these reasons, some responses were not obtained and others were incomplete and could not be used. While, 23 responses were not obtained, 81 were dropped.

Figure 6.1: Geographical Distribution of Sample

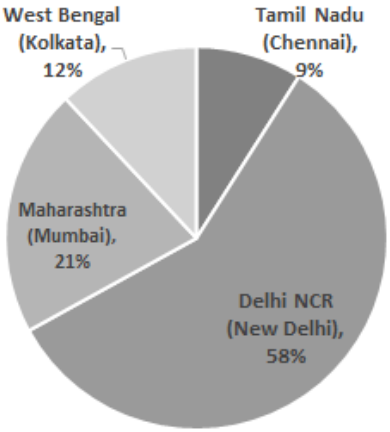


Figure 6.1 shows the distribution of the sample across the cities of India.

Geographical distribution of the final sample was in four main cities of India and its periphery, Delhi and National Capital Region (NCR), Mumbai (Maharashtra), Kolkata (West Bengal) and Chennai (Tamil Nadu). The surveyed firms were broadly located in the large cities and the periphery of small towns across the states. 58 per cent of the interviewed firms had a presence in New Delhi. It is likely that firms have corporate offices in the capital city of Delhi owing to commercial significance of location[20]. The distribution of the sample across the cities is shown in Figure 6.1.

Every possible attempt was made to ensure that the sample of firms surveyed were representative of the population of firms under study, although I recognize it is not possible to do so fully and there may be potential issues with the final sample that could bias the

[19] Based on the response rates, I test the null hypothesis that there is no statistically significant difference in the response rates across economic sectors (responses and economic sectors are independent). Using the Pearson chi-square test, I find a p-value of 0.880 for the range of expected and actual response rates that suggests that the non-response rates are independent of the sector identity.

[20] This is also the case in the WBES and in Yadav (2008).

results. The attempt was to deal with the potential bias at each stage as explained below. First, the sample could be biased in terms of economic sector or size due to non-response. The distribution of responses deviates from the initial sample design due to low response rates in some sectors. In terms of the economic sector, I do not find any significant difference in non-response such that non-response rates are independent of the sector identity. Also, the list of respondents and non-respondents were compared by the number of workers such that the non-response rates were independent of firm size with no statistically significant differences between respondents and non-respondents. I find respondents had an average of 74 number of workers compared to 82 for non-respondents. Second, concern regarding the reliability of information revealed by the firms. In terms of industry and government interaction, I find evidence of high lobbying intensity (discussed in the next section) such that the sample of firms engage regularly in the policy-making process. This is important to assess if firms responses are based on actual lobbying interactions. Since, I find high evidence of lobbying, I can assert that the lobbying data could be based on actual experience of the firms.

Finally, I consider any possible bias in terms of the distribution of the realized sample across the two initial strata. This is important as one aim of the study was to obtain a representative sample and interview both members and non-members of associations which is a potential contribution to the lobbying literature. I have used a disproportionate stratified sampling method as outlined earlier. It provides the advantage to study the responses of both sub-groups of members and phone directories accounting for the fact that firms drawn from phone directories were harder to reach for appointments. A proportionate sample in this case would give a smaller sample than the 250 firms on the whole. Also, it is important to re-iterate that members of associations can also lobby individually, I refer to phone directories to include representation for firms that lobby only individually without membership to an association. In this case, the views of the total firms interviewed will be representative of the lobbying strategies and a disproportionate sampling will provide more accurate responses. I believe this sample is a reasonable representation of the population of firms I am studying, the sample size being roughly ten per cent of the population of firms. On the whole, in spite of the potential limitations of the data, information from the survey helps reveal important lobbying phenomena for trade policy across Indian manufacturing firms that has been non-existent so far.

## 6.3 Stylized Findings on Lobbying for Trade Policy in India

At present, there exists an effective but quite informal mechanism on government-industry consultations for trade policy-making in India. I find that the sample of firms surveyed stressed the rise in their lobbying efforts from the 1990s as the government became more responsive to industry. Also, I find while MFN tariffs, import licenses and Non-tariff measures were primary issues of approaching the government in late 90s, instruments such as special consignments at the border[21] and preferential tariffs became quite important by the end of 2000s.

Before exploring the mechanism of this interaction, I attempt to assess how often firms interact with the government for lobbying for trade policy in India. In my survey, firms were asked a general question about their overall decision to lobby the government. **Lobbying Decision** was measured as: *Does your firm undertake activities for lobbying the government for trade policy?* Responses are binary coded as *0 = no* and *1 = yes* based on firm lobbying in a typical year during the period 2010-2014. 137 of the 146 firms in my sample reported to be lobbying, such that I find 94 per cent of the manufacturing firms in my sample decided to actively lobby the government in a typical year in that period. This means that most Indian firms interact with the government on trade issues.

However, it seems that the exact form of government consultations with industry for the trade policy-making process is not defined. There exist industry associations that often facilitate these interactions. At the same time, Indian firms can choose to approach the government by themselves. The argument that associations are allowed to operate officially and openly as legal entities but lack a confirmed status to be heard is found in Sen (2004). Further, Saha (2013) has also repeated that while there are no regulations governing lobbying in India, it is not deemed an illegal activity either. Also, there seems to be an absence of a set criteria or standards for access or acceptance of industry suggestion in these consultations as in most developing countries. There are no formal laws like in the United States and Europe where it is mandatory to disclose the amounts invested in lobbying and neither is there a disclosure body that allows sharing of such information.

[21] A question on special consignments was added to the survey following the pilot interviews that revealed consignments at the border being an important lobbying objective for the firms. In this case, I found that firms might face specific issues related to incoming imports at the border which relate to custom delays and procedures.

In this light, an understanding of lobbying decisions on various choices followed by Indian firms can motivate a clear mechanism for both associations and firms to interact with the government. Overall decision on lobbying differs from pursuing different choices to lobby, such that I also ask questions to measure the firm decision on the different choices again based on a typical year during the period 2010-2014. Being a member of an association does not necessarily mean actual lobbying (as argued in Chapter 5) and it arguably covers only the fixed membership cost of lobbying. Therefore, I will also examine what can potentially account for the marginal cost component such that I ask firms about their actual lobbying activities using their decision to lobby via the membership. Following a question on general lobbying decision, primarily two kinds of choices were quoted by the sample of 146 firms: Collective lobbying via trade associations and individual lobbying using direct contact with officials.

Lobbying Decision was therefore examined as a binary variable for each kind of lobbying: Collective lobbying is denoted as **Collective** when the firm is coded as 1 if it lobbies collectively and 0 otherwise, individual Lobbying is **Individual** that assigns the firm a value of 1 if it engages in individual lobbying and 0 otherwise. For dual lobbying I define **Dual** where the firm is coded as 1 if it undertakes lobbying using both collective and individual lobbying, and 0 otherwise. Finally, I identify the firms that are not lobbying as *No Lobbying*. The number of firms that adopt each choice are outlined in Figure 6.2 below.

Figure 6.2: Lobbying Decisions

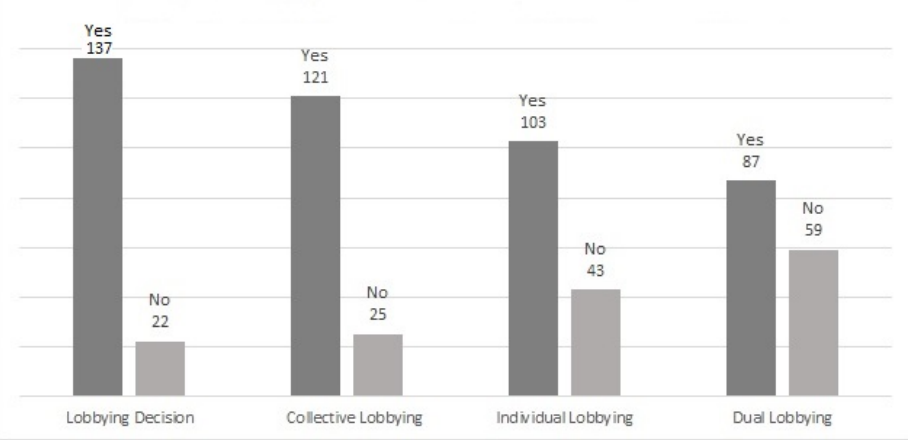


Figure 6.2 shows the number of firms by the Lobbying Decision choices.

Next, using the binary measures above, I defined **Lobbying Strategy** (L) such that I identified firms that adopt the exclusive use of each lobbying choice and the dual use of

both to include: No Lobbying (=1), Lobbying only collectively (=2), Lobbying only individually (=3) and Lobbying both collectively and individually (=4) as outlined in Figure 6.3 below as exclusive choices.

Figure 6.3: Lobbying Strategy

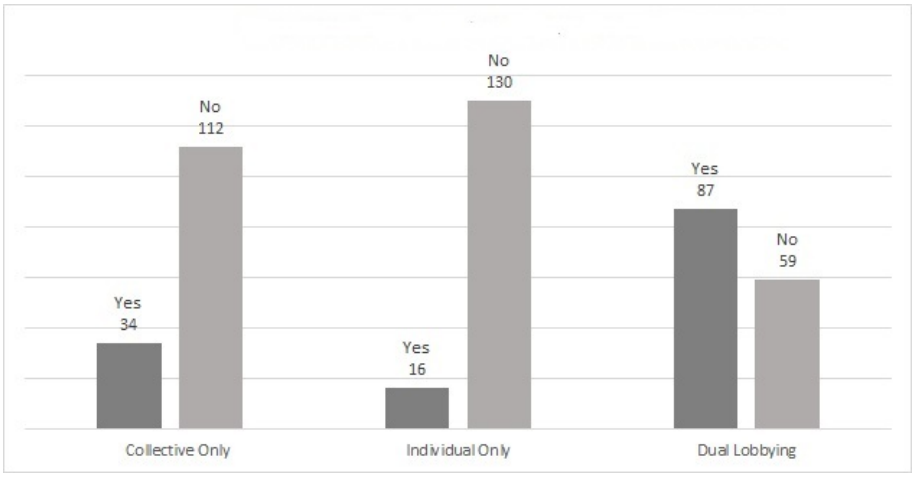


Figure 6.3 shows the number of firms by Lobbying Strategy, the categories are mutually exclusive.

The firms in my sample were asked specific questions on lobbying. I find on average 83 per cent of Indian manufacturing firms lobby using membership to associations as a possible strategy to lobby the government particularly for trade policy. In terms of individual Lobbying, an average of approximately 71 per cent firms lobby individually. Based on this information, I identified the number of firms undertaking each strategy exclusively. I construct a measure **Lobbying Strategy** (L) such that I identify firms that choose the exclusive use of each strategy and a combination of the two single strategies which is termed as a dual strategy. Using this method, Figure 6.3 shows that only 34 firms use the single strategy of lobbying only collectively (L=2), while only 16 firms use the other single strategy being lobbying only individually (L=3). 87 firms use a dual strategy that is a combination of lobbying both collectively and individually (L=4). This suggests the preferred choice of Indian firms is therefore a dual strategy to lobby for trade policy.

Further, examining the lobbying strategy across the 20 sectors of WBES, the number of firms opting for the lobbying strategies is shown by average firm size in Table 6.2 below. On the whole, there is evidence that sectors with larger average firm size seem to opt for dual lobbying using both collective and individual lobbying.

Table 6.2: Lobbying by Average Firm Size

| Industry | Firms | Avg. Firm Size | No Lobbying | Collective Lobby Only | Individual Lobby Only | Dual Lobbying |
|---|---|---|---|---|---|---|
| Str. Metals, Prod. | 16 | 6.551 | 1 | 1 | 1 | 13 |
| Paper, Prod. | 6 | 6.53 | 1 | 0 | 0 | 5 |
| Auto Compo. | 6 | 6.421 | 0 | 2 | 2 | 2 |
| Rubber, Prod. | 5 | 6.373 | 1 | 1 | 0 | 3 |
| Other Chem | 6 | 6.362 | 1 | 1 | 0 | 4 |
| Wood, Furniture | 5 | 6.261 | 1 | 0 | 1 | 3 |
| Electr. Appl. | 3 | 6.24 | 0 | 0 | 0 | 3 |
| Garments | 8 | 6.224 | 0 | 2 | 0 | 6 |
| Sugar | 4 | 6.103 | 0 | 0 | 0 | 4 |
| Plastics, Prod. | 5 | 6.095 | 0 | 1 | 0 | 4 |
| Mach. Tools, Parts | 7 | 5.958 | 0 | 2 | 0 | 5 |
| Mineral Pro. | 5 | 5.897 | 0 | 0 | 3 | 2 |
| Food Pro. | 8 | 5.892 | 3 | 0 | 2 | 3 |
| Textiles | 29 | 5.759 | 1 | 13 | 1 | 14 |
| Electr., durables | 4 | 5.728 | 0 | 1 | 0 | 3 |
| Agro Pro. | 5 | 5.684 | 0 | 0 | 1 | 4 |
| Paints, Varnish | 6 | 5.68 | 0 | 2 | 2 | 2 |
| Drugs, Pharma. | 6 | 5.63 | 0 | 3 | 2 | 1 |
| Cosmetics | 5 | 5.491 | 0 | 2 | 1 | 2 |
| Leather, prod. | 7 | 5.06 | 0 | 3 | 0 | 4 |
| Total | 146 | 5.991 | 9 | 34 | 16 | 87 |

Note: Table 6.2 shows the sectors in decreasing order of firm size (average of log firm size) and reports the number of firms by sector opting for various lobbying strategies.

To examine the differences in lobbying strategy by outcomes, I ask the firm questions on their intensity of lobbying for specific trade policy outcomes. Termed as **Lobbying Activity**, firms were asked about various trade policy outcomes[22], but in the thesis I will compare the case of MFN and Special Consignments (SC).

[22]This includes preferential tariffs, import licenses and non-tariff barriers

The intensity of lobbying in the survey is captured as a self-assessed measure of lobbying activity for each outcome of MFN and Special Consignments (SC, henceforth): *"On a scale of* $1-4$*, where 1 shows not active and 4 shows very active, how active would you say your firm was in lobbying with regard to the following: MFN Tariff Protection, Special Consignments?" (1 = Not active, 2 = Moderately active, 3 = Fairly Active, 4 = Very Active).* **MFN** is defined as the average of lobbying activity for MFN using both collective and individual lobbying. **SC** takes the average of lobbying activity for using both collective and individual lobbying for Special Consignment lobbying.

This question asked separately for collective and individual lobbying reveal firm preferences such that I find 58 (39.7%) firms use a dual strategy when lobbying for the public good MFN while 47 (32.2%) firms use the single strategy of individual lobbying when targeting special consignments shown below. These numbers for the choice of each strategy (by outcome) motivates an empirical analysis of lobbying strategies by different trade policy outcomes.

Table 6.3: MFN by Lobbying Strategy

| **Collective** | **Individual** | | | | **Total** |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | |
| **1** | 0.014 | 0.007 | 0.027 | 0.055 | **0.103** |
| **2** | 0.000 | 0.068 | 0.096 | 0.000 | **0.164** |
| **3** | 0.000 | 0.089 | 0.397 | 0.000 | **0.486** |
| **4** | 0.007 | 0.000 | 0.164 | 0.075 | **0.247** |
| **Total** | **0.021** | **0.164** | **0.685** | **0.130** | **1.000** |

Note: Table 6.3 shows the relative frequencies of firms based on responses to the question *"On a scale of* $1-4$*, where 1 shows not active and 4 shows very active, how active would you say your firm was in lobbying with regard to the following: MFN Tariff Protection?" (1 = Not active, 2 = Moderately active, 3 = Fairly Active, 4 = Very Active)* for Collective and Individual Lobbying

Table 6.4: SC by Lobbying Strategy

| Collective | Individual | | | | Total |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | |
| **1** | 0.034 | 0.000 | 0.322 | 0.048 | **0.404** |
| **2** | 0.007 | 0.000 | 0.075 | 0.041 | **0.123** |
| **3** | 0.014 | 0.000 | 0.068 | 0.068 | **0.151** |
| **4** | 0.007 | 0.000 | 0.137 | 0.178 | **0.322** |
| **Total** | **0.062** | **0.000** | **0.603** | **0.336** | **1** |

Note: Table 6.4 shows the relative frequencies of firms based on responses to the question *"On a scale of* $1-4$*, where 1 shows not active and 4 shows very active, how active would you say your firm was in lobbying with regard to the following: Special Consignments?" (1 = Not active, 2 = Moderately active, 3 = Fairly Active, 4 = Very Active)* for Collective and Individual Lobbying

Finally, effectiveness in lobbying has been an unexplored question for firms in India. Following the exercises on lobbying effectiveness in previous Chapters, I also ask firms about their perceived **Lobbying Effectiveness** as a sector. It is measured using the perception of firms on their ability to influence trade policy based on firm-level responses to the following question: *"On a scale of 1 to 4, how successful would you rate a typical firm in your sector in lobbying the government for trade policy influence?"* (1 = Not effective, 2 = Moderately Effective, 3 = Moderately Effective, 4 = Very Effective).

This question asked separately for collective and individual lobbying reveal perceptions on effectiveness by lobbying strategy. Of the total of 146 firms surveyed, 25 firms did not choose to lobby through any associations (refer Figure 6.2). However, I find that only 20 (13.7%) firms perceive themselves being ineffective in collective lobbying. 71 (48.6%) firms perceive that they have only moderately effective lobbying through associations while 55 (37.7%) firms think they have very effective collective lobbying. 43 of the total of 146 firms do not lobby individually (refer Figure 6.2). However, I find that only 32 (21.9%) of the firms actually perceive their individual lobbying as ineffective. 82 (56.2%)firms report only moderate effectiveness of their individual lobbying and only 32 (21.9%) firms have very effective individual lobbying.

Table 6.5: Lobbying Effectiveness by Lobbying Strategy

| **Collective** | **Individual** | | | | **Total** |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | |
| | **1** | **2** | **3** | **4** | |
| **1** | 0.048 | 0.041 | 0.007 | 0.041 | **0.137** |
| **2** | 0.082 | 0.055 | 0.048 | 0.027 | **0.212** |
| **3** | 0.062 | 0.082 | 0.116 | 0.014 | **0.274** |
| **4** | 0.027 | 0.055 | 0.158 | 0.137 | **0.377** |
| **Total** | **0.219** | **0.233** | **0.329** | **0.219** | **1.000** |

Note: Table 6.5 shows the relative frequencies of firms based on responses to the question *"On a scale of 1 to 4, how successful would you rate a typical firm in your sector in lobbying the government for trade policy influence?" (1 = Not effective, 2 = Moderately Effective, 3 = Moderately Effective, 4 = Very Effective).)* for Collective and Individual Lobbying

On the whole, firm perception on lobbying effectiveness is higher for collective lobbying through associations in comparison to individual lobbying. It can thereby be inferred that firms are confident in using association lobbying when channelling their lobbying efforts. Firms seem to perceive themselves more effective in lobbying via associations than individual lobbying. In light of the observed findings in my data, I set-up a framework to conduct an empirical analysis of the data in the following section.

## 6.4 The Model

This section presents the theoretical framework to guide the empirical analysis on lobbying strategies. The underlying motivation derives from the specific features observed in the context of India. Firms seek trade policy influence by lobbying the government using available resources. There is an associated cost for each lobbying strategy i.e. to lobby collectively via trade associations for a collective outcome $T$ or individual firms lobbying themselves for an individual outcome $t_i$. Here, I consider the possibility that firms can lobby for both trade policy outcomes at the same time using a dual strategy i.e. a combination of collective and individual lobbying.

A rise in concentration creates a *Free-Riding Effect* and a *Competition Effect*. Free-riding implies that higher concentration creates greater incentive to lobby via associations as the larger firm gets more of the total return from an increase the sector-wide outcome. Therefore, if the size dispersion of firms is larger (higher concentration), there is more incentive for the large firm to lobby for the public good. The competition effect on the other hand creates a stronger incentive to lobby for a product-specific outcome than for the public good when the size dispersion is larger (higher concentration). A stronger competition effect would thereby imply that for sectors with low output concentration, firms choose to lobby together, and for sectors with higher concentration firms lobby more individually.

Assume that the government welfare $G$ is such that different weights are attached to the two kinds of lobbying strategies relative to the aggregate welfare $V$ (as in BT). I argue that particularly for India, government preferences vary for the two kinds of lobbying strategies (evidenced in Chapter 5). $G$ is specified in terms of $V$ as a function of the trade policy outcomes for two firms $t_1$, $t_2$ and the collective outcome $T$. The association lobbying expenses are $L$ and the total individual firm lobbying expenses are $l$. Each is valued differently by the government, weights given by $\tau$ and $\theta$ respectively in the welfare function shown below on lines of Bombardini and Trebbi (2009):

$$G = V(t1, t2, T) + \frac{1}{\tau}L + \frac{1}{\theta}l \tag{6.1}$$

However, it is important to note here that the BT model does not make any assumptions on whether trade associations might be more effective at lobbying than individual firms or why individual lobbying may be more effective than lobbying via associations. In the context of India, the choice of collective lobbying is the preferred medium for the government to consider industry influence in formulating trade policy in India (argued in Chapters 3 and 5). Also, I assume there is an imperfect trade-off between lobbying collectively and individual lobbying that in turn depends on the trade policy.

In BT, the extent of free-riding determines the trade-off between collective and individual lobbying where firms may choose to contribute less for the lobbying expenditures of the trade association as they expect the return from a collective outcome to be spread over all firms in the sector. While in some sectors firms may prefer the collective outcome be raised for all firms simultaneously. Note that if firms decide to lobby collectively, there is

no individual lobbying in BT. I introduce the following in this existing framework. First, the possibility that firms can decide to adopt both lobbying strategies. Second, the notion of an imperfect trade-off between the sector-wide outcome from collective lobbying and the product-specific one from individual lobbying. Finally, the idea that lobbying collectively is more effective than individual lobbying.

The combination of individual and collective lobbying would depend on the specific trade policy instrument and the degree of substitutability of these strategies for that instrument. The firms in a given sector will take the decision on collective lobbying. Once the firms know their contribution to the association, they decide on individual lobbying that is undertaken by each firm in its own capacity. Therefore, some firms can adopt a dual strategy where they maximize their returns by considering a combination of the two lobbying strategies.

For asymmetric firms, with firm 1 being larger, the incentive to lobby individually will increase in concentration and the incentive to lobby via associations will decrease with rise in concentration (as in BT). Therefore, as concentration increases, firm 1 has a higher incentive to lobby for the collective trade policy outcome (as it internalizes a higher fraction of the total return) and also to deviate and lobby individually for the individual outcome. This is the scenario when the larger firm is likely to adopt a dual strategy.

This framework motivates the following directly testable hypothesis:

**Proposition 1**. A lower elasticity of substitution among goods is associated with higher individual lobbying, while sectors with firms producing similar goods are likely to lobby collectively (as in BT). For similar goods, firms are likely to lobby only collectively.

**Proposition 2**. A lower output concentration is associated with higher collective and dual lobbying, while sectors with higher output concentration lobby more individually. Competition effect is stronger than free-riding effects such that in sectors with larger number of firms producing the output, firms choose to lobby together.

**Proposition 3**. Firms lobby for a sector-wide outcome using collective lobbying, individual lobbying is used to target product-specific outcomes. This is an underlying

assumption in BT that I seek to examine. In addition, I examine the likelihood of dual lobbying, a dual strategy is preferred to the use of each single strategy. Introducing the possibility of a dual strategy in the BT set-up, I attempt to provide evidence to this underlying assumption of the model. Complemented with the stylized findings for India, I test the preference of a dual strategy to the use of each single strategy in lobbying.

## 6.5 Empirical Analysis

This section will outline the data and present the empirical analysis. Sector and firm characteristics include the primary determinants of interest from the model and in addition control variables.

The first variable of interest include the elasticities of substitution from Broda and Weinstein (2004)[23] taken as the logarithmic transformation to deal with outliers and is defined as *Elasticity* for each sector. Second, *Concentration* is the output concentration calculated as the share of output of the four largest firms in a sector using data from All India Survey of Industries (ASI). The third variable is *Firm Size* where firms were asked about the number of workers, as: *"What is the size (number of workers) of your firm?"*. In the empirical analysis, it is measured using the log of number of workers.

The control variables include the following. First, *Foreign* defined using: *"What is the ownership structure of your firm in terms of Private Foreign Ownership?"* (1 = None, 2 = Less than 10 per cent, 3 = Between 10 percent-40 per cent, 4 = More than 40 per cent). This information is used to construct the binary variable that takes the value 1 for foreign ownership and 0 for none. Second, *Competition* measured by asking how many competitors the firm faces. *"In the last year, how many competitors did your firm face for its top 3 products?"* (1 = No competitors, 2 =1-3 Competitors, 3 = 4-10 Competitors, 4 = More than 10 Competitors). This is constructed as a variable that can take the values from 1 to 4, where 1 shows no competitors, 4 shows more than ten competitors for the top products produced by the firm. Note that I will have two measures for competition, the firm-level control is the number of competitors while the sector-level variable (discussed

[23] They use the 6-digit HS import data (1992 classification system) from the COMTRADE database from 1994- 2003 to estimate the elasticities between varieties of imported goods that are reported at the 3-digit HS. I obtain concordances between 3-digit HS codes and 4-digit NIC/ISIC codes to group the estimates of elasticities of substitution by NIC/ISIC. Finally, I take the mean elasticity of substitution for each of the 20 sectors in this study.

below) is the output concentration.

### 6.5.1 Lobbying Decision

**Lobbying Decision** was defined as a binary variable for each kind of lobbying strategy: **Collective**, **Individual** and **Dual**.

I begin by examining the three propositions derived from the framework above. The determinants of the lobbying decision are examined in terms elasticities and concentration. The implicit assumption in BT that firms lobby collectively to target sector-wide tariffs and lobby individually for product-specific tariffs is also examined. In what follows, I examine the decision to lobby as a binary variable for each single strategy and the dual strategy to examine the determinants of each lobbying strategy as a binary decision variable. Let $Lobby\ Decision_i$ be a binary variable that takes the value one when the firm reports to have undertaken lobbying in a typical year using a specific strategy during the period 2010-2014. This depends on the benefit from lobbying outweighing the cost to lobby. Let this decision be based as a latent variable formulation such that $y^*$ is the unobserved continuous latent variable representing the excess utility derived by lobbying compared to not lobbying. The observed decision to lobby takes a value of one if the excess utility from lobbying (1) compared to not lobbying (0) is positive.

$$LobbyDecision_i = \begin{cases} 1\ if\ y^* > 0 \\ 0\ otherwise \end{cases} \tag{6.2}$$

I estimate a probit model as specified below assuming that the error terms are independent and normally distributed on the entire sample of 146 firms:

$$LobbyingDecision_i = \beta_0 + \beta R + \eta C + \phi_i \tag{6.3}$$

The main variables of interest are the sector-specific variables in **R** that include the elasticity of substitution among goods in a given sector and output concentration of the sector. **B** includes the control variables at the firm-level: firm-size in each sector (Firm Size) is examined as a control variable for lobbying decision; foreign ownership of the firm (Foreign);

and the number of competitors faced by the firm for its top products (Competitors). It is important to note here that a firm reporting to have done one single strategy does not exclude the use of the other single lobbying strategy. An empirical complication here is that the observations within each sector may not be independently distributed. Therefore I report robust standard errors and accounting for small sample size, I cluster the bootstrapped standard errors.

The empirical evidence in BT examines the determinants for the fraction of individual lobbying by firms. I provide empirical evidence on the determinants of lobbying decisions for each strategy of collective lobbying, individual lobbying and dual lobbying. Table 6.6 presents the results for the binary lobbying decision variables.

**Proposition 1** and **2** are examined using the data from the survey using the baseline estimation Model 1. Model 1 examines the determinants of lobbying decision for each strategy in columns (1)-(3). Sectors with firms producing similar goods are found more likely to lobby in all models except for collective strategy in Model 1 and Model 3; however this effect is insignificant. In terms of proposition 2, I find the likelihood of collective and dual lobbying is increasing significantly with fall in sector concentration. This provides support for proposition 2 such that the competition effect is clearly dominating any free-riding effects as sectors with higher concentration (small number of firms producing most of the output) will be more likely to lobby for trade policy influence using collective lobbying, and a combination of collective and individual lobbying.

Next, I include the variables MFN and SC to test **Proposition 3**, I estimate Model 2 and Model 3 respectively. Columns (4)-(6) in Model 2 includes the objective of lobbying activity MFN and columns (7)-(9) includes the activity SC. Introducing the additional lobbying covariates on activity, I find support for MFN activity being positively related to the likelihood of collective lobbying and dual lobbying, while special consignments are found to show a positive and significant relationship to individual and also dual lobbying. The evidence thereby gives support to the overall firm preference of a dual strategy, with the single strategy of collective lobbying being likely for a public good and individual strategy for product-specific outcomes.

Finally, I find only weak evidence for firm-size at the sector-level for the decision on

each lobbying strategy. There is a negative but insignificant effect of size for collective lobbying in columns (1), (4) and (7). For individual lobbying, I find a positive yet insignificant effect; where including the objective of lobbying for SC in this framework, in Models 2 and 3, it turns negative. I find a positive effect for dual lobbying across all models.

Overall, these findings lend evidence in the direction that justifies the argument of differences in lobbying strategies controlling for specific trade policy outcomes. However, it is important to examine these differences by defining the strategies as exclusive choices in the next section.

Table 6.6: Lobbying Decision

| | Model 1 | | | Model 2 | | | Model 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| Variables | Collective | Individual | Dual | Collective | Individual | Dual | Collective | Individual | Dual |
| Elasticity | -0.017 | 0.179 | 0.123 | 0.0329 | 0.192 | 0.153 | -0.022 | 0.127 | 0.079 |
| | (0.248) | (0.235) | (0.181) | (0.158) | (0.247) | (0.194) | (0.281) | (0.196) | (0.140) |
| Concentration | -0.018* | -0.013 | -0.029*** | -0.018* | -0.011 | -0.028*** | -0.017** | -0.011 | -0.029*** |
| | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) | (0.006) | (0.006) | (0.007) | (0.008) |
| MFN | | | | 0.480** | 0.203 | 0.389*** | | | |
| | | | | (0.161) | (0.108) | (0.112) | | | |
| SC | | | | | | | 0.050 | 0.283** | 0.265* |
| | | | | | | | (0.126) | (0.109) | (0.108) |
| **Controls** | | | | | | | | | |
| Firm Size | -0.074 | 0.011 | 0.044 | -0.121 | -0.005 | 0.013 | -0.08 | -0.025 | 0.012 |
| | (0.081) | (0.164) | (0.200) | (0.064) | (0.164) | (0.203) | (0.108) | (0.191) | (0.234) |
| Foreign | -0.268 | -0.408 | -0.708 | -0.143 | -0.399 | -0.701 | -0.255 | -0.392 | -0.711 |
| | (0.535) | (0.277) | (0.448) | (0.613) | (0.280) | (0.467) | (0.585) | (0.367) | (0.589) |
| Competitors | 0.099 | 0.277** | 0.330* | 0.0662 | 0.272** | 0.327** | 0.091 | 0.255** | 0.317** |
| | (0.289) | (0.107) | (0.147) | (0.300) | (0.096) | (0.119) | (0.304) | (0.097) | (0.119) |
| N | 146 | 146 | 146 | 146 | 146 | 146 | 146 | 146 | 146 |

Note: Table 6.6 shows probit coefficients; constant term is included in all estimations; Standard errors are bootstrapped using ten replications and clustered by sector.

### 6.5.2 Lobbying Strategy

**Lobbying Strategy** (L) was defined such that I identified firms that adopt the exclusive use of each strategy and the dual use of both: No Lobbying (=1), Lobbying only collectively (=2), Lobbying only individually (=3) and Lobbying both collectively and individually (=4). I argue that there exist significant differences between the use of each exclusive lobbying strategy on its own and the dual lobbying strategy as motivated above. What lends further support to this argument is that these differences are more evident if one considers the objective of lobbying activity for specific trade policy outcomes. This is in turn strengthened by the assumption that I made above in terms of imperfect substitution between each lobbying strategy and the dual strategy. Also, I find support from the existing literature that suggests the domestic institutional environment creates differences for the firm decision to do dual lobbying for a public good vs. only collective lobbying or only individual lobbying as in Beyers (2004).

The differences between each strategy to lobby collectively via the association and lobby individually by going directly to the government or between one of these and using a combination of both, lends direction to examine the differences across these choices. If the assumption of the random disturbance term associated with each strategy for firm $i$ satisfies the independence of irrelevant alternatives (IIA) assumption[24], I can examine the likelihood of lobbying using the exclusive strategies as independent choices in a Multinomial Logit (MNL) model[25], given the objective of lobbying activity. An empirical complication here is that the observations within each sector may not be independently distributed, therefore I report robust standard errors that have been corrected for clustering by sector.

[24] To check the IIA, I examined the coefficient estimates by dropping each of the choices. However, I find that the statistical inference is unchanged even when I eliminate one option at a time. Now, if the errors for each lobbying strategy are highly correlated, dropping a choice should change the results a lot as outlined in Hausman and McFadden (1984). However, note that the results are interpreted as conditional on satisfying the assumption of the IIA.

[25] Multinomial Logit was preferred over the Multinomial Probit (MNP) even though MNP relaxes the IIA by allowing error terms across different choices to be correlated. This is because MNP requires alternative-specific variables in order to converge, However in my framework THE variables vary across the agents that are firms and not across alternatives. Therefore, the identification of the matrix of variance-covariance parameters here requires the correlation across errors to be independent and standard errors to be homoskedastic. Therefore, I undertake the MNL as the preferable empirical strategy over the MNP for purpose of this study.

If one believes the data from the survey justifies the assumption of IIA, then lobbyists are indifferent between any two or more of the choices. The firm facing $N$ lobbying strategies chooses a particular strategy if the utility of that choice is greater than the utility it derives from the remaining strategies. This utility is dependent on a set of firm and sector characteristics motivated in the framework above. Accounting for small sample size, I also cluster the bootstrapped standard errors. The multinomial logit helps examine the exclusive lobbying choices compared to the base category. Fitting the log-odds of lobbying strategy in each category $p_{ij}$ vs. base $p_{ik}$ as a linear function of the covariates with each explanatory variable having $j-1$ coefficients, one for each category of the dependent variable:

$$log\frac{p_{ij}}{p_{iK}} = \alpha_i + \beta_i R + \eta_i C \tag{6.4}$$

The lobbying strategy is examined in terms of the main covariates of interest from the model **R** that include elasticity, concentration and firm size and the additional control variables **C** including foreign ownership and competition. The log odds of the lobbying outcomes are modelled as a linear combination of the predictor variables. The likelihood of each single strategy compared to the dual strategy are presented in Table 6.7. The dependent variable is the response variable consisting of three categories of lobbying strategies: Only Collective Lobbying=2, Only Individual Lobbying=3, Both Collective and Individual Lobbying=4 as unordered choices. I report the relative log odds from the multinomial logit regression for each lobbying strategy compared to the base outcome for each explanatory variable. All columns report the logit coefficients controlling for foreign ownership and competition. I present the results using alternate base categories in Model 1 and Model 2 as a means of comparison. The direct propositions suggest Model 2 to be of primary interest such that I examine the likelihood of dual lobbying compared to collective lobbying. However, examining the two models together shows the differenced in one strategy compared to the other.

Now, to provide evidence on the theoretical model, the primary cases of interest include the following. First, to examine individual lobbying vs. cooperation in lobbying in terms of competition effects for proposition 1 and 2 of my framework. Second, the dual strategy (Dual) compared to the base category of each single strategy is of interest for the third proposition of my framework[26].

[26]I began by examining the likelihood of pursuing each lobbying strategy compared to the base category

Table 6.7: Lobbying Strategy: Baseline Regressions

Dependent variable: Lobbying Strategy = Collective, Individual, Dual

| **MNL Model 1. Base-Individual Lobbying** | | | | | | |
|---|---|---|---|---|---|---|
| | | Individual Correlations | | | Baseline 1 | Bootstrap |
| Variables | Categories | (1) | (2) | (3) | (4) | (5) |
| Elasticity | Collective | -0.449 | | | -0.344 | -0.344 |
| | | (0.398) | | | (0.445) | (0.619) |
| | Dual | -0.312 | | | -0.036 | -0.036 |
| | | (0.200) | | | (0.229) | (0.425) |
| Concentration | Collective | | -0.022 | | -0.015 | -0.015 |
| | | | (0.014) | | (0.012) | (0.017) |
| | Dual | | -0.062** | | -0.061** | -0.061** |
| | | | (0.012) | | (0.012) | (0.016) |
| Firm Size | Collective | | | -0.051 | -0.010 | -0.010 |
| | | | | (0.235) | (0.332) | (0.384) |
| | Dual | | | 0.186 | 0.160 | 0.160 |
| | | | | (0.253) | (0.291) | (0.347) |
| **Controls** | | | | | | |
| Foreign | Collective | -0.542 | -0.554 | -0.475 | -0.555 | -0.563 |
| | | (0.840) | (0.918) | (0.845) | (0.816) | (7.660) |
| | Dual | -1.873* | -1.914* | -1.917* | -1.946 | -1.945 |
| | | (0.835) | (0.931) | (0.945) | (1.002) | (8.100) |
| Competition | Collective | -0.246 | -0.151 | -0.288 | -0.133 | -0.129 |
| | | (0.345) | (0.344) | (0.321) | (0.343) | (0.495) |
| | Dual | 0.374 | 0.580 | 0.323 | 0.563 | 0.547 |
| | | (0.370) | (0.382) | (0.348) | (0.365) | (0.522) |
| N | | 137 | 137 | 137 | 137 | 137 |

of no lobbying. These preliminary regressions on lobbying strategies are attached in Table A.26 in Appendix A.5.2. I consider the base category as no lobbying. Columns (1)-(3) report the individual correlations. Compared to the base category of no lobbying, the findings are similar in sign for each strategy in terms of elasticity of substitution, concentration and firm size, the coefficients are however insignificant in all cases but one where I find support for proposition 2 such that a higher concentration implies greater likelihood of individual lobbying. To discern the likelihood of a single strategy compared to the dual strategy, I drop the 9 firms that are not lobbying.

| MNL Model 2. Base-Collective Lobbying | | | | | | |
|---|---|---|---|---|---|---|
| | | Individual Correlations | | | Baseline 2 | Bootstrap |
| Variables | Categories | (1) | (2) | (3) | (4) | (5) |
| Elasticity | Individual | 0.449 | | | 0.344 | 0.344 |
| | | (0.398) | | | (0.445) | (0.619) |
| | Dual | 0.137 | | | 0.308 | 0.308 |
| | | (0.366) | | | (0.442) | (0.502) |
| Concentration | Individual | | 0.022 | | 0.015 | 0.015 |
| | | | (0.014) | | (0.012) | (0.017) |
| | Dual | | -0.041** | | -0.046** | -0.046* |
| | | | (0.015) | | (0.015) | (0.019) |
| Firm Size | Individual | | | 0.051 | 0.010 | 0.010 |
| | | | | (0.235) | (0.332) | (0.384) |
| | Dual | | | 0.237 | 0.170 | 0.170 |
| | | | | (0.313) | (0.391) | (0.500) |
| **Controls** | | | | | | |
| Foreign | Individual | 0.542 | 0.554 | 0.475 | 0.555 | 0.563 |
| | | (0.840) | (0.918) | (0.845) | (0.816) | (7.660) |
| | Dual | -1.331** | -1.359** | -1.442** | -1.392** | -1.382* |
| | | (0.316) | (0.330) | (0.346) | (0.430) | (0.602) |
| Competition | Individual | 0.129 | 0.246 | 0.151 | 0.288 | 0.133 |
| | | (0.345) | (0.344) | (0.321) | (0.343) | (0.495) |
| | Dual | 0.621** | 0.731** | 0.611** | 0.696** | 0.677** |
| | | (0.215) | (0.230) | (0.186) | (0.225) | (0.224) |
| N | | 137 | 137 | 137 | 137 | 137 |

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

Note: Table 6.7 shows the coefficients (log odds) from the Multinomial Logit (MNL) regressions. Constant term included in all estimations. Top panel shows the results for model 1 with base category of lobbying individually. Bottom panel reports results for model 2 WITH base category collective lobbying. In column (4), I test the baseline specification. Robust (clustered by industry) standard errors in parentheses. Bootstrapped standard errors (30 replications) in column (5) to check robustness.

In the top panel, model 1 presents the relative log odds from the multinomial logit regression for the lobbying strategy compared to the base outcome of individual lobbying. The bottom panel presents results for model 2 where the base category is collective lobbying. Column (4) presents the baseline estimation for each model. In terms of **Proposition 1**, the signs are found reversed in columns (1)-(5) such that I find negative coefficients for collective lobbying and positive for individual lobbying, both are however found insignificant. In column (2), I find support for **Proposition 2** of the model such that I observe a

negative coefficient for concentration in model 1 and a positive coefficient in model 2, in both cases the coefficients are however insignificant. The dual strategy compared to each single strategy shows a negative and significant coefficient for concentration. This implies strong competition effects where if the firm dispersion is higher (lower concentration), consequently firms will cooperate and lobby more using a collective lobbying strategy or a dual strategy. The strong competition effects in lobbying add support to the BT findings. In column (5), to check the robustness of the results, I bootstrap the standard errors.

Table 6.8 introduces additional lobbying covariates on activity, these being lobbying activity MFN and Special consignments (SC) to test **Proposition 3** for Model 1. I find that the baseline results hold when I control for each trade policy outcome. In addition, there is support for this proposition such that MFN activity is positively related to the likelihood of collective lobbying and dual lobbying in column (1) and (3), with the coefficient for dual lobbying being significant in (3) when I control for both outcomes. SC is found to show a negative relationship for the likelihood of collective lobbying in column (2) and (3), this being significant in (3). Further, the coefficient for dual lobbying is positive in (2) that suggests the preference of a dual strategy compared to collective lobbying for a SC. However, controlling for both MFN and SC, gives a negative coefficient (insignificant) for dual lobbying that indicates the possibility of a stronger preference for individual lobbying to target SC. These findings for Model 1 imply that firms are most likely to adopt a dual strategy to lobby for MFN.

Table 6.9 outlines the results for model 2. Now, SC shows a positive relationship for individual and dual lobbying in comparison to lobbying collectively in column (2) and (3), that is significant when we control for both MFN and SC in (3). MFN is found to be negatively related to the likelihood of individual lobbying. Controlling for MFN and SC together, reverses the sign for dual lobbying in the case of MFN as seen for SC in Table 6.8. This suggests that it is less likely for firms to use a collective strategy to target SC as firms prefer to lobby individually or adopt a dual strategy.

Table 6.8: Lobbying Strategy given trade policy outcomes, Model 1

Dependent variable: Lobbying Strategy = Collective, Individual, Dual

| | | **MNL Model 1. Base-Individual Lobbying** | | |
|---|---|---|---|---|
| Variables | Categories | (1) | (2) | (3) |
| Elasticity | Collective | -0.305 | -0.250 | -0.135 |
| | | (0.428) | (0.338) | (0.313) |
| | Dual | 0.017 | -0.067 | 0.058 |
| | | (0.166) | (0.207) | (0.186) |
| Concentration | Collective | -0.012 | -0.016 | -0.011 |
| | | (0.013) | (0.010) | (0.012) |
| | Dual | -0.059** | -0.062** | -0.059** |
| | | (0.012) | (0.013) | (0.013) |
| Firm Size | Collective | -0.057 | 0.020 | -0.023 |
| | | (0.313) | (0.340) | (0.354) |
| | Dual | 0.056 | 0.127 | 0.067 |
| | | (0.305) | (0.316) | (0.329) |
| MFN | Collective | 0.575 | | 1.058 |
| | | (0.428) | | (0.592) |
| | Dual | 0.962* | | 0.960* |
| | | (0.401) | | (0.509) |
| SC | Collective | | -0.343 | -0.716* |
| | | | (0.267) | (0.314) |
| | Dual | | 0.243 | -0.102 |
| | | | (0.219) | (0.252) |
| **Controls** | | | | |
| Foreign | Collective | -0.492 | -0.492 | 0.006 |
| | | (0.836) | (0.836) | (0.678) |
| | Dual | -1.898 | -1.898 | -1.446 |
| | | (1.027) | (1.027) | (0.809) |
| Competition | Collective | -0.191 | -0.191 | 0.166 |
| | | (0.335) | (0.335) | (0.541) |
| | Dual | 0.498 | 0.498 | 0.795 |
| | | (0.361) | (0.361) | (0.553) |
| N | | 137 | 137 | 137 |

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

Note: Table 6.8 shows the coefficients (log odds) from the Multinomial Logit (MNL) regressions given the objective of lobbying activity for MFN and Special Consignments (SC). Constant term in all estimations. Robust (clustered by industry) standard errors in parentheses.

Table 6.9: Lobbying Strategy given trade policy outcomes, Model 2

Dependent variable: Lobbying Strategy = Collective, Individual, Dual

| | | **MNL Model 2. Base-Collective Lobbying** | | |
|---|---|---|---|---|
| Variables | Categories | (1) | (2) | (3) |
| Elasticity | Individual | 0.305 | 0.250 | 0.135 |
| | | (0.428) | (0.338) | (0.313) |
| | Dual | 0.321 | 0.183 | 0.194 |
| | | (0.423) | (0.311) | (0.303) |
| Concentration | Individual | 0.012 | 0.016 | 0.011 |
| | | (0.013) | (0.010) | (0.012) |
| | Dual | -0.047** | -0.047** | -0.047** |
| | | (0.014) | (0.015) | (0.015) |
| Firm Size | Individual | 0.057 | -0.020 | 0.023 |
| | | (0.313) | (0.340) | (0.354) |
| | Dual | 0.113 | 0.107 | 0.090 |
| | | (0.374) | (0.409) | (0.416) |
| MFN | Individual | -0.575 | | -1.058 |
| | | (0.428) | | (0.592) |
| | Dual | 0.387 | | -0.099 |
| | | (0.281) | | (0.356) |
| SC | Individual | | 0.343 | 0.716* |
| | | | (0.267) | (0.314) |
| | Dual | | 0.585** | 0.614* |
| | | | (0.219) | (0.244) |
| **Controls** | | | | |
| Foreign | Individual | 0.492 | 0.492 | -0.006 |
| | | (0.836) | (0.836) | (0.678) |
| | Dual | -1.406** | -1.406** | -1.452** |
| | | (0.448) | (0.448) | (0.539) |
| Competition | Individual | 0.191 | 0.191 | -0.166 |
| | | (0.335) | (0.335) | (0.541) |
| | Dual | 0.689** | 0.689** | 0.629** |
| | | (0.229) | (0.229) | (0.212) |
| N | | 137 | 137 | 137 |

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

Note: Table 6.9 shows the coefficients (log odds) from the Multinomial Logit (MNL) regressions given the lobbying activity for MFN and Special Consignments (SC). Constant term in all estimations. Robust (clustered by industry) standard errors in parentheses.

The evidence in Table 6.8 and 6.9 thereby points to the overall firm preference of a dual strategy, with the single strategy of collective lobbying being likely for MFN and the individual strategy for product-specific outcomes. What is surprising is that firms seem to prefer the dual strategy compared to the exclusive use of the other single strategy (which is individual lobbying for MFN and collective lobbying for SC). This lends evidence to the underlying assumption in BT, where firms lobby collectively for a public good which in my case is the MFN and lobby individually for policy specific to products. Additionally, it points to the preference of dual strategies which is explained by groups lobbying for a change in policy, while each single strategy is potentially to only defend the existing policy. Lobbying for a product-specific outcome therefore seems to fit into the criteria where firms react quickly and defend an existing policy (say that relating to a customs regulation).

### 6.5.3 Robustness

A potential problem in regressing lobbying strategy on determinants for firms that are lobbying, is that the equation for the entire population of the firms is not observed. Those firms that decide to lobby will be more likely to select a strategy that being a single or the dual strategy than those that are not lobbying. Hence, there maybe an issue of sample selection bias. Since the results so far reveal that the determinants on firm lobbying strategy are not random, sample selection bias may plague the primary findings.

The Heckman (1979) selection model is a type of simultaneous equations model that can help address this potential bias caused by the lobbying decision[27]. The first equation is the selection equation that includes all 146 firms in the sample since it is designed to get at the decision to lobby or not. The sample in the second equation is restricted to include only firms that do lobby as we observe the lobbying strategy only for them.

The first step is to estimate the selection equation using a a probit model as specified in equation 6.3 above assuming that the error terms are independent and normally distributed on the entire sample of 146 firms. The variables of interest here are the sector-specific variables in $R$, that include the elasticity of substitution, output concentration of the sector and firm size. The control variables in $B$ include foreign ownership of the firm

[27] Greene (2006) discusses this case of a multinomial outcome after selection. I use a conventional non-linear multinomial choice regression specification while accounting for the potential selection from the binary decision variable.

(Foreign) and the number of competitors faced by the firm for its top products (Competitors). Additionally, I include lobbying activity for MFN and Special Consignments (SC). The exclusion restriction is **Lobbying Effectiveness** that is the firm perception on effectiveness of lobbying of the sector[28].

The estimates (coefficients shown in Table 6.10) [29] are then used to calculate an inverse Mills ratio (IMR). It is important to note here that these are firm perceptions on effectiveness of their lobbying as a sector and this is different from actual effectiveness of the firm.

Table 6.10: Selection Equation

| Variables | (1) |
|---|---|
| Elasticity | -0.036 |
| | (0.233) |
| Concentration | 0.022 |
| | (0.014) |
| Firm Size | -0.160 |
| | (0.180) |
| MFN | 0.598** |
| | (0.163) |
| Special | -0.217 |
| | (0.121) |
| Effectiveness | 0.586** |
| | (0.222) |
| N | 146 |

Note: Table 6.10 shows probit coefficients; Robust standard errors; Constant and control variables included.

The second step then is to add the IMR to the second equation as an additional independent variable. The equation for lobbying strategy is modified such that it is now given by:

[28] The overall effectiveness in lobbying is not expected to affect the choice of lobbying strategy and only affects the decision to lobby. Further, the effectiveness is measured as the perception of the firm about the effectiveness in lobbying as a sector. By definition, lobbying effectiveness is not expected to be correlated with the regressors in the second stage.

[29] I report the coefficients on the primary variables, coefficients on foreign ownership and competition discussed earlier are not shown.

$$log\frac{p_{ij}}{p_{iK}} = \alpha_i + \beta_i R + \eta_i C + \gamma IMR \tag{6.5}$$

The correction for selection enters the multinomial logit model. The standard errors are bootstrapped and clustered by sector. I do the Heckman selection as a robustness check for the primary findings above. Table 6.11 and 6.12 present the results for lobbying strategy with selection for Model 1 and 2 respectively, given MFN lobbying and SC lobbying[30]. The IMR is found negative and significant for the dual strategy in columns (1) to (4) in both tables, that suggests a selection problem and a downward bias[31]. Correcting for selection, I find higher coefficients for concentration, the main variable of interest. The findings in terms of the lobbying strategy for MFN and SC outcomes are upheld though we lose on significance. Therefore, the selection problem seems to affect the likelihood of dual lobbying even if the overall qualitative results are unchanged and robust to selection.

[30] I have not included the coefficients on the control variables foreign ownership and competitors discussed earlier in the interest of space.

[31] To examine the exclusion restriction, I check for the correlation of effectiveness with the regressors in step 2, the results are in column (5) for each model. I find effectiveness is insignificant in Model 1, however in Model 2 the effectiveness is found significant. Recognizing the issue of identification in Model 2, I focus on the findings from Model 1.

Table 6.11: Lobbying Strategy given Trade Policy outcomes, Model 1 with Selection

Dependent variable: Lobbying Strategy = Collective, Individual, Dual

| | | **MNL Model 1. Base-Individual Lobbying** | | | | |
|---|---|---|---|---|---|---|
| Variables | Categories | (1) | (2) | (3) | (4) | (5) |
| Elasticity | Collective | -0.271 | -0.265 | -0.140 | 0.000 | 0.118 |
| | | (0.389) | (0.364) | (0.308) | (0.248) | (0.238) |
| | Dual | -0.013 | -0.033 | 0.029 | 0.051 | -0.060 |
| | | (0.243) | (0.248) | (0.230) | (0.251) | (0.232) |
| Concentration | Collective | -0.024 | -0.012 | -0.025 | -0.008 | -0.017 |
| | | (0.015) | (0.017) | (0.014) | (0.019) | (0.012) |
| | Dual | -0.081** | -0.076** | -0.081** | -0.078** | -0.056** |
| | | (0.017) | (0.016) | (0.017) | (0.017) | (0.014) |
| Firm Size | Collective | -0.099 | -0.218 | -0.067 | -0.267 | -0.243 |
| | | (0.295) | (0.296) | (0.322) | (0.314) | (0.323) |
| | Dual | 0.200 | 0.190 | 0.129 | 0.150 | -0.060 |
| | | (0.310) | (0.333) | (0.327) | (0.341) | (0.302) |
| MFN | Collective | | 0.759 | | 0.206 | 0.928 |
| | | | (0.555) | | (0.597) | (0.501) |
| | Dual | | 0.275 | | 1.574 | 1.084 |
| | | | (0.499) | | (0.936) | (0.604) |
| SC | Collective | | | -0.392 | -0.011 | -0.210 |
| | | | | (0.219) | (0.227) | (0.244) |
| | Dual | | | 0.081 | -0.850* | -0.500 |
| | | | | (0.186) | (0.362) | (0.311) |
| IMR | Collective | -1.383 | 1.654 | -1.946 | 3.602 | |
| | | (2.593) | (3.335) | (2.682) | (4.686) | |
| | Dual | -9.594** | -8.826** | -9.030** | -9.174* | |
| | | (2.499) | (3.359) | (2.606) | (3.852) | |
| Effectiveness | Collective | | | | | -1.002 |
| | | | | | | (0.711) |
| | Dual | | | | | 0.634 |
| | | | | | | (0.461) |
| N | | 137 | 137 | 137 | 137 | 137 |

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

Note: Table 6.11 shows the results from Heckman selection as a robustness check for the primary findings. The IMR is based on the first stage probit reported in Table 6.10. Constant term and controls in all estimations. Robust (clustered by industry) standard errors in parentheses.

Table 6.12: Lobbying Strategy given Trade Policy outcomes, Model 2 with Selection

Dependent variable: Lobbying Strategy = Collective, Individual, Dual

| | | **MNL Model 2. Base-Collective Lobbying** | | | | |
|---|---|---|---|---|---|---|
| Variables | Categories | (1) | (2) | (3) | (4) | (5) |
| Elasticity | Individual | 0.271 | 0.265 | 0.140 | -0.000 | -0.118 |
| | | (0.389) | (0.364) | (0.308) | (0.248) | (0.238) |
| | Dual | 0.257 | 0.233 | 0.169 | 0.051 | -0.178 |
| | | (0.363) | (0.351) | (0.278) | (0.210) | (0.207) |
| Concentration | Individual | 0.024 | 0.012 | 0.025 | 0.008 | 0.017 |
| | | (0.015) | (0.017) | (0.014) | (0.019) | (0.012) |
| | Dual | -0.058** | -0.064** | -0.056** | -0.070** | -0.039** |
| | | (0.015) | (0.015) | (0.015) | (0.019) | (0.017) |
| Firm Size | Individual | 0.099 | 0.218 | 0.067 | 0.267 | 0.243 |
| | | (0.295) | (0.296) | (0.322) | (0.314) | (0.323) |
| | Dual | 0.299 | 0.407 | 0.196 | 0.418 | 0.182 |
| | | (0.266) | (0.238) | (0.280) | (0.221) | (0.192) |
| MFN | Individual | | -0.759 | | -1.574 | -1.084 |
| | | | (0.555) | | (0.684) | (0.604) |
| | Dual | | -0.484 | | -1.367* | -0.156 |
| | | | (0.403) | | (0.936) | (0.360) |
| SC | Individual | | | 0.392 | 0.850* | 0.289 |
| | | | | (0.219) | (0.304) | (0.362) |
| | Dual | | | 0.473* | 0.839** | 0.289 |
| | | | | (0.222) | (0.304) | (0.304) |
| IMR | Individual | 1.383 | -1.654 | 1.946 | -3.602 | |
| | | (2.593) | (3.335) | (2.682) | (4.686) | |
| | Dual | -8.211** | -10.480** | -7.084* | -12.775** | |
| | | (3.095) | (3.841) | (3.134) | (4.844) | |
| Effectiveness | Individual | | | | | 1.002 |
| | | | | | | (0.711) |
| | Dual | | | | | 1.637* |
| | | | | | | (0.633) |
| N | | 137 | 137 | 137 | 137 | 137 |

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

Note: Table 6.12 shows the results from Heckman selection as a robustness check for the primary findings above. The IMR is based on the first stage probit reported in Table 6.10. Constant term and controls in all estimations. Robust (clustered by industry) standard errors in parentheses.

## 6.6 Conclusions and future Research

This paper provides a new element for understanding lobbying behaviour for trade policy in India. It has important implications for democratic policy-making and offers evidence to recognize that specific types of groups are utilizing dual lobbying strategies and potentially achieving more influence. The results outline broad patterns of lobbying strategies that suggest the most likely combinations of factors that predict use of various lobbying strategies.

In the context of individual lobbying compared to lobbying via collective action, I found that Indian manufacturing firms seem reactionary such that they respond quickly in order to capitalize on a change in the political status of a policy. For this, the specific policy issue and resource constraints can potentially limit their choices. The use of dual lobbying strategies have significant implications to identify the process of policy-making in trade but the underlying mechanisms have remained unexplored in the Indian context.

On the whole, Indian manufacturing firms prefer a dual lobbying strategy i.e. *Firms Join Hands while Walking Alone*. The probability of lobbying via associations and lobbying using a dual strategy is higher in sectors with lower concentration such that the competition effect is clearly dominating any free-riding effects in lobbying for Indian trade policy. Third, firms are likely to adopt a collective lobbying strategy when targeting sector-wide public goods such as MFN tariffs while they are likely to lobby individually when targeting more product-specific trade policy outcomes; the dual strategy is preferred over each single strategy that suggests firms often lobby for changes in ongoing policy than defend existing ones.

One main finding for policy that emerged both from interviews with policy-makers and the manufacturing firms is the need for a structured consultative framework that would encompass associations and trade groups. A strengthened structure of domestic lobbying can in turn feed into responsible multilateral representation. Also, interest group representation can further democratic participation and better policy while the potential threat of corruption can be curbed. In this light, the study provides primary information on lobbying as a means of approaching policy-makers to support transparency and accountability to the trade policy process.

Finally, there are directions for further research that emerge from this study. First, I believe that an improvement of the primary investigation will consist of following up on the survey with a larger sample and constructing a panel. This will allow an examination of specific trade policy changes that include preferential tariffs which have implications for ongoing trade negotiations. Second, reducing the non-response bias and a detailed questionnaire can enable a better investigation into the findings. Third, I seek to address potential issues of endogeneity that may affect the choice of lobbying strategy. Finally, the survey collected lobbying information on preferential tariffs, import licenses and non-tariff measures in addition to that discussed in the text, this will be used for further research on differences in lobbying strategies across different outcomes.

# Chapter 7

# Conclusion

This thesis set out to examine the political economy of trade protection in India. It adopted an intuitive modification of a structural model to examine Indian trade protection. New and original estimates of effectiveness in lobbying were presented and examined in terms of their determinants. This was complemented with an analysis of original information on the actual trade policy process collected by means of a survey.

## 7.1 Summary of Findings

The primary findings of this thesis appear below in the order with which they were taken up for analysis in the Chapters.

### 7.1.1 *Protection has been for Sale in India from 1999*

The first essay of this thesis aimed at resolving various empirical issues of the PFS model. The analysis used a novel dataset that combined trade and industry data with information on membership to associations. It provided a new measure of political organization arguably more reflective of the actual trade policy set-up in India. The results presented evidence for the cross-section across various years to enable comparison with two existing studies that estimate PFS for India but have differed on several accounts. The pre-liberalization results are opposed to that of existing findings. The pooled dataset was also used to examine the findings for all the years together, the results presented structural estimates as an average for the decade of 2000s. Overall, the findings suggest that protection has been for sale after 1999.

### 7.1.2 *Modified PFS with Lobbying Effectiveness*

The literature correctly argued that quantifying effectiveness in lobbying to obtain policy outcomes is a challenging task. I used the structural framework of PFS model with an intuitive modification to provide original estimates on lobbying effectiveness using a panel dataset. Two alternate factors were suggested to explain the differences in lobbying effectiveness across sectors, this included the predisposition of the government to supply protection or the ability to lobby based on market structure. The theoretical framework was pursued using the former logic.

### 7.1.3 *Geographically concentrated firms are more effective in lobbying where effectiveness declines with increase in product similarity*

I used the estimates derived from the modified framework to examine its determinants in terms of market structure. 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. This provides support for an overall competition effect such that if concentrated firms in a given sector produce similar goods they are likely to be competitors and will lobby against each other. Being geographically close together, these firms have less opportunity to free ride and in fact compete for protection.

### 7.1.4 *Protection is for sale (only) for very effective sectors*

Chapter 4 began with the premise that accounting for differences in effectiveness to lobby across sectors in the PFS model explains the variation of trade protection across sectors. The modified PFS framework taken to the pooled data suggests that protection is still for sale with lobbying effectiveness but only for those sectors that are very effective in lobbying the government. Effectiveness in this Chapter was proxied using a measures on firm membership to associations that is seen as the more effective mechanism to lobby the government in India.

### 7.1.5 *Competition effects clearly dominate any free-riding for Indian manufacturing*

Based on the primary survey conducted in Chapter 6, I found the likelihood of lobbying collectively was higher in sectors characterized by low concentration in India. This further re-instated the earlier finding that competition effects are clearly dominating any free-riding for Indian manufacturing firms. Thereby, if the firm dispersion is higher (lower concentration), firms will cooperate and lobby more using a collective lobbying strategy or a dual strategy. This can be further explained by the finding in Chapter 4, where sectors with geographically spread firms are less effective such that they have to increase their chances of trade policy influence and therefore employ collective and dual strategies than just lobbying individually.

### 7.1.6 *Indian manufacturing firms join hands while walking alone to lobby the government*

Chapter 6 provided evidence that firms lobby collectively for a public good and lobby individually for policy specific to products. The unique finding was that firms preferred the dual strategy compared to the exclusive use of the other single strategy. The preference of dual strategies is explained by groups lobbying for changes in current policies, while each single strategy is potentially to only defend the existing policy. Lobbying for a product-specific outcome therefore fits with the criteria where firms react quickly and defend an existing policy.

## 7.2 Limitations and Future Research

This thesis was constrained by several factors, some caveats are worth noting. During the study, topic for future research have also emerged. These are discussed below to highlight both limitations and direction of future research.

Key issues calling for further investigation include examination of the basic analytical approach developed in Chapter 4 of this thesis to include further improvements. Suggestions consist incorporating information on the proportion of sector-specific capital owners $\alpha_i$, that would then give direct measures of lobbying effectiveness $\gamma_i$. Variables on intermediate goods tariffs in an industry and exporter vs importer lobbying can also

be introduced. The current work can serve as the benchmark for such further analysis to refine the estimates on lobbing effectiveness that are new for India.

It would be desirable to examine equivalence of the joint maximization approach used by following work on PFS and that of the truthful criteria in traditional PFS. While we have attempted to examine both frameworks, it remains a direction of future research. Also, we believe that truthful revelations applies primarily to individuals and has limitations in explaining group behaviour as in PFS. It would be worth exploring other alternate approaches to explain the joint maximization in PFS.

The survey conducted in this study faced several limitations, primarily owing to time and budget constraints. The survey collected lobbying information on preferential tariffs, import licenses and non-tariff measures in addition to the ones discussed in the text. This data will be used for further research on differences in lobbying strategies across different outcomes. Additionally, I believe that an improvement of the primary investigation will consist of following up on the survey and constructing a panel. This has the potential to enable an examination of specific trade policy changes for example of preferential tariffs which have implications for ongoing trade negotiations..

## 7.3 Concluding Remarks and Policy Implications

The aim of this thesis was to contribute towards the limited literature on political economy of India. In the process, it has identified a simple intuitive modification to the PFS model that can potentially capture the actual trade policy set-up.

This thesis has been able to identify manufacturing sectors based on lobbying effectiveness that can facilitate informed trade policy reform. It has shed light on factors that determine such effectiveness. The importance of competition over free-riding suggests the role of market structure in Indian manufacturing and how that can influence policy changes.

Primary evidence on lobbying strategies presents original information. An understanding of such strategies in the manufacturing sector can be a means of informed decision-making. The results can inform policy-makers and industry to facilitate support towards transparency and accountability to the trade policy process.

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# Appendix A

# Appendix

## A.1 Mappings

### A.1.1 Industry Data

The Indian Industrial Classification is called the *National Industrial Classification* (NIC). It has been developed following the International Standard Industrial Classification (ISIC) of classifying data according to the kind of economic activity. The *Annual Survey of Industries* (ASI) in India collects data using the NIC classification. To build a dataset for Indian industry from 1990-2009, I have data at various revisions of the NIC: NIC-1987, NIC-1998, NIC-2004 and NIC-2008. I will discuss each of these in detail and develop a mapping for all data to be at a common classification for all years.

The NIC-87 groups together economic activities which are similar in terms of process type, raw material used and finished goods produced. It is a hierarchical system of categories arranged on a decimal coding system with four levels similar to that of ISIC Rev. 2. This comprises 10 sections at one-digit level and 72 codes at 2-digit. Further, the scale of operation/technology has been used as criteria for classifying certain activities in the manufacturing sector such that the four digit classifications increased to 687 codes.

NIC-1987 later gave way to NIC-1998 that identifies 99 categories at the 2-digit level of the classification. Similar to ISIC Rev.3, it makes use of the concept of 'tabulation categories' which makes it possible to identify more than 9 broad categories of the economy. The new NIC has 17 such tabulation categories; 'A' through 'Q' called Sections, easily convertible into one digit major divisions of NIC 1987. Each section consists of one or more Divisions which are 60 in total. In turn, each Division is divided into groups: there

are a total of 159 Groups in the revised NIC. These Groups are further sub-divided into 292 Classes at 4-digit. The ultimate category at the 5-digit level is termed as Sub-class which meets the national requirements and accommodates appropriate 4-digit categories of NIC 1987. The number of such sub-classes is 1021.

The major changes comparing across the two classifications for the manufacturing sector in particular is listed below: 1. NIC-1998 consists of 23 2-digit divisions compared to only 18 in NIC-1987. 2. 191 3-digit groups in NIC-1987 were compressed to only 61 in NIC-1998. 3. At the 4-digit level, 687 classes were re-defined to only 127 4-digit classes in NIC-1998. 4. The 5-digit level of classification was now introduced as 611 sub-classes. 5. A new division Recycling (37) was added to include the transformation of unusable waste and scrap into usable waste and scrap by means of an industrial process.

**From NIC-1987 to NIC-1998 in Section D Manufacturing**

| | **NIC-1987** | **NIC-1998** |
|---|---|---|
| **2-digit (DIVISIONS)** | 18 | 23 |
| **3-digit (GROUPS)** | 191 | 61 |
| **4-digit (CLASSES)** | 687 | 127 |
| **5-digit (SUB-CLASSES)** | - | 611 |

The NIC-1998 is a classification of economic activities undertaken by economic units. It has followed the principles of ISIC Rev. 3 and identical with its structure up to the 4-digit level. The NIC in 1998 was extended to the 5-digit level to adjust for appropriate four-digit categories of NIC-1987 and national requirements. For the scope of my study, I take up only Section D, which is the manufacturing sector comprising 23 divisions. All the divisions taken together consist of 61 Groups that are further disaggregated to 127 Classes and 611 Sub-Classes.

The ISIC Rev.3 was updated to ISIC Rev 3.1 and to meet the national requirements on account of changes in the structure of economy, the NIC-1998 was also updated to NIC-2004. The updated NIC-2004 is also comparable with ISIC Rev 3.1 till four digits. NIC-2004 has 17 sections, 62 divisions, 161 groups, 310 classes and 1191 subclasses. It should be noted that there are no changes at the 2-digit and 3-digit. The major changes

comparing across the two classifications for the manufacturing sector in particular is listed. Total 4-digit sectors have increased from 127 to 139. 4-digit classes 1713 and 1714 under Group 171 (Spinning, weaving and finishing of textiles), classes 1724 and 1725 under Group 172 (Manufacture of other textiles) and classes 2711 to 2719 under the Group 271(Manufacture of Basic Iron and Steel) have been created. Sub-classes on activities of 'repair and maintenance' have been introduced under their related 4-digit classes. There are many changes at 5-digit (sub-class) level to meet national requirements that increased from1021 to 1191 5-digit sub-classes.

| **From NIC-1998 to NIC-2004 in Section D Manufacturing** | | |
|---|---|---|
| | **NIC-1998** | **NIC-2004** |
| **2-digit (DIVISIONS)** | 23 | 23 |
| **3-digit (GROUPS)** | 61 | 61 |
| **4-digit (CLASSES)** | 127 | 139 |
| **5-digit (SUB-CLASSES)** | 611 | 708 |

Now, in order to build a complete dataset of India's industrial data for the scope of my thesis, I select the NIC-1998 4-digit that has a perfect one-to-one correspondence with ISIC Revision 3 at 4-digit. Data from 2004-2007 is reported at NIC-2004. The task at hand was then to map all data for the available years to the NIC-1998 classification. For this, I develop concordance tables based on mappings by Ministry of Statistics and Programme Implementation (MOSPI) India. I begin by discussing the mappings from NIC-2004 to NIC-1998.

As we observed, at the 4-digit there are additions and changes to sectors. There are 12 new additions to NIC 4-digit from 1998 to 2004. There are also changes in terms of classifications. These additions and changes are shown in Table 4 below. For the new additions, I convert industrial data to NIC-1998 by summing or averaging depending on the industrial characteristic we are dealing with. For example, for output data we sum across the new classifications, while for average wage per worker we would take average across them.

Observing the changes in the classifications, we reach both one-to-many and many-to

one mapping. Now, I refer to explanatory notes on these classifications by MOSPI to observe the mappings. This however leaves some ambiguity which could be dealt with by aggregating from 5-digit of NIC. Another way to deal with this is to use these mappings to combine these 4-digit sectors.

**New Additions (*denotes we could average data depending on the industrial characteristic)**

| Concordance | NIC-1998 | Description |
|---|---|---|
| 1711+1713* | 1711 | Prep. and spinning of textile fiber incl. weaving of textiles (excl. khadi/handloom) + Preparation and spinning of textile fiber including weaving of textiles (incl. khadi/handloom) |
| 1712+1714* | 1712 | Finishing of textiles; except "while-you-wait" services + Finishing of textiles (khadi/handloom) |
| 1722+1725* | 1725 | Manuf. of carpet and rugs other than by hand + Manuf. of blankets, shawls, carpets, rugs and other similar textile products by hand |
| 1724+1729* | 1729 | Embroidery work, zari work and making of ornamental trimmings by hand + Manufacture of other textiles n.e.c. |
| 2711+2712+2713+2714 +2715+2716+2717+271 8+2719* | 2710 | Manufacture of Basic Iron & Steel |

**Changes in Classification**

| NIC-98 | NIC-04 | Description |
|---|---|---|
| 1513 | 1513 | Processing and preserving of fruit and vegetables |
| 1549 | 1513 | Roasting of nuts |
| 1549 | 1549 | Manufacture of other food products n.e.c.; except roasting of nuts |
| 2211 | 2211 | Publishing of books, brochures, maps etc. |
| 2213 | 2211 | Publishing of sheet music |
| 2213 | 2213 | Publishing of recorded media |
| 2892 | 2892 | Treatment and coating of metals; except "while-you-wait" services (2892 in NIC-2004 is mapped to only 2892 in NIC-1998, the portion to 5260 is not considered. I deal with only manufacturing sector in this study) |
| 2892 | 5260 | "While-you-wait" services, engraving of metals (5260 is not considered. I deal with only manufacturing sector in this study) |
| 2926 | 2926 | Manuf. of machinery for textile, apparel and leather production |
| 2926 | 2929 | Manuf. of machines for extruding, drawing, texturing, and manufacturing or cutting man-made textile fibres, materials or yarns production |
| 2929 | 2929 | Manuf. of other special-purpose machinery |

### A.1.2 WBES and NIC Data

Table A.1: Concordance of WBES to NIC/ISIC

| WBES Description | NIC498/ISIC Sector | NIC/ISIC Description |
|---|---|---|
| Garments | 1729 | other textiles n.e.c. |
| | 1730 | knitted and crocheted fabrics and articles |
| Rubber & rubber products | 2511 | rubber tyres and tubes; retreading and rebuilding of rubber tyres |
| | 2519 | other rubber products |
| Other chemicals | 2411 | basic chemicals except fertilizers and nitrogen compounds |
| | 2412 | fertilizers and nitrogen compounds |
| | 2429 | other chemical product n.e.c. |
| | 2430 | man-made fibers |
| Mining | 2310 | coke oven products |
| | 2320 | refined petroleum products |
| Mineral processing | 2610 | glass and glass products |
| | 2691 | non-structural non-refractory ceramic ware |
| | 2692 | refractory ceramic products |
| | 2694 | cement, lime and plaster |
| | 2695 | articles of concrete, cement and plaster |
| | 2696 | Cutting, shaping and finishing of stone |

Concordance of WBES to NIC/ISIC (cont.)

| WBES Description | NIC498/ISIC Sector | NIC/ISIC Description |
|---|---|---|
| | 2699 | other non-metallic mineral products n.e.c. |
| Marine food processing | 1512 | Processing and preserving of fish and fish products |
| | 1532 | starches and starch products |
| Agro processing | 1533 | prepared animal feeds |
| | 1541 | bakery products |
| | 1543 | cocoa, chocolate and sugar confectionery |
| | 1544 | macaroni, noodles, couscous and similar farinaceous products |
| Wood and furniture | 2010 | Saw milling and planing of wood |
| | 2021 | veneer sheets; plywood, laminboard, particle, other panels and boards |
| | 2022 | builders' carpentry and joinery |
| | 2023 | Manufacturing of wooden containers |
| | 3610 | furniture |
| | 2029 | other products of wood, articles of cork, straw and plaiting materials |
| Textiles | 1711 | Preparation, spinning of textile fiber incl. weaving of textiles |
| | 1721 | made-up textile articles, except apparel |
| | 1722 | carpet and rugs other than by hand |
| | 1723 | cordage, rope, twine and netting |
| Drugs & pharm | 2423 | pharmaceuticals, medicinal chemicals and botanical products |

Concordance of WBES to NIC/ISIC (cont.)

| WBES Description | NIC498/ISIC Sector | NIC/ISIC Description |
|---|---|---|
| | 1600 | tobacco products |
| Electronics inc. consumer durables | 2930 | domestic appliances, n.e.c. |
| | 3000 | office, accounting and computing machinery |
| | 3110 | electric motors, generators and transformers |
| | 3130 | insulated wire and cable |
| | 3140 | accumulators, primary cells and primary batteries |
| | 3150 | electric lamps and lighting equipment |
| | 3190 | other electrical equipment n.e.c. |
| | 3210 | electronic valves, tubes and other electronic components |
| | 3220 | television, radio transmitters, apparatus for line telephony, telegraphy |
| | 3230 | television, radio receivers, sound/video recording |
| | 3694 | games and toys |
| Electrical appliances inc. white goods | 3311 | medical equipment, orthopaedic appliances |
| | 3320 | optical instruments and photographic equipment |
| | 3330 | watches and clocks |
| | 3692 | musical instruments |
| | 3693 | sports goods |
| Machine tools inc. machinery & parts | 2912 | pumps, compressors, taps and valves |

Concordance of WBES to NIC/ISIC (cont.)

| WBES Description | NIC498/ISIC Sector | NIC/ISIC Description |
|---|---|---|
| | 2919 | other general purpose machinery |
| | 2921 | agricultural and forestry machinery |
| | 2922 | machine-tools |
| | 3511 | Building and repairing of ships |
| | 2924 | machinery for mining, quarrying and construction |
| | 2925 | machinery for food, beverage and tobacco processing |
| Auto components | 3410 | motor vehicles |
| | 3520 | railway and tramway locomotives and rolling stock |
| | 3530 | aircraft and spacecraft |
| | 3591 | motorcycles |
| | 3592 | bicycles and invalid carriages |
| | 3599 | other transport equipment n.e.c. |
| Leather & leather products | 1810 | wearing apparel, except fur apparel |
| | 1820 | Dressing and dyeing of fur; articles of fur |
| | 1911 | Tanning and dressing of leather |
| | 1912 | luggage, handbags, and the like, saddlery and harness |
| | 1920 | footwear. |
| Sugar | 1553 | malt liquors and malt |

Concordance of WBES to NIC/ISIC (cont.)

| WBES Description | NIC498/ISIC Sector | NIC/ISIC Description |
|---|---|---|
| | 1554 | soft drinks; production of mineral waters |
| | 1542 | sugar |
| Food processing | 1511 | Production, processing and preserving of meat products. |
| | 1513 | Processing and preserving of fruit, vegetables and edible nuts |
| | 1514 | Vegetable and animal oils and fats |
| | 1520 | dairy product |
| | 1531 | grain mill products |
| | 1551 | Distilling, rectifying and blending of spirits |
| | 1552 | wines |
| Plastics & plastic products | 2413 | plastics in primary forms and of synthetic rubber. |
| | 2520 | plastic products |
| Paper & paper products | 2101 | pulp, paper and paper board |
| | 2102 | corrugated paper and paper board, containers |
| | 2109 | other articles of paper and paperboard |
| | 2212 | Publishing of newspapers, journals and periodicals |
| | 2219 | Other publishing |
| | 2221 | Printing |
| | 2222 | Service activities related to printing |

Concordance of WBES to NIC/ISIC (cont.)

| WBES Description | NIC498/ISIC Sector | NIC/ISIC Description |
|---|---|---|
| Structural metals and metal products | 2710 | Manufacture of basic iron and steel |
| | 2720 | basic precious and non-ferrous metals |
| | 2811 | structural metal products |
| | 2812 | tanks, reservoirs and containers of metal |
| | 2813 | steam generators, except central heating hot water boilers |
| | 2893 | cutlery, hand tools and general hardware |
| | 2899 | other fabricated metal products n.e.c. |
| | 3691 | jewellery and related articles |
| Paints and varnishes | 2422 | paints, varnishes, printing ink and mastics |
| Cosmetics and toiletries | 2424 | soap, detergents, cleaning, polishing, perfumes, toilet prep |

## A.2 Chapter 3

### A.2.1 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.

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

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:

$$v = E + \sum_{i=1}^{n} s_i(p_i) \tag{A.2}$$

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[1]. 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 $\pi_i$ 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[2]. 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:

$$W = 1 + \sum_{i=1}^{n} \pi_i + \sum_{i=1}^{n} t_i M_i + \sum_{i=1}^{n} s_i \tag{A.3}$$

Those who own a specific input will have a direct interest in the tax applicable to trade

[1] 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.

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

in the good[3]. The owners of specific factors can choose to organize their interests into lobby groups for political activity[4], 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. $\alpha_i$ 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:

$$W_i = \pi_i + \alpha_i(1 + \sum_{j=1}^{n}(t_j M_j) + \sum_{j=1}^{n}(s_j)) \tag{A.4}$$

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

$$C_i = [\pi_i + \alpha_i(1 + \sum_{j=1}^{n}(t_j M_j) + \sum_{j=1}^{n}(s_j))] - B_i \tag{A.5}$$

This shows the contributions of a lobby group in sector $i$ should be directly related to its rents $\pi_i$ , 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 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 $\alpha_i$, 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.

$$G = \sum_{i \in L} C_i + aW \tag{A.6}$$

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

[3]This goes beyond the general consumer interest in trade policies that affect domestic prices.
[4]This collective action has to overcome free-rider problems.

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:

$$\sum_{i\in L} \bigtriangledown C_i^0(p) + a \bigtriangledown W(p^0) = 0 \tag{A.7}$$

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 $B_j$:

$$C_j^T(p, B_j) = max[0, W_j(p) - B_j] \tag{A.8}$$

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:

$$\sum_{i \in L} \bigtriangledown W_i(p^0) + a \bigtriangledown W(p^0) = 0 \tag{A.9}$$

The change in welfare across all organized lobby groups $i \in L$ and change in aggregate welfare from the change in price/tariff in (A.9) can be written as[5]:

$$\begin{aligned} \sum_{i \in L}^{n} \delta_{ij} X_i + \sum_{i \in L}^{n} \alpha_i (M_i + t_i M_i^{'} - d_i)] \\ + a X_i + a[M_i + t_i M_i^{'} - d_i] = 0 \end{aligned} \tag{A.10}$$

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

$$\begin{aligned} \sum_{i \in L}^{n} \delta_{ij} X_i + \sum_{i \in L}^{n} \alpha_i (M_i + t_i M_i^{'} - d_i)] \\ + a X_i + a[M_i + t_i M_i^{'} - d_i] = 0 \end{aligned} \tag{A.11}$$

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.

$$I_j X_i + \alpha_L(-X_i + t_i M_i^{'})] + a + a t_i M_i^{'} = 0 \tag{A.12}$$

Substituting and solving for $t_i$ gives:

$$t_i = -\left(\frac{I_j - \alpha_L}{a + \alpha_L}\right) \frac{X_i}{M_i} \tag{A.13}$$

Multiplying on both sides of the equation:

[5]Note that the change in total consumer surplus $s_i$ is minus the level of consumption $d_i$ , the change in producer surplus $\pi_i$ 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:

$$\begin{aligned} s_i^{'}(p_i) &= d_i \\ \pi_i^{'}(p_i) &= X_i \\ (t_i M_i(p_i)) &= M_i + t_i M_I^{'} \end{aligned}$$

$$\frac{M_i}{p_i} t_i = \left( \frac{I_j - \alpha_L}{a + \alpha_L} \right) \frac{X_i}{-M_i' \frac{p_i}{M_i}} \tag{A.14}$$

Let the positive values of the elasticity of import demand $e_i$ equals $-M_i' \frac{p_i}{M_i}$ and $p_i = p_i^* + t_i$ where international prices $p_i^*$ are assumed equal to[6] 1. Substitution gives:

$$\frac{t_i}{1 + t_i} = \left( \frac{I_j - \alpha_L}{a + \alpha_L} \right) \frac{X_i}{M_i} \frac{1}{e_i} \tag{A.15}$$

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

### A.2.2 Summary Statistics

Table A.2: 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 |

### A.2.3 First Stage Estimates

Table A.3: 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 A.4: Pooled First Stage Estimates: IV1-IV4

| | (I) | (II) | (III) | (IV) |
|---|---|---|---|---|
| Model | IV1 | IV2 | IV3 | 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 A.4 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 A.5: 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 A.5 shows the first stage estimates for the IV strategy above.

### A.2.4 Robustness

Table A.6: Protection for Sale across the Years: OLS vs 2 IVs

| | (I) | | (II) | | (III) | |
|---|---|---|---|---|---|---|
| | 1990 | | 1992 | | 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) | | (V) | | (VI) | |
|---|---|---|---|---|---|---|
| | 1999 | | 2000 | | 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) | | (VIII) | | (IX) | |
|---|---|---|---|---|---|---|
| | 2004 | | 2006 | | 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 A.6 shows the results for PFS assuming all industries are organized. Robust standard errors in parentheses.

Table A.7: Pooled Cross-Sections with Time Dummies: IV

| | (I) | (II) | (III) | (IV) |
|---|---|---|---|---|
| | IV1 | IV2 | IV3 | 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 A.7 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 A.8: Pooled Cross-Sections with Time Dummies: First Stage

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Model | OLS | OLS | OLS | 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 A.8 shows the first stage estimates for the IV strategy in Table A.7.

### A.2.5 Political Organization

Table A.9: 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 A.10: Summary of Political Organization Measures

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

Table A.11: Summary Statistics by Organized and Unorganized Sectors: $I_{iCadot}$

Tariffs by Organized and Unorganized Sectors

| Year | Organized I=1 | | Unorganized I=0 | |
|---|---|---|---|---|
| | Avg. | Max | Avg. | Max |
| | Average | Max | Average | Max |
| 1990 | 84.49 | 180.38 | 84.72 | 318.13 |
| 1992 | 57.85 | 172.86 | 60.86 | 318.13 |
| 1996 | 42.98 | 241.29 | 44.01 | 247.56 |
| 1999 | 33.85 | 100.00 | 38.29 | 206.11 |
| 2000 | 33.43 | 110.00 | 38.44 | 188.50 |
| 2001 | 31.41 | 100.00 | 38.03 | 190.56 |
| 2004 | 28.22 | 100.00 | 34.54 | 165.11 |
| 2006 | 14.30 | 100.00 | 22.17 | 134.44 |
| 2007 | 14.28 | 100.00 | 23.88 | 165.11 |
| Total | 37.87 | 241.29 | 42.77 | 318.13 |

Dependent Variable (t/1+t)*e by Organized and Unorganized Sectors

| Year | Organized I=1 | | Unorganized I=0 | |
|---|---|---|---|---|
| | Avg. | Max | Avg. | Max |
| 1990 | 4.27 | 23.74 | 9.64 | 55.38 |
| 1992 | 3.46 | 23.74 | 8.21 | 55.38 |
| 1996 | 2.91 | 26.49 | 6.66 | 51.84 |
| 1999 | 2.48 | 18.73 | 6.09 | 49.01 |
| 2000 | 2.47 | 19.63 | 6.17 | 47.56 |
| 2001 | 2.36 | 18.73 | 6.05 | 47.73 |
| 2004 | 2.20 | 18.73 | 5.62 | 45.33 |
| 2006 | 1.41 | 18.73 | 4.02 | 41.74 |
| 2007 | 1.38 | 18.73 | 4.22 | 45.33 |
| Total | 2.55 | 26.49 | 6.30 | 55.38 |

X/M by Organized and Unorganized Sectors

| Year | Organized I=1 | | Unorganized I=0 | |
|---|---|---|---|---|
| | Avg. | Max | Avg. | Max |
| 1990 | 95.13 | 2495.71 | 651.87 | 10086.30 |
| 1992 | 34.88 | 606.32 | 846.69 | 13948.44 |
| 1996 | 155.50 | 5716.44 | 304.25 | 4051.37 |
| 1999 | 91.11 | 2058.35 | 137.07 | 1720.80 |
| 2000 | 87.40 | 2848.68 | 183.42 | 3431.56 |
| 2001 | 41.59 | 584.87 | 127.72 | 1071.44 |
| 2004 | 22.09 | 329.87 | 100.83 | 961.17 |
| 2006 | 16.48 | 208.60 | 151.92 | 3608.05 |
| 2007 | 22.76 | 249.09 | 177.40 | 3795.65 |
| Total | 62.97 | 5716.44 | 296.36 | 13948.44 |

Table A.12: 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 A.12 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.

Table A.13: Pooled Cross-Section with Political Organization: $I_{iCadot}$

| | (I) Pooled | (II) Restricted Sample | (III) Restricted Sample Time Dummies | (IV) Drop Outlier | (V) Drop Outlier Restr. Sample | (VI) Drop Outlier Restr. Sample Time Dummies |
|---|---|---|---|---|---|---|
| | IV1 | IV2 | IV3 | IV4 | IV5 | IV6 |
| X/M | 0.0154*** | 0.0120*** | 0.0108*** | 0.0146*** | 0.0115** | 0.0110** |
| | (0.0039) | (0.0046) | (0.0040) | (0.0038) | (0.0046) | (0.0047) |
| X/M*$I_{iCadot}$ | 0.0256* | 0.0225 | -0.0034 | 0.0272** | 0.0236 | 0.0086 |
| | (0.0132) | (0.0158) | (0.0118) | (0.0137) | (0.0164) | (0.0157) |
| yr1 | | | 3.0526 | | | 1.8715 |
| | | | (2.2734) | | | (2.4659) |
| yr2 | | | 0.9989 | | | 0.1520 |
| | | | (1.5766) | | | (1.8819) |
| yr3 | | | 2.6037 | | | 1.1639 |
| | | | (1.7652) | | | (2.3552) |
| yr4 | | | 3.2698*** | | | 2.2611* |
| | | | (1.0885) | | | (1.2738) |
| $N$ | 876 | 386 | 386 | 867 | 382 | 382 |

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

Note: (I) shows the results for the pooled data, (II) restricts the sample till 1999, (III) restricts the sample with time dummies, (IV) drops maximum tariff, (V) data till 1999 and dropping the outlier, finally (VI) results for years till 1999 and dropping the outlier with time dummies.

### A.2.6 Comparison

Table A.14: 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 |

Comparison of Political Organization Measures

| NIC498 | Description | Political Org. (WBES) | Cadot et al Measure |
|---|---|---|---|
| 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 |
| 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 |

Comparison of Political Organization Measures

| NIC498 | Description | Political Org. (WBES) | Cadot et al Measure |
|---|---|---|---|
| 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 |

Comparison of Political Organization Measures

| NIC498 | Description | Political Org. (WBES) | Cadot et al Measure |
|---|---|---|---|
| 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 |
| 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 |

## A.3 Chapter 4

### A.3.1 OLS Estimates

Table A.15: Modified PFS, OLS Estimates

| Variables | (I) Model 1 (OLS1) | (II) Model 2 (OLS2) | (III) Model 3 (OLS3) | (IV) Model 4 (OLS4) |
|---|---|---|---|---|
| | | | *Baseline* | |
| NIC 1511 | 1.05828** | -0.08579 | 0.02069 | 0.46371* |
| | (0.474) | (0.298) | (0.384) | (0.237) |
| NIC 1512 | 0.00266 | 0.00106 | -0.00062 | -0.00015 |
| | (0.002) | (0.001) | (0.001) | (0.001) |
| NIC 1513 | 0.00385*** | 0.00160*** | 0.00102 | 0.00051 |
| | (0.001) | (0.001) | (0.001) | (0.000) |
| NIC 1514 | 0.19667*** | 0.03309 | 0.03595 | -0.01364 |
| | (0.065) | (0.032) | (0.053) | (0.025) |
| NIC 1520 | 0.02790*** | -0.00256 | 0.01090** | -0.00512 |
| | (0.006) | (0.005) | (0.005) | (0.004) |
| NIC 1531 | 0.01320*** | -0.00005 | 0.00754*** | 0.00329** |
| | (0.003) | (0.002) | (0.002) | (0.001) |
| NIC 1532 | 0.03310*** | 0.00564 | 0.00467 | -0.00427 |
| | (0.010) | (0.006) | (0.008) | (0.004) |
| NIC 1533 | 0.00285 | 0.00069 | -0.03828*** | -0.01359** |
| | (0.015) | (0.008) | (0.012) | (0.006) |
| NIC 1541 | 0.00027 | 0.00011 | -0.00520*** | -0.00207** |
| | (0.002) | (0.001) | (0.002) | (0.001) |
| NIC 1542 | 0.00097*** | 0.00003 | 0.00038 | -0.00004 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| NIC 1543 | 0.01089 | 0.00310 | -0.00362 | -0.00081 |
| | (0.008) | (0.004) | (0.007) | (0.003) |
| NIC 1544 | 0.03280** | -0.00729 | -0.00787 | 0.01358 |
| | (0.016) | (0.013) | (0.013) | (0.010) |
| NIC 1551 | 0.37747*** | 0.05306*** | 0.33920*** | 0.04053*** |
| | (0.013) | (0.010) | (0.010) | (0.008) |

Modified PFS, OLS Estimates (cont.)

| Variables | Model 1 (OLS1) | Model 2 (OLS2) | Model 3 (OLS3) | Model 4 (OLS4) |
|---|---|---|---|---|
| | | | *Baseline* | |
| NIC 1552 | 0.19431*** | -0.00185 | 0.14677*** | -0.01785* |
| | (0.016) | (0.013) | (0.013) | (0.010) |
| NIC 1553 | 0.00152** | 0.00006 | -0.00033 | -0.00062** |
| | (0.001) | (0.000) | (0.001) | (0.000) |
| NIC 1554 | 0.00083 | 0.00020 | -0.00034 | -0.00005 |
| | (0.001) | (0.000) | (0.001) | (0.000) |
| NIC 1600 | 0.01233*** | 0.00331*** | 0.01039*** | 0.00276*** |
| | (0.001) | (0.000) | (0.001) | (0.000) |
| NIC 1711 | 0.14817*** | 0.11820*** | 0.03482 | 0.05078* |
| | (0.035) | (0.035) | (0.029) | (0.028) |
| NIC 1721 | 0.07142*** | 0.03715*** | 0.01330 | 0.01478* |
| | (0.020) | (0.011) | (0.016) | (0.009) |
| NIC 1722 | 0.02289*** | 0.00854** | 0.00863 | 0.00445 |
| | (0.008) | (0.004) | (0.007) | (0.003) |
| NIC 1723 | 0.09861*** | 0.07092*** | 0.00015 | 0.02780 |
| | (0.031) | (0.025) | (0.026) | (0.020) |
| NIC 1729 | 2.03005*** | 1.27452 | -0.12902 | 0.45204 |
| | (0.682) | (0.920) | (0.557) | (0.732) |
| NIC 1730 | 0.08463*** | 0.01028 | 0.03087* | 0.00798 |
| | (0.022) | (0.012) | (0.018) | (0.010) |
| NIC 1810 | 0.00500*** | 0.00220*** | 0.00090 | 0.00072 |
| | (0.002) | (0.001) | (0.001) | (0.001) |
| NIC 1820 | 0.18298 | -0.18006*** | -0.03195 | -0.06899 |
| | (0.114) | (0.062) | (0.092) | (0.050) |
| NIC 1911 | 0.13128 | 0.08272 | -0.56200*** | -0.33564* |
| | (0.213) | (0.215) | (0.174) | (0.171) |
| NIC 1912 | 0.04189 | 0.02477 | -0.03850* | -0.00912 |
| | (0.027) | (0.016) | (0.022) | (0.013) |
| NIC 1920 | 0.05333* | 0.04456* | -0.03600 | -0.00567 |
| | (0.028) | (0.025) | (0.023) | (0.020) |

Modified PFS, OLS Estimates (cont.)

| Variables | Model 1 (OLS1) | Model 2 (OLS2) | Model 3 (OLS3) | Model 4 (OLS4) |
|---|---|---|---|---|
| | | | *Baseline* | |
| NIC 2010 | 0.67566*** | -0.16343 | 0.22295* | -0.10431 |
| | (0.148) | (0.194) | (0.121) | (0.155) |
| NIC 2021 | 0.15914*** | 0.08437*** | 0.01042 | 0.02227 |
| | (0.049) | (0.031) | (0.040) | (0.025) |
| NIC 2023 | 0.00797*** | 0.00337*** | 0.00450*** | 0.00215*** |
| | (0.002) | (0.001) | (0.001) | (0.001) |
| NIC 2029 | 0.03990*** | 0.00111 | 0.01964** | -0.00030 |
| | (0.010) | (0.005) | (0.008) | (0.004) |
| NIC 2101 | 0.40684*** | 0.14794* | 0.09490 | 0.08989 |
| | (0.111) | (0.076) | (0.091) | (0.060) |
| NIC 2102 | 0.46018 | 0.82274 | -0.50322** | -0.14136 |
| | (0.295) | (0.548) | (0.241) | (0.437) |
| NIC 2109 | 0.04249** | -0.04100 | -0.01480 | -0.00561 |
| | (0.019) | (0.027) | (0.016) | (0.021) |
| NIC 2212 | 0.23081 | 0.31573 | -0.45386*** | -0.29884 |
| | (0.208) | (0.312) | (0.171) | (0.249) |
| NIC 2219 | 0.00000 | 0.00000 | -0.01022*** | 0.00342 |
| | (0.004) | (0.003) | (0.003) | (0.002) |
| NIC 2221 | 0.43515 | -0.11441 | -1.96917*** | 0.78953 |
| | (0.850) | (0.876) | (0.693) | (0.698) |
| NIC 2222 | 0.00325 | 0.00210 | -0.00805*** | -0.00284 |
| | (0.004) | (0.003) | (0.003) | (0.002) |
| NIC 2310 | 0.06334 | 0.02341 | -0.24676*** | -0.10290** |
| | (0.105) | (0.060) | (0.086) | (0.048) |
| NIC 2320 | 0.02637 | 0.00706 | -0.19440*** | -0.07651** |
| | (0.084) | (0.041) | (0.069) | (0.032) |
| NIC 2411 | 0.01518 | -0.01117 | -0.13304** | 0.04467 |
| | (0.082) | (0.041) | (0.066) | (0.033) |
| NIC 2412 | 0.52111 | 0.67011 | -2.28651*** | -1.94796* |
| | (0.857) | (1.376) | (0.701) | (1.098) |

Modified PFS, OLS Estimates (cont.)

| Variables | Model 1 (OLS1) | Model 2 (OLS2) | Model 3 (OLS3) | Model 4 (OLS4) |
|---|---|---|---|---|
| | | | *Baseline* | |
| NIC 2413 | 0.11781 | 0.05603 | -0.47947*** | -0.08212 |
| | (0.193) | (0.254) | (0.157) | (0.202) |
| NIC 2422 | 0.08364 | -0.02510 | -0.59736*** | 0.15700 |
| | (0.253) | (0.214) | (0.206) | (0.170) |
| NIC 2423 | 0.03200 | 0.02245 | -0.09043*** | -0.03262 |
| | (0.040) | (0.026) | (0.033) | (0.021) |
| NIC 2424 | 0.05325 | 0.01236 | -0.28677*** | 0.04376 |
| | (0.108) | (0.229) | (0.089) | (0.182) |
| NIC 2429 | 0.04061 | 0.02815 | -0.10704*** | -0.04415 |
| | (0.046) | (0.042) | (0.038) | (0.034) |
| NIC 2430 | 0.25235 | 0.29255 | -0.88684*** | -0.66564 |
| | (0.348) | (0.547) | (0.284) | (0.436) |
| NIC 2511 | 0.38520*** | 0.23362** | -0.03675 | 0.10167 |
| | (0.140) | (0.106) | (0.114) | (0.085) |
| NIC 2519 | 0.00504 | 0.00417 | -0.02882*** | -0.01412** |
| | (0.011) | (0.008) | (0.009) | (0.007) |
| NIC 2520 | 0.08262 | 0.07347 | -0.49133*** | -0.27876* |
| | (0.176) | (0.187) | (0.144) | (0.150) |
| NIC 2610 | 0.07352 | 0.07577 | -0.15885*** | -0.08874 |
| | (0.071) | (0.087) | (0.058) | (0.070) |
| NIC 2691 | 0.76613*** | 1.16593*** | 0.10869 | 0.53318* |
| | (0.201) | (0.349) | (0.164) | (0.279) |
| NIC 2692 | 0.13550** | 0.08127* | -0.04917 | 0.00559 |
| | (0.060) | (0.043) | (0.049) | (0.034) |
| NIC 2694 | 0.33928*** | 0.30136*** | 0.06309 | 0.14364** |
| | (0.086) | (0.087) | (0.070) | (0.069) |
| NIC 2695 | 0.00435*** | 0.00213*** | 0.00344*** | 0.00177*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| NIC 2696 | 0.00979*** | 0.00648*** | -0.00137 | 0.00127 |
| | (0.004) | (0.002) | (0.003) | (0.002) |

Modified PFS, OLS Estimates (cont.)

| Variables | Model 1 (OLS1) | Model 2 (OLS2) | Model 3 (OLS3) | Model 4 (OLS4) |
|---|---|---|---|---|
| | | | *Baseline* | |
| NIC 2699 | 0.00248* | 0.00092 | -0.00027 | 0.00019 |
| | (0.001) | (0.001) | (0.001) | (0.000) |
| NIC 2710 | 0.20279** | 0.16015** | -0.06589 | 0.00351 |
| | (0.083) | (0.072) | (0.068) | (0.058) |
| NIC 2720 | 0.22293** | 0.22167 | -0.08227 | 0.10096 |
| | (0.096) | (0.179) | (0.079) | (0.142) |
| NIC 2811 | 1.60168** | 0.90309* | -0.71467 | -0.02238 |
| | (0.772) | (0.478) | (0.631) | (0.382) |
| NIC 2812 | 0.09874*** | 0.05161*** | 0.04158*** | 0.02924*** |
| | (0.019) | (0.011) | (0.016) | (0.009) |
| NIC 2813 | 0.04831*** | 0.02744*** | 0.00556 | 0.00942 |
| | (0.014) | (0.008) | (0.012) | (0.007) |
| NIC 2893 | 0.16343 | 0.01510 | -0.30187** | -0.05108 |
| | (0.148) | (0.214) | (0.121) | (0.170) |
| NIC 2899 | 0.09592 | 0.06044 | -0.38164*** | -0.18263* |
| | (0.150) | (0.118) | (0.122) | (0.094) |
| NIC 2912 | 0.63510** | -0.36153 | -0.25737 | 0.05170 |
| | (0.316) | (0.337) | (0.258) | (0.268) |
| NIC 2919 | 1.37919** | 2.74750 | -0.55168 | -0.15473 |
| | (0.595) | (1.877) | (0.486) | (1.496) |
| NIC 2921 | 0.05594 | 0.02378 | -0.05228 | -0.01535 |
| | (0.053) | (0.022) | (0.043) | (0.018) |
| NIC 2922 | 0.01558 | 0.00492 | -0.01296 | -0.00555 |
| | (0.010) | (0.006) | (0.008) | (0.004) |
| NIC 2924 | 1.73304 | 1.65815* | -1.87803** | -0.04553 |
| | (1.152) | (0.863) | (0.942) | (0.689) |
| NIC 2925 | 0.66137 | 0.40822 | -1.04862** | -0.73453 |
| | (0.526) | (0.680) | (0.431) | (0.542) |
| NIC 2930 | 0.63247 | 0.47786 | -1.52690*** | -0.92859 |
| | (0.666) | (0.761) | (0.545) | (0.607) |

Modified PFS, OLS Estimates (cont.)

| Variables | Model 1 (OLS1) | Model 2 (OLS2) | Model 3 (OLS3) | Model 4 (OLS4) |
|---|---|---|---|---|
| | | | *Baseline* | |
| NIC 3000 | 0.09615*** | 0.04998*** | -0.00046 | 0.01173 |
| | (0.033) | (0.019) | (0.027) | (0.015) |
| NIC 3110 | 0.46893 | 0.31918 | -1.41750*** | -0.32697 |
| | (0.670) | (0.377) | (0.548) | (0.301) |
| NIC 3130 | 0.11799 | 0.07010 | -0.44403*** | -0.26641* |
| | (0.173) | (0.176) | (0.142) | (0.141) |
| NIC 3140 | 0.03861 | 0.02873 | -0.16012*** | -0.06276 |
| | (0.063) | (0.048) | (0.052) | (0.038) |
| NIC 3150 | 0.07615 | 0.03855 | -0.16080** | -0.04404 |
| | (0.081) | (0.051) | (0.066) | (0.041) |
| NIC 3190 | 0.19106** | 0.11179** | -0.05500 | 0.01267 |
| | (0.082) | (0.051) | (0.067) | (0.041) |
| NIC 3210 | 1.14338 | -1.38821* | -0.91665 | 0.05598 |
| | (0.730) | (0.833) | (0.594) | (0.664) |
| NIC 3220 | 0.37643 | -0.75085 | -2.07985*** | 0.70684 |
| | (0.887) | (0.909) | (0.722) | (0.724) |
| NIC 3230 | 0.02936 | -0.00060 | -0.09442* | -0.00259 |
| | (0.063) | (0.029) | (0.051) | (0.023) |
| NIC 3311 | 0.19927 | 0.18050 | -0.39447*** | -0.15094 |
| | (0.185) | (0.190) | (0.151) | (0.151) |
| NIC 3320 | 1.54948 | -1.47940 | -2.87681** | 1.19461 |
| | (1.437) | (2.835) | (1.173) | (2.256) |
| NIC 3330 | 0.74632 | 0.16680 | -1.70262** | 0.02708 |
| | (0.890) | (0.621) | (0.725) | (0.494) |
| NIC 3410 | 0.31650* | 0.24015 | -0.24655* | -0.02933 |
| | (0.179) | (0.158) | (0.146) | (0.126) |
| NIC 3511 | 0.86302*** | -0.43749*** | 0.63026*** | -0.32178*** |
| | (0.077) | (0.119) | (0.063) | (0.095) |
| NIC 3520 | 0.78608 | 0.19610 | -1.44416** | -0.30318 |
| | (0.840) | (0.485) | (0.685) | (0.387) |

Modified PFS, OLS Estimates (cont.)

| Variables | Model 1 (OLS1) | Model 2 (OLS2) | Model 3 (OLS3) | Model 4 (OLS4) |
|---|---|---|---|---|
| | | | *Baseline* | |
| NIC 3530 | 0.13020 | 0.03565 | -0.23455** | -0.07990 |
| | (0.120) | (0.099) | (0.098) | (0.079) |
| NIC 3591 | 0.66968 | 0.22966 | -2.16524** | -0.23781 |
| | (1.337) | (0.625) | (1.086) | (0.497) |
| NIC 3592 | 0.00838*** | -0.00003 | 0.00258 | 0.00133 |
| | (0.002) | (0.002) | (0.002) | (0.001) |
| NIC 3599 | 0.11942*** | 0.08345*** | 0.03891* | 0.04787*** |
| | (0.026) | (0.022) | (0.021) | (0.018) |
| NIC 3594 | 0.00167 | 0.00039 | -0.00046 | 0.00014 |
| | (0.001) | (0.001) | (0.001) | (0.001) |
| NIC 3610 | 0.02180* | 0.01035** | -0.00555 | 0.00046 |
| | (0.011) | (0.005) | (0.009) | (0.004) |
| NIC 3691 | 0.13773 | 0.05579 | -0.12735 | -0.03790 |
| | (0.099) | (0.050) | (0.081) | (0.040) |
| NIC 3692 | 0.04884 | -0.00401 | -0.16719 | -0.05326 |
| | (0.145) | (0.059) | (0.117) | (0.047) |
| NIC 3693 | 0.14515 | -0.02183 | -0.42846** | -0.02071 |
| | (0.213) | (0.152) | (0.174) | (0.121) |
| NIC 3694 | 0.32823 | -0.14961 | -0.26656 | 0.00289 |
| | (0.210) | (0.204) | (0.171) | (0.162) |
| Sector FE | | Yes | | Yes |
| Year FE | | | Yes | Yes |
| Observations | 876 | 876 | 876 | 876 |
| R-squared | 0.729 | 0.966 | 0.828 | 0.979 |

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

### A.3.2 First Stage Estimates

Table A.16: First Stage Estimates Summary

| Variable | IV1 | | IV2 | | IV3 | | IV4 | |
|---|---|---|---|---|---|---|---|---|
| | Shea Partial R2 | F | Shea Partial R2 | F | Shea Partial R2 | F | Shea Partial R2 | F |
| X/M*1511 | 0.9089 | 75.73 | 0.8111 | 28.62 | 0.6513 | 75.16 | 0.3482 | 28.33 |
| X/M*1512 | 0.0534 | 0.44 | 0.5417 | 7.88 | 0.0374 | 0.45 | 0.1889 | 7.8 |
| X/M*1513 | 0.0759 | 0.71 | 0.3936 | 4.33 | 0.0635 | 0.75 | 0.1685 | 4.29 |
| X/M*1514 | 0.4679 | 6.68 | 0.2411 | 2.12 | 0.2761 | 6.63 | 0.1657 | 2.14 |
| X/M*1520 | 0.7798 | 26.89 | 0.0625 | 0.44 | 0.4896 | 26.58 | 0.0236 | 0.45 |
| X/M*1531 | 0.7407 | 21.85 | 0.7936 | 25.63 | 0.45 | 21.61 | 0.2928 | 25.39 |
| X/M*1532 | 0.3649 | 4.37 | 0.1561 | 1.23 | 0.2482 | 4.36 | 0.0768 | 1.26 |
| X/M*1533 | 0.2864 | 3.05 | 0.4211 | 4.85 | 0.1958 | 3.06 | 0.1714 | 4.8 |
| X/M*1541 | 0.4475 | 6.15 | 0.5503 | 8.16 | 0.2843 | 6.09 | 0.2264 | 8.08 |
| X/M*1542 | 0.4201 | 5.55 | 0.235 | 2.05 | 0.2599 | 5.5 | 0.0888 | 2.03 |
| X/M*1543 | 0.1422 | 1.26 | 0.175 | 1.41 | 0.105 | 1.26 | 0.1158 | 1.41 |
| X/M*1544 | 0.8289 | 37.09 | 0.4811 | 6.18 | 0.5027 | 36.77 | 0.1874 | 6.14 |
| X/M*1551 | 0.7001 | 17.72 | 0.1282 | 0.98 | 0.4293 | 17.55 | 0.0755 | 1 |
| X/M*1552 | 0.8576 | 45.7 | 0.298 | 2.83 | 0.5507 | 45.26 | 0.2029 | 2.86 |

First Stage Estimates Summary (cont.)

| Variable | IV1 | | IV2 | | IV3 | | IV4 | |
|---|---|---|---|---|---|---|---|---|
| | Shea Partial R2 | F | Shea Partial R2 | F | Shea Partial R2 | F | Shea Partial R2 | F |
| X/M*1553 | 0.2403 | 2.4 | 0.2134 | 1.81 | 0.1666 | 2.41 | 0.1196 | 1.81 |
| X/M*1554 | 0.1299 | 1.14 | 0.4593 | 5.66 | 0.1033 | 1.15 | 0.3384 | 5.62 |
| X/M*1600 | 0.5423 | 9.01 | 0.0707 | 8.51 | 0.3203 | 8.93 | 0.0597 | 6.87 |
| X/M*1711 | 0.9292 | 113.84 | 0.7912 | 213.57 | 0.5567 | 117.65 | 0.2969 | 174 |
| X/M*1721 | 0.1398 | 1.31 | 0.3852 | 4.18 | 0.1231 | 1.44 | 0.1818 | 4.14 |
| X/M*1722 | 0.0447 | 0.36 | 0.3984 | 4.41 | 0.0391 | 0.42 | 0.2253 | 4.38 |
| X/M*1723 | 0.5741 | 10.24 | 0.0702 | 0.5 | 0.4047 | 10.23 | 0.0383 | 0.51 |
| X/M*1729 | 0.7197 | 19.61 | 0.0169 | 0.11 | 0.5257 | 19.64 | 0.0079 | 0.12 |
| X/M*1730 | 0.4803 | 7.58 | 0.0025 | 0.02 | 0.315 | 7.48 | 0.0013 | 0.03 |
| X/M*1810 | 0.3107 | 4.91 | 0.4027 | 9.58 | 0.2392 | 5.1 | 0.1673 | 8.46 |
| X/M*1820 | 0.8896 | 61.15 | 0.7668 | 21.92 | 0.7046 | 60.46 | 0.5144 | 21.7 |
| X/M*1911 | 0.8771 | 54.17 | 0.1223 | 0.93 | 0.5185 | 53.66 | 0.1007 | 0.99 |
| X/M*1912 | 0.2864 | 3.06 | 0.584 | 9.36 | 0.2041 | 3.12 | 0.2176 | 9.26 |
| X/M*1920 | 0.6285 | 12.94 | 0.4935 | 6.5 | 0.4084 | 12.76 | 0.2586 | 6.43 |
| X/M*2010 | 0.8217 | 34.97 | 0.0175 | 0.12 | 0.4448 | 35.01 | 0.0058 | 0.12 |
| X/M*2021 | 0.6548 | 14.39 | 0.0122 | 0.08 | 0.3914 | 14.26 | 0.0114 | 0.14 |

First Stage Estimates Summary (cont.)

| Variable | IV1 | | IV2 | | IV3 | | IV4 | |
|---|---|---|---|---|---|---|---|---|
| | Shea Partial R2 | F | Shea Partial R2 | F | Shea Partial R2 | F | Shea Partial R2 | F |
| X/M*2022 | 0.1293 | 1.13 | 0.1337 | 1.03 | 0.0825 | 1.13 | 0.0799 | 1.06 |
| X/M*2023 | 0.3073 | 3.37 | 0.0172 | 0.12 | 0.1884 | 3.34 | 0.0144 | 0.13 |
| X/M*2029 | 0.7554 | 23.44 | 0.3588 | 3.73 | 0.4444 | 23.26 | 0.3197 | 3.74 |
| X/M*2101 | 0.9292 | 99.74 | 0.0012 | 0.01 | 0.5575 | 98.59 | 0.0009 | 0.06 |
| X/M*2102 | 0.9557 | 163.86 | 0.5367 | 7.72 | 0.6498 | 162.06 | 0.2087 | 7.64 |
| X/M*2109 | 0.7106 | 18.64 | 0.5273 | 7.44 | 0.4975 | 18.65 | 0.2237 | 7.35 |
| X/M*2212 | 0.7714 | 25.61 | 0.6059 | 10.25 | 0.4659 | 25.33 | 0.3099 | 10.15 |
| X/M*2219 | 0.7554 | 23.45 | 0.1175 | 0.89 | 0.4422 | 23.22 | 0.1102 | 0.91 |
| X/M*2221 | 0.6664 | 15.16 | 0.0885 | 0.65 | 0.4087 | 15 | 0.0508 | 0.67 |
| X/M*2222 | 0.4402 | 5.97 | 0.1614 | 1.28 | 0.2828 | 5.93 | 0.1242 | 1.3 |
| X/M*2310 | 0.1698 | 1.57 | 0.0057 | 0.04 | 0.1207 | 1.63 | 0.0029 | 0.09 |
| X/M*2320 | 0.8109 | 38.81 | 0.7857 | 49.93 | 0.6556 | 38.66 | 0.3935 | 44.35 |
| X/M*2411 | 0.9194 | 86.65 | 0.0532 | 0.37 | 0.5621 | 85.71 | 0.0236 | 0.41 |
| X/M*2412 | 0.9149 | 81.57 | 0.0048 | 0.03 | 0.547 | 80.68 | 0.0039 | 0.05 |
| X/M*2413 | 0.8187 | 34.26 | 0.0921 | 0.68 | 0.5064 | 33.87 | 0.038 | 0.68 |
| X/M*2422 | 0.7747 | 26.1 | 0.416 | 4.75 | 0.451 | 25.97 | 0.2936 | 4.77 |

First Stage Estimates Summary (cont.)

| Variable | IV1 | | IV2 | | IV3 | | IV4 | |
|---|---|---|---|---|---|---|---|---|
| | Shea Partial R2 | F | Shea Partial R2 | F | Shea Partial R2 | F | Shea Partial R2 | F |
| X/M*2423 | 0.8882 | 61.14 | 0.0102 | 0.07 | 0.5607 | 60.17 | 0.0042 | 0.08 |
| X/M*2424 | 0.7256 | 20.08 | 0.3616 | 3.78 | 0.4555 | 19.86 | 0.1868 | 3.76 |
| X/M*2429 | 0.9423 | 123.83 | 0.024 | 0.16 | 0.5643 | 122.56 | 0.0112 | 0.22 |
| X/M*2430 | 0.7351 | 21.06 | 0.0001 | 0 | 0.4416 | 20.83 | 0.0004 | 0.04 |
| X/M*2511 | 0.7313 | 20.66 | 0.1887 | 1.55 | 0.4456 | 20.46 | 0.0793 | 1.6 |
| X/M*2519 | 0.7971 | 29.82 | 0.2284 | 1.97 | 0.5017 | 29.5 | 0.0932 | 1.98 |
| X/M*2520 | 0.6834 | 16.77 | 0.7645 | 21.65 | 0.4478 | 16.47 | 0.2944 | 21.44 |
| X/M*2610 | 0.7889 | 28.49 | 0.1995 | 1.66 | 0.4825 | 28.34 | 0.1103 | 1.72 |
| X/M*2691 | 0.6979 | 17.53 | 0.0272 | 0.19 | 0.4183 | 17.36 | 0.0254 | 0.23 |
| X/M*2692 | 0.5917 | 11.91 | 0.4561 | 5.59 | 0.3874 | 11.64 | 0.3169 | 5.57 |
| X/M*2694 | 0.4065 | 5.2 | 0.0663 | 0.47 | 0.2421 | 5.15 | 0.0406 | 0.52 |
| X/M*2695 | 0.278 | 3.32 | 0.65 | 12.38 | 0.1638 | 3.38 | 0.2919 | 12.27 |
| X/M*2696 | 0.1356 | 1.2 | 0.2759 | 2.54 | 0.0901 | 1.19 | 0.1354 | 2.53 |
| X/M*2699 | 0.9473 | 136.54 | 0.7301 | 18.04 | 0.5222 | 135.39 | 0.2772 | 17.89 |
| X/M*2710 | 0.9053 | 74.75 | 0.4674 | 5.85 | 0.4918 | 74.89 | 0.4018 | 5.79 |
| X/M*2720 | 0.5126 | 8.01 | 0.6777 | 14.02 | 0.3035 | 7.91 | 0.281 | 13.87 |

First Stage Estimates Summary (cont.)

| Variable | IV1 | | IV2 | | IV3 | | IV4 | |
|---|---|---|---|---|---|---|---|---|
| | Shea Partial R2 | F | Shea Partial R2 | F | Shea Partial R2 | F | Shea Partial R2 | F |
| X/M*2811 | 0.4655 | 6.71 | 0.006 | 0.04 | 0.2931 | 6.64 | 0.0056 | 0.08 |
| X/M*2812 | 0.7104 | 18.61 | 0.3177 | 3.1 | 0.4097 | 18.47 | 0.185 | 3.11 |
| X/M*2813 | 0.9614 | 189.29 | 0.5146 | 7.07 | 0.5961 | 187.13 | 0.45 | 7.05 |
| X/M*2893 | 0.8198 | 34.53 | 0.2579 | 2.32 | 0.4827 | 34.26 | 0.1918 | 2.38 |
| X/M*2899 | 0.7859 | 28.23 | 0.2972 | 2.82 | 0.6119 | 27.79 | 0.1329 | 2.8 |
| X/M*2912 | 0.9221 | 89.96 | 0.3583 | 3.72 | 0.5826 | 88.77 | 0.1636 | 3.69 |
| X/M*2919 | 0.3226 | 3.61 | 0.166 | 1.33 | 0.182 | 3.59 | 0.076 | 1.32 |
| X/M*2921 | 0.505 | 7.74 | 0.1528 | 1.2 | 0.3034 | 7.66 | 0.1223 | 1.21 |
| X/M*2922 | 0.8681 | 49.92 | 0.4932 | 6.49 | 0.4864 | 49.55 | 0.2123 | 6.48 |
| X/M*2924 | 0.9034 | 70.97 | 0.0047 | 0.03 | 0.5397 | 70.25 | 0.0037 | 0.09 |
| X/M*2925 | 0.8711 | 51.28 | 0.0425 | 0.3 | 0.5125 | 50.76 | 0.0343 | 0.34 |
| X/M*2930 | 0.6234 | 12.56 | 0.2063 | 1.73 | 0.3683 | 12.47 | 0.1482 | 1.78 |
| X/M*3000 | 0.7473 | 22.44 | 0.537 | 7.73 | 0.4374 | 22.41 | 0.294 | 7.8 |
| X/M*3110 | 0.6194 | 12.53 | 0.3117 | 3.02 | 0.3866 | 12.31 | 0.1676 | 3.02 |
| X/M*3130 | 0.5128 | 8.11 | 0.0939 | 0.69 | 0.308 | 8.38 | 0.0441 | 0.73 |
| X/M*3140 | 0.3892 | 4.84 | 0.9348 | 95.58 | 0.2578 | 4.86 | 0.3858 | 94.55 |

First Stage Estimates Summary (cont.)

| Variable | IV1 | | IV2 | | IV3 | | IV4 | |
|---|---|---|---|---|---|---|---|---|
| | Shea Partial R2 | F | Shea Partial R2 | F | Shea Partial R2 | F | Shea Partial R2 | F |
| X/M*3150 | 0.4148 | 5.38 | 0.243 | 2.14 | 0.28 | 5.38 | 0.1211 | 2.17 |
| X/M*3190 | 0.9412 | 121.68 | 0.7039 | 15.85 | 0.693 | 121.17 | 0.2903 | 15.67 |
| X/M*3210 | 0.9621 | 192.76 | 0.7493 | 19.92 | 0.6783 | 190.73 | 0.3141 | 19.71 |
| X/M*3220 | 0.4514 | 6.24 | 0.1637 | 1.31 | 0.2848 | 6.18 | 0.123 | 1.3 |
| X/M*3230 | 0.7094 | 18.59 | 0.0248 | 0.17 | 0.4578 | 18.46 | 0.0126 | 0.23 |
| X/M*3311 | 0.9226 | 90.53 | 0.063 | 0.45 | 0.6013 | 89.58 | 0.0312 | 0.45 |
| X/M*3320 | 0.6595 | 14.7 | 0.0001 | 0 | 0.44 | 14.55 | 0.0001 | 0.01 |
| X/M*3330 | 0.9108 | 77.44 | 0.583 | 9.32 | 0.5225 | 76.92 | 0.3188 | 9.28 |
| X/M*3410 | 0.9201 | 92.16 | 0.2156 | 1.83 | 0.6036 | 91.08 | 0.1095 | 1.82 |
| X/M*3511 | 0.6262 | 12.71 | 0.1291 | 0.99 | 0.3795 | 12.61 | 0.0923 | 1.03 |
| X/M*3520 | 0.6413 | 13.71 | 0.1684 | 1.35 | 0.3728 | 14.21 | 0.0647 | 1.34 |
| X/M*3530 | 0.4125 | 5.33 | 0.0964 | 0.71 | 0.234 | 5.27 | 0.056 | 0.71 |
| X/M*3591 | 0.6036 | 11.67 | 0.0014 | 0.01 | 0.3899 | 11.5 | 0.0009 | 0.02 |
| X/M*3592 | 0.8783 | 54.74 | 0.366 | 3.85 | 0.5155 | 54.23 | 0.2306 | 3.85 |
| X/M*3599 | 0.5709 | 10.1 | 0.2383 | 2.09 | 0.4609 | 10 | 0.1533 | 8 |
| X/M*3610 | 0.1536 | 1.38 | 0.4472 | 5.39 | 0.1029 | 1.38 | 0.1955 | 5.35 |

First Stage Estimates Summary (cont.)

| Variable | IV1 | | IV2 | | IV3 | | IV4 | |
|---|---|---|---|---|---|---|---|---|
| | Shea Partial R2 | F | Shea Partial R2 | F | Shea Partial R2 | F | Shea Partial R2 | F |
| X/M*3691 | 0.1753 | 1.85 | 0.2872 | 2.69 | 0.105 | 1.82 | 0.1318 | 2.66 |
| X/M*3692 | 0.3036 | 3.31 | 0.237 | 2.07 | 0.1634 | 3.31 | 0.0724 | 2.06 |
| X/M*3693 | 0.5595 | 9.65 | 0.0079 | 0.05 | 0.4082 | 9.63 | 0.0033 | 0.06 |
| X/M*3694 | 0.8076 | 31.89 | 0.0397 | 0.28 | 0.554 | 31.57 | 0.0142 | 0.28 |

### A.3.3 Comparison

Table A.17: Comparison with previous estimates on India

| NIC498 | I1 | Cadot et al | Effectiveness |
|---|---|---|---|
| 1511 | 1 | 1 | 0.894334 |
| 1512 | 1 | 0 | 0.887439 |
| 1513 | 1 | 0 | 0.888718 |
| 1514 | 1 | 0 | 0.908373 |
| 1520 | 1 | 0 | 0.89082 |
| 1531 | 1 | 0 | 0.88984 |
| 1532 | 1 | 0 | 0.890966 |
| 1533 | 1 | 0 | 0.875721 |
| 1541 | 1 | 0 | 0.886638 |
| 1542 | 1 | 0 | 0.888239 |
| 1543 | 1 | 0 | 0.885498 |
| 1544 | 1 | 0 | 0.88611 |
| 1551 | 1 | 0 | 0.969811 |
| 1552 | 1 | 1 | 0.918997 |
| 1553 | 0 | 0 | 0.888138 |
| 1554 | 0 | 1 | 0.887772 |
| 1600 | 1 | 0 | 0.891139 |
| 1711 | 1 | 0 | 0.893962 |
| 1721 | 1 | 0 | 0.887595 |
| 1722 | 1 | 0 | 0.893969 |
| 1723 | 1 | 0 | 0.885972 |
| 1729 | 1 | 1 | 0.84647 |
| 1730 | 1 | 0 | 0.896201 |
| 1810 | 1 | 1 | 0.889411 |
| 1820 | 1 | 0 | 0.880521 |
| 1911 | 1 | 0 | 0.786959 |
| 1912 | 1 | 1 | 0.875753 |
| 1920 | 0 | 0 | 0.880574 |
| 2010 | 0 | 0 | 0.94829 |
| 2021 | 0 | 0 | 0.889417 |

Comparison with previous estimates on India (cont.)

| NIC498 | I1 | Cadot et al | Effectiveness |
|---|---|---|---|
| 2022 | 0 | 0 | 0.890714 |
| 2023 | 0 | 0 | 0.897996 |
| 2029 | 0 | 0 | 0.907327 |
| 2101 | 1 | 1 | 0.800116 |
| 2102 | 1 | 0 | 0.885549 |
| 2109 | 1 | 1 | 0.806697 |
| 2212 | 1 | 0 | 0.8855 |
| 2219 | 1 | 1 | 0.458157 |
| 2221 | 1 | 1 | 0.886313 |
| 2222 | 1 | 0 | 0.822747 |
| 2310 | 1 | 0 | 0.81131 |
| 2320 | 1 | 1 | 0.850249 |
| 2411 | 1 | 1 | 0.495878 |
| 2412 | 1 | 1 | 0.799478 |
| 2413 | 0 | 1 | 0.756821 |
| 2422 | 0 | 1 | 0.869163 |
| 2423 | 1 | 1 | 0.839497 |
| 2424 | 0 | 0 | 0.867064 |
| 2429 | 1 | 1 | 0.735254 |
| 2430 | 1 | 1 | 0.876824 |
| 2511 | 1 | 0 | 0.882213 |
| 2519 | 1 | 1 | 0.797833 |
| 2520 | 0 | 1 | 0.859462 |
| 2610 | 1 | 0 | 0.90838 |
| 2691 | 1 | 0 | 0.876529 |
| 2692 | 1 | 0 | 0.900206 |
| 2694 | 1 | 0 | 0.889096 |
| 2695 | 1 | 0 | 0.887893 |
| 2696 | 1 | 0 | 0.887733 |
| 2699 | 1 | 0 | 0.877327 |
| 2710 | 1 | 0 | 0.873585 |

Comparison with previous estimates on India (cont.)

| NIC498 | I1 | Cadot et al | Effectiveness |
|---|---|---|---|
| 2720 | 1 | 1 | 0.692024 |
| 2811 | 1 | 0 | 0.896569 |
| 2812 | 1 | 0 | 0.888997 |
| 2813 | 1 | 1 | 0.837325 |
| 2893 | 1 | 1 | 0.814237 |
| 2899 | 1 | 1 | 0.842606 |
| 2912 | 1 | 1 | 0.799295 |
| 2919 | 1 | 1 | 0.863911 |
| 2921 | 1 | 0 | 0.884799 |
| 2922 | 1 | 1 | 0.514211 |
| 2924 | 1 | 1 | 0.706773 |
| 2925 | 1 | 1 | 0.6087 |
| 2930 | 1 | 1 | 0.887226 |
| 3000 | 1 | 1 | 0.563615 |
| 3110 | 1 | 1 | 0.805156 |
| 3130 | 1 | 0 | 0.860403 |
| 3140 | 1 | 0 | 0.841359 |
| 3150 | 1 | 1 | 0.869665 |
| 3190 | 1 | 1 | 0.73492 |
| 3210 | 1 | 1 | 0.527679 |
| 3220 | 1 | 1 | 0.853193 |
| 3230 | 1 | 1 | 0.810172 |
| 3311 | 1 | 1 | 0.396709 |
| 3320 | 1 | 1 | 0.4905 |
| 3330 | 1 | 1 | 0.842582 |
| 3410 | 1 | 0 | 1 |
| 3511 | 1 | 1 | 0.520144 |
| 3520 | 1 | 1 | 0.839726 |
| 3530 | 1 | 1 | 0 |
| 3591 | 0 | 0 | 0.888849 |
| 3592 | 0 | 1 | 0.895561 |

Comparison with previous estimates on India (cont.)

| NIC498 | I1 | Cadot et al | Effectiveness |
|---|---|---|---|
| 3599 | 0 | 1 | 0.887869 |
| 3610 | 0 | 0 | 0.883526 |
| 3691 | 0 | 1 | 0.812996 |
| 3692 | 0 | 0 | 0.788624 |
| 3693 | 0 | 0 | 0.790138 |
| 3694 | 1 | 1 | 0.835894 |

Note: Table compares the political organization measures based on Cadot et al (2007) with the lobbying effectiveness measures estimated across the industries at the 4-digit of ISIC.

## A.4 Chapter 5

### A.4.1 Summary Statistics

Table A.18: WBES Sample

| WBES Sector | Firms | % Firms | Members* | Additional** |
|---|---|---|---|---|
| Garments | 275 | 12.03 | 205 | 255 |
| Textiles | 222 | 9.71 | 196 | 207 |
| Drugs & Pharma | 165 | 7.22 | 137 | 154 |
| Electronics inc. Consumer Durables | 100 | 4.37 | 80 | 92 |
| Electrical Appliances inc. white goods | 155 | 6.78 | 125 | 142 |
| Machine tools inc. Machinery & parts | 195 | 8.53 | 152 | 183 |
| Auto Components | 218 | 9.54 | 167 | 208 |
| Leather & leather products | 74 | 3.24 | 34 | 62 |
| Sugar | 4 | 0.17 | 4 | 4 |
| Food Processing | 155 | 6.78 | 124 | 140 |
| Plastics & plastics products | 122 | 5.34 | 104 | 115 |
| Rubber & rubber products | 38 | 1.66 | 34 | 35 |
| Paper & paper products | 24 | 1.05 | 20 | 20 |
| Structural metals and metal products | 303 | 13.25 | 186 | 272 |
| Paints and varnishes | 20 | 0.87 | 16 | 19 |
| Cosmetics and toiletries | 13 | 0.57 | 6 | 11 |
| Other chemicals | 112 | 4.9 | 94 | 109 |
| Mining | 3 | 0.13 | 2 | 3 |
| Mineral processing | 32 | 1.4 | 28 | 28 |
| Marine food processing | 14 | 0.61 | 11 | 12 |
| Agro processing | 26 | 1.14 | 17 | 24 |
| Wood and furniture | 16 | 0.7 | 3 | 13 |
| Total | 2,286 | 100 | 1745 | 2108 |

Note: Table A.18 presents the sampling distribution of the WBES survey. There are 22 sectors in total, with 2,286 firms distributed across the sectors. *% Firms* shows the percentage of firms in each sector. **Members* shows the number of firms that are members of associations in every sector. ***Additional* shows the number of firms that report having direct interactions (additional political factors) with the government.

### A.4.2 First Stage Estimates

Table A.19: Protection for Sale with Lobbying Effectiveness: First Stage

| | **Model 1** | | **Model 2** | |
|---|---|---|---|---|
| *Dependent Variables:* | X/M | X/M*$\gamma_i^a$ | X/M | X/M*$\gamma_i^b$ |
| | (I) | (II) | (III) | (IV) |
| **Instrumental Variables** | | | | |
| *Lag Inventories* | 0.009** | 0.006** | 0.009** | 0.008** |
| | (0.0041) | (0.0032) | (0.0038) | (0.0031) |
| *Workers Squared* | -0.003*** | -0.003*** | -0.004*** | -0.003*** |
| | (0.0007) | (0.0006) | (0.0010) | (0.0008) |
| *Lag Workers*$*\gamma_i^a$ | -0.006* | -0.004* | | |
| | (0.0039) | (0.0030) | | |
| *Lag Workers*$*\gamma_i^b$ | | | -0.006* | -0.005* |
| | | | (0.0035) | (0.0028) |
| *Centered R-Square* | 0.0386 | 0.0520 | 0.0384 | 0.0438 |
| *Shea Partial R-Square* | 0.0196 | 0.0223 | 0.0026 | 0.0028 |
| N | 876 | 876 | 876 | 876 |

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Note: Table A.19 shows the first stage results for the endogenous variable X/M and its interaction term for Models 1 and 2. Model 1 in column (1) uses the percentage members to associations in every sector to proxy for lobbying effectiveness in the modified PFS model. Model 2 uses predicted values of lobbying membership for each sector as another proxy measure of lobby effectiveness. Robust standard errors and first-stage F-statistics are heteroskedasticity-robust.

Table A.20: PFS with Additional Political Factors: First Stage

| | **Model 3** | | |
|---|---|---|---|
| *Dependent Variables:* | X/M | X/M*$\gamma_i^a$ | X/M*$E_i$ |
| | (I) | (II) | (III) |
| **Instrumental Variables** | | | |
| *Lag Inventories* | 0.0002 | 0.0002 | 0.00003 |
| | (0.0002) | (0.0032) | (0.0038) |
| *Workers Squared* | -0.0037*** | -0.0031*** | -0.0008*** |
| | (0.0001) | (0.0007) | (0.0002) |
| *Lag Workers*$*\gamma_i^a$ | -0.0003 | 0.0001 | -0.0001 |
| | (0.0012) | (0.0009) | (0.0002) |
| *Lag Inventories*$*E_i$ | 0.0136** | 0.0109** | 0.0036*** |
| | (0.0047) | (0.0039) | (0.0010) |
| *Shea Partial R-Square* | 0.0811 | 0.0302 | 0.0258 |
| N | 876 | 876 | 876 |

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Note: Table A.20 shows the first stage results for the endogenous variable X/M and its interaction terms in Model 3. Robust standard errors and first-stage F-statistics are heteroskedasticity-robust.

### A.4.3 Robustness

Table A.21: Model 1 and Model 2, Additional Regressions

| Variables | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| X/M | -0.058 | -0.103*** | -0.063*** | -0.200 | -0.840** | -0.222*** |
| | (0.049) | (0.037) | (0.014) | (0.139) | (0.347) | (0.055) |
| X/M*a | 0.090 | 0.143*** | 0.079*** | | | |
| | (0.061) | (0.047) | (0.018) | | | |
| X/M*y | | | | 0.267 | 1.051** | 0.274*** |
| | | | | (0.172) | (0.432) | (0.068) |
| yr1 | | | 7.548*** | | | 9.300*** |
| | | | (1.745) | | | (2.150) |
| yr2 | | | 6.765*** | | | 8.996*** |
| | | | (1.709) | | | (2.711) |
| yr3 | | | 6.743*** | | | 6.504*** |
| | | | (1.719) | | | (1.195) |
| yr4 | | | 4.691*** | | | 5.545*** |
| | | | (0.761) | | | (1.108) |
| yr5 | | | 4.432*** | | | 5.765*** |
| | | | (0.831) | | | (1.441) |
| yr6 | | | 4.498*** | | | 5.269*** |
| | | | (0.650) | | | (0.866) |
| yr7 | | | 4.222*** | | | 4.720*** |
| | | | (0.631) | | | (0.769) |
| yr8 | | | 2.876*** | | | 3.104*** |
| | | | (0.559) | | | (0.571) |
| yr9 | | | 2.959*** | | | 3.249*** |
| | | | (0.603) | | | (0.605) |
| $R^2$ | -1.54 | -3.20 | -0.69 | -2.78 | -32.39 | -1.99 |
| $N$ | 876 | 876 | 876 | 876 | 876 | 876 |

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

### A.4.4 Comparison

Table A.22: Comparison of Effectiveness: Chapter 4 and 3

| NIC498 | Effectiveness ($\gamma_i^a$) Chapter 4 | Effectiveness ($\gamma_i$) Chapter 3 |
|---|---|---|
| 1511 | 0.854546 | 0.894334 |
| 1512 | 0.854546 | 0.887439 |
| 1513 | 0.854546 | 0.888718 |
| 1514 | 0.854546 | 0.908373 |
| 1520 | 0.854546 | 0.89082 |
| 1531 | 0.854546 | 0.88984 |
| 1532 | 0.791667 | 0.890966 |
| 1533 | 0.766055 | 0.875721 |
| 1541 | 0.766055 | 0.886638 |
| 1542 | 0.766055 | 0.888239 |
| 1543 | 0.766055 | 0.885498 |
| 1544 | 0.766055 | 0.88611 |
| 1551 | 0.766055 | 0.969811 |
| 1552 | 0.854546 | 0.918997 |
| 1553 | 0.461539 | 0.888138 |
| 1554 | 0.461539 | 0.887772 |
| 1600 | 1 | 0.891139 |
| 1711 | 1 | 0.893962 |
| 1721 | 1 | 0.887595 |
| 1722 | 1 | 0.893969 |
| 1723 | 1 | 0.885972 |
| 1729 | 0.745455 | 0.84647 |
| 1730 | 0.745455 | 0.896201 |
| 1810 | 0.842105 | 0.889411 |
| 1820 | 0.842105 | 0.880521 |
| 1911 | 0.842105 | 0.786959 |
| 1912 | 0.842105 | 0.875753 |

Comparison of Effectiveness: Chapter 4 and 3

| NIC498 | Effectiveness ($\gamma_i^a$) Chapter 4 | Effectiveness ($\gamma_i$) Chapter 3 |
|---|---|---|
| 1920 | 0.465753 | 0.880574 |
| 2010 | 0.465753 | 0.94829 |
| 2021 | 0.465753 | 0.889417 |
| 2022 | 0.465753 | 0.890714 |
| 2023 | 0.465753 | 0.897996 |
| 2029 | 0.465753 | 0.907327 |
| 2101 | 0.903226 | 0.800116 |
| 2102 | 0.903226 | 0.885549 |
| 2109 | 0.903226 | 0.806697 |
| 2212 | 0.903226 | 0.8855 |
| 2219 | 0.903226 | 0.458157 |
| 2221 | 0.903226 | 0.886313 |
| 2222 | 0.903226 | 0.822747 |
| 2310 | 0.816327 | 0.81131 |
| 2320 | 0.816327 | 0.850249 |
| 2411 | 0.840491 | 0.495878 |
| 2412 | 0.840491 | 0.799478 |
| 2413 | 0.666667 | 0.756821 |
| 2422 | 0.68 | 0.869163 |
| 2423 | 0.821192 | 0.839497 |
| 2424 | 0.1875 | 0.867064 |
| 2429 | 0.840491 | 0.735254 |
| 2430 | 0.840491 | 0.876824 |
| 2511 | 0.890909 | 0.882213 |
| 2519 | 0.890909 | 0.797833 |
| 2520 | 0.666667 | 0.859462 |
| 2610 | 0.816994 | 0.90838 |
| 2691 | 0.816994 | 0.876529 |
| 2692 | 0.816994 | 0.900206 |

Comparison of Effectiveness: Chapter 4 and 3

| NIC498 | Effectiveness ($\gamma_i^a$) Chapter 4 | Effectiveness ($\gamma_i$) Chapter 3 |
|---|---|---|
| 2694 | 0.816994 | 0.889096 |
| 2695 | 0.816994 | 0.887893 |
| 2696 | 0.816994 | 0.887733 |
| 2699 | 0.816994 | 0.877327 |
| 2710 | 0.785714 | 0.873585 |
| 2720 | 0.785714 | 0.692024 |
| 2811 | 0.785714 | 0.896569 |
| 2812 | 0.785714 | 0.888997 |
| 2813 | 0.785714 | 0.837325 |
| 2893 | 0.785714 | 0.814237 |
| 2899 | 0.785714 | 0.842606 |
| 2912 | 0.833333 | 0.799295 |
| 2919 | 0.833333 | 0.863911 |
| 2921 | 0.833333 | 0.884799 |
| 2922 | 0.833333 | 0.514211 |
| 2924 | 0.833333 | 0.706773 |
| 2925 | 0.833333 | 0.6087 |
| 2930 | 0.866667 | 0.887226 |
| 3000 | 0.866667 | 0.563615 |
| 3110 | 0.866667 | 0.805156 |
| 3130 | 0.866667 | 0.860403 |
| 3140 | 0.866667 | 0.841359 |
| 3150 | 0.866667 | 0.869665 |
| 3190 | 0.866667 | 0.73492 |
| 3210 | 0.866667 | 0.527679 |
| 3220 | 0.866667 | 0.853193 |
| 3230 | 0.866667 | 0.810172 |
| 3311 | 0.944444 | 0.396709 |
| 3320 | 0.944444 | 0.4905 |

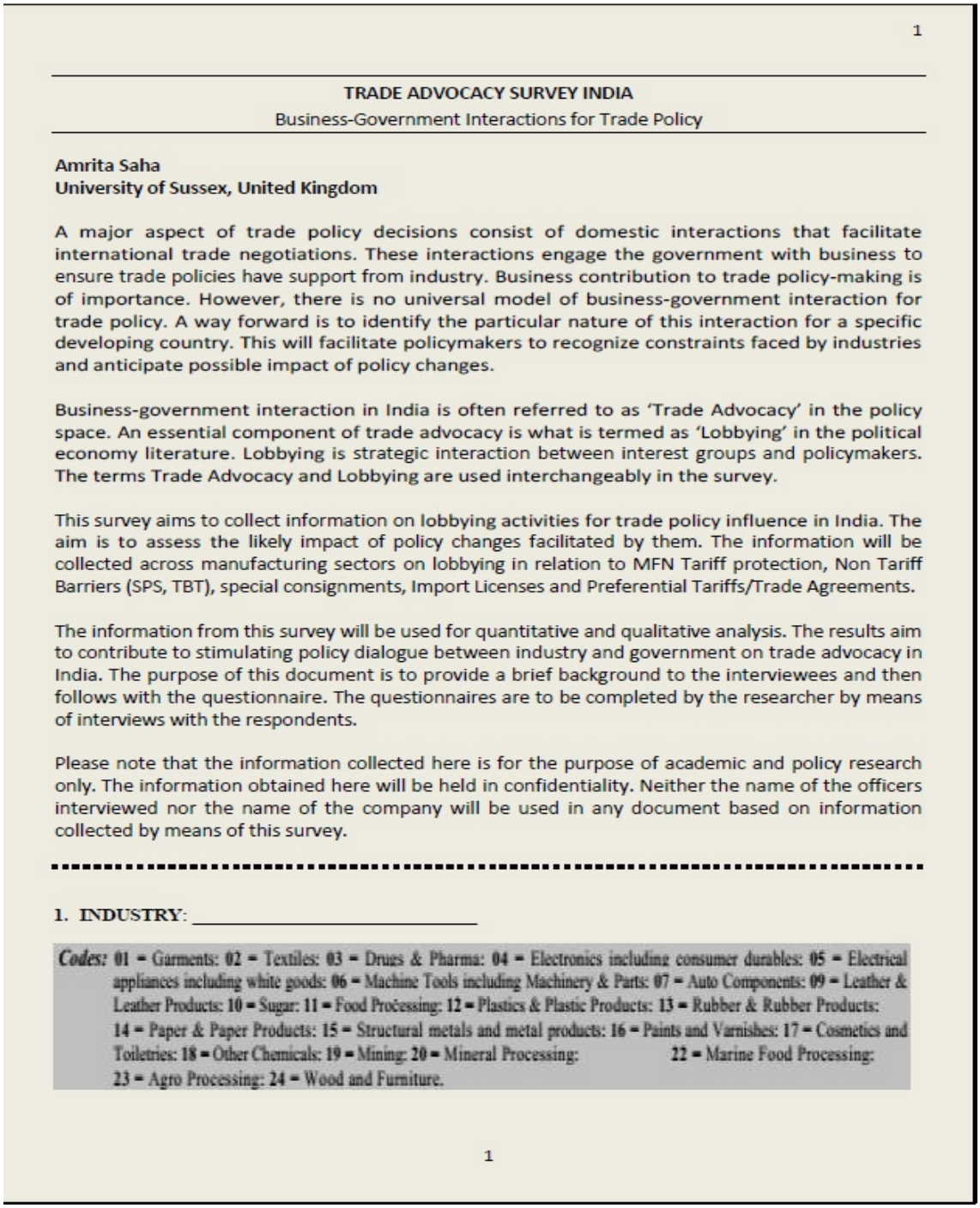
Comparison of Effectiveness: Chapter 4 and 3

| NIC498 | Effectiveness ($\gamma_i^a$) Chapter 4 | Effectiveness ($\gamma_i$) Chapter 3 |
|---|---|---|
| 3330 | 0.944444 | 0.842582 |
| 3410 | 0.944444 | 1 |
| 3511 | 0.944444 | 0.520144 |
| 3520 | 0.944444 | 0.839726 |
| 3530 | 0.944444 | 0 |
| 3591 | 0.613861 | 0.888849 |
| 3592 | 0.613861 | 0.895561 |
| 3599 | 0.613861 | 0.887869 |
| 3610 | 0.613861 | 0.883526 |
| 3691 | 0.613861 | 0.812996 |
| 3692 | 0.613861 | 0.788624 |
| 3693 | 0.613861 | 0.790138 |
| 3694 | 0.866667 | 0.835894 |

## A.5 Chapter 6

### A.5.1 Survey

Figure A.1: Questionnaire



1

**TRADE ADVOCACY SURVEY INDIA**

Business-Government Interactions for Trade Policy

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A major aspect of trade policy decisions consist of domestic interactions that facilitate international trade negotiations. These interactions engage the government with business to ensure trade policies have support from industry. Business contribution to trade policy-making is of importance. However, there is no universal model of business-government interaction for trade policy. A way forward is to identify the particular nature of this interaction for a specific developing country. This will facilitate policymakers to recognize constraints faced by industries and anticipate possible impact of policy changes.

Business-government interaction in India is often referred to as 'Trade Advocacy' in the policy space. An essential component of trade advocacy is what is termed as 'Lobbying' in the political economy literature. Lobbying is strategic interaction between interest groups and policymakers. The terms Trade Advocacy and Lobbying are used interchangeably in the survey.

This survey aims to collect information on lobbying activities for trade policy influence in India. The aim is to assess the likely impact of policy changes facilitated by them. The information will be collected across manufacturing sectors on lobbying in relation to MFN Tariff protection, Non Tariff Barriers (SPS, TBT), special consignments, Import Licenses and Preferential Tariffs/Trade Agreements.

The information from this survey will be used for quantitative and qualitative analysis. The results aim to contribute to stimulating policy dialogue between industry and government on trade advocacy in India. The purpose of this document is to provide a brief background to the interviewees and then follows with the questionnaire. The questionnaires are to be completed by the researcher by means of interviews with the respondents.

Please note that the information collected here is for the purpose of academic and policy research only. The information obtained here will be held in confidentiality. Neither the name of the officers interviewed nor the name of the company will be used in any document based on information collected by means of this survey.

**1. INDUSTRY**: _____

***Codes:*** **01** = Garments: **02** = Textiles: **03** = Drugs & Pharma: **04** = Electronics including consumer durables: **05** = Electrical appliances including white goods: **06** = Machine Tools including Machinery & Parts: **07** = Auto Components: **09** = Leather & Leather Products: **10** = Sugar: **11** = Food Processing: **12** = Plastics & Plastic Products: **13** = Rubber & Rubber Products: **14** = Paper & Paper Products: **15** = Structural metals and metal products: **16** = Paints and Varnishes: **17** = Cosmetics and Toiletries: **18** = Other Chemicals: **19** = Mining: **20** = Mineral Processing: **22** = Marine Food Processing: **23** = Agro Processing: **24** = Wood and Furniture.

1

What are the Products manufactured by your firm (% of Annual Sales)? Do you export the product? (Please mark relevant 3-digit NIC codes.)

| NIC-3digit Codes | Product Description | % Annual Sales | Exports (Yes/No) |
|---|---|---|---|
| 151 | Production, processing and preservation of meat, fish, fruit vegetables, oils & | | |
| 152 | Dairy product | | |
| 153 | Grain mill products, starches and starch products, and prepared animal feeds | | |
| 154 | Other food products | | |
| 155 | Beverages | | |
| 160 | Tobacco products | | |
| 171 | Spinning, weaving and finishing of textiles. | | |
| 172 | Other textiles | | |
| 173 | Knitted and crocheted fabrics & articles | | |
| 181 | Wearing apparel, except fur apparel | | |
| 191 | Tanning and dressing of leather, manufacture of luggage handbags, saddler & | | |
| 192 | Footwear. | | |
| 201 | Saw milling and planning of wood | | |
| 202 | Products of wood, cork, straw and plaiting materials | | |
| 210 | Paper and paper product | | |
| 221 | Publishing | | |
| 222 | Printing and service activities related to printing | | |
| 231 | Coke oven products | | |
| 241 | Basic chemicals | | |
| 242 | Other chemical products | | |
| 243 | Rubber products | | |
| 251 | Rubber tyres and tubes; retreading and rebuilding of rubber tyres | | |
| 252 | Plastic products | | |
| 261 | Glass and glass products | | |
| 269 | Non-metallic mineral products n.e.c. | | |
| 271 | Basic Iron & Steel | | |
| 272 | Basic precious and non-ferrous metals | | |
| 281 | Structural metal products, tanks, reservoirs and steam generators | | |
| 289 | Other fabricated metal products; metal working service activities | | |
| 291 | General purpose machinery | | |
| 292 | Special purpose machinery | | |
| 293 | Domestic appliances, n.e.c. | | |
| 300 | Office, accounting and computing machinery | | |
| 311 | Electric motors, generators and transformers | | |
| 313 | Insulated wire and cable | | |
| 314 | Accumulators, primary cells and primary batteries | | |
| 315 | Electric lamps and lighting equipment | | |
| 319 | Other electrical equipment n.e.c. | | |
| 321 | Electronic valves and tubes and other electronic components | | |
| 322 | Television and radio transmitters and apparatus for line telephony and line | | |
| 323 | Television and radio receivers, sound or video recording or reproducing | | |
| 323 | Medical appliances and instruments and appliances for measuring, checking, | | |
| 331 | Medical and surgical equipment and orthopaedic appliances | | |
| 332 | Optical instruments and photographic equipment | | |
| 333 | Watches and clocks | | |
| 341 | Motor vehicles | | |
| 351 | Building and repair of ships & boats | | |
| 352 | Railway and tramway locomotives and rolling stock | | |
| 353 | Aircraft and spacecraft | | |
| 359 | Transport equipment n.e.c. | | |
| 361 | Furniture | | |
| 369 | Other Manufacturing n.e.c. | | |

2. **SIZE:** What is the Size (Number of workers) of your firm? _____

3. **OWNERSHIP:** What is the ownership structure of your firm?

| Ownership | Percentage (%) | | | | |
|---|---|---|---|---|---|
| SINGLE OWNERSHIP: | | | | | |
| PRIVATE FOREIGN: | 1-None | 2-Less than 10 | 3- 10-40% | 4-40%-60% | 5->60% |
| GOVERNMENT: | 1-None | 2-Less than 10 | 3- 10-40% | 4-40-60% | 5->60% |

4. **LOCATION:** Is your business located in the capital city (New Delhi)? **1- Yes 2-No**
Name the states where your firm is located: _____

5. **IMPORTS:** What are the top 3 products intermediate inputs imported by your firm? (Refer to NIC 3-digit)

| Intermediate Imported Goods (3-Digit Codes) | % Annual Sales |
|---|---|
| 1. | |
| 2. | |
| 3. | |

6. **COMPETITION:** In the last year, how many competitors did your firm face for its top 3 products?

| Top 3 Products (Refer Question1) | | | |
|---|---|---|---|
| Number of Competitors | CODE | CODE | CODE |
| No competitors | 1 | 1 | 1 |
| 1-3 Competitors | 2 | 2 | 2 |
| 4-10 Competitors | 3 | 3 | 3 |
| >10 Competitors | 4 | 4 | 4 |

7. **TRADE ADVOCACY:** Does your firm undertake activities for Trade Advocacy?

| Response | Description (If Yes-Describe, If No-Reasons) |
|---|---|
| 1-Yes | Describe:_____ |
| 2-No | Reasons: 1-Not relevant 2-No means to advocate 3-Too Costly 4-No info. |

8. **ADVOCACY TEAM:** Do you have a team/specialist officer(s) dealing with Trade Advocacy?

| Response | Description |
|---|---|
| 1-Yes | Do you have a specialist officer dealing with trade advocacy? |
| | 1-Yes (How many?)_____ 2-No |
| 2-No | How do you undertake advocacy? |

9. **LOBBY ASSOCIATION**: Is your firm a member of a producer or trade association that undertakes Trade Advocacy activities?

| Response | Description |
|---|---|
| 1-Yes | 1-CII 2- FICCI 3-Others (Sectoral Associations)_____ |
| 2-No | Reasons: 1-No relevant association 2-You do not see any benefit 3-Very High Membership Fee |

10. **GOVERNMENT REPRESENTATION**: Are the interests of your sector represented by any Ministry?

| Response | Description |
|---|---|
| 1-Yes | Name:_____ |
| 2-No | Reason: 1- No Relevant Ministry 2-No Representation |

11. **DIRECT LOBBYING**: How many meetings per month approximately do you engage in for Trade Advocacy activities with the Government?

| Number of Meetings : | 1-None | 2-Less than 5 | 3- Between 5-10 | 4-More than 10 |
|---|---|---|---|---|

In a typical month, what percentage of Advocacy team/Specialist officer time of your firm is spent in dealing directly with government for Trade Advocacy?

| % Time per week : | 1-None | 2-Less than 10% | 3-10-40% | 4->40% |
|---|---|---|---|---|

12. **LOBBYING EFFECTIVENESS**: On a scale of 1 to 5, how successful would you rate a typical firm in your sector in Trade Advocacy (not necessarily yours)?

| LOBBY (ASSOCIATIONS) | REASONS | DIRECT LOBBYING | REASONS |
|---|---|---|---|
| 1 | | 1 | |
| 2 | | 2 | |
| 3 | | 3 | |
| 4 | | 4 | |
| 5 | | 5 | |

13. **ACTIVITIES**: On a scale of **1-5**, where 1 shows not active and 5 shows very active, <u>how active</u> would you say your firm was in Trade Advocacy in the last year with regard to the following:

| Description | | | | | |
|---|---|---|---|---|---|
| Through Associations (CII/FICCI) | Why?_____ | | | | |
| MFN Tariff Protection | (1) | (2) | (3) | (4) | (5) |
| Non-Tariff Barriers | (1) | (2) | (3) | (4) | (5) |
| Special Consignments | (1) | (2) | (3) | (4) | (5) |
| Import License | (1) | (2) | (3) | (4) | (5) |
| Preferential Tariffs | (1) | (2) | (3) | (4) | (5) |

| Direct Lobbying | Why?_____ | | | | |
|---|---|---|---|---|---|
| MFN Tariff Protection | (1) | (2) | (3) | (4) | (5) |
| Non-Tariff Barriers | (1) | (2) | (3) | (4) | (5) |
| Special Consignments | (1) | (2) | (3) | (4) | (5) |
| Import License | (1) | (2) | (3) | (4) | (5) |
| Preferential Tariffs | (1) | (2) | (3) | (4) | (5) |

**14. LOBBY COST:** What is the **Total Cost as % Annual Sales** of a typical firm in a single year to engage in Trade Advocacy in your sector, not necessarily yours?

| Total Cost | | | | |
|---|---|---|---|---|
| 1990s | 1- Between 0-5% | 2-Between 5-10% | 3-Between 10-20% | 4-More than>20% |
| 2000s | 1- Between 0-5% | 2-Between 5-10% | 3-Between 10-20% | 4-More than>20% |
| **Cost Breakup: How much of the Total cost can be attributed to:** | | | | |
| 1990s | Lobbying through Association:_____ | | Direct lobbying:_____ | |
| 2000s | Lobbying through Association:_____ | | Direct lobbying:_____ | |

**15. ACTIVITIES**: On a scale of **1-5**, where 1 shows not active and 5 shows very active, **how active** would you say your firm was in Trade Advocacy in the following years:

| Description | | | | | |
|---|---|---|---|---|---|
| Through Associations (CII/FICCI) | Why?_____ | | | | |
| 1990 | (1) | (2) | (3) | (4) | (5) |
| 1996 | (1) | (2) | (3) | (4) | (5) |
| 1999 | (1) | (2) | (3) | (4) | (5) |
| 2001 | (1) | (2) | (3) | (4) | (5) |
| 2004 | (1) | (2) | (3) | (4) | (5) |
| 2007 | (1) | (2) | (3) | (4) | (5) |
| Direct Lobbying | Why?_____ | | | | |
| 1990 | (1) | (2) | (3) | (4) | (5) |
| 1996 | (1) | (2) | (3) | (4) | (5) |
| 1999 | (1) | (2) | (3) | (4) | (5) |
| 2001 | (1) | (2) | (3) | (4) | (5) |
| 2004 | (1) | (2) | (3) | (4) | (5) |

Figure A.2: Count distribution of World Bank Enterprise Survey

| Industry | Number of Firms | % of Total Firms |
|---|---|---|
| Garments | 275 | 12.03 |
| Textiles | 222 | 9.71 |
| Drugs & Pharma | 165 | 7.22 |
| Electronics inc. Consumer Durables | 100 | 4.37 |
| Electrical Appliances inc. white goods | 155 | 6.78 |
| Machine tools inc. Machinery & parts | 195 | 8.53 |
| Auto Components | 218 | 9.54 |
| Leather & leather products | 74 | 3.24 |
| Sugar | 4 | 0.17 |
| Food Processing | 155 | 6.78 |
| Plastics & plastics products | 122 | 5.34 |
| Rubber & rubber products | 38 | 1.66 |
| Paper & paper products | 24 | 1.05 |
| Structural metals and metal products | 303 | 13.25 |
| Paints and varnishes | 20 | 0.87 |
| Cosmetics and toiletries | 13 | 0.57 |
| Other chemicals | 112 | 4.9 |
| Mining | 3 | 0.13 |
| Mineral processing | 32 | 1.4 |
| Marine food processing | 14 | 0.61 |
| Agro processing | 26 | 1.14 |
| Wood and furniture | 16 | 0.7 |
| Total | 2,286 | 100 |

This shows the coverage of the World Bank Enterprise Survey of 2005. I drop the sector of Mining and Marine food processing that gives me 20 sectors. These sectors are the base sampling reference of my survey.

Table A.23: Sampling Procedure

| Stratum | Population | | Criteria | | | Sample | |
|---|---|---|---|---|---|---|---|
| | Firms | % | Cost (c) | Variability (s) | $\frac{s}{\sqrt{c}}$ | Firms | % |
| Member Directories | 508 | 49.20% | $20 | 6.4 | 1.431 | 211 | 60.30% |
| Phone directories | 524 | 50.80% | $32 | 5.2 | 0.919 | 139 | 39.70% |
| Total | 1032 | 100% | | | | 350 | 100% |

Table A.24: ASI Data 2010

| **SECTOR** | ASI data (2010) Economic Activity |
|---|---|
| GARMENTS AND TEXTILES | 7.69 |
| PHARMACEUTICAL | 5.28 |
| ELECTRICAL EQUIPMENTS | 4.49 |
| MACHINERY AND EQUIPMENT N.E.C. | 6.09 |
| MOTOR VEHICLES, TRAILERS AND SEMI-TRAILERS | 5.91 |
| LEATHER AND RELATED PRODUCTS | 0.64 |
| FOOD PRODUCTS | 6.73 |
| RUBBER AND PLASTIC PRODUCTS | 4.07 |
| PAPER AND PAPER PRODUCTS | 1.37 |
| BASIC METALS | 12.32 |
| CHEMICALS AND CHEMICAL PRODUCTS | 8.74 |
| MINERAL PRODUCTS | 5.14 |
| AGRO | 0.52 |
| FURNITURE | 0.18 |
| OTHERS | 30.83 |

Table A.25: Target vs Actual Distribution across Sectors

| Industry | Target Coverage | | Actual Coverage | | Response Rate |
|---|---|---|---|---|---|
| | Firms | Percent | Firms | Percent | Percent |
| Garments | 18 | 7.2 | 8 | 5.48 | 44.40% |
| Textiles | 32 | 12.8 | 29 | 19.86 | 90.60% |
| Drugs & Pharma. | 12 | 4.8 | 6 | 4.11 | 50.00% |
| Electronics inc. consumer durables | 9 | 3.6 | 4 | 2.74 | 44.40% |
| Electrical Appliances | 15 | 6 | 3 | 2.05 | 20.00% |
| Machine Tools incl. Machinery & Parts | 9 | 3.6 | 7 | 4.79 | 77.80% |
| Auto Components | 18 | 7.2 | 6 | 4.11 | 33.30% |
| Leather & leather products | 10 | 4 | 7 | 4.79 | 70.00% |
| Sugar | 12 | 4.8 | 4 | 2.74 | 33.30% |
| Food Processing | 9 | 3.6 | 8 | 5.48 | 88.90% |
| Plastics & Plastic Products | 11 | 4.4 | 5 | 3.42 | 45.50% |
| Rubber & Rubber Products | 10 | 4 | 5 | 3.42 | 50.00% |
| Paper & Paper Products | 10 | 4 | 6 | 4.11 | 60.00% |
| Structural Metals & Metal Products | 22 | 8.8 | 16 | 10.96 | 72.70% |
| Paints & Varnishes | 11 | 4.4 | 6 | 4.11 | 54.50% |
| Cosmetics & Toiletries | 8 | 3.2 | 5 | 3.42 | 62.50% |
| Other Chemicals | 9 | 3.6 | 6 | 4.11 | 66.70% |
| Mineral Processing | 7 | 2.8 | 5 | 3.42 | 71.40% |
| Agro Processing | 10 | 4 | 5 | 3.42 | 50.00% |
| Wood & Furniture | 8 | 3.2 | 5 | 3.42 | 62.50% |
| Total | 250 | 100 | 146 | 100 | 58.40% |

### A.5.2 Additional Regressions

Table A.26: Lobbying Strategy: Preliminary Regressions

Dependent variable: Lobbying Strategy = No Lobbying, Collective, Individual, Dual

| | **Preliminary MNL. Base-No Lobbying** | | | | |
|---|---|---|---|---|---|
| | | Individual Correlations | | | Primary |
| Variables | Categories | (1) | (2) | (3) | (4) |
| Elasticity | Collective | 0.003 | | | -0.159 |
| | | (0.586) | | | (0.626) |
| | Individual | 0.503 | | | 0.223 |
| | | (0.337) | | | (0.381) |
| | Dual | 0.195 | | | 0.217 |
| | | (0.287) | | | (0.275) |
| Concentration | Collective | | 0.058 | | 0.060 |
| | | | (0.037) | | (0.032) |
| | Individual | | 0.083* | | 0.076** |
| | | | (0.034) | | (0.028) |
| | Dual | | 0.021 | | 0.015 |
| | | | (0.033) | | (0.030) |
| Firm Size | Collective | | | -0.492 | -0.443 |
| | | | | (0.458) | (0.457) |
| | Individual | | | -0.350 | -0.369 |
| | | | | (0.433) | (0.439) |
| | Dual | | | -0.342 | -0.347 |
| | | | | (0.442) | (0.411) |
| N | | 146 | 146 | 146 | 146 |

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

Note: Table A.26 shows the coefficients (log odds) from the preliminary regressions where the likelihood of collective, individual and dual lobbying is compared to the base category of no lobbying. Note that all categories are mutually exclusive. Columns (1) - (4) contains control variables on Foreign Ownership and Competition. Individual correlations controlling for foreign ownership and competition are observed in columns (1) - (3). In column (4), I test the primary specification with the controls. Robust (clustered by industry) standard errors in parentheses in columns (1) - (4).