A Theory of Open Trade with Heterogeneous Firms

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Abstract

Endowment based economic models with constant returns to scale and perfect competition have been a primary theoretical basis for analyzing political preferences of domestic actors. However, it is well known that such class of model is inadequate in explaining the large volume of intra-industry trade. How do we understand distributive consequences of trade policy of industrialized countries especially when intra-industry trade account for more than 70% of total trade volume of them? In this paper, I offer an alternative political economy model with increasing returns to scale and imperfect competition building on recent trade theories with heterogeneous firms. Specifically, I show that there exist heterogeneous political incentives and capabilities of firms even within a same industry: exporting firms lobby foreign government directly to eliminate trade barriers. In addition, I construct a novel dataset based on lobbying reports in the U.S. and financial statements of firms in global market. I find that domestic firms lobby their own government to reduce trade barriers in foreign countries. This suggests that open trade for sale is at least as important as protection for sale.

Key Words: international trade, heterogeneous firms, lobbying, political economy

1 Introduction

Why do we observe tariffs and non-tariff-barriers in international trade? Many observers point to “politics” when asked why it is hard to adhere to free trade. Because of intensive lobbying by import-competing firms, policy makers tend to protect domestic industries from foreign competition, biasing states against the welfare-maximizing alternative of free trade. The politics that affect trade policy have important implications for welfare

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distribution both at the domestic and global level. This paper makes two contributions toward answering these important questions of international political economy.

First, I challenge the conventional wisdom by highlighting counteracting political forces of free trade. The conventional theoretical explanation of trade barriers is limited in that it generally assumes that import-competing industries are more capable than exporting industries are of solving collective action problems. Consequently, political pressure in these models runs only in one direction: politicians collect campaign contributions from industries that seek tariff protection. I show that the incentives of exporting firms to lobby can be as strong as those of their import-competing counterparts when products are sufficiently differentiated: In these cases the benefits of lobbying accrue only to the small number of firms that actually produce the differentiated products in question. For instance, when consumers distinguish between smart phones produced by Apple and Samsung, each firm has higher incentives to lobby its respective government for trade liberalization than it would in a case where products are homogeneous, e.g., apples from Florida and those from Chile are perfect substitutes.

Second, I construct a novel dataset using a software program that can automatically extract and update very detailed firm level lobbying. It includes every lobbying report in the U.S. filed under the Lobbying Disclosure Act of 1995. Although some subsets of the same original data have been analyzed by a number of political scientists and economists, the unique data collection process makes my dataset much larger in scope and detailed in its contents. This allows for much systematic analysis of lobbying activities over time.

Finally, I collect firm-level data on sales, productivity, and primary industry of competition to test whether a high degree of product differentiation (low level of elasticity of substitution) across goods within an industry is associated with 1) active lobbying by exporting firms and 2) a decreased level of trade protection for the industry. To the best of my knowledge, this is the first large-N empirical project in the field of international political economy that systemically connects domestic political activity of firms to industry level trade policy.

The rest of the paper is organized as follows. Section 2 briefly discusses related

\footnote{Hillman (1982) assumes that policy makers desire political support only from import-competing groups while the interest from exporting industry is explicitly left out from his analysis.}
literature. In Section 3, political incentives of heterogeneous firms will be formally analyzed. Section 4 describes the data collection process and presents some prima facie evidence on exporting firms’ political activity. The last section concludes.

2 Literature

Some models of political economy rely on endowment-based trade theory with perfectly mobile factors, while others like Grossman and Helpman (1994) base their model on specific factors model. Although useful in studying cross-industry differences, neither can explain within industry heterogeneity: That is, a situation in which each firm within the same industry has heterogeneous preferences over trade policy.

However, recent developments in international trade theory suggests that there are important economic difference across firms. Melitz (2003), characterizes a market equilibrium whereby only highly productive firms export; relatively less productive firms either produce goods only domestically or exit the market entirely. Moreover, there exists ample empirical evidence for the existence of the productivity differences across firms within the same industry: the distribution of firm level productivity is highly skewed, and more productive firm are likely to be bigger, pay higher wages to employees, and make larger profits (Bernard et al. 2007).

If resource reallocation occurs in favor of productive exporting firms within industry, one should expect that their political incentives and capability might also differ from others. Specifically, if they prefer trade liberalization, conventional wisdom that political forces always result in market distortion might be wrong. I argue, therefore, political economy models of trade should incorporate firm level differences in order to correctly identify political dynamics underlying economic decision making.

This paper is certainly not the first to argue that firms are political actors. Through extensive interviews with heads of corporations, lobbyists, and congressmen, Bauer et al. (1972) suggest that social-psychological factors are important in understanding businessman’s preferences and their influence on trade policy. Hansen and Mitchell (2000) compare political activities of foreign and domestic firms. Gilligan (1997) shows that protection becomes a private good when firms engage in monopolistic competition within an industry with large volumes of intra-industry trade. He finds that industries with large intra-industry trade tends to request more protection due to less severe
collective action problem. Bombardini (2008) extends the Grossman and Helpman model by embedding heterogeneous firms within industry. She finds that industries with higher shares of large firms tend to obtain higher levels of protection.

This paper aims at expanding our understanding of exporting firms’ (both domestic and foreign) political incentives. First, unlike Gilligan (1997) who focuses on “adjustment cost” under intra-industry trade, I emphasize potential benefits and resource reallocation within industry in favor of exporting firms. Second, I explicitly model the level of product differentiation based on the elasticity of substitution to fully capture the idea of consumers’ “love of variety.” This is a both theoretically and empirically natural way of analyzing firm level differences when they compete both at economic and political level.

A number of studies have noted exporting firms’ role in understanding political forces underlying trade liberalization. Gawande et al. (2006) is most closely related to this paper: they provide an important empirical evidence for the effect of political activity by “foreign agents” on the decrease in trade barriers. This paper differs from theirs in that political incentives are analyzed at a much disaggregated level of firms rather than industries. Milner and Yoffie (1989) showed that there exists strategic demands by multinational firms to open trade in foreign nations. Similarly, Destler and Odell (1987) found that exporting firms are active in opposing trade restrictions. Although it is well known that governments may favor exporting firms (Milner, 1987), trade policy variation across industries has not been studied in terms of consumer taste differences and product differentiation. This paper makes an important advancement of earlier studies by systemically incorporating these factors to understand conditions under which one should expect more or less political activities by exporting firms.

Finally, this paper empirically examines the link between firm-level political activity and industry level trade policy. In doing so, I constructed a novel dataset that contains detailed information about issue-specific lobbying activity of firms reported under the Lobbying Disclosure Act of 1995. Although a number of studies have used the same

Gawande et al. (2006) offers a theoretical model that link foreign lobbies to industry level trade policy by adding foreign lobbying into Grossman and Helpman (1994). Due to the lack of data on actual lobbying expenditures at firm level, they use a somewhat arbitrary cut-off rule to determine the presence of foreign lobbying. Data available from Foreign Agents Registration Act (FARA) was used in their analysis. This paper offers a better measure of foreign lobbying by focusing on actual firm level lobbying expenditures. See Section 4 for more detail.
data (e.g., Ansolabehere et al. 2002; Bombardini and Trebbi 2009), only a part of the original data—in terms of its contents and period—has been actually analyzed. Using text parsing software, I offer a dataset with entire lobbying reports from 1999 to 2012.\footnote{Although Bombardini and Trebbi (2009) also look at the link between lobbying activities and trade policy, they focus primarily on the mode of lobbying, i.e., whether firms lobby together or independently to affect trade policy. Note that their data covers only the period between 1999 and 2001 without incorporating firm level information.}

A more detailed description of data follows in Section 4.

3 The Model

To study the political incentives of firms, I specify the underlying economic structure within which actors interact. I analyze an industry in which consumers love variety based on CES (constant elasticity of substitution) utility and firms engage in monopolistic competition. This is useful in limiting strategic interaction among firms while capturing an important source of intra-industry trade. Equation 1 characterizes consumer utility toward type $t$ good within an industry $D$.

$$U_{D_t} = \left( \int_{\Omega_t} q(\omega_t)^{\sigma_{t+1}} \right)^{\frac{\sigma}{\sigma-1}}$$ (1)

A model with infinite number of firms (with continuous variety), however, need to address the issue of individual firm’s being both politically and economically minimal. This can be formally justified by having two tiers in economy: upper-tier with finite number of types and lower-tier with monopolistic competition across firms. Based on this idea, Equation 2 characterizes a representative consumer’s problem given a budget constraint.

$$\max_{q(\omega_t)} U_D = \left\{ \sum_t (U_{D_t})^{\frac{\sigma-1}{\sigma}} \right\}^{\frac{\sigma}{\sigma-1}}$$ (2)

$$s.t \sum_t \int p(\omega_t)q(\omega_t)d\omega_t \leq E_D$$

It can be shown that firms in lower-tier behaves symmetrically assuming that government chooses firm-specific trade policy contingent upon lobbying expenditure. As a result, one can simplify the model by focusing on Equation 3 for underlying utility function of a representative consumer. This formulation greatly simplifies model by...
limiting political and economic interaction across individual firms, while focusing on a discrete types of firms’ political incentives.\footnote{Alternatively, one may assume that an industry requires high enough fixed entry cost with sufficiently high elasticity of substitution that there are very small number of firms.} For now, I assume that there are four types of firms. A more technical justification of doing analysis with discrete types of firms is given in Appendix C.

There are two countries: Country 1 and Country 2 with their size of economy $E_1$ and $E_2$ respectively. Any variable with subscript $ij$ is associated with an export of country $i$ to $j$. Accordingly, we denote the demand for a good $\varphi_k$ that is produced in Country $i$ and exported to Country $j$ by $x_{ij}(\varphi_k)$, when firm’s type is parameterized by $\varphi_k$. Other variables with subscript $ij$ should be understood likewise. We assume that firms $\varphi_1$ and $\varphi_2$ belong to Country 1 and $\varphi_3$ and $\varphi_4$ are in Country 2. Each country has one productive firm and one un-productive firm, where higher value of $\varphi_k$ means higher productivity. We denote the set of firms by $\varphi = \{\varphi_1, \varphi_2, \varphi_3, \varphi_4\}$.

I take the results from Melitz (2003) and assume that only productive firms can export. In particular, there exist a productivity cutoff $\varphi^*_{ij}$ for a firm producing a good in Country $i$ and exporting to Country $j$. By the same token, any firm $\varphi_k$ that produce goods domestically in Country $i$ should satisfy $\varphi_k \geq \varphi^*_{ii}$.

**Assumption 1** *Only more productive firms exports (Melitz, 2003).*

\[
\varphi_1 \geq \varphi^*_{12} > \varphi_2 \geq \varphi^*_{11},
\]

\[
\varphi_3 \geq \varphi^*_{21} > \varphi_4 \geq \varphi^*_{22}.
\] (3)

In our framework of two domestic firms and two foreign firms and Assumption 1 a representative consumer’s utility in Country 1 can be written as follows.

\[
U_D = \left[ x_{11}^{\frac{\sigma - 1}{\sigma}} (\varphi_1) + x_{11}^{\frac{\sigma - 1}{\sigma}} (\varphi_2) + x_{21}^{\frac{\sigma - 1}{\sigma}} (\varphi_3) \right]^{\frac{\sigma}{\sigma - 1}} .
\] (4)

where $\sigma > 1$ denotes the constant elasticity of substitution. Equation (4) indicates that there are three types of firms in Country 1: productive domestic firms $\varphi_1$, un-productive domestic firms $\varphi_2$ and productive foreign firms $\varphi_3$ exporting their goods from Country 2. Note that, bigger $\sigma$ means higher substitutability across goods and more intense economic competition.
3.1 Demand

With the CES utility function, one can use the standard technique to derive the demand function for any given good \( x_{ij}(\varphi_k) \) in economy.

\[
x_{ij}(\varphi_k) = E_j \cdot p_{ij}(\varphi_k)^{-\sigma} \cdot P_j^{\sigma-1},
\]

(5)

where \( p_{ij}(\varphi_k) \) denotes the price of good \( \varphi_k \) and \( P_j \) is the price index. If the prices of other goods increase, then the price index goes up, which in turn increases the demand for a given good. The derivation of demand function and \( P_j \) can be found in the Appendix B.1. It is immediate to write down the price index of each economy in each country. Since only productive firms can export by assumption, the price index for each country in the two country case becomes

\[
P_1 = \left[ p_{11}(\varphi_1)^{1-\sigma} + p_{11}(\varphi_2)^{1-\sigma} + p_{21}(\varphi_3)^{1-\sigma} \right]^{\frac{1}{1-\sigma}}
\]

\[
P_2 = \left[ p_{22}(\varphi_3)^{1-\sigma} + p_{22}(\varphi_4)^{1-\sigma} + p_{12}(\varphi_1)^{1-\sigma} \right]^{\frac{1}{1-\sigma}}.
\]

(6)

3.2 Supply

Having specified the demand, we need to derive the expression for the price of each good \( p_{ij}(\varphi_k) \) to complete the characterization of the economy. Constant elasticity of substitution in both economy implies that firms’ pricing decisions in different country are made separately as a function of variable trade costs. Equation (7) characterizes each firm’s profit maximizing problem within market \( j \) by producing good \( \varphi_k \).

\[
\pi_{ij}(\varphi_k) = \max_{\{p_{ij},C_j(\varphi_k)\}} \left\{ \frac{p_{ij}^{1-\sigma}}{P_j^{1-\sigma} \varphi_k} E_j - \tau_{ij} \frac{p_{ij}^{-\sigma}}{P_j^{1-\sigma} \varphi_k} E_j - f_{ij} - \frac{1}{2} C_j(\varphi_k)^2 \right\},
\]

(7)

where the first term is the revenue \( \text{demand} \times \text{price} \), second terms is variable production cost given exogenous iceberg tariff rate \( \tau_{ij} \) when goods are exported from Country \( i \) to Country \( j \), \( f_{ij} \) is the fixed entry cost for the market, and the final term represents the political contribution that firm \( \varphi_k \) pays to Government \( j \). Notice that the average cost decreases as the productivity of the firm \( \varphi_k \) increases. That is, increasing returns to scale is modeled explicitly by including the fixed entry cost and the variable production cost separately.
With this setting, it is immediate to verify that each firm under monopolistic competition sets the price of good as follows. As usual, the pricing under monopolistic competition becomes constant markup over marginal cost of production.

\[ p_{ij}(\varphi_k) = \frac{\sigma}{\sigma - 1} \frac{\tau_{ij}}{\varphi_k}. \]  

(8)

, where \( \tau_{ij} \geq 1 \) if \( i \neq j \) and \( \tau_{ij} = 1 \) if \( i = j \).

First, note that \( \partial p_{ij}(\varphi_k)/\partial \sigma < 0 \), where \( \sigma \) is the elasticity of substitution between goods. Since higher \( \sigma \) implies that goods are more substitutable, Equation (8) indicates that a firm that is facing higher competition sets a lower price. Second, productive firms set lower prices. Finally, a higher tariff rate induces higher price of any given good when \( \tau_{ij} \) denotes the tariff on goods from Country \( i \) to \( j \). Technically, any variable trade barrier can be interpreted as increasing \( \tau_{ij} \). However, we will understand \( \tau_{ij} \) as tariff rates that is set by each government to simplify the interpretation of the model.

We assume that governments set firm-specific tariffs, and they care only about maximizing political contribution. For now, we make a simplifying assumption that tariff decision is linear with constant marginal rate of increase \( \kappa_j \) for Country \( j \). Higher \( \kappa_j \) can be interpreted as the degree of sensitivity of a government toward political rents.

\textbf{Assumption 2} Country \( j \)'s tariff decision is linear in its political contribution. \( 0 < \tau'_{ij} = \kappa_j < \infty \), where \( \kappa_j \in \mathbb{R}^+ \)

3.3 Optimal Political Contribution

As noted, exporting firms are different in their economic characteristics. Does their political behavior differ? This section examines the different political incentives that each type of firm faces. In this economy, there are three types of firms that are important:

1) productive domestic firm, 2) un-productive domestic firm, and 3) productive foreign firm. Notice that un-productive firms do not need to make contributions to foreign government since doing so only results in negative payoffs.

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5Including consumer surplus will only relax the constraint governments face. It is well known that there exist welfare gains from trade with intra-industry trade. Arkolakis et al. (2012) show that the welfare gain can be summarized by two summary statistics in different class of trade models: 1) the share of expenditure on domestic goods, and 2) an elasticity of imports with respect to variable trade costs.
The following set of propositions and corollaries show that firms are politically different. First, Proposition 1 characterizes the optimal political contribution decision of each type of firm in Country 1.

**Proposition 1 (Optimal Lobby by Firms)** For a given tariff level \(\tau_{12}\), the optimal political contribution function of two types of domestic firms (similar results hold for the foreign firms by symmetry).

1. **Productive Firm to Foreign Government**

\[
C_2(\varphi_1) = \varphi_1^{\sigma-1} \left( \frac{\sigma-1}{\sigma} \right) \kappa_2 \cdot E_2 \cdot \tau_1^{-\sigma} \left\{ \left( \frac{1}{\varphi_3} \right)^{1-\sigma} + \left( \frac{1}{\varphi_4} \right)^{1-\sigma} + \left( \frac{\tau_{12}}{\varphi_1} \right)^{1-\sigma} \right\}^{-2}
\]

\[
\cdot \left\{ \left( \frac{1}{\varphi_3} \right)^{1-\sigma} + \left( \frac{1}{\varphi_4} \right)^{1-\sigma} + \left( \frac{\tau_{12}}{\varphi_1} \right)^{1-\sigma} \right\}^{-1} - \tau_1^{-\sigma} \varphi_1
\]

2. **Productive Firm to Domestic Government**

\[
C_1(\varphi_1) = \varphi_1^{\sigma-1} \left( \frac{\sigma-1}{\sigma} \right) \kappa_1 \cdot E_1 \left( \frac{\tau_{21}}{\varphi_3} \right)^{-\sigma} \left\{ \left( \frac{1}{\varphi_1} \right)^{1-\sigma} + \left( \frac{1}{\varphi_2} \right)^{1-\sigma} + \left( \frac{\tau_{21}}{\varphi_3} \right)^{1-\sigma} \right\}^{-2}
\]

3. **Un-productive Firm to Domestic Government**

\[
C_1(\varphi_2) = \varphi_2^{\sigma-1} \left( \frac{\sigma-1}{\sigma} \right) \kappa_1 \cdot E_1 \left( \frac{\tau_{21}}{\varphi_3} \right)^{-\sigma} \left\{ \left( \frac{1}{\varphi_1} \right)^{1-\sigma} + \left( \frac{1}{\varphi_2} \right)^{1-\sigma} + \left( \frac{\tau_{21}}{\varphi_3} \right)^{1-\sigma} \right\}^{-2}
\]

Proof is in Appendix B.2

Notice that each type of firm’s optimal political contribution decision can be expressed in terms of their competing firms’ productivity level as well as other economic variables. Some general points are in order. First, as competition between firms increases (higher \(\sigma\)), firms are willing to pay higher political contribution to both governments. This is intuitive as domestic firms need higher tariff rate in place against productive foreign firms. Given such interest, exporting firms also pay higher political rents.

Second, economic size of the market induces higher political contribution. Simply put, more pies are at stake, and therefore firms engage in more intense competition. What is interesting here is that such competitions are not only economic but also political. Note that political competition becomes more and more intense as leaders become politically greedier (higher \(\kappa_j\)). This suggests that a corrupt government will be approached by highly productive foreign firms in hopes of increasing their market share.
**Corollary 1 (Collective Action Problem)**  
*Domestic firm’s political contribution decreases as it faces highly productive domestic competitor.*

\[
\frac{\partial C_1(\varphi_2)}{\partial \varphi_1} < 0, \quad \frac{\partial C_1(\varphi_1)}{\partial \varphi_2} < 0.
\]

Third, political contribution changes based not only on firm’s own productivity but also on the productivity of others. In particular, the amount of a given firm’s domestic political contribution decreases as its domestic competitor’s productivity increases as Corollary 1 shows. This can be an important basis for solving domestic collective action problem when it comes to lobby group formation. Consider Country 1. If un-productive firm \(\varphi_2\) has highly productive competitor such that \(\varphi_1 \gg \varphi_2\), then \(\varphi_2\) knows that \(\varphi_1\) has enough material capability and incentives to lobby. Firm \(\varphi_1\), on the other hand, knows that firm \(\varphi_2\) cannot credibly commit to making enough political contribution to their own government to prevent highly productive foreign firms coming into their market. This is an important insight which can provide a micro-foundation for endogenous lobby formation in a more general setting later.

**Corollary 2 (Positive Lobbying)**  
*Productive domestic firm pays higher lobbying cost than un-productive domestic firm to their own governments. Also, they pay strictly positive political lobbying costs.*

\[C_1(\varphi_1) \geq C_1(\varphi_2) > 0\]

Another important result is shown in Corollary 2 as an immediate consequence of Assumption 1. In addition to the result in Corollary 1, productive firms offer higher political contribution in absolute value. Also, both types of domestic firms always provide strictly positive political contribution.

So far, we have studied the political incentives of domestic firms. The results generally confirms the political pressures for “protection for sale” from import competing industries. In addition, the results advance the traditional model in that they suggest that lobbying incentives do no longer have to be given exogenously as in Grossman and Helpman (1994). That is, highly productive domestic firms have incentives and capabilities to lobby domestically. It is now time to analyze whether productive firms have similar power and incentives vis-à-vis foreign governments. Proposition 2 shows that it is true only under some conditions.
**Proposition 2 (Lobbying by Foreign Firms)** Productive firm in Country 1 makes positive political contribution to Government 2 when the current tariff is sufficiently high: \( C_2(\varphi_1) \geq 0 \) iff

\[
\tau_{12} \geq \varphi_1^{\frac{\sigma}{\sigma-1}} \left( 1 - \varphi_1 \right)^{\frac{1}{\sigma-1}} \left[ \left( \frac{1}{\varphi_3} \right)^{1-\sigma} - \left( \frac{1}{\varphi_4} \right)^{1-\sigma} \right]^{\frac{1}{\sigma-1}}
\]  

(9)

Proof is in Appendix B.3.

Proposition 2 provides an important intuition for the empirical pattern identified in Figure 2, i.e., lobbying by foreign firms regarding domestic government’s trade policy. The result implies that firms indeed have incentives to buy off governments abroad. However, they do so only when the tariff rate is severe enough to make political contributions worthwhile. This is quite surprising in that one may expect that highly productive firms have enough material capability to lobby, and thus will always try to do so. A careful examination, however, suggests that highly productive firms do not need to lobby unless the tariff level is sufficiently high to prevent them from making profits. The main intuition of the result comes from the fact that firms’ average cost decreases as their productivity increases. Simply put, highly productive firms can guarantee enough profit by using resources on production rather than on lobbying.

**Corollary 3 (Lobbying Cutoff for Productive Foreign Firm)**

1. The cutoff tariff level for positive political contribution can be characterized for a given productivity level of an exporting firm as follows.

\[
\tau_{12}^* = \varphi_1^{\frac{\sigma}{\sigma-1}} \left( 1 - \varphi_1 \right)^{\frac{1}{\sigma-1}} \left[ \left( \frac{1}{\varphi_3} \right)^{1-\sigma} - \left( \frac{1}{\varphi_4} \right)^{1-\sigma} \right]^{\frac{1}{\sigma-1}}
\]  

(10)

2. As a firm becomes more productive, it is less likely to make positive political contribution to foreign government as the cutoff increases.

\[
\frac{\partial \tau_{12}^*}{\partial \varphi_1} \geq 0
\]  

(11)

Corollary 3 shows that the cutoff tariff level for political contribution to foreign government increases with the productivity of exporting firms. That is, highly productive firms do not lobby to foreign government unless the tariff level is unbearably high. It is in fact relatively less productive exporting firms who have higher incentives to lobby. From the perspective of relatively less productive exporting firms, due to the increasing
returns to scale, decreases in the tariff level opens up the possibility of realizing significant expected increase in the profits from foreign market. In this regard, Corollary 3 implies that relatively less productive exporting firms are more likely to make political contributions to foreign government for a given tariff rate. That is, among the exporting firms, it is relatively less productive firms who are at the margin $\varphi_{ij}^*$ that has higher incentives to lobby because they are the ones who benefit the most from the reduction of variable trade cost.

This theoretical result suggests that extremely productive firms do not need to lobby foreign government since they can secure on their own profits anyways in the foreign market and the marginal increase in their expected profit is less than the marginal cost of political contribution. For a relatively less productive exporting firms (recall that they are still productive enough to export!), sufficiently high tariff rates abroad induce incentives to lobby foreign government. Ceteris paribus, therefore, one can expect that the average productivity level of foreign firms who lobby decreases as the trade liberalization deepens. Contrarily, politicians in relatively closed economy will have to deal with firms with higher productivity level on average.

As noted in Section 4, one of the interesting empirical patterns that exist in the lobbying dataset is that “Open Trade for Sale” occurs. There are at least two political forces that are in play: 1) lobbying by foreign firms to directly influence domestic government’s trade policy, and 2) lobbying by domestic firms to indirectly affect foreign government’s trade policy. Although Proposition 2 provides a theoretical foundation for lobbying by foreign firms, our current model cannot address the second political channel. In a separate paper, I address this concern by introducing a bargaining stage between foreign and domestic government.

4 Data

This section describes the dataset: 1) Lobbying data that describes firm level political behavior, 2) Financial data capturing firm level economic activities including primary industry of competition each firm is associated with, and 3) Industry level characteristics such as trade policy and product differentiation.

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\(^6\) Data collection for empirical analysis is still work in progress. I am presenting a small subset of dataset in this section to offer a preliminary evidence for the theoretical results in Section 3.
4.1 Heterogeneous Political Activity of Firms

The Lobbying Disclosure Act (LDA) of 1995 and the Section 209 of Honest Leadership and Open Government Act of 2007 (HLOGA) made detailed information about individual lobbying activities publicly available. In accordance with the LDA, lobbyists must register and report their “lobbying activities” to the Senate Office of Public Records on behalf of their clients. It is important to note that foreign firms and organizations defined by “foreign entity” under Section 3 of LDA are also subject to the rule.

Although each lobbying report is publicly accessible from the Senate Office of Public Records, as of the writing of this paper, it exists either in pdf or xml file format. The search machine provided by the Senate Office of Public Records is also limited in that only a certain part of individual lobbying report can be displayed, and each search is limited in returning only 3,000 records. To resolve this issue, I wrote text-parsing software in R and Python to automate the extraction of all information available in each lobbying report. This creates a dataset with 727,016 observations that contains information such as client, amount, issue code, associated Senate or House bill number, specific description of lobbying activities, and foreign entity. In addition to the highly detailed contents of dataset, another benefit of such data constructing process is that it can be automatically updated quarterly so that information can be used as soon as it is available.

This LDA dataset is particularly useful in analyzing political interaction between firms and governments. First, it captures a firm’s direct, expressed interest in a specific policy. As Ansolabehere et al. (2002) find, private corporations tend to emphasize

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7 The definition of lobbyist is as follows: Lobbyist is “any individual (1) who is either employed or retained by a client for financial or other compensation (2) whose services include more than one lobbying contact; and (3) whose lobbying activities constitute 20 percent or more of his or her services time on behalf of that client during any three-month period.”

8 A client is “Any person or entity that employs or retains another person for financial or other compensation to conduct lobbying activities on behalf of the person or entity. An organization employing its own lobbyists is considered its own client for reporting purposes.”

9 From each lobbying report, one can distinguish whether a client is foreign or domestic. In order to identify a broad foreign interest, one can also look at the location of foreign entity. By definition, a foreign entity “holds at least 20% equitable ownership in the client or any affiliate of the client required to be listed on line 13; or directly or indirectly, in whole or major part, plans, supervises, controls, directs, finances, or subsidizes the activities of the client or affiliate of the client required to be listed on line 13; or is an affiliate of either the client, or an organization affiliated with the client identified on Line 13 or 14 of Form LD-1 and has a direct interest in the outcome of the lobbying activity.”

10 Originally, running the text parsing code on each xml file to create a dataset took more than two weeks. I wrote a parallelized version of the software to run it on a cluster machine with 1344 cores. Now, it takes less than 12 hours to construct an always up-to-date dataset.
lobbying to affect specific policies and bills, while ideologically oriented partisan organizations such as labor unions tend to make campaign contributions to influence electoral outcomes.

Empirical studies of political economy models of trade, however, have primarily used PAC level Federal Election Commission (FEC) contribution dataset. For instance, Gawande and Bandyopadhyay (2000) and Goldberg and Maggi (1999) both use PAC (Political Action Committee) contribution spending to test the “Protection for Sale” model. Such empirical analysis inevitably leaves out independent firm level political activities. This justifies the use of LDA dataset over Federal Election Commission electoral contribution dataset in studying heterogeneous political incentives of individual firms regarding a specific trade policy.

The second advantage of the LDA dataset is that an analyst can observe specific policy issues that concern each firm. There are about 90 issue categories such as Trade, Energy/Nuclear, and Tariff that broadly define each lobbying activity and some detail about lobbying activities under each category. Although there is no one-to-one relation between lobbying report and issue area, this is highly valuable information because it specifies the interest of individual firms at a fairly detailed level. The right panel of Figure 1 shows texts that are frequently used in describing individual lobbying activities under the category of trade.

Third, the detailed description of lobbying activity helps identify exporting firms’ general interest in removing both tariff and non-tariff-barriers. This is important given that political economy models of trade have focused primarily on trade barriers. This paper shows that there exist political forces behind trade liberalization, and therefore “Buying Free Markets” is as important as “Protection for Sale.” The left panel of Figure 1 shows a part of fourth quarter lobbying report by Chrysler in 2011 to illustrate the case that domestic firms lobby in order to eliminate trade barriers imposed by foreign government.

Lastly, the amount of lobbying expenditure is economically significant. LDA requires each lobbying entity to report their lobbying spending only if it is above $5,000. An example of a lobbying report is given in Appendix A.1. It shows that Chrysler spent

\[ \text{\footnotesize{\cite{11}}} \text{A complete list of issue area code is available in General Instruction for Lobbying Report}\]

\[ \text{\footnotesize{\cite{12}}} \text{A different rule is applied to in-house lobbying entities. They need to report if the expense is more than $20,000.}\]
Figure 1: Specific Lobbying Issues: Each lobbying report should describe specific lobbying issues under section 16. The left panel shows a part of lobbying report filed by Chrysler Group in 2011. It shows that exporting firms do lobby domestic government (see section 17) to affect a foreign government’s trade policy. The word cloud in the right panel descriptively shows the frequency of words that are used more than 300 times in the section 16 of 30,000 reports that have TRADE as general issue area. The size of each word corresponds to the frequency of its use. Note that clients have general interests in legislative outcomes.

$1,131,245.00 during 4th quarter alone in 2011. The amount of political spending is much higher in absolute value than the contribution amount since campaign contribution is generally limited up to $5,000 per PAC. As noted, earlier empirical studies omit such lobbying expenditures and primarily focused on PAC contribution. If firms are political and their lobbying expenses are economically significant, we should incorporate such information in linking politics and economic policy outcomes.

Figure 2 shows an increasing trend in lobby spending. The left panel shows that the total amount (in million dollars) of lobbying expenses reported in entire lobbying reports from 1999 to 2010 have increased. Note that client can be an interest group or a firm in this case. The right panel, on the other hand, focuses on foreign firms after matching clients name with finance dataset (COMPUTSTAT). It shows that there also exist an increasing trend in lobby spending by foreign exporters. To the extent that traditional political economy models exclude the possibility that foreign entity can lobby
domestic governments, this empirical fact points to a new political channel in the era of globalization.

4.2 Financial Data for Heterogeneous Firms

The so-called “New Trade Theory” and “New-new Trade Theory” emphasize consumer taste differentiation and firm level productivity differences (e.g., Krugman [1980], Helpman and Krugman [1985], Melitz [2003]). Firms are economically different. In particular, only a small number of productive firms export given the fixed cost of entry in foreign market (e.g., Melitz [2003], Bernard et al. [2007, 2003]). Consequently, as in Section 3, we need to incorporate in any model of trade policy exporting firm’s preferences for open trade policy in addition to import-competing firms’ incentives to protect domestic market. Figure 3 shows that firm level lobbying is indeed highly skewed: Small number of firms within a given industry spends significantly larger amount of money than other firms. This is consistent with empirical studies of recent trade literature, where firm level productivity is also highly skewed.

There exist a number of databases that contain detailed firm-level financial information. Among the most widely used is COMPUSTAT, which records financial statements of every publicly traded company both yearly and quarterly. Given a firm that engages
in lobbying, I manually searched the firm in this database to get information such as sales, capital, R&D expenses, and primary industry of competition in either SIC 4 digits or NAICS 6 digits level. We need this information to test 1) whether firm-level economic productivity is associated with their political activities, and 2) if variation in lobbying expenditures can explain trade policy differences across industries. Note that there are still many private firms that cannot be identified although large number of public firms in lobbying dataset can be matched. For instance, among 38,548 lobbying reports that have either “Trade” or “Tariffs” as their associated issue codes, 14,558 cases were matched through COMPUSTAT database. Although unmatched clients may be interest groups or an organization rather than firms, there are still many private firms that were left out.

As a secondary source, therefore, I used Osiris database maintained by Bureau van Dijk. Like COMPUSTAT, Osiris contains all the financial information of publicly traded firms in global stock markets. One benefit of using Osiris is that I can identify subsidiaries of public firms as well. For example, Samsung Electronics Co. LTD is...
a publicly traded firm in Korean stock exchange market, and it owns a subsidiary—Samsung Electronics America—located in the U.S. As a subsidiary of foreign firm, Samsung Electronics America spent $180,000 from January to June in 1999 regarding “US-Korea trade relations generally and US legislation affecting imports into the United States.” By using Osiris, I am able not only to match a private subsidiary of public firms, but also to examine foreign exporters’ political activities to eliminate trade barriers of domestic government which have been left out from traditional political economy analysis.

Finally, I use Orbis as a final source of getting financial information of firms that cannot be matched from above two steps. Orbis is also maintained by Bureau van Dijk, but it covers much larger set of both private and public firms. Although data on private firms is less reliable since private companies are not required to issue audited financial statement, it is the best source available to get estimated financial characteristics of firms that produce goods and services in global market. Most importantly for this paper, one can identify the primary industry of competition for each firm.

Manual search of each firm’s name appeared in lobbying data from finance databases is a highly tedious process, and it is still work in progress. As a first cut, I matched client names in the lobbying dataset when a lobbying report contains either trade or tariff as one of issue area, while carefully recording the source databases to account for the compatibility across them. So far, I was able to match 24,107 lobbying reports related to trade and tariff issues out of 38,548.

4.3 Product Differentiation and International Trade

Consumers’ “love of variety” is an important source of intra-industry trade. Products are differentiated within industry, and thus it is increasingly difficult to draw a clear line between an exporting industry and import-competing industry. That is, within an industry, some firms export while others produce goods only domestically. As a result, firm level preferences over trade policy within the same industry should differ from each other.

An important measure for product differentiation is elasticity of substitution across goods. It measures the willingness with which consumers will substitute a good for another. It is the elasticity of the ratio of consumptions of two goods with respect to the
ratio of marginal utility of each good. Simply put, it measures substitutability across goods, where lower elasticity of substitution implies higher degree of differentiation. I use HS (Harmonized System) 10 digits level U.S. trade elasticities that Broda and Weinstein (2006) estimate.

![Graph showing product differentiation and lobbying by domestic firms](image1)

![Graph showing employment and spending on lobbying by foreign manufacturing firms](image2)

Figure 4: Heterogeneous Lobbying: The left panel descriptively shows some variation in lobbying amount by domestic firms across industries with different level of product differentiation. Lower elasticity of substitution implies higher product differentiation. For each SIC 4 digits level industry, I used mean elasticity of substitution across corresponding 10 digits HS products. 2532 observations from domestic firms whose lobby report has either trade or tariff issue area are used. The right panel shows that large foreign exporters, in terms of their employment size, tend to spend more money on lobbying. 216 foreign firms whose 1) location was identified as foreign and 2) primary industry is manufacturing (first two digits of SIC code are from 20 to 40) were used.

As a final step, a concordance between HS 10 digits categorization for international trade and SIC 4 digits (or NAICS 6 digits) domestic industry categorization is necessary. This makes it possible to associate industry level trade policy with firm level political activities conditional on the primary industry identified in the process of matching clients in lobbying reports with firm names in financial database. I use the concordance from Pierce and Schott (2009).

The left panel of Figure 4 shows that political activities vary across industries with different levels of product differentiation. Although it is still hard to identify a causal link between product differentiation and spending on lobbying, firms selling differentiated products tend to be politically more active. The right panel is consistent with
“New-new Trade Theory” where product differentiation and firm level productivity selects only productive firms as exporters. This figure suggests that exporting firms’ economic capability may be positively correlated with their political clout.

5 Conclusion

The boundary between exporting and import-competing industries have become increasingly ambiguous especially for the ones with large volume of intra-industry trade. It is not unusual to observe that some firms export while others produce goods only to domestic market even within a same industry.

In this paper, I show that exporting firms do have incentives to lobby. Specifically, increasing returns to scale implies that firms who are just productive enough to export have higher incentives to lobby for eliminating trade barriers. This is theoretically important since political economy models of trade generally do not consider the possibility of foreign firms lobbying domestic governments. It is also important to note that domestic firms also lobby their own government to influence foreign government’s trade policy.

In order to investigate the theoretical insights empirically, I have collected a large scale dataset consisting of detailed firm-level political and economic factors. Although a full-blown statistical analysis requires further data collection, I was able to identify some evidences that firms are politically different, and a large number of firms do lobby for open trade rather than protection.

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14For now, I assume that political power is positively correlated with lobby spending.
References


## A Appendix

### A.1 An Example of Lobbying Report

**LOBBYING REPORT**

Lobbying Disclosure Act of 1995 (Section 5)  - All Filers Are Required to Complete This Page

1. **Registrant Name**  Organization/Lobbying Firm  Self-Employed Individual

   Chrysler Group, LLC

2. **Address**

   Address1  1401 H Street NW, Suite 700  Address2

   City  Washington  State  DC  Zip Code  20005  Country  USA

3. **Principal place of business (if different than line 2)**

   City

   State

   Zip Code

   Country

4a. **Contact Name**

   NANCY BELL

   Telephone Number  (202) 414-6798

   E-mail  neb14@chrysler.com

5. **Senate ID#**

   400460283-12

6. **House ID#**

   408810000

7. **Client Name**

   Chrysler Group, LLC

   Self

   Check if client is a state or local government or instrumentality

8. **Client Category**

   11. **No Lobbying Issue Activity**

9. **Type of Report**

   8. Year  2011

   Q1 (1/1 - 3/31)

   Q2 (4/1 - 6/30)

   Q3 (7/1 - 9/30)

   Q4 (10/1 - 12/31)

10. **Check if this filing amends a previously filed version of this report**

11. **Check if this is a Termination Report**

12. **Lobbying**

   Income relating to lobbying activities for this reporting period were:

   Less than $5,000  $0

   $5,000 or more  $1,131,245.00

   Provide a good faith estimate, rounded to the nearest $10,000, of all lobbying related income from the client (including all payments to the registrant by any other entity for lobbying activities on behalf of the client).

13. **Organizations**

   Expense relating to lobbying activities for this reporting period were:

   Less than $5,000  $0

   $5,000 or more  $1,131,245.00

   Check box to indicate expense accounting method. See instructions for description of options.

   - Method A. Reporting amounts using LDA definitions only
   - Method B. Reporting amounts under section 6033(b)(8) of the Internal Revenue Code
   - Method C. Reporting amounts under section 162(e) of the Internal Revenue Code

14. **Reporting**

   Check box to indicate expense accounting method. See instructions for description of options.

   - Method A. Reporting amounts using LDA definitions only
   - Method B. Reporting amounts under section 6033(b)(8) of the Internal Revenue Code
   - Method C. Reporting amounts under section 162(e) of the Internal Revenue Code

**Signature**

Filed Electronically  Date  01/20/2012

**Printed Name and Title**

Nancy Bell, Senior Manager

Figure 5: 4th Quarter Lobbying Report by Chrysler in 2011
B Mathematical Appendix

B.1 Derivation of Equation (5)

1. For any given prices of goods \( p_{ij}(\phi_k) \), a representative consumer minimizes its spending.

\[
\min_{x_{ij}(\phi_k)} \sum_i \sum_k p_{ij}(\phi_k)x_{ij}(\phi_k), \quad \text{s.t.} \quad U_j = \sum_i \sum_k \left[ \frac{x_{ij}(\phi_k)}{\sigma x_{ij}(\phi_k)} \right]^{\sigma-1},
\]

2. Taking the first order condition, and plug the result in the constraint gives,

\[
x_{mn} = \frac{p_{mn}^{-\sigma}}{\left[ \sum_i \sum_k p_{ij}^{-\sigma} \right]^{\sigma-1}} U_j
\]

3. Derive indirect utility function \( V_j \). Multiplying the above equation by \( p_{mn} \) and sum over all the goods in the economy gives

\[
E_j = \left[ \sum_i \sum_k p_{ij}(\phi_k)^{1-\sigma} \right]^{\frac{1}{\sigma-1}} \sum \frac{V_j}{p_j} \equiv P_j \text{ Indirect Utility}
\]

4. We can define price index \( P_j \).

\[
P_j = \left[ \sum_i \sum_k p_{ij}(\phi_k)^{1-\sigma} \right]^{\frac{1}{\sigma-1}} \quad \text{(12)}
\]

5. Use Roy’s identity to derive the demand function.

\[
x_{ij}(\phi_k) = \frac{\partial V_i}{\partial p_{ij}} \frac{\partial p_{ij}}{\partial E} \quad \text{(Roy’s Identity)}
\]

\[
\Rightarrow x_{ij}(\phi_k) = E \cdot p_{ij}(\phi_k)^{-\sigma} \cdot P_j^{\sigma-1}
\]

B.2 Proof of Proposition 1

Proof From Equation (12) and Equation (8), one can re-write the profit functions for each firms.

\[
\pi(\phi_1) = \frac{p_{11}^{-\sigma}(\phi_1)}{p_1^{-\sigma}} E_1 - \frac{p_{12}^{-\sigma}(\phi_1)}{p_1^{-\sigma}} E_1 - f_{11} + \frac{p_{12}^{-\sigma}(\phi_1)}{p_2^{-\sigma}} E_2 - \frac{\tau_{12} p_{12}^{-\sigma}(\phi_1)}{p_2^{-\sigma}} E_2 - f_{12} - \frac{1}{2} C_1(\phi_1)^2 - \frac{1}{2} C_2(\phi_1)^2
\]

\[
= \left( \frac{1}{\phi_1} \right)^{1-\sigma} E_1 \left[ \left( \frac{1}{\phi_1} \right)^{1-\sigma} + \left( \frac{1}{\phi_2} \right)^{1-\sigma} + \left( \frac{\tau_{21}}{\phi_3} \right)^{1-\sigma} \right]^{-1}
\]

\[
+ \left( \frac{1}{\phi_1} \right)^{1-\sigma} E_2 \cdot \tau_{12} \left[ \left( \frac{1}{\phi_3} \right)^{1-\sigma} + \left( \frac{1}{\phi_4} \right)^{1-\sigma} + \left( \frac{\tau_{12}}{\phi_1} \right)^{1-\sigma} \right]^{-1}
\]

\[- f_{11} - f_{12} - \frac{1}{2} C_1(\phi_1)^2 - \frac{1}{2} C_2(\phi_1)^2
\]
The results are immediate from the profit maximization with respect to the political contribution functions.

\[ \pi(\varphi_2) = \frac{p_{11}^{1-\sigma}(\varphi_2)}{P_1^{1-\sigma}} E_1 - \frac{p_{11}^{1-\sigma}(\varphi_2)}{P_1^{1-\sigma} \varphi_2} E_1 - f_{11} - \frac{1}{2} C_1(\varphi_2)^2 \]

\[ = \left( \frac{1}{\varphi_2} \right)^{1-\sigma} \frac{E_1}{\sigma} \left\{ \left( \frac{1}{\varphi_1} \right)^{1-\sigma} + \left( \frac{1}{\varphi_2} \right)^{1-\sigma} + \left( \frac{\tau_{21}}{\varphi_3} \right)^{1-\sigma} \right\}^{-1} - f_{11} - \frac{1}{2} C_1(\varphi_2)^2 \]

\[ \text{B.3 Proof of Proposition 2} \]

\[ C_1(\varphi_2) \geq 0 \iff \left( \frac{1}{\varphi_3} \right)^{1-\sigma} - \left( \frac{1}{\varphi_4} \right)^{1-\sigma} + \left( \frac{\tau_{12}}{\varphi_1} \right)^{1-\sigma} \geq \tau_{12} \varphi_1^{1-\sigma} \]

\[ \iff \tau_{12}^{\sigma-1} \left[ \left( \frac{1}{\varphi_3} \right)^{1-\sigma} - \left( \frac{1}{\varphi_4} \right)^{1-\sigma} \right] \geq \varphi_1^{1-\sigma} \left( 1 - \frac{1}{\varphi_1} \right) \]

\[ \iff \tau_{12} \geq \varphi_1^{1-\sigma} \left( 1 - \frac{1}{\varphi_1} \right)^{\sigma-1} \left[ \left( \frac{1}{\varphi_3} \right)^{1-\sigma} - \left( \frac{1}{\varphi_4} \right)^{1-\sigma} \right]^{\frac{1}{\sigma-1}} \]

, where the last inequality follows from Assumption 1.

\[ \text{C Symmetric Lobbying Activities with Discrete Firm Types} \]

\[ \text{C.1 Demand} \]

This section provides a formal justification of focusing on finite types with infinite firms engaging in monopolistic competition for interested readers. Define the type specific utility function as follows. Monopolistic competition among symmetric type \( t \) firms: each type \( t \) firm has monopoly power with respect to its own variety.

\[ U_{D_t} = \left( \int_{\Omega_t} q(\omega_t)^{\frac{\sigma_t-1}{\sigma_t}} \right)^{\frac{\sigma_t}{\sigma_t-1}} \]

(13)

A representative consumer faces the following maximization problem.

\[ \max_{q(\omega_t)} U_D = \left\{ \sum_t (U_{D_t})^{\frac{\sigma-1}{\sigma}} \right\}^{\frac{\sigma}{\sigma-1}} \]

(14)

s.t \( \sum_t \int_{\Omega_t} p(\omega_t)q(\omega_t)d\omega_t \leq E_D \)

Taking first order condition gives,

\[ \frac{\sigma}{\sigma-1} U_D^{-\frac{1}{\sigma}} \cdot \frac{\sigma-1}{\sigma} U_{D_t}^{-\frac{1}{\sigma_t}} \cdot \frac{\sigma_t-1}{\sigma_t} U_{D_t}^{-\frac{1}{\sigma_t}} \cdot \frac{\sigma_t-1}{\sigma_t} q(\omega_t)^{\frac{1}{\sigma_t}} = \lambda p(\omega_t) \]

(15)

Let
\[ A = U_{Dt}^{\frac{1}{\sigma}} \\
B_t = U_{Dt}^{-1/\sigma} U_{Dt}^{1/\sigma} \]

Then, Equation (15) becomes,

\[ AB_t q(\omega_t)^{-\frac{1}{\sigma}} = \lambda p(\omega_t) \]

This implies,

\[ q(\omega_t) = \left( \frac{\lambda p(\omega_t)}{AB_t} \right)^{-\frac{1}{\sigma}} \]

\[ \Rightarrow \int_{\Omega_t} p(\omega_t) q(\omega_t) d\omega_t = \left( \frac{\lambda}{AB_t} \right)^{-\frac{1}{\sigma}} \int_{\Omega_t} p(\omega_t)^{1-\sigma} d\omega_t = E_{Dt} \tag{16} \]

Now suppose the following,

**Assumption 3 (Equal Elasticity of Substitution)** Each type of good has same elasticity of substitution. That is,

\[ \sigma_t = \bar{\sigma} \quad \forall t \tag{17} \]

To simplify the notation, we define the following quantities.

\[ \kappa \equiv \left( \frac{\lambda}{A} \right)^{-\bar{\sigma}} \tag{18} \]

\[ \bar{p}_t = \int_{\Omega_t} p(\omega_t)^{1-\sigma} d\omega_t \tag{19} \]

Then, from Equation (16),

\[ \left( \frac{\lambda}{AB_t} \right)^{-\bar{\sigma}} \bar{p}_t = E_{Dt} \]

\[ \Leftrightarrow \kappa B_t^{\bar{\sigma}} \bar{p}_t = E_{Dt} \]

\[ \Leftrightarrow \kappa \sum B_t^{\bar{\sigma}} \bar{p}_t = E_D \]

\[ \Leftrightarrow \frac{B_t^{\bar{\sigma}} \bar{p}_t}{\sum B_t^{\bar{\sigma}} \bar{p}_t} = \frac{E_{Dt}}{E_D} \]

Also,

\[ q(\omega_t) = \left( \frac{\lambda p(\omega_t)}{AB_t} \right)^{-\bar{\sigma}} \]

\[ = \kappa B_t^{\bar{\sigma}} p(\omega_t)^{-\bar{\sigma}} \]
Note that,
\[
B_t = U_{D_t}^{\frac{1}{\sigma} + \frac{1}{\tilde{\sigma}}}
\]
\[
B_t^{\tilde{\sigma}} = U_{D_t}^{1 - \frac{\tilde{\sigma}}{\sigma}}
\]

Thus,
\[
q(\omega_t) = \kappa U_{D_t}^{1 - \frac{\tilde{\sigma}}{\sigma}} p(\omega_t)^{-\tilde{\sigma}}
\]
\[
\Rightarrow (q(\omega_t))^{\frac{\tilde{\sigma} - 1}{\sigma}} = \kappa \frac{\tilde{\sigma} - 1}{\sigma} U_{D_t}^{1 - \frac{\tilde{\sigma}}{\sigma}} (\tilde{\sigma} - 1) p(\omega_t)^{1 - \tilde{\sigma}}
\]

From Equation (13), integrating over \( \Omega_t \) gives,
\[
U_{D_t} = \kappa U_{D_t}^{1 - \frac{\tilde{\sigma}}{\sigma}} \tilde{p}_t^{\frac{\tilde{\sigma}}{\sigma - 1}}
\]
\[
\Rightarrow U_{D_t}^{\tilde{\sigma}} = \kappa \tilde{p}_t^{\frac{\tilde{\sigma}}{\sigma - 1}}
\]
\[
\Rightarrow U_{D_t} = \kappa \tilde{p}_t^{\frac{\tilde{\sigma}}{\sigma - 1}}
\]

This implies,
\[
B_t^{\tilde{\sigma}} = U_{D_t}^{1 - \frac{\tilde{\sigma}}{\sigma}}
\]
\[
= \left( \kappa \tilde{p}_t^{\frac{\tilde{\sigma}}{\sigma - 1}} \right)^{1 - \frac{\tilde{\sigma}}{\sigma}}
\]
\[
= \left( \kappa \tilde{p}_t^{\frac{\tilde{\sigma}}{\sigma - 1}} \right)^{\frac{\tilde{\sigma} - \sigma}{\sigma - 1}}
\]
\[
= \left( \kappa \tilde{p}_t^{\frac{\tilde{\sigma}}{\sigma - 1}} \right)^{\sigma - \tilde{\sigma}}
\]

Thus,
\[
B_t^{\tilde{\sigma}} \tilde{p}_t = \kappa \tilde{p}_t^{\frac{\tilde{\sigma} - 1}{\sigma - 1}} \tilde{p}_t^{\frac{\tilde{\sigma} - 1}{\sigma - 1}}
\]
\[
\sum B_t^{\tilde{\sigma}} \tilde{p}_t = \kappa \tilde{p}_t^{\frac{\tilde{\sigma} - 1}{\sigma - 1}} \sum \tilde{p}_t^{\frac{\tilde{\sigma} - 1}{\sigma - 1}}
\]

Since, \( \kappa = E_D / \sum B_t^{\tilde{\sigma}} \tilde{p}_t \), this implies,
\[
\kappa = \frac{E_D}{\sum B_t^{\tilde{\sigma}} \tilde{p}_t}
\]
\[
= \kappa^{1 - \frac{\tilde{\sigma}}{\sigma}} \frac{E_D}{\sum \tilde{p}_t^{\frac{\tilde{\sigma} - 1}{\sigma - 1}}}
\]

Thus,
\[
\kappa = \left( \frac{E_D}{\sum \tilde{p}_t^{\frac{\tilde{\sigma} - 1}{\sigma - 1}}} \right)^{\frac{\tilde{\sigma}}{\sigma}}
\]
Finally,
\[
q(\omega_t) = \kappa B_t^\tilde{\sigma} p(\omega_t)^{-\tilde{\sigma}}
\]
\[
= \kappa \left( \frac{1}{p_t^{\tilde{\sigma} - 1}} \right)^{\sigma - \tilde{\sigma}} p(\omega_t)^{-\tilde{\sigma}}
\]
\[
= \kappa \tilde{\sigma} (\tilde{p}_t)^{\frac{\sigma - \tilde{\sigma}}{\tilde{\sigma} - 1}} p(\omega_t)^{-\tilde{\sigma}}
\]
\[
= \frac{E_D}{\sum_t (\tilde{p}_t)^{\frac{\sigma - \tilde{\sigma}}{\tilde{\sigma} - 1}}} \cdot (\tilde{p}_t)^{\frac{\sigma - \tilde{\sigma}}{\tilde{\sigma} - 1}} \cdot p(\omega_t)^{-\tilde{\sigma}}
\]
\[
\equiv Q_t
\]

C.2 Supply

C.2.1 Optimal Pricing Decision

Each type \( t \) firm, denoted as \( \omega_t \), faces the following problem. We consider firms producing goods in Country \( D \).

\[
\max_{p(\omega_t)} \Pi_D(\omega_t) = p(\omega_t)q(\omega_t)(1 - \tau_t(\omega_t)) - \frac{q(\omega_t)}{\varphi_t} \text{ variable cost} - f_D \text{ fixed cost} - C(\omega_t) \tag{22}
\]

First order condition gives,
\[
\left[ q(\omega_t) + p(\omega_t) \frac{dq(\omega_t)}{dp(\omega_t)} \right] (1 - \tau_t(\omega_t)) - \frac{1}{\varphi_t} \frac{dq(\omega_t)}{dp(\omega_t)} = 0
\]
\[
\Leftrightarrow \left[ Q_t p(\omega_t)^{-\tilde{\sigma}} - \tilde{\sigma} Q_t p(\omega_t)^{-\tilde{\sigma}} \right] (1 - \tau_t(\omega_t)) + \frac{\tilde{\sigma}}{\varphi_t} Q_t p(\omega_t)^{-\tilde{\sigma} - 1} = 0
\]
\[
\Leftrightarrow (1 - \tilde{\sigma})(1 - \tau_t(\omega_t)) + \frac{\tilde{\sigma}}{\varphi_t} p(\omega_t)^{-1} = 0
\]
\[
\Leftrightarrow p(\omega_t) = \frac{\tilde{\sigma}}{\tilde{\sigma} - 1} \frac{1}{\varphi_t (1 - \tau_t(\omega_t))} \tag{23}
\]

As usual, we have constant markup over variable cost of production for the pricing decision. Plugging Equation (23) into Equation (22) and using the definition from Equation (19) we get,

\[
\tilde{p}_t = \left\{ \begin{array}{ll}
\left( \frac{\tilde{\sigma} - 1}{\tilde{\sigma}} \right)^{\frac{\tilde{\sigma} - 1}{\tilde{\sigma}}} \varphi_t^{\tilde{\sigma} - 1} | \Omega_t | & \text{if } t = DH, DL \\
\left( \frac{\tilde{\sigma} - 1}{\tilde{\sigma}} \right)^{\frac{\tilde{\sigma} - 1}{\tilde{\sigma}}} \varphi_t^{\tilde{\sigma} - 1} | \Omega_t | \cdot \int_{\Omega_t} (1 - \tau_t(\omega_t))^{\tilde{\sigma} - 1} d\omega_t & \text{if } t = FH \tag{24}
\end{array} \right.
\]

Now, plugging Equation (23) into Equation (21) gives,
\[
q(\omega_t) = Q_t p(\omega_t)^{-\tilde{\sigma}}
\]
\[
= Q_t \left( \frac{\tilde{\sigma}}{\tilde{\sigma} - 1} \right)^{\frac{\tilde{\sigma}}{\tilde{\sigma} - 1}} \varphi_t^{\tilde{\sigma} - 1} (1 - \tau_t(\omega_t))^{\tilde{\sigma}}
\]
\[
\equiv Q_t \tag{25}
\]
\[ \Pi_D(\omega_t) = \frac{\hat{\sigma}}{\sigma - 1} \frac{q(\omega_t)}{\varphi_t} - \frac{q(\omega_t)}{\varphi_t} - f_D - C(\omega_t) \]
\[ = \frac{1}{\sigma - 1} \frac{q(\omega_t)}{\varphi_t} - f_D - C(\omega_t) \]
\[ = \frac{1}{\sigma - 1} \frac{\tilde{Q}_t}{\varphi_t} [1 - \tau_t(\omega_t)]^{\hat{\sigma}} - f_D - C(\omega_t) \]
\[ \equiv R_t \quad (26) \]

C.2.2 Optimal Political Contribution

Firm solves the following maximization problem for optimal lobbying contribution,

\[ \max_{C(\omega_t)} \Pi_D(\omega_t) = R_t [1 - \tau_t(C(\omega_t))]^{\hat{\sigma}} - f_D - C(\omega_t) \quad (27) \]

Finally, we focus on Foreign Productive Firm. First order condition gives,

\[ - \hat{\sigma} R_t [1 - \tau_t(C(\omega_t))]^{\hat{\sigma} - 1} \tau_t'(C(\omega_t)) - 1 = 0 \quad (28) \]

Note that each type \( FH \) firm faces the same problem. This implies

\[ C_{FH}(\omega_t) = C_{FH} \quad (29) \]

This justifies the approach of focusing on finite type of firms in characterizing optimal political contribution in Section 3.