Protection For Sale In A General Oligopolistic Equilibrium (GOLE) Framework

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Abstract

We consider how the lobbying of organized sectors serves to affect the equilibrium trade policy of a country, where the market structure is oligopolistic. This paper shows that the lobbying of threshold sectors - which causes domestically produced goods which would not be exported at all in the absence of an export subsidy to become exported; or which causes goods which would not be produced domestically to become produced - have opposite welfare effects on the domestic country as compared to the lobbying of non-threshold sectors. The former enhances the country's national welfare while the latter worsens it. In this sense, this paper sheds light on a government's industrial targetting policy, when the government may be interested in reducing the influence of special interest groups in domestic policy making. Our findings also provide numerical evidence to the fact that lobbying which results in "dumping" is detrimental to the welfare of the Home country.

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> The final clause of the First Amendment guarantees "the right of the people . . . to petition the government for a redress of grievances." The Supreme Court has called this right one of "the most precious of the liberties safeguarded by the Bill of Rights," and one that "extends to all departments of the Government." That right was derived from the earliest charters of liberty. The Declaration of Independence spoke to the importance of this freedom: "In every stage of these Oppressions We have Petitioned for Redress in the most humble terms: Our repeated Petitions have been answered only by repeated injury.
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> -Joel Jankowsky and Thomas Goldstein, “In Defense of Lobbying”, *Wall Street Journal*, September 3, 2009.

1 Introduction and Motivations

President Obama has on numerous accounts tried to limit the influence of lobbyists in the policy making process of the USA. For example, he barred registered lobbyists from political appointments, and banned spoken communication between outsiders and federal officials about stimulus contracts in 2009. In January 2010, he brought this a step further, by imposing a ban on registered lobbyists from raising money for political candidates.[1]

From the viewpoint of the International Trade literature, President Obama's battle against lobbying makes perfect sense. Economists are in general agreement that lobbying by domestic sectors for protection against foreign competition is detrimental to the welfare of the domestic economy itself. Protection leads to a transfer of rents away from domestic consumers to domestic producers in the protected sectors, where it has been shown in economics textbooks that the loss in consumer surplus is greater than the gain in producer surplus, thus leading to the creation of deadweight loss.[2]

Having said so, is lobbying for protection against foreign competition, or lobbying for the promotion of domestic exports, always bad for the domestic economy?

[1]Please see [Thurber(2011)] for more details on President Obama's efforts to curb the influence of special interests groups in the USA.

[2]See chapters 8 and 9 in[Krugman(2009)] for example.

Should a government - such as the Obama administration - which is interested in minimizing the influence of special interest groups, seek to limit all organized domestic sectors' access to the government uniformly?

This paper argues that the effect of lobbying by domestic sectors on the national welfare of the home country depends on whether the organized sector is a threshold sector or not. We define a threshold sector as either one of the following: an import-competing sector whose goods would not be produced at all in the absence of protection against foreign competition; or an exporting sector whose goods would not be exported at all in the absence of an export subsidy. The oil and natural gas sector in Japan would be a good example of the former[3]; and Japan's smartphone industry today[4], or semiconductor industry in the 1950s-60s, would be good examples of the latter[5]. Another recent example of the former would be the solar panel industry in the EU and the USA, where domestic producers have been increasingly driven out of the market over the past few years, due to their inability to compete with Chinese producers. For example, Solyndra, a California-based solar panel producer, filed for bankruptcy in 2011,

[3] Japan is extremely scarce in domestic oil reserves and relies almost solely on imports to satisfy its oil consumption needs. However, it does posses a robust oil sector comprised of various sate-run and private companies. Until 2004, Japan's oil sector was monopolized by the Japan National Oil Corporation (JNOC), which was inaugurated by the Japanese government in 1967 and charged with the task of conducting oil exploration and production. Over the years, many of the JNOC's activities were ceded to the Japan Oil, Gas and Metals National Corporation (JOGMEC), a state-run enterprise. In addition, some new companies were formed, two of the largest being Inpex and the Japan Petroleum Exploration Company (Japex). The interested reader might like to refer to the U.S. Energy Information Administration (EIA)'s website for more details.

The main point we would like to stress however, is that the oil sector in Japan is an example of a threshold sector, where domestic production would not be possible without protection against foreign competition by her domestic government. According to Japan's Ministry of the Environment website, Japan levies a petroleum tax, where imported crude oil and petroleum products are taxed at 2040 yen (about 20.11 USD) per kilogram. Natural gas is taxed at 1080 yen (about 10.65 USD) per ton and diesel oil at 32.1 yen (about 0.32 USD) per litre. According to [Kotter(1993)], most of Japan's petroleum tax revenues (about 93%) are used to finance oil and gas exploration overseas; government and private-sector oil stockpiling; and revitalization of the domestic oil refining industry.

[4] An article by Eric Pfanner of the New York Times describes how the Japanese electronics industry missed out largely on the smartphone revolution, and is currently trying to catch up by promoting its exports in new niche markets such as user-friendly smartphones targetted at older consumers who, Japanese smartphone producers claim, are not always served adequately by their foreign competitors such as Apple and Samsung. Fujitsu, for example, has begun exporting its Raku-Raku, or "easy easy" smartphone to France, under a partnership with Orange, the former France Télécom. Please see Eric Pfanner, "Japanese Smartphone Manufacturer Sees an Export Market in Older Users", *The New York Times*, September 3, 2013, for more details.

[5] Please see [Noland(2007)]and [Okimoto(1989)]for details on Japan's success at industry targetting with regards to threshold sectors such as semiconductors; steel; automobiles and shipbuilding in the late 1950s to 1960s.

whereupon the company asserted that it was unable to build a viable business based on the cylindrical solar panels it had designed, due to less-sophisticated but cheaper Chinese-made solar panels flooding the market. Soon after, SolarWorld Industries America Inc. filed a complaint with the US Commerce department, claiming that Chinese companies were selling their panels in the US market below cost in order to expand their share of the market.[6]

Our results suggest that while a greater degree of protection being granted to non-marginal sectors in response to their lobbying is indeed harmful to the Home country, the opposite can be said for threshold sectors. This finding is in tandem with the observations of [Noland(2007)], who argues that one of the reasons why present-day Japan has met with such limited success in trying to model her past industrial-targetting policies could be due to political economy considerations, where resources in Japan have been increasingly directed to large, politically influential sectors, instead of marginal sectors. Based on these results, we argue that a government could seek to improve the welfare of its country by seeking to limit non-threshold sectors' access to the government, while being more receptive towards the lobbying of threshold sectors. For example, assuming that the home government chooses the equilibrium amount of export subsidies and import tariffs by maximizing its objective function - which is a weighted sum of national welfare and lobbying contributions[7] -, we propose that the government could rank domestic sectors according to how well they satisfy the criteria of a threshold sector, and attach a different amount of weight to the value function of each sector, with threshold sectors receiving the largest amount of weight and non-threshold sectors receiving much smaller amounts of weight.

Our findings also provide numerical evidence to the fact that lobbying which results in "dumping" is detrimental to the welfare of the Home country. In other words, when non-threshold sectors - whose goods are produced at such a low cost that these goods could be exported even without any help from their government - manage to lobby for a higher incidence of export subsidy, this lowers the welfare of the Home country.

This paper resembles to some extent the work of [Itoh and Kiyono(1987)], who exemplified that although protectionism almost always reduces a country's economic welfare, there is a specific type of trade policy that does improve the

[6]Please see Liyan Qi and Wayne Ma, "US-China Solar-Products Dispute Heats Up", *The Wall Street Journal*, June 4, 2014.

[7]This is the standard assumption used in [Grossman and Helpman(1992)]'s Protection For Sale model, upon which this paper is based.

welfare of the country implementing it: an export subsidy (or import tariff) that is levied on so-called "marginal goods", that is, goods that are not exported (produced) at all, or are exported (produced) only in small amounts under free trade, but whose exports (output) can be promoted considerably by export subsidies (import tariffs). The mechanism behind their findings is as follows. Based on their model of a continuum of goods, [Itoh and Kiyono(1987)] show that export subsidies on non-marginal goods serves to expand the volume of non-marginal sectors's outputs- which would have been exported even under free trade -, whereas export subsidies on marginal goods serves to expand the range of goods exported by the Home country. Under the asusmption that the country has monopoly power over the supply of non-marginal goods, the former worsens the country's welfare while the latter improves it.

This paper departs from [Itoh and Kiyono(1987)]'s approach in several ways. First, the market structure here is oligopolistic, whereas that in the latter is perfectly competitive. Second, this paper incorporates the consideration of heterogeneity in terms of productivity levels at the sectoral level, wheareas the latter does not. Finally, while [Itoh and Kiyono(1987)] are simply concerned with the effects of industrial targtting policies in the absence of political economy considerations, this paper aims to shed light on the welfare effects of lobbying by threshold and non-threshold sectors.

2 The Model

What would the equilibrium trade and tariff structure of a country be like, when firms have considerable market power within their own sectors, but are small in relation to the entire economy? This equilibrium trade structure will be the basis upon which further discussions on lobbying will be built upon.

The fact that firms are large within their own sectors implies that their production decisions have the power to influence endogenously-determined variables that pertain specifically to their own sectors. Such variables include the total supply; equilibrium price; demand; and level of imports of the specific sector. At the same time, the fact that firms are small in relation to the entire economy means that they are unable to affect nation-wide variables such as national income; factor prices; and the prices of other sectors. An oligopolistically competitive market structure of this sort, (where firms are large in their own sectors but small in relation to the entire economy), is certainly characteristic of a wide and diverse spectrum of modern industries, ranging from automobiles and household electrical appliances, to heavy machinery.[8]

2.1 Demand

We begin by considering two countries, Home and Foreign, which are symmetric in all respects, with the exception that they may differ in terms of their unit labor or technological requirements. In each country, there is a numeraire good and a continuum of non-numeraire goods. We assume that Home's income is always large enough to ensure that some non-negative amount of the non-numeraire is consumed. Citizens have identical preferences, which are continuum-quadratic. Hence, it follows that the instantaneous utility derived from the consumption activities of all domestic citizens is:

$$\begin{aligned} U[\{x(z)\}] &= x_0 + \int_0^1 u[x(z)]dz \\ &= x_0 + a\int_0^1 x(z) - \frac{b}{2}x(z)^2 dz \end{aligned} \tag{1}$$

The aggregate national utility function written above is to be interpreted as follows. In each country, there is a numeraire good denoted good *0*; and a continuum of non-numeraire goods or sectors, each sector denoted $z \in [0,1]$. x_0 denotes the total amount of good 0 consumed, and $x(z)$ the total amount of each good z consumed, for any $z \in [0,1]$. The sub-utility function, -which assumes the form $u[x(z)] = ax(z) - \frac{b}{2}x(z)^2$ - captures the utility which Home's citizens derive from their consumption of a single non-numeraire good, z. Denoting the first uncentered moment (i.e. uncentered mean) of consumption as $\mu_1^x = \int_0^1 x(z)dz$ and the 2nd uncentered moment (i.e. uncentered variance) of consumption as $\mu_2^x = \int_0^1 x(z)^2 dz$ allows us to rewrite the preferences of Home's citizens as $U[\{x(z)\}] = x_0 + a\mu_1^x - \frac{b}{2}\mu_2^x$.

[8] For example, focusing on weighted and unweighted averages of concentration ratios and the Herfindahl index for 436 sectors, [Cortes(1998)] demonstrates that the structure of the Japanese economy proves highly oligopolistic over the 1983–92 period. Also, on a more general note, many firms involved in international activities through exports or FDI (termed "international firms" by [Mayer and Ottaviano(2008)]) have also been shown to demonstrate high concentration ratios - "...their distribution is highly skewed as a handful of firms accounts for most aggregate international activity. They are bigger, generate higher value-added, pay higher wages, employ more capital per worker and more skilled workers, and have higher productivity." ([Mayer and Ottaviano(2008)]). In other words, [Mayer and Ottaviano(2008)]'s so-called "international firms" have the ability to affect endogenous variables at the sectoral level, unlike firms in perfectly and monopolistically competitive markets, which are atomistic within their own sectors.

Home's population seeks to maximize its total utility from consumption, by solving the following optimization problem.

$$\max U[\{x(z)\}]\{\equiv x_0 + a\int_0^1 x(z) - \frac{b}{2}x(z)^2 dz\} \tag{2}$$

subject to

$$x_0 + \int_0^1 p(z)x(z)dz = I$$

where $p(z)$ denotes the price of good $z \in [0, 1]$, and I represents Home's gross national income. Solving Home's utility-maximization problem yields the demand

$$x(z) = \frac{1}{b}[a - \lambda p(z)] \tag{3}$$

and inverse demand functions for good $z \in [0, 1]$.

$$p(z) = a - bx(z) \tag{4}$$

In order to solve the political economy equilibrium at a later stage in time, it is helpful that we derive the indirect national utility function as well. Let us denote this as $\tilde{U}(p, I)$. Following [Neary(2009)], we can derive an indirect utility function, by substituting the direct demand function (3) into the aggregate national utility function (1), so that

$$\tilde{U}[p(z), I] = x_0 + \frac{1}{2b}(a^2 - \mu_2^p)$$

where $\mu_2^p = \int_0^1 p(z)^2 dz$ is the second uncentered moment of the price distribution. Assuming that Home's aggregate national income is always large enough to enable a positive consumption of the numeraire good; and that each citizen spends all of his / her remaining income on x_0 after having consumed the amount of non-numeraire goods that maximizes his / her sub-utility function, we have

$$\begin{aligned} I &= x_0 + \int_0^1 p(z)x(z)dz \\ \Rightarrow x_0 &= I - \frac{a}{b}\mu_1^p + \frac{1}{b}\mu_2^P \end{aligned}$$

where $\mu_1^p = \int_0^1 p(z)dz$ and $\mu_2^p = \int_0^1 p(z)^2 dz$ are the first and second uncentered moments of the price distribution, respectively. Substituting this back into the expression for $\tilde{U}[p(z), I]$ yields

$$\begin{aligned}\tilde{U}[p(z), I] &= (I - \frac{a}{b}\mu_1^p + \frac{1}{b}\mu_2^P) + \frac{1}{2b}(a^2 - \mu_2^p) \\ &= I + \{\frac{a^2}{2b} - \frac{a}{b}\mu_1^p + \frac{\mu_2^p}{2b}\}\end{aligned}$$

where $\{\frac{a^2}{2b} - \frac{a}{b}\mu_1^p + \frac{\mu_2^p}{2b}\}$ is the gross national consumer surplus (CS) from the consumption of non-numeraire goods by Home's citizens.

2.2 Supply

We now turn to the supply side of the economy. Labor is the only factor of production in our model, and is available in inelastic supply at the national level. Let Home's aggregate labor supply be denoted L; and Foreign's aggregate labor supply be denoted L^*. The numeraire is produced one-to-one using labor, so the equilibrium wage rate in each country (w) is equal to unity. We assume that while the market structure of good x_0 is perfectly competitive, each of the non-numeraire sectors is oligopolistic. That is, each non-numeraire sector is characterized by a few firms which are large within their own sectors, but small in relation to the entire economy. There is no entry or exit of firms in each period, so the number of firms in each sector (n in Home and n^* in Foreign) is assumed to be fixed.[9]

The model also asumes away transport costs and barriers to trade. An important implication of this is that for each sector, the same equilibrium price $p(z)$ will prevail across both countries, under Free Trade. Following the original GOLE model by [Neary(2003b)], a single non-numeraire sector (i.e.sector z) could belong to either one of three trade regimes, when it opens up to trade. The three regimes differ according to the number of surviving (or actively-producing) firms in each country for that particular sector, and they are defined as follows.

1. Regime H: $[n > 0, n^* = 0]$. Here, both the Home and Foreign markets are served by Home firms alone, and there are no actively producing Foreign firms.

[9] This assumption may be justified in two ways. First, by the fact that incumbent firms are sufficiently large within their own sectors, and are hence able to block the entry of new firms; and second, by the fact that the frame of time considered is not long enough for firm entry and exit to occur.

2. Regime HF: $[n > 0,\ n^* > 0]$. Here, both Home and Foreign firms are engaged in active production. That is, there is a positive number of Home and Foreign firms in the sector.

3. Regime F: $[n = 0,\ n^* > 0]$. Here, both the Home and Foreign markets are served by Foreign firms alone.

We shall see that which of the above three regimes a particular sector finds itself in after it has opened up to trade depends entirely upon the sector's level of productivity in its own country, relative to that in the other country. In this model, we restrict our analysis to cases where trade between Home and Foreign is completely balanced.[10]

The Free Trade equilibrium of a particular domestic sector depends on the trade regime which it belongs to, that is, the number of active firms in Home and Foreign. It is derived by solving the profit-maximization problem of a single domestic firm in a particular sector z, when the firm competes via Cournot competition against all its rival firms in the two countries. Sectoral-level variables can then be attained by aggregating across the total number of firms in Home. Tables 1 and 2 capture the Free Trade equilibrium for domestic sectors under trade regimes H and HF, respectively. The notation is such that: y denotes the amount supplied by one domestic firm; y^* the amount supplied by one foreign firm; $\overline{x}$ the aggregate sectoral demand; $\overline{y}$ the aggregate sectoral supply; M the total import volume of Home; and M^* the total import volume of Foreign.

[10] Our assumption that sectors are symmetric in each country with the exception of their productivity levels implies that two-way trade - a situation where the two countries both import and export the same good at the same time-will not occur. This is due to the fact that the only driving force for trade to take place between the two countries is the difference in a sector's productivity level in each country. Home exports when it is more productive, and imports when it is less productive in producing a particular good. When it imports, it could be entirely dependent on imports for its consumption of the good (under Regime F), or it could engage in some domestic production that will be faced with competition from abroad (under Regime HF). The analysis could, however, be easily extended to include considerations of two-way trade, by for example, relaxing the assumption of symmetric population size between Home and Foreign. Hence, our assumption does not result in any loss of generality.

Table 1: Free Trade (Partial) Equilibrium in an Exporting Sector under Regime H

Regime	H: $[n > 0, n^* = 0]$, FREE TRADE
y	$\frac{2(a-\alpha(z))}{b(1+n)}$
y^*	0
$\bar{x} = \bar{y} = ny + n^*y^*$	$\frac{2n(a-\alpha(z))}{b(1+n)}$
$p = a - \frac{b}{2}\bar{x}$	$\frac{a+n\alpha(z)}{(1+n)}$
$x = \frac{1}{b}[a-p]$	$\frac{n(a-\alpha(z))}{b(1+n)}$
$M = x - ny$	$-\frac{n(a-\alpha(z))}{b(1+n)}$
$M^* = -M = x^* - n^*y^*$	$\frac{n(a-\alpha(z))}{b(1+n)}$

Table 2: Free Trade (Partial) Equilibrium in an Exporting / Import-Competing Sector under Regime HF

Regime	HF: $[n > 0, n^* > 0]$, FREE TRADE
y	$\frac{2[a-(n^*+1)\alpha(z)+n^*\alpha^*(z)]}{b(1+n+n^*)}$
$y*$	$\frac{2[a-(n+1)\alpha^*(z)+n\alpha(z)]}{b(1+n+n^*)}$
$\bar{x} = \bar{y} = ny + n^*y^*$	$\frac{2\{(n+n^*)a-n\alpha(z)-n^*\alpha^*(z)\}}{b(1+n+n^*)}$
$p = a - \frac{b}{2}\bar{x}$	$\frac{a+n\alpha(z)+n^*\alpha^*(z)}{(1+n+n^*)}$
$x = \frac{1}{b}[a-p]$	$\frac{a(n+n^*)-[nc+n^*\alpha^*(z)]}{b(1+n+n^*)}$
$M = x - ny$	$-\{\frac{n[a-\alpha(z)]-n^*[a-\alpha^*(z)]-2nn^*[\alpha(z)-\alpha^*(z)]}{b(1+n+n^*)}\}$
$M^* = -M = x^* - n^*y^*$	$\frac{n[a-\alpha(z)]-n^*[a-\alpha^*(z)]-2nn^*[\alpha(z)-\alpha^*(z)]}{b(1+n+n^*)}$

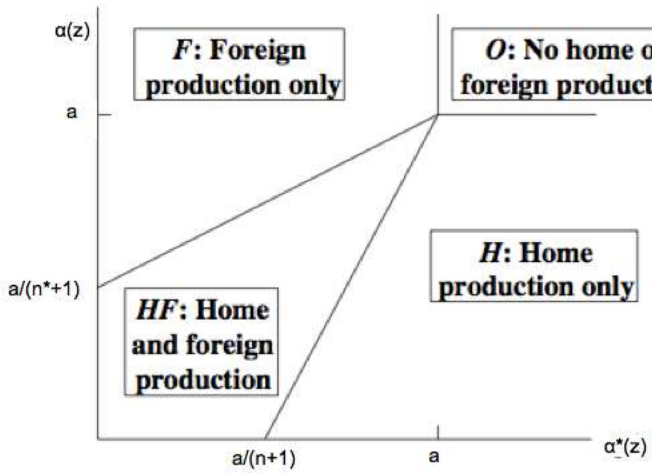
3 The General Oligopolistic Equilibrium (GOLE)

3.1 Equilibrium Production and Trade Patterns For Arbitrary Home and Foreign Costs

Now that we have pinned down the partial equilibrium under the two trade regimes where active Home firms exist under Free Trade, we are ready to consider the production and trade patterns for Home and Foreign under the general equilibrium. The General Oligopolistic Equilibrium (GOLE) is a situation where each and every sector across the entire continuum of sectors: $z \in [0, 1]$ is in a state of equilibrium. Under such an equilibrium, which of the three trade regimes described above would each sector belong to; and which range of sectors would get to export?

Making use of the fact that profits are proportional to output, Home firms can only be profitable if and only if $\alpha(z) < a$ under regime H: $[n > 0, n^* = 0]$; and $\alpha(z) < \frac{a+n^*\alpha^*(z)}{n^*+1}$ under regime HF: $[n > 0.n^* > 0]$.[11] In other words, the threshold level of productivity for producing is $\alpha(z) = a$ under Regime H, and $\alpha(z) = \frac{a+n^*\alpha^*(z)}{n^*+1}$ under Regime HF.[12] These findings are illustrated in Figure 1 below.

Figure 1. Equilibrium production patterns for arbitrary Home and Foreign costs



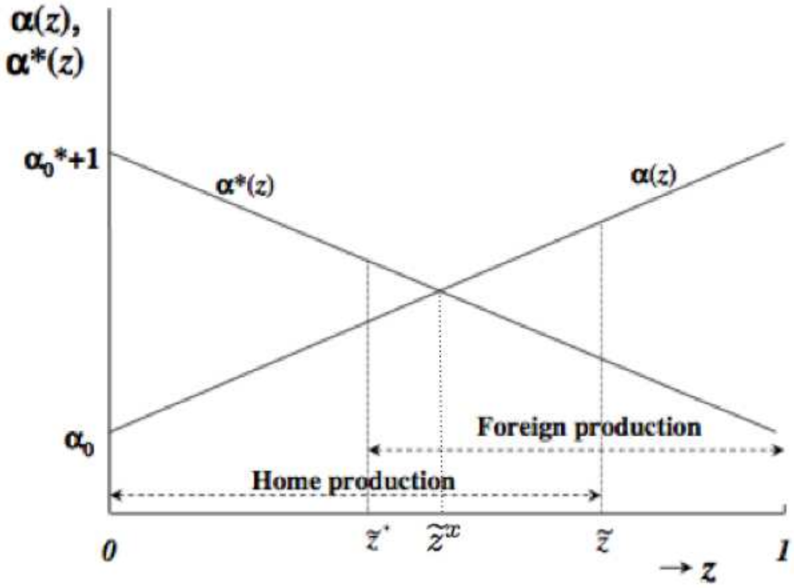
Following [Dornbusch et al.(1977)Dornbusch, Fischer, and Samuelson], we assume that sectors can be ranked unambiguously in terms of their unit labor (i.e. technological) requirements. This allows us to assume, without loss of generality, that $\frac{\partial\alpha(z)}{\partial z} > 0$ and $\frac{\partial\alpha^*(z)}{\partial z} < 0$. This is equivalent to saying that $\alpha(z)/\alpha^*(z)$ is increasing in $z \in [0,1]$. In other words, Home's sectors are more efficient (relative to their competitors in Foreign) the lower the value of $z \in [0,1]$, and Foreign's sectors are more efficient (relative to their competitors in Home) the higher the value of $z \in [0,1]$. Further, following [Neary(2003a)], let us suppose that Home and Foreign's unit labor requirements can be expressed as linear functions of z, so that: Home's unit labor requirements are $\alpha(z) = \alpha_0 + z$, and Foreign's unit labor requirements are $\alpha^*(z) = \alpha_0^* + (1 - z)$. Then, it fol-

[11] This is because these conditions must be satisfied in order for $y > 0$ ($\Leftrightarrow \pi > 0$).

[12] By the assumption of symmetry, we deduce that Foreign firms are profitable if and only if $\alpha^*(z) < a$ under regime F: $[n = 0, n^* > 0]$; and $\alpha^*(z) < \frac{a+n\alpha(z)}{n+1}$ under regime HF: $[n > 0, n^* > 0]$.

lows that the condition for a domestic sector to export (under Free Trade) is: $\alpha(z) < \alpha^*(z)$.[13] In other words, the cutoff level of productivity for exporting under Free Trade is $\alpha(z) = \alpha^*(z)$.

Figure 2. Home and Foreign's technological distributions



Denoting Home's cutoff or threshold sector (i.e. the sector whose costs are equal to the cutoff condition: $\frac{a+n^*\alpha^*(z)}{n^*+1}$) as $\widetilde{z}$; and Foreign's cutoff or threshold sector (i.e. the sector whose costs are equal to the Foreign cutoff condition: $\frac{a+n\alpha(z)}{n+1}$) as $\widetilde{z}^*$, it is clear that the range of sectors $z \in [0, \widetilde{z}^*)$ belong to regime$H$: $[n > 0, n^* = 0]$; $z \in [\widetilde{z}^*, \widetilde{z})$ belong to regime HF: $[n > 0, n^* > 0]$; and $z \in [\widetilde{z}, 1]$ belong to regime F: $[n = 0, n^* > 0]$. Further, labelling Home's least productive export sector as $\widetilde{z}^x$, it is clear that for any sector $z \in [0, \widetilde{z}^x)$, Home firms are exporting firms (i.e. they produce and sell to both the Home and Foreign markets); while for any sector $z \in [\widetilde{z}^x, \widetilde{z})$, Home firms are import-competing firms (i.e. they produce only for the Home market, and face import competition from Foreign firms in the sector). The implications of the above with respects to special interest politics, are as follows. First, Home firms in sectors $z \in [0, \widetilde{z}^x)$ have an interest in receiving protection in the form of export subsidies. Second, Home firms in sectors $z \in [\widetilde{z}^x, \widetilde{z})$ have an interest in receiving protection in the

[13] This is because Home's import volume: $M = -\{\frac{n[a-\alpha(z)]-n^*[a-\alpha^*(z)]-2nn^*[\alpha(z)-\alpha^*(z)]}{b(1+n+n^*)}\}$ is equal to zero when $\alpha(z) = \alpha^*(z)$; positive when $\alpha(z) > \alpha^*(z)$; and negative when $\alpha(z) < \alpha^*(z)$.

form of import tariffs. Finally, Sectors $z \in [\widetilde{z}, 1]$ are devoid of special interests, since there are no active Home firms in these sectors.

In the section that follows, we turn our attention to the partial equilibrium in Home, when the Home government sets a protectionist trade policy in the form of an export subsidy for domestic sectors within the range $z \in [0, \widetilde{z}^x)$; and an import tariff for sectors within the range of $z \in [\widetilde{z}^x, 1)$.

4 Protectionist-Trade-Policy Equilibria

Now consider that the Home government decides to protect its domestic sectors, by implementing an export subsidy (denoted τ^x) on domestic exports to Foreign; and an import tariff (τ^m) on foreign-produced goods that are imported by Home. The export subsidy $\tau^x = p_s^F - p_c^*$ drives a wedge between the price paid by Foreign consumers (p_c^*) and the price received by Home producers from their exports to the Foreign market (p_s^F).

On the other hand, the import tariff $\tau^m = p_c - p_s^{*H}$ drives a wedge between the price paid by Home consumers (p_c) and the price received by Foreign producers from their exports to Home (p_s^{*H}). In what follows, we shall adopt the use of terminology in [Grossman and Helpman(1992)], where we shall refer to a positive incidence of an export subsidy or import tariff as "protection", and a negative incidence of either of the above as "negative protection". Suppose the Foreign government does not implement any trade policy.

The equilibrium situation for each Home sector will then depend on the sector's trade regime; as well as its export status. There will be four types of partial equilibria in particular: one for exporting domestic sectors under Regime H (that is, for $z \in [0, \widetilde{z}^*)$); for exporting domestic sectors under Regime HF ($z \in [\widetilde{z}^*, \widetilde{z}^x)$); for import-competing domestic sectors under Regime HF ($z \in [\widetilde{z}^x, \widetilde{z})$); and for import-reliant domestic sectors under Regime F ($z \in [\widetilde{z}, 1]$). We derive the partial equilibrium for each of the above ranges of sectors, by solving the profit-maximization problem(s) of a representative firm in each country, when firms compete via Cournot competition. The partial equilibria for each of the four ranges of sectors are summarized in Tables 3 - 6 respectively.[14] Please refer

[14] It is apt to make a note of clarification here, due to the complexity of the notation henceforth.

1. From this point onwards, all variables that have to do with the consumer will be denoted with a subscript c; and all variables that have to do with the producer (or supplier)

to A.1 in the Appendix for mathematical details.

Table 3: Protectionist-trade-policy equilibrium in an exporting sector under regime H, with the imposition of an export subsidy

Regime	H$[n > 0, n^* = 0]$
Range of sectors	$z \in [0, \widetilde{z}^*)$
ny_i^H	$\frac{n(a-\alpha(z))}{b(1+n)}$
ny_i^F	$\frac{n(a+\tau^x-\alpha(z))}{b(1+n)}$
$n^* y_i^{*H}$	0
$n^* y_i^{*F}$	0
x^H	$\frac{n(a-\alpha(z))}{b(1+n)}$
x^F	$\frac{n(a+\tau^x-\alpha(z))}{b(1+n)}$
p_s^F	$\frac{a+n\alpha(z)+\tau^x}{(1+n)}$
p_c^*	$\frac{a-n\tau^x+n\alpha(z)}{(1+n)}$
$p_s^H = p_c$	$\frac{a+n\alpha(z)}{(1+n)}$
M	$-\frac{n[a+\tau^x-\alpha(z)]}{b(1+n)}$
M^*	$\frac{n[a+\tau^x-\alpha(z)]}{b(1+n)}$

where ny_i^H is the total quantity of good z supplied by domestic producers to the Home market;

ny_i^F is the total quantity supplied by domestic producers to the Foreign market;

$n^* y_i^{*H}$ is the total quantity supplied by Foreign producers to the Home market;

$n^* y_i^{*F}$ is the total quantity supplied by Foreign producers to the Foreign market;

x^H is Home's aggregate demand for the good;

x^F is Foreign's aggregate demand;

p_s^F is the price received by domestic producers from their exports to Foreign;

p_c^* is the price paid for the good by Foreign consumers;

p_s^H is the price received by domestic producers from their sales to Home;

will be denoted with a subscript s.

2. Foreign suppliers / consumers will be denoted with the asterisk sign; and Home suppliers / consumers without.

3. The quantity supplied and price charged in the Foreign country will be marked with a superscript F; and the quantity supplied and price charged in the Home country with a superscript H.

p_c is the price paid for the good by Home consumers; and

M and M^* are Home and Foreign's aggregate import volumes respectively.

Table 4: Protectionist-trade-policy equilibrium in an exporting sector under regime HF, with the imposition of an export subsidy

Regime	HF$[n > 0, n^* > 0]$
Range of sectors	$z \in [\widetilde{z}^*, \widetilde{z}^x)$
ny_i^H	$\frac{n[a-\alpha(z)]}{b(1+n)}$
ny_i^F	$n\{\frac{a-(n^*+1)\alpha(z)+(n^*+1)\tau^x+n^*\alpha^*(z)}{b(1+n+n^*)}\}$
n^*y^{*H}	0
n^*y^{*F}	$n^*\{\frac{a-(n+1)\alpha^*(z)+n\alpha(z)-n\tau^x}{b(1+n+n^*)}\}$
x^H	$\frac{n(a-\alpha(z))}{b(1+n)}$
x^F	$\frac{a(n+n^*)+n\tau^x-[n\alpha(z)+n^*\alpha^*(z)]}{b(1+n+n^*)}$
p_s^F	$\frac{a+n\alpha(z)+n^*\alpha^*(z)+\tau^x+n^*\tau^x}{(1+n+n^*)}$
p_s^{*F}	$\frac{a-n\tau^x+n\alpha(z)+n^*\alpha^*(z)}{(1+n+n^*)}$
p_s^H	$\frac{a+n\alpha(z)}{(1+n)}$
p_c	$\frac{a+n\alpha(z)}{(1+n)}$
p_c^*	$\frac{a-n\tau^x+n\alpha(z)+n^*\alpha^*(z)}{(1+n+n^*)}$
M	$-n\{\frac{a-(n^*+1)\alpha(z)+(n^*+1)\tau^x+n^*\alpha^*(z)}{b(1+n+n^*)}\}$
M^*	$n\{\frac{a-(n^*+1)\alpha(z)+(n^*+1)\tau^x+n^*\alpha^*(z)}{b(1+n+n^*)}\}$

Table 5: Protectionist-trade-policy equilibrium in an import-competing sector under regime HF, with the imposition of an import tariff

Regime	HF$[n>0, n^*>0]$
Range of sectors	$z \in \widetilde{z}^x, \widetilde{z})$
ny_i^H	$\frac{an-nn^*\alpha(z)-n\alpha(z)+nn^*\alpha^*(z)+nn^*\tau^m}{b(1+n+n^*)}$
ny_i^F	0
$n^*y_i^{*H}$	$\frac{an^*-nn^*\alpha^*(z)-n^*\alpha^*(z)-nn^*\tau^m-n^*\tau^m+nn^*\alpha(z)}{b(1+n+n^*)}$
$n^*y_i^{*F}$	$\frac{n^*(a-\alpha^*(z))}{b(1+n^*)}$
x^H	$\frac{a(n+n^*)-n\alpha(z)-n^*\alpha^*(z)-n^*\tau^m}{b(1+n+n^*)}$
x^F	$\frac{n^*(a-\alpha^*(z))}{b(1+n^*)}$
p_s^H	$\frac{a+n\alpha(z)+n^*\tau^m+n^*\alpha^*(z)}{(1+n+n^*)}$
p_s^{*H}	$\frac{a+n\alpha(z)+n^*\alpha^*(z)-\tau^m-n\tau^m}{(1+n+n^*)}$
p_s^{*F}	$\frac{a+n^*\alpha^*(z)}{(1+n^*)}$
p_c	$\frac{a+n\alpha(z)+n^*\tau^m+n^*\alpha^*(z)}{(1+n+n^*)}$
p_c^*	$\frac{a+n^*\alpha^*(z)}{(1+n^*)}$
M	$\frac{n^*(a-\alpha^*(z)-\tau^m)+nn^*(\alpha(z)-\alpha^*(z)-\tau^m)}{b(1+n+n^*)}$
M^*	$-\frac{n^*(a-\alpha^*(z)-\tau^m)+nn^*(\alpha(z)-\alpha^*(z)-\tau^m)}{b(1+n+n^*)}$

Table 6: Protectionist-trade-policy equilibrium in an import-reliant sector under regime F, with the imposition of an import tariff

Regime	F$[n=0, n^*>0]$
Range of sectors	$z \in [\widetilde{z}, 1]$
ny_i^H	0
$n^*y_i^{*H}$	$\frac{n^*(a-\tau^m-\alpha^*(z))}{b(1+n^*)}$
x^H	$\frac{n^*(a-\tau^m-\alpha^*(z))}{b(1+n^*)}$
p_c	$\frac{a+n^*\tau^m+n^*\alpha^*(z)}{(1+n^*)}$
p_s^{*H}	$\frac{a+n^*\alpha^*(z)-\tau^m}{(1+n^*)}$
M	$\frac{n^*(a-\tau^m-\alpha^*(z))}{b(1+n^*)}$
M^*	$-\frac{n^*(a-\tau^m-\alpha^*(z))}{b(1+n^*)}$

5 Lobbying

We are now ready to consider how the government's choice of trade policy may be influenced by the special interests of organized sectors within the Home economy. Suppose that an exogenously determined subset of sectors (Z_O) choose to become politically-active, with the rest of the subset $Z_U = (1 - Z_O)$ remaining politically inactive. The numeraire sector is untaxed and remains politically inactive. Further, import-reliant sectors between the range of $z \in [\widetilde{z}, 1]$ are devoid of political interests and hence do not lobby, since there are no active Home firms in these sectors. Following [Grossman and Helpman(1992)], we assume that all firms in a sector act as one entity when it comes to making political contributions. In other words, if a sector is politically organized, then all the firms within the sector would make positive contributions in the same amount. Conversely, if a sector is not organized, then all the firms within that sector would make zero political contributions.

When the Home government is subject to the lobbying of organized domestic sectors, the government's policy instrument becomes a composite vector $\tau = \{\tau_O^{x,H}, \tau_O^{x,HF}, \tau_O^{m,HF}, \tau_U^{x,H}, \tau_U^{x,HF}, \tau_U^{m,HF}, \tau_U^{m,F}\}$, which is composed of the following 7 vectors:

1. $\tau_O^{x,H}$, which is a vector of export subsidies for politically organized exporting sectors under Regime H: $[n > 0, n^* = 0]$;
2. $\tau_O^{x,HF}$, which is a vector of export subsidies for politically organized exporting sectors under Regime HF: $[n > 0, n^* > 0]$;
3. $\tau_O^{m,HF}$, which is a vector of import tariffs for politically organized import-competing sectors under Regime HF: $[n > 0, n^* > 0]$;
4. $\tau_U^{x,H}$, which is a vector of export subsidies for unorganized exporting sectors under Regime H: $[n > 0, n^* = 0]$;
5. $\tau_U^{x,HF}$, which is a vector of export subsidies for unorganized exporting sectors under Regime HF: $[n > 0, n^* > 0]$;
6. $\tau_U^{m,HF}$, which is a vector of import tariffs for unorganized import-competing sectors under Regime HF: $[n > 0, n^* > 0]$; and
7. $\tau_U^{m,F}$, which is a vector of import tariffs for sectors under Regime F: $[n = 0, n^* > 0]$.

5.1 The Governent's Objective Function

Following [Grossman and Helpman(1992)], Home's government chooses the equilibrium trade policy vector: $\overline{\tau} = \{\overline{\tau}_O^{x,H}, \overline{\tau}_O^{x,HF}, \overline{\tau}_O^{m,HF}, \overline{\tau}_U^{x,H}, \overline{\tau}_U^{x,HF}, \overline{\tau}_U^{m,HF}, \overline{\tau}_U^{m,F}\}$ by maximizing its objective function, which is a weighted aggregate of national welfare and political contributions.

$$\begin{aligned} G &= \xi W + C \\ &= \xi \widetilde{U} + C \end{aligned} \tag{5}$$

where $\xi > 0$ is the weight which the government attaches to national welfare (relative to political contributions); W is gross national welfare; $\widetilde{U}$ is Home's indirect utility from the consumption activities of all her citizens; and C is the total amount of contribution dollars which the government receives from organized sectors.[15]

5.2 Stages Of The Lobbying Game

The lobbying game proceeds as follows.

1. In stage 1 of the game, an exogenously-determined fraction -which is less than or equal to 1- of all the domestic sectors become politically organized. Each lobby group $z \in Z_O$ presents the government with a contribution schedule $C(z)$, which maps every possible policy vector to a specific level of contributions.

2. In stage 2 of the game, the government chooses the equilibrium trade policy vector $\overline{\tau} = \{\overline{\tau}_O^{x,H}, \overline{\tau}_O^{x,HF}, \overline{\tau}_O^{m,HF}, \overline{\tau}_U^{x,H}, \overline{\tau}_U^{x,HF}, \overline{\tau}_U^{m,HF}, \overline{\tau}_U^{m,F}\}$, based on the proposed contribution schedules of each and every organized sector. The equilibrium policy vector is chosen with the aim of maximizing the government's objective function.

3. The lump sum of export subsidies granted to Home's exporting sectors are financed by taxing all domestic citizens equally. On the other hand,

[15] The equivalence between W and $\widetilde{U}$ stems from the fact that both gross national welfare and indirect utility are equal to the sum of national income and consumer surplus.

the lump sum of tariff revenue collected from Home's import-competing or import-reliant sectors are rebated to all domestic citizens equally.

4. Finally, the government collects $C(z)$ from each organized sector.

5.3 Truthful Contributions

A key question is how each organized sector $z \in Z_O$ determines the amount of political contributions it will pay to the government. Following the original Protection For Sale model, we restrict contributions to be globally truthful, so that $\forall z \in Z_O$, $C(z) = \Pi(z) - B(z)$[16], where $B(z)$ is a scalar representing some base level of welfare for the sector.[17] On the other hand, $C(z) = 0$, $\forall z \in Z_U$. We know from[Dixit et al.(1997)Dixit, Grossman, and Helpman] that an equilibrium of a Common Agency game is characterized by three conditions:

1. Feasibility of the contributions. That is, each organized sector must be able to afford its proposed schedule of contributions. This is satisfied by assumption in our model.

2. Optimality of the policy vector to the agent (i.e. government) within the set of feasible actions, given the principals' (i.e. organized sectors') contribution schedules.

3. Optimality of the policy and payments vectors to every principal (i.e. organized sector), subject to feasibility constraints and to the agent (i.e. government)'s individual rationality constraint.

Conditions 2 and 3 simply mean that the equilibrium policy vector must optimize the net profit function of each and every organized sector - which is the

[16] Note that $\Pi(z)$ denotes the gross sectoral profits of the domestic sector z, as opposed to $\pi(z)$ which denotes the profits of a single domestic firm in that sector.

[17] According to [Bernheim and Whinston(1986)], in the Nash equilibrium of the lobbying game we have just described - with each lobby group optimally choosing its contribution schedule C taking as given the schedules of all other lobby groups, and knowing that the trade policy τ will be chosen to maximize the government's objective function - the lobby groups can do no better than to select a contribution schedule of the form $C = \max[0, \Pi - B]$, where B is constant. This implies that the welfare of each lobby group net of its contributions becomes $\Pi - C = \min[\Pi(\tau), B]$, so B is an upper bound on net welfare.

sector's gross profits less its contributions to the government - ; and the objective function of the government consecutively.

5.4 The Utilitarian Benchmark

As is standard in the political economy literature, it is appropriate that we first derive the socially optimal policy $\widehat{\tau} = \{\widehat{\tau}^{x,H}, \widehat{\tau}^{x,HF}, \widehat{\tau}^{m,HF}, \widehat{\tau}^{m,F}\}$ that will serve as our benchmark for later analysis.[18] This is the policy that the government would implement in the absence of lobbying by organized sectors, and it is derived by maximizing the government's objective function with respects to the policy for each of the 4 different ranges of sectors, when $C(z)$ is set to zero, $\forall z \in [0, 1]$.

By replacing $\widetilde{U}$ in the government's objective function (5) with $I + CS$, and expressing

$$\begin{aligned} I \quad = \quad & L + \int_0^{\widetilde{z}^*} \Pi(z)dz + \int_0^{\widetilde{z}^*} \tau^{x,H}(z)M(z)dz + \int_{\widetilde{z}^*}^{\widetilde{z}^x} \Pi(z)dz + \int_{\widetilde{z}^*}^{\widetilde{z}^x} \tau^{x,HF}(z)M(z)dz + \\ & \int_{\widetilde{z}^x}^{\widetilde{z}} \Pi(z)dz + \int_{\widetilde{z}^x}^{\widetilde{z}} \tau^{m,HF}(z)M(z)dz + \int_{\widetilde{z}}^{1} \Pi(z)dz + \int_{\widetilde{z}}^{1} \tau^{m,F}(z)M(z)dz \end{aligned}$$

and

$$\begin{aligned} CS \quad = \quad & \int_0^{\widetilde{z}^*} u[x(z)]dz + \int_{\widetilde{z}^*}^{\widetilde{z}^x} u[x(z)]dz + \int_{\widetilde{z}^x}^{\widetilde{z}} u[x(z)]dz + \int_{\widetilde{z}}^{1} u[x(z)]dz - \\ & \int_0^{\widetilde{z}^*} p(z)x(z)dz - \int_{\widetilde{z}^*}^{\widetilde{z}^x} p(z)x(z)dz - \int_{\widetilde{z}^x}^{\widetilde{z}} p(z)x(z)dz - \int_{\widetilde{z}}^{1} p(z)x(z)dz \end{aligned}$$

in terms of the trade policy alone, we can rewrite the government's objective

[18] Note that the hat notation stands for "first best".

function as

$$
\begin{aligned}
G &= \xi\widetilde{U}[p(z),I]+\int_0^1 C(z)dz\\
&= \xi\{L+\int_0^{\widetilde{z}^*}\frac{n[2a^2-4a\alpha(z)+2\alpha(z)^2+\tau^{x,H}(z)^2+2a\tau^{x,H}(z)-2\alpha(z)\tau^{x,H}(z)]}{b(1+n)^2}dz-\\
&\int_0^{\widetilde{z}^*}\tau^{x,H}(z)\frac{an+n\tau^{x,H}(z)-n\alpha(z)}{b(1+n)}dz+\\
&\frac{n}{b(1+2n)^2}\int_{\widetilde{z}^*}^{\widetilde{z}^x}[a+n\alpha^*(z)-\alpha(z)-n\alpha(z)+\tau^{x,HF}(z)+n\tau^{x,HF}(z)]^2dz+\\
&\frac{n}{b(1+n)^2}\int_{\widetilde{z}^*}^{\widetilde{z}^x}[a-\alpha(z)]^2dz-\\
&\int_{\widetilde{z}^*}^{\widetilde{z}^x}\tau^{x,HF}(z)\{\frac{an-n\alpha(z)+n\tau^{x,HF}(z)+n^2\alpha^*(z)+n^2\tau^{x,HF}(z)-n^2\alpha(z)}{b(1+2n)}\}dz+\\
&\int_{\widetilde{z}^x}^{\widetilde{z}}\frac{n[a-n\alpha(z)-\alpha(z)+n\alpha^*(z)+n\tau^{m,HF}(z)]^2}{b(1+2n)^2}dz+\\
&\int_{\widetilde{z}^x}^{\widetilde{z}}\tau^{m,HF}(z)\{\frac{an-n\alpha^*(z)-n\tau^{m,HF}(z)+n^2\alpha(z)-n^2\alpha^*(z)-n^2\tau^{m,HF}(z)}{b(1+2n)}\}dz+\\
&\int_{\widetilde{z}}^1\tau^{m,F}(z)\{\frac{an-n\tau^{m,F}(z)-n\alpha^*(z)}{b(1+n)}\}dz+\\
&\frac{2a^2}{b}-\frac{a}{b}\int_0^{\widetilde{z}^*}\frac{a+n\alpha(z)}{(1+n)}dz+\frac{1}{2b}\int_0^{\widetilde{z}^*}\frac{[a+n\alpha(z)]^2}{(1+n)^2}dz-\\
&\frac{a}{b}\int_{\widetilde{z}^*}^{\widetilde{z}^x}\frac{a+n\alpha(z)}{(1+n)}dz+\frac{1}{2b}\int_{\widetilde{z}^*}^{\widetilde{z}^x}\frac{[a+n\alpha(z)]^2}{(1+n)^2}dz-\\
&\frac{a}{b}\int_{\widetilde{z}^x}^{\widetilde{z}}\frac{a+n\alpha(z)+n\tau^{m,HF}(z)+n\alpha^*(z)}{(1+2n)}dz+\\
&\frac{1}{2b}\int_{\widetilde{z}^x}^{\widetilde{z}}\frac{[a+n\alpha(z)+n\tau^{m,HF}(z)+n\alpha^*(z)]^2}{(1+2n)^2}dz-\\
&\frac{a}{b}\int_{\widetilde{z}}^1\frac{[a+n\tau^{m,F}(z)+n\alpha^*(z)]}{(1+n)}dz+\frac{1}{2b}\int_{\widetilde{z}}^1\frac{[a+n\tau^{m,F}(z)+n\alpha^*(z)]^2}{(1+n)^2}dz\}+\\
&\int_0^{\widetilde{z}^*}C(z)dz+\int_{\widetilde{z}^*}^{\widetilde{z}^x}C(z)dz+\int_{\widetilde{z}^x}^{\widetilde{z}}C(z)dz \qquad (6)
\end{aligned}
$$

Setting $\int_0^{\widetilde{z}^*}C(z)dz+\int_{\widetilde{z}^*}^{\widetilde{z}^x}C(z)dz+\int_{\widetilde{z}^x}^{\widetilde{z}}C(z)dz$ to zero, and taking the First Order Condition of G with respects to $\tau^{x,H}(z)$; $\tau^{x,HF}(z)$; $\tau^{m,HF}(z)$; and $\tau^{m,F}(z)$ gives us the First Best level of policy for each of the four different ranges of sectors:

$$\widehat{\tau}^{x,HF}(z)=-\frac{(n-1)[a-\alpha(z)]}{2n}<0 \qquad (7)$$

$$\widehat{\tau}^{x,HF}(z) = \frac{a - (1+n)\alpha(z) + n\alpha^*(z)}{2n(1+n)} > 0 \tag{8}$$

$$\widehat{\tau}^{m,HF}(z) = \frac{a - \alpha^*(z)}{2+n} > 0 \tag{9}$$

$$\widehat{\tau}^{m,F}(z) = \frac{a - \alpha^*(z)}{(2+n)} > 0 \tag{10}$$

All of the above satisfy the second order neccessary condition for the policies to maximize the government's objective function.

Proposition 1. *Unlike the case of perfect competition - as was assumed in the original Protection For Sale model -, Free Trade does not prevail under the First Best. When firms have market power within their own sectors, the First Best level of policy is such that exporting sectors under Regime H receive negative protection, while all other sectors receive (positive) protection.*

Please see A.2 in the appendix for the proof.

Proposition 2. *The imposition of an import tariff leads to the entry of new sectors which would not have been able to survive under Free Trade; and the imposition of an export subsidy makes it possible for all Free Trade import-competing sectors to become exporting sectors.*

The proof is as follows. Recall that under Free Trade, Home firms can only be profitable in the (import-competing) domestic market when $\alpha(z) < \frac{a+n^*\alpha^*(z)}{n^*+1}$); and they can only afford to export when $\alpha(z) < \alpha^*(z)$. When the government implements a trade policy, the condition for a Home firm to be profitable in the (import-competing) domestic market becomes: $\alpha(z) < \frac{2a+n\alpha^*(z)}{2+n}$[19]; and that for a Home firm to export becomes $\alpha(z) < \frac{a+n\alpha^*(z)}{n+1}$[20].

First, it is straightforward to show that when the government implements the First Best policy, the unit labor requirements of both the threshold producing and exporting sectors are raised ex post.[21] This means that the government's trade policy makes it possible for less productive sectors -those with higher unit labor requirements than the previous cutoff levels - to produce and export.

[19] $\frac{2a+n\alpha^*(z)}{2+n}$ is the level of productivity that sets the output (and hence profit) level of an import-competing domestic firm or sector to zero in the presence of a tariff.

[20] $\frac{a+n\alpha^*(z)}{1+n}$ is the level of productivity that sets the export level of a domestic firm or sector under Regime HF to zero in the presence of an export subsidy.

[21] In other words, $\frac{2a+n\alpha^*(z)}{2+n} > \frac{a+n^*\alpha^*(z)}{n^*+1}$ and $\frac{a+n\alpha^*(z)}{n+1} > \alpha^*(z)$.

Second, since $n = n^*$, the cutoff level for producing under Free Trade is exactly equal to the cutoff level for exporting under the First Best. In other words, the imposition of a tariff on import-competing sectors makes it possible for all Free Trade import-competing sectors to become exporting sectors.

Finally, it is also easy to check that the First Best policy has no effect on the cutoff level of productivity for sectors in Regime H, with respects to both producing and exporting.[22]

5.5 The Political Economy Equilibrium

Now that we have derived the First Best policy which maximizes the government's objective function in the absence of lobbying, our next task is to derive the trade policy which the government would implement when it is subject to lobbying. This is achieved by replacing $C(z)$ in the government's objective function with "$\Pi(z) - B(z)$" $\forall z \in Z_O$; and $C(z)$with "0" $\forall z \in Z_U$; and taking the First Order Condition of G with respects to $\{\tau_O^{x,H}, \tau_O^{x,HF}, \tau_O^{m,HF}, \tau_U^{x,H}, \tau_U^{x,HF}, \tau_U^{m,HF}$ and $\tau^{m,F}\}$. The equilibrium policies are

$$\overline{\tau}_O^{x,H}(z) = \frac{[a - \alpha(z)][(n-1)\xi - 2]}{2(1 - n\xi)} \begin{cases} > 0, & if \quad (n-1)\xi < 2 \\ < 0. & if \quad (n-1)\xi > 2 \end{cases} \tag{11}$$

with indeterminate sign, because $n\xi > 1$ must hold in order for the Second Order necessary condition to be satisfied, and ξ could be larger than or smaller than 1.

$$\overline{\tau}_O^{x,HF}(z) = \frac{[a - (n+1)\alpha(z) + n\alpha^*(z)][2 + 2n + \xi]}{2(n+1)[-1 + n(-1 + \xi)]} > 0 \tag{12}$$

with positive sign, because we know from Table 4 that in order for Foreign's imports to be positive, $[[a - (n+1)\alpha(z) + n\alpha^*(z)]]$ in the numerator must be positive; and $\xi > \frac{(n+1)}{n}$ must hold in order for the Second Order necessary condition to be satisfied.

$$\overline{\tau}_O^{m,HF} = \frac{2n[a - (n+1)\alpha(z) + n\alpha^*(z)] + [(1+2n)(a - \alpha^*(z))]\xi}{2n^2(\xi - 1) + 2\xi + 5n\xi} > 0 \tag{13}$$

with positive sign, because we know from Table 5 that in order for ny_i^H and $n^* y_i^{*F}$ to be positive, the numerator must be positive; and because $\xi > \frac{2n^2}{2(n+1)^2 + n}$

[22] For sectors under Regime H, the cutoff level of productivity remains $\alpha(z) = a$, regardless of whether Free Trade prevails or whether the government implements the First Best level of export subsidies.

must hold in order for the Second Order necessary condition to be satisfied.

$$\overline{\tau}_U^{x,H}(z) = \widehat{\tau}^{x,H}(z) = -\frac{(n-1)[a-\alpha(z)]}{2n} < 0$$

$$\overline{\tau}_U^{x,HF}(z) = \widehat{\tau}^{x,HF}(z) = \frac{a-(1+n)\alpha(z)+n\alpha^*(z)}{2n(1+n)} > 0$$

$$\overline{\tau}_U^{m,HF}(z) = \widehat{\tau}^{m,HF}(z) = \frac{a-\alpha^*(z)}{2+n} > 0$$

$$\overline{\tau}^{m,F}(z) = \widehat{\tau}^{m,F}(z) = \frac{a-\alpha^*(z)}{(2+n)} > 0$$

Proposition 3. *As compared to the First Best, lobbying always increases the degree of protection granted to a politically-organized sector. Also, the degree of protection is increasing in the level of productivity of an organized sector, and decreasing in the government's preference for national welfare.*

Please see A.3 in the appendix for the proof.

Proposition 4. *Lobbying makes the entry of sectors which would not have been able to survive in the domestic import-competing market under the First Best possible. Also, lobbying makes it possible for sectors which would not have been able to export under the First Best, to do so.*

Please see A.4 in the appendix for the proof of Proposition 4. We only highlight the main intuition here. First, for every range of sectors, sectoral profits are strictly increasing in the level of protection granted to the sectors. That is, $\frac{\partial \Pi(z)}{\partial \tau(z)} > 0, \forall z \in [0,1]$. Second, we know from Proposition 3 that for any politically-organized sector, the level of protection granted to the sector under the political equilibrium is always larger than that under the First Best.

By these facts, it is clear that a politically-organized sector which was earning zero profits under the First Best will make a positive profit under the political equilibrium. Further, some politically-organized sectors which would have been earning negative profits under the First Best can afford to break even (or make positive profits) under the political-equilibrium level of protection.[23]

[23] By applying the same line of reasoning to exporting sectors under Regime H: $z \in [0, \widetilde{z}^*)$, we find that it is possible for exporting sectors under Regime HF: $z \in [\widetilde{z}^*, \widetilde{z}^x)$ to lobby for a higher export subsidy so as to drive their Foreign competitors out of the market. In other words, it is possible for exporting sectors under Regime HF to lobby so that they become Regime H sectors. However, as equation (11) shows, the political equilibrium export subsidy granted to Regime H sectors could be negative. Comparing between the level of profits that

Proposition 5. *The lobbying of threshold sectors - which causes domestically produced goods which would not be exported at all in the absence of an export subsidy to become exported; or which causes goods which would not be produced domestically to become produced - enhances Home's national welfare. On the contrary, the lobbying of non-threshold sectors serves to dampen Home's national welfare.*

Please see A.5 in the appendix for the proof. The main idea is that we can compute the effect on national welfare of moving a sector away from the First Best to the political equilibrium, by using the fact that Home's national welfare is the sum of total national income and consumer surplus. Table 7 summarizes the effects of moving away from the First Best to the political equilibrium, for threshold and non-threshold sectors. The total effect on national welfare is the sum of the change in sectoral profits; tariff revenue; and consumer surplus resulting from the change in policy.

Table 7: Effect of granting the political equilibrium policy instead of the First Best policy to threshold and non-threshold sectors

Net effect on:	Sectoral profits	Tariff revenue	Consumer surplus	National Welfare
Threshold import-competing sector	> 0	> 0	> 0	> 0
Non-threshold import-competing sector	> 0	> 0	< 0	< 0
Threshold exporting sector	> 0	< 0	< 0	> 0 (for sufficiently large ξ)
Non-threshold exporting sector	> 0	< 0	< 0	< 0

The lobbying of a threshold import-competing sector - which moves the sector from $z \in [\widetilde{z}, 1]$ to $z \in [\widetilde{z}^x, \widetilde{z})$ - enhances national welfare, because it leads to a gain in profit income, an rise in tariff revenue, and a gain in consumer surplus. The gain in consumer surplus stems from the fact that in moving from Regime F to Regime HF, the sector experiences a rise in the number of firms serving the Home market. This depresses the price of the good in the Home market and benefits domestic consumers.

In contrast, the lobbying of a non-threshold import-competing sector also increases profit income and tariff revenue. However, by raising the price of the good, the political equilibrium tariff leads to a decrease in consumer surplus which overwhelms the rise in profits and tariff revenue.

an exporting sector would earn under Regime HF with the level of profits that it would earn under Regime H, we find that depending on the values assumed by the model's exogenous parameters: $(a, n, \alpha(z), \alpha^*(z), \xi)$, it is possible for the sector to earn less profits under Regime H than HF. Hence, lobbying by exporting sectors to drive their Foreign competitors out of the market may or may not occur, depending on the values assumed by the model's exogenous parameters.

On the other hand, the lobbying of a threshold exporting sector -which moves the sector from $z \in [\widetilde{z}^x, \widetilde{z})$ to $z \in [\widetilde{z}^*, \widetilde{z}^x)$ - leads to a fall in tariff revenue, because the government has to subsidize the sector's exports; and a fall in consumer surplus, because it reduces the number of firms serving the domestic market and raises the price of the good in Home. However, as we find in A.5 of the appendix - provided the government's preference for welfare (ξ) is higher than some exogenous value[24] - the gain in profits to the threshold sector could very possibly overwhelm the fall in tariff revenue and consumer surplus. In order to understand the implication behind this finding, it is helpful to recall from Proposition 3 that the amount of export subsidies granted to the politically-organized threshold exporting sector is decreasing in ξ. Hence, our findings imply that when the level of export subsidy is not too high, granting an export subsidy to promote the sales of a threshold exporting sector in the Foreign market may be welfare-enhancing for the Home country.

Finally, the lobbying of a non-threshold exporting sector leads to a gain in sectoral profits, but this gain is never high enough to compensate for the fall in tariff revenue and consumer surplus.

6 Conclusion

This paper is especially relevant to governments that are interested in curbing the influence of special interest groups vis-à-vis the trade-policy-making process. It exemplifies that - when the market structure is oligopolistic and firms compete à la Cournot competition - being more responsive to the voice of threshold sectors and much less responsive to that of non-threshold sectors could be welfare-enhancing for a country. Threshold sectors are defined as sectors whose goods would be not be produced at all in the absence of a tariff; or whose goods would not be exported at all in the absence of an export subsidy.

The above result stems from the fact that protection - that is, an export subsidy aimed at promoting domestic exports abroad; or a tariff aimed at promoting the sales of import-competing sectors domestically - has opposite welfare effects on the Home country when it is extended to threshold and non-threshold sectors. The latter simply allows goods which would be produced even in the absence of protection to be produced in larger amounts. When this is the case, welfare

[24]The value which ξ must be larger than depends on the values assumed by the other parameters of the model.

is transferred from domestic consumers to producers, and the gain in producer surplus is never large enough to compensate for the loss in consumer surplus. In contrast, the former expands the range of goods produced or exported by the Home country. By adopting the continuum-of-goods and general equilibrium approach of [Neary(2003b)], we show that when a tariff expands the range of goods produced domestically, it always enhances the welfare of the Home country. Further, when an export subsidy expands the range of goods exported by the Home country, the gain in producer surplus could possibly overwhelm the loss in consumer surplus and tariff revenue - provided that the subsidy is not too large.

This paper is novel to the literature on the political economy in the following ways. First, it incorporates the consideration of heterogenous productivity levels across sectors into the Protection For Sale model. Second, it shows that the effect of sectoral-level lobbying on the welfare of a Home country can differ depending on whether the sector is a threshold sector or not.

On a more critical note, however, this paper has left out the consideration of how lobbying might serve to affect the equilibrium national wage rate, by assuming the presence of a numeraire good which is produced one-to-one using labor. In addition, while we have treated the existence of sectoral lobby groups as exogenous, additional insights may be obtained by allowing for endogenous formation of lobby groups. Relaxing these limitations requires separate treatment and are left for future research.

Appendix

A.1 Deriving the Protectionist-Trade-Policy Equilibrium (For Each Range of Sectors)

A.1.1 For Exporting Domestic Sectors Under Regime H: $[n > 0, n^* = 0]$

With an export subsidy being granted to domestic sectors $z \in [0, \widetilde{z}^*)$, each domestic firm solves

(H.1) Its profit-maximization problem with respects to the Foreign market:

$$\begin{aligned} \max_{y_i^F} \pi_i^F(y_i^F, y_{-i}^F) \quad \{\equiv & \quad p_s^F(y_{-i}^F + y_i^F) - \alpha(z)]y_i^F \\ = & \quad [p_c^*(y_{-i}^F + y_i^F) + \tau^x - \alpha(z)]y_i^F\} \end{aligned}$$

where p_c^* is the Foreign consumer price; p_s^F is the domestic supplier price from its sales to Foreign; $p_c^*(y_{-i}^F + y_i^F) + \tau^x = p_s^F$; and $y_{-i}^F = \sum_{j \neq i, j=1}^n y_j^F$.

(H.2) Its profit-maximization problem with respects to the Home market:

$$\max_{y_i^H} \pi_i^H(y_i^H, y_{-i}^H)\{\equiv [p_s^H(y_{-i}^H + y_i^H) - \alpha(z)]y_i^H\}$$

where p_s^H is the domestic supplier price from the supplier's sales to Home; and $y_{-i}^H = \sum_{j \neq i, j=1}^n y_j^H$.

A.1.2 For Exporting Domestic Sectors Under Regime HF: $[n > 0, n^* > 0]$

With an export subsidy being granted to domestic sectors $z \in [\widetilde{z}^*, \widetilde{z}^x)$, each domestic firm solves

(H.1) Its profit-maximization problem with respects to the Foreign market

$$\begin{aligned} \max_{y_i^F} \pi_i^F \quad \{\equiv & \quad \pi_i^F(y_i^F, y_{-i}^F) = [p_s^F - \alpha(z)]y_i^F \\ = & \quad [p_c^*(y_i^F + y_{-i}^F) + \tau^x - \alpha(z)]y_i^F\} \end{aligned}$$

where p_s^F denotes the price received by a domestic supplier from its sales to Foreign; p_c^* denotes the Foreign consumer price; and $y_{-i}^F = \sum_{j \neq i, j=1}^{n} y_j^F + \sum_{j=1}^{n^*} y_j^{*F}$ (where y_j^F is the quantity supplied by each domestic firm $j \neq i$ to the Foreign market; and y_j^{*F} is the quantity supplied by each Foreign firm j to the Foreign market.

(H.2) Its profit-maximization problem with respects to the Home market:

$$\max_{y_i^H} \pi_i^H(y_i^H, y_{-i}^H)\{\equiv [p_s^H(y_i^H + y_{-i}^H) - \alpha(z)]y_i^H\}$$

where $y_{-i}^H = \sum_{j \neq i, j=1}^{n} y_j^H$.

On the other hand, each Foreign firm solves

(F.1) its profit-maximization problem with respects to the Foreign market:

$$\max_{y_i^{*F}} \pi_i^{*F}(y_i^{*F}, y_{-i}^F)\{\equiv [p_s^{*F}(y_i^{*F} + y_{-i}^F) - \alpha^*(z)]y_i^{*F}\}$$

where $y_{-i}^F = \sum_{j \neq i, j=1}^{n} y_j^F + \sum_{i=1}^{n^*} y_i^{*F}$.

A.1.3 For Import-Competing Domestic Sectors Under Regime HF: $[n > 0, n^* > 0]$

With an import tariff being implemented on Foreign-produced goods ($z \in [\widetilde{z}^x, \widetilde{z})$) that are imported into Home, each Home firm solves

(H.1) Its profit-maximization problem with respects to the Home market:

$$\begin{aligned} \max_{y_i^H} \pi_i^H \quad \{\equiv \quad & [p_s^H(y_i^H + y_{-i}^H) - \alpha(z)]y_i^H \\ = \quad & [p_c(y_i^H + y_{-i}^H) - \alpha(z)]y_i^H\} \end{aligned}$$

where $y_{-i}^H = \sum_{j \neq i, j=1}^{n} y_j^H + \sum_{j=1}^{n^*} y_j^{*H}$.

On the other hand, each Foreign firm solves

(F.1) its profit-maximization problem with respects to the Home market

$$\begin{aligned} \max_{y_i^{*H}} \pi_i^{*H} \quad \{\equiv \quad & [p_s^{*H}(y_i^{*H} + y_{-i}^H) - \alpha^*(z)]y_i^{*H} \\ = \quad & [p_c(y_i^H + y_{-i}^H) - \tau^m - \alpha^*(z)]y_i^{*H}\} \end{aligned}$$

where $y^H_{-i} = \sum_{j\neq i,j=1}^{n^*} y^{*H}_j + \sum_{i=1}^{n} y^H_i$; as well as

(F.2) its profit-maximization problem with respects to the Foreign market:

$$\max_{y_i^{*F}} \pi_i^{*F}(y_i^{*F}, y_{-i}^{*F})\{\equiv [p_c^*(y_i^{*F} + y_{-i}^{*F}) - \alpha^*(z)]y_i^{*F}\}$$

where $y^{*F}_{-i} = \sum_{j\neq i,j=1}^{n^*} y^{*F}_j$.

A.1.4 For Import-Reliant Domestic Sectors Under Regime F: $[n = 0, n^* > 0]$

With an import tariff being implemented on Foreign-produced goods ($z \in [\widetilde{z}, 1]$) that are imported into Home, each Foreign firm solves, with respects to its sales to the Home market,

(F.1)

$$\begin{aligned} max_{y_i^{*H}} \pi_i^{*H}(y_i^{*H}, y_{-i}^{*H}) \quad \{\equiv \quad & [p_s^{*H}(y_i^{*H} + y_{-i}^{*H}) - \alpha^*(z)]y_i^{*H} \\ = \quad & [(p_c(y_i^{*H} + y_{-i}^{*H}) - \tau^m) - \alpha^*(z)]y_i^{*H}\} \end{aligned}$$

where $y^{*H}_{-i} = \sum_{j\neq i,j=1}^{n^*} y^{*H}_j$;

and with respects to its sales to the Foreign market,

(F.2)

$$\max_{y_i^{*F}} \pi_i^{*F}(y_i^{*F}, y_{-i}^{*F})\{\equiv [p_c^{*F}(y_i^{*F} + y_{-i}^{*F}) - \alpha^*(z)]y_i^{*F}\}$$

A.2 Proof of Proposition 1.

The proof is as follows. First, taking the First Order Condition of G with respects to $\tau^{x,HF}(z)$, we find that $\widehat{\tau}^{x,HF}(z) = -\frac{(n-1)[a-\alpha(z)]}{2n} < 0$. We know that the policy is negative, because we can ascertain from Table 3 that in order for the total supply to the Home market $y^H = ny^H_i$ to be positive, $a > \alpha(z)$ must hold. This, coupled with the fact that $n > 1$ and the negative sign attached to the expression for the policy together imply that $\widehat{\tau}^{x,H}(z) = p^F_s - p^*_c < 0$.

Second, taking the First Order Condition of G with respects to $\tau^{x,HF}(z)$, we find that $\widehat{\tau}^{x,HF}(z) = \frac{a-(1+n)\alpha(z)+n\alpha^*(z)}{2n(1+n)} > 0$. We can check that the sign of $\widehat{\tau}^{x,HF}$ is positive, by taking the following procedure. From Table 4, we know that the total supply of good $z \in [\widetilde{z}^*, \widetilde{z}^x)$ to the Foreign market by domestic suppliers is $y^F = ny_i^F = n\{\frac{a-(n+1)\alpha(z)+(n+1)\tau^{x,HF}(z)+n\alpha^*(z)}{b(1+2n)}\}$, where we have made use of the assumption of symmetry in the number of firms in Home and Foreign to write n^* as n. Replacing $\tau^{x,HF}(z)$ with $\widehat{\tau}^{x,HF}(z) = \frac{a-(1+n)\alpha(z)+n\alpha^*(z)}{2n(1+n)}$ gives us the total supply of the good to the Foreign market by domestic suppliers, under the First Best. This is: $\widehat{y}^F = \frac{1}{2b(1+2n)}(1+2n)[a-(n+1)\alpha(z)+n\alpha^*(z)]$. It is evident that in order for $\widehat{y}^F$ to be positive, $a-(n+1)\alpha(z)+n\alpha^*(z) > 0$ must hold. This ensures that the numerator of the expression for $\widehat{\tau}^{x,HF}(z)$ is positive.

Third, taking the First Order Condition of G with respects to $\tau^{m,HF}(z)$ yields $\widehat{\tau}^{m,HF}(z) = \frac{a-\alpha^*(z)}{2+n} > 0$. We know that this must be positive, because from Table 5, we calculated the total supply of good $z \in [\widetilde{z}^x, \widetilde{z})$ to the Foreign market by Foreign firms to be equal to $y^{*F} = n^* y_i^{*F} = \frac{n^*[a-\alpha^*(z)]}{b(1+n^*)}$. Since this must be positive, $[a-\alpha^*(z)]$ in the numerator of the expression for $\widehat{\tau}^{m,HF}(z)$ must also be positive.

Finally, taking the First Order Condition of G with respects to $\tau^{m,F}(z)$ yields $\widehat{\tau}^{m,F}(z) = \frac{a-\alpha^*(z)}{(2+n)} > 0$, which must be positive due to the same reasoning as above.■

A.3 Proof of Proposition 3.

The political equilibrium policy for an organized exporting sector under Regime H

First, let us compare the degree of protection granted to an organized exporting sector under Regime H, with the degree of protection that the sector would have received under the First Best. The difference between the political equilibrium policy $\overline{\tau}_O^{x,H}(z)$ and the First Best policy $\widehat{\tau}^{x,H}(z)$ is $\frac{(n+1)[a-\alpha(z)]}{2n(n\xi-1)}$. We know that this is strictly positive, because of the following reasons. First, the numerator must be strictly positive, since we know from Table 3 that in order for the total supply to the Home market $y^H = ny_i^H$ to be positive, $a > \alpha(z)$ must hold. Second, the denominator must be strictly positive, because in order for the Second Order necessary condition to be satisfied, $n\xi > 1$ must hold. This means that $\overline{\tau}_O^{x,H}(z) > \widehat{\tau}^{x,H}(z)$.

Recall that in Proposition 1, we found the sign of $\widehat{\tau}^{x,H}(z)$ to be negative; and that in section 5.5, we found the sign of $\overline{\tau}_O^{x,H}(z)$ to be indeterminate. This implies that when the latter is positive, the lobbying of the sector serves to turn the policy from negative protection (i.e. an export tax) to positive protection (i.e. an export subsidy). Further, even if the latter were negative, we know for sure that it is less negative than the First Best policy, implying that through its lobbying, the sector manages to demand a smaller incidence of tax on its exports.

Next, turning to the question of how $\overline{\tau}^{x,H}(z)$ changes with the productivity of a sector, let us differentiate the policy once with respects to its unit labor requirement. $\frac{\partial \overline{\tau}^{x,H}(z)}{\partial \alpha(z)} = -\frac{-2+(n-1)\xi}{2-2n\xi}$. Recalling that $\overline{\tau}^{x,H}(z)$ is positive when $\xi < \frac{2}{(n-1)}$ and negative when $\xi > \frac{2}{(n-1)}$, we find that for a positive incidence of $\overline{\tau}^{x,H}(z)$, $\frac{\partial \overline{\tau}^{x,H}(z)}{\partial \alpha(z)} < 0$; and that for a negative incidence of $\overline{\tau}^{x,H}(z)$, $\frac{\partial \overline{\tau}^{x,H}(z)}{\partial \alpha(z)} > 0$. This implies that positive protection is increasing in tandem with the sector's productivity level - since a lower unit labor requirement means a higher productivity level -; and negative protection is decreasing in tandem with the sector's productivity level.

Finally, with regards to how the policy changes with the government's preference for social welfare, consider that $\frac{\partial \overline{\tau}^{x,H}(z)}{\partial \xi} = -\frac{-(1+n)[a-\alpha(z)]}{2(n\xi-1)^2}$ is strictly negative. This means that the more the government cares for social welfare, the less positive (or more negative) protection it will grant to the sector.

<u>The political equilibrium policy for an organized exporting sector under Regime HF</u>

It is straightforward to show that lobbying increases the degree of protection granted to an organized exporting sector under RegimeHF, since $\overline{\tau}_O^{x,HF}(z) - \widehat{\tau}^{x,HF}(z) = \frac{(1+2n)[a-(n+1)\alpha(z)+n\alpha^*(z)]}{2n[-1+n(\xi-1)]}$ is strictly positive, as the numerator must be positive in order for domestic supply under Free Trade and Regime HF to be positive[25] , and the denominator must be positive since the Second Order necessary condition requires that $\xi > \frac{1+n}{n}$.

Further, by the fact that $\xi > \frac{1+n}{n}$, we know that $\frac{\partial \overline{\tau}_O^{x,HF}(z)}{\partial \alpha(z)} = \frac{2+2n+\xi}{2+2n-2n\xi} < 0$, implying the the level of protection is increasing in tandem with the sector's productivity. Finally, we find that $\frac{\partial \overline{\tau}_O^{x,HF}(z)}{\partial \xi} = -\frac{[a-(n+1)\alpha(z)+n\alpha^*(z)]}{2(1+n-n\xi)} < 0$, implying that the level of protection is decreasing in the government's preference for national welfare.

<u>The political equilibrium policy for an organized import-competing sector under Regime HF</u>

[25]Please see Table 2.

We know that $\overline{\tau}_O^{m,HF}(z) - \widehat{\tau}^{m,HF}(z) = \frac{2n(n+1)[2a-(2+n)\alpha(z)+n\alpha^*(z)]}{(2+n)[2n^2(-1+\xi)+2\xi+5n\xi]}$ is strictly positive, because from Table 5, the total output of the sector (that is, ny_i^H,) is $\frac{n(n+1)[2a-(2+n)\alpha(z)+n\alpha^*(z)]}{b(2+n)(1+2n)}$. Since this must be positive, the term $[2a-(2+n)\alpha(z)+n\alpha^*(z)]$ in the numerator of $\frac{2n(n+1)[2a-(2+n)\alpha(z)+n\alpha^*(z)]}{(2+n)[2n^2(-1+\xi)+2\xi+5n\xi]}$ must be positive. We also know that the denominator $(2+n)[2n^2(-1+\xi)+2\xi+5n\xi]$ is positive, because the Second Order necessary condition requires that $\xi > \frac{2n^2}{2(n+1)^2+n}$.

Next, $\frac{\partial \overline{\tau}_O^{m,HF}(z)}{\partial \alpha(z)} = -\frac{2n(1+n)}{2n^2(-1+\xi)+2\xi+5n\xi}$ is strictly negative, since $[2n^2(-1+\xi)+2\xi+5n\xi]$ in the denominator is positive. This means that the level of protection is increasing in tandem with the sector's productivity. Finally, $\frac{\partial \overline{\tau}_O^{m,HF}(z)}{\partial \xi} = -\frac{2n(1+n)(1+2n)[2a-(2+n)\alpha(z)+n\alpha^*(z)]}{[2n^2(-1+\xi)+2\xi+5n\xi]^2}$ is strictly negative, implying that the level of protection is decreasing in the government's preference for national welfare.■

A.4 Proof of Proposition 4.

In order to see that Proposition 4 is true, let us express the threshold levels of productivity for producing and exporting as functions of the government's trade policy. First, it is important to note that conducting the following analysis in terms of arbitrary domestic and Foreign productivity levels will not yield informative results, since what matters to the analysis is whether moving from the First Best to the political equilibrium changes the ratio of α/α^* which manages to break even in the domestic import-competing and exporting markets.[26]

In what follows, we shall define a "threshold sector" as a sector that just manages to make zero profits (in either the domestic import-competing market or Foreign market). Since the level of productivity of a threshold sector's Foreign competitors does not change under the incidence of protection granted to the sector, it is helpful to normalize the Foreign level of productivity in the threshold sector so that we can focus on how the level of α that manages to break even changes under the two different levels of protection, while keeping the levels of α^* which each and every domestic sector competes against unchanged.

With reference to Table 5, we can write the total output of the threshold import-competing sector ($z \in [\widetilde{z}^x, \widetilde{z})$) as $ny_i^H = \frac{an - n^2\alpha/\alpha^* - n\alpha/\alpha^* + n^2 + n^2\tau^{m,HF}}{(1+2n)}$, where we have normalized α^* to 1. The threshold *relative* level of productivity for domestic production is the level of α/α^* which sets ny_i^H to zero. This is

[26] Recall that by assumption, α/α^* is increasing in z.

$({}^{\alpha}/{}_{\alpha*})^{threshold,production} = \frac{a+n+n\tau^{m,HF}}{1+n}$. Considering the case where the threshold sector is politically organized, it is clear that $({}^{\alpha}/{}_{\alpha^*})^{threshold,production}$ is higher under the political equilibrium than under the First Best, because in Proposition 3 we proved that $\overline{\tau}_O^{m,HF} > \widehat{\tau}^{m,HF}$.

Similarly, (with reference to Table 4), the volume of exports of the threshold exporting sector can be written as $-M = \frac{n[a-{}^{\alpha}/{}_{\alpha^*}+\tau^{x,HF}]+n^2[1+\tau^{x,HF}-{}^{\alpha}/{}_{\alpha^*}]}{b(1+2n)}$, where we have again normalized the threshold sector's α^* to 1. The threshold *relative* level of productivity, $({}^{\alpha}/{}_{\alpha^*})^{threshold,exporting}$ sets $-M$ to zero. This is equal to $\frac{a+n+(1+n)\tau^{x,HF}}{1+n}$. By Proposition 3, we know that $\overline{\tau}_O^{x,HF} > \widehat{\tau}^{x,HF}$, and this implies that $({}^{\alpha}/{}_{\alpha^*})^{threshold,exporting}$ is higher under the political equilibrium than First Best. ■

A.5 Proof of Proposition 5.

Recalling that Home's national welfare is defined as the sum of total national income and consumer surplus, we can compute the effect on national welfare of moving a sector away from the First Best to the political equilibrium. We shall carry out the analysis for the case of a threshold import-competing sector; a non-threshold import-competing sector; a threshold exporting sector; and a non-threshold exporting sector. A threshold import-competing sector is a sector which would belong to $z \in [\widetilde{z}, 1]$ under the First Best, but which manages to enter Regime HF as an import-competing sector ($z \in [\widetilde{z}^x, \widetilde{z})$) under the political equilibrium. On the other hand, a threshold exporting sector is a sector which would belong to $z \in [\widetilde{z}^x, \widetilde{z})$ under the First Best, but which manages to enter the range $z \in [\widetilde{z}^*, \widetilde{z}^x)$ under the political equilibrium. Non-threshold sectors are those which remain import-competing ($z \in [\widetilde{z}^x, \widetilde{z})$) or exporting ($z \in [\widetilde{z}^*, \widetilde{z}^x)$) throughout.

For ease of notation, we shall drop all sectoral subscripts in what follows. Instead, we will add a superscipt to all endogenous variables, which indicates the export status and trade regime which the variable belongs to. For example, $x^{m,HF}$ will refer to the demand for an import-competing good under Regime HF.

Impact of lobbying of a threshold import-competing sector

The lobbying of a threshold import-competing sector, which moves the sector from Regime F to Regime HF, has the following effect on consumer surplus.

$$\begin{aligned}\triangle CS &= \{u[x^{m,HF}] - p^{m,HF}x^{m,HF}\} - \{u[x^{m,F}] - p^{m,F}x^{m,F}\} \\ &= \{a[(\frac{1}{b})(a - p^{m,HF})] - \frac{b}{2}[(\frac{1}{b})(a - p^{m,HF})]^2 - [p^{m,HF}[(\frac{1}{b})(a - p^{m,HF})]\} - \\ &\quad \{a[(\frac{1}{b})(a - p^{m,F})] - \frac{b}{2}[(\frac{1}{b})(a - p^{m,F})]^2 - [p^{m,F}[(\frac{1}{b})(a - p^{m,F})]\},\end{aligned}$$

where we can find the relevant expressions for $p^{m,HF}$ and $p^{m,F}$ from Tables 5 and 6, respectively. Plugging $\overline{\tau}_O^{m,HF} = \frac{2n[a-(n+1)\alpha(z)+n\alpha^*(z)]+[(1+2n)(a-\alpha^*(z))]\xi}{2n^2(\xi-1)+2\xi+5n\xi}$ into the expression for $p^{m,HF}$, and $\widehat{\tau}^{m,F} = \frac{a-\alpha^*(z)}{(2+n)}$ into the expression for $p^{m,F}$ yields

$$\begin{aligned}\triangle CS &= \frac{1}{2b(2+n)^2[2n^2(\xi-1)+2\xi+5n\xi]^2} \\ &\quad \{n^2[2a-(2+n)\alpha+n\alpha^*][n(\xi-2)+2\xi][2n(-2a(1+n)+(2+n)\alpha+n\alpha^*]\} + \\ &\quad \{(2+n)[4a(1+n)-2(\alpha+\alpha^*)-n(\alpha+3\alpha^*)]\}\end{aligned}$$

The change in sectoral profits ($\triangle\Pi$) is simply equal to $\Pi^{m,HF}$, since the threshold sector would have been earning zero profits under the First Best. Finally, the change in government revenue from the policy is

$$\begin{aligned}\triangle(\tau \times M) &= \overline{\tau}_O^{m,HF}\{\frac{an - n\alpha^* - n\overline{\tau}_O^{m,HF} + n^2\alpha - n^2\alpha^* - n^2\overline{\tau}_O^{m,HF}}{b(1+2n)}\} - \\ &\quad \widehat{\tau}^{m,F}\{\frac{an - n\widehat{\tau}^{m,F} - n\alpha^*}{b(1+n)}\}\end{aligned}$$

Hence, the total impact of the lobbying of a threshold import-competing sector on national welfare is

$$\begin{aligned}\triangle CS + \triangle\Pi + \triangle(\tau \times M) &= \frac{1}{2b(2+n)^2[2n^2(\xi-1)+2\xi+5n\xi]^2} \\ &\quad \big\{n^2\{2n[2a-(2+n)\alpha+n\alpha^*]+(2+n)[-2a+(2+n)\alpha-n\alpha^*]\xi\big\} \\ &\quad \big\{-2n[(2+n)\alpha+n\alpha^*]+(2+n)[(2+n)\alpha+2\alpha^*+3n\alpha^*]\xi - \\ &\quad 4a(1+n)[n(\xi-1)+2\xi]\}\big\}\end{aligned}$$

We know that the following restrictions must hold.

1. $a > \alpha$ and $a > \alpha^*$. (Please refer to section 3.1).

2. $a, b > 0$.

3. $n \geq 2$. (This is because the number of firms in each sector has to be at least equal to 2, in order for the market structure to be oligopolistic).

4. $\xi > \frac{2n^2}{2(n+1)^2+n}$, $\xi > \frac{1+n}{n}$, and $\xi > \frac{2}{n-1}$. (These are the necessary Second Order Conditions from the government's optimization problem).

By plugging in values for the model's parameters that satisfy the above restrictions, and ensuring that $\alpha > \alpha^*$, it is clear that $\triangle CS + \triangle\Pi + \triangle(\tau \times M)$ is positive. Hence, the lobbying of a threshold producing sector serves to enhance national welfare. ■

<u>Impact of lobbying of a non-threshold import-competing sector</u>

The lobbying of a non-threshold sector within $z \in [\widetilde{z}^x, \widetilde{z})$ has the following effect on national welfare:

$$\triangle CS + \triangle\Pi + \triangle(\tau \times M) = \frac{-2n^3(1+n)^2[2a-(2+n)\alpha+n\alpha^*]^2}{b(2+n)(1+2n)[2n^2(\xi-1)+2\xi+5n\xi]^2},$$

where it is easy to check that the above expression is strictly negative, by plugging in values for the model's parameters that satisfy the restrictions, and ensuring that $\alpha > \alpha^*$.

<u>Impact of lobbying of a threshold exporting sector</u>

The lobbying of a threshold exporting sector has the following effect on consumer surplus:

$$\begin{aligned}\triangle CS &= \{u[x^{x,HF}] - p^{x,HF}x^{x,HF}\} - \{u[x^{m,HF}] - p^{m,HF}x^{m,HF}\} \\ &= -\frac{1}{2b(1+n)^2(2+n)^2(1+2n)^2} \\ &\quad \big\{n^2[a+n(2+n)\alpha-(1+n)^2\alpha^*][a(5+2n(5+2n)]- \\ &\quad [(2+n)(2+3n)\alpha-(1+n)^2\alpha^*]\big\},\end{aligned}$$

the following effect on sectoral profits:

$$\begin{aligned}\triangle\Pi &= \{p^{x,HF} - \alpha\}y^{x,HF} - \{p^{m,HF} - \alpha\}y^{m,HF} \\ &= \frac{n}{9b}\{(a-\alpha)^2 - \frac{9(1+n)^2[2a-(2+n)\alpha+n\alpha^*]^2}{(2+5n+2n^2)^2} + \\ &\quad \frac{9[a-(1+n)\alpha+n\alpha^*]^2\xi^2}{4(1+n-n\xi)^2}\},\end{aligned}$$

and the following effect on government revenue from the policy:

$$\begin{aligned}\triangle(\tau\times M) &= \frac{1}{2(b+2bn)}\{\frac{2n[a-\alpha^*][-a-n(2+n)(\alpha-\alpha^*)+\alpha^*]}{(2+n)^2} - \\ &\quad \frac{n(1+2n)[a-(1+n)\alpha+n\alpha^*]^2\xi[2+2n+\xi]}{2(1+n)(1+n-n\xi)^2}.\end{aligned}$$

The total effect, which is the sum of the above, can be positive, provided that ξ is large enough. For example, setting $a = 50, \alpha = 10, \alpha^* = 9$ and $n = 5$, we find that the total effect is positive, if and only if $\xi \geq \frac{8}{5}$. This is slightly larger than the minimum value of ξ which is required by the second order necessary conditions (but not unrealistically high).

Impact of lobbying of a non-threshold exporting sector

The lobbying of a threshold exporting sector has no effect on consumer surplus, but it changes the level of sectoral profits and the amount of government revenue. The total effect on welfare is:

$$\triangle\Pi + \triangle(\tau\times M) = \frac{-(1+n)[a-(1+n)\alpha+n\alpha^*]^2}{4b(1+n-n\xi)^2}$$

It is easy to check that this is strictly negative, by plugging in values for the model's parameters that satisfy the restrictions, and ensuring that $\alpha < \alpha^*$.

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