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Abstract:
The basic goal of this paper is to develop an endogenous trade policy model in the Grossman and Helpman (1994) tradition that could endogenise the number of lobby groups in the economy. The game has three stages. In the first stage, the consumer that owns a specific factor decides whether to organise or not in pressure groups. In the second one, the lobbies (organised groups of consumers) select the contributions (income transfers) they are willing to make to influence the government's actions. Finally, in a third stage of the game the government establishes the trade policy. This chapter highlights two main results. The first one is that contribution is a dominant strategy for each lobby group, thus the sub-game perfect equilibrium implies all the lobby groups being active (L=N). The second one is related with the welfare evaluation of this equilibrium. It is well known in the literature that this equilibrium is efficient (in a Pareto sense) but it is also important to analyse what happen when only the lobby welfare is considered. The conclusion is that being organised and defending a particular interest is better than not being organised, given that the others are not organised (or only some are), because it is possible to obtain an advantage in the political relationship with the government. On the other hand, since the other antagonic groups (one or some) are organised in lobbies, it is possible to reduce the damage from the distortions created by their influence on the government's actions. An implication of this result is that many times in societies with a multiplicity of specific interests organised corporately, typically all finish in a worst situation than if they were not organised, arriving to a prisoner's dilemma outcome, if only the lobby's welfare is considered.

Resumen:
El objetivo de este documento es desarrollar un modelo de política comercial endógena en la tradición de Grossman y Helpman (1994) que sea capaz de endogenizar el número de grupos.de presión (lobby) en la economía. El juego tiene tres etapas. En la primera etapa, los consumidor que son dueños de un factor específico deciden si se organizan o no en grupos de presión. En la segunda etapa, los lobbies (grupos organizados de consumidores) seleccionan las contribuciones (transferencias de ingreso) que realizarán con el objetivo de influenciar la acción del gobierno. Finalmente, en una tercera etapa del juego el gobierno decide la política comercial. En el trabajo se destacan dos resultados. El primero es que organizarse y contribuir es una estrategia dominante para cada grupo de presión., por lo tanto el equilibrio perfecto en sub-juegos implica que todos los lobbies estarán activos (L=N). El segundo resultado está vinculado con la evaluación del equilibrio del punto de vista del bienestar. Es bien conocido en la literatura que este equilibrio es eficiente (en el sentido de Pareto) pero es importante estudiar que pasa cuando solo el bienestar de los lobbies es considerado. La conclusión es que estar organizado y defender el interés particular es mejor que no estar organizado, dado que los otros no se organizaron (o solo algunos), porque es posible obtener una ventaja en la relación política con el gobierno. En otro sentido, dado que los grupos antagónicos están organizados (uno o algunos) en grupos de presión, es posible reducir el daño por las distorsiones creadas por su influencia en la acción del gobierno. Una implicación de este resultado es que muchas veces es sociedades con una multiplicidad de intereses específicos organizados corporativamente, típicamente todos terminan en una peor situación que si no estuvieran organizados, llegando a una situación de dilema del prisionero, si solo el bienestar de los lobbies es el considerado.

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1. Introduction

Free trade is a “rara avis” in the international economy, in spite of the fact that there exists a wide consensus on its benefits. Although in the past decades there has been some progress on tariff reduction, protectionism is still potentially present through diverse mechanisms. In fact, the average tariff decreased, as a consequence of unilateral reforms and of the multilateral liberalisation process, but several tools of new protectionism came into existence, one of which is the contingent protectionism. This implies the use of a set of instruments which public administration can manage (according or not to the multilateral arrangements) in a way that could generate the desired protection level. The trade blocs-wave could be another one, but his case is less clear in terms of its influence because it contains elements of liberalisation also.

More and more attention has been given to models of international trade which attempt to explain these phenomena. It is well known that the existence of uncertainty about the continuity of a certain trade policy has a perverse influence on the economy (Calvo, 1987 and Calvo, 1989). The knowledge about the economic reasons behind the existence of this protectionism bias could be a valuable instrument in the design of successful trade reforms.

One of the most interesting approaches explains the trade policy through the functioning of the political system. It is well known that trade policy could result in strong distributive effects between the different types of consumers, thus are likely to align in different ways in the debate between commercial liberalisation and protectionism.

The government, when defining the taxes and subsidies to exports and imports is influenced by: the effects on the income distribution and the well-being of the consumers; and the organised pressure groups (lobbies) that are able to influence their political actions. The government wants to win votes (direct or indirectly) in order to be able to access or to remain in office. The political economy of trade policy builds a positive theory of this field. Endogenous trade policy models seek to explain government's behaviour when defining the trade policy. Also, these models show how the private sector behaviour is determined. In this case, they must select the level of pressure (effort) that they will make to influence the government policy measures.

There are different types of models with this inspiration (see Rodrik, 1994):

- In the majority voter model (Mayer, 1984) the trade policy is the result of an electoral process where each consumer votes taking into account his (her) own interest. The consumers are heterogeneous in their relative endowment of production factors. This characteristic will determine (in a Heckscher Ohlin framework) the trade tariff level they prefer. By a democratic voting process the level of tariff that will prevail (by the median voter theorem) is defined.
- The tariff formation models do not explicitly show the mechanism by which the lobbies influence the trade policy process. Taking as given this relationship, the models analyse the equilibrium effort of opposite lobbies.

- The political support function approach (Hillman, 1982) assumes a government's objective function where the welfare of lobby groups that demand protection has a greater weight than the aggregate consumer's welfare. With this assumption the model explains the bias towards protectionist policies that some governments could have.
- The party competition approach assumes that two parties compete for funds. The fund suppliers are two opposite lobbies (pro exports lobby and pro import substitution lobby) which can influence the future government policy (Magge, Brock and Young, 1989).

The models are diverse in the way they specify the supply and demand sides of protection but all of them have in common the feature of considering protectionism as permanent phenomena, its roots being in the structure of the political process that generates it. The proteccionist bias should not be viewed as persistent mistakes of the policy makers but as a mechanism of production of the trade policy.

Recently, a new generation of endogenous trade policy models has been developed; e.g. the one set out in Grossman and Helpman (1994). This particular model assumes on the supply side that an incumbent government sets the trade policy maximising an objective function in which different weights are given to the contribution of the private sector, organised in pressure groups (political objective), and the aggregate welfare of the consumers (economic objective). On the demand side, they assume that a given number of lobbies play a contribution game to influence the trade policy. The lobbies define the level of contributions that they want to carry out with the objective of maximising their aggregate welfare function and looking for the most convenient trade policy for them.

2. Objectives and organisation of the chapter

The basic goal of this chapter is to develop an endogenous trade model in the Grossman and Helpman tradition that could endogenise the number of active groups in the economy, as suggested in Grossman and Helpman (1994). In addition to their model, in this chapter there is a previous stage to the political contribution game in which the consumers, as owners of specific factors, decide whether it is beneficial to them to be organised in group in order to participate in the subsequent game with the government.

The chapter develops a model of endogenous trade policy where the number of lobbies in which the consumers are organised is endogenous. An incumbent government sets the trade policy and the owners of specific factors make monetary contributions to influence on it. The objective function of the government weights the specific factor owner contribution and the consumers aggregate welfare. It is considered a simple small economy with one export sector that uses a specific factor and one import substitution sector that uses another specific factor. In this framework, the number of lobbies that will be active in the political contribution game is endogenised.

The game has three stages. In the first stage the consumers (in a decentralised way) decide to whether to organise or not in pressure groups. In the second stage, the lobbies (in fact, organised groups of consumers) select the level of income contributions to influence the government. Finally, in a third stage of the game, the government sets the trade policy.

In the chapter, there is a characterisation of the set of relevant parameters that are associated with five possible equilibrium (Nash sub game perfect equilibrium) situations: no organisation of the owners and so free trade equilibrium; only one lobby group is active (exporters or import substitution sector); the two lobby groups are active; no equilibrium in the lobby game.

The chapter is organised in six more sections. In section three the model is set out. In the following section the structure of the game is developed and a typology of equilibrium in dominant strategies is presented. Section five compares the three alternative regimes: the sub game between an exporter lobby and the government; the sub game between the imports substitution sector and the government; and finally the sub game in which the two lobby groups actively compete with each other to influence on the trade policy set by the government. In section six, the equilibrium of the global game is analysed and also the distributive impacts of the different regimes. In section seven a generalisation to n specific factors is derived. Finnaly the main conclusion of the chapter are developed.

3. **The model**

The economy is supposed to have individuals with identical preferences, that are only different in their factors endowments. Consumers preferences are quasi-linear and can be represented by the following utility function:

$$u^h = c^h_0 + u_1\left(c^h_1\right) + u_2\left(c^h_2\right) \qquad 3.1$$

The functions u1 and u2 have the usual properties (increasing and concave functions). Consumers want to maximise (3.1) subject to their budget constraint:

$$y^h \geq c_0 + p_1.c_1 + p_2.c_2 \qquad 3.2$$

The price of the good 0 is taken as numeraire. The indirect utility function is represented by:

$$b\left(p, y^h\right) = y^h + cs(p) \qquad 3.3$$

Where: $cs(p) = \sum_i u_i(d_i(p_i)) - \sum_i p_i.d_i(p_i)$, is the consumer surplus.of good one and good two (i=1,2).

The general economic production framework is specified as in a specific factor trade model. There exist three sectors in the economy: one sector (labelled with a sub index 0) that only uses the mobile factor labour; an exporter sector (labelled with a sub index 1) that uses a specific factor (v1) and also the mobile factor and the imports substitution sector (labelled with a sub index 2) that uses another specific factor (v2) and the mobile factor labour. The specific factors are not mobiles between sectors and are fixed in a given amount. Thus, the assignment decisions is made only in the labour factor.

The supply side of the economy is characterised by those three constant returns to scale sectors:

$$x_0 = L_0 \qquad 3.4$$

$$x_1 = F^1(L_1, v_1) \qquad 3.5$$

$$x_2 = F^2(L_2, v_2) \qquad 3.6$$

where: L_z - is the amount of mobile factor in the z sector (with z =-i,i); v_i - is the amount of specific factor in sector i (with i=1,2) ; x_z - is the quantity produced by sector z.

It is assumed that in equilibrium xo is greater than zero. As p_0 is equal to one, then the mobile factor price will also be one (assuming a competitive framework). The profits' functions in the specific factor sectors are:

$$\pi^i(p_i) = \left\{ \max_{x_i} (p_{i.}x_i - L_i)F^i(L_i, v_i) = x_i \right\}$$
$$\pi^i{}_{p_i} = x_i(p_i) \qquad 3.7$$

Where the subscript indicates a derivative and $x_i(p_i)$- is the supply function of good i.

The economy is small so the international prices are given. The trade policy is a set of instruments that can affect in a direct way the domestic prices of export and import goods, as shown in the following equation:

$$p_i = p^*_i + \tau_i \qquad 3.8$$

Where:

The tariff revenue is defined in per capita terms as follows:

$$\tau(p) = \left(p_1 - p^{*}_{1}\right).\left\{d_1(p_1) - \frac{x_1(p_1)}{N}\right\} + \left(p_2 - p^{*}_{2}\right).\left\{d_2(p_2) - \frac{x_2(p_2)}{N}\right\} \qquad 3.9$$

Where:

The tariff revenue is given as a lump sum to the consumers. As each consumer has a different factor production endowment they have different levels of income. This specification of the model does not allow for a consumer having overlapping ownership of different specific factors. Each consumer is provided with a labour endowment of one unit, thus the population is equal to the supply of labour (N=L).

$$\overline{y}^{h} = 1 + s^{h}{}_{i}.\pi^{i}(p_i) + \tau(p) \qquad 3.10$$

Where: $s^{h}{}_{i} = v_i^h / v_i$ - is the participation that consumer h has in the ownership of specific factor i.

The disposable income is used in the consumer's budget constraint ((1.2)); it is the gross income net of the contributions that each consumer does to participate in the lobby.

$$y^{h} = \overline{y}^{h} - c^{h}(p) \qquad 3.11$$

where: $c^h(p)$-consumer h´s contribution to the political game.

In this model consumers can be organised in groups as a way to influence on the government's actions. This will occur if they perceive that organising is beneficial for them (we will return to this point in the section 3.1). In this sense, the number of active lobbies is endogenous to the model. Only those consumers who are organised in lobbies do political contributions. The indirect utility function of this kind of consumers can be written in the following way:

$$b\left(p, y^h\right) = b^h(p) = \bar{b}^h(p) - c^h(p) = 1 + s^h{}_i(p).\pi_i(p_i) + \left(\tau(p) + cs(p)\right) - c^h(p) \qquad 3.12$$

The natural members of a lobby group are the owners of a specific factor and they have the same interest related with the domestic prices and the trade policy. In table 1 the ownership of the specific production factor and the distribution allocation of labour between sectors is shown.

Table 1

	0	1	2	Total
Labour supply factor 1 owners	$L^1{}_0$	$L^1{}_1$	$L^1{}_2$	$N^1 = \theta_1 . N$
Labour supply factor 2 owners	$L^2{}_0$	$L^2{}_1$	$L^2{}_2$	$N^2 = \theta_2 . N$
Labour supply non-owners	$L^{-12}{}_0$	$L^{-12}{}_1$	$L^{-12}{}_2$	N^{-12}
Distribution of labour between sectors	L_0	L_1	L_2	N

Without loss of generality it is assumed that N is equal to one. The lobby's objective function is the aggregate welfare of the members of the group, as it is shown in the following equation:

$$\Omega_i(p) = \sum_{h \in \mathbf{N}^i} \left\{ b^h(p) \right\} = \sum_{h \in \mathbf{N}^i} \bar{b}^h(p) - \sum_{h \in \mathbf{N}^i} c^h(p) = \bar{\Omega}_i(p) - C_i(p) = \theta_i . (1 + cs(p) + \tau(p)) + \pi_i(p) - C_i(p) \qquad 3.13$$

It is assumed that the only economic policy's instruments available to the government are the trade policy ones. The government has an objective function with two components: in the first term, it is interested in receiving direct contributions that allow him to keep himself in the power; in the second term, the government is benevolent in the sense that it maximises the aggregate well-being of all the consumers (owners and not owners).

$$G = \lambda . \left(C_1(p) + C_2(p) \right) + (1 - \lambda) . \Omega(p) = \left(C_1(p) + C_2(p) + \bar{\Omega}(p) . a \right) . k \qquad 3.14$$

Where: $a = \dfrac{(1-\lambda)}{(2.\lambda - 1)}$; $k = (2.\lambda - 1)$.

We assume that λ is greater than ½ so the parameter a is greater than zero. This condition is necessary because the government's utility function is assumed to be an increasing function of the contributions.

4. **The Lobby Game**

As it was previously established, the contribution game has three stages. In the first stage, the group of consumers simultaneously decide if they are going to organise or not, keeping in mind when taking this decision the benefits and costs of the action. In this stage, there will be a strategic interaction between the different consumers' groups, since the results are different depending on the other lobby being active or not. It is assumed that if a consumer owns a particular specific factor then this consumer will have the same interest of any other consumer who owns the same factor. So in this paper the problem of membership of each pressure group it is not solved, by hypothesis all the owners of a particular specific

factor will be potential members of the lobby group who defends the interest of this specific factor.

In the second stage, the organised groups aim to influence on the government's action using the contributions that they have made. In the third stage, the government establishes the trade policy instruments.

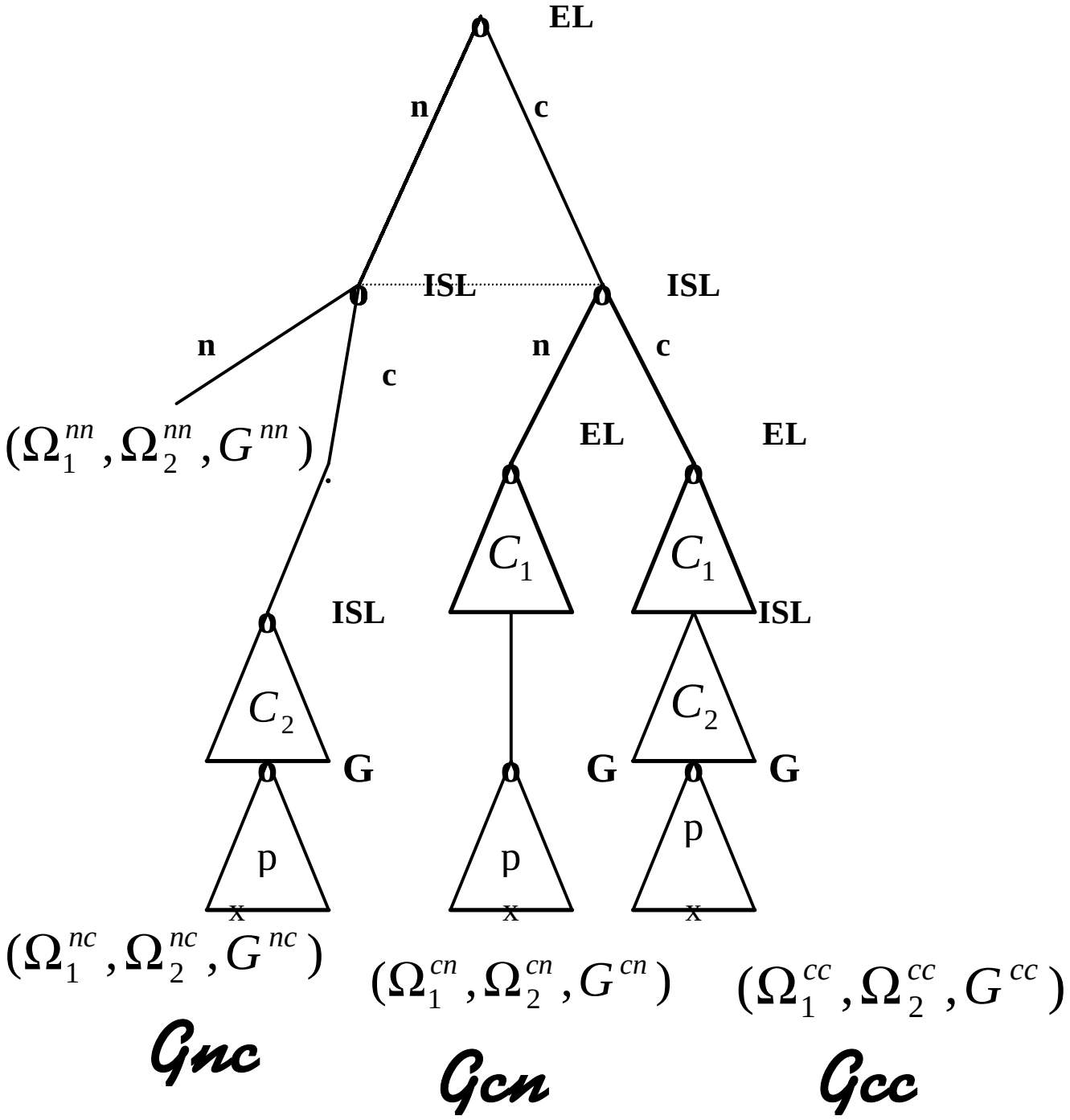
The sub games defined by the second and the third stage are similar to that in Grossman and Helpman (1994) which has the structure of a common agency problem. The principals are the lobbies that simultaneously carry out the contributions in order to influence the agent (the government). The effort that the agent is induced to make is to select a domestic price through the definition of a trade policy. This effort implies a cost to the government because it cares about the aggregate wellbeing of all the consumers. Complete information is assumed in this model, so we do not have moral hazard problems as in the standard principal- agent model. This game can also be viewed as a menu auctions problem, where the bidders are the lobbies. In this auction the lobbies want to buy an object (the domestic price) and the auctioneer (government) defines the object as a result of the auction game (Bernheim and Whinston, 1986).

In this economy, there does not exist any other distortion apart from the political game that the government and the lobbies play. The trade policy is endogenously defined. Any deviation from the free trade outcome should be attributed to the logic of the trade policy contribution game.

The extensive form of the game is presented in Figure 1. In the first stage the exporter lobby (EL) group has two actions to decide if it is going to play the contribution game with the government (G) or not, (c or n). Simultaneously, the import substitution lobby (ISL) must decide into the same action set. The combinations of those decisions create four different situations. One of them is the end of the game, so the pay off of each of the players (ES, ISL and G) are reported. In the others cases three different sub-games are defined. The first one (G_{nc}) is with the export lobby do not active and the import substitution lobby active. The second one (G_{cn}) is with the export lobby active and the import substitution lobby do not active. Finally the third and last sub-game (G_{cc}) is with the two lobby group actives. In each sub games the final payoff of each strategic player is reported.

Figure 1

Extensive Form of the Game *Gl*



Where: EL- export lobby; ISL- import substitution lobby; G- government.

In table 2 the lobby game $\mathcal{GL}$ in the strategic form is presented. Explicitly is reported the first stage of the game, the others are implicit in the pay off of each of the players, in each of the possible contingencies of the game. The government's payoff is reported only as a reference, the interaction at this stage of the game is only between the lobby groups.

Table 2

Strategic Form of the Game $\mathcal{GL}$

2 / 1	C	N
C	$\Omega_1^{cc}, \Omega_2^{cc}, G^{cc}$	$\Omega_1^{cn}, \Omega_2^{cn}, G^{cn}$
N	$\Omega_1^{nc}, \Omega_2^{nc}, G^{nc}$	$\Omega_1^{nn}, \Omega_2^{nn}, G^{nn}$

A typology of the possible equilibrium with dominant strategies in the lobby game will be done. There are five different situations:

a) No contribution is a dominant strategy for one of the lobby group and in this situation no contribution is dominant for the other, so free trade will be an endogenous result of the game.

$$\text{i. } \Omega_1^{nc} > \Omega_1^{cc}$$
$$\text{ii. } \Omega_1^{nn} > \Omega_1^{cn}$$
$$\text{iii. } \Omega_2^{cn} > \Omega_2^{cc}$$
$$\text{iv. } \Omega_2^{nn} > \Omega_2^{nc}$$

If inequalities i. and ii. and iv., or iii. and iv. and i. are fulfilled then, the equilibrium for the first stage of the lobby game is e_a = (N,N) so $\mathcal{L} = 0$. The optimum government's policy is doing nothing, thus p=p*. The sub game perfect equilibrium of all the game $\mathcal{GL}$ will be the following: $\mathcal{E} = (N, N, p^{nn})$.

b) Contribution (no contribution) is a dominant strategy for the export lobby (import substitution lobby) and no contribution (contribution) is a dominant for import substitution lobby (export lobby) when the other play contribution (no contribution).

$$\text{i. } \Omega_1^{cc} > \Omega_1^{nc}$$
$$\text{ii. } \Omega_1^{cn} > \Omega_1^{nn}$$

$$\text{iii. } \Omega_2^{cn} > \Omega_2^{cc}$$
$$\text{iv. } \Omega_2^{nn} > \Omega_2^{nc}$$

If inequalities i., ii. and iii., or iii, iv. and ii. are fulfilled then, the equilibrium for the lobby sub-game is e_b=(C,N) so $\mathcal{L} = 1$. The active lobby group is the exporter sector. The sub game perfect equilibrium of all the game $\mathcal{GI}$ will be the following: $\mathcal{E} = (C_1^{cn}, N, p^{cn})$.

c) No contribution (contribution) is a dominant strategy for the export lobby (import substitution lobby) and contribution (no contribution) is dominant for import substitution lobby (export lobby) when the other play no contribution (contribution).

$$\text{i. } \Omega_1^{cc} < \Omega_1^{nc}$$
$$\text{ii. } \Omega_1^{cn} < \Omega_1^{nn}$$
$$\text{iii. } \Omega_2^{cn} < \Omega_2^{cc}$$
$$\text{iv. } \Omega_2^{nn} < \Omega_2^{nc}$$

If inequalities, i. and ii. and iv. or iii.,iv. and i. are fulfilled then, the equilibrium for the lobby sub-game is e_b=(N,C) so $\mathcal{L} = 1$. The active lobby group is the imports substitution sector. The sub game perfect equilibrium of all the game $\mathcal{GI}$ will be the following: $\mathcal{E} = (N, C_2^{nc}, p^{nc})$.

d) Contribution is a dominant strategy for one of the lobbies and in this situation contribution is dominant for the other.

$$\text{i. } \Omega_1^{cc} > \Omega_1^{nc}$$
$$\text{ii. } \Omega_1^{cn} > \Omega_1^{nn}$$
$$\text{iii. } \Omega_2^{cn} < \Omega_2^{cc}$$
$$\text{iv. } \Omega_2^{nn} < \Omega_2^{nc}$$

If inequalities, i., ii. and iii., or iii., iv. and i. are fulfilled then, the equilibrium for the lobby sub-game is e_b=(C,C) so $\mathcal{L} = 2$. The two lobbies are active. The sub game perfect equilibrium of all the game $\mathcal{GI}$ will be the following: $\mathcal{E} = (C_1^{cc}, C_2^{cc}, p^{cc})$.

In this equilibrium we could have a prisoner dilemma between lobby groups, it could happen that:

$$\Omega_1^{cc} \leq \Omega_1^{nn} \quad and \quad \Omega_2^{cc} \leq \Omega_2^{nn}$$

e) In any other situation does not exist any equilibrium with dominant strategy.

5. **The Lobby Regimes**

5.1 **Equilibrium Definition**

In this section, the pressure groups contributions and the trade policy are analysed in the three others sub-games, each one has two stages. In the first one, the lobbies choose simultaneously the contribution schemes that they will offer to the government. The contribution scheme is a relationship between contributions (transfers of income to the government) and a vector of domestic prices (trade policy). It is like an incentive table that the principals (lobbies) build in order to be able to obtain the desired level of effort (a trade policy) from the agent (government). In the second stage, the government selects the optimum trade policy according to their objective function. In this game, a sub-game perfect equilibrium is a contribution scheme for each lobby and an optimum trade policy for the government. Following Grossman and Helpman (1994), who use Berheim and Whinston´s result (1986), an equilibrium is defined by $\left\{\left(C_i^0\right)_{i\in L}, p^0\right\}$ and must satisfy the following program for each principal i:

$$\left\{p^0, C_i^0(p^0)\right\} \in \arg\max_{p,\, c_i} \left(\overline{\Omega}_i(p) - c_i\right), \ \textit{such that}$$

$$p^0 \in \arg\max_{p} \sum_{-i\in \mathbf{L}} C_{-i}^0(p) + c_i + a.\overline{\Omega}(p), \ IC$$

$$c_i = C_i(p) \ \textit{for some } C_i(p) \geq 0$$

$$\sum_{-i\in \mathbf{L}} C_{-i}^0(p) + c_i + a.\overline{\Omega}(p) \geq \sum_{-i\in \mathbf{L}} C_{-i}^0\left(p^{-i}\right) + 0 + a.\overline{\Omega}(p^{-i}), \ PC$$

with

$$p^{-i} \in \arg\max_{p} \sum_{-i\in \mathbf{L}} C_{-i}^0(p) + 0 + a.\overline{\Omega}(p), \ \ \forall\, i \in \mathbf{L}$$

In the equilibrium each principal must be maximising his objective function restricted to the incentive constraint (IC) and the participation constraint (PC) of the agent. Is equivalent to establish that the equilibrium $\left\{\left(C_i^0\right)_{i\in L}, p^0\right\}$ must satisfy the following conditions:

a- the contributions schemes should be feasible (greater than zero), that is

$$C_i^0(p) \geq 0, \ \forall\, i \in L \qquad 5.1.1$$

b- government's incentive restriction, should be satisfied, government should select the trade policy that maximises its objective function.

$$p^{o} \in \arg\max_{p} \sum_{i \in L} C_{i}^{o}(p) + a.\overline{\Omega}(p) \qquad 5.1.2$$

c- the contribution schemes should satisfy the following property: given the equilibrium prices nobody will have an incentive to deviate. That is, the equilibrium prices maximise the lobby i's objective function plus the government's objective function.

$$p^{o} \in \arg\max_{p}(\overline{\Omega}_{i}(p) - C_{i}^{o}(p)) + \sum_{i \in L} C_{i}^{o}(p) + a.\overline{\Omega}(p) \quad \text{for each i} \qquad 5.1.3$$

d- the fourth property points out that for each lobby i, the government has the possibility of selecting a particular price that maximises the net well-being of all other active lobbies plus the government's objective function, while the lobby i does not make any contribution at these prices, as it is shown in the following expression:

$$\forall\ j \in L, \exists p^{j} \in \arg\max \sum_{i \in L} C_{i}^{o}(p) + a.\overline{\Omega}(p): C_{j}^{0}(p^{j}) = 0 \qquad 5.1.4$$

The second and third properties are used to prove that all the contributions schemes should be locally true in the equilibrium neighbourhood. That is, the marginal contribution of lobby i to a policy change should be equal to the gross gain in well being that it obtains, thus the contribution scheme states the same relationship with the prices that the lobby gross well being shows. Moreover, it is possible to show that the true contributions schemes belong always to the set of better answers of each lobby. The fourth property allows to establish each active lobby's level of the political contribution.

If the contributions are differentiable around p_0, then using the properties 5.1.1 and 5.1.2 it can be shown that the contribution schedules are locally truthful ($\nabla C_i^0(p^0) = \nabla \Omega_i(p^0), \forall\ i \in L$). Then it is possible to define a particular contribution schedule that always satisfies the previous condition, as follows:

$$C_{i}^{T}(p, B_{i}) = \max(0, \overline{\Omega}_{i}(p) - B_{i}), \text{ for some Bi.} \qquad 5.1.5$$

The pressure group pays, for any policy p, the excess (if any) of lobby i´s gross welfare relative to some level (Bj). So equation 5.1.5 that shows a relationship between contribution and prices shows the same relationship between gross welfare and prices, and in this sense the contribution schedule is truthful.

Bernheim and Whinston (1986) highlight that in this setting the truthful strategy (TS) has many interesting properties. First, the set of best responses to any strategy of the others always includes a truthful strategy. So each lobby bears no cost from playing a

truthful strategy no matters what the other lobby groups do. Second, equilibrium supported by TS (TNS) implements a Pareto Efficient action. Third, TNS are "coalition proof", so this kind of equilibrium is stable to non binding communication among players. So, truthful Nash equilibrium (TNE) may be focal among the set of Nash.

Also, the TNE has the property that the equilibrium prices satisfy the political support function (PSF). This important result is shown in Grossman & Helpman (1994), whose work is also a microfundation of the PSF (Hillman, 1982)[1].

5.2 **The first regime: Export Sector and Government**.

In this section, each sub-game is labelled as a regime because each one is characterised by different players in the trade policy-contribution sub-game. In the first one (***Gcn***) only the export sector contributes to influence the trade policy, this is a bilateral game between one lobby group and the government.

Equilibrium Trade Policy

In this particular case the PSF is:

$$p^{cn} \in \arg\max_{p} \overline{\Omega}_1(p) + a.\overline{\Omega}(p) \qquad 5.2.1$$

Where: p^{cn} - is the equilibrium price when the action selected by sector 1 is contribution and the action selected by sector 2 is no contribution.

Using the first order conditions of 5.2.1 (assuming concavity in the indirect utility functions) is possible to show that the unique optimal trade policy is given by the following expressions:

$$\tau_1^{cn} = \frac{(1-\theta_1)}{(a+\theta_1)} . \frac{x_1(p_1^{cn})}{-m_{1p}(p_1^{cn})} \qquad 5.2.2$$

$$\tau_2^{cn} = \frac{-\theta_1}{(a+\theta_1)} . \frac{x_2(p_2^{cn})}{-m_{2p}(p_2^{cn})} \quad , \qquad 5.2.3$$

Where the trade functions are:

---

[1] For b. equilibrium condition we know that: $\sum_{i \in L} C_i^o(p^o) + a.\overline{\Omega}(p^o) \geq \sum_{i \in L} C_i^o(p) + a.\overline{\Omega}(p)$. By the definition of the TNE supported by TS we have that: $C_i^o = \overline{\Omega}_i(p^o) - B_i$ and $C_i^o(p) \geq \overline{\Omega}(p) - B_i$. Then if we join the two inequalities the result is: $\sum_{i \in L} \overline{\Omega}_i(p^0) + a.\overline{\Omega}(p^o) \geq \sum_{i \in L} \overline{\Omega}_i(p) + a.\overline{\Omega}(p)$.

$$m_1 = d_1(p_1).N - x_1(p_1) \qquad 5.2.4$$

$$m_2 = d_2(p_2).N - x_2(p_2) \qquad 5.2.5$$

So, according to this, the endogenous trade policy in this regime is an export and an import subsidy, and thus the income tariff will always be negative (see 3.9).

Equilibrium Political Contribution

It is necessary to take into account two equations to determine the level of the political contribution and the net welfare that the lobby group could reach in equilibrium. This is the specification of condition d. in section 5.1. The first one is:

$$p^{nn} \in \arg\max_{p}(a\Omega(p)) \qquad 5.2.6$$

Obviously in this simple case $p^{nn} = p^{*}$. The second one is:

$$G^{cn} = C_1(p^{cn}, B_1^{cn}) + a.\overline{\Omega}(p^{cn}) = a.\Omega(p^{nn}) = G^{nn} \qquad 5.2.7$$

Then:

$$C_1(p^{cn}, B_1^{cn}) = C_1^{cn}(p^{cn}) = a.(\Omega(p^{nn}) - \overline{\Omega}(p^{cn})) \qquad 5.2.8$$

To maintain the government with the same level of utility as in the case where the lobby is not active, it is necessary to make a contribution equal to a times the size of the distortion created by the lobby's influence on the government's trade policy.

Proposition 1: In this bilateral sub-game ($\mathcal{G}cn$) between the export lobby and the government, contribution will be a dominant strategy $\Omega_1(p^{cn}) \rangle \Omega_1(p^{nn})$ for any value of the parameters of the model.

Proof:

It will be rationale for the export lobby to contribute if:

$$\overline{\Omega}_1(p^{cn}) - C_1^{cn}(p^{cn}) \rangle \Omega_1(p^{nn}) \qquad 5.2.9$$

But condition 5.2.9 is satisfied by definition of equilibrium prices (see 5.2.1). Substituting 5.2.8 in 5.2.9 and rearranging terms, we get the previous condition:

$$\overline{\Omega}_1(p^{cn}) - \Omega_1(p^{nn}) \rangle a.(\Omega(p^{nn}) - \overline{\Omega}(p^{cn})) \Leftrightarrow \overline{\Omega}_1(p^{cn}) + a.\overline{\Omega}(p^{cn}) \rangle \Omega_1(p^{nn}) + a.\Omega(p^{nn})$$

So the proof is complete.

5.3 **The second regime: Imports Substitution Sector and Government**.

In this regime, the results are symmetric to the ones we have just studied in the previous section, but in this sub-game ($\mathcal{G}^{nc}$) only the imports substitution sector contributes to influence the trade policy (i.e. it is a bilateral game between one lobby group and the government).

Equilibrium Trade Policy

In this case, the PSF is defined as follows:

$$p^{nc} \in \arg\max_{p} \ \overline{\Omega}_2(p) + a.\overline{\Omega}(p) \qquad 5.3.1$$

Using the first order conditions of 5.3.1 problem, it is possible to show that the optimal trade policy in this regime is:

$$\tau_1^{nc} = \frac{-\theta_2}{(a+\theta_2)}.\frac{x_1(p_1^{nc})}{-m_{1p}(p_1^{nc})} \qquad 5.3.2$$

$$\tau_2^{nc} = \frac{(1-\theta_2)}{(a+\theta_2)}.\frac{x_2(p_2^{nc})}{-m_{2p}(p_2^{nc})} \qquad 5.3.3$$

According to these results, in this regime the endogenous trade policy is a tax on imports and exports, and thus the income tariff is always positive.

Equilibrium Political Contribution

It is necessary to consider two equations to determine the level of the political contribution and net welfare that the lobby group could attain in equilibrium. The first equation is:

$$p^{nn} \in \arg\max_{p}(a\Omega(p)) \qquad 5.3.4$$

Obviously in this simple case $p^{nn} = p^{*}$. The second equation is:

$$G^{nc} = C_2(p^{nc}, B_2^{nc}) + a.\overline{\Omega}(p^{nc}) = a.\Omega(p^{nn}) = G^{nn} \qquad 5.3.5$$

Then the political contribution is expressed as:

$$C_2(p^{nc}, B_2^{nc}) = C_2^{nc}(p^{nc}) = a.(\Omega(p^{nn}) - \overline{\Omega}(p^{nc})) \qquad 5.3.6$$

Proposition 2: In this bilateral sub-game ($\mathcal{Gnc}$) between the import substitution lobby and the government, contribution will be a dominant strategy $\Omega_2(p^{nc}) \rangle \Omega_2(p^{nn})$ for any value of the parameters of the model.

Proof:

It will be rationale for the import substitution lobby to contribute if:

$$\overline{\Omega}_2(p^{nc}) - C_2^{nc}(p^{nc}) \rangle \Omega_2(p^{nn}) \qquad 5.3.7$$

Condition 5.3.7 is satisfied by definition of equilibrium prices (see 5.3.1). Substituting 5.3.6 in 5.3.7 and rearranging terms we obtain the previous condition:

$$\overline{\Omega}_2(p^{nc}) - \Omega_2(p^{nn}) \rangle a.(\Omega(p^{nn}) - \overline{\Omega}(p^{nc})) \Leftrightarrow \overline{\Omega}_2(p^{nc}) + a.\overline{\Omega}(p^{nc}) \rangle \Omega_2(p^{nn}) + a.\Omega(p^{nn})$$

So we complete the proof.

5.4 **The third regime: Export Sector, Imports Substitution Sector and Government**.

In this regime ($\mathcal{Gcc}$), the two lobbies are active and there is competition between them for the government's protection. Now, government could take a profit from this competition but the lobbies could damage each other. For them it will be optimal to contribute if the other lobbies contribute, even though welfare could be less compared to the bilateral game.

Equilibrium Trade Policy

As before, the trade policy equilibrium is obtained by the PSF in this regime:

$$p^{cc} \in \arg\max_{p} \ \overline{\Omega}_1(p) + \overline{\Omega}_2(p) + a.\overline{\Omega}(p) \qquad 5.4.1$$

Using the first order conditions of 5.4.1 problem it is possible to show that the optimal trade policy is:

$$\tau_1^{cc} = \frac{(1-\theta_1-\theta_2)}{(a+\theta_1+\theta_2)}.\frac{x_1(p_1^{cc})}{-m_{1_p}(p_1^{cc})} \qquad 5.4.2$$

$$\tau_2^{cc} = \frac{(1-\theta_1-\theta_2)}{(a+\theta_1+\theta_2)} . \frac{x_2(p_2^{nc})}{-m_{2p}(p_2^{nc})} \qquad 5.4.3$$

So, in this regime the optimum trade policy for the government is to apply import taxes and export subsidies.

Equilibrium Political Contribution

In this sub-game a set of relationships is required to derive the equilibrium contributions from each lobby to the government (see condition 5.1.4), as listed below:

$$p^{nc} = \arg\max_p \; C_2^{cc}(p) + a.\overline{\Omega}(p) = \arg\max_p \overline{\Omega}_2(p) - B_2^{cc} + a.\overline{\Omega}(p) \qquad 5.4.4$$

$$p^{cn} = \arg\max_p \; C_1^{cc}(p) + a.\overline{\Omega}(p) = \arg\max_p \overline{\Omega}_1(p) - B_1^{cc} + a.\overline{\Omega}(p) \qquad 5.4.5$$

$$C_1^{cc}(p^{cc}) + C_2^{cc}(p^{cc}) + a.\overline{\Omega}(p^{cc}) = C_2^{cc}(p^{nc}) + a.\overline{\Omega}(p^{nc}) \qquad 5.4.6$$

$$C_1^{cc}(p^{cc}) + C_2^{cc}(p^{cc}) + a.\overline{\Omega}(p^{cc}) = C_1^{cc}(p^{cn}) + a.\overline{\Omega}(p^{cn}) \qquad 5.4.7$$

By solving the previous system is possible to show that the two contribution schedules must satisfy the following relationships:

$$C_1^{cc}(p^{cc}) = a.(\overline{\Omega}(p^{nc}) - \overline{\Omega}(p^{cc})) + (\overline{\Omega}_2(p^{nc}) - \overline{\Omega}_2(p^{cc})) \qquad 5.4.8$$

$$C_2^{cc}(p^{cc}) = a.(\overline{\Omega}(p^{cn}) - \overline{\Omega}(p^{cc})) + (\overline{\Omega}_1(p^{cn}) - \overline{\Omega}_1(p^{cc})) \qquad 5.4.9$$

Proposition 3: In this subgame ($\mathcal{G}_{cc}$), with the two lobby groups active, contribution will be a dominant strategy for the exports lobby, i.e. $\Omega_1(p^{cc}) \rangle \Omega_1(p^{nc})$, for any value of the parameters of the model.

Proof:

It will be rationale for the exports lobby to contribute if:

$$\overline{\Omega}_1(p^{cc}) - C_1^{cc}(p^{cc}) \rangle \Omega_1(p^{nc}) \qquad 5.4.10$$

Condition 5.4.10 is satisfied by definition of equilibrium prices (see 5.4.1). Substituting 5.4.8 in 5.2.10 and rearranging terms we obtain the previous condition:

$$\overline{\Omega}_1(p^{cc}) - (a.(\overline{\Omega}(p^{nc}) - \overline{\Omega}(p^{cc})) + (\overline{\Omega}_2(p^{nc}) - \overline{\Omega}_2(p^{cc}))) \rangle \Omega_1(p^{nc}) \Leftrightarrow$$
$$\overline{\Omega}_1(p^{cc}) + \overline{\Omega}_2(p^{cc}) + a.\overline{\Omega}(p^{cc}) \rangle a.\overline{\Omega}(p^{nc}) + \overline{\Omega}_2(p^{nc}) + \overline{\Omega}_1(p^{nc})$$

5.4.11

see that:

$$\Omega_1(p^{nc}) = \overline{\Omega}_1(p^{nc}) - C_1^{cc}(p^{nc}) = \overline{\Omega}_1(p^{nc}) \ \ as \ \ C_1^{cc}(p^{nc}) = 0.$$

So the proof is complete.

Proposition 4: In this subgame ($\mathcal{Gcc}$), with the two lobby groups active, contribution will be a dominant strategy for imports substitution lobby, i.e. $\Omega_2(p^{cc}) \rangle \Omega_2(p^{cn})$, for any value of the parameters of the model.

Proof:

It is similar to the one developed to prove proposition 3.

6. **Equilibrium in the lobby game and distributive effects**

In this section, the aim is to study the global equilibrium of the game taking into account the previous results in all the regimes. The four previous propositions can be summarised into the following one:

Proposition 5: **In** the lobby game ($\mathcal{GL}$) the sub-game perfect equilibrium is with the two lobby groups active (case d. 4.2 equilibrium typology).

Proof:

We have already shown (proposition 1 to 4) that the followings statements are true,

i. $\Omega_1^{cc} \rangle \Omega_1^{nc}$ Proposition 3

ii. $\Omega_1^{cn} \rangle \Omega_1^{nn}$ Proposition 1

iii. $\Omega_2^{cn} \langle \Omega_2^{cc}$ Proposition 4

iv. $\Omega_2^{nn} \langle \Omega_2^{nc}$ Proposition 2

So the proof is complete.

Proposition 6: The government has an incentive to play the game with more than one lobby because it is possible to show that $G^{cc} \geq G^{nn}$ for any value of the parameters.

Proof:

By definition of the equilibrium (see condition b., 5.1.2) we know that:

$$C_1^{cc}(p^{cc}) + C_2^{cc}(p^{cc}) + a.\overline{\Omega}(p^{cc}) \geq C_1^{cc}(p^{nn}) + C_2^{cc}(p^{nn}) + a.\overline{\Omega}(p^{nn}) \qquad 6.1$$

By definition of the contribution schedule (see 5.1.5)**:**

$$C_i^{cc}(p) \geq 0 \qquad 6.2$$

By definition of the government's objective function in the non distortion case $G^{nn} = a.\overline{\Omega}(p^{nn})$**, so** we complete the proof.

Proposition 7: The payoffs' order for the lobby groups is:

$$\begin{aligned} &\Omega_1^{cn} \geq \Omega_1^{cc} \rangle \Omega_1^{nc} \\ &\Omega_1^{cn} \rangle \Omega_1^{nn} \rangle \Omega_1^{nc} \end{aligned} \qquad 6.3$$

$$\begin{aligned} &\Omega_2^{nc} \geq \Omega_2^{cc} \rangle \Omega_2^{cn} \\ &\Omega_2^{nc} \rangle \Omega_2^{nn} \rangle \Omega_2^{cn} \end{aligned} \qquad 6.4$$

Where: $\Omega_i^{nn} = \Omega_i(p^{nn})$.

Proof:

In the first line of 6.4 we must prove only the first part of the inequality (the second one is proposition 4). To do so, it is enough to use 5.3.5, 5.4.6 and proposition 6, as it is shown next:

$$\begin{aligned} &C_2^{cc}(p^{nc}) + a.\overline{\Omega}(p^{nc}) \geq C_2^{nc}(p^{nc}) + a.\overline{\Omega}(p^{nc}) \\ &C_2^{cc}(p^{nc}) \geq C_2^{nc}(p^{nc}) \textit{ then} \\ &\overline{\Omega}(p^{nc}) - \Omega_2^{cc} \geq \overline{\Omega}(p^{nc}) - \Omega_2^{nc} \textit{ and so} \\ &\Omega_2^{cc} \leq \Omega_2^{nc} \end{aligned} \qquad 6.5$$

The same argument can be used to prove the first inequality of 6.3 ($\Omega_1^{cc} \leq \Omega_1^{cn}$). To prove the second line of 6.3 we will proceed by contradiction. In this case it is necessary only to prove the second part of the inequality (the first one is proposition 3). Recalling that

in a world without political distortions free trade is optimum, and using 5.3.7 ($\overline{\Omega}_2(p^{nc}) \rangle \Omega_2(p^{nn})$), it can be shown that:

$$\overline{\Omega}_1(p^{nn}) + \overline{\Omega}_{-12}(p^{nn}) \rangle \overline{\Omega}_1(p^{nc}) + \overline{\Omega}_{-12}(p^{nc}) \qquad 6.6$$

Assuming that $\Omega_1^{nn} \leq \Omega_1^{nc}$, it is possible to show that:

$$\Omega_{-12}^{nn} \leq \Omega_{-12}^{nc} \qquad 6.7$$

But 6.7 contradicts the true result shown in 6.6, that is the statement that free trade is optimum in a world without political distortions, so by absurd we prove that $\Omega_1^{nn} \rangle \Omega_1^{nc}$. Using the same procedure it can be shown that $\Omega_2^{nn} \rangle \Omega_2^{cn}$.

Corollary: The gain that the government obtains when there are two competitive lobby groups is identical to the loss that each lobby has due to the change in the numbers of active groups (from one to two).

Proof:

Using the definition of the government's objective function in the different regimes we know that:

$$G^{cc} - G^{nn} = G^{-1} - G^{nc} = G^{-2} - G^{cn} \qquad 6.8$$

And also:

$$G^{cc} = G^{nn} + (\Omega_2^{nc} - \Omega_2^{cc}) = G^{nn} + (\Omega_1^{cn} - \Omega_1^{cc}) \qquad 6.9$$

So we complete the proof.

Proposition 8: The non-owner outcome is the following:

i. $\Omega_{-12}^{nn} \leq \Omega_{-12}^{cn}$ *or* $\Omega_{-12}^{nn} \rangle \Omega_{-12}^{cn}$ 6.10

ii. $\Omega_{-12}^{nn} \leq \Omega_{-12}^{nc}$ *or* $\Omega_{-12}^{nn} \rangle \Omega_{-12}^{nc}$ 6.11

iii. $\Omega_{-12}^{nn} \rangle \Omega_{-12}^{cc}$ 6.12

Proof:

Using the previous result that $\Omega^{nn} \geq \Omega^{cn}$ *and* $\Omega^{nn} \geq \Omega^{nc}$, and proposition 7 (6.3 and 6.4) it is easy to show that the non owners consumers could be better off or worse off comparing to the non distorting situation and the regimes where only one lobby group is active (6.10

and 6.11), depending on the particular values of the parameters of the model (specially a, θ_1, θ_2).

The third part (6.12) of the proposition is very important: for any value of the parameters the non owners consumers will be worse off in the regime with the two lobby groups active compared with the non distortion situation. This can be proved by showing that:

$$\overline{\Omega}_1(p^{nn}) + \overline{\Omega}_2(p^{nn}) + \overline{\Omega}_{-12}(p^{nn}) \geq \overline{\Omega}_1(p^{cc}) + \overline{\Omega}_2(p^{cc}) + \overline{\Omega}_{-12}(p^{cc}) \text{ then}$$
$$cs^{nn} - (cs^{cc} + \tau^{cc}) \geq \rangle (\pi_1^{cc} - \pi_1^{nn}) + (\pi_2^{cc} - \pi_2^{nn}) \text{ but as } \pi_1^{cc} \geq \pi_1^{nn} \text{ and } \pi_2^{cc} \geq \pi_2^{nn} \text{ then}$$
$$cs^{nn} - (cs^{cc} + \tau^{cc}) \geq 0 \Rightarrow \overline{\Omega}_{-12}(p^{nn}) \geq \overline{\Omega}_{-12}(p^{cc})$$

So the proof is complete.

Finally an important issue related with the comparison between the lobbies' welfare in the non distortion regime and when the two lobbies are active is analysed. The two lobbies could be in a prisoner's dilemma in this contribution game where the net welfare they achieve in the $\mathcal{Gcc}$ subgame will be less than the one they would obtain in the non contribution outcome. This can be formalised in the following proposition.

Proposition 9:If the demand functions are linear and the production functions are Cobb-Douglas, then the following set:

$$PDS = \left\{ \begin{array}{l} pds = (a, \theta_1, \theta_2) \in R_+^3 : a \geq 0, 0 \leq \theta_1 \leq 1, 0 \leq \theta_2 \leq 1, \\ \overline{\Omega}_1^{cc} - C_1^{cc}(p^{cc}) \leq \Omega_1^{nn}, \ \overline{\Omega}_2^{cc} - C_2^{cc}(p^{cc}) \leq \Omega_2^{nn} \end{array} \right\}$$

Is not empty.

Proof:

This result is not general, it depends on the functional forms (demand and supply) and on the values of the parameters of the model, in particular a, θ_1 *and* θ_2. By means of a numerical example (see anex) we found that the conditions that define the set are fulfilled by a range of values of the parameters chosen. So the proof is complete.

7. **Greater dimensional issues: N specific factor model**.

In this section, propositions of section 5.2 to 5.3 are generalised in a more general context with N specific factors and therefore with a potential number of lobby groups greater than two. Applying the b. equilibrium property (see section 5.1) and considering that the players

use true strategies in order to establish their contribution schemes, the equilibrium price will be:

$$p^{a_i\, a_{-i}} \in \arg\max_{p} \sum_{j \in L^{a_i\, a_{-i}}} \overline{\Omega}_j(p) + a.\overline{\Omega}(p) \qquad 7.1$$

where: $a_i = \{c, n\}$ - is the action (contributing or not contributing) of the specific factor i owners in the first stage of the game; i=1,...,N- is the specific factor index; j=1,...L- is the lobby groups index (with $L \subseteq N$).

It can be shown that this equilibrium implements an efficient action for the L+1 strategic players of this game (lobbies plus government) [2].

In this more general framework it is interesting to analyse which will be the sub-set of sectors ($L \subseteq N$) that have an incentive to participate in the political contribution game. The next proposition establishes the general result derived.

Proposition 10: contributing is a dominant strategy for sector i for any feasible action of the rest of the sectors that could potentially be organised in lobby groups.

$$\overline{\Omega}_i(p^{c\, a_{-i}}) - C_i^{c\, a_{-i}}(p^{c\, a_{-i}}) \geq \Omega_i(p^{n\, a_{-i}}) \qquad 7.2$$

Proof:

Condition d. of the equilibrium is the government participation restriction (see section 5.1) and it is known that:

$$C_i^{ca_{-i}}(p^{ca_{-i}}) + \sum_{j \neq i} C_j^{ca_{-i}}(p^{ca_{-i}}) + a.\overline{\Omega}(p^{ca_{-i}}) = \sum_{j \neq i} C_j^{ca_{-i}}(p^{na_{-i}}) + a.\overline{\Omega}(p^{na_{-i}}) \qquad 7.3$$

Therefore, lobby's j contribution scheme will be the following:

$$C_i^{ca_{-i}}(p^{ca_{-i}}) = a.\left\{\overline{\Omega}(p^{na_{-i}}) - \overline{\Omega}(p^{ca_{-i}})\right\} + \sum_{j \neq i}\left\{C_j^{ca_{-i}}(p^{na_{-i}}) - C_j^{ca_{-i}}(p^{ca_{-i}})\right\} \qquad 7.4$$

---

[2] In fact we have that:

$$p^{a_i\, a_{-i}} \in \arg\max_{p} \sum_{j \in L^{a_i\, a_{-i}}} (\overline{\Omega}_j(p) - C_j(p) + a.\overline{\Omega}(p)) + \sum_{j \in L^{a_i\, a_{-i}}} C_j(p) \Leftrightarrow$$

$$p^{a_i\, a_{-i}} \in \arg\max_{p} \sum_{j \in L^{a_i\, a_{-i}}} \Omega_j + G$$

As the contribution schemes are truthful, then:

$$C_i^{\alpha_{-i}}(p^{\alpha_{-i}}) = a.\left\{\bar{\Omega}_i(p^{n_{-i}}) - \bar{\Omega}_i(p^{\alpha_{-i}})\right\} + \sum_{j\neq i}\left\{\bar{\Omega}_j(p^{n_{-i}}) - \bar{\Omega}_j(p^{\alpha_{-i}})\right\} \qquad 7.5$$

Including equation 7.5 in 7.2, we can conclude that:

$$\bar{\Omega}_i(p^{\alpha_{-i}}) + \sum_{j\neq i}\bar{\Omega}_j(p^{\alpha_{-i}}) + a.\bar{\Omega}_i(p^{\alpha_{-i}}) \geq \bar{\Omega}_i(p^{n_{-i}}) + \sum_{j\neq i}\bar{\Omega}_j(p^{n_{-i}}) + a.\bar{\Omega}_i(p^{n_{-i}}) \qquad 7.6$$

This last result is true by definition of equilibrium prices (see equation 7.1). So, as contribution is a dominant strategy for lobby i (for all i that belongs to N) then a perfect equilibrium in sub- games, in this new problem of N specific factors, implies all the potential lobby groups playing the contribution game.

Proposition 11: $\left\{p^C, \left\{C_i^C\right\}_{i\in N}\right\}, C = (c,\ldots,c)$ is a sub-game perfect equilibrium, with C being a vector of equilibrium actions in the first stage of the game, of 1xN dimension (L=N), thus all the lobbies will be active.

Proof:

Use proposition 10.

In this new setting it is important to see what happens with the trade policy equilibrium. From the first order condition of 7.1 and proposition 11 it is possible to show that:

$$\tau_i^C = \frac{(1-\theta^L)}{(a+\theta^L)} \cdot \frac{x_i(p_i^C)}{-m_{ip}(p_i^C)}, \text{ with } \theta^L = \sum_{i\in L}\theta_i. \qquad 7.7$$

When the number of specific factors increases (decreases), taking as given the degree of concentration, the distorting consequences of the political game will be reduced (increased). Also, if the degree of concentration diminishes (increases), taking as given the number of specific factors, distortions will be reduced (increased). It is natural to think of a positive interaction effect between the increase in the number of specific factors (number of lobby groups in equilibrium) and the degree of ownership concentration of each one. The political contributions in equilibrium will be obtained with the following set of equations:

$$C_i^{\alpha}(p^{\alpha}) = a.\left\{\bar{\Omega}_i(p^{n}) - \bar{\Omega}_i(p^{\alpha})\right\} + \sum_{j\neq i}\left\{\bar{\Omega}_j^{\alpha}(p^{n}) - \bar{\Omega}_j^{\alpha}(p^{\alpha})\right\}, \forall i \in L \qquad 7.8$$

The distributive analysis in this more general problem with L = < n lobbies groups could be similar to the one just presented for the simple case in which L= 2. From this, it is possible to conclude that being organised in a strategic interaction environment is a dominant strategy for the pressure groups (without organisation costs or when they are sufficiently low). This means that being organised and defending a particular interest is better than not being organised, given that the others are not organised (or only some of them are), since it is possible to obtain an advantage in the political relationship with the government. On the other hand, since the other antagonic groups (all or some) are organised in lobbies, it is possible to reduce the damage of being affected by the distortions created by their influence on the government's actions. The application of this logic implies that many times, in very corporative societies, with multiplicity of specific interests, typically all finish in a worst situation than if they were not organised, arriving to prisoner's dilemma situation if only the lobby's welfare is considered.

8. **Conclusions**

The basic goal of this chapter is to develop an endogenous trade model in the Grossman and Helpman (1994) tradition that could endogenise the number of lobby groups in the economy. An incumbent government sets the trade policy and the owners of specific factors make monetary contributions to influence on it. The objective function of the government assigns different weights to the specific factors owners' contribution and the consumers' aggregate welfare. Consumers' preferences are quasilinear. This chapter endogenises the lobbies that will be active in the political contribution game, in a simple small economy with one export sector that uses a certain specific factor and one imports substitution sector that uses other specific factor. The structure of the economy implies that the price of the mobile factor is given, and remains unchanged by the trade policy. The game has three stages. In the first stage, the consumer that owns a specific factor (in a decentralised way) decides whether to organise or not in pressure groups. In the second one, the lobbies (organised groups of consumers) select the level of contributions (income transfers) they are willing to make to influence on the government's actions. Finally, in the third stage of the game, the government establishes the trade policy. By hypothesis the organisation in a pressure group of the non owner is not considered.

A typology of the five possible equilibrium outcomes is presented: no organisation of the owners and thus free trade equilibrium; only one lobby group active (exporters or imports substitution sector); the two lobby groups active; not equilibrium in the lobby game. Welfare results, taking as given the active lobbies, are computed when only two specific factors exist. Comparisons between them are made (Proposition 1 to 4), and it is concluded that contribution is a dominant strategy in the first stage of the game. The sub-game perfect equilibrium implies the two lobby groups being active. Distributive issues are considered for all the actors in the economy (strategic and not strategic players). The best outcome for a lobby is when it contributes and the other does not, the worst is when it does not contribute and the other does. The regime where both follow the same contribution strategy is in between them. In the case of the government it has always an incentive to play the game. The non owners could gain or loose when only one lobby is active, but they will

be unambiguously worse when the two are active. Finally, in the regime with the two lobby groups active, it is shown that both are worse off compared to the situation where they do not contribute.

Summarising, this chapter highlights two main results. The first one is that contribution is a dominant strategy for each lobby group, thus the sub-game perfect equilibrium implies all the lobby groups being active (L=N). The second one is related with the welfare evaluation of this equilibrium. It is well known in the literature that this equilibrium is efficient (in a Pareto sense) but it is also important to analyse what happens when only the lobby welfare is considered. The conclusion is that being organised and defending a particular interest is better than not being organised, given that the others are not organised (or only some of them are), since it is possible to obtain an advantage in the political relationship with the government. On the other hand, since the other antagonic groups (one or some) are organised in lobbies, it is possible to reduce the damage of being affected by the distortions created by their influence on the government's actions. An implication of this result is that many times in societies with a multiplicity of specific interests, which are organised coporately, typically all finish in a worst situation than if they were not organised, arriving to a prisoner's dilemma outcome if only the lobby's welfare is considered.

Bibliography

Avinash Dixit, Gene Grossman and Elhanan Helpman, 1997: "Common Agency and Coordination General Theory and Application to tax policy", Journal of Political Economy, September.

Douglas Bernheim and Michael D. Whinston (1986,a): Menu auctions, resources allocation and economic influence , The quarterly journal of economics, vol. C1, Issue 1.

Douglas Bernheim and Michael D. Whinston (1986,b): Common agency , Econometrica, Vol. 54, No 4 (July), 923-942.

S. Lael Brainard and Thierry Verdier, 1993: "The political economy of declining industries: senescent industry collapse revisted", NBER Working Paper No 4606, December 1993.

Gene Grossman, Elhanan Helpman, 1992: "Protection for sale", NBER Working Paper #4149, August 1992.

Arye Hillman, 1982: "Declining industries and political support protectionist motives", American Economic Review, December 1982, 72, 1180-7.

Pinelopi Koujianou Goldberg and Giovanni Maggi: "Protection for Sale:an empirical investigation", NBER Working Paper No 5492, Febraury 1997.

Wolfgang Mayer, 1984: "Endogenous Tariff Formation", American Economic Review, 74, 970-85.

Dani Rodrik, 1994: "What does the political Economy Literature on Trade Policy (not) tell us that we ought to know?", NBER, Working paper No 4870.

Daniel Trefler, 1993: "Trade liberalisation and the theory of endogenous protection: an econometric study of U.S. Import Policy", Journal of Political Economy, vol. 101, no 1.

Gabriel Sanchez, 1996: "Lobbying, innovation and protectionist cycles", Instituto Torcuato di Tella, Seminario 18.

Robert W. Staiger and Guido Tabellini, 1987: "Discretionary Trade Policy and Excessive Protection", The American Economic Review, Vol. 77 No 5.

Matheuw Tharakan, 1995: "Political economy and contingent protection", The Economic Journal, 105 (Novemeber), 1550-1564.