

Endogenous trade policy and political contributions in a standard-trade model (HOS trade model)

Marcel Vaillant*

Marzo, 1999

(*) Universidad de la República, Departamento de Economía (Facultad de Ciencias Sociales). El presente documento constituye una de los capítulos del trabajo de tesis de Doctorado de Marcel Vaillant en la Universitaire St Ignatius Antwerpen Belgium (UFSIA), cuyo tutor es el Profesor Mathew Tharakan.

Resumen:

El artículo desarrolla un modelo de economía política sobre la política comercial en la línea de los conocidos trabajos de Grossman and Helpman (1994). En este caso la estructura de la economía es estándar (modelo neoclásico de comercio en vez del modelo de factores específicos usado en el artículo original) y más general (las preferencias no son cuasi lineales). En este nuevo ambiente un equilibrio del juego es derivado. Dos proposiciones resumen los resultados relacionados al nivel de la política comercial establecido por los hacedores de política y las contribuciones políticas hechas por los grupos de consumidores activos (lobbys). Estos nuevos resultados generales son analizados en particular en una economía pequeña abundante en un factor diferente al trabajo, como por ejemplo pueden ser los recursos naturales. Tres casos son estudiados para presentar los resultados de las dos proposiciones generales de acuerdo con los distintos grupos de lobby activos en el juego de las contribuciones: :sindicato de trabajadores que permiten las contribuciones de ingreso de los trabajadores para influenciar la política comercial; asociaciones de propietarios que permiten las contribuciones de los otros consumidores en el extremo superior de la distribución del ingreso; contribuciones de los dos tipos de consumidores trabajadores y propietarios.

Abstract:

The paper developed a political economy model about endogenous trade policy along the lines of the well known contribution of Grossman and Helpman (1994). In our case the structure of the economy is standard (neoclassical trade model instead of the specific factor trade model of the original paper) and more general (preferences are not quasilinear). In this new environment an equilibrium of the game is derived. Two basic proposition resume the results related to the level of the trade policy instruments set by the policy makers and the political contribution made by the active group of consumers (lobbies). This new general result is analysed in a particular small economy abundant in a factor different from labor, e.g. natural resources. Three cases are studied to present the results of the two general propositions according with the different active lobby in the contribution game :labor unions that allow the income contribution of workers to influence the trade policy; factor owners associations that allow the income contribution of the others consumers in the other extreme of the income distribution; contributions of both types of consumers workers and owners.

JEL: F13, D72

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1 Introduction

The classic opposition between trade liberalisation and protectionism is concentrated in the efficiency effect (statics and dynamics). The main conclusion for a small country (terms of trade given) is the positive evaluation of trade liberalisation oriented policies. Although, economic reality shows that protectionism is difficult to reduce everywhere (also in small countries) and if a government is successful in a trade liberalisation process then he must do too much effort to sustain trade reform in time. This phenomena, suggested that there are deep reasons in the structure of economy and in the way economy policies are set out that could explain the protectionism bias. One of them is the dramatic effect trade policy has on income distribution. Usually trade policy model describes and measures the aggregated gain from trade but they do not give too much attention to the way different groups are affected by the trade liberalisation process. In spite of the fact that trade models recognise in his own theoretical structure this kind of effects. In particular, this is typical the case of the standard neoclassical model with the link between production factors returns and commodity prices established in the well known Stolper Samuelson theorem¹.

The critical discussion of recent trends in the international economics linked with the increment in globalisation process (more trade of goods and services as a percentage of GDP, increment in factor movements) have as a central topic this distributional effects of the trade liberalisation process (see for example Leamer, 1995 and Rodrik, 1997).

In a political economy perspective that see economy policies like an equilibrium outcome of an economy-political system this is a relevant phenomena to explain. How are the mechanism through what the economies particular interests influence trade policies decisions ? and then, which is the endogenous trade policy that emerges as an equilibrium of the game (in the sense that no body have an incentive to deviate of this equilibrium outcome) ?

For the first question Grossman and Helpman (1994) model was selected. The general flavour of the model was similar to the one developed in Vaillant (1998). The common agency structure is a good framework to specificate the government action like an agent with the simultaneously influence of several

¹The basic statement of this theorem is the following: "if there are constant return to scale and if both goods continue to be produced, a relative increase in the price of a commodity will increase the return to the factor used intensively in that industry and reduce the real return to the other factor" (Markusen, Melvin et al, 1995).

principals (interest group) that demand a specific policy action in his own benefit. There is evidence in the literature that trade policy instruments are defined by policy makers in a very similar environment.

The second question is the one this paper is devoted to answer and it is developed in the next sections.

2 Objectives and organisation of the paper

The present chapter has two basic objectives:

- the first one focuses on applying the political economy model of Grossman and Helpman (1994) to a more traditional trade model (the neo-classical approach) with a generalization in the specification of preferences different from the quasilinear case usual in this literature.
- the second one is to obtain a new solution to compare with the results from the specific trade model case developed in chapter 2. This will increase the theoretical perspective to analyse particular cases of trade policy and trade reforms. This comparison will be done in the next chapter.

The innovation in the specification of preferences was suggested and developed by Dixit, Grossman and Helpman (1997) in a more general framework. The endogenous trade policy in HOS model was studied in the classical paper of Mayer (1984). The HOS model has a rich structure to develop political economy models related with trade policy instruments. Mayer specified a voting model of endogenous trade policy with heterogeneity in the factor endowment of each consumer. Then consumers will have different preferences about the optimal trade policy. The political equilibrium in a voting model will depend on the median voter's preference (median voter theorem).

The model presented in this chapter is a sort of combination of Grossman and Helpman's trade policy political economy model (common agency framework) with the Mayer approach to study the distribution implications of the HOS trade model and the voter preferences in this context.

The chapter is organised in five sections. In section 2 the structure of the economy is presented. A standard neoclassical trade model (instead of the specific factor trade model of the original paper) is developed with a more general consumer utility function in which preferences are not quasilinear.

In this new environment an equilibrium of the game is derived (section 3). Two basic propositions summarize the results. They are related with the level of trade policy (tariff instruments) set by the policy makers and the political contribution made by the active group of consumers (lobbies). In section 4, this new general result is analysed in a particular small economy abundant in a factor different from labor, e.g. natural resources. In this section, three lobby regime (different groups of consumers active in the contribution game) are developed to present the results: labor unions that allow the income contribution of workers to influence the trade policy; factor owners associations that allow the income contribution of the consumers in the other extreme of the income distribution; contributions of both types of consumers workers and owners.

3 The structure of the Economy

The general environment of the economy is that of a standard small economy that produces only two goods with two production factors mobile across sectors and inside the domestic economy. The economy pattern of production and trade specialization is explained as in the Hecksher-Ohlin-Samuelson (HOS) model. Comparative advantage (CA) comes from the relative abundance in factors of production related with respect to the rest of the world.

The consumers preferences are specified in the following indirect utility function:

$$\Omega(p, y^i) = \left\{ \max_{d^i} u(d^i) : p \cdot d^i \leq y^i \right\} \quad (1)$$

where: $i = 1 \dots I$ - consumers index; u - standard utility function with traditional properties (increasing function in his arguments ($u_{d_s} > 0 \quad s = 1, 2$) with decreasing marginal utility in each one ($u_{d_s d_s} < 0 \quad s = 1, 2$) and homoteticity; $d^i = \begin{bmatrix} d_1 \\ d_2 \end{bmatrix}$ - column vector of consumption; y^i - income of consumer i ; $p = [p_1 \quad p_2]$ - row vector of domestic consumer price.

The expenditure function is:

$$e(p, u^i) = \left\{ \min_{d^i} p \cdot d^i : u(d^i) \leq u^i \right\} \quad (2)$$

The income of each consumer i is:

$$y^i = w + rk^i + \tau - c^i(p) = \bar{y}^i - c^i(p) \quad (3)$$

Where: w - labor price; r -capital price; k^i -capital endowment of consumer i ; τ -lump sum transfer ; c^i - political income contribution to the government; \bar{y}^i -gross income from contribution. As the previous equation shows it is assumed that each consumer is endowed with the same amount of units of labor (for simplicity without loss of generality $L^i = 1 \forall i$).

Consumers are heterogeneous in their factor endowments so that the structure and the level of income of each consumer may be different. In particular it will be relevant the capital labor relation that each consumer has (k^i).

Definition 1 *The set of consumers is classified in three types ($t_y = w m o$) according to their factor endowment relation: worker consumers ($k^{i_w} < k$); medium consumers ($k^{i_m} = k$); capitalistic consumers ($k^{i_o} > k$). For simplicity workers and capitalistic consumers will be assumed to be homogenous groups ($k^{i_w} = k^w$ and $k^{i_o} = k^o \forall i_w \in \mathcal{I}$ and $i_o \in \mathcal{I}$) and the medium consumer is homogenous by definition of the type.*

By assumption workers have a lower level of income than owners, so the factor endowment relation has a consequence in terms of the quantity of poor and rich individuals in the economy. This will have consequences in trade policy through the type of government's preferences on the distribution of income dimension.

Definition 2 *Two subsets ($i = h z$) of consumers are also defined: the active consumers which make an income contribution to influence the economic policy of the government ($c^h > 0 \ h \in \mathcal{L} \ h = 1 \dots H$); and the passive consumers that do not have a lobby activity ($c^z = 0 \ z \notin \mathcal{L} \ z = 1 \dots Z$).*

Some additional restrictions about the active consumers set will be developed in next section.

The aggregated income function of the economy is:

$$r(p, v) = \left\{ \max_x px : \Phi(x, v) = 0 \right\} \quad (4)$$

Where: $p' = \begin{bmatrix} p_1 \\ p_2 \end{bmatrix} = \begin{bmatrix} 1 \\ p^*(1+t) \end{bmatrix}$ - domestic producer price; $p^* = \frac{p_2^*}{p_1^*}$ - rest of the world relative price are given (small economy assumption); Φ - is a

traditional production frontier with the assumption of production functions in each sector with substitution between capital and labor and free mobility of both factors between sectors and constant returns to scale; $x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$ - good vector produced in the economy; $v = \begin{bmatrix} v_1 \\ v_2 \end{bmatrix}$ - factor endowment vector of the economy.

Each production function is of the form $x_s = F^s(L_s, K_s)$ with F^s homogeneous of degree one and $\sigma = 1/2$.

The domestic prices are affected by the trade policy, in this case (with only two goods) it is exhaustively characterised by the import tariff t (Lerner symmetry).

The supply functions come from the revenue function (using the envelope theorem):

$$r_p = x(p, v) = \begin{bmatrix} x_1(p, v) \\ x_2(p, v) \end{bmatrix} \quad (5)$$

Applying Roy's identity we have the marshallian demand functions in the following equation:

$$(p, y^i) = \frac{-\Omega_p^i}{\Omega_{y^i}^i} = \begin{bmatrix} x_1(p, y^i) \\ x_2(p, y^i) \end{bmatrix} \quad (6)$$

From the expenditure function we obtain the compensated demand function (Hicksian):

$$h_p^i = (p, u^i) = \begin{bmatrix} h_1(p, u^i) \\ h_2(p, u^i) \end{bmatrix}$$

The following relation between the two demand functions holds:

$$\frac{p u^i}{u^i} = \frac{\frac{\partial d_1(p, u^i)}{\partial u}}{\frac{\partial d_2(p, u^i)}{\partial u}} \cdot \Omega_{y^i}^i = \frac{\frac{\partial d_1(p, u^i)}{\partial y^i}}{\frac{\partial d_2(p, u^i)}{\partial y^i}}$$

where: $e_{u^i} = \frac{1}{\Omega_{y^i}^i}$

The trade functions are:

$$m = \sum_i h^i - x = \begin{bmatrix} m_1 \\ m_2 \end{bmatrix} \quad (7)$$

The global income collected by the government using the tariff (tariff income) is given by the next equation:

$$T = p^*tm_2 \quad (8)$$

The lump sum transfer produced by the income tariff will be:

$$\tau = \frac{T}{L}$$

The government objective function (GOF) is a mix of a benevolent objective (the government takes care about the well being of each of the consumers) and a particular political objective (income contributions).

$$G = g(\Omega, C)$$

$$\text{where: } \Omega = \begin{pmatrix} \Omega^1 \\ \vdots \\ \Omega^I \end{pmatrix}; C = \sum_h c^h \text{ with } g_{c^h} > 0 \text{ and } g_{\Omega^i} > 0$$

In this chapter this general specification will adopt this particular functional form:

$$g = (1 - \alpha) \sum_i \Omega^i + \alpha C \quad (9)$$

where the weight α is between zero and one.

The income and expenditure of the economy will be in equilibrium, so the following condition holds:

$$Y = Lw + rK + T = x_1 + p_2x_2 + T = p_1x_1 + p_2x_2$$

Contributions from the lobby group to the government are transfers that do not affect income besides the way that equilibrium trade policy does.

4 The Contribution Game

4.1 The structure of the game

The Game will have two stages. In the first one, active consumers must decide the contribution schemes that they are going to give to the Government to influence his policy decisions. In the second stage the Government establishes the trade policy, taking into account its objective functions that combines the benevolent objective (aggregated welfare) with the particular one (income contribution of the active consumers).

In this chapter the set of active consumers are assumed exogenous (H is given). It is also assumed that to be able to influence the government, it is necessary to be a member of a subset of consumers with the same incentives (lobby group). The institutional restrictions that allow to justify this assumption are not modeled. So in our model, if a certain type of consumer (for example a worker) is active (he/she participates in the contribution game) all the consumers of the same type will be active also. Contributions are made by the lobby (the aggregated active consumers of certain type) and it is identical for all members of the lobby. The restriction that it is imposed is that:

$$c^{hty} = c^{ty} \quad \forall h \in ty.$$

4.2 Equilibrium

An equilibrium of the game must satisfy a set of conditions (see chapter 2). First, each principal (consumer with some particular endowment of production factor) must be maximising his/her objective function:

$$\{t^0, c_h^0(t)\} \in \arg \max_{t,c} \Omega(p(t), y^h(c, p(t))) \quad (10)$$

such that the agent (government) incentive constraint (IC) and the participation constraint (PC) are satisfied.

- IC

$$t \in \arg \max_t g(\Omega(t), C^0(t))$$

where: $C^0(t) = \left\{ \left\{ c_j^0 \right\}_{j \neq h_{ty}}, c \right\}$ for some $c^h \in C^h$

- PC

$$g(t^{-h_{ty}} \{c_j^0(t^{-h_{ty}})\}_{j \neq h_{ty}} | 0) \leq g(t \{c_j^0(t)\}_{j \neq h_{ty}} | c) \quad (11)$$

where: $t^{-h_{ty}} \in \arg \max_t g(\Omega(t) \{C_j^0(t)\}_{j \neq h_{ty}} | 0) \quad \forall h_{ty} \in \mathcal{L}$.

This game has multiple subgame perfect Nash Equilibrium. In this case it is applied the same refinement of equilibrium that Berheim and Whinston (1986) suggested in their article: to select equilibria that implement Pareto efficient actions. The concept of efficiency is restricted to the available set of actions. We use the more general version of the problem developed by Dixit, Helpman and Grossman (1997) where preferences are not quasilinear as in the present chapter.

4.2.1 Trade Policy Truthful Equilibrium

The first order condition (FOC) of the objective function of each active consumer gives this result:

$$\frac{\partial \Omega^h}{\partial t} = \Omega_t^h + \Omega_y^h (\bar{y}_t^h - (c_t^h)^0) = 0 \quad (12)$$

Using Roy's identity, $\Omega_p^h = -\Omega_y^h \frac{h}{2}$ then:

$$(c_t^h)^0 = \bar{y}_t^h - p^* \frac{h}{2}$$

Contribution in the equilibrium must be locally true, so the relation with prices must be the same as the relation that consumers welfare has with prices over the marginal utility of income². Then we select a particular strategy that always fulfils the optimum condition, this is the globally truthful strategy:

$$c(t | \Omega^h) = \max(0, \bar{y}^h(t) - (t | \Omega^h)) \quad (13)$$

The FOC of the incentive constraint is:

$$\frac{\partial g}{\partial t} = \sum_i \frac{\partial \Omega^i}{\partial t} g_{\Omega^i} + \sum_h g_{c^h} (c_t^h)^0 = 0 \quad (14)$$

see that $i = z = h$.

²See Definition 3 and 4 and Proposition 2 and 3 in Dixit, Grossman and Helpman (1997).

Studying the particular GOF (see 3.9) it is possible to derive those two equations:

$$g_{\Omega^z} = (1 - \beta_2)$$

$$g_{c^h} =$$

Definition 3 *The ratio between the marginal utility of contribution to marginal utility of individual i utility in the GOF is defined as:*

$$= \frac{g_{c^h}}{g_{\Omega^z}} = \frac{1}{(1 - \beta_2)} \quad (15)$$

Where it is true that $\beta_2 > 0$ by the assumptions made on the value of β_2 .

Proposition 1 *In the HOS framework with the G \mathcal{E} H political economy model the endogenous trade policy is given by the following expression:*

$$t^0 = \frac{1}{-m_{2t}} \frac{L \cdot D_2 / Y}{\sum_z \Omega_{y^z} + L^{\mathcal{L}}} \quad (16)$$

$$\left(\sum_h c^h + r \left(\sum_z \Omega_{y^z} (k^z - k) + \sum_h (k^h - k) \right) \left(\frac{\hat{r}}{\beta_2} - 1 \right) \right)$$

where: \hat{r} - is the elasticity of factor price r to p ; $\beta_2 = \frac{p_2 \cdot D_2}{Y}$ - is the participation of good 2 in total income; $L^{\mathcal{L}} = \sum_h L^h$.

Proof.

As $\frac{\partial \Omega^h}{\partial t} = 0$ then applying in the FOC incentive constraint(3.15):

$$\frac{\partial g}{\partial t} = \sum_z \frac{\partial \Omega^z}{\partial t} + \sum_h (c_t^h)^0 = 0$$

For the consumers z that are not active in the contribution game, the change in their welfare when tariff changes is the following:

$$\frac{\partial \Omega^z}{\partial t} = \Omega_t^z + \Omega_y^z \bar{y}_t^z = \Omega_y^z (\bar{y}_t^z - p^* \bar{y}_t^z)$$

The change in contribution is:

$$(c_t^h)^0 = \bar{y}_t^h - {}_t(p(t) (\Omega^h)^0) = \bar{y}_t^h - p^* ({}^h_2)^0$$

The change in gross income as tariff change is:

$$\bar{y}_t^i = w_t + r_t k^i + \tau_t \quad (17)$$

where the change in lump sum tariff income as tariff changes is given by

$$\tau_t = \frac{(m_2 + m_{2,t})p^*}{L}.$$

Then it is possible to show that:

$$\begin{aligned} & \sum_z \Omega_{yz} ((w_p + r_p k^z) + (m_2 + tm_{2,t}) - \phi^z D_2) \\ & + \sum_h ((w_p + r_p k^z) + (m_2 + tm_{2,t}) - \phi^h D_2) \\ & = 0 \end{aligned}$$

where: $\phi^i = \frac{y^i}{Y}$.

From the previous equation it is possible to obtain the endogenous trade policy in equilibrium:

$$\begin{aligned} \frac{t^0}{(1+t^0)} &= \frac{1}{p_m} \left(1 + \frac{L}{m_2} (w_p + r_p \frac{\sum_z \Omega_{yz} k^z + \sum_h k^h}{\sum_z \Omega_{yz} + L\mathcal{L}} - \right. \\ & \left. D_2 \frac{\sum_z \Omega_{yz} \phi^z + \sum_h \phi^h}{\sum_z \Omega_{yz} + L\mathcal{L}}) \right) \quad (18) \end{aligned}$$

where: $p_m = \frac{-m_{2,t}p}{m_2}$.

Differentiating the global income in t it is obtained the next expression is obtained:

$$m_2 = D_2 - L(w_p + r_p k) \quad (19)$$

Substituting this result in 3.19 the alternative expression of the tariff is obtained. ■

4.2.2 Political Contribution Truthful Equilibrium

To obtain the political contribution equilibrium, we use the participation constraint to derive the contribution that each of the active consumers must do to influence the government decisions:

$$\begin{aligned}
& (1 - \alpha) \sum_i \Omega^i(t^0) + \sum_{h \neq j_{ty}} c(t^0, \Omega^h(t^0)) + \sum_{j_{ty} \in ty} c^{j_{ty}} \\
= & (1 - \alpha) \sum_i \Omega^i(t^{0-j_{ty}}) + \sum_{h \neq j_{ty}} c(t^{0-j_{ty}}, \Omega^h(t^0)) + 0 \tag{20}
\end{aligned}$$

where: $t^{0-j_{ty}} \in \arg \max_t (1 - \alpha) \sum_z \Omega^z(t) + (1 - \alpha) \sum_{h \neq j_{ty}} \Omega(t, y^h) + \sum_{h \neq j_{ty}} c(t, \Omega^h(t^0))$ is the optimum trade policy for the government when the consumers of type ty are not active.

Proposition 2 *The aggregated political contribution that an active type of consumers (lobby group) will do in equilibrium is given by the following expression:*

$$C^{ty} = \frac{(1 - \alpha)}{L^{ty}} \sum_i (\Omega^i(t^{0-j}) - \Omega^i(t^0)) + \sum_{h \neq j_{ty}} (c(t^{0-j_{ty}}, \Omega^h(t^0)) - c(t^0, \Omega^h(t^0)))$$

where: $C^{ty} = L^{ty} c^{ty}$; $ty = w, m, o$.

Proof.

From 3.21 and considering the assumption related with the structure of the game then the following result is obtained:

$$c^{ty} = \frac{(1 - \alpha)}{L^{ty}} \sum_i (\Omega^i(t^{0-j}) - \Omega^i(t^0)) + \frac{\sum_{h \neq j_{ty}} (c(t^{0-j_{ty}}, \Omega^h(t^0)) - c(t^0, \Omega^h(t^0)))}{L^{ty}} \tag{21}$$

■

5 Analysis of the results

5.1 CA and Pattern of specialisation

In this section the case of a particular small economy (SE) is analysed. The relative price to the rest of the world is taken as given. There are only two production factors natural resources () and labor (L). Sector one is intensive in the use of natural resources and sector two in the use of labor ($k_1 > k_2$) The small economy has a comparative advantage (CA) in sector one because it is relatively abundant in natural resources so:

$$p_2^* < p_2^a$$

where: p^a -autarchy prices.

A trade specialisation pattern characterised by exports in sector 1 and imports in sector 2 is expected.

Consumers are heterogenous in the level and the structure of income as it was assumed in section 3. There are three types of consumers: workers (w); medium consumers (m); and owners of the other production factor (o). As we know from the traditional distributional results of the HOS model, each group will have a different preferred trade policy. In this section, we will analyse the general results of section 4 (the endogenous trade policy for a G&H political economy but in HOS model) in our particular economy. Three lobby regime are studied using the two propositions derived in the previous section: labor unions that make the income contribution of workers; factor owners associations that make the income contribution of the consumers in the other extreme of the income distribution; contributions of both types of consumers, workers and owners.

5.2 Trade policy voting preference

In this subsection, the optimal unrestricted trade policy for each type of consumer is derived, that is the preferences that each type of consumers have over the trade policy instrument set. The results will be a benchmark case for the comparison with the equilibrium of the game in the different lobby regime. The objective function to maximise is the indirect utility function of each type of consumer:

$$\max_t \Omega^{ty}(t) \tag{22}$$

Proposition 3 *In a voting political economy model assuming concavity of the indirect utility function in price as in Mayer (1984), the trade policy each type of consumer will prefer is the following:*

$$t^{ty} = \frac{L.(\hat{r}/\beta_2 - 1)(k^{ty} - k)rD_2}{(-m_{2t}).Y} \quad (23)$$

Proof.

From the FOC of 3.23 it is shown that,

$$\Omega_t^{ty} + \Omega_y^{ty}.y_t = 0 \iff (\Omega_t^{ty}/\Omega_y^{ty}) + y_t = 0$$

then using Roy identity and equations 3.18 and 3.20,

$$-\Phi^{ty}.D_2.L + L.(w_p + r_p.k^{ty}) + (D_2 - L.(w_p + r_p.k)) + t.m_{2t} = 0$$

Simplifying terms after some calculations 3.23 follows. ■

The result is comparable with the one Mayer shows in his paper. The workers prefer a tariff on imports, owners a subsidy on exports and the medium type consumer prefers free trade. See that by Stolper Samuelson theorem $\hat{r} < 0$.

One important difference is the way lump sum transfers are specified in both cases. In fact Mayer uses a lump sum specification that is neutral from the income distribution point of view. In the present model, the lump sum is a fixed and identical quantity of income that is transferred to each of the consumers of the economy (see section 3).

5.3 Labor unions (LU) lobby group

In this subsection the endogenous trade policy will be derived in the case in which a when the particular small economy has only workers Unions as a lobby institution, so the active consumers are those that have an endowment of natural resources relative to labor smaller than the mean of the economy. In this case, applying proposition 1 the endogenous trade policy will be the following:

$$t^{cn} = \frac{1}{-m_{2t}} \frac{LD_2/Y}{(\Omega_y^m L^m + \Omega_y^o L^o)/(L^w) + 1} \cdot \left(c^{cn} + r \left(\frac{\hat{r}}{\beta_2} - 1 \right) (k^w - k) (1 - \Omega_y^o /) \right) \quad (24)$$

where: c^n - income contribution from workers and no contribution from factor owners; $\Omega_y^{ty} = \Omega_y^{ity}$.

Proposition 4 *When worker union are the only active lobby group in the particular SE a sufficient condition to have a tariff on import sector (the one more intens in the scarce factor labor) as an endogenous trade policy is that the Government has sufficiently high marginal utility on the income contribution from the lobby group ().*

Proof.

By Stolper Samuelson theorem $\hat{r} < 0$ and $(k^w - k) < 0$ by definition , so a sufficient condition to have a tariff as an endogenous trade policy when only workers unions are active is that:

$$(1 - \Omega_y^o /) > 0 \Leftrightarrow \frac{(1 -)}{(1 -)} > (\Omega_y^o)$$

The others terms of 3.25 are all positive and so they are not considered to study the sign of the trade policy. ■

Applying proposition 2 to this case it is possible to obtain the political contributions in equilibrium:

$$c^{cn} = \frac{(1 -)}{L^w} (\Omega^{nn} - \Omega^{cn}) \quad (25)$$

$$\text{where: } \Omega^{nn} = \sum_i \Omega^i(p^{nn}); \Omega^{cn} = \sum_i \Omega^i(p^{cn}).$$

The trade policy when nobody makes contributions (nn) comes from the optimisation of the government utility function in this situation:

$$t^{nn} \in \arg \max_t (1 -)\Omega(t)$$

With some calculations it is possible to show that:

$$t^{nn} = \frac{1}{-m_{2t}} \frac{L.D_2/Y}{(\Omega_y^m L^m + \Omega_y^o L^o)/(L^w \Omega_y^w) + 1} \left(r \left(\frac{\hat{r}}{\beta_2} - 1 \right) (k^w - k) (1 - \Omega_y^o / \Omega_y^w) \right) \quad (26)$$

As $\Omega_y^w > \Omega_y^o$ because $y^w < y^o$ then the no contribution trade policy is a tariff ($t^{nn} > 0$). Government has only this instrument for an income distribution policy so in spite of the well known result that any trade policy different from free trade has an efficient cost to the small economy considered, the government optimum policy will be to impose a tariff.

5.4 Factor owners unions (OU) lobby group

In this subsection the symmetric case is analysed. The endogenous trade policy when owner unions are the active lobby group comes from the following equation:

$$t^{nc} = \frac{1}{-m_{2t}} \frac{L.D_2/Y}{(\Omega_y^m L^m + \Omega_y^w L^w)/(L^o) + 1} \cdot (c^{nc} + r(\frac{\hat{r}}{\beta_2} - 1)(k^o - k)(1 - \Omega_y^w/)). \quad (27)$$

where: nc - no income contribution from workers and income contribution from factor owners.

Proposition 5 *A necessary condition to have a subsidy on the import sector (the same as a subsidy to the export sector) is that the Government has a sufficiently high marginal utility on income contributions of the lobby groups ().*

Proof.

See again that by Stolper Samuelson theorem $\hat{r} < 0$ and $(k^o - k) > 0$ by definition 1, so a necessary condition to have a subsidy on import as an endogenous trade policy when only owners unions are active is that:

$$(1 - \Omega_y^w/) > 0 \Leftrightarrow \frac{1}{(1 -)} > (\Omega_y^w)$$

The others terms of 1.24 are all positive and so they are not considered to study the sign of the trade policy ■.

In this new case applying proposition 2 it is possible to obtain the political contributions in equilibrium:

$$c^{nc} = \frac{(1 -)}{L^o} (\Omega^{nn} - \Omega^{nc}) \quad (28)$$

where: $\Omega^{nn} = \sum_i \Omega^i(p^{nn}); \Omega^{nc} = \sum_i \Omega^i(p^{nc})$.

5.5 LU&OU

The third case to analyse is when both Unions exist (workers and owners of the other factor). In this case antagonist groups offer different amounts of income to the government to influence trade policy decisions. Clearly workers seek protection to the import sector (tariffs) and the owners the opposite (subsidy). Applying proposition 1 is possible to derive the following equation:

$$t^{cc} = \frac{1}{-m_{2t}} \frac{L.D_2/Y}{\Omega_y^m L^m / ((L^o + L^w)) + 1} \left(\frac{L^o}{(L^o + L^w)} \right. \quad (29)$$

$$\left. (c_o^{cc} + r(\frac{\hat{r}}{\beta_2} - 1)(k^o - k)) + \frac{L^w}{(L^o + L^w)} (c_w^{cc} + r(\frac{\hat{r}}{\beta_2} - 1)(k^w - k)) \right)$$

The trade policy outcome shows a counter balance between the two lobby activities so this will imply less distortions in the economy. In the equilibrium with both unions active the trade policy is a function of the average of the most preferred tariff that each of the two groups has. But from the point of view of the welfare interest of the lobby group they must do contribution to neutralise the influence of the other lobby but this income contribution will not be entirely traduced in a movement of the trade policy in the desired direction. Then surely the conjecture is that they will be worse than in the situation where they only play a bilateral game with the government and also than the situation when nobody does a contribution. In a very different economy environment related with the model of chapter 2 the results relative to the lobby welfare are similar. Again a prisoner's dilemma outcome emerges (see simulations in chapter 4).

See that the endogeneous trade policy in this regime can be written in a more illustrative way, doing some calculation in 3.29 and using 3.23:

$$t^{cc} = \frac{\{t^o(t)((c_o^{cc}/rq_5) + 1)\gamma(t) + t^w(t)((c_w^{cc}/rq_4) + 1)(1 - \gamma(t))\}}{\{(\Omega_y^m L^m) / ((L^w + L^o)) + 1\}} \quad (30)$$

where: $\gamma(t) = \frac{L^o}{(L^o + L^w)}$.

But 3.30 can be simplifying observing that:

$$t^o(t)\gamma(t) + (1 - \gamma(t))t^w(t) = 0$$

In a regime with both lobby groups active the endogenous trade policy always will be a tariff as the following expression show:

$$t^{cc} = \frac{1}{-m_{2t}} \frac{L \cdot D_2 / Y}{(\Omega_y^m /)L^m + (L^o + L^w)} (C^{cc}) \quad (31)$$

where: $C^{cc} = L^o \cdot c_o^{cc} + L^w \cdot c_w^{cc}$.

Then to find the political contributions it is necessary to apply proposition 2 to this third case:

$$C_w^{cc} = \frac{(1 -)}{+L^o(c(t^{\tilde{nc}} \Omega^o(t^{cc})) - c(t^{cc} \Omega^o(t^{cc})))} \{ L^m(\Omega^m(t^{\tilde{nc}}) - \Omega^m(t^{cc})) + L^w(\Omega^w(t^{\tilde{nc}}) - \Omega^w(t^{cc})) \} \quad (32)$$

$$C_o^{cc} = \frac{(1 -)}{+L^w(c(\tilde{t}^{cn} \Omega^w(t^{cc})) - c(t^{cc} \Omega^w(t^{cc})))} \{ L^m(\Omega^m(\tilde{t}^{cn}) - \Omega^m(t^{cc})) + L^o(\Omega^o(\tilde{t}^{cn}) - \Omega^o(t^{cc})) \} \quad (33)$$

Where: $t^{\tilde{nc}}$ - optimal tariff to the government restricted to the case when the worker union does not participate in the contribution game and the other lobby does not change the welfare level achieved and so has the same contribution schedule; \tilde{t}^{cn} - similar definition as in the previous case.

See that the utility level to guarantee the government participation and the trade policy associated with it are different from the utility level that the Government obtained and the trade policy that was selected in the equilibrium with only one lobby group active. The notation with an over-line of the variable t is chosen to highlight this difference.

Analytically those trade policy are:

$$t^{nc} \in \arg \max_t (1 -) (L^m \Omega^m(t) + L^w \Omega^w(t) + L^o \Omega^o(t^{cc})) + L^o c(t \Omega^o(t^{cc})) \quad (34)$$

$$\tilde{t}^{cn} \in \arg \max_t (1 -) (L^m \Omega^m(t) + L^o \Omega^o(t) + L^w \Omega^w(t^{cc})) + L^w c(t \Omega^w(t^{cc})) \quad (35)$$

see that $\Omega^o(t^{cc}) = \Omega^o(t \ c(t \ \Omega^o(t^{cc})))$ and $\Omega^w(t^{cc}) = \Omega^w(t \ c(t \ \Omega^w(t^{cc})))$.

In this third case, to solve the participation constraint and to obtain the political contribution of each lobby group, it is necessary to find a solution to this new problem to obtain the level of utility that the government would obtain when one lobby group does not participate and the other lobby have exactly the same contribution schedule as in the case where both were active. This is the welfare level the Government must achieve to participate in the game with both players.

From the FOC of 3.29 and 3.30 the trade policy levels are derived. The final expressions are identical to equations 3.21 and 3.24 and both differ in the contribution that the active lobby makes in each case. The government could threat each lobby to make a bilateral arrangement with the other lobby and finally this determines the utility level that will be obtained by the government.

$$t^{\tilde{nc}} = \frac{1}{-m_{2t}} \frac{L.D_2/Y}{(\Omega_y^m L^m + \Omega_y^w L^w)/(L^o) + 1} \cdot (c^{\tilde{nc}} + r(\frac{\hat{r}}{\beta_2} - 1)(k^o - k)(1 - \Omega_y^w / o)) \quad (36)$$

$$c^{\tilde{nc}} = \max \left\{ 0, \bar{y}^o(t^{\tilde{nc}}) - (t^{\tilde{nc}} \Omega^o(t^{cc})) \right\} \quad (37)$$

$$\tilde{t}^{cn} = \frac{1}{-m_{2t}} \frac{L.D_2/Y}{(\Omega_y^m L^m + \Omega_y^o L^c)/(L^w - w) + 1} \cdot (c^{\tilde{cn}} + r(\frac{\hat{r}}{\beta_2} - 1)(k^w - k)(1 - \Omega_y^o / w)) \quad (38)$$

$$\tilde{c}^{cn} = \max \left\{ 0, \bar{y}^w(\tilde{t}^{cn}) - (\tilde{t}^{cn} \Omega^w(t^{cc})) \right\} \quad (39)$$

An equilibrium in trade policy and political contribution has as necessary condition to satisfy the system of seven equations (3.26, 3.27, 3.28, 3.31, 3.32, 3.33, 3.34) that determine the seven unknown variables $(t^{cc}, c_w^{cc}, c_o^{cc}, t^{\tilde{nc}}, c^{\tilde{nc}}, \tilde{t}^{cn}, \tilde{c}^{cn})$.

6 Efficiency and distribution issues

6.1 General results

The characterisation of the efficiency properties of the political contribution game equilibrium in a general framework (Dixit, Grossman and Helpman, 1997) is the most relevant recent result of the common agency literature applied to political economy issues.

For the strategic players (active lobbies (principals) and the government (agent)) the truthful equilibrium is Pareto Efficient (proposition 4, D&G&H).

The efficient result is extended to all the consumers set (corollary 2 to proposition 4, D&G&H) organised and not organised in lobby groups, given the contribution equilibrium of the lobby group. As the contributions are given in the equilibrium level and the strategic are truthful then the utility level of the lobby group are given. If there would be any opportunity to improve the welfare level of the non organised consumers then the government could raise also his own welfare level so this will not satisfy the statement of proposition 4.

This results are used to study government policy making (the political economy of the tax and transfer problem) in section 3 of Dixit, Grossman and Helpman (1997) article. If a government could choose in a general set of instruments that includes distorsionary taxes (taxes and subsidies to domestic production and/or domestic consumption) and lump-sum transfers, it will always choose the last one (by corollary 2 of proposition 4).

The proof is clear in verbal terms. With lump sum transfers, it is always possible to replicate the welfare level of each type of consumers using any distortionary taxes and obtain a positive income to the government. Any government that could choose instrument without restrictions in the policy instruments set will never use distorsionary taxes. The use of those kind of instruments could not be an equilibrium because it would not satisfy the government incentive constraint and so the efficiency properties of the equilibrium.

But this result must be discussed taking into account the distribution perspective. The equilibrium could be efficient but the consumer welfare, for some types of government, (considering organised and/or not organised consumers) could be very low relative to the no contribution outcome (not restricted maximum from an aggregated welfare point of view). So the equilibrium with lump sum transfers is efficient but all of the consumer groups

could be worse off in than any other equilibrium obtained with restrictions over the policy instruments set (for example if the government could only uses trade policy as we impose in the previous section of this chapter).

This result is relevant because, in general, if the political economy of policy makers instrument decisions is the one derived from the contribution model, it would be rational for consumers (citizens) to sustain rules (introduce in a democratic way, e.g. establishing constitutional or legal restraints) that imply some kind of limits over the policy instrument set available to the government. Note that this result would imply a deeper way of explaining the protectionist bias. It shows that protectionism arises not only as a solution to the endogenous trade policy problem assuming that government could only use this type of instrument. In the next section, it will be justified why consumers would in fact prefer to constrain government policy actions to use only distortionary instruments as it is the case of trade policy.

6.2 Results in the HOS model

6.2.1 The Government problem (incentive compatibility restriction)

Without any restriction in the policy instrument set the Government problem is to choose a set of lump sum transfer that solves the following maximisation program:

$$\{\tau^i\}_{i \in I} \in \arg \max_{\tau^i} (1 - \epsilon) \left\{ \sum_z \Omega^z(\tau^z) + \sum_h \Omega^h(\tau^h, c^0(\tau^h, \Omega^h)) \right\} + \sum_h c_h^0(\tau^h, \Omega^h) \quad (40)$$

such that

$$\sum_i \tau^i = 0 \text{ (budget constraint)}$$

$$\Omega_y^z = \frac{1}{1 - \epsilon} = \iff y(\cdot) = \Omega_y^{-1}(\cdot) \quad (41)$$

where: τ^i - are consumer specific non distortionary lump sum transfers ; Ω_y^{-1} - is the inverse of the marginal utility of income and it exists by assumption about preferences.

In this particular case it is easy to show that the government problem has a solution identical to the following auxiliar problem when two or more lobby group are active (see proposition 6 in Dixit, Grossman and Helpman, 1997):

$$\{y^i\}_{i \in I} \in \arg \max_{y^i, C} (1 - \alpha) \sum_i \Omega^i(y^i) + C \quad (42)$$

such that

$$\sum_i y^i + C \leq \pi L \text{ (budget constraint)}$$

where: $\pi = w + rk$ - is given in this small economy.

From the FOC of 3.40 it is shown that:

$$\Omega_y^i = \alpha \iff y(\alpha) = \Omega_y^{-1}(\alpha) \quad (43)$$

From the budget constraint in both problems it is possible to derive the income (contributions) the government can capture:

$$C = (\pi - y(\alpha))L \quad (44)$$

where: it is assumed that $y(\alpha) \leq \pi$ for $\alpha < \alpha^*$.

This last result depends in the assumption that $y_w^{cc} = y_w^{cc} = y(\alpha)$. Later in the next sub section this assumption will be derived when we find the political contribution in this regime and the proof of the equivalence of the solutions of both problems will be completed.

6.2.2 The no contribution regime

In this case the consumer specific lump sum transfers are:

$$\tau_m^{nn} = 0; \tau_w^{nn} = \pi - \pi_w; \tau_o^{nn} = \pi - \pi_o$$

$$\Omega^{nn} = \Omega(\pi)L, G^{nn} = (1 - \alpha)\Omega^{nn} \quad (45)$$

This results characterises the maximum the aggregated welfare could achieve without restrictions in the instrument sets and without contributions of the consumer groups that could influence policy makers decisions.

Proposition 6 *For some types of government ($\alpha \leq \alpha^*$) the no contribution outcome*

$$(\tau_m^{nn}, \tau_w^{nn}, \tau_o^{nn}, \Omega^{nn}, G^{nn})$$

could be obtained as an equilibrium of the contribution game.

Proof.

It exists a $\underline{}$ such that $y(\underline{}) = \pi$. For any type of government with equal or greater preferences in the benevolent objective ($\leq \underline{}$ and $\leq \underline{}$) then $y(\underline{}) > \pi$ and so contributions in equilibrium will be zero. ■.

6.2.3 The regime with one or more active lobby (cn,nc,cc).

In this sub section it is assumed that the type of government implies positive contributions ($> \underline{}$). Using 3.39 it is possible to derive the no participation consumers lump sum transfers in the different regime:

$$\tau^z = y(\underline{}) - \pi^z \quad (46)$$

$$y(\underline{}) = \pi^m + \tau_m = \pi^w + \tau_w^{nc} = \pi^o + \tau_o^{cn}$$

$$\tau_m = y^z - \pi^m = \tau_m^{cn} = \tau_m^{nc} = \tau_m^{cc}$$

From the budget constraint comes the consumer lump sum equilibrium of the active lobby in the *cn* and *nc* regime is obtained:

$$\tau_w^{cn} = -\frac{(\tau_m L^m + \tau_o^{cn} L^o)}{L^w}$$

$$\tau_o^{nc} = -\frac{(\tau_m L^m + \tau_w^{nc} L^w)}{L^o}$$

Applying the participation constraint condition of the equilibrium in the bilateral regime (*cn* and *nc*) the results are:

$$c_o^{nc} = \frac{(1 - \tau_o^{nc})}{L^o} ((\Omega^m - \Omega^m(\tau_m))(L^w + L^m) - L^o(\Omega^{nc}(\tau_o^{nc} c_o^{nc}) - \Omega^m)) \quad (47)$$

$$c_w^{cn} = \frac{(1 - \tau_w^{cn})}{L^w} ((\Omega^m - \Omega^m(\tau_m))(L^o + L^m) - L^w(\Omega^{cn}(\tau_w^{cn} c_w^{cn}) - \Omega^m)) \quad (48)$$

In the regime where both lobby groups are active, taking account that the lump sum to the medium consumer group is always the same then from the budget constraint we obtain:

$$L^w \cdot \tau_w^{cc} + L^o \cdot \tau_o^{cc} = L^w \cdot \tau_w^{cn} + L^o \cdot \tau_o^{cn} = L^w \cdot \tau_w^{nc} + L^o \cdot \tau_o^{nc} \quad (49)$$

The political contribution when the two lobbies are active is ³:

$$c_w^{cc} = \frac{(1 - \alpha)}{\alpha} (\Omega^w(\tau_w^{nc}) - \Omega^w(\tau_w^{cc} - c_w)) + \frac{L^o(\tau_o^{nc} - \tau_o^{cc})}{L^w} \quad (50)$$

$$c_o^{cc} = \frac{(1 - \alpha)}{\alpha} (\Omega^o(\tau_o^{nc}) - \Omega^o(\tau_o^{cc} - c_o)) + \frac{L^w(\tau_w^{cn} - \tau_w^{cc})}{L^c} \quad (51)$$

It is possible to verify that a solution in contribution comes from the next pair of equations:

$$\begin{aligned} c_w^{cc} &= \frac{L^o(\tau_o^{nc} - \tau_o^{cc})}{L^w} \\ c_o^{cc} &= \frac{L^w(\tau_w^{cn} - \tau_w^{cc})}{L^c} \end{aligned} \quad (52)$$

Then the income that each lobby group would receive when both compete for the government transfers are the same that each would receive if they do not any contribution as we assume in the previous sub section:

$$y(\alpha) = y_w^{cc} = y_o^{cc} \quad (53)$$

See that in the case where the active consumer groups are more than one the possible lump sum transfers that satisfy the equilibrium condition are infinite. But the income net of contributions it is unambiguously determined.

So using the budget constraint it must be true that:

$$C^{cc} = L^w c_w^{cc} + c_o^{cc} L^o = (\pi - y(\alpha))L$$

³See that:

$$c(\tau_o^{nc}, \Omega^o(\tau_o^{cc})) - c(\tau_o^{cc}, \Omega^o(\tau_o^{cc})) = \pi^o + \tau_o^{nc} - (\pi^o + \tau_o^{cc} - c_o^{cc}) - c_o^{cc}$$

As the prices are always the same, because no distorsionary tools are used, then to compare welfare outcomes in the different regimes it is sufficient to study the income outcomes. Joining results it is possible to show that:

$$\begin{aligned}\pi^m + \tau_m &= \pi^o + \tau_o^{cc} - c_o^{cc} = \pi^w + \tau_w^{cc} - c_w^{cc} = \\ \pi^o + \tau_o^{cn} &= \pi^w + \tau_w^{nc} = y(\)\end{aligned}$$

The incentive to participate (measured as the difference in income when the active lobby contribute minus the income it will obtain in the no contribution outcome) for both lobby groups when no one makes contributions is always positive. If not contribution will not be an equilibrium because a deviation pay: the active lobby could fix contribution in zero increasing own welfare and the government achieve the same welfare level. Then it will true that the following inequalities hold:

$$\tau_w^{cn} - c_w^{cn} > \tau_w^{nn}$$

$$\tau_o^{nc} - c_o^{nc} > \tau_o^{nn}$$

Finally the prisoner dilemma outcome comes from the following relations:

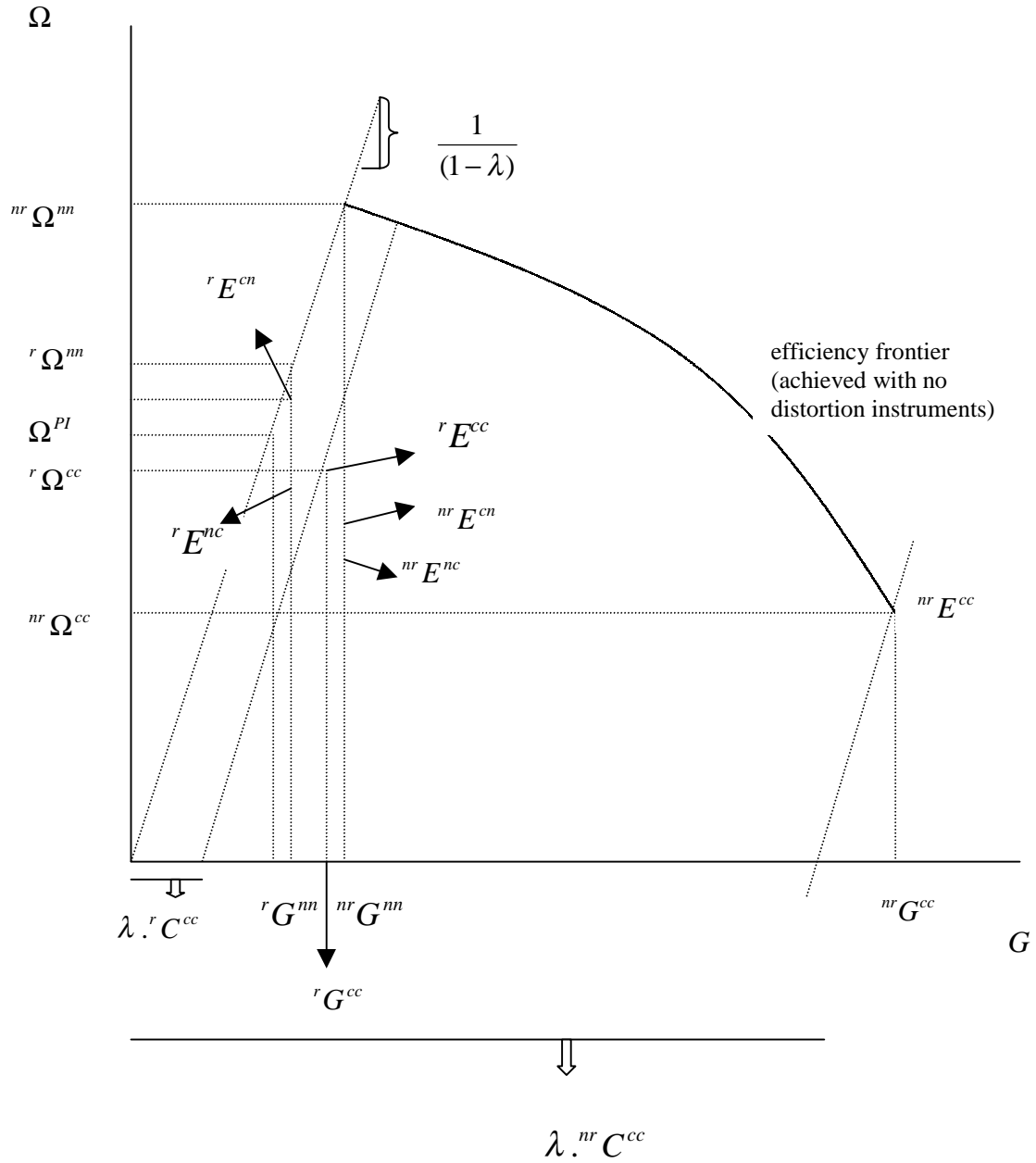
$$y_w^{cc} = y_o^{cc} = y_m^{cc} = y(\) < y^{nn} = \pi^m = \pi \iff C > 0$$

In figure 2 many of the main conclusions of the chapter are summarised. Two types of outcome are identified: the ones derives from in section 3 and 4, where the government is restricted to use trade policy instruments (noted with the right superscript r); and the ones obtained when the government without any restriction select to use consumer specific lump sum (noted with the right superscript nr).

In both cases with and without restriction over the policy instrument set, the prisoner dilemma problem is present. The equilibrium is pareto dominated (considered only the consumer perspective) by the no contribution outcome. On the other side the government always has an incentive to play the contribution game with more than one lobby group. Finally the equilibrium with restriction and contribution of both lobby groups could give an aggregated welfare level (and also for each lobby group which is not shown

in the present figure) better than the one that could be obtained when the government is constrained to use any instrument and so it chooses specific consumer lump sum transfers.

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Where: r- restricted action policy set for the government (example trade policy); nr- no restriction over the instrument set so the government uses consumer specific lump sum transfers.

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