Information transmission and inefficient lobbying*

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Abstract

In a seminal paper, Grossman and Helpman (1994) introduced a framework to understand how lobbying activities influence the choice of import/export tariffs. Although their analysis presumes perfect information, in many situations lobbies are privately informed on the impact of the policies available to the governments. In this paper we assume that the competitiveness of producers are lobbies’ private information in a Grossman and Helpman’s lobby game. In particular, this allows us to analyze the effects of information transmission within their model. Information transmission generates two informational asymmetry problems in the political game. One refers to the cost of signaling the lobby’s competitiveness to the policy maker and the other to the cost of screening the rival lobby’s competitiveness from the policy maker. We show that information transmission may improve welfare through the reduction of harmful lobbying activity.

Keywords: lobby; asymmetric information; common agency; political economy.

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1 Introduction

Lobbying is a central element in the study of the policy-making process in many fields of economic literature such as trade, taxation and regulation. Yet, there is no consensus about the role of lobbies on the political process. A branch of the literature treats lobbies as groups that have privileged access to information which is relevant to the decision making process. Then, lobbies may improve the policy making by providing information but can also be harmful if they make strategic use of the information. Another branch views lobbies as rent-seeking groups that exercise influence by giving money contributions to swing the decision of an influenceable policy maker in their favor at the expense of the society’s welfare.

Among the papers that focus on the rent-seeking aspect, Grossman and Helpman (1994) is one of the most important to capture the effect of lobbying. In their model, the political game takes place in a small economy and lobbies represent productive sectors that offer money contributions to an influenceable policy maker in order to receive tariff protection. A fraction of individuals of the economy is not represented by lobbies and do not participate in the political game. Therefore, the country’s trade policy favors the sectors that lobby while the welfare cost of the tariff is borne by individuals that do not lobby. Their analysis assumes that there is perfect information in the political game.

Potters and Van Winden (1992), Austen-Smith (1995), Krishna and Morgan (2001) and Esteban and Ray (2007), to name a few, investigate situations where lobbies are better informed than policy makers. In these papers lobby’s preferences are not aligned with the policy maker’s and she\(^1\) can make strategic use of her private information to influence the policy maker’s choice in her favor.

Our work stands in-between these two branches. We assume that the competitiveness of productive sectors in Grossman and Helpman (1994) - GH henceforth - is the lobbies’ private information. To be more precise, each lobby knows its own sector’s competitiveness but does not know the other sectors’. The policy maker has no private information and does not observe the sectors’ competitiveness. Therefore, this is a rent-seeking model where lobbies have more information on the impact of policies.

Under this informational structure two asymmetric information problems arise. The first one hinges on the fact that, facing the same tariff, more competitive lobbies (“high types”) substitute more imports than the less competitive ones (“low types”). Import substitution due to tariff generates inefficiency for the economy because home goods are produced with marginal costs above international prices. Since high type sectors substitute more, they cause higher welfare loss than low

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\(^1\)We will use feminine pronouns to lobbies and masculine pronouns to the policy maker.
type sectors for a given tariff level. The informational problem arises because the policy maker does not know the lobbies' true types. Then, high type lobbies may pretend they are low types in order to contribute less for the protection they receive. If both types offer the same contribution, the policy maker cannot learn their types and can only ask for an average compensation for protection. On the other hand, low types do not want to be mixed up with high types because the cost of protection is lower for them. When they separate themselves they pay the true cost of their protection. Separation allows the policy maker to correctly learn types through the received contributions, although distorting low types' offer. We refer to these distortions as the signaling effect.

The second asymmetric information problem comes from the fact that, in our model, goods are substitutes and each lobby does not know the rival’s type. When the lobby representing good 1 producers asks for more protection, the demand of the substitute good 2 shifts upward. In turn, the shift in the demand of good 2 gives the policy maker an increase of the import tariff revenue of good 2. This revenue increase is large if the tariff of good 2 is higher, and small if the tariff is lower. Under perfect information, the lobby (of sector) 1 can anticipate the tariff in market 2 and deduct the revenue increase from the contribution she gives to the policy maker. When lobby 1 does not know the protection in market 2, she cannot deduct this exact amount from the contribution she offers to the policy maker.

Although lobby 1 does not know the tariff that will be granted to lobby 2, the policy maker learns the lobbies’ types when he receives the contributions (if they are separating). Hence, lobby 1 knows that the policy maker learns the rival’s type before the implementation of the policies and she is able to make conditional contributions and screen this information from him. Yet screening is costly and generates distortions in the political game. We refer to these distortions as the screening effect. We refer to both asymmetric information problems as information transmission problem.

In our model contributions perform three tasks: buy influence, signal the lobby’s type to the policy maker and screen the rival’s type from the policy maker. The low type lobby separates from the high type demanding less protection than she would do under perfect information. Moreover, screening the rival’s type makes the low type lobby leave informational rents to the policy maker and also demand less protection. Finally, information transmission allows the policy maker to extract informational rents and also reduces the lobbies’ influence, which dissipates some of the political rents. Thus, information transmission hinders the rent-seeking activity. As a consequence tariffs decrease, imports increase and the welfare of the society increases compared with the perfect information situation.

Hence, not only the policy outcome differs significantly from that of GH, but also the distribution of the political game’s surplus. In GH, when lobbies are highly
concentrated (the case we consider here) the policy maker receives his reserve utility and the lobbies extract all the surplus. With privately informed lobbies, the policy maker has a bargaining power against the lobbies, due to the screening effect and is able to retain some rents. Also, since the policies are no longer truthful, some of the political rents are dissipated. Both effects reduce the lobbies’ rents.

Lobby games were also modeled as common agency in Le Breton and Salanié (2003), Martimort and Semenov (2008) and Campante and Ferreira (2007). However, the first two papers consider the ideological uncertainty case, i.e., the policy maker’s preference on contributions and welfare is private information. The first paper allows individuals to form or not a lobby, which we do not consider here (as in GH, lobbies are assumed to exist in the first place).

Our results can be better compared with Martimort and Semenov (2008). They found that ideological uncertainty reduces the lobbies’ influence and the outcome of the game is closer to the policy maker’s preferred policy. This result is similar to ours, since we find that policies are closer to the free trade equilibrium, which in the GH model is the policy maker’s “preferred policy”.

Within the literature that focus on the informative role of lobbies, our paper is related to Esteban and Ray (2007). In their model lobbies also represent producers that signal their productivity to the policy maker with contributions. However, their paper differs from ours in two key aspects. First, they assume that the policy maker is not influenceable and he only tries to allocate resources to more efficient producers. Second, there is wealth inequality and credit constraints, thus wealthy but unproductive lobbies may send the same signal as productive lobbies. As a result, inefficiencies arise because the policy maker cannot separate productive lobbies from unproductive but rich lobbies and allocates productive resources to both of them, leaving poor but productive firms without resources. In our model, inefficiencies are caused by rent-seeking nature of the lobbying activity. Thus, the information asymmetry is welfare enhancing because it reduces the rent-seeking activity, while in Esteban and Ray (2007) the information asymmetry reduces welfare because it makes the well-intentioned policy maker allocate resources to the “wrong” producers.

Bennedsen and Feldmann (2006) are also related to our paper. They analyze a common agency game where lobbies search for information about the state of the economy and make contributions to influence the policy maker’s decision. They find that the ability to offer contributions reduces the lobby’s willingness to search for information and that competition between lobbies favors those who abstain from searching. Their structure differs from ours first because the information gathered does not affect the lobbies’ preferences while in our model information transmission affects preferences directly. But most importantly our model is closer to the GH model, which allows us to derive sharp results about welfare.
Our approach benefits from Martimort and Moreira (2009) who analyze the divisible public good provision problem as a common agency game with privately informed contributors. In their model contributors are privately informed about their preferences and give conditional money transfers to a common agent who produces the public good. Similarly we introduce private information on the lobbies’ preferences and analyze a common agency game with privately informed principals. The screening effect found in our model is similar to their paper. However, our model is a common value model once the police maker cares also about the social welfare which includes the lobbies’ profits, while their model is a private value model since the agent is self-interested. Maskin and Tirole (1992) show that informed principal models with common values have informational distortions in the same spirit of signaling games (e.g., Spence, 1973). Thus, the nature of the signaling effect is directly related to the common value aspect of our model.

In the next section we present the economy and the political game, we characterize the efficient policies and the equilibrium of the political game under perfect information. In Section 3 we present the informed lobby problem. We define and characterize the equilibrium of the political game in Section 4. We then compare this equilibrium with the equilibrium of the game under perfect information. Section 5 concludes.

2 The model

The basic model closely follows the GH model with some minor differences. We consider a small, competitive economy that faces fixed international prices ($p^e$). Within this economy a political game takes place. Special interest groups (lobbies) offer money contributions to the government in exchange for tariff protection, which is the only available policy instrument. Lobbies are better informed about the true impact of tariff in this economy.

The economy has a size one population of consumers. These consumers have preferences for three goods ($x^0$, $x^1$ and $x^2$) represented by the following utility function:

$$u(x^0, x^1, x^2) = x^0 + \alpha - \beta x^n + \delta x^1 x^2,$$

where the uppercase 0 means the numeraire and $n \in \{1, 2\}$ refers to the productive sector $n$.

The government’s revenue from import tax is given by

$$TR = \sum_{n} (p^n - p^e) (x^n - y^n),$$

where $p^n - p^e$ is the import tariff of good $n$ and the international price $p^e$ is the same for $x^1$ and $x^2$. The home production of good $x^n$ is $y^n$. This revenue is redistributed to the society through lump-sum transfers.
Good \( x^0 \) is not taxed and its international price is normalized to 1. It is produced only from labor with constant returns of scale with input-output coefficient of 1. We assume that the labor supply is big enough so that wages can be also normalized to 1.

The wages and the government transfers define the consumers’ income which, together with preferences, allow us to find the market demands:

\[
x^n = a - bp^n + dp^{-n},
\]

where \( b > 0 \) and \( d \) is a parameter that defines whether goods are substitutes \((d > 0)\) or complements \((d < 0)\).

**Assumption 1** *Goods \( x^1 \) and \( x^2 \) are substitutes \((d > 0)\).*

Assumption 1 is made for simplicity, but most of the results carry on in the case of complementary goods. This is an important difference from our model to GH (who deals with \( d = 0 \)). When demands are interdependent the tariff in one sector affects the welfare cost of tariff in the other sector. This key assumption is very important for the informational problems in this model.

Substituting the demands into the utility function we can compute the indirect utility function, denoted by \( u(p^1, p^2) \) with some abuse of notation that shall not make confusion.

Goods are produced with sector specific inputs. Hence, the owners of these factors receive all the profit from production. Moreover, we assume that the owners of productive factors correspond to a negligible fraction of the population, thus the factor ownership is highly concentrated. We refer to the owners of the specific factor as producers.

The production technology of goods \( x^1 \) and \( x^2 \) is given by the following marginal cost function:

\[
\frac{\partial c}{\partial y} (\theta, y) = \begin{cases} 
\frac{\gamma y}{\theta} & \text{if } y \leq \frac{\theta}{1-\gamma} \\
\infty & \text{if } y > \frac{\theta}{1-\gamma}
\end{cases},
\]

which implies that the marginal cost is positive, increasing and producers face a capacity constraint. Notice that the elasticity of the supply will be different whether the optimal production is an interior or corner solution. In the first case, production increases in response to an increase in home prices, while in the second the production is fixed. For simplicity we only analyze two polar cases. In the first case \((\gamma = 0)\) each sector produces exactly the capacity constraint. In the second \((\gamma = 1)\), the capacity is never reached\(^2\). As we shall see, these extreme cases imply in different effects of information transmission problems.

\(^2\)The results are essentially the same for different values of \( \gamma \) such that production does not reach the capacity constraint.
The profit function is given by \( \theta \pi (p) \), where \( \pi (\cdot) \) is a convex function (which depends on the value of \( \gamma \)). The supply function of good \( n \) is denoted by \( y^n (\theta^n, p^n) \).

By the Envelope Theorem, \( y^n (\theta^n, p^n) = \theta^n \pi' (p^n) \).

The welfare is the sum of the government’s revenues, the consumers’ and producers’ surpluses in all markets:

\[
W (\theta^1, p^1, \theta^2, p^2) = u (p^1, p^2) + n (p^n - p^e) \left( x^n (p^n, p^n) - \theta^n \pi' (p^n) \right) + \theta^n \pi (p^n).
\]

Figure 1 presents the welfare effect of a tariff in market 1.

In market 1 the home price \( \bar{p}_1 \) is above the international price \( p^e \) due to the tariff. The downward sloped line is the home market demand and the upward sloped line is the home supply of good 1. The triangle A below the demand curve and above the home price is the consumers’ surplus; B and F are the producers’ surpluses; D is the tariff revenue; C and E are the deadweight loss of the tariff. The rectangle G in market 2 is an extra revenue due to substitutability and the increase of protection in market 1.

Let us compute the impact of tariffs on welfare:

\[
\frac{\partial W}{\partial p^n} = -(b + \theta^n \pi'' (p^n)) (p^n - p^e) + d (p^n - p^e).
\]

Notice that the area of triangle C is \( b (p^1 - p^e) \) in (1) and represents the loss from the decrease in home consumption. The area E is \( \theta^1 \pi'' (p^1) (p^1 - p^e) \) in (1) and represents the welfare loss due to import substitution. Finally, the area of rectangle G is exactly the last term in (1).

The government’s revenue, the market demands, the home supplies and the international prices define the economy in our model.

**Asymmetric information.** The competitiveness parameter \( \theta \) can only take two values: \( \theta_h \) and \( \theta_l \), where \( \theta_h > \theta_l \). Its realization is private information of the lobby. The distribution of \( \theta \)-s is common knowledge, i.i.d. and \( z \) is the probability of \( \theta = \theta_h \). Therefore, each lobby knows her type but does not know the rival’s type, while the policy maker does not know their types.

We make the following assumption about the parameters to assure interior solutions of the lobbies’ problems:

These assumptions are not necessary for interior solutions, however they greatly simplify our analysis since they rule out negative prices. Essentially, they ensure interior solution for the “virtual utility” maximization problem.
Assumption 2

\[(1 - z)b - d > 0 \quad 2\theta_l \geq \theta_h\]

and if \(\gamma = 1\)

\[(1 - z)b - d > (1 - z) \frac{(1 - \lambda)}{\lambda} \theta_h.\]

The first inequality in Assumption 2 states that the substitutability of goods is not too large. The second inequality states that the difference of the asymmetric information parameters is mild. The third has a similar role of the first one when \(\gamma = 1\).

**Political game**

There are three actors: two lobbies and one policy maker. Lobbies offer contributions, \(C \in \mathbb{R}_+\), to the policy maker. Thus, they are the principals of the common agency game. We assume that consumers cannot lobby.

Each lobby represents the producers of her sector. They care about the profit of the sector they represent and dislike giving money contributions to the policy maker. Their utility function is

\[V(\theta, p, C) = \theta \pi(p) - C.\]

The lobbies do not care about the consumer’s surplus because the sectors’ ownership is highly concentrated.

The policy maker is the common agent who chooses the home price of the economy, \(p \in \mathbb{R}_+\), by imposing an import tariff. He cares about the social welfare \((W)\) but also likes money contributions. Therefore, he is willing to trade economic welfare for money. His utility function is represented by

\[U(\theta^1, p^1, C^1, \theta^2, p^2) = \lambda W(\theta^1, p^1, \theta^2, p^2) + C^m,\]

where \(\lambda > 0\) is the relative preference between money and welfare.

**Strategy space**

We assume, for the sake of simplicity and realism, that lobbies can only demand protection for their own good. Therefore, the contribution schedule (contract) of
lobby $n$, $C^n(\theta^n, p^n)$, specifies the level of contribution $C^n$ for each policy $p^n$ and type $\theta^n$. Moreover, we assume that contributions cannot be negative.

Once the contribution is accepted, the policies are implemented and payments are made accordingly (we are then assuming commitment in the political game).

Since the political game is symmetric, we drop the uppercase index, whenever it does not make any confusion.

Timing
(0) nature draws the lobbies’ types and each lobby learns her type;
(1) each lobby offers non-cooperatively contribution schedules to the policy maker;
(2) policy maker either accepts or rejects the contracts;
(3) policies are chosen and, when contributions are accepted, payments are made accordingly.

The preference of the lobbies and the policy maker, the information structure, the strategy space and the timing define the political game.

This rent seeking model has two benchmarks that will help us to evaluate the effects of information transmission. The first one is the free trade equilibrium. It defines which policies arise if there is no political influence over the decision making.

Free trade equilibrium

If the policy maker does not care about contributions, he chooses the import tariffs that maximize the society’s welfare:

**Definition 1** The free trade equilibrium prices $\{\hat{p}_{ik}, \hat{p}_{ki}\}$ are defined by

$$\{\hat{p}_{ik}, \hat{p}_{ki}\} \in \arg \max_{p_{ik}, p_{ki}} W(\theta_i, p_{ik}, \theta_k, p_{ki}),$$

where the first lowercase index refers to the lobby’s own type and the second index refers to the rival’s type, where $i, k \in \{h, l\}$.

The first-order conditions of this problem are given by

$$\frac{\partial W}{\partial p^n}(\theta_i, \hat{p}_{ik}, \theta_k, \hat{p}_{ki}) = 0$$

for $n, k = 1, 2$ and $k \neq n$. 

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From (1) we obtain that the free trade equilibrium is the welfare maximum for the society\(^5\), i.e., \(\hat{p}_{ik} = \hat{p}_{ki} = p^e\). Therefore, any deviation from these tariffs reduces the welfare and, in particular, those resulting from lobby influence.

The second benchmark is the truthful equilibrium. It defines which policies arise from the political game under perfect information.

**Truthful equilibrium**

From Bernheim and Whinston (1986b) we know that when principals play truthful strategies\(^6\), the solution of this common agency game is the same as the solution of a centralized problem that maximizes the surplus of the political game. Hence, we have:

**Definition 2** The truthful equilibrium prices \(\{\bar{p}_{ik}, \bar{p}_{ki}\}\) are defined by

\[
\{\bar{p}_{ik}, \bar{p}_{ki}\} \in \arg \max_{p_{ik}, p_{ki}} \theta_i \pi (p_{ik}) + \theta_k \pi (p_{ki}) + \lambda W (\theta_i, p_{ik}, \theta_k, p_{ki}).
\]

The first-order conditions resulting from the truthful contribution schedules are

\[
\theta_i \pi' (\bar{p}_{ik}) - \lambda \frac{\partial W}{\partial p} (\theta_i, \bar{p}_{ik}, \theta_k, \bar{p}_{ki}) = 0. \tag{3}
\]

They equalize the marginal benefit of the lobbies and the marginal welfare cost of the society. Compared to condition (2), (3) gives an extra weight to lobbies and, therefore, policies increase for lobbies and the welfare cost is borne by the rest of the society.

If \(\gamma = 0\), the policies implemented by the truthful equilibrium are given by

\[
\bar{p}_{ik} = \frac{\theta_i b + \theta_k d}{\lambda (b^2 - d^2)} + p^e
\]

and if \(\gamma = 1\), the policies are given by

\[
\bar{p}_{ik} = \frac{[\theta_i (\lambda (b + \theta_k) - \theta_k) + \lambda d\theta_k] p^e}{(\lambda (b + \theta) - \theta_k) (\lambda (b + \theta_i) - \theta_i) - \lambda^2 d^2} + p^e.
\]

Therefore, the free trade equilibrium defines the first-best solution and the truthful equilibrium defines the solution of the political game without asymmetric information. We will compare the qualitative properties of the political game with privately informed lobbies with these two benchmarks in mind.

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\(^5\)In this framework, the second-order condition implies that free trade is the welfare maximum whenever \(b > d\), which trivially follows from Assumption 3.

\(^6\)Truthful contribution schedule means that \(\frac{\partial C}{\partial p} (\theta, p) = \theta \pi' (p)\).
3 The informed lobby problem

In this section we present the lobby’s best reply problem which we refer as the informed lobby problem. In the political game lobbies simultaneously offer contribution schedules to the policy maker. Therefore, the offers maximize the lobby’s utility taking as given the offer of the other lobby. We will focus on symmetric Perfect Bayesian Equilibria (equilibria, in short) of the political game.

Instead of trying to find which is the best response for every possible rival’s strategy, we will discipline the lobby’s conjecture by placing particular conditions on the rival lobby’s offer. Then, we let the lobby choose her best reply and check that such conditions hold in our selected equilibrium.

We now present these conditions in detail. The rival’s variables are presented in bold and, to simplify notation, we denote $C(\theta_i, p_{ik})$ as $C_{ik}$. We then place the following:

**Selection Criterion 1** The rival’s offer is separating and the policy is increasing in her type ($p_{hi} \geq p_{li}$).

SC implies that the policy maker will learn the rival lobby’s type from her offer. This is inspired in Maskin and Tirole (1992) who argue that a principal (lobby) has no incentive to withdraw information from the agent in informed principal problems with quasi-linear utility functions. It also states that a high type rival asks for more protection than a low type. This seems to be a reasonable condition since high types have greater willingness to pay for protection. Of course SC restricts the possible conjectures about the rival’s offer. Thus, it works as an equilibrium selection criterion. In Appendix 2 we then present a more formal justification for SC.

The informational problems along with SC are translated into incentive compatibility constraint in the informed lobby problem. As we focus on separating equilibrium and lobbies are privately informed, we must impose incentive compatibility constraints on the lobby. If not, some type of lobby may want to pretend she is a different type. When binding, these constraints will generate distortions in the same spirit of signaling games. The distortions coming from these constraints lead to the signaling effect.

The lobby’s incentive compatibility constraint states that type-($-i$) lobby does not want to offer the contribution schedule of type-$i$ lobby:

$$E[\theta_{-i} \pi (p_{-i}) - C_{-ik}] \geq E[\theta_{-i} \pi (p_{i}) - C_{ik}], \quad (IC_{-i})$$

where $-i \neq i$ is the rival’s type. This constraint ensures that the policy maker can correctly learn the lobby’s type from the contribution schedule.
The lobby’s individual rationality constraint is given by

\[ E [\theta_i \pi (p_i) - C_{ik}] \geq \theta_i \pi (p^e). \]  

(\textit{IR}_i)

Once the rival’s offer is separating, the policy maker will learn the rival’s type when he receives her offer (before implementing the policy). In turn, the policy of the rival is a valuable information for the lobby, thus, she has to screen this information from the policy maker. Screening requires incentive compatibility constraints for the policy maker in the informed lobby problem. This incentive compatibility constraints ensure that he chooses the level of protection according to the true type of the rival lobby. In other words, they ensure that the policy maker chooses the contribution associated with his true marginal cost of tariff:

\[ C_{ik} + C_{ki} + \lambda W (\theta_i, p_{ik}, \theta_k, p_{ki}) \geq C_{i(-k)} + C_{ki} + \lambda W (\theta_i, p_{i(-k)}, \theta_k, p_{ki}), \quad \text{(ICP}_ik) \]

where \(-k \neq k\) is the rival’s fake type.

Notice that constraint (ICP$_{ik}$) leads to two different constraints in the type-$i$ informed lobby problem (one for each possible $k$). The distortions coming from these constraints constitute the screening effect.

Finally, the policy maker’s individual rationality constraint is given by:

\[ C_{ik} + C_{ki} + \lambda W (\theta_i, p_{ik}, \theta_k, p_{ki}) \geq \lambda W (\theta_i, p^e, \theta_k, p^e). \]  

(IRP$_{ik}$)

This constraint says that the policy maker will accept contributions that give him a lower payoff than rejecting both contributions\(^7\).

The type-$i$ informed lobby problem

\[
\max_{C_{ik}, C_{ki}} E [\theta_i \pi (p_i) - C_{ik}]
\]

subject to (IC$_{-i}$), (IRP$_{ik}$), (IR$_i$), (ICP$_{ik}$) and $C_{ik} \geq 0$ for all $-i$ and $k$.

The first task to solve this problem is to identify which of the constraints are binding at the optimal contract. Notice that, when goods are substitutes, the lobby’s marginal cost of protection decreases with the protection in the other market, which means that lobbies’ policies are strategic complements. In other words, a lobby prefers to face a high type opponent because the marginal welfare cost of protection is smaller.

\(^7\)More precisely, the individual rationality constraint should give the policy maker the utility he receives rejecting the contribution of one lobby and accepting the rival’s. However, with substitute goods, this is the same as the utility he receives rejecting both contributions.
Lemma 1 If contribution schedules that satisfy SC, then the lobby’s protection is increasing in the rival’s type, i.e.,

\[ p_{ih} \geq p_{il}. \] (5)

Lemma 1 suggests the direction of the policy maker’s incentive compatibility constraints that should be binding. The policy maker will be prompt to lie and choose protection as if the rival is the low type (i.e., high welfare cost) when he is truly the high type in the absence of proper incentives. Hence, constraints \((ICP_{ih})\) and \((IRP_{il})\) are binding in the type-\(i\) informed lobby problem. Thus, we can eliminate the contribution in (4) and optimize only with respect to the policies \(p_{ik}\) as in the usual cases. However, we cannot say whether constraint \((IC_{-i})\) binds. Moreover, we assume that constraint \((IR_i)\) holds and we must check it ex-post.

Lemma 2 If the contribution schedules satisfy SC and constraints \((IR_{il})\) and \((IC_{ih})\) are binding, then the first-order conditions of the informed lobby problem are given by

\[
\theta_i \pi' (p_{ik}) - \lambda \frac{\partial W}{\partial p^i} (\theta_i, p_{ik}, \theta_k, p_{ki}) + \frac{\mu_{-i}}{1 - \mu_{-i}} \Delta \theta_i \pi' (p_{ik}) + \lambda I (k) \frac{z}{(1 - z)} d (p_{li} - p_{hi}) = 0,
\] (6)

where \(\mu_{-i}\) is the Lagrangian multiplier of \((IC_{-i})\), \(\Delta \theta_i = \theta_i - \theta_{-i}\) and \(I (k)\) is an indicator function such that \(I (l) = 1\) and \(I (h) = 0\).

The first terms of (6) are the lobby’s marginal social benefit and cost of protection, which are the driving forces of the truthful equilibrium characterization. The second term is related to the cost of separation; \(\mu_{-i}\) is the shadow price of a marginal increase in the difference between type-\((-i)\) lobby telling the truth and lying. It captures the necessary distortion to ensure separation. Notice that if \(i = l, \Delta \theta_l < 0\), which means that if the high type wishes to pretend she is the low type, then the low type has to demand less protection to separate herself.

The last term is due to the informational rent the lobby has to leave to the policy maker in order to induce him to tell the truth. In order to save on the informational rent she demands less when facing a low type rival, but that decreases her utility. This is the usual trade-off between allocative efficiency and rent extraction.

4 Information transmission and tariff protection

In this section we define and characterize the equilibrium of the political game and discuss the effects of information transmission on the pattern of protection given
to the lobbies. We divide the section in two parts, one for each value of $\gamma$ that we consider, since the informational effects are quite different for these different technologies.

We begin by defining the equilibrium concept$^8$.

**Definition 3** A symmetric PBE of the political game that satisfies SC for each lobby is a pair of contribution schedules (one for each lobby) that simultaneously solve (4) for every type $i$.

Therefore, the equilibrium is a fixed point of the best responses of the informed lobby problem for all possible type realization.

### 4.1 Capacity constraints ($\gamma = 0$)

When lobbies have capacity constraint $\theta$, the home country supply curve is perfectly inelastic. In this case, Figure 1 would have a vertical supply curve instead and the triangle C would not exist. This means that there is no import substitution, and then different sectors generate the same welfare cost of protection for a given tariff. Thus, the welfare cost comes solely from the decrease in consumption (triangle E in Figure 1). Since the policy maker knows the demands, we have:

**Lemma 3** If contribution schedules satisfy SC, the constraints ($IC_{-i}$) are never binding.

Lemma 3 states that there is no signaling effect in the political game when sectors have capacity constraints. Thus, only the screening constraints are binding.

When demands are interdependent (as in the case of substitute goods), the tariff in one market affects the demand in the other market. Therefore, if a lobby does not know the type of her rival, she does not know the true welfare cost of protection. On the other hand, the policy maker receives contributions that reveal the lobbies’ types before implementing the policy. Thus, the private information of the rival lobby becomes “private information” of the policy maker. The best the lobby can do is to screen the rival’s information through the policy maker.

Figure 2 presents the effect of a tariff increase in its own market and on the other market. For simplicity, suppose that $p^e = 0$. Figure 2 shows a protection increase from $p^1$ to $p^1 + \Delta$ in market 1 and the welfare losses in market 1 for each tariff (the darker triangle is the welfare loss of $p^1$ and the big grey triangle is the welfare loss of $p^1 + \Delta$). A tariff increase in market 1 also shifts positively the demand in market 2, which gives the policy maker an additional tariff revenue

---

$^8$Remember that we are focusing on equilibria that satisfy SC.
given by the grey rectangles. The bigger (and darker) rectangle corresponds to the additional revenue when protection is high in market 2 and the smaller rectangle corresponds to the additional revenue when protection is small.

In order to have protection, a lobby has to compensate the policy maker for the welfare loss caused by the tariff increase. Therefore, the lobby could discount the revenue increase in the other market from the contributions she gives to the policy maker. The problem is that the lobby does not know the tariff in the rival market because she does not know the rival lobby’s type. Since the policy maker will hold the rival’s information, she can only screen this information from the policy maker.

This informational problem exists because the lobby cannot observe the contribution of the rival lobby given that offers are simultaneous. As the policy maker learns information that lobbies do not have, he bargains with lobbies. Thus, the lobby’s inability to observe the contributions of the rival gives the policy maker power to extract informational rents.

When $\gamma = 0$, the first-order conditions of the type-$i$ informed lobby are given by

$$\theta_i - \lambda [b (p_{ih} - p_e) - d (p_{hi} - p_e)] = 0 \quad (7)$$
$$\theta_i - \lambda [b (p_{ih} - p_e) - d (p_{hi} - p_e)] = 0. \quad (8)$$

Notice that the lobby distorts her demand for protection whenever she faces a low type opponent in order to save informational rent she has to give to the policy maker. This explains the following:

**Theorem 1** There exists a symmetric separating pure strategy PBE of the political game with informed lobbies that satisfy SC for each lobby. The equilibrium policies are given by:

$$P_{hh}^S = \tilde{p}_{hh}$$
$$P_{hl}^S = \tilde{p}_{hl} - b \Psi$$
$$P_{lh}^S = \tilde{p}_{lh} - d \Psi$$
$$P_{ll}^S = \tilde{p}_{ll} - (b + d) \Psi,$$

where $\Psi = \frac{z \lambda (d \theta_h)}{\lambda (1 - z) (b^2 - d^2) (b^2 - d^2)}$ and the uppercase $s$ refers to the screening equilibrium policies. The equilibrium contributions are obtained from the binding constraints $(ICP_{ih})$ and $(IRP_{il})$.

Notice that policies decrease, except when both lobbies have high types. The screening effect makes lobbies demand less protection than they do under perfect information.
One important question is how the screening equilibrium compares with the truthful equilibrium. First, the screening effect gives power to the policy maker so that lobbies have to pay informational rents. This informational rent makes lobbies distort their demands downward for protection compared to the truthful equilibrium. Since the latter maximizes the political rents, information transmission dissipates political rents. Moreover, once protection is above the free-trade level in the truthful equilibrium, decreasing protection is welfare enhancing. Thus, information transmission increases welfare compared to the perfect information situation.

**Corollary 1** The welfare of the screening equilibrium of the political game with informed lobbies is higher than the welfare of the truthful equilibrium of the political game under perfect information.

### 4.2 Linear marginal cost ($\gamma = 1$)

When $\gamma = 1$, the profit function is given by $\theta \pi (p) = \theta p^2$ and the home supply is given by $y(\theta, p) = \theta p$, which is more elastic the higher is $\theta$. Different elasticities of supply imply in different welfare costs of protection as shown in Figure 3.

Figure 3 shows that more competitive sectors generate higher welfare costs than less competitive ones. The policy maker, however, does not know the true value of $\theta$. Therefore, high type lobbies may wish to pretend they are low types in order to give small contributions for the tariff increase. If both types of lobby offer the same contribution, the policy maker cannot learn the lobbies’ types and has to ask for a compensation for protection that is equal to the average welfare cost. This leads to a signaling problem: the low type lobby has to separate herself to allow the policy maker to learn her type. Then, she pays for the true cost of her protection, which is smaller than the average cost.

The more competitive are the sectors the higher the welfare cost for the same tariff protection because sectors substitute more the imports for a given tariff. Import substitution is harmful because home consumers buy a good produced at a higher marginal cost than the international price. Since the high type causes higher welfare costs, we have the following:

**Lemma 4** If contribution schedules satisfy $SC$, then the constraint ($IC_l$) is never binding.

Lemma 4 implies that only low type lobbies may have to bear the cost of separation in equilibrium. The first-order conditions of the low type informed
lobby problem are then given by
\[
\theta_l p_h - \lambda \frac{\partial W}{\partial p_h} (\theta_l, p_h, \theta_h, p_{hl}) - \frac{\mu \Delta \theta_h}{1 - \mu} p_{lh} = 0 \quad (9)
\]
\[
\theta_l p_l - \lambda \frac{\partial W}{\partial p_l} (\theta_l, p_h, \theta_h, p_{hl}) - \frac{\mu \Delta \theta_h}{1 - \mu} p_{lh} + \lambda d \frac{z}{1 - z} (p_{hl} - p_{lh}) = 0. \quad (10)
\]

The first-order conditions for the high type are analogous but with no signaling term. Notice also that \(\mu = \mu_h\) since only constraint \((IC_h)\) can be binding.

The low type lobby may be forced to separate herself from the high type and she does so by offering a contribution that demands less protection from the policy maker. We then have:

**Theorem 2** There exists a symmetric separating PBE of the political game with informed lobbies that satisfy SC for each lobby. Moreover, if the constraint \((IC_h)\) is binding, the equilibrium policies are such that:

\[
\begin{align*}
\bar{p}_{hh}^* &= \bar{p}_{hh} \\
\bar{p}_{hl}^* &< \bar{p}_{hl} \\
\bar{p}_{lh}^* &< \bar{p}_{lh} \\
\bar{p}_{ll}^* &< \bar{p}_{ll},
\end{align*}
\]

where the uppercase * indicates the equilibrium policy. The equilibrium contributions are computed from the binding constraints \((ICP_h)\) and \((IRP_l)\).

Theorem 2 shows that the signaling effect reinforces the screening effect by reducing the protection for low type lobbies; \(p_{hl}^*\) decreases due to the strategic complementarity and \(p_{hh}^*\) remains the same. The signaling effect on the equilibrium policies can be better understood when \(d = 0\) (i.e., no screening effect case):

\[
\begin{align*}
\bar{p}_{hh}^* &= \frac{\theta_h p^e}{\lambda (b + \theta_h) - \theta_h} + p^e = \bar{p}_{hi} \\
\bar{p}_{lh}^* &= \frac{\left(\theta_l - \frac{\mu (\Delta \theta_h)}{1 - \mu^*}\right) p^e}{\lambda (b + \theta_l) - \theta_l + \frac{\mu (\Delta \theta_h)}{1 - \mu^*}} < \bar{p}_{li}.
\end{align*}
\]

In this case the high type does not distort her protection while the low type’s protection falls to achieve separation.

**Corollary 2** The welfare of the equilibrium of the political game with informed lobbies is higher than the welfare of the equilibrium of the political game under perfect information.
Therefore, the existence of private information within the lobby groups generates two informational problems on the political game that reduce the lobbies' influence on the policy maker. Hence, tariffs decrease, imports increase and the welfare of the society increases.

5 Equilibrium discussion

In this section we discuss important properties of the equilibrium of this game.

We modified the GH model by introducing private information on the lobbies preferences but also we introduced substitutability between the lobbies goods. Substitutability is a key ingredient in this model. Suppose \( d = 0 \) and \( \gamma = 0 \), in such case the equilibrium policies would be the same as in the truthful equilibrium (because \( \Psi = 0 \)). When \( d = 0 \) the policy maker’s preferences are separable in the lobbies policies. Hence, private information on the lobbies preferences only distorts the political game when the policy maker’s preference is no separable.

Non-separability of the policy maker’s preferences is a common element in lobby games. For example, consider a model where the policy maker has to decide where to allocate a scarce resource among different firms that can lobby (like in Esteban and Ray (2007)). Since the resource is scarce, one unit allocated to one sector reduces the available resources to the other sectors. Thus, the policy maker’s preference would also be non-separable.

We claimed the signaling effect comes from the fact that the policy maker does not know the type of each lobby. But, this information asymmetry only affects the equilibrium when the policy maker’s marginal cost depends on the type of the lobby. Hence, the policy maker does not know his own marginal cost (i.e., this is a common value model). Therefore, the fact that the policy maker cares about the firms’ profits is a key element for the signaling effect. Moreover, it must be the case that the lobby’s type affects the marginal cost of welfare, which does not happen when \( \gamma = 0 \). Common value is the natural case in political games if the policy maker cares about the welfare of the society.

Another important difference of this equilibrium from the one found in GH concerns the distribution of the political game’s surplus. When a type–\( i \) lobby faces a high type rival she leaves rents for the policy maker since contributions are computed from the binding constraint (\( ICP_{ih} \)) in this state. In the GH model, when lobbies are highly concentrated, the policy maker does not extract any political rent. Here we show that when lobbies are concentrated but have private information, the policy maker is able to extract informational rents in some states of nature. Consequently, lobbies loose from the reduction in overall political rents and from having to leave some of these rents to the policy maker when compared
Moreover, Corollaries 1 and 2 sharply contrast with the results of Esteban and Ray (2007). They have a model where a “well intentioned” policy maker fails to allocate productive resources efficiently to lobbying firms because of information asymmetry, while we show that information asymmetry may reduce the harm of lobbying and improve the payoff of the policy maker. Our results are contrasts from their because of the preferences of the policy maker. While they model the policy maker as a welfare minded agent, we model him as an agent who is willing to trade welfare for contributions. Therefore, in their paper lobbying is potentially positive, since it may reveal useful information to the policy maker, while in our paper lobbying is essentially a rent-seeking activity.

This comparison stresses the nature of the results of Corollaries 1 and 2. Since we model lobbying as a rent-seeking activity, it is by construction a harmful activity for the society. Therefore, asymmetric information hinders an activity that harms the society’s welfare.

Equilibrium Properties

We now discuss the equilibrium selection that was implicit in our approach.

The Selection Criterion (SC) restricts the possible conjectures each lobby has about the contributions of her rival. Clearly this criterion helps us select the most informative equilibrium of this game. By “informative” we mean the equilibrium where all players endogenously learn the information of the others. Therefore, our Selection Criterion can be understood as bound for the surplus that can be obtained in a game where players noncooperative learn each other’s information, i.e., a decentralized equilibrium where the information is fully transmitted.

How about other types of equilibrium that could emerge in this political game? The first one we can think of is the pooling equilibrium, where different types of lobby offer the same contribution and ask for the same policy. In such case, the policy maker would not learn the lobbies types and would not be able to screen any information from them. However, in a pooling equilibrium different types of lobbies get the same policy. Thus, this policy cannot be optimal for both types since they have different willingness to pay for protection. Hence, at least one type would like to separate herself by sending a signal that reveals her type to the policy maker and asking for a different protection. This would give her a higher payoff. Intuitively, this argument suggests that a pooling equilibrium would not survive the intuitive criterion. In Appendix B we characterize the contribution schedules that are interim efficient in the informed lobby problem. In particular, no pooling contribution schedule would survive this criterion.

Another type of equilibrium that could arise is one where lobbies offer a “pile” of contribution schedules that are conditional on a signal she would send to the policy
maker after the contribution is accepted. Delaying the revelation of information could help the lobby relaxing the policy maker’s incentive constraints, as shown by Maskin and Tirole (1990). In Appendix B, we show that such contributions would give the lobby the same payoffs as the contributions that reveal the lobby’s information directly, like the ones considered in Section 3. Therefore, delaying information revelation does not give the lobbies any advantage compared to our equilibrium.

Therefore, the Selection Criterion SC helps us to find the contribution schedules that survive the intuitive criterion. It can be interpreted as a bound for the political surplus that can be obtained in a fully separating equilibrium.

6 Conclusion

We modified Grossman and Helpman (1994) assuming that the technology of productive sectors is the private information of the lobbies. This new element introduces private information on the lobbies’ preferences in the political game which allows us to analyze the effects of information transmission in the political game for influence.

The information transmission causes two asymmetric information problems. The first one is the screening problem. It comes from the fact that one lobby does not know how much protection her rival is going to receive together with non-substitutability of the policy maker’s preferences. This implies that the lobby does not know the marginal welfare cost of the her protection. Thus, she has to screen the rival’s type from the policy maker. Screening makes lobbies to leave informational rents to the policy maker and to ask for less protection.

The second informational problem is the signaling problem. The policy maker does not know the lobbies’ types while the cost of protection depends on this information. This gives the opportunity for sectors that cause high welfare costs (the more competitive sectors) to pretend they are less competitive in order to give less contribution to the policy maker. Thus, the less competitive sectors have to separate their contributions in order to allow the policy maker to learn the true types from the contributions he receives. Separation makes low type lobbies ask for less protection.

Both information transmission effects reduce the lobbies’ ability to influence. Thus, they demand less protection when compared with the perfect information game. Hence, information transmission reduces the lobbying activity, which increases the society’s welfare since lobbying is a rent-seeking activity (as in GH). Moreover, information transmission allows the policy maker to extract informational rents, thus it also changes the division of surplus in the political game against
the lobbies.

The results of this paper raise some questions. The first is about transparency. It is commonly argued that transparency in the relationship between governments and lobbies is good for the society, what sharply contrasts with the results found here. The arguments in favor of transparency are traditionally based on the accountability of politician on elections (see Coate and Morris, 1995), something that we do not consider in this paper. Nonetheless, we showed that the absence of information asymmetry can harm the society, what suggests a trade-off between better accountability versus less information transmission in political games.

A second question concerning the role of information transmission when policy makers use different policy instruments, such as non tariff barriers. With such instruments, the government does not have the tariff revenue, thus the screening effect may be different. One important issue is that with such instruments, the size of imports matters, not only the market elasticities, as pointed out by Maggi and Rodrigues-Clare (2000). Therefore, different instruments should generate different effects given the information transmission problem.

References


Appendix A - Proofs

Proof of Lemma 1. Constraint (ICP$_h$) is

$$C_{ih} + C_{hi} + \lambda W(\theta_i, p_{ih}, \theta_h, p_{hi}) \geq C_{il} + C_{li} + \lambda W(\theta_i, p_{il}, \theta_l, p_{li})$$

which can be rewritten as

$$C_{ih} - C_{il} \geq \lambda [W(\theta_i, p_{il}, \theta_l, p_{li}) - W(\theta_i, p_{ih}, \theta_h, p_{hi})]. \quad (L1-1)$$

Constraint (ICP$_l$) is

$$C_{il} + C_{li} + \lambda W(\theta_i, p_{il}, \theta_l, p_{li}) \geq C_{ih} + C_{li} + \lambda W(\theta_i, p_{il}, \theta_l, p_{li})$$

which can be rewritten as

$$C_{ih} - C_{il} \leq \lambda [W(\theta_i, p_{il}, \theta_l, p_{li}) - W(\theta_i, p_{ih}, \theta_h, p_{hi})]. \quad (L1-2)$$

Putting (L1-1) and (L1-2) together, we get

$$W(\theta_i, p_{il}, \theta_l, p_{li}) - W(\theta_i, p_{il}, \theta_l, p_{li}) \geq W(\theta_i, p_{ih}, \theta_h, p_{hi}) - W(\theta_i, p_{ih}, \theta_h, p_{hi}).$$

This last inequality can be written as

$$\int_{p_{ih}}^{p_{il}} \frac{\partial W}{\partial p_1}(\theta_i, s, \theta_l, p_{li}) \, ds - \int_{p_{il}}^{p_{ih}} \frac{\partial W}{\partial p_1}(\theta_i, s, \theta_h, p_{hi}) \, ds \geq 0$$
or as
\[
\int_{p_{ih}}^{p_{hi}} \left[ \int_{p_{hi}}^{p_{ih}} \frac{\partial^2 W}{\partial p^1 \partial p^2} (\theta_i, s, \theta_i, \tilde{p}) \, d\tilde{p} + \int_{\theta_i}^{\theta_i} \frac{\partial^2 W}{\partial \theta^2 \partial p^1} (\theta_i, s, \tilde{\theta}, p_{hi}) \, d\tilde{\theta} \right] \, ds \geq 0.
\]

From (1) we have that
\[
\frac{\partial^2 W}{\partial \theta^2 \partial p^1} (\theta^1, p^1, \theta^2, p^2) = 0
\]
and
\[
\frac{\partial^2 W}{\partial p^1 \partial p^2} (\theta^1, p^1, \theta^2, p^2) = d.
\]

Hence, since \( p_{hi} \geq p_{li} \), \[ \int_{p_{hi}}^{p_{hi}} \left[ \int_{p_{hi}}^{p_{hi}} \frac{\partial^2 W}{\partial p^1 \partial p^2} (\theta_i, s, \theta_i, \tilde{p}) \, d\tilde{p} \right] \, ds \geq 0 \] if and only if \( p_{ih} \geq p_{il} \), which proves the lemma. \( \blacksquare \)

**Proof of Lemma 2.** Provided that constraints \((IRP_d)\) and \((ICP_h)\) are binding, the contributions must be given by

\[
C_{il} = -C_{li} - \lambda \left[ W(\theta_i, p_{id}, \theta_i, p_{li}) - W(\theta_i, p^e, \theta_i, p^e) \right] \tag{L2-1}
\]

and

\[
C_{ih} = C_{il} - \lambda \left[ W(\theta_i, p_{ih}, \theta_h, p_{hi}) - W(\theta_i, p_{il}, \theta_h, p_{hi}) \right]. \tag{L2-2}
\]

We plug these contributions into the lobby’s utility function in (4) to get

\[
\max_{p_{ih},p_{il}} \{ \theta_i \pi'(p_{ih}) + \lambda \left[ W(\theta_i, p_{ih}, \theta_h, p_{hi}) - W(\theta_i, p^e, \theta_i, p^e) \right] \}
\]
\[
+ (1 - z) \{ \theta_i \pi'(p_{il}) + \lambda \left[ W(\theta_i, p_{il}, \theta_l, p_{li}) - W(\theta_i, p^e, \theta_i, p^e) \right] \}
\]
\[
- z \lambda \left[ W(\theta_i, p_{il}, \theta_l, p_{li}) + W(\theta_i, p_{il}, \theta_l, p_{li}) \right] + C_{li}
\]
s.t. \((IC_{-i})\).

The first-order conditions of this problem are

\[
\theta_i \pi'(p_{ih}) - \lambda \frac{\partial W}{\partial p^1} (\theta_i, p_{ih}, \theta_h, p_{hi}) - \mu_{-i} \left[ \theta_{-i} \pi'(p_{ih}) - \lambda \frac{\partial W}{\partial p^1} (\theta_{-i}, p_{ih}, \theta_h, p_{hi}) \right] = 0 \tag{L2-3}
\]

\[
\theta_i \pi'(p_{id}) - \lambda \frac{\partial W}{\partial p^1} (\theta_i, p_{id}, \theta_i, p_{li}) + \frac{z \lambda d}{1 - z} \left[ (p_{li} - p^e) - (p_{il} - p^e) \right]
\]
\[
- \mu_{-i} \left[ \theta_{-i} \pi'(p_{id}) - \lambda \frac{\partial W}{\partial p^1} (\theta_{-i}, p_{id}, \theta_l, p_{li}) \right] - \mu_{-i} \frac{z \lambda d}{1 - z} \left[ (p_{li} - p^e) - (p_{il} - p^e) \right] = 0. \tag{L2-4}
\]
We add and subtract the term $\mu_i \pi'(p_{ih})$ in (L2-3) and add and subtract the term $\mu_i \pi'(p_{il})$ in (L2-4), and then divide both by $(1 - \mu_i)$ to get

$$\theta_i \pi'(p_{ih}) - \lambda \frac{\partial W}{\partial p^i} (\theta_i, p_{ih}, \theta_h) + \frac{\mu_i}{1 - \mu_i} \Delta \theta_i \pi'(p_{ih}) = 0$$

and

$$\theta_i \pi'(p_{il}) - \lambda \frac{\partial W}{\partial p^i} (\theta_i, p_{il}, \theta_l, p_{li}) + \frac{\mu_i}{1 - \mu_i} \Delta \theta_i \pi'(p_{il}) + \frac{z \lambda d}{1 - z} (p_{li} - p_{lh}) = 0,$$

which imply condition (6).

**Proof of Lemma 3.** Let $p_{ik} = p(\theta_i, \theta_k)$ and $C_{ik} = C_k(\theta_i, p(\theta_i, \theta_k))$ be a solution of problem (4) satisfying SC.

We have to show that when $\gamma = 0$, constraints $(IC_{-i})$ are not binding. Therefore, it must be that the utility of the type-$i$ lobby is greater than the utility when she mimics type-($-i$):

$$E[V(\theta_i, p(\theta_i, .), C(\theta_i, p(\theta_i, .), .))] \geq E[V(\theta_i, p(\theta_{-i}, .), C(\theta_{-i}, p(\theta_{-i}, .), .))].$$

We will write this inequality artificially as if the lobby could lie to the policy maker and announce any type $\tilde{\theta} \in [\theta_l, \theta_h]$. That is, we extend $\theta \in [\theta_l, \theta_h]$ to be a continuous variable, which greatly simplifies this proof.

The policies for the intermediate values of $\tilde{\theta} \left(p(\tilde{\theta}, .)\right)$ are implicitly computed applying the implicit function theorem on a modified version of (6), replacing $\theta_i$ by $\tilde{\theta}$, for the case $\mu_{-i} = 0$. That is, we apply the implicit function theorem on:

$$\tilde{\theta} \pi'(\tilde{\theta}, \theta_k) - \lambda \frac{\partial W}{\partial p^i} (\tilde{\theta}, p(\tilde{\theta}, \theta_k), \theta_k, p_{ki}) + \lambda I(k) \frac{z}{1 - z} d(p_{li} - p_{hi}) = 0.$$

Notice that we can apply the implicit function theorem since, from Assumption 2, the program (4) is strictly concave.

The contribution when the rival lobby is the low type, $(C_l(\tilde{\theta}, p(\tilde{\theta}, \theta_l)))$ is computed from (L2-1) and the contribution when the rival is the high type $(C_h(\tilde{\theta}, p(\tilde{\theta}, \theta_h), p(\tilde{\theta}, \theta_l)))$ is computed from (L2-2) by replacing $p_{ik}$ for $p(\tilde{\theta}, \theta_k)$, for every $k$. Therefore, $p(\tilde{\theta}, .)$ is a differentiable function of $\tilde{\theta}$ and the contributions are differentiable functions of $\tilde{\theta}$ and $p(\cdot)$.

Thus, constraints $(IC_{-i})$ can be equivalently written as

$$E \left[ \int_{\tilde{\theta}_{-i}}^{\theta_i} \frac{\partial V}{\partial \tilde{\theta}} (\theta_i, p(\tilde{\theta}, .), C(\tilde{\theta}, p(\tilde{\theta}, .), p(\tilde{\theta}, .))) d\tilde{\theta} \right] \geq 0,$$  \hfill (11)
where the expectation is taken with respect to the rival’s type. Notice that although the announced types change, the lobby’s true type remains the same.

In turn, we have

\[
\begin{align*}
\frac{\partial V}{\partial \tilde{\theta}}(\theta_i, p(\tilde{\theta}, \theta_h), C_h) &= \left( \theta_i - \frac{\partial C_h}{\partial p^i} \right) \frac{\partial p}{\partial \tilde{\theta}}(\tilde{\theta}, \theta_h) - \frac{\partial C_h}{\partial p^i} \frac{\partial p}{\partial \tilde{\theta}}(\tilde{\theta}, \theta_h), \\
\frac{\partial V}{\partial \tilde{\theta}}(\theta_i, p(\tilde{\theta}, \theta_l), C_l) &= \left( \theta_i - \frac{\partial C_l}{\partial p^i} \right) \frac{\partial p}{\partial \tilde{\theta}}(\tilde{\theta}, \theta_l) - \frac{\partial C_l}{\partial p^i} \frac{\partial p}{\partial \tilde{\theta}},
\end{align*}
\]

where we suppressed the arguments of the contribution function.

Since \(p(\tilde{\theta}, .)\) satisfies (6) for every \(\tilde{\theta}\), when \(\gamma = 0\) we get that

\[
\begin{align*}
\tilde{\theta} &= \frac{\partial C_h}{\partial p^1} (\tilde{\theta}, p(\tilde{\theta}, \theta_h), \theta_h, p_{hi}) \\
\tilde{\theta} &= \frac{\partial C_l}{\partial p^1} (\tilde{\theta}, p(\tilde{\theta}, \theta_l), \theta_l, p_{li}) + \frac{z}{1 - z} \frac{\partial C_h}{\partial p^2} (\tilde{\theta}, p(\tilde{\theta}, \theta_h), \theta_h, p_{hi}) - \frac{\partial C_l}{\partial p^2} (\tilde{\theta}, p(\tilde{\theta}, \theta_l), \theta_l, p_{li}).
\end{align*}
\]

Hence, the derivatives of the lobby’s utility with respect to the policy simplify to

\[
\begin{align*}
\frac{\partial V}{\partial \tilde{\theta}}(\theta_i, p(\tilde{\theta}, \theta_h), C_h) &= \left( \theta_i - \tilde{\theta} \right) \left( \frac{\partial p}{\partial \tilde{\theta}} - \frac{\partial C_h}{\partial p^i} \frac{\partial p}{\partial \tilde{\theta}} - \frac{\partial C_h}{\partial p^i} \frac{\partial p}{\partial \tilde{\theta}} \right), \\
\frac{\partial V}{\partial \tilde{\theta}}(\theta_i, p(\tilde{\theta}, \theta_l), C_l) &= \left( \theta_i - \tilde{\theta} \right) \left( \frac{\partial p}{\partial \tilde{\theta}} - \frac{\partial C_l}{\partial p^i} \frac{\partial p}{\partial \tilde{\theta}} \right) + \frac{z}{1 - z} \frac{\partial C_h}{\partial p^2} \frac{\partial p}{\partial \tilde{\theta}}.
\end{align*}
\]

Substituting them back into condition (11) gives

\[
E \left[ \int_{\theta_i}^{\theta_h} \left( \theta_i - \tilde{\theta} \right) \frac{\partial p}{\partial \tilde{\theta}} (\tilde{\theta}, .) - \frac{\partial C}{\partial \tilde{\theta}} d\tilde{\theta} \right] \geq 0. \tag{12}
\]

Moreover, when \(\gamma = 0\), the welfare function is given by

\[
W(\tilde{\theta}, p(\tilde{\theta}, \theta_k), \theta_k, p_{ki}) = A - \frac{b}{2} \left( p(\tilde{\theta}, \theta_k) - p^e \right)^2 + d \left( p(\tilde{\theta}, \theta_k) - p^e \right) (p_{ki} - p^e) - \frac{b}{2} (p_{ki} - p^e)^2 + \tilde{\theta} p^e + \theta_k p^e,
\]

where \(A\) is a constant that depends only on the parameters \(a, b\) and \(d\).
This implies that
\[ \frac{\partial W}{\partial \tilde{\theta}}(\tilde{\theta}, p, \theta_k, p) = p^e. \] (13)

Since contributions are computed from (L2-1) and (L2-2), equation (13) implies that \( \frac{\partial C_i}{\partial \tilde{\theta}} = \frac{\partial C_h}{\partial \tilde{\theta}} = 0 \).

Therefore, condition (12) becomes
\[ E \left[ \int_{\tilde{\theta}}^{\theta_i} (\theta - \tilde{\theta}) \frac{\partial p}{\partial \tilde{\theta}} (\tilde{\theta}, \cdot) d\tilde{\theta} \right] \geq 0. \]

The above inequality holds since \( \theta_i > \theta_{-i} \) if and only if
\[ (\theta_i - \tilde{\theta}) \frac{\partial p}{\partial \tilde{\theta}} (\tilde{\theta}, \cdot) \geq 0, \]
for all \( \tilde{\theta} \in [\theta_i, \theta_{-i}] \). Therefore, the lobby is always better-off telling the truth and constraints \((IC_{-i})\) are not binding when \( \gamma = 0 \).

Proof of Theorem 1. The first-order conditions of the informed lobby problem (7) and (8) for lobby 1 and 2 constitute a system of linear equations that can be written in a matrix form. We will solve this system for each state of nature, i.e., for each realization \((\theta_i, \theta_k)\) of the lobby’s types. When both lobbies are high types (state \((\theta_h, \theta_h)\)), we have the following system:
\[
\begin{bmatrix}
-\lambda b & \lambda d \\
\lambda d & -\lambda b
\end{bmatrix}
\begin{bmatrix}
p_{1hh}^1 - p^e \\
p_{2hh}^2 - p^e
\end{bmatrix}
= \begin{bmatrix}
-\theta_h \\
-\theta_h
\end{bmatrix}.
\]

There is always a solution since the determinant of the coefficient matrix is \((\lambda b)^2 - (\lambda d)^2 > 0\) (remember that, by Assumption 2, \( b (1 - z) > d \)).

Given the solution at state \((\theta_h, \theta_h)\), we have a similar system of the first-order conditions for the state \((\theta_l, \theta_l)\) given by
\[
\begin{bmatrix}
-\lambda b (1 - z) & \lambda d \\
\lambda d & -\lambda b
\end{bmatrix}
\begin{bmatrix}
p_{1ll}^1 - p^e \\
p_{2ll}^2 - p^e
\end{bmatrix}
= \begin{bmatrix}
-\theta_l (1 - z) + z \lambda d (p_{1hh}^e - p^e) \\
-\theta_l (1 - z)
\end{bmatrix},
\]

which has a positive determinant for the same reason as in the case of the previous system. We also have a symmetric system for state \((\theta_l, \theta_h)\).

Given the solution of the previous systems, we have the system of the first-order conditions for state \((\theta_l, \theta_l)\) given by:
\[
\begin{bmatrix}
-\lambda b (1 - z) & \lambda d \\
\lambda d & -\lambda b (1 - z)
\end{bmatrix}
\begin{bmatrix}
p_{1ll}^1 - p^e \\
p_{2ll}^2 - p^e
\end{bmatrix}
= \begin{bmatrix}
-\theta_l (1 - z) + z (p_{1hh}^e - p^e) \\
-\theta_l (1 - z) + z (p_{2hh}^e - p^e)
\end{bmatrix}.
\]
The determinant of the coefficient matrix is given by 
\[ (\lambda (1 - z) b^2 - (\lambda d)^2 > 0 \] 
(again by Assumption 2). Therefore, there exists a solution for the systems at 
states \((\theta_h, \theta_l), (\theta_h, \theta_l), (\theta_l, \theta_h)\) and \((\theta_l, \theta_l)\). To compute the expression of equilibrium 
policies we just have to solve the systems.

The equilibrium contributions are given by \(L2-1\) and \(L2-2\) calculated at 
these equilibrium policies.

We now have to check whether SC is satisfied for this equilibrium. First notice 
that the equilibrium policies are increasing in the lobby’s own type since

\[ p_{hk}^* - p_{lk}^* = \frac{b \Delta \theta_h}{\lambda (b^2 - d^2)} + \frac{zbd^2 \Delta \theta_h}{\lambda ((1 - z) b^2 - d^2) (b^2 - d^2)} > 0, \text{ for all } k. \]

Thus, SC is verified in equilibrium.

Also, we have to check whether no other constraints other than \(IRP_d\) and 
\(ICP_{ih}\) are violated at the equilibrium. We begin noticing that the rent of the 
policy maker is increasing in the lobbies’ types in equilibrium. This is so because 
the equilibrium contributions are computed from the policy maker’s constraints. 
In state \((\theta_l, \theta_l)\), \(IRP_d\) is binding, and, the policy maker receives his reserve utility. 
Since \(ICP_{ih}\) is binding, then the policy maker also receives his reserve utility in 
states \((\theta_h, \theta_l)\) and \((\theta_l, \theta_h)\). Since constraint \(ICP_{ih}\) is binding the policy maker 
receives some rent when both lobbies are high types. Therefore, the policy maker’s 
utility is increasing in the lobbies’ types.

Therefore, we have:

\[
U(\theta_t, p_{th}, C_{th}, \theta_h, \theta_{hi}, \theta_{hi}, C_{hi}) - U(\theta_t, p^e, 0, \theta_h, p^e, 0) \geq
U(\theta_t, p_{th}, C_{th}, \theta_l, p_{li}, C_{li}) - U(\theta_t, p^e, 0, \theta_l, p^e, 0). \tag{14}
\]

This can be written as

\[
C_{il} + C_{hi} + \lambda [W(\theta_t, p_{th}, \theta_h, \theta_{hi}, p_{hi}) - W(\theta_l, p^e, \theta_h, p^e)] \geq
C_{il} + C_{hi} + \lambda [W(\theta_t, p_{th}, \theta_l, \theta_{li}, p_{li}) - W(\theta_l, p^e, \theta_l, p^e)]. \tag{15}
\]

From constraint \(ICP_{ih}\), we have that

\[
C_{ih} + C_{hi} + \lambda [W(\theta_t, p_{th}, \theta_h, \theta_{hi}, p_{hi}) - W(\theta_t, p^e, \theta_h, p^e)] \geq
C_{il} + C_{hi} + \lambda [W(\theta_t, p_{th}, \theta_l, \theta_{li}, p_{li}) - W(\theta_l, p^e, \theta_h, p^e)] \tag{ICP_{ih}}
\]

and, from constraint \(IRP_d\), we have that

\[
C_{il} + C_{li} + \lambda [W(\theta_t, p_{th}, \theta_l, \theta_{hi}, p_{hi}) - W(\theta_t, p^e, \theta_l, p^e)] \geq 0. \tag{IRP_d}
\]

From (15), \(ICP_{ih}\) and \(IRP_d\), we have that

\[
C_{ih} + C_{hi} + \lambda [W(\theta_t, p_{th}, \theta_h, \theta_{hi}, p_{hi}) - W(\theta_t, p^e, \theta_h, p^e)] \geq 0. \tag{16}
\]
Therefore, the fact that the policy maker’s rent is increasing, (15), together with \((IRP_{ih})\) and \((ICP_{il})\) binding constraint ensure that \((IRP_{ih})\) is satisfied in equilibrium.

Since \((ICP_{ih})\) is binding, condition \((L1-1)\) holds with equality and, which allow us to compute the contribution \(C_{ih}\). Since \((L1-1)\) is binding and policies are increasing in the lobbies types, then \((L1-2)\) holds with inequality, thus \((ICP_{il})\) is not binding. Thus, the set of binding constraints we postulated ex ante hold in equilibrium.

**Proof of Corollary 1.** We must compare the expected welfare at the screening equilibrium with the welfare at the truthful equilibrium. Since preferences are quasi-linear and concave, the distribution of contributions do no affect the size of the society’s welfare. Therefore, we must only compare the expected welfare evaluated at the equilibrium policies, that is, to compare \(E[W(\theta, \bar{p}, \theta, \bar{p})]\) with \(E[W(\theta, \bar{p}^S, \theta, p^S)]\), where the expectation is taken with respect to lobbies’ types.

We will compare the welfare function evaluate at the truthful equilibrium with the welfare function evaluated at the screening equilibrium, state by state. At state \((\theta_h, \theta_h)\) the policies are the same in both truthful and in the screening equilibria. Therefore, the welfare of the society is also the same. The policies at other states are such that

\[
\begin{align*}
\bar{p}_{hl}^S &= \frac{\theta_h b \left((1-z)b-d\right)}{b-d} + \theta_l d \lambda((1-z)b^2 - d^2) + p^e < \bar{p}_{hl} \\
\bar{p}_{lh}^S &= \frac{\theta_l b (1-z) + \theta_h d \left((1-z)b-d\right)}{b-d} + p^e < \bar{p}_{lh} \\
\bar{p}_{ll}^S &= \frac{\theta_l ((1-z)b + d) - \theta_h d \left(\frac{b}{b-d}\right)}{b^2 - d^2} + p^e < \bar{p}_{ll}.
\end{align*}
\]

The maximum welfare for the society is given by the free trade equilibrium. In turn, this implies that \(\frac{\partial W}{\partial p_n} < 0\) for all \(p > p^e\). At states \((\theta_h, \theta_l)\) and \((\theta_l, \theta_h)\) policies of the screening equilibrium are such that

\[
\bar{p}_{hl} > \bar{p}_{hl}^S, \quad \bar{p}_{lh} > \bar{p}_{lh}^S, \quad \bar{p}_{ll} > \bar{p}_{ll}^S, \quad p^e < \bar{p}_{hl},
\]

i.e., they are below the truthful policies and above international prices (because \((1-z)b > d\)). Therefore, the welfare of the screening equilibrium is higher than at the truthful equilibrium at these states.

At state \((\theta_l, \theta_l)\) policies are also below the truthful policies, but they can fall below international prices as well. Thus, to show that the welfare of the political
game in this state is greater in than the truthful equilibrium, we must compare the welfare of the two equilibria by directly looking at the expressions, that is,

$$W(\theta_l, \bar{p}_l, \bar{p}_l) \leq W(\theta_l, \bar{p}_l^S, \theta_l, \bar{p}_l^S).$$

Given our functional forms, the last inequality is equivalent to

$$(\bar{p}_l - p^e)^2 - (\bar{p}_l^S - p^e)^2 \geq 0.$$  

Since $p^*_l < \bar{p}_l$, we must have

$$(\bar{p}_l - p^e)^2 \geq (\bar{p}_l^S - p^e)^2.$$  

If $p^*_l > p^e$ the above inequality holds. However, it is possible that $p^*_l < p^e$, in which case the above inequality becomes

$$\bar{p}_l - p^e \geq p^e - \bar{p}_l^S.$$  

Replacing the policies by their closed form values, the inequality becomes

$$\frac{\theta_l (b + d)}{\lambda (b^2 - d^2)} \geq -\frac{\theta_l (b + d)}{\lambda (b^2 - d^2)} + \frac{zbd (\Delta \theta_h) (b + d)}{\lambda ((1 - z) b^2 - d^2)(b^2 - d^2)}.$$  

which we can rewrite as

$$\frac{2\theta_l (b + d)}{\lambda (b^2 - d^2)} > \frac{zbd (\Delta \theta_h) (b + d)}{\lambda ((1 - z) b^2 - d^2)(b^2 - d^2)}.$$  

After some algebra, the last expression simplifies to

$$\frac{(1 - z) b^2 - d^2}{zbd} > \frac{\Delta \theta_h}{2\theta_l^2}.$$  

By Assumption 1 this inequality holds. Therefore, in state $(\theta_l, \theta_l)$ the welfare is greater than in the truthful equilibrium, which proves the corollary.  

**Proof of Lemma 4.** Let $p_{ik} = p(\theta_i, \theta_k)$ and $C_{ik} = C_k(\theta_i, p(\theta_i, \theta_k))$ be the solution to (4) satisfying SC.

We have to show that constraint $(IC_1)$ is not binding. We will use the same approach of the proof of Lemma 3, except that we consider the case where $\gamma = 1$. What we have to show is that

$$E[V(\theta_l, p(\theta_l, .), C(\theta_l, p(\theta_l, .))) \geq E[V(\theta_l, p(\theta_h, .), C(\theta_h, p(\theta_h, .))].$$

Again we compute policies $\left(p \left(\tilde{\theta}, .\right)\right)$ from (6) replacing $\theta_i$ by $\tilde{\theta} \in [\theta_l, \theta_h]$. The contributions when the rival is the low type, $\left(C_l \left(\tilde{\theta}, p \left(\tilde{\theta}, \theta_l\right)\right)\right)$ is computed from
(L2-1) replacing \( p_{ik} \) by \( p(\hat{\theta}, \theta_k) \) and the contributions when the rival is the high type, \( (C_h(\theta_h, p(\hat{\theta}, \theta_h), p(\tilde{\theta}, \theta_i))) \) is computed from (L2-2) again replacing \( p_{ik} \) by \( p(\hat{\theta}, \theta_k) \). Moreover, all functions are differentiable in their arguments. Thus, the inequality above can be expressed as

\[
E \left[ \int_{\theta}^{\theta_h} \frac{\partial V}{\partial \theta} (\theta_i, p(\hat{\theta}, \tilde{\theta}), C. (\hat{\theta}, p(\hat{\theta}, \tilde{\theta})) d\hat{\theta} \right] \geq 0. \tag{17}
\]

The derivative of the lobby’s utility is given by

\[
\frac{\partial V}{\partial \theta} (\theta_i, p(\hat{\theta}, \theta_h), C_h) = \left( \frac{\partial C_h}{\partial \theta} \right) \frac{\partial p}{\partial \theta} (\hat{\theta}, \theta_h) - \frac{\partial C_h}{\partial \theta} - \frac{\partial C_h}{\partial \theta} = \frac{\partial C_h}{\partial \theta} (\hat{\theta}, \theta_i)
\]

\[
\frac{\partial V}{\partial \theta} (\theta_i, p(\hat{\theta}, \theta_i), C_i) = \left( \frac{\partial C_i}{\partial \theta} \right) \frac{\partial p}{\partial \theta} (\hat{\theta}, \theta_i) - \frac{\partial C_i}{\partial \theta},
\]

where we suppressed the arguments of the contributions.

Since the policies are computed from condition (6) for every \( \hat{\theta} \in [\theta_i, \theta_h] \), when \( \gamma = 1 \) we have that

\[
\hat{\theta} p(\hat{\theta}, \theta_h) = -\frac{\partial W}{\partial p_1} (\hat{\theta}, p(\hat{\theta}, \theta_h), \theta_h, p_{hi}) = \frac{\partial C_h}{\partial p_1} (\hat{\theta}, p(\hat{\theta}, \theta_h), \theta_h, p_{hi})
\]

\[
\hat{\theta} p(\hat{\theta}, \theta_i) = -\lambda \frac{\partial W}{\partial p_1} (\hat{\theta}, p(\hat{\theta}, \theta_i), \theta_i, p_{hi})
\]

\[
- \frac{z \lambda}{1 - z} \left( \frac{\partial W}{\partial p_1} (\hat{\theta}, p(\hat{\theta}, \theta_i), \theta_i, p_{hi}) - \frac{\partial W}{\partial p_1} (\hat{\theta}, p(\hat{\theta}, \theta_i), \theta_h, p_{hi}) \right)
\]

\[
\frac{\partial C_i}{\partial p_1} (\hat{\theta}, p(\hat{\theta}, \theta_i)) + \frac{z}{1 - z} \frac{\partial C_h}{\partial p_1} (\hat{\theta}, p(\hat{\theta}, \theta_h), \theta_i, p_{hi}).
\]

Hence, the derivatives of the lobby’s expected utility simplify to

\[
\frac{\partial V}{\partial \theta} (\theta_i, p(\hat{\theta}, \theta_h), C_h) = (\theta_i - \hat{\theta}) \frac{\partial p}{\partial \theta} (\hat{\theta}, \theta_h) \frac{\partial C_h}{\partial \theta} - \frac{\partial C_h}{\partial \theta} - \frac{\partial C_h}{\partial \theta} = \frac{\partial C_h}{\partial \theta} (\hat{\theta}, \theta_i)
\]

\[
\frac{\partial V}{\partial \theta} (\theta_i, p(\hat{\theta}, \theta_i), C_i) = (\theta_i - \hat{\theta}) \frac{\partial p}{\partial \theta} (\hat{\theta}, \theta_i) \frac{\partial C_i}{\partial \theta} - \frac{\partial C_i}{\partial \theta} + \frac{z}{1 - z} \frac{\partial C_h}{\partial \theta} \frac{\partial p}{\partial \theta}.
\]

Replacing these derivatives back into (17) gives

\[
E \left[ \int_{\theta}^{\theta_h} \left[ (\theta_i - \hat{\theta}) \frac{\partial p}{\partial \theta} (\hat{\theta}, \theta_h) - \frac{\partial C_i}{\partial \theta} \right] d\hat{\theta} \right]. \tag{18}
\]
To find the expression of $\frac{\partial C}{\partial \tilde{\theta}}$ we have to look at the welfare. When $\gamma = 1$, the welfare is given by

$$W(\tilde{\theta}, p(\tilde{\theta}, \theta), p_{ki}) = A - \frac{(b - \tilde{\theta})}{2} \left( p(\tilde{\theta}, \theta) - p^c \right)^2$$

$$+ d \left( p(\tilde{\theta}, \theta) - p^c \right) (p_{ki} - p^c) - \frac{(b - \theta_k)}{2} (p_{ki} - p^c)^2 + \frac{\tilde{\theta} + \theta_k}{2} (p^c)^2$$

Hence, the derivatives of the welfare function are given by

$$\frac{\partial W}{\partial \tilde{\theta}} (\tilde{\theta}, p(\tilde{\theta}, \theta), \theta, p_{ki}) = -p(\tilde{\theta}, \theta) \left( \frac{p(\tilde{\theta}, \theta)}{2} - p^c \right)$$

and

$$\frac{\partial W}{\partial \tilde{\theta}} (\tilde{\theta}, p^c, \theta, p^c) = \frac{(p^c)^2}{2}.$$ 

Therefore, we have that

$$\frac{\partial C}{\partial \tilde{\theta}} = 1 \frac{1}{2} \left( p(\tilde{\theta}, \theta) - p^c \right)^2.$$ 

Hence, condition (18) can be written as

$$E \left[ \int_{\theta_l}^{\theta_h} \left[ (\theta_l - \tilde{\theta}) p(\tilde{\theta},,) \frac{\partial p}{\partial \tilde{\theta}} (\tilde{\theta},,) - \frac{1}{2} (p(\tilde{\theta},,) - p^c)^2 \right] d\tilde{\theta} \right] \geq 0$$

or

$$E \left[ \int_{\theta_l}^{\theta_h} \left[ (\tilde{\theta} - \theta_l) p(\tilde{\theta},,) \frac{\partial p}{\partial \tilde{\theta}} (\tilde{\theta},,) + \frac{1}{2} (p(\tilde{\theta},,) - p^c)^2 \right] d\tilde{\theta} \right] \geq 0.$$ 

By the implicit function theorem we have that $\frac{\partial p}{\partial \tilde{\theta}} (\tilde{\theta},,) \geq 0$. Therefore, since $\tilde{\theta} \geq \theta_l$, the above inequality holds. This implies that constraint (IC$_l$) is not binding.

Notice that for the high type we have

$$E \left[ \int_{\theta_l}^{\theta_h} \left[ (\theta_h - \tilde{\theta}) p(\tilde{\theta},,) \frac{\partial p}{\partial \tilde{\theta}} (\tilde{\theta},,) - \frac{1}{2} (p(\tilde{\theta},,) - p^c)^2 \right] d\tilde{\theta} \right]$$

which clearly may not be positive since $p(\theta_h,,) - p^c > 0$ and $\frac{\partial p}{\partial \tilde{\theta}} (\tilde{\theta},,) \geq 0$. $\blacksquare$
Proof of Theorem 2. The first-order conditions (9) and (10) for lobbies 1 and 2 constitute a system of linear equations that can be written in a matrix form as in the proof of Theorem 1. For state \((\theta_h, \theta_h)\) this system is given by

\[
\begin{bmatrix}
\theta_h - \lambda (b + \theta_h) & \lambda d \\
\lambda d & \theta_h - \lambda (b + \theta_h)
\end{bmatrix}
\begin{bmatrix}
p^1_{hh} - p^e \\
p^2_{hh} - p^e
\end{bmatrix} =
\begin{bmatrix}
-p^e \theta_h \\
-p^e \theta_l
\end{bmatrix}.
\]

This system has a solution because the coefficient matrix has a positive determinant since, by Assumption 2, \((1 - z) (\lambda (b + \theta_h) - \theta_h) > \lambda d\).

Given the solution of the system at state \((\theta_h, \theta_h)\), we have the following system of first-order conditions at state \((\theta_h, \theta_l)\):

\[
\begin{bmatrix}
(1 - z) (\theta_h - \lambda (b + \theta_i)) & \lambda d \\
\lambda d & \theta_l - \mu \Delta \theta_h (1 - \mu) - \lambda (b + \theta_i)
\end{bmatrix}
\begin{bmatrix}
p^1_{hl} - p^e \\
p^2_{hl} - p^e
\end{bmatrix} =
\begin{bmatrix}
-(1 - z) \theta_h p^e + z (p^*_{hh} - p^e) \\
-p^e \left( \theta_l - \mu \Delta \theta_h (1 - \mu) \right)
\end{bmatrix}
\]

and a symmetric system for state \((\theta_l, \theta_h)\).

The determinant of this system is given by

\[
(1 - z) (\theta_h - \lambda (b + \theta_i)) \left( \theta_l - \frac{\mu \Delta \theta_h}{1 - \mu} - \lambda (b + \theta_i) \right) - (\lambda d)^2 > 0,
\]

since \(\mu \in [0, 1)\) and \((1 - z) (\lambda (b + \theta_i) - \theta_i) > \lambda d\) (by Assumption 2) the systems have solutions.

In turn, given the solutions of the systems at states \((\theta_h, \theta_h)\), \((\theta_h, \theta_l)\) and \((\theta_l, \theta_h)\), we have the following system of best-responses at state \((\theta_l, \theta_l)\):

\[
(1 - z) \begin{bmatrix}
\theta_l - \frac{\mu \Delta \theta_h}{1 - \mu} - \lambda (b + \theta_i) \\
\lambda d (1 - z)
\end{bmatrix}
\begin{bmatrix}
p^1_{ll} - p^e \\
p^2_{ll} - p^e
\end{bmatrix} =
\begin{bmatrix}
-p^e (1 - z) \left( \theta_l - \frac{\mu \Delta \theta_h}{1 - \mu} \right) + z (p^*_{lh} - p^e) \\
-p^e (1 - z) \left( \theta_l - \frac{\mu \Delta \theta_h}{1 - \mu} \right) + z (p^*_{lh} - p^e)
\end{bmatrix}.
\]

The determinant of the coefficient matrix is given by

\[
(1 - z) \left( \theta_l - \frac{\mu \Delta \theta_h}{1 - \mu} - \lambda b (b + \theta_l) \right)^2 - (\lambda d)^2 > 0
\]

since \((1 - z) (\lambda (b + \theta_i) - \theta_l) > \lambda d\) and \(\mu \in [0, 1)\), this system has a solution as well.
Therefore, this system has a unique solution for each given $\mu \in [0, 1)$.

Now, we will show that there exists $\mu \in [0, 1)$ which ensures that constraint $(IC_h)$ holds. If constraint $(IC_h)$ holds for $\mu = 0$, then there is no signaling effect and the equilibrium of this game is analogous to the case $\gamma = 0$. If, however, constraint $(IC_h)$ does not hold for $\mu = 0$, then $\mu > 0$. In this case the policies for the low type are given by

$$p_{ih}^* - p^e = \frac{\left( \theta_l - \frac{\mu \Delta \theta_h}{(1-\mu)} \right) p^e (1-z) (\lambda (b + \theta_h) - \theta_h) + \lambda \theta_h p^e \left( \frac{(1-z)(b+\theta_h)-\theta_h-\lambda d}{\lambda(b+\theta_h)-\theta_h-\lambda d} \right)}{(1-z) (\lambda (b + \theta_h) - \theta_h) \left( \lambda (b + \theta_l) - \theta_l - \lambda \left( \frac{\mu \Delta \theta_h}{(1-\mu)} \right) \right) - (\lambda d)^2}$$

and

$$p_{il}^* - p^e = \frac{\left( \theta_l - \frac{\mu \Delta \theta_h}{(1-\mu)} \right) p^e (1-z) - z \lambda d (p_{ih}^* - p^e)}{(1-z) (\lambda (b + \theta_l) - \theta_l + \mu (\theta_l-\theta_l)) - (\lambda d)^2}.$$

Notice that both policies are continuous functions of $\mu \in (0, 1)$ and also that $\frac{\partial p_{ih}}{\partial \mu}, \frac{\partial p_{il}}{\partial \mu} < 0$. Moreover, we have that if $\mu \rightarrow 1$, then $p_{ih}^*, p_{il}^* \rightarrow 0$. Thus, by continuity, there exists $\tilde{\mu} \in (0, 1)$ such that

$$E \left[ \pi (p_{ih}^*) - \pi (p^e) \right] = 0. \quad (19)$$

Since there exist a $\tilde{\mu}$ such that $E \left[ \pi (p_{ih}^*) \right] = E \left[ \pi (p^e) \right]$, in such case, $E \left[ C_h^* \right] = 0$, if not the lobby’s individual rationality constraint $(IR_l)$ would not hold. Thus, for $\tilde{\mu}$, $(IR_l)$ is binding.

However, multiplying (19) by $\theta_h$ shows that the high type lobby gets $E \left[ \theta_h \pi (p_{ih}^*) \right] = \theta_h \pi (p^e)$ when she lies to the policy maker. However, by constraint $(IR_l)$, we have that

$$E \left[ \theta_h \pi (p_{ih}^*) - C_h^* \right] \geq E \left[ \theta_h \pi (p^e) \right] = E \left[ \theta_h \pi (p_{ih}^*) \right]. \quad (20)$$

Therefore, when $\mu = \tilde{\mu}$ the high type lobby has no incentive to lie and constraint $(IC_h)$ holds. But that implies that $\mu = 0$, which is a contradiction. Therefore, the equilibrium multiplier $\mu^*$ is smaller than $\tilde{\mu}$.

We also have that, when $\mu = 0$,

$$E \left[ \theta_h \pi (p_{ih}) - C_h^* \right] < E \left[ \theta_h \pi (p_{il}^*) - C_l^* \right], \quad (21)$$

since we are analyzing the case where signaling is costly.

Therefore, given conditions (20) and (21), there exists $\mu^* \in (0, \tilde{\mu})$ such that

$$E \left[ \theta_h \pi (p_{ih}^*) - C_h^* \right] = E \left[ \theta_h \pi (p_{il}^*) - C_l^* \right],$$

and constraint $(IC_h)$ is binding.
In fact, there may be more than one $\mu^*$ for each constraint ($IC_h$) is binding. Choose then the smallest one (which generates the least distortion). Given this minimum $\mu^*$, there exists an equilibrium for the political game when $\gamma = 1$.

The equilibrium contributions are given by (L2-1) and (L2-2) for the equilibrium policies $p^*_ik$ for all $i$ and $k$.

A similar argument of the proof of Theorem 1 shows that SC is satisfied for this equilibrium and that no other constraint is binding at the equilibrium. ■

**Proof of Corollary 2.** Analogous to the proof of Corollary 1. ■

**Appendix B - The equilibrium selection**

**Countervailing**

The political game, as most common agency games, has degrees of freedom in the determinacy of the division of the surplus between lobbies. We reduced this indeterminacy by looking for symmetric equilibria. However, symmetry does not account for the surplus division in non-symmetric states of nature (high versus low types).

This indeterminacy raises some issues for this game. Particularly, they can generate equilibria with countervailing incentives. If we look at individual rationality constraints ($IR_{ih}$) and ($IR_{il}$), from the point of view of type-$i$ lobby that takes as given the rival’s offer, we have

$$C_{ih} + \lambda W(\theta_i, p_{ih}, \theta_h, p_{hi}) \geq \lambda W(\theta_i, p^e, \theta_h, p^e) - C_{hi}$$

$$C_{il} + \lambda W(\theta_i, p_{il}, \theta_l, p_{li}) \geq \lambda W(\theta_i, p^e, \theta_l, p^e) - C_{li}.$$

Notice that the reserve utilities depend on the contribution offered by the rival. Let type-$i$ lobby conjecture that his high type rival will offer a small contribution. This implies that the policy maker’s reserve utility at this state has increased and may be above the reserve utility of the policy maker when the rival is the low type. In this situation, possibly the binding constraints are no longer the ones we have assumed, i.e., there may be countervailing incentives in the type-$i$ problem. For detailed reference on countervailing incentives see Jullien (2000).

Countervailing incentives change the binding constraints in the informed lobby problem. Suppose, for example, that the binding constraints on the type-$i$ informed principal problem are ($ICP_{il}$) and ($IRP_{ih}$) (which are the opposite of what we considered in the text). Then, the best-response policies and contributions are such that this lobby makes the same set of constraints bind for the rival’s problem. As a consequence, distortions in the equilibrium policies due to screening are the
opposite ones. When the lobby faces a high type rival she demands more protection than in the truthful equilibrium, while when she faces a low type opponent, she demands the same as in the truthful equilibrium. Therefore, the welfare ranking of Corollary 1 would be reversed and the welfare ranking of Corollary 2 would be ambiguous. As an example, we present the policies of an equilibrium with countervailing incentives when $\gamma = 0$:

\[
\begin{align*}
    p_{hh}^S &= \bar{p}_{hh} + (b + d) \Psi, \\
    p_{hl}^S &= \bar{p}_{hl} + d \Psi, \\
    p_{lh}^S &= \bar{p}_{lh} + b \Psi, \\
    p_{ll}^S &= \bar{p}_{ll},
\end{align*}
\]

where $\Psi = \frac{zd(b + d)\Delta \theta h}{(1 - c)^2(b^2 - d^2)(b^2 - d^2)}$.

Notice that the distortions change. Now policies are upward distorted because lobbies demand more protection in the efficient states (high type rival) to prevent the policy maker saying that the low type rival is the high type.

One way to rule out countervailing is to impose more structure on conjecture about the rival’s offer, for example, that the policy maker’s rent is non-decreasing with the rival’s type. This condition, may seem arbitrary, but it implies that the difference in the utility between high and low type rivals is not greater than the surplus increase of the political game across the two states.

**Direct information revelation**

The first one is the pooling equilibrium where none of the lobbies reveal their types, i.e., they offer the same contribution for whatever type they may be.

We have focused in separating contribution schedules where the lobby reveals her type directly through the contribution schedule. This restriction could arbitrarily reduce the possible equilibria. There are at least one other type of equilibrium we should check for. The lobby could offer a more complex type of separating equilibrium, where she offers a “pile” of contributions, that are conditional on a message she would send later to the policy maker. Thus, the policy maker would not learn the lobby’s type by the time he accepts the contracts. In this section we show that the lobby does not benefit from delaying the information revelation.

We rely on Maskin and Tirole (1992) for the discussion that follows.

We begin assuming that the rival lobby offers a contribution schedule that is both separating and increasing in her type. Then, we show that the solution of program (4) is indeed the contribution schedule (CS henceforth) that maximizes the lobby’s utility in the informed lobby problem. The program (4) is the counterpart
of the Rothschild-Stiglitz-Wilson contribution schedule (RSW CS) from Maskin and Tirole (1992), adapted to the lobby’s utility maximization in this model.\footnote{In fact, the RSW CS is defined for a given reserve utility of the agent. In our model, the reserve utility is determined by the rival’s offer.} It maximizes each type of lobby’s utility, assuming that this lobby reveals her type to the policy maker.

**Definition 4 (Rothschild-Stiglitz-Wilson CS)** Given a rival’s offer that satisfies SC, a contribution schedule \((\hat{C}, \hat{p})\) is a RSW CS if and only if, for all \(i,\)

\[
\left(\hat{C}_{ik}, \hat{p}_{ik}\right) \equiv \arg \max_{C_{ik}, p_{ik}} E [\theta_i \pi (p_i) - C_i]
\]

subject to

\[
E [\theta_i \pi (p_i) - C_i] \geq E [\theta_i \pi (p_{-i}) - C_{-i}], \text{ for all } i, -i
\]

\[
U (\theta_i, p_{ik}, C_{ik}, \theta_k, p_{ki}, C_{ik}) \geq U (\theta_i, p^{\hat{p}}, 0, \theta_k, p^{\hat{p}}, 0), \text{ for all } k
\]

\[
U (\theta_i, p_{ik}, C_{ik}, \theta_k, p_{ki}, C_{ik}) \geq U (\theta_i, p_{i(-k)}, C_{i(-k)}, \theta_k, p_{k(-k)}, C_{ik}), \text{ for all } k, -k.
\]

In general, the informed lobby problem may have many solutions different from the RSW CS. In some of these other solutions the lobby does not reveal his information directly. She delays the revelation of her private information to a stage after the acceptance of the contract.

On the other hand, the RSW CS always belongs to the set of solutions, meaning that, there always exist beliefs that support this CS as a solution. Moreover, if one type of lobby is worse off in a solution different from the RSW CS, she can always reveal her information and offer the RSW CS. Therefore, the RSW CS is a lower bound for the lobby’s utility in the solution set. However, in some cases, delaying information revelation may increase the surplus of both types of lobby.

The main theorem from Maskin and Tirole (1992) states that the solution of the informed principal problem with common values is the CS that weakly dominates the RSW CS and is also incentive compatible. Therefore, to characterize this solution we must define what is the best that can be achieved in the informed principal problem. We denote the beliefs the policy maker may have about the lobbies’ type conditional on the CS he receives as \(\bar{\Pi}\) (which is derived through the Bayes rule whenever possible) and we denote the prior belief (\(z\)) by \(\Pi\).

We now can define:
Definition 5 (Interim Efficient CS) A contribution schedule \((\hat{C}, \hat{p})\) is interim efficient relative to beliefs \(\hat{\Pi}\) and for positive weights \(w_i\) if and only if

\[
\left(\hat{C}_{ik}, \hat{p}_{ik}\right) \in \arg \max_{C_{ik}, p_{ik}} \Sigma_i w_i E \left[\theta_i \pi (p_i) - C_i\right]
\]

subject to

\[
E \left[\theta_i \pi (p_i) - C_i\right] \geq E \left[\theta_i \pi (p_{-i}) - C_{-i}\right], \text{ for all } i, -i \quad (IC^IE_i)
\]

\[
E^\hat{\Pi} \left[U (\theta, p, C, \theta_k, p_k, C_k)\right] \geq E^\hat{\Pi} \left[U (\theta, \rho^*, 0, \theta_k, \rho^*, 0)\right], \text{ for all } k \quad (IR^IE_k)
\]

\[
E^\hat{\Pi} \left[U (\theta, p, C, \theta_k, p_k, C_k)\right] \geq E^\hat{\Pi} \left[U (\theta, p_{(-k)}, C_{(-k)}, \theta_k, p_k, C_k)\right], \text{ for all } k, -k \quad (ICP^IE_k)
\]

where the expectation \(E[.]\) is taken on the rival lobby’s type and the expectation \(E^\hat{\Pi}[.]\) is the expectation with the beliefs the police maker has about the lobby’s type.

Now we can present the result from Maskin and Tirole (1992) restated in this structure.

Theorem 3 (Maskin and Tirole, 1992) Suppose the RSW CS is interim efficient for some belief \(\Pi\), then the optimal CS of the informed lobby problem are such that

\[
E \left[\theta_i \pi (p_i) - C_i\right] \geq E \left[\theta_i \pi (p_{-i}) - C_{-i}\right], \text{ for all } i,
\]

\[
E^\Pi \left[U (\theta, p, C, \theta_k, p_k, C_k)\right] \geq E^\Pi \left[U (\theta, \rho^*, 0, \theta_k, \rho^*, 0)\right], \text{ for all } k,
\]

\[
E^\Pi \left[U (\theta, p, C, \theta_k, p_k, C_k)\right] \geq E^\Pi \left[U (\theta, p_{(-k)}, C_{(-k)}, \theta_k, p_k, C_k)\right], \text{ for all } k,
\]

and

\[
E \left[\theta_i \pi (p_i) - C_i\right] \geq E \left[\theta_i \pi (\hat{p}_i) - \hat{C}_i\right],
\]

where \(\Pi\) is the prior beliefs.

Theorem 3 states that all the incentive compatible CS that weakly dominates the RSW CS belongs to the set of solutions of the informed lobby problem.

Corollary 3 If the RSW CS is interim efficient for prior beliefs \(\Pi\), then the equilibrium of the game is unique (i.e., the RSW CS is the equilibrium).

Hence, if the RSW CS is interim efficient for some weights and with respect to prior beliefs, then it is the unique solution of the informed lobby problem. This is exactly what we are going to show in this next theorem.
Theorem 4 The RSW SC is interim efficient for the prior beliefs.

Proof. Problem (22) is explicitly given by

\[
\begin{align*}
\max_{p_h, C_{ih}} & \quad w_h \left[ z (\theta_h \pi (p_{hh}) - C_{hh}) + (1 - z) (\theta_h \pi (p_{hl}) - C_{hl}) \right] + \\
& \quad w_l \left[ z (\theta_l \pi (p_{lh}) - C_{lh}) + (1 - z) (\theta_l \pi (p_{ll}) - C_{ll}) \right]
\end{align*}
\]

subject to

\[
\begin{align*}
z (\theta_h \pi (p_{hh}) - C_{hh}) + (1 - z) (\theta_h \pi (p_{hl}) - C_{hl}) & \geq \\
z (\theta_h \pi (p_{lh}) - C_{lh}) + (1 - z) (\theta_h \pi (p_{ll}) - C_{ll}) & \quad (IC_{h}^{IE}) \\
z (\theta_l \pi (p_{lh}) - C_{lh}) + (1 - z) (\theta_l \pi (p_{ll}) - C_{ll}) & \geq \\
z (\theta_l \pi (p_{hh}) - C_{hh}) + (1 - z) (\theta_l \pi (p_{hl}) - C_{hl}) & \quad (IC_{l}^{IE}) \\
z (C_{hh} + C_{hh} + \lambda W (\theta_h, p_{hh}, \theta_h, p_{hh})) + (1 - z) (C_{hl} + C_{hl} + \lambda W (\theta_l, p_{hl}, \theta_h, p_{hl})) & \geq \\
z (C_{hl} + C_{lh} + \lambda W (\theta_h, p_{hl}, \theta_l, p_{lh})) + (1 - z) (C_{ll} + C_{ll} + \lambda W (\theta_l, p_{ll}, \theta_l, p_{ll})) & \quad (IR_{h}^{IE}) \\
z (C_{hl} + C_{lh} + \lambda W (\theta_h, p_{hl}, \theta_l, p_{lh})) + (1 - z) (C_{ll} + C_{ll} + \lambda W (\theta_l, p_{ll}, \theta_h, p_{hl})) & \geq \\
z (C_{hh} + C_{hh} + \lambda W (\theta_h, p_{hh}, \theta_h, p_{hh})) + (1 - z) (C_{hl} + C_{hl} + \lambda W (\theta_l, p_{hl}, \theta_h, p_{hl})) & \quad (ICP_{h}^{IE}) \\
z (C_{hl} + C_{lh} + \lambda W (\theta_h, p_{hl}, \theta_l, p_{lh})) + (1 - z) (C_{ll} + C_{ll} + \lambda W (\theta_l, p_{ll}, \theta_l, p_{ll})) & \geq \\
z (C_{hh} + C_{hh} + \lambda W (\theta_h, p_{hh}, \theta_h, p_{hh})) + (1 - z) (C_{hl} + C_{hl} + \lambda W (\theta_l, p_{hl}, \theta_h, p_{hl})) & \quad (ICP_{l}^{IE}) \\
\end{align*}
\]

The arguments of Lemma 2 apply almost directly to this case. If constraints \((ICP_{h})\) and \((IR_{l})\) are binding in program (4) implies that \((ICP_{h}^{IE})\) and \((IR_{l}^{IE})\) are binding in program (22).

Then, the first-order conditions of the maximization problem in (22) are given by:

\[
\begin{align*}
z \theta_h \pi' (p_{hh}) w_h & - z \gamma I R_h \lambda (b (p_{hh} - p^f) - d (p_{hh} - p^f)) \\
& + z \gamma I C P_l \lambda (b (p_{lh} - p^f) - d (p_{lh} - p^f)) - z \gamma I C l \theta_l \pi' (p_{hh}) = 0 \quad (23)
\end{align*}
\]
\[(1 - z) \theta_h \pi'(p_{hl}) w_h - z\gamma_{ICPI}\lambda (b(p_{hl} - p^e) - d(p_{hl} - p^e))
+ (1 - z) \gamma_{ICl}\theta_h \pi'(p_{hl}) = 0 \quad (24)\]

\[-zw_h + z\gamma_{IRh} - z\gamma_{ICPI} + z\gamma_{ICl} - z\gamma_{ICl} = 0 \quad (25)\]

\[-w_h (1 - z) + z\gamma_{ICPI} + (1 - z) \gamma_{ICl} - (1 - z) \gamma_{ICl} = 0 \quad (26)\]

\[z\theta_l \pi'(p_{lh}) w_l - (1 - z) \gamma_{IRh}\lambda (b(p_{lh} - p^e) - d(p_{lh} - p^e))
+ (1 - z) \gamma_{ICPl}\lambda (b(p_{lh} - p^e) - d(p_{lh} - p^e)) - z\gamma_{ICh}\theta_l \pi'(p_{lh}) = 0 \quad (27)\]

\[(1 - z) \theta_l \pi'(p_{lh}) w_l - (1 - z) \gamma_{ICPl}\lambda (b(p_{lh} - p^e) - d(p_{lh} - p^e))
- (1 - z) \gamma_{ICl}\theta_l \pi'(p_{lh}) = 0 \quad (28)\]

From (25), (26), (29) and (30) we can rewrite (23), (24), (27) and (28) as

\[\theta_h \pi'(p_{hh}) - \lambda b (p_{hh} - p^e) + \lambda d (p_{hh} - p^e) + \frac{\gamma_{ICl}}{w_h - \gamma_{ICl}} \Delta \theta_h \pi'(p_{hh}) = 0 \quad (31)\]

\[\theta_h \pi'(p_{hl}) - \lambda b (p_{hl} - p^e) + \lambda d (p_{hl} - p^e) + \frac{z}{1 - z} \lambda d (p_{hl} - p_{hh})
+ \frac{\gamma_{ICl}}{w_h - \gamma_{ICl}} \Delta \theta_h \pi'(p_{hl}) = 0 \quad (32)\]

\[\theta_l \pi'(p_{lh}) - \lambda b (p_{lh} - p^e) + \lambda d (p_{lh} - p^e) - \frac{\gamma_{ICh}}{w_l - \gamma_{ICh}} \Delta \theta_l \pi'(p_{lh}) = 0 \quad (33)\]

\[\theta_l \pi'(p_{ll}) - \lambda b (p_{ll} - p^e) + \lambda d (p_{ll} - p^e) + \frac{z}{1 - z} \lambda d (p_{ll} - p_{lh})
- \frac{\gamma_{ICh}}{w_l - \gamma_{ICh}} \Delta \theta_l \pi'(p_{ll}) = 0. \quad (34)\]

Moreover, we have that

\[(1 - z) w_h - zw_l + \gamma_{ICh} - \gamma_{ICl} = 0,\]
and when the policies are increasing in the lobby’s types, constraints \((IC_h^E)\) and \((IC_l^E)\) cannot be both binding at once. Therefore, if \(\gamma_{ICl} > 0\) then \(\gamma_{ICl} = 0\) while if \(\gamma_{ICh} > 0\) then \(\gamma_{ICh} = 0\). Hence,

\[
\gamma_{ICl} = \max \{ (1 - z) w_h - zw_l, 0 \} \\
\gamma_{ICh} = \max \{ zw_l - (1 - z) w_h, 0 \}.
\]

To show that the RSW CS is interim efficient we have to show that the best response functions of the interim efficient program are the same as the RSW CS. Therefore, we must compare the first order conditions for the policies of the two programs.

The only difference from the system of equations (31) through (34) to the first-order condition (6) is the multiplier of the signaling effect \((\mu_{-i})\). However, we know that, for any value of the multiplier \((\mu_{-i})\) in the RSW problem, we can find \(w_h\) and \(w_l\) such that

\[
\frac{\gamma_{ICl} - \gamma_{ICh}}{w_h^* - w_l^*} = \frac{\mu_{-i}}{1 - \mu_{-i}}.
\]

This means that there exist weights \(w_h^*\) and \(w_l^*\) such that the policies that solve the RSW also are optimal in the interim efficient program (4). Moreover, the contributions from program (4) trivially make the constraints of the interim efficient hold.

Therefore, the RSW CS is interim efficient. ■

**Corollary 4** If the RSW CS is interim efficient, it is the unique solution of the informed lobby problem that satisfies the intuitive criterion.

Another possible type of equilibrium that could emerge is a pooling equilibrium where both lobbies offer the same contribution for whatever type they may be.

**Corollary 5** Any pooling equilibrium would not be interim efficient.

The proof of the corollary is trivial since in any pooling equilibrium, both high and low type of lobby offer the same contribution schedules and ask for the same policies, i.e., \(p_h = p_l\). However, we know that the interim efficient policies are increasing in the lobbies’ types.