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Lobbying and Information Transmission in Customs Unions

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Lobbying and information transmission in customs unions*

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Abstract

This paper studies a customs union agreement when governments are subject to the pressure of special interest groups that have better information about the competitiveness of the industries they represent. We focus on the agreement's effect on the structure of political influence. When joining a customs union, the structure of political pressure changes and with privately informed lobbies, a new effect emerges: the governments can use the information they learn from the lobby of one country to extract rents from the lobbies of the other country. We call this the "information transmission effect". This effect enhances the governments' bargaining power in a customs union and makes lobbies demand less protection. Thus, we find that information transmission increases the welfare of the agreement and decreases tariffs towards non-members. We also investigate the incentives for the creation of a customs union and find that information transmission makes such agreement more likely to be politically sustainable.

Keywords: preferential trade agreements; customs union; political economy; lobbying; asymmetric information.

JEL Classification: F13; F15; D82.

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1 Introduction

Motivated by the vast increase in the number of regional trade agreements after the creation of the World Trade Organization, the recent literature on preferential trade agreements (PTAs) has advanced in characterizing the kinds of PTAs that are actually implementable, how they affect the countries' protection towards non-members and whether they influence the countries' willingness to pursue further trade liberalization.

This new literature recognizes politics as a central element to the decision making in trade policy. The agreements and the tariffs are endogenously chosen by governments subject to the pressure of special interest groups.

In this paper we extend this literature evaluating the costs and benefits of customs union agreements when governments are subject to the pressure of special interest groups that have better information than governments. We focus on the political effects of the agreement and therefore, our setup is suitably simple so that there are no terms of trade effects. Without the agreement, each lobby demands protection for the government of her[1] own country, while in a customs union the lobbies from both counties compete to get protection and have to "please" the governments in the union.

Three effects arise in a customs union. The first one is the dilution of the lobbies' influence: with the agreement the decision making takes into consideration the welfare of all partner countries, thus the benefit of a particular group becomes relatively small and the lobbies' ability to influence decreases. The second effect is the free riding. Politically weak groups benefit from a customs union since they free-ride on the lobbying efforts of groups from the other countries.

The third and new effect is due to asymmetric information: since goods are substitutes, when a lobby offers contributions she should know the price of the other goods in order to learn the true marginal cost of her protection. However, prices of other goods are determined by the protection demanded by the lobbies of the other countries which, in turn, depends on the other lobbies' capacities. Since lobbies do not know the capacity of the rival lobbies, they do not know the true marginal cost of their own protection.

On the other hand, when a lobby negotiates protection with the governments, she conveys her information through contributions and, in our model, the outcome of this negotiation reveals the competitiveness of the lobbies to the policy maker. This gives the governments an advantage to use the information of the lobbies from one country to extract rents from the lobbies of the other country in a customs union. Thus, from the point of view of a given lobby, the private information of foreign lobbies becomes private information of the coalition of governments that

[1] We refer to lobbies with feminine pronouns and to governments with masculine pronouns.

form the customs union. Lobbies can only screen the rival's information from the policy maker, yet, screening generates distortions on the demands for protection. We refer to this distortions as the "information transmission effect".

Information transmission allows the governments to extract informational rents and makes the lobbies demand less protection to save on rents they pay. Therefore, this effect decreases the tariffs imposed to non-members in a customs union, which increases the welfare of societies of the member countries.

We then consider the incentives for the creation of customs unions. We find that lobbies have no interest in participating of a customs union. Thus, under perfect information, customs unions are always blocked by lobbies. However, with informed lobbies, if the information transmission effect is relatively large, the welfare increase of the agreement becomes too big that lobbies are no longer able to block it. Therefore, information transmission can make a customs unions politically sustainable.

Related literature

The first effect of a customs union was called the "preference-dilution effect" by de Melo, Panagariya and Rodrik (1993). In a setting quite different from ours, they found that a trade agreement (not only a customs union) reduces the relative weight of lobbies in the eyes of the decision makers when countries decide policies taking into consideration its effects on partner countries.

Richardson (1993) has compared free trade areas (FTAs) and customs unions, and found that the second is welfare superior because tariffs are public good for lobbies on the same sector from different countries. Thus, they free ride on the contributions of each other and the overall protection falls. In a FTA each lobby demands protection for the policy maker of their country. In the perfect information version of our framework, the welfare effects of a customs union are similar to those analyzed by these authors.

Grossman and Helpman (1995) and Krishna (1998) considered the role of politics on the incentives to sign PTAs. In a context where tariffs are endogenously defined by lobbying, they found that trade diverting FTAs were more likely to be supported. Krishna (1998) also finds that the incentives for engaging in multilateral liberalization decrease after joining a FTA. However, the role of politics in theses papers is just partially accounted for since they assume that the countries' tariffs towards the rest of the world are the same before and after the agreement is signed.

In their setup, lobbies cannot influence the external tariffs after the agreements were signed, thus, they do not take into account the effect of the agreement on the political game, which is the focus of this paper. We, instead, compare the pattern of politically motivated protection outside and inside a customs union. Thus, in

our framework, protection changes because the agreement changes the structure of the political game.

Ornelas (2005) and Maggi and Rodrígues-Clare (2007) have already considered the role for lobbying after an agreement is signed. The first paper shows that the rent that lobbies can obtain decreases in a FTA, which makes welfare decreasing agreements less likely to be implemented. The second paper considers the role of trade agreements as a commitment against future lobbying and also finds that trade agreements result in deeper liberalization when countries are more politically motivated.

The trade literature, to our knowledge, has always considered the political pressure game as one with perfect information. However, there is a vast literature on political economy that investigates situations where lobbies have more information than the decision makers, like Austen-Smith (1995) and Potters and Wan Winden (1991) to name a few. We link these two literatures and we acknowledge the role of information asymmetries in political pressure for trade protection.

Our work benefits from Maskin and Tirole (1990, 1992) and from Costa Lima and Moreira (2008). The first authors have studied informed principal problems which represents the structure of political pressure in our model when the governments do not reach the agreement. The second analyzed a lobbying game like Grossman and Helpman (1994) with informed lobbies and the informational effects we find in a customs union is similar to theirs.

The next section presents the two countries' economies and the political game. In sections 3 and 4 we find the trade protection when the agreement is not signed and in a customs union, respectively. Section 5 compares the welfare under each political structure. In section 6 we investigate the incentives for the creation of a customs union. Section 7 concludes.

2 Analytical framework

We consider two small countries (A and B) that produce and trade goods with each other and the rest of the world. Within each country a political game takes place. Special interest groups that represent productive sectors offer money contributions to governments in order to receive tariff protection. Since governments are influenceable, lobbying shifts rents from consumers to producers.

We compare two different regimes for the political game, one where the governments choose their import tariffs unilaterally (the unilateral regime), and another where the countries sign a customs union agreement to remove all tariffs between them and set the same import tariff towards the rest of the world (customs union regime).

The economies presented are similar to that described in Grossman and Help-

man (1994) with particular functional forms. We begin presenting the economies, and then we present the political game under each regime.

The economy

We assume that countries are symmetric, thus we only present the economy of country A. The country produces and trades three goods, x_A^0, x_A^1 and x_A^2. It has a size one population with preferences given by

$$u\left(x_A^0, x_A^1, x_A^2\right) = x_A^0 + \sum_n \left(\alpha - \beta x_A^n\right) x_A^n - \delta x_A^1 x_A^2,$$

where the uppercase index $n \in \{1, 2\}$ refers to the market and the lowercase index refers to the country and we assume that $\alpha, \beta > 0$.

The consumer's income comes from labor and government transfers. With the income, we can find the market demands for goods 1 and 2, which are given by

$$x_A^n\left(p_A^n, p_A^{-n}\right) = a - bp_A^n + dp_A^{-n},$$

where $-n$ indicates the price of the good in the other market. If $d > 0$, then the goods are substitutes, if $d < 0$, they are complements. The fact that $d \neq 0$ implies that the welfare cost of tariffs depends on the tariffs of other goods. This is important for the political game since it implies that the choice of tariffs of different goods are interrelated. For simplicity, we impose:

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

Goods are substitutes throughout the paper, although the results carry on when goods are complements as well.

If we substitute these demands into the utility function, we find the indirect utility function, denoted by $u_A\left(p_A^1, p_A^2\right)$ with some abuse of notation that shall not make confusion.

Good x_A^0 is the numeraire good. It is produced using labor with constant returns to scale with an input-output coefficient of one. We assume that the labor supply is big enough, so that the wages are fixed at one. Goods x_A^1 and x_A^2 are produced by competitive firms with sector specific inputs. Thus, the owners of these inputs receive all the profit coming from the production of the goods. We assume that the ownership of these inputs is highly concentrated, so that the fraction of the owners in the society is negligible. The country's industries have a fixed capacity constraint, that is, the industries' marginal cost (c) is given by

$$c\left(y_A^n\right) = \begin{cases} 0 \text{ if } y_A^n \leq \theta^n \\ \infty \text{ if } y_A^n > \theta^n \end{cases}$$

where y_A^n is the home production of good n and θ_A^n is the capacity constraint. With this technology, the industry produces θ_A^n, sells it for price p_A^n and earns profit

$$\theta_A^n \pi\left(p_A^n\right) = \theta_A^n p_A^n.$$

There are no fixed costs.

The government's revenue comes from import tariffs, redistributed by lump-sum transfers. The revenue is given by

$$R_A = \Sigma_n \left(p_A^n - p^e\right)\left(x_A^n\left(p_A^n, p_A^{-n}\right) - \theta_A^n\right)$$

where p^e is the international price of goods x_A^1 and x_A^2, $p_A^n - p^e$ is the protection and $x_A^n\left(p_A^n, p_A^{-n}\right) - \theta_A^n$ is the size of the imports. We assume that x^0 is untaxed in all countries.

For simplicity, we restrict the analysis to the cases where countries import both goods 1 and 2, that is:

Assumption 2 *a is large enough so that* $x^n\left(p_A^n, p_A^{-n}\right) > \theta^n$.

This implies that lobbies offer contributions to protect their markets from foreign competition. Together with capacity constraints, this assumption eliminates the usual trade diversion and trade creation effects from our analysis because neither country exports goods 1 and 2. Thus, trade can only increase in the good that is already untaxed. Although restrictive, this assumption allows us to clear out the terms of trade effects and focus on the role of politics on tariffs protection between the two regimes.

The consumer's preferences, the government's revenues, the technologies of production and the assets ownership define the economy of each country. We now present the political game under each regime.

The political game

There is one lobby in each country that represents the producers of one market. In country A the lobby represents producers of sector 1 and in country B the lobby represents producers of sector 2. The lobbies can offer contributions to the governments in exchange for tariff protection for their product.

In the unilateral regime, each lobby offers contributions to the government of her country. Hence, the political game is an informed principal game, where the lobby is the principal and the government is the agent. On the other hand, in a customs union, the two lobbies offer contributions to the same policy maker. Thus, the political game is a common agency game with informed principals.

The lobbies care about the profits of the producers from the sector they represent and dislike giving money contributions to governments. Their utility function is given by

$$V_A\left(\theta_A^1, p_A^1, C_A^1\right) = \theta_A^1 p_A^1 - C_A^1.$$

The capacity constraint θ is private information of the lobby. It can assume two values: θ_h and θ_l, where $\theta_h > \theta_l$, and θ_h's ex-ante probability (z) is common knowledge.

For simplicity, we assume that lobbies can only demand protection for their goods and that contributions must be non-negative. A contribution schedule $C(\theta, p)$ specifies a monetary transfer for each policy p and for each lobby type θ.

The governments are the policy makers that choose the import tariffs of the economies. We assume that import tariffs are the only policy instrument available. They care about the economic welfare but also like money contributions. In the unilateral regime, each government chooses his import tariffs, while in a customs union, governments coordinate to a unique import tariff for the rest of the world and we assume they do so with preferences given by the sum the governments' preferences. The preferences of government A are given by

$$U_A\left(\theta_A^1, p_A^1, p_A^2, C_A^1\right) = C_A^1 + \lambda W_A\left(\theta_A^1, p_A^1, p_A^2\right)$$

and the welfare (W_A) is given by the government's revenues plus the consumer's and producer's surpluses

$$W_A\left(\theta_A^1, p_A^1, p_A^2\right) = \Sigma^n \theta_A^n p_A^n + u\left(p_A^1, p_A^2\right) + \Sigma^n \left(p_A^n - p^e\right)\left(x_A^n - \theta_A^n\right).$$

Figure 1 gives the welfare of market 1 in country A.

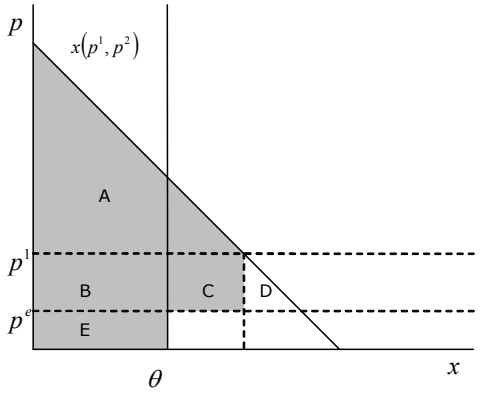

Figure 1: The welfare in market 1

The downward sloped line is the home market demand and the vertical line is the home supply of good one. The triangle A, below the demand and above the price p^1 is the consumer's surplus. The rectangles B and E are the producers' surplus, the rectangle C is the tariff revenue and the triangle D is the deadweight loss of the tariff.

To simplify the notation throughout the paper we will omit the explicit form of the welfare function, but we use of the fact that

$$\frac{\partial W_A}{\partial p_A^1}\left(\theta_A^1, p_A^1, p_A^2\right) = -b\left(p_A^1 - p^e\right) + d\left(p_A^2 - p^e\right) \quad (1)$$

$$\frac{\partial W_A}{\partial \theta_A^1}\left(\theta_A^1, p_A^1, p_A^2\right) = \theta_A^1 p^e. \quad (2)$$

We want to avoid corner solutions, where either lobbies get the entire surplus from the society or they do not get any protection:

Assumption 3 *i.* $b(1-z) > d$;

ii. $\theta_h \leq 2\theta_l$.

iii. $\frac{b}{d} > \frac{\theta_h}{\theta_l}$.

The first two items of Assumption 3 are sufficient conditions for interior solution. Item (iii) is useful, although not necessary for our main results.

If governments reject contributions, they maximize their utility without influence, i.e., they maximize economic welfare. In this framework, the welfare maximum for the economies is the free-trade ($p^n = p^e$), regardless of the regime.

The preferences of the lobbies and the policy makers, the information structure, the regime and the strategy space define the political game.

The timing of this game is given by:

(0) nature draws the lobbies' types;

(1) each lobby offers a contribution schedule to the policy maker;

(2) policy makers accept or reject the offers;

(3) policies are chosen and, if contributions are accepted, payments are made accordingly.

3 Unilateral tariff setting

In the unilateral regime, governments choose their tariffs separately. In this case the unique informed lobby offers contributions to the policy maker of her own

country to get protection. Thus, the political game is an informed principal game where the police maker has to choose tariffs for the two home markets subject to the pressure of one privately informed lobby. Since markets and countries are symmetric, we drop the country's and the good's index and we identify the variables only by the type of the lobby. We begin looking at the perfect information setup.

Perfect information

We assume that the lobby has all the bargaining power. Then, a type-i lobby offers a contribution schedule that solves

$$\max_{p_i, C(\theta_i, p_i)} \theta_i p_i - C(\theta_i, p_i) \qquad \text{(lobby's problem I)}$$

subject to

$$C(\theta_i, p_i) + \lambda W_A(\theta_i, p_i, \mathbf{p}_i) \geq \lambda W_A(\theta_i, p^e, p^e), \qquad (IR)$$

where the lowercase index $i \in \{h, l\}$ refers to the lobby's type and $\mathbf{p}$ is the price in the market that has no lobby.

The lobby has no incentives to leave rent to the policy maker, which implies that the (IR) constraint is binding and we can use it to substitute out the contribution. Then, lobby's problem I becomes

$$\max_{p_i} \theta_i p_i + \lambda W_A(\theta_i, p_i, \mathbf{p}_i) - \lambda W_A(\theta_i, p^e, p^e).$$

The first-order conditions of this problem are given by

$$\begin{aligned} \theta_i - \lambda b(\hat{p}_i - p^e) + \lambda d(\hat{\mathbf{p}}_i - p^e) &= 0 \\ -b(\hat{\mathbf{p}}_i - p^e) + d(\hat{p}_i - p^e) &= 0, \end{aligned}$$

where $\mathbf{p}_i$ is chosen by the policy maker to accommodate the cost of protection of the other good. We refer to the policies that solve lobby's problem I with a "hat" for the sectors that have lobby and with an inverted "hat" for the sectors without lobby. These policies are given by

$$\begin{aligned} \hat{p}^1_{Ai} &= \hat{p}^2_{Bi} = \hat{p}_i = \frac{\theta_i b}{\lambda(b^2 - d^2)} + p^e \\ \check{\mathbf{p}}^2_A &= \check{\mathbf{p}}^1_B = \check{\mathbf{p}}_i = \frac{\theta_i d}{\lambda(b^2 - d^2)} + p^e. \end{aligned}$$

Notice that by symmetry $\hat{p}^1_{Ai} = \hat{p}^2_{Bi}$ and $\check{\mathbf{p}}^2_A = \check{\mathbf{p}}^1_B$.

The tariff is positive for the lobbying industry, and it is increasing in the industry's capacity (θ_i). The unorganized sector receives the tariff that best accommodates the cost of giving protection to the lobby. Since the goods are substitutes,

increasing the tariff for the sector that does not lobby reduces the marginal cost of protection for the sector that has a lobby. Therefore, even without exerting pressure, the unorganized sector receives some protection.

Private information

In the unilateral regime, the political game is an informed principal problem with common values because the government cares about the lobby's competitiveness. From Maskin and Tirole (1992), we know that informed principal problems with common values have informational distortions like in signaling games. However, in our particular structure, the capacity constraint does not affect the marginal welfare cost of protection, which implies that informed lobbies reveal their private information without any cost. This is the essence of the following:

Proposition 1 *There are no distortions on the political game in the unilateral regime.*

Proposition 1 hinges on the fact that there is no reason for a lobby to withdraw information from the policy maker. The figure below gives an intuition for this result:

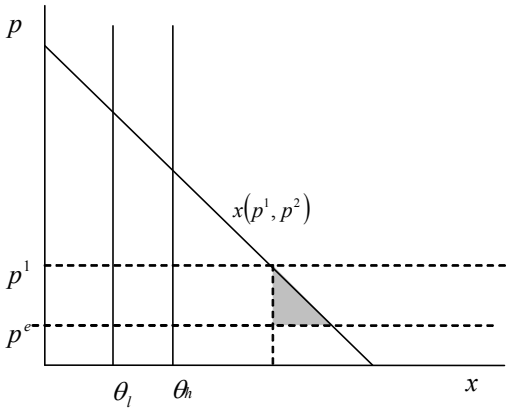

Figure 2: No informational distortion

Figure 2 shows the welfare cost of protection (the gray triangle) for two different production capacities (which are unknown to the policy maker). Notice that the size of the welfare cost depends only on the size of the tariff and on the shape of the demand, which the policy maker knows. The true type of the lobby of the

home sector does not affect the welfare cost of protection. Hence, lobbies do not have incentives to withdraw information from the government[2].

Since there are no distortions on the political game, the policy outcome under unilateral tariff setting is the same as in the perfect information case.

4 Customs union

A customs union is a trade agreement where two or more countries decide to eliminate all tariffs between them and set the same import tariff regarding the countries outside the agreement.

In our framework, such agreement does not increase trade between the partners since home production is fixed and the countries are importers of goods 1 and 2 (they export good 0, but this good is already untaxed). Therefore, tariffs change between the regimes solely as consequence of the agreement's effects on the political structure. Obviously, in real negotiations of PTAs, countries are looking to gain access to other markets and to increase exports. Yet, these simplifying assumptions help us to isolate the effects of politics on trade agreements.

In this regime, we assume that governments choose the import tariffs with preferences given by the sum of the government's preferences, i.e., the policy maker's preferences are given by

$$U\left(\theta_A^1, p^1, C_A^1, \theta_B^2, p^2, C_B^2\right) = C_A^1 + C_B^2 + \lambda W_A\left(\theta_A^1, p^1, p^2\right) + \lambda W_B\left(\theta_B^2, p^2, p^1\right).$$

This means that the governments have no coordination problem in this regime. The lobbies offer contributions to the same policy maker that choose the import tariffs of the two countries and the political game is a common agency game with informed lobbies, similar to Costa Lima and Moreira (2008).

We begin analyzing the perfect information case. The variables of the rival lobby are in bold and, to simplify the notation, we denote $C\left(\theta_i, p_{ik}\right)$ by C_{ik}.

Perfect information

With perfect information, a type-i lobby, facing a type-k rival lobby offers a contribution schedule that solves

$$\max_{p_{ik}, C_{ik}} \theta_i p_{ik} - C_{ik} \qquad \text{(lobby's problem II)}$$

subject to the individual rationality of the policy maker

$$C_{ik} + \mathbf{C}_{ki} + \lambda W_A\left(\theta_i, p_{ik}, \mathbf{p}_{ki}\right) + \lambda W_B\left(\boldsymbol{\theta}_k, \mathbf{p}_{ki}, p_{ik}\right) \geq \bar{U}\left(\theta_i, \boldsymbol{\theta}_k\right), \qquad (IR_{ik})$$

[2]Notice also that this result hinges on the specification of the technology of production.

where the second lowercase index $k \in \{h, l\}$ refers to the rival lobby's type and $\bar{U}(\theta_i, \boldsymbol{\theta}_k)$ is the policy maker's reserve utility.

Usually $\bar{U}(\theta_i, \boldsymbol{\theta}_k)$ gives the payoff of the policy maker when he rejects the contribution of only this lobby. However, once we assume that lobbies have the bargaining power, rejecting one lobby does not give any rents to the policy maker. Therefore,

$$\bar{U}(\theta_i, \boldsymbol{\theta}_k) = \lambda W_A(\theta_i, p^e, p^e) + \lambda W_B(\boldsymbol{\theta}_k, p^e, p^e).$$

Since the lobby has the bargaining power, the constraint (IR_{ik}) is binding and we can substitute out the contribution. Therefore, the lobby's problem II becomes

$$\max_{p_{ik}} \theta_i p_{ik} + \lambda \left[W_A(\theta_i, p_{ik}, \mathbf{p}_{ki}) + W_B(\boldsymbol{\theta}_k, \mathbf{p}_{ki}, p_{ik}) - W_A(\theta_i, p^e, p^e) - W_B(\boldsymbol{\theta}_k, p^e, p^e) \right].$$

We follow Bernheim and Whinston (1986) and assume the lobbies' contributions are truthful, and then the first-order condition of p_{ik} is given by

$$\theta_i - 2\lambda b(p_{ik} - p^e) + 2\lambda d(\mathbf{p}_{ki} - p^e) = 0$$

which implies that the equilibrium policy under perfect information is given by

$$\bar{p}_{ik} = \frac{b\theta_i + d\theta_k}{2\lambda(b^2 - d^2)} + p^e. \tag{3}$$

We see that policies increase with the lobby's own type because high types have higher willingness to pay for protection. They also increase with the protection for the lobby in the other market because goods are substitutes, which means that higher protection for the rival implies lower marginal cost of protection.

Comparing these policies with the prices in the unilateral regime under Assumption 3 gives

$$\begin{aligned} \bar{p}_{ik} &< \hat{p}_i \\ \bar{p}_{ik} &> \check{p}_i. \end{aligned}$$

These inequalities show that the lobbies get less protection in a customs union because they have to compensate the policy maker for the welfare loss in two countries. Thus, the relative weight of lobbies decreases compared to welfare in the preference of the policy maker. This is exactly the preference-dilution effect presented in de Melo, Panagariya and Rodrik (1993). On the other hand, the protection increases in sectors that do not lobby because they free-ride in the protection demanded by the lobby in the other country. This effect is similar to the one presented by Richardson (1993).

Notice that prices are equalized in the two countries. However, we cannot anticipate which regime generates higher welfare under perfect information, because

protection decreases in markets that have lobby but it increases in markets that do not have lobby. Therefore, in each country, some markets get less while some get more protection. We discuss the welfare properties of each regime in the next section.

We now turn to the case of informed lobbies in a customs union.

Privately informed lobbies

With privately informed lobbies, new elements arise in the political game. In this common agency game with informed lobbies, the lobby cannot access the true marginal cost of her protection because she does not know the price of the substitute good. This is determined by the pressure of the lobby from the other country whose type she does not know.

Obviously, the policy maker knows the policy that is to be implemented in both markets but a lobby does not know the policy to be granted for her rival. Therefore, the policy maker has an informational advantage against the lobbies. From the lobby's point of view, the policy maker holds the information of the lobby from the partner country. The best the lobby can do is to offer conditional contribution schedules that induce the governments to choose protection according to the true welfare cost. That is, to screen the rival's information from the policy maker. Yet screening is costly and generates distortions on the political game. These distortions are what we call "the information transmission effect".

Before clearly presenting these effects, we must discuss some technical issues about our approach.

We restrict the analysis symmetric Perfect Bayesian Equilibrium (equilibrium, in short) of the political game and we focus on separating contribution schedules. To find the optimal contribution schedules, we proceed as follows: we take as given the rival's offer $C^{-n}\left(\theta^{-n}, p^{-n}\right)$ and assume that it is separating, increasing in the rival's type and that

$$U\left(\theta_i, p, C, \boldsymbol{\theta}_{hi}, \mathbf{p}_{hi}, \mathbf{C}_{hi}\right) \geq U\left(\theta_i, p, C, \boldsymbol{\theta}_{li}, \mathbf{p}_{li}, \mathbf{C}_{li}\right).$$

This condition implies that the difference between the utility of high and low type rivals is not greater than the surplus increase between the two states of nature.

Then, we approach the lobby's choice of contribution schedules as a principal-agent problem. In turn, we present the lobby's utility maximization problem subject to the information transmission constraints, which we refer to as "the informed lobby problem". For further details about this approach see Costa Lima and Moreira (2008).

Once the rival's offer is separating, the policy maker will learn the rival's type when he receives her offer, before the implementation of the policy. Therefore, the lobby can screen this information from him. In order to do that, a lobby has to

offer a conditional contribution that imposes incentive compatibility on the policy maker.

The incentive compatibility constraints for the policy maker ensures that he will choose the import tariff according to the true marginal of protection, that is, according to the true type of the rival. When the type-i lobby faces a high type rival, we must have

$$C_{ih} + \mathbf{C}_{hi} + \lambda W_A(\theta_i, p_{ih}, \mathbf{p}_{hi}) + \lambda W_B(\boldsymbol{\theta}_h, \mathbf{p}_{hi}, p_{ih}) \geq C_{il} + \mathbf{C}_{hi} + \lambda W_A(\theta_i, p_{il}, \mathbf{p}_{hi}) + \lambda W_B(\boldsymbol{\theta}_h, \mathbf{p}_{hi}, p_{il}) \quad (IC_{ih})$$

and when the type-i lobby faces a low type opponent we must have

$$C_{il} + \mathbf{C}_{li} + \lambda W_A(\theta_i, p_{il}, \mathbf{p}_{li}) + \lambda W_B(\boldsymbol{\theta}_l, \mathbf{p}_{li}, p_{il}) \geq C_{ih} + \mathbf{C}_{li} + \lambda W_A(\theta_i, p_{ih}, \mathbf{p}_{li}) + \lambda W_B(\boldsymbol{\theta}_l, \mathbf{p}_{li}, p_{ih}). \quad (IC_{il})$$

The policy maker's individual rationality constraints are given by (IR_{ik}) for each k.

Now we can present the informed lobby problem.

The type-i informed lobby problem

$$\max_{\substack{p_{ih}, p_{il}, \\ C_{ih}, C_{il}}} E[\theta_i p_{i\cdot} - C_{i\cdot}] \qquad \text{(informed lobby's problem)}$$

subject to (IC_{ik}), (IR_{ik}) and $C_{ik} \geq 0$, for all k.

We need to identify which of these constraints are binding on the informed lobby problem. The lobbies' goods are substitutes ($d > 0$), which implies that $\frac{\partial^2 W}{\partial p^2 \partial p^1} = d$. So the marginal cost of protection for lobby 1 decreases with the protection of lobby 2. Therefore, lobby 1 prefers to face a high type rival because high types demand more protection, which reduces the marginal cost of her protection. On the other hand, in the absence of some compensation, the policy maker will be prompt to lie and choose lobby 1's policy as if the marginal cost of protection were high (i.e., the rival is low type). Therefore, the binding incentive compatibility constraint must be (IC_{ih}) and the binding individual rationality constraint must be (IR_{il}).[3]

With these constraints we can eliminate the contributions from the informed lobby's problem which becomes

$$\max_{p_{ik}, p_{il}} z\left[\theta_i p_{ih} + \lambda\left(W(\theta_i, p_{ih}, \boldsymbol{\theta}_h, \mathbf{p}_{hi}) - W(\theta_i, p_{il}, \boldsymbol{\theta}_l, \mathbf{p}_{hi}) + W(\theta_i, p_{il}, \boldsymbol{\theta}_l, \mathbf{p}_{li})\right)\right] + (1-z)\left[\theta_i p_{il} + \lambda W(\theta_i, p_{il}, \boldsymbol{\theta}_l, \mathbf{p}_{li})\right] - \bar{U}(\theta_i, \boldsymbol{\theta}_l) + \mathbf{C}_{li}$$

[3] If the utility of the policy maker is not increasing in the rival lobby's type, we can have equilibrium with countervailing incentives as shown in Costa Lima and Moreira (2008).

where $W(\theta_i, p_{ik}, \boldsymbol{\theta}_k, \mathbf{p}_{ki}) = W_A(\theta_i, p_{ik}, \mathbf{p}_{ki}) + W_B(\boldsymbol{\theta}_k, \mathbf{p}_{ki}, p_{ik})$.

Taking the derivatives with respect to the policies gives the following:

Lemma 1 *The first-order conditions of the informed lobby problem are given by*

$$\theta_i - 2\lambda b(p_{ih} - p^e) + 2\lambda d(\mathbf{p}_{hi} - p^e) = 0 \tag{4}$$

$$\theta_i - 2\lambda b(p_{il} - p^e) + 2\lambda d(\mathbf{p}_{li} - p^e) + 2\lambda d\frac{z}{1-z}[(\mathbf{p}_{li} - p^e) - (\mathbf{p}_{hi} - p^e)] = 0. \tag{5}$$

The first two terms of (4) and (5) refer to the trade-off between the marginal cost of the policy and the lobby's benefit from protection. The last term of (5), inside brackets, comes from the informational rent the lobby has to leave to the policy maker in order to give him the proper incentives. It makes a lobby demand less protection when she faces a low type opponent in order to reduce the policy maker's payoff of "lying" when the rival is high type. Therefore, the binding informational constraint makes the lobby demand less protection than she would under perfect information.

Figure 3 helps us to explain this information transmission effect (for simplicity, we set $p^e = 0$).

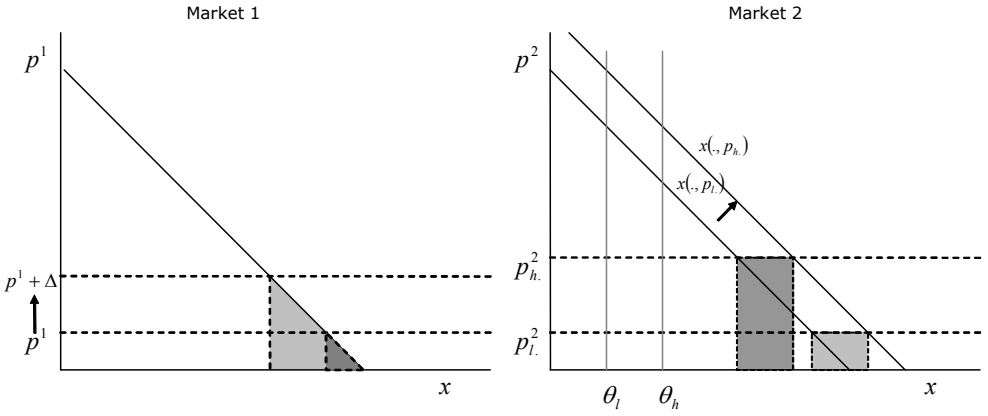

Figure 3: The screening effect

When lobby 1 increases her demand for protection, say from p^1 to $p^1 + \Delta$, by substitutability, the demand for good 2 shifts upwards as shown on the right side of Figure 3. This shift in the demand gives the policy maker an increase in the tariff revenue given by the two grey rectangles in market 2. Notice that the size of this revenue increase depends on the price (protection) in market 2.

If this price ($p_{h.}^2$) is big, then the revenue increase is big as shown by the darker rectangle in market 2. If the price ($p_{l.}^2$) is small, the revenue increase is small as shown by the lighter rectangle in market 2. In a perfect information context, the lobby anticipates the price in market 2 and deducts the revenue increase from her contributions. However, with information asymmetries, the lobby has to screen this information from the policy maker, distorting her demand for protection.

The equilibrium prices are those that simultaneously solve the condition informed lobby's problem for the two lobbies and for all possible type i. We then have:

Proposition 2 *There exists a unique symmetric equilibrium of the political game with informed lobbies. Moreover, the equilibrium prices are given by*

$$\begin{aligned} p_{hh}^* &= \bar{p}_{hh} \\ p_{hl}^* &= \bar{p}_{hl} - \frac{zb^2d\left(\theta_h - \theta_l\right)}{2\lambda\left(\left(1-z\right)b^2 - d^2\right)\left(b^2 - d^2\right)} \\ p_{lh}^* &= \bar{p}_{lh} - \frac{zbd^2\left(\theta_h - \theta_l\right)}{2\lambda\left(\left(1-z\right)b^2 - d^2\right)\left(b^2 - d^2\right)} \\ p_{ll}^* &= \bar{p}_{ll} - \frac{zbd\left(b+d\right)\left(\theta_h - \theta_l\right)}{2\lambda\left(\left(1-z\right)b^2 - d^2\right)\left(b^2 - d^2\right)}, \end{aligned}$$

where the uppercase $*$ refers to the equilibrium prices in a customs union. The equilibrium contributions are characterized by the binding constraint (IC_{ih}) and (IR_{il}) for the equilibrium prices.

Notice that prices decrease when compared to the prices in a customs union under perfect information, except when both lobbies have high type. The lobbies distort their demand for protection whenever they face a low type opponent, then $p_{ll}^* < \bar{p}_{ll}$ and $p_{hl}^* < \bar{p}_{hl}$; p_{lh}^* decreases due to strategic complementarity. From Proposition 2 we have the following:

Corollary 1 *In a customs union, the equilibrium of the political game with informed lobbies is welfare superior to the equilibrium of the political game with perfect information.*

This corollary shows that information transmission increases the benefits of a customs union. In this regime, the policy maker has the ability to use the information of one lobby against the other reducing the lobbies' power to extract rents. Since lobbying is harmful for the society, information transmission is welfare improving.

Now we can compare the prices in a customs union and in the unilateral tariff setting:

$$\begin{aligned} \hat{p}_h &> p^*_{hh} > \check{p}_h \\ \hat{p}_l &> p^*_{lh} \\ \hat{p}_h &> p^*_{hl} \\ \hat{p}_l &> p^*_{ll}. \end{aligned}$$

We can see that when a lobby with high type lobby faces a high type rival, she does not distort her demand for protection and the ordering of the tariffs remains the same as in the perfect information case. The other inequalities show that information transmission makes the lobbies distort downward their protection and the sectors that free ride may receive less protection in a customs union.

5 Welfare

In this section we compare the welfare of the two regimes. In our particular framework the welfare effects are due to the differences between the political game under the two regimes. We begin comparing the two regimes under perfect information.

In the unilateral regime lobbies have more protection than in the customs union because in the first they only have to compensate for the welfare loss of one economy. Therefore, a customs union reduces the relative weight of the lobby's profits compared to the welfare costs of protection. On the other hand, the sectors that do not have a lobby receive less protection in the unilateral regime than in the customs union because they free-ride on the protection demanded by the lobby of the other country.

Hence, a customs union can increase protection for politically weak sectors and decrease protection of politically stronger sectors. The proposition below shows that the second effect dominates.

Proposition 3 *Under perfect information, the welfare of a customs union is greater than the welfare of the unilateral regime.*

Proposition 3 shows that the preference-dilution dominates the free-riding effect. This means that, when tariffs are endogenously determined by lobbying and not all countries' sectors have lobby, a customs union changes the relative forces on the political game and makes countries, on average, more open to international trade than in the unilateral regime.

From Corollary 1, we know that in a customs union the solution of the political game with informed lobbies is welfare superior to the equilibrium under perfect

information. From Proposition 1 we also know that in the unilateral regime, the solution of the political game is the same with or without informed lobbies. Therefore, we have the following:

Corollary 2 *With privately informed lobbies, the welfare of a customs union is greater than the welfare of the unilateral regime.*

Corollary 2 shows that information transmission makes customs unions even more beneficial for the two countries decreasing their protection towards non-members even more than in the perfect information case. Therefore, the strategic use of the lobby's private information is an additional benefit of this trade agreement.

Of course, given the simplicity of our framework, we cannot generalize our results and say that customs unions are always welfare improving. Indeed, this may not be the case for some of these agreements that are implemented. However, what we do want to stress is that the agreement's effect on the political game is more beneficial for the countries when lobbies have private information.

6 Blocking the agreement

In this section we investigate the incentives for the creation of a customs union. We introduce a previous stage in the game that allows the governments to choose the regime before implementing the tariffs and the lobbies to offer contributions to support one of the regimes. The choice of the regime is binary: each government decides whether or not to join the customs union. If both governments decide to join the customs union, it is created. The lobbies offer money contributions to the government of her country to swing their decision to join or not the customs union. Given the chosen regime, lobbies offer contributions to influence the choice of import tariffs.

Since the choice of the regime is binary, the lobbies' contribution in this previous stage is a positive money transfer (Δ) in favor of the regime she prefers.

The timing of this new game is given by:

(0) lobbies offer contributions pro, or against the trade agreement;

(1) governments choose to join or not the customs union;

(2) nature draws the lobbies' types;

(3) lobbies offer contributions to influence the choice of import tariffs;

(4) policy maker(s) accept(s) or reject(s) the contributions;

(5) tariffs are chosen and, if contributions are accepted, payments are made accordingly.

For simplicity, we assume that nature only draws the lobbies' types after the choice of the regime. This assumption eliminates the possibility of information revelation in the first stage of contributions for the regime. If otherwise, lobbies could reveal information in this stage and the game would become quite complex. More importantly, we would not be able to compare the results of this section with the results of the previous sections.

With this timing, we only have to analyze the first stage of the game because, once the regime is chosen, the game unfolds as in the previous sections. The government prefers not to join the customs union if his utility in this regime is smaller than his utility under the unilateral regime. We assume that, once in a customs union, the governments share the benefits equally, since the governments are ex ante symmetric. We have that

$$\Delta^* + E\left[C^* + \lambda W_A\left(\theta, p^*, p^*\right)\right] \leq \hat{\Delta} + E\left[\hat{C}_{ik} + \lambda W_A\left(\theta, \hat{p}, \check{p}\right)\right]$$

where the expectation is taken in both type (thus, we omit the indexes). The "hat" refers to the policies of the unilateral regime while the asterisk refers to the policies of the customs union. Δ^* ($\hat{\Delta}$) is the contribution in favor of (against) the customs union. We can rewrite this inequality as

$$\hat{\Delta} - \Delta^* \geq E\left[C^* - \hat{C} + \lambda W_A\left(\theta, p^*, p^*\right) - \lambda W_A\left(\theta, \hat{p}, \check{p}\right)\right].$$

We know that lobbies have less protection under a customs union. Thus, they are better off when their governments choose not to join this regime and, therefore, $\Delta^* = 0$. A lobby's willingness to contribute against the customs union is at most the difference in the profits she receives in the two regimes, that is,

$$E\left[\theta\hat{p} - \hat{C}\right] - \hat{\Delta} \geq E\left[\theta p^* - C^*\right]$$

which we rewrite as

$$\hat{\Delta} \leq E\left[\theta\left(\hat{p} - p^*\right) - \left(\hat{C} - C^*\right)\right].$$

Therefore, the regime will be blocked by lobbies if

$$E\left[\theta\left(\hat{p} - p^*\right) - \left(\hat{C} - C^*\right)\right] \geq E\left[C^* - \hat{C} + \lambda W_A\left(\theta, p^*, p^*\right) - \lambda W_A\left(\theta, \hat{p}, \check{p}\right)\right]$$

or

$$E\left[\theta\left(\hat{p} - p^*\right)\right] \geq \lambda E\left[W_A\left(\theta, p^*, p^*\right) - W_A\left(\theta, \hat{p}, \check{p}\right)\right] \tag{6}$$

which simply states that if the loss in the lobby's surplus due to the agreement is greater (in absolute value) to the welfare increase times λ, the lobby blocks the agreement. As we did in the previous sections, we begin analyzing the perfect information case. We have the following:

Proposition 4 *Under perfect information, a customs union is always blocked by lobbies.*

Proposition 4 states that the profit loss the lobbies incur in a customs union is always greater than the contribution necessary to swing the governments decision away from the agreement under perfect information.

When the lobbies are privately informed, information transmission plays a role in this game and in some cases the governments choose to joint the agreement.

Proposition 5 *Let z be equal to $\frac{b-d}{b}$. Then, there exists $\mathring{d}$ such that if $d > \mathring{d}$ then lobbies cannot block a customs union.*

The intuition for the Proposition 6 is the following. We set z to be the maximum value that ensures interior solutions and reduce the difference between b and d. As d increases relatively to b, the preference-dilution effect decreases because the protection of the rival has a greater impact in reducing the lobby's marginal cost of protection. Moreover, the distortions of the information transmission effect are bigger since the substitutability's relative weight (d) is bigger. This increases the welfare of a customs union and implies in greater costs to block the agreement. Both effects make the customs union more likely to be politically viable.

The simplicity of our model also does not allow us to draw sharp conclusion about the qualitative properties of customs unions that are actually implemented. The lobbies may have incentive to support agreements that are trade diverting as pointed out by Grossman and Helpman (1995) and Krishna (1998). However, what we point out is the fact that information transmission makes the customs unions more beneficial and, in turn, more likely to be supported. Hence, it reduces the possibility of implementing a welfare decreasing customs union.

7 Conclusion

We analyzed the information transmission effect in a political game of customs unions when lobbies have private information about the competitiveness of the sectors they represent.

The information transmission effect arises in customs unions because the cost of protection for a lobby depends on the size of the protection granted for lobbies in other markets since goods are substitutes. However, a lobby does not know the competitiveness of the lobbies from the other country. Hence, she cannot anticipate which will be the protection in other sectors. In turn, this implies that she does not know the marginal cost of her own protection.

Although the lobby cannot anticipate the protection of the other markets, she knows that the policy maker learns the foreign lobbies' information before implementing the policies. Therefore, from the point of view of the lobby, the rival's private information becomes the policy maker's "private information". Hence, the lobby screens the rival's information from the policy maker. Screening gives informational rents to the governments and distorts the lobbies' demands for protection downward.

On the other hand, if such agreement is not reached, governments choose tariffs separately and the political game is an informed principal problem. In this case, the information asymmetry does not generate distortions because lobbies reveal their information without any cost. Thus, protection is as predicted by Grossman and Helpman (1994): sectors that lobbies are protected and sectors that do not lobby receive the tariff that accommodates the protection granted and the society bears the welfare cost of protection.

We found that the information transmission effect increases the welfare of a customs union because it reduces the protection of countries towards non-members. We also found that this effect adds up with the free riding effect identified by Richardson (1993) and makes the welfare under a customs union greater than without agreement.

Moreover, we investigated the incentives for the creation of customs unions. We introduced a previous stage in the game where lobbies offer contributions pro or against the agreement; and then the governments choose to join or not the customs union. We found that, under perfect information, the agreement is never politically sustainable, while with the information transmission effect the results can be reversed. Hence, information transmission can make customs unions politically sustainable.

Therefore, the information transmission effect may favor customs union agreements. The effect also points to the fact that, when information asymmetries are important for politics, then the changes on institutions must take into account the informational distortions that may be created or eliminated from the decision making process.

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Appendix

Proof of Proposition 1. A lobby does not lie about her type if

$$V\left(\theta_i, p\left(\theta_i\right), C\left(p\left(\theta_i\right), \theta_i\right)\right) \geq V\left(\theta_i, p\left(\theta_{-i}\right), C\left(p\left(\theta_{-i}\right), \theta_{-i}\right)\right),$$

where $-i \neq i$.

This inequality can be artificially written as

$$\int_{\theta_{-i}}^{\theta_i} \frac{\partial V}{\partial \tilde{\theta}}\left(\theta_i, p\left(\tilde{\theta}\right), C\left(p\left(\tilde{\theta}\right), \tilde{\theta}\right)\right) d\tilde{\theta} \geq 0. \tag{7}$$

Using that constraints (IR_i) are binding, we have

$$C_i = -\lambda W_A\left(\tilde{\theta}_i, p_i, \mathbf{p}_i\right) + \lambda W_A\left(\tilde{\theta}_i, p^e, \mathbf{p}^e\right).$$

We also use that

$$\frac{\partial V}{\partial \tilde{\theta}}\left(\theta_i, p_i, C\left(p_i, \tilde{\theta}\right)\right) = \theta_i \frac{\partial p_i}{\partial \tilde{\theta}} - \frac{\partial C_i}{\partial \tilde{\theta}} - \frac{\partial C_i}{\partial p_i}\frac{\partial p_i}{\partial \tilde{\theta}}.$$

Applying the envelope theorem we have that $\tilde{\theta} = \frac{\partial C_{ih}}{\partial p_{ih}}$.
Hence, the above derivatives of the lobby's utility simplify to

$$\frac{\partial V}{\partial \tilde{\theta}}\left(\theta_i, p_i, C\left(p_i, \tilde{\theta}\right)\right) = \left(\theta_i - \tilde{\theta}\right)\frac{\partial p_i}{\partial \tilde{\theta}} - \frac{\partial C_i}{\partial \tilde{\theta}}.$$

Therefore, condition (7) becomes

$$\int_{\theta_{-i}}^{\theta_i}\left[\left(\theta_i - \tilde{\theta}\right)\frac{\partial p}{\partial \tilde{\theta}}\left(\tilde{\theta}\right) - \frac{\partial C}{\partial \tilde{\theta}}\right] d\tilde{\theta} \geq 0. \tag{8}$$

Again, from the constraint (IR_{il}) we have

$$\frac{\partial C_{il}}{\partial \tilde{\theta}} = \lambda \frac{\partial W_A}{\partial \tilde{\theta}} \left(\tilde{\theta}, p^e, \mathbf{p}^e \right) - \lambda \frac{\partial W_A}{\partial \tilde{\theta}} \left(\tilde{\theta}, p_i, \mathbf{p}_i \right).$$

However, using (2) gives $\frac{\partial C_i}{\partial \tilde{\theta}} = 0$.
Therefore, (8) becomes

$$\int_{\theta_{-i}}^{\theta_i} \left(\theta_i - \tilde{\theta} \right) \frac{\partial p}{\partial \tilde{\theta}} \left(\tilde{\theta} \right) d\tilde{\theta} \geq 0.$$

Since this is a discrete type model there is no intermediate values for $\tilde{\theta}$. However, if we assume that $p\left(\tilde{\theta}\right)$ is a linear function that links $p\left(\theta_i\right)$ and $p\left(\theta_{-i}\right)$, then $\frac{\partial p}{\partial \tilde{\theta}} \left(\tilde{\theta} \right) \geq 0$ since the price is increasing in the lobby's type. Hence, the above inequality holds because if $\theta_i > \theta_{-i}$ then $\left(\theta_i - \tilde{\theta} \right) \frac{\partial p}{\partial \tilde{\theta}} \left(\tilde{\theta} \right) \geq 0$, while if $\theta_{-i} > \theta_i$ then $\left(\tilde{\theta} - \theta_i \right) \frac{\partial p}{\partial \tilde{\theta}} \left(\tilde{\theta} \right) d\tilde{\theta} \geq 0$. Therefore, the lobby is always better-off telling the truth. Therefore, she reveals her type without any cost. ■

Proof of Lemma 1. When the constraints (IC_{ih}) and (IR_{il}) are binding we have that

$$C_{il} = -\mathbf{C}_{li} - \lambda W_A\left(\theta_i, p_{il}, \mathbf{p}_{li}\right) - \lambda W_B\left(\boldsymbol{\theta}_l, \mathbf{p}_{li}, p_{il}\right) + \lambda W_A\left(\theta_i, p^e, \mathbf{p}^e\right) + \lambda W_B\left(\theta_l, \mathbf{p}^e, p^e\right) \tag{9}$$

and

$$C_{ih} = C_{il} - \lambda W_A\left(\theta_i, p_{ih}, \mathbf{p}_{hi}\right) - \lambda W_B\left(\boldsymbol{\theta}_h, \mathbf{p}_{ih}, p_{ih}\right) + \lambda W_A\left(\theta_i, p_{il}, \mathbf{p}_{hi}\right) + \lambda W_B\left(\boldsymbol{\theta}_l, \mathbf{p}_{ih}, p_{il}\right). \tag{10}$$

We plug these contributions into the lobby's utility function and the problem informed lobby's problem becomes

$$\begin{aligned} \max_{p_{ik}, p_{il}} z & \left[\begin{array}{c} \theta_i p_{ih} + \lambda\left(W_A\left(\theta_i, p_{ih}, \mathbf{p}_{hi}\right) + W_B\left(\boldsymbol{\theta}_h, \mathbf{p}_{ih}, p_{ih}\right) - W_A\left(\theta_i, p_{il}, \mathbf{p}_{hi}\right) - W_B\left(\boldsymbol{\theta}_l, \mathbf{p}_{ih}, p_{il}\right)\right) \\ + \lambda\left(W_A\left(\theta_i, p_{il}, \mathbf{p}_{li}\right) + W_B\left(\boldsymbol{\theta}_l, \mathbf{p}_{li}, p_{il}\right) - W_A\left(\theta_i, p^e, \mathbf{p}^e\right) - W_B\left(\theta_l, \mathbf{p}^e, p^e\right)\right) + \mathbf{C}_{li} \end{array} \right] \\ & + (1-z)\left[\theta_i p_{il} + \lambda\left(W_A\left(\theta_i, p_{il}, \mathbf{p}_{li}\right) + W_B\left(\boldsymbol{\theta}_l, \mathbf{p}_{li}, p_{il}\right) - W_A\left(\theta_i, p^e, \mathbf{p}^e\right) - W_B\left(\theta_l, \mathbf{p}^e, p^e\right)\right) + \mathbf{C}_{li}\right]. \end{aligned}$$

The first-order conditions of this problem are given by

$$z\left[\theta_i p_{ih} - 2\lambda b\left(p_{ih} - p^e\right) + 2\lambda d\left(\mathbf{p}_{hi} - p^e\right)\right] = 0$$

$$(1-z)\left[\theta_i p_{il} - 2\lambda b\left(p_{il} - p^e\right) + 2\lambda d\left(\mathbf{p}_{li} - p^e\right)\right] + z\left[2\lambda d\left(\mathbf{p}_{li} - p^e\right) - 2\lambda d\left(\mathbf{p}_{hi} - p^e\right)\right] = 0.$$

Dividing the first-order conditions, respectively, by z and $(1-z)$ gives (4) and (5). ■

Proof of Proposition 2. The first-order conditions (4) and (5) for the problems of lobby 1 and 2 constitute a system of linear equations that can be written in matrix form.

When both lobbies are high type (state $\{\theta_h, \theta_h\}$), we have

$$\begin{bmatrix} -2\lambda b & 2\lambda d \\ 2\lambda d & -2\lambda b \end{bmatrix} \begin{bmatrix} p_{hh}^1 - p^e \\ p_{hh}^2 - p^e \end{bmatrix} = \begin{bmatrix} -\theta_h \\ -\theta_h \end{bmatrix}$$

and a solution always exists since, by Assumption 1, the determinant of the coefficient matrix is $4(\lambda b)^2 - 4(\lambda d)^2 > 0$.

Given the solution of the system in this state, we can find policies for the state $\{\theta_h, \theta_l\}$:

$$\begin{bmatrix} -2\lambda b(1-z) & 2\lambda d \\ 2\lambda d & -2\lambda b \end{bmatrix} \begin{bmatrix} p_{hl}^1 - p^e \\ p_{lh}^2 - p^e \end{bmatrix} = \begin{bmatrix} -\theta_h(1-z) + 2z\lambda d(p_{hh}^* - p^e) \\ -\theta_l \end{bmatrix}$$

because the coefficient matrix has a positive determinant for the same reason as before. We also have a symmetric system for state $\{\theta_l, \theta_h\}$.

Given the solution of these systems, we can find the policies for state $\{\theta_l, \theta_l\}$:

$$\begin{bmatrix} -2\lambda b(1-z) & 2\lambda d \\ 2\lambda d & -2\lambda b(1-z) \end{bmatrix} \begin{bmatrix} p_{ll}^1 - p^e \\ p_{ll}^2 - p^e \end{bmatrix} = \begin{bmatrix} -\theta_l(1-z) + 2z\lambda d(p_{lh}^* - p^e) \\ -\theta_l(1-z) + 2z\lambda d(p_{lh}^* - p^e) \end{bmatrix},$$

because the determinant of the coefficients matrix is $4(\lambda(1-z)b)^2 - 4(\lambda d)^2 > 0$ since $(1-z)b > d$ (by Assumption 1).

We find policies for the case where both lobbies have high types. We begin computing the best-response functions, which are given by

$$\begin{aligned} p_{hh}^1 &= f_{hh}(p_{hh}^2) = p^e + \frac{\theta_h + 2\lambda d(p_{hh}^2 - p^e)}{2\lambda b} \\ p_{hh}^2 &= f_{hh}(p_{hh}^1) = p^e + \frac{\theta_h + 2\lambda d(p_{hh}^1 - p^e)}{2\lambda b}. \end{aligned}$$

Then we substitute one function into the other to get:

$$p_{hh}^* = f_{hh}(f_{hh}(p_{hh}^*)) = p^e + \frac{\theta_h + 2\lambda d\left(\frac{\theta_h + 2\lambda d(p_{hh}^* - p^e)}{2\lambda b}\right)}{2\lambda b}$$

that can be rearranged to

$$p_{hh}^* - p^e = \frac{2\lambda b\theta_h + 2\lambda d\theta_h + 4(\lambda d)^2(p_{hh}^* - p^e)}{4(\lambda b)^2}$$

and we get

$$\left(p_{hh}^{*}-p^{e}\right)4\lambda^{2}\left(b^{2}-d^{2}\right)=\lambda 2\left(b\theta_{h}+d\theta_{h}\right)\Leftrightarrow p_{hh}^{*}-p^{e}=\frac{b\theta_{h}+d\theta_{h}}{2\lambda\left(b^{2}-d^{2}\right)}.$$

Finally, we have that

$$p_{hh}^{*}=\frac{b\theta_{h}+d\theta_{h}}{2\lambda\left(b^{2}-d^{2}\right)}+p^{e}=\bar{p}_{hh}.$$

The prices in the other states are found in the same way.

The contributions are obtained by substituting the equilibrium policies into (9) and (10). ■

Proof of Corollary 1. Since preferences are quasi-linear, in order to compare the welfare of the political game with and without private information, we only need to compare prices.

The welfare of the customs union in the state $\{\theta_h,\theta_h\}$ is the same for the perfect and private information cases, since prices are the same. The prices in the other states can be written as

$$\begin{aligned}
p_{hl}^{*} &= \frac{\theta_{h}b\left(\frac{(1-z)b-d}{b-d}\right)+\theta_{l}d}{2\lambda\left(\left(1-z\right)b^{2}-d^{2}\right)}+p^{e}<\bar{p}_{hl}\\
p_{lh}^{*} &= \frac{\theta_{l}b\left(1-z\right)+\theta_{h}d\left(\frac{(1-z)b-d}{b-d}\right)}{2\lambda\left(\left(1-z\right)b^{2}-d^{2}\right)}+p^{e}<\bar{p}_{lh}\\
p_{ll}^{*} &= \frac{\theta_{l}\left(\left(1-z\right)b+d\right)-\theta_{h}d\left(\frac{zb}{b-d}\right)}{2\lambda\left(\left(1-z\right)b^{2}-d^{2}\right)}+p^{e}<\bar{p}_{ll}.
\end{aligned}$$

The maximum welfare for the society is the free trade. Thus, when lobbies receive positive protection, the welfare decreases. This means that $\frac{\partial W}{\partial p^{n}}\left(\theta^{n},p^{n},p^{-n}\right)<0$ for $p^{n}>p^{e}$. From the above formulas, we know that $\bar{p}_{hl}>p_{hl}^{*}>p^{e}$ and $\bar{p}_{lh}>p_{lh}^{*}>p^{e}$. Therefore, the welfare with informed lobbies in state $\{\theta_h,\theta_l\}$ is greater than under perfect information. In state $\{\theta_l,\theta_l\}$ prices are also below the truthful prices, but they may fall below the international prices and the welfare can decrease compared to the perfect information case. Thus, we must have

$$W_{A}\left(\theta_{l},\bar{p}_{ll},\bar{p}_{ll}\right)+W_{B}\left(\theta_{l},\bar{p}_{ll},\bar{p}_{ll}\right)<W_{A}\left(\theta_{l},p_{ll}^{*},p_{ll}^{*}\right)+W_{B}\left(\theta_{l},p_{ll}^{*},p_{ll}^{*}\right).$$

This last inequality is equivalent to

$$\left(\bar{p}_{ll}-p^{e}\right)^{2}\left(b-d\right)-\left(p_{ll}^{*}-p^{e}\right)^{2}\left(b-d\right)>0.$$

Since $p_{ll}^{*}<\bar{p}_{ll}$, we must have

$$\left(\bar{p}_{ll}-p^{e}\right)^{2}>\left(p_{ll}^{*}-p^{e}\right)^{2}$$

which simplifies to

$$\bar{p}_{ll} - p^e > p^e - p^*_{ll}.$$

Substituting the formulas for these prices, we get:

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

which we can rewrite as

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

that, after some algebra, simplifies to

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

By Assumption 3, the welfare of equilibrium of the political game with informed lobbies is greater than the welfare of equilibrium of the political game with perfect information. ■

Proof of Proposition 3. The economic welfare in one country is given by

$$\begin{aligned} W_A(\theta_i, p_{ik}, p_{ki}) = (b-d)\left(\frac{a}{b-d} - p^e\right)^2 \\ -\frac{b}{2}\left[(p_{ik}-p^e)^2 + (p_{ki}-p^e)^2\right] + d(p_{ik}-p^e)(p_{ki}-p^e) + \left(\theta_i + \bar{\theta}\right) p^e. \end{aligned}$$

Therefore, we have that

$$\begin{aligned} W_A(\theta_i, \bar{p}_{ik}, \bar{p}_{ki}) - W_A(\theta_i, \hat{p}_{ik}, \check{p}_{ki}) &= -\frac{b}{2}\left[(\bar{p}_{ik}-p^e)^2 + (\bar{p}_{ki}-p^e)^2\right] + d(\bar{p}_{ik}-p^e)(\bar{p}_{ki}-p^e) \\ &\quad + \frac{b}{2}\left[(\hat{p}_{ik}-p^e)^2 + (\check{p}_{ki}-p^e)^2\right] - d(\hat{p}_{ik}-p^e)(\check{p}_{ki}-p^e) \end{aligned}$$

which, substituting the equilibrium formulas of the policies, simplifies to

$$W_A(\theta_i, \bar{p}_{ik}, \bar{p}_{ki}) - W_A(\theta_i, \hat{p}_{ik}, \check{p}_{ki}) = \frac{\theta_i}{4\lambda}(2(\hat{p}_i - p^e) - (p_{ik} - p^e)) - \frac{\theta_k}{4\lambda}(p_{ki} - p^e).$$

Taking the expected value both in i and k, we have

$$E[W_A(\theta, \bar{p}, \bar{p}) - W_A(\theta, \hat{p}, \check{p})] = E\left[\frac{\theta}{2\lambda}((\hat{p} - p^e) - (\bar{p} - p^e))\right] > 0 \qquad (11)$$

which proves the result. ■

Proof of Corollary 2. From Proposition 4 we have that

$$W_A\left(\theta_i, \hat{p}_{ik}, \check{p}_{ki}\right) + W_B\left(\theta_k, \hat{p}_{ki}, \check{p}_{ik}\right) < W_A\left(\theta_i, \bar{p}_{ik}, \bar{p}_{ki}\right) + W_B\left(\theta_k, \bar{p}_{ki}, \bar{p}_{ik}\right)$$

and from Corollary 1 we have that

$$W_A\left(\theta_i, \bar{p}_{ik}, \bar{p}_{ki}\right) + W_B\left(\theta_k, \bar{p}_{ki}, \bar{p}_{ik}\right) < W_A\left(\theta_i, p^*_{ik}, p^*_{ki}\right) + W_B\left(\theta_k, p^*_{ki}, p^*_{ik}\right).$$

Hence, it follows that

$$W_A\left(\theta_i, \hat{p}_{ik}, \check{p}_{ki}\right) + W_B\left(\theta_k, \hat{p}_{ki}, \check{p}_{ik}\right) < W_A\left(\theta_i, p^*_{ik}, p^*_{ki}\right) + W_B\left(\theta_k, p^*_{ki}, p^*_{ik}\right).$$

■

Proof of Proposition 4. Substituting (11) into (6) gives us

$$E\left[\theta\left(\left(\hat{p} - p^e\right) - \left(\bar{p} - p^e\right)\right)\right] > \lambda E\left[\frac{\theta}{2\lambda}\left(\left(\hat{p} - p^e\right) - \left(\bar{p} - p^e\right)\right)\right] \tag{12}$$

which simplifies to

$$E\left[\frac{\theta}{2}\left(\left(\hat{p} - p^e\right) - \left(\bar{p} - p^e\right)\right)\right] > 0$$

which holds trivially. Therefore, the lobbies' surplus loss is greater than the surplus increase of a customs union, thus they are always willing to block the agreement.

■

Proof of Proposition 5. We will show that (6) does not hold when $z = \frac{b-d}{b}$ and d tends to b. To do that, we need to compare the expected welfare increase of a customs union with the expected lobbies' profit loss.

The difference between the expected welfare of the two regimes is given by

$$\begin{aligned} E\left[W_A\left(\theta, p^*, p^*\right) - W_A\left(\theta, \hat{p}, \check{p}\right)\right] &= \frac{b}{2} E\left[\left(\hat{p} - p^e\right)^2 - \left(p^* - p^e\right)^2 + \left(\check{p} - p^e\right)^2 - \left(p^* - p^e\right)^2\right] \\ &\quad + dE\left[\left(p^* - p^e\right)\left(p^* - p^e\right) - \left(\hat{p} - p^e\right)\left(\check{p} - p^e\right)\right]. \end{aligned}$$

Substituting the policies, this becomes

$$\begin{aligned} E\left[W_A\left(\theta, p^*, p^*\right) - W_A\left(\theta, \hat{p}, \check{p}\right)\right] &= E\left[W_A\left(\theta, \bar{p}, \bar{p}\right) - W_A\left(\theta, \hat{p}, \check{p}\right)\right] + \\ &\quad z\left[\left(1-z\right)\delta\left(2\left(\frac{b\theta_h + d\theta_l}{b^2 - d^2}\right) - \delta b\left(b^2 - d^2\right)\right)\right] \\ &\quad + \left(1-z\right)\left[\left(1-z\right)\delta\left(2\theta_l\left(\frac{b+d}{b^2-d^2}\right) - \delta\left(b+d\right)\left(b^2-d^2\right)\right)\right], \end{aligned} \tag{13}$$

where $\delta = \frac{zbd(\theta_h - \theta_l)}{2\lambda((1-z)b^2 - d^2)(b^2 - d^2)}$

The the lobbies's profit loss is given by

$$E\left[\theta\left(\hat{p}-p^{*}\right)\right]. \tag{14}$$

Substituting (13) and (14) into (6) gives

$$\begin{aligned} E\left[\theta\left(\hat{p}-p^{*}\right)\right] \underset{\geq}{\leq} & \lambda E\left[W_A\left(\theta,\bar{p},\bar{p}\right)-W_A\left(\theta,\hat{p},\check{p}\right)\right] \\ & +z\left[\left(1-z\right)\delta\left(2\left(\frac{b\theta_h+d\theta_l}{b^2-d^2}\right)-\delta b\left(b^2-d^2\right)\right)\right] \\ & +\left(1-z\right)\left[\left(1-z\right)\delta\left(2\theta_l\left(\frac{b+d}{b^2-d^2}\right)-\delta\left(b+d\right)\left(b^2-d^2\right)\right)\right] \end{aligned}$$

which is ambiguous. If the right-hand side is greater than the left-hand side, then the welfare increase of a customs union is big enough and lobbies cannot block the agreement. If the left-hand side is greater than the right-hand side, then lobbies's loss is big enough and they can dissuade the governments to join the customs union.

Assuming that $z=\frac{b-d}{b}$, the above expression becomes

$$\begin{aligned} & \left(\frac{b-d}{b}\right)^2\left(\frac{\theta_h^2\left(b-d\right)}{4\lambda\left(b^2-d^2\right)}\right)+\frac{d\left(b-d\right)}{b^2}\left(\frac{\theta_h^2 b-\theta_h\theta_l d}{4\lambda\left(b^2-d^2\right)}\right) \\ & \quad +\frac{d\left(b-d\right)}{b^2}\left(\frac{\theta_l^2 b-d\theta_l\theta_h}{4\lambda\left(b^2-d^2\right)}\right)+\frac{d^2}{b^2}\left(\frac{\theta_l^2\left(b-d\right)}{4\lambda\left(b^2-d^2\right)}\right)\underset{\leq}{\geq} \\ & \quad \frac{d\left(b-d\right)}{b^2}\frac{\theta_h-\theta_l}{2\lambda\left(b+d\right)}\left(2\frac{b\theta_h+d\theta_l}{b^2-d^2}-\frac{\left(\theta_h-\theta_l\right)\left(b-d\right)}{2\lambda}\right) \\ & \quad +\frac{d^2}{b^2}\frac{\theta_h-\theta_l}{2\lambda\left(b+d\right)}\left(2\frac{\theta_l}{b-d}-\frac{\left(\theta_h-\theta_l\right)\left(b^2-d^2\right)}{2\lambda}\right) \end{aligned}$$

that can be rewritten as

$$\begin{aligned} & \left(b-d\right)^3\frac{\theta_h^2}{4\lambda}+d\left(b-d\right)\frac{\theta_h}{4\lambda}\left(b\theta_h-d\theta_l\right)+d\left(b-d\right)\frac{\theta_l}{4\lambda}\left(\theta_l-d\theta_h\right) \\ & \quad +d^2\frac{\theta_l^2}{2}\left(b-d\right)\underset{\leq}{\geq}\frac{d\left(b-d\right)\left(\theta_h-\theta_l\right)}{2\lambda}\left(2\frac{b\theta_h+d\theta_l}{b+d}-\frac{\left(\theta_h-\theta_l\right)\left(b-d\right)}{2\lambda}\right) \\ & \quad +d^2\frac{\left(\theta_h-\theta_l\right)}{2\lambda}\left(2\theta_l-\frac{\left(\theta_h-\theta_l\right)}{2\lambda}\left(b+d\right)\left(b-d\right)^2\right). \end{aligned}$$

When $d\rightarrow b$ the left-hand side of the inequality tends to zero, while the right-hand side tends to $d^2\frac{\left(\theta_h-\theta_l\right)}{2\lambda}2\theta_l$. Therefore, there exists $\mathring{d}\in\left(0,b\right)$, such that, if $d>\mathring{d}$, then the right-hand side is greater than the left-hand side and the agreement cannot be blocked. ■