

# A Commitment Theory of Subsidy Agreements\*

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## Abstract

This paper takes a novel look at the rationale for the rules on domestic subsidies in international trade agreements. We build a model where a government has a tariff and a production subsidy at its disposal, taxation can be distortionary and an industrial lobby is organized to influence the political process to its advantage. The model shows that, under political pressures, the government will turn to subsidies when its ability to provide protection is curtailed by a trade agreement that binds only tariffs. This policy substitutability between tariffs and subsidies is inefficient and offsets the welfare gains from tariff cuts. Moreover, when factors of production are mobile in the long run but investments are irreversible in the short run, we show that the government cannot credibly commit vis-à-vis the domestic lobby unless the trade agreement also regulates production subsidies. That is, this model highlights the commitment value of subsidy rules. Finally, we employ the theory to analyze the Subsidies and Countervailing Measures (SCM) Agreement within the GATT/WTO system. Interestingly, we find important similarities in terms of the efficient design of rules on domestic subsidies between the standard approach and the commitment approach to trade agreements.

**Keywords:** Trade Agreements, Trade Policy Credibility, Subsidy Rules, GATT/WTO.

**JEL Codes:** F13, F55, H25, D72.

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# 1 Introduction

The appropriate treatment of subsidies in trade agreements is an issue of continuing debate among practitioners and academics. At the Doha Ministerial Meeting in November 2001, WTO ministers stated that "*In the light of experience and of the increasing application of these instruments by Members, we agree to negotiations aimed at clarifying and improving disciplines under the Agreement on Subsidies and Countervailing Measures*" (paragraph 28 of the Doha Ministerial Declaration). On the academic side, the purpose and the design of subsidy agreements -namely the regulation of domestic subsidies within the WTO- have been criticized in important recent contributions (Sykes, 2005 and 2009, Bagwell and Staiger, 2006, Bagwell, 2008).

What is the role of subsidy agreements within international trade treaties? Why do governments value such agreements? And what is the appropriate treatment of subsidies in the multilateral trading system? In this paper, we focus on domestic production subsidies to the import-competing sector and develop a political economy theory to address these questions.

Before discussing our basic story, it might be useful to review the main economic arguments in favour and against rules on domestic subsidies in the multilateral trading system that have so far emerged in the literature. First and foremost, when taxation does not result in large distortions (for instance, when lump-sum taxes are available), a subsidy may be a first-best policy tool that government can use to address market imperfections (such as externalities) that lead to too little production. An import tariff has the same boosting effect on domestic production, but due to its distorting effect on consumption, it may be an inefficient (second-best) policy (Bhagwati and Ramaswami, 1963, and Johnson, 1965). The advantage of a subsidy is lessened (and possibly eliminated) when the taxes required to finance it introduce large distortions. In this case, either a combination of tariffs and subsidies or tariffs only should be used to efficiently address market failures. In brief, this argument implies that, in the presence of domestic distortions, a trade agreement should leave to national governments flexibility in setting domestic subsidies -provided that tax distortions are not too large.

This argument alone, however, disregards the reason why a trade treaty is signed in the first place. In the standard theory of trade agreements (Johnson, 1954, Bagwell and Staiger, 1999) countries bind their tariffs to escape a terms-of-trade driven Prisoner's Dilemma.<sup>1</sup> Specifically, through a trade agreement signatories lower their tariffs to grant reciprocal, and welfare-enhancing, market access to their trading partners. In this view, an argument in favour of limiting government flexibility in setting domestic subsidies is that governments can use such policy instruments to erode market access commitments made in previous tariff negotiations. As trading partners anticipate this incentive, they might be reluctant to accept a tariff cut in the first place.

Taken together, these two arguments imply that a subsidy agreement needs to strike a bal-

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<sup>1</sup>For an overview of the terms-of-trade approach to trade agreements, see Bagwell and Staiger (2002).

ance between the benefits of government discretion in using domestic subsidies to address market distortions and the need to limit governments' flexibility as a means to secure market access commitments. In particular, within the framework of the standard approach to trade agreements, Bagwell and Staiger (2006) show that subsidy rules that are too restrictive could have a "chilling" effect on trade negotiations. More precisely, if under an international treaty welfare-enhancing domestic subsidies could be challenged and removed, a government may prefer not to sign the agreement when it values flexibility more than the trade-liberalizing effect of the tariff reduction.

Terms of trade considerations are not the only reason why countries may value trade policy rules. A separate -and complementary- approach emphasizes the commitment role of trade agreements (Staiger and Tabellini, 1987, Maggi and Rodriguez-Clare, 1998): when a government faces a *credibility problem* in setting trade policy (for reasons of time-inconsistency or because of political pressures by domestic interest groups), signing a trade agreement can improve welfare as it provides a device to enforce commitments to the efficient policy.<sup>2</sup> In particular, Maggi and Rodriguez-Clare (1998) consider a standard Grossman and Helpman (1994) framework where a lobby pays political contributions to the policy maker to obtain tariff protection. They show that, in presence of irreversible investments, tariffs distort the allocation of resources between different activities and have long-run negative effects on social and government welfare. For this reason, politicians value a tariff agreement which allows the government to commit its policy vis à vis domestic special interests. The role and design of rules on domestic subsidies when the problem that the trade agreement is solving is one of policy credibility is precisely the subject of the present paper.

An important argument that circulates among practitioners is that when liberalizing trade, governments may be pressured by special interests into an inefficient use of domestic subsidies.<sup>3</sup> Intuitively, import-competing producers lobby for protection as tariffs increase the domestic price of imported goods and boost their profits. This way, tariffs redistribute income from domestic consumers to protected domestic producers. Therefore, a trade agreement that lowers import tariffs hurts producers in the import-competing sectors, who have an incentive to lobby for other (domestic) policies that will benefit them. Production subsidies are obvious candidates of such alternative policy measures.<sup>4</sup> We refer to this as the *policy substitution problem*. Under political pressures by

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<sup>2</sup>Maggi and Rodriguez-Clare (2007) build a model that combines the terms-of-trade rationale for trade agreements with the commitment approach and formally show the complementary nature of the two theories.

<sup>3</sup>In a book on the treatment of subsidies in the multilateral trading system, Hurlbauer, former Deputy Assistant Secretary of the Treasury for Trade and Investment Policy, makes the following case for international disciplines on subsidies (quoted in Sykes, 2009): "*Unbridled and competing national subsidies can undermine world prosperity ... Because the concentrated interests of producers command greater political support than the diffuse interests of consumers, national governments find it much easier to emulate the vices of protection than the virtues of free trade. This lesson has prompted the international community to fashion guidelines that distinguish between acceptable and unacceptable national subsidy measures and to codify these guidelines both in bilateral and multilateral agreements*".

<sup>4</sup>Other policies would include different forms of subsidies (e.g. government transfers and R&D subsidies), non-tariff barriers (e.g. sector-specific regulations), contingent measures (e.g. anti-dumping), etc. While this paper focuses on production subsidies, the logic applies to other measures as well. We come back to this point in the conclusions.

import-competing sectors, a trade agreement which binds only tariffs may lead a government to set an inefficiently high level of subsidies, thus undoing (partially or totally) the welfare effects of trade liberalization. Not only. As the level of protection to the import-competing sector is determined by the tariff *and* the subsidy, a trade agreement that binds tariffs but leaves complete flexibility on domestic subsidies does not solve the trade policy credibility problem as excessive investment would still concentrate in the protected sector. This is why –we argue– multilateral (WTO) and regional (e.g. EU) economic integration processes may contemplate disciplines on the use of domestic subsidies.

Our first goal is to introduce these considerations into the political economy theory of trade policy. We do this with the simplest possible modification of the standard "Protection for Sale" model (Grossman and Helpman, 1994). We assume a two-sector small open economy, where the government has at its disposal an import tariff and a production subsidy. Taxation can be distortionary, which implies that in presence of production externalities in one sector, the first-best policy mix depends on the extent of tax distortions. Finally, only one industry is able to coalesce into a lobby and exert political pressures on the government to obtain favorable policies. This simple structure is sufficient to show our first set of results. A *tariff-only agreement* (i.e. an agreement that binds tariffs, but not subsidies) suffers of a policy substitution problem: in presence of political pressures, governments will turn to subsidies when their ability to impose tariffs is curtailed. In this environment, a country achieves higher social welfare under a *tariff & subsidy agreement* (i.e. an agreement that binds both policy measures) relative to a tariff-only agreement.

We then introduce the assumption that capital is mobile in the long-run, but investment decisions are irreversible in the short-run. Capital allocation is decided before the lobbying game between the interest group and the government takes place -i.e. before the tariff and the subsidy are decided. As in Maggi and Rodriguez-Clare (1998), this timing does not allow the government to credibly distance itself from the lobby and determines a welfare loss (the credibility problem). In the short-run, political contributions fully compensate the policy maker for the loss in social welfare caused by the inefficient policy, but in the long-run the government is not compensated for the misallocation of capital that high protection causes. Differently from Maggi and Rodriguez-Clare (1998), however, signing a trade agreement which binds only the tariff at its efficient level does not solve the trade policy credibility problem. Intuitively, the reason is that a tariff-only agreement does not commit the government to the efficient policy mix as it leaves open the policy substitution problem. The government is, therefore, better off under an agreement that imposes rules on the use of domestic subsidies, because only under such a more complete trade agreement policy credibility vis à vis special interests may effectively be restored.

Our last step is to examine the proper design of rules on domestic subsidies in light of the commitment approach. We look at the GATT/WTO rules contained in the Subsidies and Countervail-

ing Measures (SCM) Agreement that apply to subsidies to import-competing sectors: nullification or impairment (i.e. non-violation) and serious prejudice complaints. Nullification or impairment rules bind the subsidy at the level existing before a tariff commitment was signed. We find that this mechanism eliminates the policy substitution problem. However, non-violation complaints may not suffice to solve credibility problems when subsidies were inefficiently high at the time a tariff commitment was signed. Under serious prejudice rules, WTO Members may challenge and ask the removal of any subsidy that displaces or impedes imports independently of the existence of a tariff binding. When applied within the context of our model, we show that serious prejudice rules are efficient -in the sense that they eliminate policy substitution and credibility problems- only when a tariff commitment is in place and the sector is not subject to some market distortion. First, removing a subsidy in the absence of a tariff commitment creates a policy substitution problem as the (anticipated) removal of the subsidy leads the import-competing sector to demand -and obtain- higher tariff protection. While the logic is different, this result is reminiscent of the "tariff chill" found in Bagwell and Staiger (2006). Second, in presence of a tariff commitment, eliminating a subsidy that addresses a domestic market failure may lead to inefficient under-production.

In addition to the papers discussed above, few other works provide alternative economic rationales for rules on subsidies in international trade treaties. An argument that shares some similarities with ours is in Horn, Maggi and Staiger (2008).<sup>5</sup> In their model, the trade agreement is an endogenously incomplete contract and governments choose what policy domain they intend to regulate in the agreement as a result of a basic trade-off between the benefits of a more detailed agreement and the costs associated to writing it (transaction costs). While this framework is very different from ours, they stress that *instrument substitutability* between tariffs and subsidies may affect the efficient design of an agreement. However, it should be emphasized that the type of substitutability in the two papers is also quite different. In our model, subsidies can be used by governments to boost import-competing sectors' profits when tariffs are constrained. In Horn et al. (2008) subsidies are exploited as a substitute for terms-of-trade manipulation.

Our work also relates to a second branch of the literature on trade agreements which deals with the choice of trade and domestic policies.<sup>6</sup> In particular, our paper is similar to the recent work of Limao and Tovar (2008) who also model the choice between tariff and non-tariff barriers. Their focus, however, is why governments use inefficient policy tools to redistribute income towards organized groups when more efficient measures are available. We expand on this approach by allowing the non-tariff barrier (in our case, a production subsidy) to be a part of the trade agreement to which the government can commit.

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<sup>5</sup>Other papers that analyze subsidy agreements include Bagwell and Staiger (2001a) and Leahy and Neary (2009). These works assume that governments can only set subsidies (and not tariffs) and look at the effects of subsidy agreements under different hypotheses. See Bacchetta and Ruta (2009) for a collection of key contributions on subsidies and the WTO.

<sup>6</sup>See, among others, Copeland (1990) and Bagwell and Staiger (2001b).

The paper is organized as follows. Section 2 provides the structure of the model and the basic result of efficiency of tariff & subsidy agreements. The value of commitment to tariff and subsidy rules is investigated in Section 3. We examine the efficient design of rules on production subsidies in Section 4. Finally, Section 5 provides a simplified version of the model that allows to obtain closed form solutions and studies the welfare effects of trade agreements when bindings are different from the first-best levels. Concluding remarks follow.

## 2 The rationale for tariff & subsidy agreements

This section introduces a simple model to discuss the rationale for international agreements that regulate both import tariffs and production subsidies. We show that, in the face of political economy considerations, both the tariff and the subsidy levels will be higher than their welfare-maximizing levels. Trade agreements that constrain only tariffs will have an ambiguous effect on aggregate welfare as the government is induced to use the other policy tool in order to satisfy special interests. We refer to this as the *policy substitution problem*. Instead, agreements that constrain both tariffs and subsidies will result in an unambiguous improvement in social welfare, exactly because this set of rules impede policy substitution. In the simple setting of this section, a credible commitment to policy constraints is politically impossible. In the next section, we extend this framework to show why a government may find it convenient to commit to such an agreement even in presence of political pressures.

### 2.1 The economic and political structure

Consider a small open economy with two sectors and two factors of production, labor ( $l$ ) and capital ( $k$ ). Each agent is endowed with one unit of labor and population is normalized to 1. The amount of capital in this economy is fixed and owned by a subset of the population of measure zero. The first sector, which we will refer to as the numeraire sector, produces a non-tradable good the price of which we normalize to one. Production of the numeraire good requires the linear technology  $x_n = l + k_n$ , where  $k_n$  denotes capital specific to the numeraire sector.<sup>7</sup> The manufactured good is produced with a constant-return production function  $x = x(l, k_m)$ , where  $k_m$  is the amount of capital specific to the manufacturing sector. In this section we assume that capital in each sector is available in a fixed amount and cannot be reallocated to a different activity, allowing us to omit capital from our notation. This assumption will be relaxed in Section 3.

The manufactured good is traded internationally and its international price is denoted with  $p^*$ . The government has at its disposal two policy instruments: an ad valorem tariff  $t \geq 0$  and a production subsidy  $s \geq 0$ . Thus, the domestic price of the manufactured good is  $p_y = p^*(1 + t)$ ,

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<sup>7</sup>The assumption of perfect substitutability between capital and labor in the numeraire sector simplifies the analysis of the long-run equilibrium, see Section 3. However, it plays no role in this section.

while the net revenue to producers is given by  $p_x = p^*(1 + t) + s$ . Supply in the manufacturing sector is derived from profit-maximization and denoted as  $x(p_x)$ , while  $\pi(p_x)$  is "profits" -i.e. the returns from owning capital in the manufacturing sector.<sup>8</sup>

The government budget has two sources of revenue, a wage tax and tariff revenue, that can be used to finance the subsidy and a public service. We follow Matschke (2008) and assume that raising taxes is costly for the economy: in order to dispose of  $\Delta$  dollars, the government has to raise  $\lambda\Delta$  dollars in taxes, where  $\lambda \geq 1$ . In other words, taxation may be distortionary and impose a deadweight loss to society equal to  $(\lambda - 1)\Delta$ .<sup>9</sup> To keep things simple, we also assume that the public service is entirely financed by the tariff revenue and takes the form of a hand-out evenly distributed across citizens. In this environment, the subsidy can only be financed by a costly revenue-raising process.<sup>10</sup>

Consumer preferences are quasi-linear and take the form  $y_n + u(y)$ , where  $y_n$  and  $y$  are the quantity consumed of the numeraire and of the manufacturing good, respectively. Demand for the manufactured good can be written as  $y(p_y)$ , with the resulting consumer surplus  $S(p_y)$ . Agents receive income from labor and -possibly- from capital ownership, and have to pay taxes to the government to finance the subsidy payment.

Aggregate welfare consists of factor incomes, tariff revenue/public hand-out, and consumer surplus. In addition, it is assumed that production in the manufacturing sector may have a positive external effect on the rest of society (see further below) and that this externality is not internalized by producers. The presence of this externality motivates government intervention in the economy. More formally, we assume that  $\gamma D(x)$  is the social benefit of production in the manufacturing sector, with  $D' > 0$ ,  $D'' \leq 0$  and where  $\gamma = \{0, 1\}$  is an indicator variable which takes the value of 1 if the manufacturing sector is subject to a positive production externality. Aggregate welfare is given by:

$$W = 1 + k_n + \pi(p_x) + S(p_y) - \lambda s x + t p^*(y - x) + \gamma D(x), \quad (1)$$

where 1 and  $k_n$  are, respectively, total labor income and total returns from owning capital in the numeraire sector (where we are using the fact that profit maximization in this sector will imply a

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<sup>8</sup>We stress that these profits depend on the level of capital available in the sector, even though in this section we suppress such notation. Specifically, diminishing returns to capital in manufacturing imply that  $\pi'(k_m)$ .

<sup>9</sup>As in this model the equilibrium wage rate is fixed by the price of the numeraire good and labor supply is inelastic, the wage tax is a per-capita tax. Notice that if  $\lambda = 1$  the government can collect non-distortionary taxes, while if  $\lambda > 1$  taxation is always distortionary. Estimating this model for the U.S., Matschke (2008) finds that the parameter  $\lambda$  is estimated as lying between 1.03 and 1.05 (i.e. raising 1 dollar through taxation costs 3 to 5 cents more than collecting 1 dollar through tariffs). Developing economies, with larger administrative costs of taxation, will likely display higher values of  $\lambda$ .

<sup>10</sup>In alternative, we could assume an exogenous amount of the public service and that the joint revenue from trade policy and domestic taxation is used by the government to finance both the subsidy and the public service (see Matschke, 2008). Intuitively, however, what matters for our results is not how the latter is financed, but that (part of) the subsidy requires costly revenue raising through taxation. We come back on this point in footnote 12.

wage rate and a per-unit capital return equal to 1) and  $tp^*(y - x)$  is tariff revenue (total domestic demand of manufactures,  $y$ , minus domestic production,  $x$ ).

Capital owners in the manufacturing sector are organized to lobby the government for favorable policies. The objective function of this lobby is to maximize net of contribution profits for its members:  $\pi(p_x) - c$ , where  $c$  is the aggregate lobbying contribution. We assume that other groups in society, workers and owners of capital in the numeraire sector, were not able to solve their collective action problem and are not politically organized.

Politicians care about a combination of social welfare and political contributions by the interest group:

$$G(t, s) = W(t, s) + ac(t, s), \quad (2)$$

where we make explicit that government welfare, social welfare and contributions are functions of both the tariff and the subsidy, while  $a \geq 0$  captures the political bias in the government objective function.

The lobbying game has two stages. At stage one, the lobby offers a contribution schedule contingent on the policy choice of the government. The offer is binding and we assume it to be take-it-or-leave-it.<sup>11</sup> At the second stage, the government observes the contributions and chooses the policy to maximize the above objective function. Under the assumption of truthful (or compensating) contributions (i.e.  $c(t, s) = \max[0, \pi(t, s) - z]$ , where  $z$  is some positive constant optimally chosen by the lobby), the tariff and subsidy rates will maximize the joint utility:

$$\Omega = W(t, s) + a\pi(t, s) \quad (3)$$

In this section, we study how international agreements on tariffs or on both tariffs and subsidies affect the equilibrium policy and social welfare. Before solving the political game, it is worth finding the optimal policy mix in this model. This provides the benchmark for the rest of the analysis.

## 2.2 First-Best Tariff and Subsidy

The optimal policy choice is the combination of a tariff and a subsidy that maximizes social welfare. The first order conditions (FOCs) of the social maximization problem with respect to the tariff and subsidy are given respectively by:

$$p^* [(x - y) + -\lambda sx' + (y - x) + tp^*(y' - x') + \gamma D'x'] = 0 \quad (4)$$

and

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<sup>11</sup>In other words, the government has no bargaining power in its relationship with the lobby. Removing this assumption does not alter the results of this section, but would affect the choice of the government to commit to an international agreement. We will come back to this point in Section 3.

$$x - \lambda(x + sx') - tp^*x' + \gamma D'x' = 0, \quad (5)$$

where we have used the fact that  $\pi' = x$  and  $S' = -y$ .

By setting the two conditions equal to each other and rearranging terms, we obtain the optimal tariff

$$\hat{t} = -\frac{x(\lambda - 1)}{p^*y'}. \quad (6)$$

Using this into the second FOC, we get an expression for the optimal subsidy:

$$\hat{s} = \frac{1}{\lambda} [\gamma D' - (\lambda - 1)xA]. \quad (7)$$

where  $A \equiv \frac{y' - x'}{y'x'} > 0$ .

Several results should be noticed. First, if the government has access to non-distortionary taxes ( $\lambda = 1$ ), the optimality conditions imply  $\hat{t} = 0$  and  $\hat{s} = \gamma D'$ . This is the traditional result where the government does not intervene in the economy in the absence of market distortions ( $\gamma = 0$ ).<sup>12</sup> While for  $\gamma = 1$ , the policy maker only uses the non-distortionary policy tool (here, subsidies) to address the production externality in the manufacturing sector. In this latter case, the subsidy has the well-known property that its efficient level is equal to the marginal social benefit of domestic production. Second, if taxation is distortionary ( $\lambda > 1$ ), it may be optimal to use both policy tools to address the production externality. In particular, notice that for  $\lambda > 1$ , the optimal tariff is always strictly positive (recall that  $y' < 0$ ). Whether the optimal subsidy is positive depends on the size of the opportunity cost of government revenue  $\lambda$ . We show next that, when tax distortions are not too large, a welfare-maximizing government optimally uses a combination of tariffs and subsidies to promote the domestic manufacturing sector. When the opportunity cost of government revenue is too large, it is optimal instead to use tariffs only rather than a combination of a tariff and a subsidy to address the market imperfection.

Formally, recall that the subsidy has to be non-negative (i.e.  $s \geq 0$ ). Using condition (7), it can be easily shown that  $\hat{s} > 0$ , that is the constraint on the subsidy is not binding, if and only if

$$\lambda < 1 + \frac{\gamma D'}{xA} \equiv \hat{\lambda}.$$

Therefore, if tax distortions are low (i.e. for  $\lambda \in (1, \hat{\lambda})$ ), both the tariff and the subsidy are positive and are given by conditions (6) and (7) above. Instead, if the opportunity cost of

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<sup>12</sup>In a model with an exogenous amount of public service provided by the government, it can be shown that a positive tariff is efficient even in the absence of domestic distortions (see Matschke, 2008). The reason is that a larger income from trade policy lowers the cost of distorsive taxation needed to finance the service. In our model, we shut down this channel by assuming that the amount of the public hand-out is endogenously determined by the trade policy income. This simplifies the comparison of our results with the standard political economy model of trade policy.

government revenue is high ( $\lambda \geq \hat{\lambda}$ ), the constraint on the subsidy binds and  $\hat{s} = 0$ . To obtain the optimal tariff in this case, we substitute this constraint in condition (4) and, rearranging terms, we obtain:

$$\hat{t} = -\frac{\gamma D'}{p^* y' A} \geq 0. \quad (8)$$

Notice that  $\hat{t} = 0$ , when there is no externality ( $\gamma = 0$ ), and  $\hat{t} > 0$  for  $\gamma = 1$ . This case is the opposite extreme of the first-policy under non-distortionary taxation as the government only uses the tariff to address the production externality. Namely, the optimal tariff rate is higher the larger is the marginal benefit from domestic production and the less responsive are imports to changes in domestic price (where  $(y' - x') < 0$  is the change in net imports in response to a change in the domestic consumer and producer price).

We summarize these findings in the following

**Lemma 1.** *If the economy has no domestic distortions ( $\gamma = 0$ ), the optimal policy mix is  $\hat{s} = \hat{t} = 0$ . In presence of domestic market distortions ( $\gamma = 1$ ), the optimal policy mix depends on the extent of tax distortions ( $\lambda$ ):*

$$\begin{aligned} \text{If } \lambda &= 1, \hat{s} = \gamma D' > 0 \text{ and } \hat{t} = 0; \\ \text{If } \lambda &\in (1, \hat{\lambda}), \hat{s} = \frac{1}{\lambda} [\gamma D' - (\lambda - 1)x A] > 0 \text{ and } \hat{t} = -\frac{x(\lambda - 1)}{p^* y'} > 0; \\ \text{If } \lambda &\geq \hat{\lambda}, \hat{s} = 0 \text{ and } \hat{t} = -\frac{\gamma D'}{p^* y' A} > 0. \end{aligned}$$

The presence of domestic distortions justifies government intervention in the form of protection. In this model, the policy maker can grant protection to the manufacturing industry either through a tariff, a subsidy or some combination of the two measures. The first-best policy mix depends on the size of deadweight costs created by the two policy. As it is well-known, a tariff lowers consumer surplus by rising the domestic price while a subsidy may distort the market taxed to finance it (here captured by the exogenous parameter  $\lambda$ ). The cost of a tariff can be offset in all or in part by the tax distortion.<sup>13</sup> From a welfare standpoint, therefore, it does not come as a surprise that the optimal policy mix to address the market failure depends on the size of the opportunity cost of government revenue.

### 2.3 Political equilibrium

We consider now the political game described above where a lobby representing capital owners in the manufacturing sector influences tariff and subsidy choices. We initially abstract from international

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<sup>13</sup>For a discussion on the efficient use of alternative policy measures to achieve protection, see Sykes (2001).

agreements and study the discretionary (i.e. unconstrained) politically optimal policy combination -i.e. the choice of  $t$  and  $s$  which maximizes condition (3).

The FOCs for this problem are respectively given by:

$$-\lambda sx' + tp^*(y' - x') + \gamma D'x' + ax = 0 \quad (9)$$

and

$$x - \lambda(x + sx') - tp^*x' + \gamma D'x' + ax = 0. \quad (10)$$

For convenience, we rewrite the first FOC as follows

$$t = -\frac{(\gamma D' - \lambda s)x' + ax}{p^*(y' - x')} \quad (11)$$

and use this expression in the second FOC to obtain the politically optimal subsidy

$$\tilde{s} = \frac{1}{\lambda} \left[ \gamma D' - (\lambda - 1) \frac{x}{x'} + \frac{ax}{x'} \right]. \quad (12)$$

Notice that the above expression is the same as the first-best subsidy in (7), except for the last term. Not surprisingly, the equilibrium subsidy of the lobbying game can be influenced by the special interest group. Namely, the larger the government bias for contributions (i.e. the higher is  $a$ ) the higher is the production subsidy that the lobby receives. This political distortion is reduced by two factors: the distortionary effect of taxation,  $\lambda$ , and the responsiveness of domestic production to changes in producer's price ( $x'$ ).

Importantly, the expression for the politically optimal subsidy can be positive or negative. In the latter case, the non-negativity constraint binds and the equilibrium subsidy will be null. Notice that this will be the case when the opportunity cost of government revenue is sufficiently high. More precisely,  $\tilde{s} \geq 0$  if and only if

$$\lambda \leq 1 + \frac{\gamma D'}{xA} + \frac{a}{Ax'} \equiv \tilde{\lambda} > \hat{\lambda} > 1,$$

and  $\tilde{s} = 0$  otherwise. We look at these two cases in turn.

First, if tax distortions are low (i.e. for  $\lambda \in [1, \tilde{\lambda})$ ), the constraint  $s \geq 0$  is not binding and the politically optimal subsidy is given by (12). Using this into condition (11), we derive an expression for the politically optimal tariff:

$$\tilde{t} = -\frac{x(\lambda - 1)}{p^*y'}. \quad (13)$$

Notice that, for any  $\lambda \in (1, \tilde{\lambda})$  the equilibrium tariff is strictly larger than the first-best tariff rate. This can be immediately appreciated by rewriting the equilibrium tariff and the optimal tariff as follows

$$\tilde{t} = -\frac{x(\tilde{t}, \tilde{s})(\lambda - 1)}{p^*y'(\tilde{t})} > \hat{t} = -\frac{x(\hat{t}, \hat{s})(\lambda - 1)}{p^*y'(\hat{t})}.$$

In the political equilibrium, the subsidy level is greater than in the welfare-maximizing case. The producer price must, therefore, be greater also and, since output is increasing in the producer price ( $x' > 0$ ), the level of output will be higher. This means that the actual level of the tariff in the political equilibrium will be larger than the first-best rate because the level of output ( $x$ ) will be greater. This result does not apply to the case of non-distortionary taxation ( $\lambda = 1$ ), where the equilibrium and the optimal tariff rates are always zero.

Consider next high tax distortions ( $\lambda \geq \tilde{\lambda}$ ). In this case the constraint that  $s \geq 0$  is binding and the politically optimal subsidy is null. Using this into (11), we derive the politically optimal tariff

$$\tilde{t} = -\frac{\gamma D'}{p^*y'A} - \frac{ax}{p^*(y' - x')}. \quad (14)$$

As we have seen in the previous section, when the opportunity cost of government revenue is high, a tariff is more efficient (i.e. less costly to society) than a subsidy. The lobby internalizes this when selecting compensatory contributions to the government. As a result, the interest group uses its political influence to obtain tariff protection from imports and to ensure that no distortionary taxes are levied. In the equilibrium, the tariff is higher than the efficient one because of political distortions as in the standard "Protection for Sale" paradigm. The extent of this distortion is larger, the higher the political bias  $a$  and the less responsive are imports to changes in domestic prices -i.e. the smaller the term  $(y' - x')$ .

These findings are summarized in the following

**Lemma 2.** *The political distortions of the tariff and the subsidy depend on the extent of the tax distortion:*

$$\begin{aligned} \text{If } \lambda &= 1, \tilde{s} = \frac{1}{\lambda} \left[ \gamma D' + \frac{ax}{x'} \right] > \hat{s} = \frac{1}{\lambda} [\gamma D'] \geq 0 \text{ and } \tilde{t} = \hat{t} = 0; \\ \text{If } \lambda &\in (1, \tilde{\lambda}), \tilde{s} = \frac{1}{\lambda} \left[ \gamma D' - (\lambda - 1) \frac{x}{x'} + \frac{ax}{x'} \right] > \hat{s} = \frac{1}{\lambda} \left[ \gamma D' - (\lambda - 1) \frac{x}{x'} \right] > 0 \\ \text{and } \tilde{t} &= -\frac{x(\tilde{t}, \tilde{s})(\lambda - 1)}{p^*y'(\tilde{t})} > \hat{t} = -\frac{x(\hat{t}, \hat{s})(\lambda - 1)}{p^*y'(\hat{t})} > 0; \\ \text{If } \lambda &\geq \tilde{\lambda}, \tilde{s} = \hat{s} = 0 \text{ and } \tilde{t} = -\frac{\gamma D'}{p^*y'A} - \frac{ax}{p^*(y' - x')} > \hat{t} = -\frac{\gamma D'}{p^*y'A} \geq 0. \end{aligned}$$

These results generalize the findings in Grossman and Helpman (2001), chapter 7.4, where only one policy is altered by the lobbying process. For  $\lambda = 1$  and  $\lambda \geq \tilde{\lambda}$ , the lobby could affect

both the tariff and the subsidy, but it concentrates its activity to distort the efficient policy (the subsidy and the tariff, respectively). The inefficient policy is unaltered in the political equilibrium. This is the result in Grossman and Helpman (2001). Intuitively, the interest group looks for the less costly route to influence the government and, hence, concentrates its lobbying contributions on one policy tool. For intermediate values of  $\lambda$ , instead, the efficient policy mix is a combination of tariffs and subsidies. The lobby recognizes that it will cost less to induce a positive tariff and subsidy, than concentrating on a single policy dimension.<sup>14</sup>

To grasp the intuition, focus on a reduction in  $t$  and an increase in  $s$  that leave unaltered the producer price  $p_x$ . This policy change does not affect output (and, hence, the externality) and the lobby's welfare. What such a change in the policy mix affects is consumer surplus (which increases), tariff revenue (which decreases) and tax distortions (that also raise). Which one of these effects dominates depends on  $\lambda$ . Under non-distorsive taxation, the last effect is zero and consumer surplus always dominates the fall in government revenue. In this case, a cut in the tariff and an increase in the subsidy is always efficient and the lobbying process drives the equilibrium tariff to zero. The opposite argument can be made for high levels of tax distortions (where the resulting equilibrium subsidy is null). For intermediate levels of  $\lambda$ , as the tariff rate is reduced, the gain in consumer surplus (net of the loss of tariff revenue) falls while the tax distortion raises at the constant rate. Therefore, there is a point past which a reduction in the tariff and an increase in the subsidy that leave  $p_x$  constant reduce social welfare. Hence, for all intermediate values of  $\lambda$ , the joint efficiency of the lobby and the government requires a positive level of the tariff and the subsidy and the lobbying process will distort both policies.

A final consideration concerns the role of the domestic market distortion in the political equilibrium. The parameter  $\gamma$  alters the efficient level of the tariff and/or the subsidy (see Lemma 1), but it does not affect the extent of the political distortion. In other words, the lobby takes as a given the efficient policy mix, which may well encompass positive protection to address the production externality. Starting from there, the interest group demands additional protection in the least costly way, as discussed above.

## 2.4 Tariff-only and tariff & subsidy agreements

Assume that at an earlier stage of the game, the government has an opportunity to commit its policy through an international agreement. The agreement can take the form of a tariff-only agreement, that binds the tariff at its first-best level, or a tariff & subsidy agreement that binds both policy tools at their optimal level.<sup>15</sup> The presence of political distortions, as highlighted in Lemma 2, suggests that in principle signing such an agreement may move the economy towards efficiency.

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<sup>14</sup>Notice that the political bias ( $a$ ) enters in both the equilibrium subsidy and the tariff. In the latter, this can be seen as production ( $x$ ) depends on ( $a$ ). The explicit model that we use in the last section makes this point clear.

<sup>15</sup>Section 5 allows for tariff and subsidy ceilings different from the efficient ones.

In this subsection, however, we show that this is not always the case and that social welfare is unambiguously increased only if the government can commit both the tariff and the subsidy.

More precisely, we show how in the absence of rules on subsidies, a trade agreement that imposes an efficient tariff binding may not move the economy towards efficiency. Moreover, we prove that a tariff & subsidy agreement always improves upon this situation. The intuition is that a tariff-only agreement imposes a ceiling on the domestic tariff which may or may not be binding. If the tariff is already at its first-best level (as in the case of non-distortionary taxes), then the commitment does not bind and the tariff-only agreement has no effect on welfare. Whenever the commitment on the tariff is binding, this constraint alters the equilibrium choice of the subsidy. The reason is that in the eyes of the domestic lobby the two policy tools are substitutes, as both higher tariffs and production subsidies ultimately increase the lobby's payoff. Notice that the interest group will use its influence to receive a production subsidy even if such policy choice is socially inefficient because of large tax distortions. This instrument substitutability between tariffs and subsidies is at the core of our results.

Focus first on the case where tax distortions are large ( $\lambda > \tilde{\lambda}$ ). We know from the previous sections that in this case the political economy equilibrium implies no subsidy. Therefore, in this scenario the only policy in place is an import tariff, which is given by condition (14). As discussed, this tariff is inefficiently high because of political pressures.

Assume now that the government can enter into a trade agreement that imposes a ceiling on the tariff at the efficient level  $t^c = \hat{t}$ , where  $\hat{t}$  is given by condition (8). Any  $t \leq t^c$  will be feasible, while any  $t > t^c$  will be ruled out by the agreement. As for  $\lambda > \tilde{\lambda}$  the politically optimal tariff in (14) is larger than  $\hat{t}$ , this constraint will be binding. Substituting  $\hat{t}$  into the FOC for the subsidy (10) and rearranging terms, we obtain the equilibrium subsidy under a tariff-only agreement

$$\tilde{s}^{to} = \frac{1}{\lambda x'} \left[ \frac{\gamma D'}{A} - x(\lambda - 1) + ax \right]. \quad (15)$$

Intuitively, when the interest group cannot influence the choice of the tariff, it will lobby for a higher level of the subsidy. In the equilibrium, the political distortion simply "relocates" from the first to the second policy tool. In this case, where tax distortions are high, this implies a larger inefficiency.

Consider next the case where  $\lambda \in (1, \tilde{\lambda})$ .<sup>16</sup> Recalling Lemma 2, one immediately realizes that the tariff commitment is binding as the efficient level of the tariff is given by  $\hat{t} = -\frac{x(\hat{t}, \hat{s})(\lambda - 1)}{p^* y'(t)}$  which is lower than the equilibrium level. Substituting this into condition (10), we obtain an expression for the subsidy

$$\tilde{s}^{to} = \frac{1}{\lambda} \left[ \gamma D' - \frac{x}{x'}(\lambda - 1) + \frac{ax}{x'} - \hat{t} p^* \right].$$

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<sup>16</sup> As we noticed above, the case where  $\lambda = 1$  is trivial as the tariff-only agreement has no effect whatsoever on the policy mix.

Notice that as  $\hat{t} < \tilde{t}$ , the above expression implies that  $\tilde{s}^{to} > \tilde{s}$ .

In this case, it is unclear whether the tariff-only agreement is moving the economy towards efficiency. The reduction of the tariff to its first-best level has a positive effect on social welfare, but the increase of the subsidy has the opposite effect.

**Proposition 3.** *A tariff-only agreement that imposes a ceiling on the tariff at its first-best level alters the choice of the politically optimal subsidy for any  $\lambda > 1$ . The effect of the tariff binding on social welfare is negative for  $\lambda > \tilde{\lambda}$  and null for  $\lambda = 1$ . For  $\lambda \in (1, \tilde{\lambda})$  the welfare effect of the tariff-only agreement is ambiguous.*

The previous proposition shows that a tariff-only agreement does not move the policy mix towards the first-best. The tariff commitment has the only effect of increasing the use of the subsidy beyond the (already inefficiently high) equilibrium subsidy. It is straightforward to realize that an efficient trade agreement is one that binds both tariffs and subsidies at their first-best level, as such an agreement eliminates the policy substitutability between the two measures.

**Corollary 4.** *A tariff & subsidy agreement that binds the tariff and the subsidy at the first-best level is efficient and always welfare dominates a tariff-only agreement.*

While this efficiency result is appealing and may rationalize why a society would like to impose constraints to these domains of government activity, the optimal agreement is, however, not politically feasible. The reason is that in the short-run the government has no incentive to sign an agreement that limits its discretion, as contributions by the lobby make politicians just indifferent between the political economy equilibrium and the first-best scenario. As we discuss in the next section, things may be different in the long-run.

### 3 The commitment value of subsidy rules

In this section we extend the analysis to introduce the political economy rationale for signing a tariff & subsidy agreement. We build on the model of Maggi and Rodriguez-Clare (1998) and assume that capital, which was sector-specific in the short-run (Section 2), is fully mobile across sectors in the long-run. This timing implies that investment decisions are irreversible. In this setting, investments affect trade policy and, in turn, expected trade policy affects current investment. This interaction is at the root of the *trade policy credibility problem*. Political pressures sustain inefficiently high protection in manufacturing. Anticipating high returns, capital owners excessively invest in the protected sector. As shown in Maggi and Rodriguez-Clare (1998), the government may want to sign a trade agreement to solve this credibility problem and induce the efficient allocation of capital across sectors. Here we take a closer look at the commitment role of trade agreements in a setting

with multiple policy measures. Namely, we show that while a tariff-only agreement is ineffective, because of the policy substitution problem of Section 2, a tariff & subsidy agreement restores trade policy credibility. This is the value of subsidy rules within trade agreements.

Consider the following timing of events. At stage 1, the government chooses to sign an international agreement that imposes credible bindings on its policy or to maintain discretionary power over tariffs and subsidies. As in Section 2, the trade agreement can take the form of a tariff-only or a tariff & subsidy agreement. At stage 2, capitalists decide the sector where they want to invest their capital. Investors are small, non-strategic and are not politically organized (i.e. the lobby is only formed after the capital is invested). Once the investment has been made, capital becomes sector-specific and cannot be moved. Stages 3 and 4 are as in the lobbying game analyzed in Section 2 where the government retains discretion (or partial discretion, as under a tariff-only agreement). The game is solved by backward induction. Hence, the equilibrium policy we found in Section 2 can be thought of as the outcome of the last two stages of this extended game.

### 3.1 Investment decision

At stage 2, investors take as given the policy mix and choose the allocation of their unit of capital in one of the two sectors. As the total amount of capital in the economy is fixed at  $k$ , we have that  $k = k_m + k_n$ . Recall that, given the assumption of perfect substitutability of capital and labor in the numeraire sector, the rate of return to capital in this sector is equal to the price of the numeraire good, which is simply 1. Hence, total returns in the numeraire can be expressed as  $k_n(k_m) = k - k_m$ . In the manufacturing sector, instead, diminishing returns to capital imply that  $\pi'(k_m) < 0$ . We assume that  $\pi(0) > k - k_m > \pi(k)$ , which entails that an interior solution always exists where returns from investment in the two sectors equalize and capitalists have no longer incentives to alter their decisions.

Before analyzing the equilibrium investment, we look for the efficient allocation of capital across sectors. The optimal policies are determined by the social welfare maximization problem studied in Section 2.2 and are denoted by  $\hat{s}$  and  $\hat{t}$ .<sup>17</sup> Investors choose capital allocation taking into account these first-best policies. The return from investing in the manufacturing sector at this stage is, therefore, given by  $\pi(\hat{p}_x, k_m)$ , where  $\hat{p}_x = p^*(1 + \hat{t}) + \hat{s}$ . Investors allocate capital across the two sectors up to the point where returns equalize. That is, the efficient allocation of capital in the manufacturing sector (call it,  $\hat{k}_m$ ) is implicitly determined by the following condition

$$\pi(\hat{t}, \hat{s}, \hat{k}_m) = k - \hat{k}_m, \quad (16)$$

where we emphasize that profits in manufacturing depend on the two policies and the capital

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<sup>17</sup>As we have seen, the first-best policy mix depends on the extent of tax distortion  $\lambda$ . However, as the value of this parameter plays no important role in this section, we suppress such notation.

allocation.

As the policy mix is first-best,  $\widehat{k}_m$  is the allocation of capital that maximizes social welfare in this economy. We denote this level of welfare with  $W(\widehat{t}, \widehat{s}, \widehat{k}_m)$ , where the function  $W$  is given by condition (1).

When equilibrium policies are determined by the lobbying game described in Section 2.3, the equilibrium allocation of capital is different from the one implied by condition (16). In particular, domestic producers in the manufacturing sector face the price  $\widetilde{p}_x = p^*(1 + \widetilde{t}) + \widetilde{s} > \widehat{p}_x$  and the equilibrium allocation of capital in this activity ( $\widetilde{k}_m$ ) is implicitly determined by

$$\pi(\widetilde{t}, \widetilde{s}, \widetilde{k}_m) - c(\widetilde{t}, \widetilde{s}, \widetilde{k}_m) = k - \widetilde{k}_m, \quad (17)$$

where  $c(\widetilde{t}, \widetilde{s}, \widetilde{k}_m)$  is the equilibrium contribution paid by the lobby.<sup>18</sup>

Clearly  $\widetilde{k}_m \neq \widehat{k}_m$ , and long run investment in the political equilibrium will generally be different from the first best capital allocation.<sup>19</sup> This implies that social welfare in the political equilibrium, denoted by  $W(\widetilde{t}, \widetilde{s}, \widetilde{k}_m)$ , will be lower than in the first-best,  $W(\widehat{t}, \widehat{s}, \widehat{k}_m)$ , for two reasons: the short-run policy distortion (as highlighted in Section 2) and its long-run implication for capital allocation across sectors. More precisely, if the government does not credibly commit to an efficient policy mix, investors anticipate that returns will be affected by the policy distortions created by the lobbying game. This alters investment decisions at stage 2.

### 3.2 Commitment choice

At the first stage, the politically-motivated government has an option to commit to a tariff & subsidy agreement which binds the tariff and the subsidy at their efficient levels  $\widehat{s}$  and  $\widehat{t}$ . We show next that 1. the government finds it convenient to commit to an efficient tariff & subsidy agreement; and 2. that having the choice between such an agreement and a tariff-only agreement, the government will prefer the first to the latter. The intuition is that the government faces a credibility problem vis a vis long-run investors which a tariff & subsidy agreement solves, as it removes the discretionary power in trade policy. A tariff-only agreement (as well as no agreement at all) allows the interest group to exert pressures on at least one policy measure and, hence, distorts the long-run allocation of capital.

We compare the government's payoff under commitment with its payoff under no commitment. If the government ties its hands, it will lose political contributions from the organized group. In this case government welfare simply corresponds to social welfare evaluated at the level of the bindings (the efficient tariff and subsidy):

<sup>18</sup>For the existence and uniqueness of such an equilibrium it is sufficient to show that the left-hand side of the above condition is decreasing in  $k_m$ .

<sup>19</sup>In the example we formally show that lobbying activity in the manufacturing sector leads to over-investment. Here, however, it is sufficient to highlight the misallocation of capital.

$$G(\hat{t}, \hat{s}, \hat{k}_m) = W(\hat{t}, \hat{s}, \hat{k}_m),$$

where we stress the fact that this policy mix supports the efficient capital allocation. In this case, social welfare is at its peak.

If the government does not commit to a tariff & subsidy agreement, then its utility is given by

$$G(\tilde{t}, \tilde{s}, \tilde{k}_m) = W(\tilde{t}, \tilde{s}, \tilde{k}_m) + ac(\tilde{t}, \tilde{s}, \tilde{k}_m) = W(\hat{t}, \hat{s}, \hat{k}_m),$$

where the last equality comes from the fact that equilibrium contributions exactly compensate the government for the loss in social welfare due to the policy distortion. That is, since the lobby's offer is take-it-or-leave-it, it makes the government just indifferent between choosing the optimal policy mix or an inefficient one. Importantly, government welfare is lower in the political equilibrium relative to the commitment case -that is  $W(\tilde{t}, \tilde{s}, \tilde{k}_m) < W(\hat{t}, \hat{s}, \hat{k}_m)$  - as the allocation of capital in such an equilibrium ( $\tilde{k}_m$ ) is inefficient. The intuition is that the lobby compensates the government for the short-run loss of social welfare due to the policy distortion, but does not compensate it for the long-run misallocation of capital. This proves the following<sup>20</sup>

**Proposition 5.** *If investment decisions are irreversible in the short-run, government welfare is higher under a trade agreement that binds the tariff and the subsidy at their first-best level than under discretion.*

Consider next the case where at the first stage of the game, the government faces the choice between a tariff-only agreement and an tariff & subsidy agreement. More specifically, assume that the trade agreement binds the tariff at its efficient level  $t^c = \hat{t}$ , but imposes no constraint on the subsidy. As we have shown in Section 2.4, a tariff-only agreement alters the equilibrium subsidy, which is increased compared to its level under full discretion ( $\tilde{s}^{to} > \tilde{s}$ ). In this case, stage 2 capital allocation (denoted with  $\tilde{k}_m^{to}$ ) is determined by

$$\pi(\hat{t}, \tilde{s}^{to}, \tilde{k}_m^{to}) - c(\hat{t}, \tilde{s}^{to}, \tilde{k}_m^{to}) = k - \tilde{k}_m^{to}, \quad (18)$$

Finally, one can immediately show that government welfare is lower under full commitment than under the partial commitment provided by the tariff-only agreement:

$$G(\hat{t}, \tilde{s}^{to}, \tilde{k}_m^{to}) = W(\hat{t}, \tilde{s}^{to}, \tilde{k}_m^{to}) + ac(\hat{t}, \tilde{s}^{to}, \tilde{k}_m^{to}) = W(\hat{t}, \hat{s}, \hat{k}_m^{to}) < W(\hat{t}, \hat{s}, \hat{k}_m).$$

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<sup>20</sup>If the government had a positive bargaining power in its relationship with the lobby, this result would be contingent on the extent of such power. Specifically, as shown by Maggi and Rodriguez-Clare (1998), the government would prefer commitment only for a low bargaining power (ours is the limit case where such power is null). For a positive bargaining power, politicians trade-off the long-run loss in social welfare due to the misallocation of capital, with the short-run benefit of receiving rents from the lobbying process.

Interestingly, the last inequality can be interpreted as the cost to the government of not including (efficient) rules on subsidy in a trade agreement. This shows the next

**Proposition 6.** *If investment decisions are irreversible in the short-run, government welfare is higher under a trade agreement that binds the tariff and the subsidy at their first-best level than under a trade agreement that binds the tariff only.*

If given the opportunity, a politically motivated government will prefer to sign a trade agreement that imposes rules on subsidies along with commitments on the tariff rate. This is also what is best from the point of view of social welfare. Notice that a shorter way to get the intuition for this result is to realize the important role of the policy substitution problem highlighted in Section 2. A partial trade agreement is always an inefficient agreement as the lobby can work its way around it by influencing the level of the non-committed policy tool. This leads to a long-run misallocation of investments, for which the government, however, is not compensated by the lobby.

## 4 Commitment and GATT/WTO rules on subsidies

This section revisits the question of the efficient design of rules on production subsidies in the multilateral trading system in light of the commitment theory.<sup>21</sup> The model analyzed in previous sections highlights two main policy problems related to the treatment of domestic subsidies within trade agreements. First, there is a credibility problem in trade (tariff and subsidy) policy. Specifically, lobbying pressures by domestic producers lead to inefficiently high tariffs and/or subsidies. This political distortion induces excessive investment in the protected sector and reduces market access below its efficient level. Second, there exists a policy substitution problem between tariffs and subsidies. If, through a trade agreement, a government commits only one instrument (e.g. the tariff) below the politically optimal level, the import-competing lobby demands (and obtains) protection through the uncommitted measure (the subsidy). The new policy mix is not necessarily more efficient than the one under discretion. Moreover, such an agreement does not solve the policy credibility problem. The efficient design of a trade agreement should take into account both these concerns.

The GATT/WTO system regulates the use of subsidies. The broad objective of WTO subsidy rules is to build a set of rights and obligations for Member governments which aim at limiting the trade distorsive impact of these measures. Before the Uruguay Round, two mechanisms were in place that allowed foreign governments to react to domestic subsidies. First, if the subsidy offered to exporters would cause *injury* to foreign producers, a trading partner could impose a countervailing

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<sup>21</sup>For an introduction to GATT/WTO rules on subsidies refer to Sykes (2005) and WTO (2006).

duty. Clearly, injury does not apply to our model which focuses on a single importing sector. Second, if the subsidy to domestic producers would frustrate (*nullify* or *impair*) market access after a tariff commitment had been negotiated, then the negotiating trading partner could formalize a non-violation complaint. In other words, the subsidy agreement in place before the Uruguay Round only regulated the use of "new" subsidies –i.e. of subsidies that a government would offer to its private sector subsequent to the signature of the agreement.

The Uruguay Round introduced the Agreement on Subsidies and Countervailing Measures (SCM), which extends WTO subsidy regulation beyond GATT rules.<sup>22</sup> According to SCM Article 5, no Member should cause, through the use of any subsidy, *adverse effects* to the interests of other WTO Members. Adverse effects include the old GATT provisions -injury and nullification or impairment- and introduce *serious prejudice* to the interest of another Member as a cause that could legally trigger a reaction by trading partners. Article 6.3 of the SCM Agreement describes four cases where serious prejudice may arise. Articles 6.3(a) and 6.3(b) are concerned with trade volume effects, suggesting that the effect of the subsidy on the world price are either small or nonexistent (as for small open economies). Namely, these Articles deal respectively with the effects on the imports (6.3a) and on the exports (6.3b) of another WTO Member. Article 6.3(c) may best be thought of in the context of a large economy, whose subsidies change the world price in addition to the domestic price and volume. Finally Article 6.3(d) deals with the volume effects of a subsidy in a third-market.

The issues contemplated by Articles 6.3(b,c,d) of the SCM Agreement do not arise in the model developed in the previous sections which assumes a small open economy with a single import-competing sector. We instead focus on Article 6.3(a), which provides that serious prejudice may arise when a domestic subsidy displaces or impedes imports of another Member into the subsidizer's market. Importantly, serious prejudice can be invoked in cases where the subsidy was already in place at the time of the tariff negotiation ("old" subsidy), as there is no mention in Article 6.3 of existing tariff commitments.

In brief, under the current GATT/WTO rules (nullification or impairment and serious prejudice), "old" and "new" subsidies are both within the scope of the agreement if they are found to create a certain level of trade distortion. These policy measures may be challenged via the WTO dispute settlement mechanism. If the complaint is successful, WTO rules require the subsidizing government to remove the subsidy.<sup>23</sup>

Do GATT/WTO subsidy rules address the policy problems identified in this paper? To answer

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<sup>22</sup>The SCM Agreement revolves around a so-called "traffic light" system, where some subsidies (e.g. export) are prohibited, while others are actionable -that is, can be challenged by affected trading partners. The latter is the category discussed in this paper.

<sup>23</sup>In principle, the subsidy need not be withdrawn if its adverse effects can be removed. However, when applied within the context of our model (where no other policy can be implemented), nullification or impairment and serious prejudice rules imply that the (illegal) subsidy be removed.

this question, we need to represent the key features of these rules within the context of our model. We study first the effects of nullification or impairment rules and then focus on the serious prejudice case admitted by the SCM Agreement.

We formally define nullification or impairment as follows:

**Definition (Nullification or Impairment).** *A domestic subsidy,  $s^{nv}$ , violates nullification or impairment (NI) rules if only if  $y(t^c, s^{nv}) - x(t^c, s^{nv}) < y(t^c, \tilde{s}) - x(t^c, \tilde{s})$ , where  $t^c$  is the tariff commitment.*

Assume to start from an equilibrium under discretion and consider a tariff-only agreement that binds the tariff at the efficient level and includes NI rules. The effect of non-violation complaints is to preserve the market access implied by the tariff binding  $t^c = \hat{t}$ . While this set of rules does not impose any direct constraint on the production subsidy, we argue below that it solves the policy substitution problem, but not the credibility problem. First notice that, by preserving market access, NI rules constrain the government's ability to offer a higher subsidy to import competing sectors after the tariff ceiling is imposed, as any  $s^{nv} > \tilde{s}$  would violate the condition in the above definition. In other words, a trade-only agreements with NI rules effectively imposes a ban on "new" subsidies.

The second question is whether NI rules solve the trade policy credibility problem. Lemma 2 shows that in the political equilibrium the tariff and the subsidy -and, hence, the effective rate of protection- are excessively high. As proved in Section 3, high protection induces over-investment in the manufacturing sector. The government can escape from this credibility problem by signing a tariff & subsidy agreement, but not by committing its tariff policy only (Proposition 5). Therefore, we can rephrase the question, asking whether a tariff-only agreement with NI rules effectively commits trade policy.

Consider first an economy where tax distortions are high (i.e. for  $\lambda \geq \tilde{\lambda}$ ). In this case, the politically optimal subsidy under discretion (that is, the "old" subsidy) is zero and any "new" subsidy would impair the committed market access of trading partners. This implies that the tariff agreement binds the tariff at its efficient level and NI rules effectively commit the subsidy at its first-best level. In turn, this sustains the efficient long-run allocation of capital across the two sectors.

Next, we consider all other economies (i.e. for  $\lambda < \tilde{\lambda}$ ). Lemma 2 shows that the political equilibrium implies a tariff and a subsidy (or a subsidy only for non-distortionary taxation) which are larger than their efficient level. In particular, the "old" subsidy is high because of lobbying pressures by the import-competing sector, market access is below the efficient level and long-run capital allocation is still biased in favor of the subsidized sector. The imposition of a tariff binding at its efficient level and NI rules improves over a tariff-only agreement, but does not solve the

credibility problem. To see this, notice that the tariff agreement binds the tariff at  $\hat{t}$ , while NI rules impose a ceiling on the subsidy at  $\tilde{s} > \hat{s}$ . As this policy mix is inefficient and implies a sub-optimally high level of protection for the manufacturing sector, investment decisions will still be distorted. These findings are summarized in

**Proposition 7.** *Under NI rules and a first-best level tariff binding, (i) the equilibrium policy choice is  $(\hat{t}, \tilde{s})$ ; (ii) the equilibrium subsidy is efficient for  $\lambda \geq \tilde{\lambda}$  and inefficiently high for  $\lambda \in [1, \tilde{\lambda})$ ; (iii) investment is at its first best level for  $\lambda \geq \tilde{\lambda}$  and inefficient for  $\lambda \in [1, \tilde{\lambda})$ ; (iv) the policy-substitution problem is solved for any  $\lambda$ , while the credibility problem is solved if only if  $\lambda \geq \tilde{\lambda}$ ; (v) an agreement with NI rules and a first best tariff commitment improves social and government welfare over discretion.*

The above discussion suggests that rules that intend to limit "old" subsidies (in addition to "new" ones) may have an economic foundation within the commitment approach to trade agreements. Put it differently, if the problem that the agreement is trying to solve is one of policy commitment, binding tariffs and limiting "new" subsidies (as nullification or impairment rules do) would not achieve the goal. Naturally, one would want to know whether the new rules contained in the SCM Agreement are well tailored to tackle this set of political economy distortions. We first provide a definition of serious prejudice based on Article 6.3(a) of the SCM Agreement and then discuss its implications within the model.

**Definition (Serious Prejudice).** *A domestic subsidy,  $s^{sp}$ , violates serious prejudice (SP) rules if only if  $s^{sp} > 0$ .*

Any positive subsidy offered to import competing sectors displaces or impedes imports and, hence, creates a serious prejudice to other WTO Members. Therefore, a strict reading of Article 6.3(a) implies that any such subsidy (if challenged) should be removed.<sup>24</sup> Notice in particular that in Article 6.3 there is no reference to the existence of a tariff commitment and to the possibility of legitimate (i.e. efficient) subsidies (i.e. in the model, whether  $\gamma = 1$  or  $\gamma = 0$ ).<sup>25</sup> We look first at the effect of SP rules in the absence of a tariff commitment and then focus on the case where such a commitment exists. The presence of the production externality also plays an important role in the evaluation of the effects of serious prejudice and we devote some attention to this in the ensuing discussion.

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<sup>24</sup>An important issue in the WTO case law is how the causal effect of the subsidy on the volume of trade or on the world price of the subsidized good should be established by the Dispute Settlement Body. On this, see Sapir and Trachtman (2008). In this paper we implicitly assume that the effect of the subsidy can always be identified.

<sup>25</sup>The original SCM Agreement contained a "green light" category of subsidies that were not actionable (e.g. subsidies to research activities, assistance to disadvantaged regions). This category was introduced to allow legitimate -even if potentially trade distorsive- subsidies. The provision expired in 2000 and has not been renewed by Members.

Absent a tariff commitment, the effect of the removal of the subsidy is to push the lobby of domestic producers to demand higher tariff protection for  $\lambda \in [1, \tilde{\lambda})$ . The substitutability between subsidies and tariffs leads to an excessive use of the latter policy as the government would use the tariff rather than the subsidy to address the production externality (if  $\gamma = 1$ ) and the interest group would relocate its political pressures from the latter to the first policy instrument. Formally, this can be shown by looking at the first-order conditions (9) and (10). If the (positive) subsidy is removed, then the equilibrium tariff is given by

$$t^{sp} = -\frac{\gamma D'x' + ax}{p^*(y' - x')} > \tilde{t}.$$

Second, in case a tariff commitment is in place at  $t^c = \hat{t}$ , removing the subsidy eliminates the political distortions and leads to an efficient policy mix ( $\hat{t} = \hat{s} = 0$ ) when there is no production externality in the manufacturing sector ( $\gamma = 0$ ). On the other hand, under this set of rules the government cannot commit its trade policy to an efficient level of protection whenever a domestic market distortion is present ( $\gamma = 1$ ).

Notice that under no tariff commitment, SP rules imply over-investment in manufacturing. It is also immediate to see that, under an efficient tariff binding SP rules sustain under-protection and, hence, under-investment for  $\gamma = 1$ . The effect on social and government welfare in this case is ambiguous. On the other hand, SP rules combined with a first-best tariff binding maximize social welfare if  $\gamma = 0$ , as in this case this set of rules supports the efficient policy mix and the first-best allocation of capital across sectors. Following the same steps of the previous discussion, it is also immediate to realize that government welfare is higher under commitment to these rules than under discretion. We sum up these findings in the following

**Proposition 8.** *1. Under SP rules and no tariff commitment, (i) the equilibrium policy mix is  $(t^{sp}, 0)$ ; (ii) investment is not at its efficient level; (iii) the policy-substitution and the credibility problem are not solved; (iv) an agreement with SP rules and no tariff commitment has an ambiguous effect on social and government welfare. 2. Under SP and a tariff binding at the first best level, (i) the equilibrium policy mix is  $(\hat{t}, 0)$ ; (ii) the allocation of capital is efficient if only if  $\gamma = 0$  and there is under-investment for  $\gamma = 1$ ; (iii) the policy-substitution problem is solved, but commitment to the efficient policy mix is achieved only for  $\gamma = 0$ ; (iv) an agreement with SP rules and a first best tariff commitment unambiguously improves social and government welfare if only if  $\gamma = 0$ .*

It follows from the above discussion that -within the logic of the commitment approach- efficiency would be improved if the agreement allowed the first-best subsidy (even when it distorts trade) and forbid the politically distorted subsidy (i.e. any subsidy in excess of the efficient level  $\hat{s}$ ). However, implementing a trade agreement with such subsidy rules may be quite difficult in practice. As noted by Sykes (2005), finding the line that divides a legitimate domestic subsidy

from a measure that benefits the interest of an organized group to the expenses of society is not a straightforward matter. While this model is silent on this important aspect, we can point out that mistakes on the proper level of the subsidy would lead to one of the following problems. Any over-estimation of the efficient level of the domestic production subsidy would result in an excessively low market access and in an over-investment in the subsidized sector. The commitment problem in this case would be reduced, but not eliminated. An under-estimation of the efficient level of the subsidy would limit the policy maker's ability to appropriately respond to the domestic market failure.

## 5 Non-optimal tariff bindings

In this section we discuss non-optimal tariff ceilings. We first introduce a more tractable version of the above model that allows us to obtain closed form solutions. Then we use this model to analyze the welfare effects of subsidy rules in presence of tariff bindings that are different from the first-best level.

### 5.1 An example

Consider the above economy with specific functional forms. Production takes the form  $x(l, k) = l^5 k^\beta$  such that  $x(p_x) = \frac{1}{2w} k^{2\beta} p_x \equiv f p_x$ .<sup>26</sup> Utility takes the form  $u(y) = \frac{1}{e} [vy - \frac{1}{2}y^2]$  such that  $y(p_y) = v - ey$ . Finally, the externality is assumed to be linear:  $D(x) = Dx$ . This makes it relatively easy to obtain closed form solutions for all the equilibrium policies and profit as well as welfare values. Profits are given by

$$\pi(p_x) = \frac{(f p_x)^2}{2f} = \frac{[x(p_x)]^2}{2f}. \quad (19)$$

Consumer surplus is

$$S(p_y) = \frac{(v - e p_y)^2}{2e} = \frac{[y(p_y)]^2}{2e}. \quad (20)$$

In order to guarantee the existence and uniqueness of the equilibrium, it is sufficient to assume that the objective function,  $\Omega(t, s)$  (given by condition 3), is concave in  $(t, s)$ . This requires that  $\Omega_{11}\Omega_{22} - \Omega_{12}^2 > 0$ . Using the above functional forms, this condition becomes:

$$\left(2\lambda - 1 - \frac{1}{a}\right) e - (\lambda - 1)^2 f > 0.$$

We can easily calculate first-best policies in this setting by maximizing social welfare. The first-order condition for the tariff is

$$t p^*(e + f) = (\gamma D - \lambda s) f$$

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<sup>26</sup>Notice that, we initially treat  $f$  as a constant, but we recognize later that it is a function of  $k$ .

and for subsidy

$$\lambda s = \gamma D - (\lambda - 1)p_x - \lambda t p^* \Rightarrow (2\lambda - 1)s = \gamma D - (\lambda - 1)p^* - \lambda t p^*$$

where the last identity follows from the fact that  $p_x = (1 + t)p^* + s$ . Substituting one into the other and assuming an interior solution ( $s \geq 0$  and  $t \geq 0$ ), we have

$$\widehat{s} = \frac{[e - (\lambda - 1)f] \gamma D - (\lambda - 1)(e + f)p^*}{(2\lambda - 1)e - (\lambda - 1)^2 f} \quad (21)$$

and

$$\widehat{t} p^* = \frac{f(\lambda - 1)[\gamma D + \lambda p^*]}{(2\lambda - 1)e - (\lambda - 1)^2 f} \quad (22)$$

Furthermore, the total level of protection provided to the manufacturing sector is given by

$$\widehat{p}_x = (1 + \widehat{t})p^* + \widehat{s} = \frac{e[\gamma D + \lambda p^*]}{(2\lambda - 1)e - (\lambda - 1)^2 f} \quad (23)$$

It can be shown that  $\frac{\partial t}{\partial \lambda} > 0$ ,  $\frac{\partial s}{\partial \lambda} < 0$  and  $\frac{\partial p_x}{\partial \lambda} < 0$ .

The condition for the subsidy to be positive is

$$\lambda < 1 + \frac{e\gamma D}{fD + (e + f)p^*} \equiv \widehat{\lambda}. \quad (24)$$

When  $\lambda \geq \widehat{\lambda}$ , the subsidy is zero and the tariff is determined solely by the FOC with respect to  $t$ :

$$\widehat{t}^\circ p^* = \frac{\gamma D f}{f + e} \quad (25)$$

and

$$\widehat{p}_x^\circ = \frac{(f + e)p^* + \gamma D f}{f + e}. \quad (26)$$

We next find the political equilibrium. Notice that the policies determined here define the government's reservation utility in the bargaining game. We can define  $\widehat{W} = W(\widehat{t}, \widehat{s})$ . Contributions are given by

$$c(t, s) = \frac{1}{a} \left[ \widehat{W} - W(t, s) \right].$$

The first-order condition for the tariff is

$$t p^* (e + f) = (\gamma D - \lambda s) f + a f p_x \Rightarrow t p^* [e + (1 + a)f] = (\gamma D - (\lambda - a)s) f + a f p^* \quad (27)$$

and for subsidy

$$\lambda s = \gamma D - (\lambda - 1 - a)p_x - \lambda t p^* \Rightarrow (2\lambda - 1 - a)s = \gamma D - (\lambda - 1 - a)p^* - (\lambda - a)t p^* \quad (28)$$

where the last identity follows from the fact that  $p_x = (1+t)p^* + s$ . Substituting one into the other and assuming an interior solution ( $s \geq 0$  and  $t \geq 0$ ), we have

$$\tilde{s} = \frac{[e - (\lambda - 1)f]\gamma D - [(\lambda - 1)(e + f) - ae]p^*}{(2\lambda - 1 - a)e - (\lambda - 1)^2 f} > \hat{s} \quad (29)$$

and

$$\tilde{t}p^* = \frac{f(\lambda - 1)[\gamma D + \lambda p^*]}{(2\lambda - 1 - a)e - (\lambda - 1)^2 f} > \hat{t}p^*. \quad (30)$$

Furthermore, the total level of protection provided to the manufacturing sector is given by

$$\tilde{p}_x = (1 + \tilde{t})p^* + \tilde{s} = \frac{e[\gamma D + \lambda p^*]}{(2\lambda - 1 - a)e - (\lambda - 1)^2 f} > \hat{p}_x. \quad (31)$$

It can be shown that  $\frac{\partial t}{\partial \lambda} > 0$  and  $\frac{\partial s}{\partial \lambda} < 0$ . The condition for the subsidy to be positive is

$$\lambda < 1 + \frac{e[\gamma D + \lambda p^*]}{fD + (e + f)p^*} \equiv \tilde{\lambda}.$$

When  $\lambda \geq \tilde{\lambda}$ , the subsidy is zero and the tariff is determined solely by the FOC with respect to  $t$ :

$$\tilde{t}^\circ p^* = \frac{(\gamma D + \lambda p^*)f}{(1 - a)f + e} \quad (32)$$

and

$$\tilde{p}_x^\circ = \frac{(f + e)p^* + \gamma D f}{(1 - a)f + e}. \quad (33)$$

## 5.2 Tariff ceilings

Starting from the political equilibrium  $(\tilde{t}, \tilde{s})$ , consider imposing a tariff ceiling,  $\bar{t}$ , such that  $\bar{t}p^* = \tilde{t}p^* - \delta$ . The subsidy will be determined by condition (28):

$$(2\lambda - 1 - a)s = \gamma D - (\lambda - 1 - a)p^* - (\lambda - a)\bar{t}p^*$$

which yields

$$\frac{\partial s}{\partial t} = -\frac{\lambda - a}{2\lambda - 1 - a}.$$

Furthermore, the corresponding change in the total level of protection provided to the manufacturing sector is given by

$$\frac{\partial p_x}{\partial t} = \frac{\lambda - 1}{2\lambda - 1 - a}p^*.$$

Notice that while the tariff is reduced, the subsidy increases and the producer price falls. Since  $\pi'(p_x) = x > 0$ , returns to capital decrease in response to the imposition of a tariff ceiling with no rules on subsidies. We summarize the effects of a tariff-only agreement in the following proposition:

**Proposition 9.** *An agreement that sets only a tariff ceiling  $\bar{t} < \tilde{t}$  results in a less than proportional increase in the subsidy rate and an overall decline in the producer price. The government is indifferent, aggregate welfare falls, profits fall and contributions increase.*

**Proof.** The effects on the subsidy and price follow from the above discussion. Government utility is unaffected because contributions compensate it for any changes in aggregate welfare. To see that aggregate welfare falls notice that

$$\frac{dW}{dt} = \frac{\partial W}{\partial t} + \frac{\partial W}{\partial s} \frac{\partial s}{\partial t} = -axp^* \left[ 1 - \frac{\lambda - a}{2\lambda - 1 - a} \right] = -axp^* \left[ \frac{\lambda - 1}{2\lambda - 1 - a} \right] < 0.$$

Where we use the fact that at the political equilibrium,  $\frac{\partial \Omega}{\partial t} = \frac{\partial W}{\partial t} + a \frac{\partial \pi}{\partial t} = 0 \Rightarrow \frac{\partial W}{\partial t} = -axp^*$  and  $\frac{\partial \Omega}{\partial s} = \frac{\partial W}{\partial s} + a \frac{\partial \pi}{\partial s} = 0 \Rightarrow \frac{\partial W}{\partial s} = -ax$ . It is clear that profits fall since the producer price,  $p_x$ , falls. Contributions must rise in order to compensate the government for the reduction in aggregate welfare. As a result, net profits,  $\pi - c$ , must also fall.

Now consider an agreement where the subsidy rate is also constrained to not increase. This is for instance the case of nullification or impairment rules that we have introduced in Section 4. Starting from the political equilibrium  $(\tilde{t}, \tilde{s})$ , consider imposing a tariff ceiling,  $\bar{t}$ , such that  $\bar{t}p^* = \tilde{t}p^* - \delta$ . At the same time, assume that the subsidy cannot be increased:  $s \leq \tilde{s}$ .<sup>27</sup> The effects of a tariff & subsidy agreement are summarized in the following

**Proposition 10.** *An agreement that sets a tariff ceiling  $\bar{t} < \tilde{t}$  and ensures that the subsidy does not increase  $s \leq \tilde{s}$  leaves the government indifferent, increases aggregate welfare, and decreases gross profits and contributions. Net profits cannot increase.*

**Proof.** Government utility is unaffected because contributions compensate it for any changes in aggregate welfare. To see that aggregate welfare must increase, notice that the parameter restriction also guarantees that the welfare function is concave. Since  $\tilde{t} > \hat{t}$  and  $\tilde{s} > \hat{s}$ , any decrease in one without an increase in the other must result in an increase in welfare. Profits fall as the producer price falls and contributions fall as aggregate welfare falls. To see that net profits fall, notice that  $(\tilde{t}, \tilde{s}) = \arg \max\{\pi - c : \alpha W + c = \widehat{W}\}$ . In words, the political equilibrium also maximizes net profits subject to keeping the government at its reservation utility. Any other  $(t, s)$  cannot result in greater net profits.

The above results are generalizations of the findings in Section 2, as they would clearly apply to the case where the tariff (or the tariff and the subsidy) are fixed at the first-best level. These findings confirm that a tariff-only agreement is not desirable. It reduces aggregate welfare and

<sup>27</sup>This is a generalization. The following results also hold if the agreement specifies a subsidy ceiling  $\bar{s} < \tilde{s}$ .

makes the lobby worse off. Importantly, this is true for any level of the tariff ceiling built into the agreement. The reason, as we have seen before, is the policy-substitution effect. A tariff & subsidy agreement which binds the level of the subsidy at its pre-negotiation level (such as the non-violation rules analyzed earlier) can offset this problem as it curbs the lobby's power over the government and increase aggregate welfare.

## 6 Conclusions

This paper revisits the commitment approach to trade agreements when the government has at its disposal a tariff and a production subsidy, the import-competing sector is politically organized, the domestic economy may be characterized by a market failure and taxation can be distortionary. In this framework we establish several results. First, trade agreements that bind tariffs but leave complete government discretion on subsidies create a policy substitution problem and are (generally) inefficient. Second, when a tariff commitment is undertaken, rules that limit the policy maker's flexibility in setting subsidies reduce or eliminate this problem and, hence, improve social welfare. Third, when the political process distorts the long-run allocation of resources, trade policy discretion creates a credibility problem. In this environment, the government prefers to commit through a tariff & subsidy agreement (i.e. a treaty that imposes rules on both instruments), rather than maintain policy flexibility on subsidies or on both tariffs and subsidies. Fourth, we show that GATT/WTO rules on nullification or impairment solve the policy substitution problem, but generally leave the trade policy credibility problem standing. Finally, GATT/WTO rules on serious prejudice are shown to be efficient, in the sense that they solve the policy substitution and credibility problem, only when there is a tariff commitment and no domestic distortions -otherwise they lead to an inefficient use of tariffs or to under-investment in the sector characterized by the distortion.

An interesting policy question is what we can learn on the efficient design of rules on domestic subsidies from the standard and the commitment approach to trade agreements. It is quite surprising to realize that, while these are separate (even if, possibly, complementary) rationales for trade cooperation, there are some important overlaps in their implications for subsidy rules. First, both theories predict that non-violation complaints play an important role in the multilateral trading system. Governments have an incentive to revert to subsidies once a tariff commitment has been signed (to manipulate the terms of trade or to redistribute income to organized interests). A ban on "new" subsidies, as implied by nullification or impairment, eliminates this dangerous temptation. Second, under both theories there are cases where serious prejudice rules are inefficient. When no tariff commitments are present, strict rules on domestic subsidies may induce the government to seek flexibility in the use of tariffs. Bagwell and Staiger (2006) refer to this scenario as "tariff chill" at the negotiating table, while in the present paper this is a special case of the policy

substitution problem. When a tariff commitment is in place, rigid rules on subsidies may deprive the government of an important tool to pursue a legitimate domestic goal, such as addressing a production externality. The similarities between the two theories should not come as a surprise, as they derive from the instrument substitutability between tariffs and subsidies. In other words, from an efficiency point of view, it is not important whether a government distorts the subsidy or the tariff for terms of trade manipulation or for redistributive concerns, what matters is that rules that limit the use of one measure will affect the policy maker's choice of the other.

Finally, there seems to be an important point of divergence of the two theories. In the commitment theory, the government needs rules that bind the subsidy at its efficient level to improve its bargaining power vis a vis domestic lobbies. So, if such rules were easily implementable (something that may not be obvious), they would undoubtedly represent an improvement from the commitment point of view. On the other hand, a rule that imposes a first-best level of the subsidy may not be efficient from the point of view of the standard approach. In this view, the goal of a trade agreement is to eliminate the terms of trade externality, but this is compatible with tariffs and/or subsidies higher than first-best. Hence, rules on domestic subsidies that are consistent with the commitment approach may be an unnecessary constraint to policy-making in this context.

The model we present here is based on some simplifying assumptions. First, we assume the presence of a single lobby. Under the more realistic assumption of multiple sectors and several organized groups, however, the logic of our findings should not change. Intuitively, policy-substitution effects take place within a sector, where a lobby demands higher subsidies once a tariff binding is imposed. Second, the government is assumed to have only two policy tools at its disposal. While this is a step in the right direction, one can correctly argue that several other measures can be taken to guarantee protection. We leave this for future research, and limit ourselves to two observations. Trade agreements go indeed in the direction of imposing constraints to the use on non-tariff policies. This is consistent with the need of limiting the policy-substitution effects beyond tariffs and subsidies. However, trade agreements do not impose limits on every possible government activity. As in Horn, Maggi and Staiger (2008), this can be explained as the result of a trade off between the benefits of trade rules (here given by the credibility gain) and the transaction costs associated to an increasingly complex agreement.

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