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Abstract

This paper examines the rationale for the rules on domestic subsidies in international trade agreements through a framework that emphasizes commitment. We build a model where the policy-maker has a tariff and a production subsidy at its disposal, taxation can be distortionary and the import-competing sector lobbies the government for favourable policies. 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 tariffs only. We refer to this as the *policy substitution* problem. 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, thus addressing the policy substitution problem. Finally, we employ the theory to analyze the Subsidies and Countervailing Measures (SCM) Agreement within the GATT/WTO system.

Keywords: Trade Agreements, Trade Policy Credibility, Subsidy Rules, GATT/WTO.
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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 several recent contributions (Sykes, 2005 and 2009, Bagwell and Staiger, 2006, Bagwell, 2008, Rodrik, 2010).

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 production subsidies to the import-competing sector and develop a political economy theory to address these questions. Political considerations may support excessive protection for a given sector and trade agreements allow the government to commit to welfare improving policies. But in a political environment where special interests compensate the government for deviations from welfare maximizing policies, it is not clear that the government would be willing to limit its discretion. We argue that, since capital is allocated in anticipation of the protection it may receive, the government can benefit from trade agreements because they prevent the misallocation of capital. Subsidy rules play an important role because they prevent the erosion of gains from reduced tariffs caused by shifting protection from one policy instrument (tariffs) to another (subsidies).

The role of rules on domestic subsidies in the multilateral trading system has a substantial history in the literature. It has long been recognized that subsidies can be used to achieve domestic policy objectives. Bhagwati and Ramaswami (1963) and Johnson (1965) argue that when taxation does not result in large distortions, a subsidy may be a first-best policy tool that government can use to address market imperfections (such as externalities) that lead to domestic under-production. This is preferable to an import tariff, which has a similar boosting effect on domestic production, but has the cost of distorting consumption. This argument loses some of its strength if the taxes required to finance the subsidy are themselves distortionary. When this is the case, a combination of tariffs and subsidies may be the best way to address a domestic market failure.

The above argument, however, disregards the fact that domestic subsidies also have an impact on trade. Since securing market access is arguably a key objective of trade agreements, this can be seen as problematic. In the standard theory of trade agreements (Bagwell and Staiger, 1999 and 2002) countries bind their tariffs to escape a terms-of-trade driven prisoner's dilemma. Through an international treaty, signatories lower their tariffs to grant reciprocal, and welfare-enhancing, market access to their trading partners. In the absence of rules on domestic subsidies, however,

governments may use these measures to erode market access commitments made in previous tariff negotiations. Furthermore, as trading partners anticipate this incentive, they might be reluctant to accept a tariff cut in the first place. This suggests that there is a role for constraints on a government's ability to set domestic subsidies.

Taken together, these arguments imply that a subsidy agreement needs to strike a balance 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. Agreements that are too permissive with respect to subsidies can be self-defeating. But agreements that are too strict will be unappealing to governments with justifiable domestic public policy objectives. 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. Specifically, 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).[1] 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. In particular, Maggi and Rodriguez-Clare (1998) -henceforth, MRC- consider a political economy framework à la Grossman and Helpman (1994) where a lobby pays political contributions to the government to obtain tariff protection. When capital is mobile in the long-run but investments are irreversible in the short-run, tariffs distort the allocation of capital between different activities and have long-run negative effects on social and government welfare. For this reason, the policy-maker values an agreement that allows it to commit its trade policy vis-à-vis domestic special interests.[2]

The economic literature on the commitment approach to trade agreements has so far focused on border measures (tariffs and export subsidies) and has neglected behind-the-border policy tools, such as domestic subsidies and regulations, that constitute the core of government activities.[3] This paper offers a first insight into these issues. Specifically, we study the role and design of rules on domestic subsidies when the problem that the trade agreement is solving is one of policy credibil-

[1] Maggi and Rodriguez-Clare (2007) develop 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.

[2] Staiger and Tabellini (1999) provide evidence that GATT/WTO rules have helped the US government to make trade policy commitments to its private sector. More recently, Tang and Wei (2008) have found that accession to the GATT/WTO increases credibility of policy commitments, particularly for countries with poor domestic governance.

[3] For an overview of the literature on the commitment approach to trade agreements, see Maggi and Rodriguez-Clare (2012).

ity. 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 measures.[4] 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.[5] We refer to this as the *policy substitution problem*. Under political pressures by import-competing sectors, a trade agreement which binds only tariffs may lead a government to set an inefficiently high level of subsidies, thus undoing (at least in part) the trade effects of tariff reduction.[6] Furthermore, as the level of support granted 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 may not solve the trade policy credibility problem. This is why –we argue- multilateral (WTO) and regional (e.g. EU) economic integration processes 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 is distortionary. Capital, which is used in the production of both the numeraire and the manufacturing good, cannot be moved across sectors. Manufacturing producers are organized to 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) is subject to the policy substitution problem: in presence of political pressures, governments will turn to subsidies when their ability to impose tariffs is curtailed by a tariff binding. 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.

While insightful, the model with fixed capital allocation suffers of two main problems. First,

[4] WTO (2012) makes this point for non-tariff measures in general and provides preliminary evidence that governments tend to use these tools in sectors with more stringent (applied) tariff. In a book on the treatment of subsidies in the multilateral trading system, Gary Hufbauer, makes the following case for international disciplines on subsidies (quoted in Sykes, 2011): "*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*".

[5] Other policies would include different forms of subsidies and government transfers, non-tariff barriers (e.g. protectionist sector-specific regulations), contingent measures (e.g. anti-dumping), etc. While this paper fouces on production subsidies, the logic applies to other measures as well. We come back to this point in the conclusions.

[6] For a simple model that captures this idea, see Brou and Ruta (2009).

it does not provide a rationale for a trade agreement. In a political environment where special interests compensate the government for deviations from the welfare maximizing policies, it is not clear that a government will be willing to enter a trade agreement that limits its discretion - even if aggregate welfare is higher. Second, trade agreements are long-run commitments and in this time horizon capital is likely to be mobile across sectors. We, therefore, turn to study an economy of the MRC type, where investment decisions are irreversible in the short-run, but capital can move to different uses in the longer term. In this setting, capital allocation anticipates the outcome of the lobbying game between the interest group and the government. As in MRC, this timing does not allow the government to credibly distance itself from the lobby and results in a *trade policy credibility problem*. Differently from MRC, however, the availability of another policy instrument, namely a domestic subsidy, complicates the design of an efficient trade agreement.

When a sector is politically organized, political pressures induce a combination of high tariffs and subsidies that lead to over-investment in the sector. Equilibrium contributions fully compensate the policy-maker for the loss in social welfare caused by the inefficient policy, but not for the misallocation of capital across sectors. Addressing this long-run distortion is the problem that the government tries to address through international commitments. However, a trade agreement that binds only the tariff will not suffice. Intuitively, a tariff-only agreement does not commit the government to the efficient policy mix as it leaves open the policy substitution problem. The government would be better off under an agreement that also imposes rules on the use of domestic subsidies because policy credibility vis-à-vis special interests may effectively be restored only under this more complete trade agreement.

As an extension we consider the possibility that the manufacturing sector has relevant external effects that could serve as a justification for the use of a production subsidy. In addition to the political considerations above, government policy suffers from a problem of time inconsistency. The policy mix that supports the efficient allocation of capital is not credible because, once capital has been allocated, the government has an incentive to provide a lower level of protection and benefit from the externality. Anticipating this, capitalists under-invest in manufacturing. Flexibility in policy-making may be beneficial in this case.

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 Countervailing Measures (SCM) Agreement that apply to subsidies to import-competing sectors: nullification or impairment (i.e. non-violation) and serious prejudice complaints. Under nullification or impairment rules, WTO members can challenge subsidies that frustrate access to foreign markets after the agreement has been signed. We argue that this mechanism eliminates the policy substitution problem, as it binds the subsidy at the level existing before a tariff commitment was undertaken. However, non-violation complaints may not suffice to fully eliminate credibility prob-

lems when subsidies were inefficiently high at the time the trade agreement was signed. Under serious prejudice rules, WTO members may challenge any subsidy that lowers market access 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- when a tariff commitment is in place and the sector is not subject to relevant externalities. Therefore, the model also rationalizes the (now expired) exceptions in the SCM Agreement for subsidies in sectors where positive externalities are likely to be large, such as in research or green technologies.

In addition to the papers discussed above, several works provide alternative economic rationales for rules on subsidies in international trade treaties. Agreements that focus on subsidies in isolation have been studied by (among others) 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.[7] Recent works that focus on subsidy rules within trade agreements include Potipiti (2006), Mrazova (2009), Saure (2010), Bagwell and Staiger (2011) and DeRemer (2012). With the exception of the first, that focuses on the commitment value of export subsidy rules, these papers abstract from the commitment rationale for subsidy rules. An argument that shares some similarities with ours is in Horn, Maggi and Staiger (2010). 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. (2010) subsidies are exploited as a substitute for terms-of-trade manipulation.

Our work also relates to a second branch of the literature which deals with the choice of border and domestic policies.[8] In particular, our paper is similar to the recent work of Limao and Tovar (2011) who also model the choice between tariff and non-tariff barriers. Their goal, however, is to explain why governments may 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. Finally, Korinek and Serven (2010) show that when the multilateral trading system imposes strict rules on domestic subsidies, governments may use reserve accumulation as a second-best policy to promote a tradable sector characterized by

[7] See Bacchetta and Ruta (2011) for a collection of key contributions on subsidies and the WTO.

[8] Early works, in the context of trade agreements, include Copeland (1990) and Bagwell and Staiger (2001b).

positive learning externalities. While their paper is clearly different from ours, it shares the idea that policy substitution is a concern for the efficient design of international rules.

The paper is organized as follows. Section 2 provides the structure of the model. Section 3 focuses on an economy with a fixed allocation of capital in the two sectors. The long-run value of commitment to tariff and subsidy rules is investigated in Section 4. We extend the model to account for production externalities in Section 5 and analyze the WTO agreement on domestic subsidies in Section 6. Concluding remarks follow.

2 The economic and political structure

This section introduces a simple model that explores the rationale for international agreements that regulate both import tariffs and production subsidies. The model has several salient features: the government's policy choice can be influenced by special interests; there are two types of measures available to the policy-maker, both of which impose some cost on society: a border measure (a tariff) and a domestic instrument (a production subsidy). Tariffs have the usual distortions while subsidies are funded through costly taxation. Furthermore, the allocation of capital within the economy occurs in anticipation of the process that determines the policy outcome.

Using this set up, we show that there are two related problems which can be addressed by international agreements that regulate both tariffs and subsidies. The first problem is static. In the face of political economy considerations, both the tariff and the subsidy levels may be different from their welfare-maximizing levels. Trade agreements that constrain only tariffs will have opposing effects on aggregate welfare: lower tariffs directly reduce the political distortion, but at the same time induce a lobby representing the interests of the import-competing sector to seek additional protection through a relatively more costly policy tool. We refer to this as the *policy substitution problem.* The second problem can be thought as an intertemporal problem. Political considerations sustain high protection in a politically organized sector. Anticipating higher returns, capital owners over-invest in the protected sector. This misallocation of capital is costly for the government (and society as a whole). Following the literature, we call the government's inability to avoid this distortion the *trade policy credibility problem.* We show that tariff and subsidy agreements are superior to tariff only agreements in addressing these two problems.

Consider a small open economy with two sectors (called, respectively, manufacturing and numeraire) and three factors of production, labor (l), capital (k), and land (z). Each agent is endowed with one unit of labor and population is normalized to 1. The amounts of capital and land in this economy are fixed and owned by a subset of the population of measure zero. Capital is used in both sectors so that $\overline{k} = k_n + k$, where k_n is the capital employed in production of the numeraire, k is the capital used in production of the manufactured good, and $\overline{k}$ is the total capital endowment for the economy. Similarly, $\overline{l} = 1 = l_n + l$. Land is only used in the numeraire sector.

The numeraire sector produces a good that is freely traded internationally at a price which we normalize to one. Production of the numeraire good requires the technology $x_n = l_n + f(k_n, z)$, where f is a function that is homogenous of degree one. The marginal productivity of capital can be expressed as $\pi_n(k) \equiv f_k(\overline{k} - k, z)$ and represents the per unit rate of return to capital in the numeraire sector. The rate of return to land is given by $\rho_n(k) \equiv f_z(\overline{k} - k, z)$. In equilibrium, the wage rate will be equal to one.

The manufactured good is produced with a Cobb-Douglas production function. In order to obtain closed-form solutions, we assume $x = \sqrt{2} l^{.5} k^{.5}$. Since we will assume that the production decision occurs after capital is allocated and policy is set (see the discussion of the timing below), it is useful to derive supply as a function of capital and the producer price, p_x. Profit maximization yields the expression $x(p_x, k) = kp_x$. Similarly, gross profits in the manufacturing sector are $\Pi(p_x, k) = \frac{1}{2}(p_x)^2 k$. We can then define the per unit rate of return to capital in the manufacturing sector as $\pi(p_x) \equiv \Pi/k = \frac{1}{2}(p_x)^2$.

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. For simplicity, we assume that $u(y) = vy - \frac{1}{2}y^2$. Demand for the manufactured good can then be written as $y(p_y) = v - p_y$, with the resulting consumer surplus $S(p_y) = \frac{1}{2}(v - p_y)^2$. Agents receive income from labor and -possibly- from capital and land ownership, and have to pay taxes to the government.

The government conducts trade and fiscal policy that affect the import-competing sector. Under free trade, the manufactured good is imported at the international price p^*. The government has at its disposal two policy instruments: a tariff $t \geq 0$ and a production subsidy $s \geq 0$. Thus, the domestic price of the manufactured good is $p_y = p^* + t$, while net revenue to producers is given by $p_x = p^* + t + s$. The government uses tax and tariff revenue to finance the production subsidy and any other expenditures (denoted as E). We follow Matschke (2008) and assume that raising revenue is costly for the economy: in order to spend 1 unit, the government has to raise λ units, where $\lambda \geq 1$. In other words, taxation imposes a deadweight loss to society equal to $(\lambda - 1)$.[9] The government balances its budget, $T + t(y - x) = \lambda(sx + E)$,where T is the tax and $t(y - x)$ is tariff revenue.

Aggregate welfare consists of factor incomes and consumer surplus and is given by:

$$W = 1 - T + \rho_n(k)z + \pi_n(k)(\overline{k} - k) + \pi(p_x)k + S(p_y).$$

It is important to note at this point that aggregate welfare depends on the allocation of capital as well as the policies that determine the relevant prices. Furthermore, if we use the government

[9] Estimating this model for the U.S., Matschke (2008) finds that the parameter λ lies 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 λ.

budget constraint to eliminate T, we can express aggregate welfare as

$$W(t,s,k) = 1 + t(y(p_y) - x(p_x)) - \lambda(sx(p_x) + E) + \rho_n z + \pi_n(\overline{k} - k) + \pi(p_x)k + S(p_y). \quad (1)$$

We assume a simple political structure. Capital owners in the manufacturing sector are organized to lobby the government for favorable policies. The objective of this lobby is to maximize profits net of contributions for its members: $\Pi(p_x, k) - C$, where C is the aggregate lobbying contribution. Other groups in society, workers and owners of capital in the numeraire sector and land-owners, are not able to solve their collective action problem and are not politically organized. As in Grossman and Helpman (1994), politicians care about a combination of social welfare and political contributions by the interest group:

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

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

Finally, we make the following two assumptions on parameter values:

A1. $1 - \overline{k}\,(\lambda - 1) > 0$.
A2. $\lambda > a > \lambda - 1$.

Assumption A1 ensures that taxation is not so costly as to make subsidies unattractive under any circumstances. Assumption A2 ensures that the government does not value contributions so much as to be willing to tax consumers fully, but it cares enough about contributions to enact some positive level of protection.

The timing of the game is as follows. In the first stage, capitalists choose whether to invest their capital in the numeraire or manufacturing sector. Investors are small, non-strategic and are not politically organized (i.e. the lobby is only formed after the capital is invested). Investment decisions are irreversible so that once investment is made, capital cannot be moved to a different sector. In the second stage, policy is determined as a result of bargaining between the government and the lobby. In this setting, a trade agreement signed before investment decisions are made (i.e. at stage zero) allows the government to commit to limits on the policies available in the final stage. The model is solved by backward induction.

3 The political economy of import tariffs and domestic subsidies

In this section, we focus first on the policy determination stage, where the allocation of capital across sectors is taken as given. This 'short-run' perspective will give us an insight into the role played by rules on tariffs and subsidies within a trade agreement in the presence of political pressures and introduces the *policy substitution problem*.

3.1 Welfare maximizing policy

An important first step is to establish the impact of the policy variables on aggregate welfare (1). Both policies directly increase the producer price and result in an increase in domestic production and profits in the manufacturing sector. In the case of the tariff, there is also a direct impact on tariff revenue, but this together with the increase in profits, is offset by a loss of consumer surplus. In the case of the subsidy, its impact on profits is more than offset by the costly taxation required to raise the subsidies. In both cases, the increased domestic production results in a greater cost of subsidizing this production and in lower tariff revenues. These effects can be seen in the first-order conditions for maximizing aggregate welfare, with respect to tariffs and subsidies, respectively:

$$-\left[(t+\lambda s)\,x' - t\right] t = 0 \tag{3}$$

$$-\left[(t+\lambda s)\,x' - (\lambda-1)\,x\right] s = 0. \tag{4}$$

The following lemma follows from the above conditions.

Lemma 1. *For any capital allocation and parameter values, the welfare maximizing policy choice is* $\left(\widehat{t},\widehat{s}\right) = (0,0)$.

Neither policy provides any net benefit to society and it is clear that the welfare maximizing policy is to set both the tariff and the subsidy equal to zero.[10] Given the socially optimal policies $\left(\widehat{t},\widehat{s}\right)$, per unit of capital profits in the manufacturing sector will be denoted as $\widehat{\pi} \equiv \pi(p^*) = \frac{1}{2}p^{*2}$ and aggregate welfare is $\widehat{W}\,(k) \equiv W\,(0,0,k)$. These will serve as useful benchmarks in the analysis that follows.

3.2 Political equilibria

Tariffs and subsidies are chosen in a political economy environment where the government is subject to political pressures. As in Grossman and Helpman (1994), the lobby offers a "take-it-or-leave-it" contribution schedule contingent on the policy choice. The government then observes the contributions on offer and chooses policy to maximize its own objective.[11] Contributions are assumed to be compensating such that $C(t,s,k) = \max\left[0, \Pi(t,s,k) - b\right]$, where b is some positive constant optimally chosen by the lobby. The lobby maximizes net of contribution profits subject to the

[10] In section 5 we introduce the possibility of an externality in the production of the manufactured good. In that case, the socially optimal policy will depend on the capital allocation. It will be necessary to differntiate between the ex-post optimal policy - the one that maximizes welfare for a given capital allocation - and the ex-ante optimal policy - the one that induces the optimal capital allocation.We reserve that discussion for section 5.

[11] In other words, the government has no bargaining power in its relationship with the lobby. Removing this assumpiton does not alter the results of this section, but would affect the choice of the government to commit to an international agreement (as shown in MRC).

constraint that it must ensure that the government is no worse off than if it set policy unilaterally (i.e. subject to $G(t,s,k) \geq \widehat{W}(k)$). It can be shown that the resulting tariff and subsidy rates will maximize the joint utility:

$$\Omega = W(t,s,k) + a\Pi(t,s,k). \tag{5}$$

Given the objective of the lobby, contributions will be chosen so as to just leave the government indifferent. Contributions compensate the government for any loss in welfare resulting from protection of the organized sector. Using (1) together with Lemma 1, the welfare loss from any policy (t,s) that deviates from the social optimum is given by

$$\widehat{W}(k) - W(t,s,k) = \frac{1}{2}\left[t\left((1+k)t + \lambda k s\right) + s\left((2\lambda-1)ks + \lambda k t\right) + 2(\lambda-1)kp^*s\right]. \tag{6}$$

Contributions (per unit of capital) are then

$$c(t,s,k) = \frac{1}{ak}\left[\widehat{W}(k) - W(t,s,k)\right]. \tag{7}$$

Gross profits for each unit of capital are denoted as $\pi(t,s,k) = \frac{1}{2}(p^* + t + s)^2 = \pi + p^*(t+s) + (t+s)^2$.

We will consider the determination of policy under three alternate regimes: the government has discretion over setting tariffs and subsidies (*full discretion*); the government has previously committed to a binding ceiling on tariffs with no commitment on subsidies (*tariff-only agreement*); and, the government has previously committed to binding ceilings on both policy instruments (*tariff & subsidy agreement*).

3.2.1 Full discretion

When the government faces no restrictions on the policy space, the choice of t and s will simply maximize condition (5). The choice will reflect the costs and benefits of using tariffs and subsidies, respectively:

$$\left[a\pi' k - (t+\lambda s)x' + ty'\right]t = 0 \tag{8}$$

$$\left[a\pi' k - (t+\lambda s)x' - (\lambda-1)x\right]s = 0. \tag{9}$$

These conditions embody the same costs to social welfare discussed in the previous subsection since the government values aggregate welfare. Both conditions, however, are augmented by a term that reflects the political importance of manufacturing profits. This has the expected impact of inducing some positive level of protection for the manufacturing sector. The policy mix used to provide this protection depends on the the distortionary effect of taxation, λ, relative to the responsiveness of

imports to changes in producer's price (which is proportional to k). When the tax distortion is relatively small, the government will use tariffs and subsidies.

More precisely, the political equilibrium will include a positive subsidy when $\lambda < 1+a/(1+k) \equiv \widetilde{\lambda}$. When this is the case, the full discretion tariff can be derived as

$$\widetilde{t}(k) = \frac{(\lambda-1)\lambda p^* k}{(2\lambda-1)-(\lambda-1)^2 k - a} \geq 0 \tag{10}$$

and the politically determined subsidy is:

$$\widetilde{s}(k) = \frac{[a-(\lambda-1)(1+k)]\, p^*}{(2\lambda-1)-(\lambda-1)^2 k - a} \geq 0. \tag{11}$$

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

$$\widetilde{p}_x = p^* + \widetilde{t} + \widetilde{s} = \frac{\lambda p^*}{(2\lambda-1)-(\lambda-1)^2 k - a} > \widehat{p}_x. \tag{12}$$

If the cost of taxation is sufficiently large ($\lambda \geq \widetilde{\lambda}$), the non-negativity constraint on the subsidy is binding and the politically determined tariff is given by

$$\widetilde{t} = \frac{a p^* k}{1+(1-a)\, k} \geq 0. \tag{13}$$

Note that the equilibrium level of protection is always greater than zero. The extent of this political economy distortion is affected by the parameters of the model. Namely, the larger the government bias for contributions (i.e. the higher is a) the higher are the tariff and production subsidy that the lobby receives. This political preference accorded to the organized group is constrained by two factors: the distortionary effect of taxation, λ, and the responsiveness of imports to changes in producer's price (which is proportional to k). These findings are summarized in the following

Lemma 2. *The equilibrium policy mix under discretion depends on the extent of the tax distortion (λ) and implies a higher level of protection relative to the optimal policy mix:*

$$\begin{aligned}
\text{If } \lambda &\geq \widetilde{\lambda},\ \widetilde{s}=0 \text{ and } \widetilde{t} = \frac{a p^* k}{1+(1-a)\, k} \geq 0; \\
\text{If } \lambda &< \widetilde{\lambda},\ \widetilde{s} = \frac{[a-(\lambda-1)(1+k)]\, p^*}{(2\lambda-1-a)-(\lambda-1)^2 k} \geq 0 \\
\text{and } \widetilde{t} &= \frac{(\lambda-1)\lambda p^* k}{(2\lambda-1-a)-(\lambda-1)^2 k} \geq 0.
\end{aligned}$$

We find that when the lobby has the choice of seeking additional profits either by affecting the tariff or the subsidy or both, it concentrates its activity to distort the policy or the policy mix

which has a lower social cost. This, in effect, is a cheaper way to obtain preferential treatment from the government, because the nature of contributions is "compensating". Specifically, when taxation is not distortionary ($\lambda = 1$), influencing the subsidy rate is the most convenient way for the lobby to achieve its objective. When $\lambda \geq \widetilde{\lambda}$, taxation is highly distortionary (λ high) and/or there is more capital allocated to manufacturing (k high). In this case, tariff protection is the cheaper alternative. For intermediate levels ($\lambda < \widetilde{\lambda}$), taxation is not very costly and/or capital is low in the manufacturing sector. The lobby does not concentrate on just one policy, as it recognizes that it will cost less to induce a positive tariff and subsidy, than concentrating on a single policy dimension.[12]

Alternately, consider a reduction in t and an increase in s that leave unaltered the producer price p_x. This policy change does not affect output or the lobby's profits. 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 λ. Under non-distortionary 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 λ, 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 λ, 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.

As one would expect, lobbying distorts the policy process and results in lower aggregate welfare. Using (6) and conditions (8) and (9), we have

$$\widehat{W}(k) - W(\widetilde{t}, \widetilde{s}, k) = \frac{1}{2}\left[\left(p^* + \widetilde{t} + \widetilde{s}\right)\left(\widetilde{t} + \widetilde{s}\right) + \frac{\lambda - 1}{a} p^* \widetilde{s}\right]. \tag{14}$$

The government effectively trades off aggregate welfare for contributions. Similarly, net profits for the protected sector are higher than if no lobbying occurred:

$$\pi(\widetilde{t}, \widetilde{s}, k) - c(\widetilde{t}, \widetilde{s}, k) \equiv \widetilde{\pi}(k) - \widetilde{c}(k) = \widehat{\pi} + \frac{1}{2}\left[p^*\left(\widetilde{t} + \widetilde{s}\right) - \frac{(\lambda - 1)}{a} p^* \widetilde{s}\right]. \tag{15}$$

The lobby clearly benefits from the bargain it strikes with the government but the government is no better or worse off since contributions are compensating, $G(\widetilde{t}, \widetilde{s}, k) = W(\widetilde{t}, \widetilde{s}, k) + aC(\widetilde{t}, \widetilde{s}, k) \equiv \widetilde{G}(k) = \widehat{G}(k) = \widehat{W}(k)$.

[12] These results generalize the findings in Grossman and Helpman (2001, chapter 7) on lobbying when a government has at its disposal multiple policy tools.

We show next how different international rules affect equilibrium policy at the last stage of the game. In particular, we consider two variations: a trade agreement that constrains only the tariff and one that encompasses rules on both the tariff and the subsidy.

3.2.2 Tariff-only agreement

We define a tariff-only agreement as one where the government commits to a binding ceiling on the tariff rate. No restrictions are placed on the other instrument. More formally, assume the government has entered an agreement that imposes a tariff ceiling, $\bar{t}$, such that the equilibrium tariff rate, t^T, must satisfy $t^T \leq \bar{t} = \widetilde{t} - \delta$. Any $t \leq \bar{t}$ will be feasible, while any $t > \bar{t}$ will be ruled out by the agreement.

Intuitively, a tariff-only agreement imposes a binding ceiling on the tariff. This constraint alters the relative cost of obtaining additional subsidies from the government. If we consider the gross profit of the organized sector, π, the two policies are perfect substitutes. Each boosts profits by raising the producer price. But their relative costs, in terms of contributions, are different. When the government has full discretion - as in the previous subsection - the lobby is able to minimize the cost of protection. As the tariff is forced below the political equilibrium under discretion ($\widetilde{t}$), the subsidy becomes more attractive to the lobby.[13] Only when the tariff is forced down by a trade agreement does the lobby "settle" for the relatively more costly policy mix. This *substitutability* between policy instruments will also play an important role in our results in Section 4.

A commitment to place a ceiling on the tariff level below the political equilibrium under discretion will increase the attractiveness of subsidies. To see this, consider for simplicity the case of a tariff-only agreement that sets the ceiling at $\bar{t} = 0$.[14] In this institutional environment, the equilibrium tariff level will be $t^T = \bar{t} = 0$ and the subsidy will be determined by condition (9), which can be re-written as:

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

and yields

$$s^T = \frac{[a - (\lambda - 1)]\, p^*}{2\lambda - 1 - a} > \widetilde{s}. \tag{16}$$

Furthermore, the corresponding change in the total level of protection provided to the manufacturing sector, p_x^T, satisfies

$$p_x^T = p^* + s^T < \widetilde{p}_x. \tag{17}$$

These conditions allow us to establish some interesting preliminary results. First, while the tariff-only agreement reduces the equilibrium tariff, the subsidy increases in response. Intuitively,

[13] Notice from equation (9) that the marginal benefit of a subsidy is greater as t is lower.

[14] The same qualitative results hold for any $\bar{t} < \widetilde{t}$, though the algebra is not as clean.

when the interest group cannot influence the choice of the tariff, it will lobby for a higher level of the subsidy. The political distortion "relocates" from the first to the second policy tool. Second, the total level of protection in a tariff-only agreement falls compared to the full discretion equilibrium. At the full discretion equilibrium, the lobby uses each policy tool up to the point that their costs are the same. In the tariff-only agreement, as the lobby is prevented from using the tariff to its full potential, additional protection comes from the relatively more costly subsidy. For this reason, a lower level of total protection is achieved under a tariff-only agreement compared to discretion. Third, the reduction of the tariff moves policy in the direction of the social optimum, but the increase of the subsidy has the opposite effect. This can be seen by using (1) and (9) to see that the welfare cost of the policy $\left(t^T, s^T\right)$ is

$$\widehat{W}\left(k\right) - W(t^T, s^T, k) = \frac{1}{2}\left[\left(p^* + s^T\right)\left(s^T\right) + \frac{\lambda - 1}{a} p^* s^T\right] > 0. \tag{18}$$

Intuitively, less total protection implies a smaller distortion to the economy, but the higher and more costly subsidy increases the cost of this distortion.

Net profits for the lobby are lower, given that the lobby is now constrained by the tariff-only agreement:

$$\pi(t^T, s^T, k) - c(t^T, s^T, k) \equiv \pi^T(k) - c^T(k) = \widehat{\pi} + \frac{1}{2}\left[p^* s^T - \frac{(\lambda - 1)}{a} p^* s^T\right]. \tag{19}$$

Finally, the fact that political contributions are compensating means that the government is no better (or worse) off than under full discretion.

3.2.3 Tariff & subsidy agreement

We define a tariff & subsidy agreement as a treaty where the government commits to a binding ceiling on both the tariff and subsidy rates. Specifically, consider an agreement where a tariff ceiling, $\bar{t}$, is imposed such that $t^{TS} \leq \bar{t} = \widetilde{t} - \delta$ and the subsidy rate is also constrained to not be increased: $s \leq \widetilde{s}$.[15] In this case, the policy substitution effect cannot occur and the lobby is prevented from turning to the alternative - and more costly - source of protection in the form of a subsidy. Again, consider the simplified case where $\bar{t} = 0$. Both constraints will be binding since at the policy combination $(0, \widetilde{s})$ the lobby would be willing to 'pay' the political cost of increasing both policy instruments. Thus we have that the policy enacted under a tariff & subsidy agreement is $\left(t^{TS}, s^{TS}\right) = (0, \widetilde{s})$, and it is straight forward to verify that the total level of protection is lower in this instance than under a tariff-only agreement $(t^{TS} + s^{TS} < t^T + s^T)$ or

$$p_x^{TS} = p^* + \widetilde{s} < p_x^T. \tag{20}$$

[15] This is the case of nullification or impairment rules of the GATT/WTO. See section 6 for an in-depth discussion. More generally, we could assume that the agreement imposes a subsidy ceiling $s < \bar{s} = \widetilde{s} - \delta_s$. The results would be qualitatively the same.

The total level of protection in a tariff & subsidy agreement falls compared to that in a tariff-only agreement. The reduction in total protection moves policy in the direction of the social optimum. The welfare loss from the policy enacted under a tariff & subsidy agreement is given by

$$\widehat{W}(k) - W(t^{TS}, s^{TS}, k) = \frac{s^T}{2}\left[(2\lambda - 1)\, k s^T + 2(\lambda - 1)p^*\right]. \tag{21}$$

Comparing conditions (6) and (21), it is clear that this welfare loss is less than that under full discretion and a tariff-only agreement. Recognizing that $s^{TS} = \widetilde{s}$ and using (9), net profits for the lobby under a tariff & subsidy agreement are

$$\pi(t^{TS}, s^{TS}, k) - c(t^{TS}, s^{TS}, k) \equiv \pi^{TS}(k) - c^{TS}(k) = \widehat{\pi} + \frac{1}{2}\left[\frac{a - (\lambda - 1)}{a} p^* s^{TS}\right] - \frac{\lambda - a}{a}\widetilde{t}s^{TS}. \tag{22}$$

Again, since political contributions are compensating the government is no better (or worse) off.

We summarize the findings of this section in the following

Proposition 3. *Consider an economy with a fixed capital allocation. A comparison of the social optimum (denoted by $\widehat{\ }$), complete discretion (denoted by $\widetilde{\ }$), a tariff only agreement (denoted by the superscript T), and a tariff & subsidy agreement (superscript TS)* yields:

1. $\widehat{p}_x(k) < p_x^{TS}(k) < p_x^T(k) < \widetilde{p}_x(k)$,
2. $\widehat{\pi}(k) - \widehat{c}(k) < \pi^{TS}(k) - c^{TS}(k) < \pi^T(k) - c^T(k) < \widetilde{\pi}(k) - \widetilde{c}(k)$,
3. $\widehat{W}(k) > W^{TS}(k) > W^T(k)$; $\widehat{W}(k) > W^{TS}(k) > \widetilde{W}(k)$ *and*
4. $\widehat{G}(k) = G^{TS}(k) = G^T(k) = \widetilde{G}(k)$.

Proof. See appendix.

Proposition 3 establishes a first rationale for subsidy rules on welfare grounds. Political influence distorts policy away from the social optimum. A tariff only agreement leaves open the possibility that lobbies, constrained by limits on tariffs, will target the more costly policy alternatives (in this case production subsidies). A tariff-only agreement leads to policy substitution between tariffs and subsidies. Subsidy rules in a trade agreement can address this problem.

While this may be an intriguing result, the analysis abstracts from two important issues. First, in the short-run the government has no incentive to sign an agreement that limits its discretion (with or without subsidy rules), as contributions by the lobby compensate the government for any reduction in welfare. The question of why policy-makers value commitment is left unanswered. Second, in the long-run capital can move across sectors and is likely to respond to whether it can influence policy. As a result, the equilibrium capital allocation may be different from the one that maximizes the welfare of society. This distortion interacts in a complex way with the political economy considerations of this stage of the game. We turn our attention to these two questions in the next section.

4 The value of commitment

In this section we introduce a political economy rationale for signing a tariff & subsidy agreement. We turn our attention to the first stage of the game when capitalists decide in which sector to invest. This decision is made in anticipation of the policies described in the previous section. Intuitively, more capital will be allocated to the manufacturing sector if greater protection is expected. This is problematic for the government for two reasons. First, the misallocation of capital causes a reduction in aggregate welfare. Second, since lobbying occurs after capital has been allocated, the government receives no compensation for this misallocation. This interaction is at the root of the *trade policy credibility problem*. As shown in MRC, the government may want to sign a trade agreement to solve this problem and induce the efficient allocation of capital across sectors. In the absence of such an agreement, it cannot do so credibly because once capital is in place, the government benefits from contributions. Our model includes the MRC economy as a special case, where the government has only a tariff at its disposal and production depends only on capital (i.e. production cannot react to changes in policy). In the first subsection we take a closer look at the commitment role of trade agreements in a setting with multiple policy measures. In the second subsection, we show that a tariff-only agreement is not an effective commitment technology because of the policy substitution between tariffs and subsidies. The value of subsidy rules within trade agreements is that they restore (at least in part) trade policy credibility.

4.1 Investment decisions and the scope of commitment

The capital allocation decision plays a crucial role in understanding the scope for commitment. We want to derive the conditions under which the government is worse off when it has full discretion over policy. Since compensating contributions allow the government to achieve the same level of utility as in the social optimum *for a given allocation of capital*, then government utility comparisons can be achieved by contrasting the allocation of capital under different regimes.

Investors anticipate 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 $\overline{k}$, we have that $\overline{k} = k + k_n$. Recall that the per unit rate of return to capital in the numeraire sector is given by $\pi_n(k)$, with $\pi_n' > 0$. In the manufacturing sector, instead, the per unit, net return to capital takes the form $\pi(t, s, k) - c(t, s, k)$. We will consider the allocation of capital under various regimes, but recall that in all cases the level of protection is a function of the level of capital: $(t(k), s(k))$. To simplify notation, we will write $\pi(k) - c(k) \equiv \pi(t(k), s(k), k) - c(t(k), s(k), k)$ as in equations (15), (19), and (22).

First consider the allocation of capital in the absence of lobbying.[16] Investors choose the capital

[16] An equivalent interpretation is to imagine a government that could credibly commit to the socially optimal level of (zero) protection. The organized group would have no incentive to lobby and $c = 0$.

allocation anticipating the policies to be enacted. The return from investing in the manufacturing sector at this stage is, therefore, given by $\widehat{\pi}(k) \equiv \pi(0,0,k)$. Investors allocate capital across the two sectors up to the point where returns equalize. We define $\widehat{k}$ as the allocation of capital in the manufacturing sector implicitly determined by the following condition

$$\widehat{\pi}(\widehat{k}) = \pi_n(\widehat{k}), \tag{23}$$

where we emphasize that the returns in both sectors depend on the capital allocation. To ensure that these curves intersect only once, we assume that

$$\pi_n' - \widehat{\pi}' > \frac{\widehat{\pi}(0) - \pi_n(0)}{\overline{k}}$$

for all k. Figure 1 represents this allocation.

INSERT FIGURE 1 HERE

The top panel depicts net profits per unit of capital in the numeraire and the manufacturing sectors, while the bottom panel shows social welfare as a function of the amount of capital in manufacturing. Note that the top panel relies on the result from Lemma 1 that the socially optimal policy is to provide no protection regardless the capital allocation. Net profits per unit of capital are thus fixed at $\widehat{\pi}$. The bottom panel highlights the fact that the allocation chosen by capitalists coincides with the one that maximizes social welfare. In the absence of market failures and government intervention, the market allocation corresponds to the social optimum. This is important because we rely on the use of compensating contributions to pin down the government's utility ($G(k) = \widehat{W}(k)$).

More formally, we can define the level of aggregate welfare when the ex-post optimal policies are enacted as $\widehat{W}(k) \equiv W\left(\widehat{t}, \widehat{s}, k\right)$. Similarly, let $\widetilde{W}(k) \equiv W\left(\widetilde{t}(k), \widetilde{s}(k), k\right)$ denote the level of aggregate welfare when the equilibrium policies under discretion are in place. In order to establish the scope for commitment, we must show that the government can have greater utility when it can commit to implementing the socially optimal policy (call the resulting capital allocation $\widehat{k}$) than when it has full discretion (call the resulting capital allocation $\widetilde{k}$):

$$\widehat{G}(\widehat{k}) = \widehat{W}\left(\widehat{k}\right) > \widetilde{G}(\widetilde{k}) = \widetilde{W}\left(\widetilde{k}\right) + aC(\widetilde{k}) = \widehat{W}\left(\widetilde{k}\right),$$

where we recognize that equilibrium contributions also depend on the capital allocation and the final equality is a result of compensating contributions.

Now consider the allocation when the government has full discretion, as described in Section 3.2. Domestic producers in the manufacturing sector face the price $\widetilde{p}_x(k)$. In order to receive

this additional protection, the lobby must compensate the government for deviating away from the welfare-maximizing trade policy and the return from investing in the manufacturing sector is then given by (15) and depicted by the red schedule in the top panel of Figure 1.

The equilibrium allocation of capital in this activity ($\widetilde{k}$) is implicitly determined by

$$\widetilde{\pi}(\widetilde{k}) - \widetilde{c}(\widetilde{k}) = \pi_n(\widetilde{k}), \tag{24}$$

where the net profit per unit of capital in the numeraire intersect the return from investing in manufacturing under lobbying.

The extent of the scope for commitment is described in the following

Proposition 4. *Full discretion results in an over-allocation of capital to the manufacturing sector* $\left(\widetilde{k} > \widehat{k}\right)$. *The government is unambiguously worse off under full discretion* $\left(\widetilde{G}(\widetilde{k}) < \widehat{G}(\widehat{k})\right)$.

Proof. See appendix.[17]

The commitment value is most obvious here because the government has no incentive to provide protection to the manufacturing sector other than to elicit contributions. The welfare maximizing allocation coincides with the allocation of capital when the optimal policy is expected. To the contrary, we see from (24) that discretion induces capitalists to over-invest in the manufacturing sector and reduces government utility, as shown in Figure 1. The government would benefit from committing to any policy that provides a level of protection lower than the equilibrium protection under discretion and brings the capital allocation closer to its efficient level.

4.2 The commitment value of subsidy rules

Now consider the possibility that the politically-motivated government has an option, before investments are made, to sign a tariff-only or a tariff & subsidy agreement. What type of trade agreement will the policy-maker sign? We show that the government will prefer to commit to an agreement that regulates its domestic subsidy policy. Intuitively, the extent to which a policy credibility problem is mitigated depends on how strong a constraint the trade agreement places on the government's use of trade *and* domestic policy as a tool for redistributing income to the lobby. An agreement that constrains only the tariff level and imposes no rules on domestic subsidies is subject to the *policy substitution problem*. Capitalists anticipate that a tariff-only agreement allows them to influence the subsidy and, therefore, continue to over-invest in the manufacturing sector. An agreement that constrains both policy instruments protects against this.

[17] As in MRC, if we allow for the government to have some bargaining power this result would be tempered if the policymaker can claim a significant portion of the lobby's profits under discretion.

In a tariff-only agreement, the policies that the lobby anticipates are given by equations (16) and (17). In this case, the allocation of capital (denoted with k^T) is determined by

$$\pi^T(k^T) - c^T(k^T) = \pi_n(k^T). \tag{25}$$

For a tariff & subsidy agreement, the level of support is given by (20) and the the allocation of capital (denoted with k^{TS}) is determined by

$$\pi^{TS}(k^{TS}) - c^{TS}(k^{TS}) = \pi_n(k^{TS}). \tag{26}$$

It follows from Proposition 3 that for any given k net profits are lower under a tariff & subsidy agreement ($\pi^T(k) - c^T(k) > \pi^{TS}(k) - c^{TS}(k)$). As can be seen in Figure 2, this fact implies that the over-investment is lower in the latter case ($k^T > k^{TS}$). In particular, we have

$$\widetilde{k} > k^T > k^{TS} > \widehat{k}.$$

Furthermore, since government utility is greatest at $\widehat{k}$ and the tariff & subsidy agreement allows the government to get closer to this, it must be that

$$\widehat{W}\left(\widehat{k}\right) > \widehat{W}\left(k^{TS}\right) > \widehat{W}\left(k^T\right) \geq \widehat{W}\left(\widetilde{k}\right),$$

and by extension

$$\widehat{G}\left(\widehat{k}\right) > G^{TS}\left(k^{TS}\right) > G^T\left(k^T\right) \geq \widetilde{G}\left(\widetilde{k}\right).$$

This shows the following:

Proposition 5. *If capital is mobile in the long-run and investment decisions are irreversible in the short-run, government and social welfare are higher under a trade agreement that binds the tariff and the subsidy than under a trade agreement that binds the tariff only.*

When there is scope for commitment, 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. The important role of the policy substitution problem highlighted in Section 3 is evident here. An incomplete trade agreement is less efficient 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 distortion of investments, for which the government is not compensated. A tariff & subsidy agreement not only results in higher aggregate welfare, as previewed in Proposition 3, but it is also preferred by the policy maker.

INSERT FIGURE 2 HERE

5 Extensions

In this section we consider two extensions to the model. First, we look at the introduction of externalities in the manufacturing sector and later we discuss the role of exceptions in a trade agreement.

5.1 The role of externalities

A common justification for not constraining domestic production subsidies is that they are useful in addressing domestic externalities. We consider this issue by introducing a production externality in the model of the previous sections. The presence of this externality motivates government intervention in the economy. We assume that Dx is the social benefit of production in the manufacturing sector and that $D \geq 0$ captures the extent of the positive production externality. Aggregate welfare (1) is replaced with:

$$W(t,s,k) = 1 + t(y-x) - \lambda(sx+E) + \rho_n z + \pi_n(\overline{k}-k) + \pi(p_x)k + S + Dkp_x. \tag{27}$$

This alters the analysis in one important respect. The welfare-maximizing policies chosen in the final stage now depend on the long-run investment decision. We refer to these policies as *ex-post optimal*, precisely because they depend on the long-run investment decision that was made at the previous stage and that the government takes as given at the policy determination stage. These policies are described in the following Lemma.

Lemma 6. *In the presence of a domestic production externality, the optimal policy mix for a fixed capital allocation (i.e. the ex-post optimal policy mix) depends on the extent of the tax distortions (λ):*

$$\begin{aligned}
\text{For } \widehat{\lambda} &\equiv \frac{(1+k)(D+p^*)}{(1+k)(D+p^*)-D} \\
\text{If } \lambda &\geq \widehat{\lambda},\ \widehat{s}=0 \text{ and } \widehat{t} = \frac{Dk}{1+k} > 0; \\
\text{If } \lambda &< \widehat{\lambda},\ \widehat{s} = \frac{[1-(\lambda-1)\,k]\,D - (\lambda-1)(1+k)p^*}{(2\lambda-1)-k(\lambda-1)^2} > 0 \\
\text{and } \widehat{t} &= \frac{(\lambda-1)\,[D+\lambda p^*]\,k}{(2\lambda-1)-k(\lambda-1)^2} > 0.
\end{aligned}$$

If the government had access to non-distortionary taxes ($\lambda = 1$), the optimality conditions would imply $\widehat{t} = 0$ and $\widehat{s} = D$. This is the traditional result that the government does not intervene in the economy in the absence of market distortions, otherwise the policy maker only uses the non-distortionary policy tool (here, the subsidy) to address the production externality in

the manufacturing sector. In this case, the subsidy has the well-known property that its efficient level is equal to the marginal social benefit of domestic production. When taxation is distortionary ($\lambda > 1$), the government faces a trade-off between these policies. The extent of the trade-off is determined by the size of the externality relative to the cost of taxation. When the cost of raising the funds to provide a subsidy is high relative to the benefit from the externality, the policy-maker is better off using only the tariff in order to increase domestic output. Otherwise, the policy-maker will use both policy instruments.

When the production externality is positive, we have the traditional result that the market allocation and the social welfare maximizing allocation diverge. Let k^* denote the capital allocation that maximizes social welfare (i.e. $k^* = \arg\max_k \widehat{W}(k)$). This allocation is implicitly determined by

$$\widehat{\pi}(k^*) + (D - \widehat{t}(k^*) - \lambda \widehat{s}(k^*))\widehat{p}_x(k^*) = \pi_n(k^*). \tag{28}$$

Notice that this allocation is different from the one determined by the market according to (23). This adds to the policy analysis an element of time inconsistency. Specifically, the policy that induces the socially optimal allocation of capital (i.e. the ex ante optimal policy) is not the policy the government would choose once capital is allocated (i.e. the ex post optimal policy). In terms of the notation previously introduced, $\left(\widehat{t}, \widehat{s}\right)$ will not induce capitalists to allocate k^* to the manufacturing sector. In particular, since the externality is assumed to be positive the market will allocate too little capital to the manufacturing sector when it anticipates that the government will enact the ex post optimal policy ($\widehat{k} < k^*$). The larger is the externality, the more $\widehat{k}$ and k^* diverge.[18]

Now consider the policies enacted when political pressure is exerted by the manufacturing sector. The main results of section 3 do not change. When the government has full discretion, the lobby obtains more protection than is socially optimal. Maximizing joint utility (5) yields:

Lemma 7. *The equilibrium policy mix under discretion depends on the extent of the tax distortion (λ) and implies a higher level of protection relative to the ex post optimal policy mix:*

$$\begin{aligned}
\text{For } \widetilde{\lambda} &\equiv \frac{(1+k)(D+p^*)+ap^*}{(1+k)(D+p^*)-D} \\
\text{If } \lambda &\geq \widetilde{\lambda},\ \widetilde{s}=0 \text{ and } \widetilde{t} = \frac{(D+ap^*)\,k}{1+(1-a)\,k} \geq \widehat{t}; \\
\text{If } \lambda &< \widetilde{\lambda},\ \widetilde{s} = \frac{[1-(\lambda-1)\,k]\,D - [(\lambda-1)(1+k)-a]\,p^*}{(2\lambda-1-a)-k(\lambda-1)^2} \geq \widehat{s} \\
\text{and } \widetilde{t} &= \frac{(\lambda-1)\,[D+\lambda p^*]\,k}{(2\lambda-1-a)-k(\lambda-1)^2} \geq \widehat{t}.
\end{aligned}$$

[18] When there is no externality, as in sections 2-4, then the market allocation coincides with the social optimum ($\widehat{k} = k^*$).

Importantly, note that the equilibrium tariff and subsidy are at least as large as the ex-post optimal tariff and subsidy and, hence, the implied total level of protection is always greater. The extent of this political economy distortion, as discussed in Section 3, is affected by the parameters of the model.

5.2 The value of exceptions

Notwithstanding our more general setting, the MRC key result also applies to this framework in a rather straightforward way. If the government could commit to the ex-ante optimal policy mix (i.e. the policies that support the efficient investment in the manufacturing sector), the trade policy credibility problem would be solved. However, real-world trade agreements do not commit governments to a specific policy mix, but rather encompass a set of rules and exceptions. These rules generally commit the government to a policy mix that guarantees a maximum and binding level of protection below the equilibrium protection under discretion. Exceptions essentially leave certain sectors out of such broad-based commitments. In this section, we use our model to shed some light on the value of such rules and exceptions. We first study investment decisions and argue that there can be a trade-off between commitment and flexibility. Then, we show that when commitment improves social and government welfare, an efficient trade agreement requires rules on domestic subsidies in addition to tariff bindings.

In the presence of a domestic production externality, the design of trade agreements must now recognize that binding commitments (on tariffs and subsidies) imply a trade-off. Ex-ante, the government wants to induce investors to allocate capital to the sector with positive production externalities. But, as we have seen, ex-post the policy-maker takes capital allocation as given. For this reason, the optimal policy is not time consistent, which leads to under-investment in manufacturing in presence of production externalities. Lobbying by the manufacturing sector in the second stage of the game offsets this problem. Political pressures sustain high protection in manufacturing. Anticipating high returns, capital owners tend to invest more in the protected sector. In this context, a commitment to a level of protection below discretion may increase or decrease long-run (social and government) welfare depending on the importance of production externalities in the sector. To illustrate this point in a simple and intuitive way, we show this trade-off assuming that the binding level of commitment is the ex-post optimal policy mix in Lemma 1 (but the logic extends to any binding below the equilibrium policy under discretion for sufficiently high externalities).

For low levels of D the story is similar to section 4. The market allocation of capital in the absence of political distortions is close to the welfare maximizing allocation. Capitalists anticipate that they will have the ability to distort policy in their favour and allocate more capital to the manufacturing sector. This movement away from the market allocation is costly to the government,

because the market allocation in the absence of political distortions is close to the welfare maximizing allocation. If the government could commit to implementing the ex-post optimal policies it would receive the welfare gains of a "better" capital allocation. This gain would more than make up for the contributions the government gives up by eliminating its discretion.

In contrast, when the externality is large, the market allocation of capital can be far from the welfare maximizing allocation, as depicted in Figure 3. Since investors do not internalize the externality, there is a tendency to under-invest in the manufacturing sector, relative to the welfare maximizing allocation. When capitalists anticipate the ability to distort policy under discretion, they will allocate more capital to the manufacturing sector which will move the economy in the direction of the welfare maximizing allocation. Figure 3 depicts this case. The externality is large so that the marginal benefit to society from additional capital allocated to this sector (the line $\widehat{\pi} + (D - \widehat{t} - \lambda\widehat{s})\widehat{p}_x$) is greater than the benefit to the capitalist (the line $\widehat{\pi}$). When the government has full discretion to set policy, capitalists anticipate a higher benefit to allocating their capital in the manufacturing sector (depicted by $\widetilde{\pi} - \widetilde{c}$) and the government benefits from this "better" capital allocation, $\widehat{k} < \widetilde{k} < k^*$.

In this case, there is no *scope for commitment*. By committing to any agreement - whether tariff-only or tariff & subsidy - the government limits the amount of protection it can offer to the manufacturing sector and reduces the net profits capitalists can expect from that sector.[19] In terms of the previous notation, $\pi^T - c^T$ and $\pi^{TS} - c^{TS}$ (not pictured) would lie everywhere below $\widetilde{\pi} - \widetilde{c}$ and the allocation of capital that occurs when the government commits would be even lower than the (sub-optimal) allocation under full discretion.

INSERT FIGURE 3 HERE

The greater amount of capital that enters the manufacturing sector as a result of full discretion and lobbying actually brings the economy closer to the welfare maximizing allocation. The government in this case values the policy space granted to it by discretion and it has no incentive to commit to lower levels of protection. This justifies the presence of exceptions in trade agreements for sectors in which market failures are particularly strong.

6 Commitment and GATT/WTO rules on domestic subsidies

This section revisits the question of the efficient design of rules on domestic subsidies in the multilateral trading system in light of the commitment theory presented above.[20] The model analyzed

[19] The results of Proposition 3 comparing full discretion, tariff-only and tariff & subsidy agreements continue to hold in the setting with a production externality.

[20] For an introduction to GATT/WTO rules on subsidies refer to Sykes (2005) and WTO (2006).

in the previous sections highlights two main policy problems related to the treatment of domestic subsidies within trade agreements. First, there exists a *policy substitution* problem between tariffs and subsidies. If, through a trade agreement, a government commits only one instrument (the tariff) below its equilibrium level under discretion, the import-competing lobby will demand protection through the uncommitted measure (the subsidy). This policy substitution partially offsets the trade gains from tariff cuts. Second, there is a *policy credibility* problem. A trade agreement needs to distinguish between sectors with high and sectors with low external effects. In the latter, lobbying pressures by domestic producers lead to inefficiently high tariffs and subsidies. This political distortion induces excessive investment in the protected sector that lowers social (and government) welfare.[21] In sectors where externalities are large, under-investment results from the time inconsistency of government policy. For these sectors, the political distortion offsets the time consistency problem, possibly making discretion preferable to commitment. An efficiently designed trade agreement should provide a set of rules (and exceptions) that address these problems.

The GATT/WTO system regulates the use of subsidies. 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 duty. Clearly, injury does not apply to our model which focuses on a transfer to the 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. The SCM Agreement revolves around a so-called "traffic light" system. Some subsidies, such as export subsidies, are prohibited ("red light"). All other forms of domestic subsidization are actionable ("amber light") -that is, they are permitted, but can be challenged by affected trading partners. The regulation of actionable subsidies is further discussed below. Finally, the original SCM Agreement contained a "green light" category of subsidies that could not be challenged (e.g. subsidies to research activities, assistance to disadvantaged regions, green subsidies). This category offered an exception to subsidy commitments in certain pre-specified sectors, independently of their trade effects. The provision, however, expired in 2000 and has not since been renewed by WTO members.

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

[21] As discussed in previous sections, the two policy problems are related. Specifically, if the trade agreement does not solve the policy substitution problem, the government cannot credibly commit its policy.

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 trade 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" subsides are both within the scope of the agreement if they are found to create a certain level of trade distortion. Exceptions for specific sectors identified by the agreements were foreseen, but are not currently in place. Policy measures inconsistent with the rules may be challenged via the WTO dispute settlement mechanism. If the complaint is successful, WTO rules require the subsidizing government to remove the subsidy.

Do GATT/WTO subsidy rules address the policy problems identified in this paper? To answer this question, we need to represent the key features of these rules within the context of our model. We study first 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^{ni}, violates nullification or impairment (NI) rules if only if $y\left(\bar{t}, s^{ni}\right) - x\left(\bar{t}, s^{ni}\right) < y\left(\bar{t}, \widetilde{s}\right) - x\left(\bar{t}, \widetilde{s}\right)$, where $\bar{t}$ is the tariff commitment.*

Consider starting from an equilibrium under discretion and consider a tariff-only agreement that binds the tariff at level $\bar{t}$ and includes NI rules. Note 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 $s^{ni} > \widetilde{s}$ would violate the condition in the above definition. In other words, a trade agreement with NI rules effectively imposes a ban on "new" subsidies and solves the policy substitution problem.

The second question is whether NI rules eliminate the trade policy credibility problem. In this case, the political economy equilibrium supports over-investment in the protected sector. The

imposition of a tariff binding and NI rules improve over the equilibrium under discretion, as they lower the level of protection, but this set of rules does not necessarily eliminate the credibility problem. This is most clear in our baseline model (i.e. for $D = 0$). In this case, NI rules impose a ceiling on the subsidy at $\widetilde{s} > \widehat{s} = 0$ (where, recall, the latter is the efficient subsidy in a sector with no external effect). Even in the special case in which the tariff binding is set at its efficient level ($\overline{t} = \widehat{t} = 0$), the policy mix implies a sub-optimally high level of support to the manufacturing sector, which distorts investment decisions.

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. Differently put, if the problem that the agreement is trying to solve is one of policy credibility, binding tariffs and limiting "new" subsidies (as nullification or impairment rules do) would not go far enough. The question is whether the 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 and only if $y\left(t, s^{sp}\right) - x\left(t, s^{sp}\right) < y\left(t, 0\right) - x\left(t, 0\right)$, where $t = \left\{\overline{t}, \widetilde{t}\right\}$.*

In the model, any positive subsidy offered to the import-competing sector lowers imports and, hence, is susceptible to creating 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. Note also that in Article 6.3 there is no reference to the existence of a tariff commitment. 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.

Absent a tariff commitment, SP rules create a policy substitution problem. The effect of the removal of the subsidy is to push the lobby of domestic producers to demand support through higher tariff protection. The substitutability between subsidies and tariffs leads to an excessive use of the latter policy as the interest group would relocate its political pressures from the domestic to the border policy.[22] This finding is similar to the "chilling effect" on tariffs found in Bagwell and Staiger (2006). As the policy substitution problem is not solved, SP rules do not help the government to credibly commit its policy stance.

On the other hand, in case a tariff commitment is in place, SP rules may solve both the policy-substitution and credibility problems or, at least, improve over NI rules. This is the case for our baseline model where no relevant market failure exists ($D = 0$). In this situation, the efficient policy mix of free trade and no subsidy can be implemented by a combination of SP rules and a

[22] We saw this formally in Section 3 when we obtained condition (13).

tariff binding at $\bar{t} = 0$. To the contrary, if the manufacturing sector displays a sufficiently large external effect, discretion may be preferable to commitment, which would justify the existence of an exception (as initially envisaged in the SCM Agreement). The problem in this case is to properly identify the sectors that deserve an explicit exception and embed such loopholes in the multilateral trade system. 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 at the expense of society is not always a straightforward matter.

7 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 and taxation is distortionary. In this framework we establish several results. First, trade agreements that bind tariffs but leave complete government discretion on domestic subsidies create a policy substitution problem that partially offsets the trade and welfare effects of tariff cuts. Second, when a tariff commitment is undertaken, rules that limit the policy-maker's flexibility in setting subsidies reduce or eliminate this problem. Third, when the political process distorts the long-run allocation of resources, policy discretion creates a credibility problem. In sectors where positive externalities are low, the government prefers to commit to a tariff & subsidy agreement, while policy flexibility is valued in sectors with high externalities. Fourth, GATT/WTO rules on nullification or impairment solve the policy substitution problem, while serious prejudice rules efficiently solve the policy credibility problem when there is a tariff commitment and low domestic distortions -but exceptions are needed for sectors with important external effects.

An interesting policy question is what we can learn on the efficient design of rules on domestic subsidies from a joint look at 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

and exceptions are needed. 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 between the two theories. In the commitment theory, the government needs rules that bind the subsidy at its efficient level to eliminate its credibility problem. So, if such rules could easily be implemented (something that, we argued, is not 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 the context of the standard theory.

The model we presented here is based on some simplifying assumptions. First, we assumed 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 a simple observation. Trade agreements such as the WTO go indeed in the direction of imposing constraints to the use of non-tariff policies. This is consistent with the need to limit policy-substitution beyond tariffs and subsidies. How far should this process go? In the spirit of Horn, Maggi and Staiger (2010), the degree of incompleteness of the agreement will likely be the result of the trade off between the benefits of rules (here given by the credibility gain) and the transaction costs associated to an increasingly complex contract. Third, we limited ourselves to lobbying to influence day-to-day policy rather than to influence a trade agreement. This analysis would likely provide further insights on the actual design of WTO rules as organized groups anticipate how such rules will impact on their welfare. We leave this for future research.

References

[1] Bacchetta, M. and M. Ruta (eds.), 2011, *The WTO, Subsidies and Countervailing Measures*, Edward Elgar: Cheltenham, UK.

[2] Bagwell, K., 2008, Remedies in the WTO: An Economic Perspective, in Merit E. Janow, Victoria J. Donaldson and Alan Yanovich (eds.), *The WTO Governance, Dispute Settlement & Developing Countries*, Juris Publishing, Huntington, New York, Chapter 40, 733-770.

[3] Bagwell, K. and R.W. Staiger, 1999, An Economic Theory of GATT, *American Economic Review*, 89, 215-248.

[4] Bagwell, K. and R.W. Staiger, 2001a, Strategic Trade, Competitive Industries and Agricultural Trade Disputes, *Economics and Politics* 13, 1954-1985.

[5] Bagwell, K. and R. W. Staiger, 2001b, Domestic Policies, National Sovereignty and International Economic Institutions, *Quarterly Journal of Economics*, 116:2, 519-562.

[6] Bagwell, K. and R.W. Staiger, 2002, *The Economics of the World Trading System*, MIT Press, Cambridge.

[7] Bagwell, K. and R.W. Staiger, 2006, Will International Rules on Subsidies Disrupt the World Trading System?, *American Economic Review*, 96:3, 877-895.

[8] Bagwell, K. and R. W. Staiger, 2011, The Economics of Trade Agreements in the Linear Cournot Delocation Model, mimeo, Stanford University.

[9] Bhagwati, J. and V.K. Ramaswami, 1963, Domestic Distortions, Tariffs and the Theory of Optimum Subsidy, *Journal of Political Economy*, 71:1, 44-50.

[10] Brou, D. and M. Ruta, 2009, On the Political Substitutability between Tariffs and Subsidies, *Swiss Journal of Economics and Statistics*, 145:4, 403-408.

[11] Copeland, B., 1990, Strategic Interaction Among Nations: Negotiable and Non-negotiable Trade Barriers, *Canadian Journal of Economics*, 23, 84-108.

[12] Grossman, Gene M. and Elhanan Helpman, 1994, Protection for Sale, *American Economic Review*, 84:4, 833-850.

[13] Grossman and Helpman, 2001, *Special Interest Politics*, MIT Press, Cambridge.

[14] Horn, H., G. Maggi and R.W. Staiger, 2010, Trade Agreements as Endogenously Incomplete Contracts, *American Economic Review*, 100(1): 394–419.

[15] Johnson, H.G., 1965, Optimal Trade Intervention in the Presence of Domestic Distortions, in R.E. Caves, H.G. Johnson, and P.B. Kenen (eds.), *Trade Growth and the Balance of Payments*, North Holland Publishing.

[16] Korinek, A. and L. Serven, 2010, Undervaluation through Foreign Reserve Accumulation: Static Losses, Dynamic Gains, World Bank Policy Research Working Paper No. 5250.

[17] Leahy, D. and J.P. Neary, 2009, Multilateral Subsidy Games, *Economic Theory*, 41, 41-66.

[18] Limao, N. and P. Tovar, 2011, Policy Choice: Theory and Evidence from Commitment via International Trade Agreements, *Journal of International Economics*, 85(2), 186-205.

[19] Maggi, G. and A. Rodriguez-Clare, 1998, The Value of Trade Agreements in Presence of Political Pressures, *Journal of Political Economy*, 106:3, 574-601.

[20] Maggi, G. and A. Rodriguez-Clare, 2007, A Political-Economy Theory of Trade Agreements, *American Economic Review*, 97:4, 1374-1406.

[21] Maggi, G. and A. Rodriguez-Clare, 2012, Lobbying and the Theory of Trade Agreements, work in progress, Yale University.

[22] Matschke, X., 2008, Costly revenue-raising and the case for favoring import-competing industries, *Journal of International Economics*, 74, 143-157.

[23] Mrazova, M., 2011, Trade agreements when profits matter, mimeo, University of Surrey.

[24] Potipiti,T., 2006, Import Tariffs and Export Subsidies in the WTO: A Small Country Approach, mimeo, Chulalongkorn University

[25] Rodrik, D., 2010, Growth After the Crisis, in M. Spence and D. Leipziger, eds., *Globalization and Growth: Implications for a Post-Crisis World*, Commission on Growth and Development, Washington, DC.

[26] Sauré P., 2010, On Subsidies in Trade Agreements, mimeo, Swiss National Bank.

[27] Staiger, R.W. and G. Tabellini, 1987, Discretionary Trade Policy and Excessive Protection, *American Economic Review*, 77:5, 823-837.

[28] Staiger, R.W. and G. Tabellini, 1999, Do GATT Rules Help Governments Make Domestic Commitments?, *Economics and Politics*, 11(2):109-144.

[29] Sykes, A.O., 2005, The Economics of WTO Rules on Subsidies and Countervailing Measures, in P.F.J. McCrory, A.E. Appleton, and M.G. Plummer (eds.), *The World Trade Organization: Legal, Economic, and Political Analysis*, Vol. 2, Springer.

[30] Sykes, A.O., 2011, The Questionable Case for Subsidies Regulation: A Comparative Perspective, forthcoming, *Journal of Legal Analysis*.

[31] Tang, M.K. and S.J. Wei, 2009, The value of making commitments externally: Evidence from WTO accessions, *Journal of International Economics*, 78(2), 216-229.

[32] World Trade Organization, 2006, *Subsidies, Trade and the WTO*, World Trade Report 2006.

[33] World Trade Organization, 2012, *Trade and Public Policies*, World Trade Report 2012.

A Technical appendix

In this technical appendix, we provide proofs for the propositions.

A.1 Proofs of propositions

Proposition 3. *Consider an economy with a fixed capital allocation. A comparison of the social optimum (denoted by $\widehat{}$), complete discretion (denoted by $\widetilde{}$), a tariff only agreement (denoted by the superscript T), and a tariff & subsidy agreement (superscript TS)* yields:

1. $\widehat{p}_x(k) < p_x^{TS}(k) < p_x^T(k) < \widetilde{p}_x(k)$,
2. $\widehat{\pi}(k) - \widehat{c}(k) < \pi^{TS}(k) - c^{TS}(k) < \pi^T(k) - c^T(k) < \widetilde{\pi}(k) - \widetilde{c}(k)$,
3. $\widehat{W}(k) > W^T(k) > \widetilde{W}(k)$: $W^{TS}(k) > W^T(k) > \widetilde{W}(k)$ *and*
4. $\widehat{G}(k) = G^{TS}(k) = G^T(k) = \widetilde{G}(k)$.

Proof.

1. The first three inequalities follow directly from the derived values of $\left(\widehat{t}, \widehat{s}\right)$, $\left(t^{TS}, s^{TS}\right)$ and $\left(t^T, s^T\right)$. To see that $p_x^T(k) < \widetilde{p}_x(k)$, recall that there are two cases:

$$\begin{aligned}
\text{For } \lambda \quad &\leq \quad \widetilde{\lambda}\text{: } \widetilde{t} + \widetilde{s} = \widetilde{t} + \frac{[a-(\lambda-1)]\,p^* - (\lambda-a)\widetilde{t}}{2\lambda - 1 - a} = \frac{(\lambda-1)}{2\lambda-1-a}\widetilde{t} + s^T > s^T \\
\text{For } \lambda \quad &> \quad \widetilde{\lambda}\text{: } \widetilde{t} + \widetilde{s} = \frac{akp^*}{1+k-ak} > \frac{[a-(\lambda-1)]\,p^*}{2\lambda-1-a} = s^T
\end{aligned}$$

2. That $\pi^T(k) - c^T(k) < \widetilde{\pi}(k) - \widetilde{c}(k)$ follows from (15), (19) and the fact that $\widetilde{t} + \widetilde{s} > s^T$, while $\widetilde{s} < s^T$. To see that $\pi^{TS}(k) - c^{TS}(k) < \pi^T(k) - c^T(k)$, we first derive the condition for the tariff & subsidy agreement using (6), the welfare loss from this type of agreement is

$$\widehat{W}\,(k) - W^{TS}(k) = \frac{1}{2}\left[s^{TS}\,(2\lambda-1)\,ks^{TS} + 2(\lambda-1)kp^*s^{TS}\right].$$

Recognizing that $s^{TS} = \widetilde{s}$ and using (9), we have $(2\lambda-1)\,ks^{TS} = [a-(\lambda-1)]\,kp^* - (\lambda-a)k\widetilde{t} + aks^{TS}$ and thus

$$\pi^{TS}(k) - c^{TS}(k) = \widehat{\pi} + \frac{1}{2}\left[\frac{a-(\lambda-1)}{a}p^*s^{TS}\right] - \frac{\lambda-a}{a}\widetilde{t}s^{TS}.$$

The result follows from $\widetilde{s} < s^T$. Also note that $\widehat{\pi}(k) - \widehat{c}(k) = \widehat{\pi}$ for all k.

3. Equations (14), (18) and (21) establish that $\widehat{W}$ is greater than $\widetilde{W}$, W^T and W^{TS}, respectively. To see that $W^{TS}(k) > W^T(k)$, note that (6) and $s^T > s^{TS}$ imply that $\widehat{W}(k) - W^{TS}(k) < \widehat{W}(k) - W^T(k)$. Similarly, (6) together with $\widetilde{t} > t^{TS}$ and $\widetilde{s} > s^{TS}$ imply that $\widehat{W}(k) - W^{TS}(k) < \widehat{W}(k) - \widetilde{W}(k)$. Notice, however, that

$$W^T(k) - \widetilde{W}(k) = \frac{ak}{2}\left[\left(\widetilde{t}+\widetilde{s}\right)\widetilde{p}_x - \left(t^T + s^T\right)p_x^T\right] - (\lambda-1)\,k(s^T - \widetilde{s})p^*$$

is ambiguous in sign.

4. The equality follows from the assumption of compensating contributions, such that $G(t, s, k) = \widehat{W}(k)$ for all (t, s).

Proposition 4. *Full discretion results in an over-allocation of capital to the manufacturing sector* $\left(\widetilde{k} > \widehat{k}\right)$. *The government is unambiguously worse off under full discretion* $\left(\widetilde{G}(\widetilde{k}) < \widehat{G}(\widehat{k})\right)$.

Proof. From Proposition 3, we have that $\widetilde{\pi}(k) - \widetilde{c}(k) > \widehat{\pi}$ for all k. Since $\pi'_n > 0$, this is sufficient to ensure that $\widetilde{k} > \widehat{k}$. The second part of the proposition follows directly from the fact that $\widehat{k} = \arg\max_k \widehat{W}(k)$ and that compensating contributions ensure that $\widetilde{G}(k) = G(\widetilde{t}, \widetilde{s}, k) = \widehat{W}(k)$.

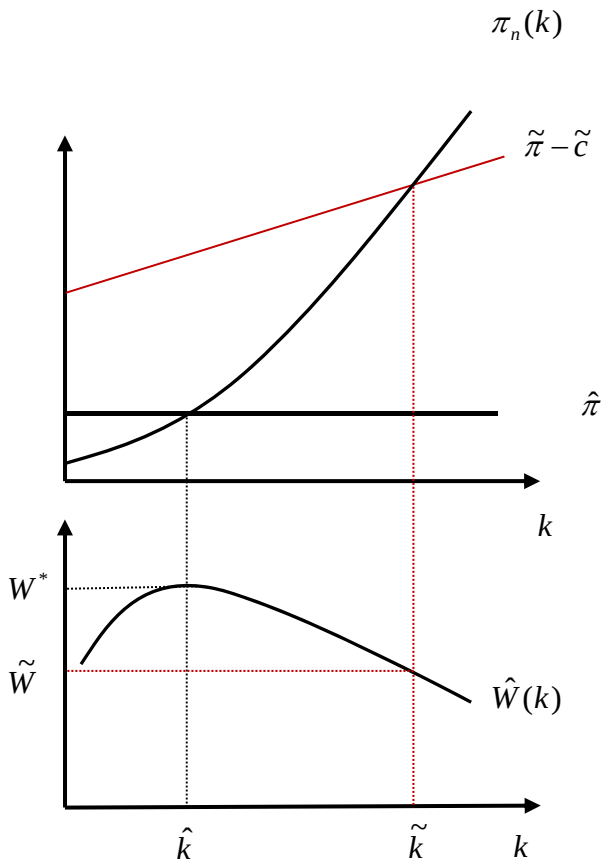

Figure 1: Full discretion versus no lobbying

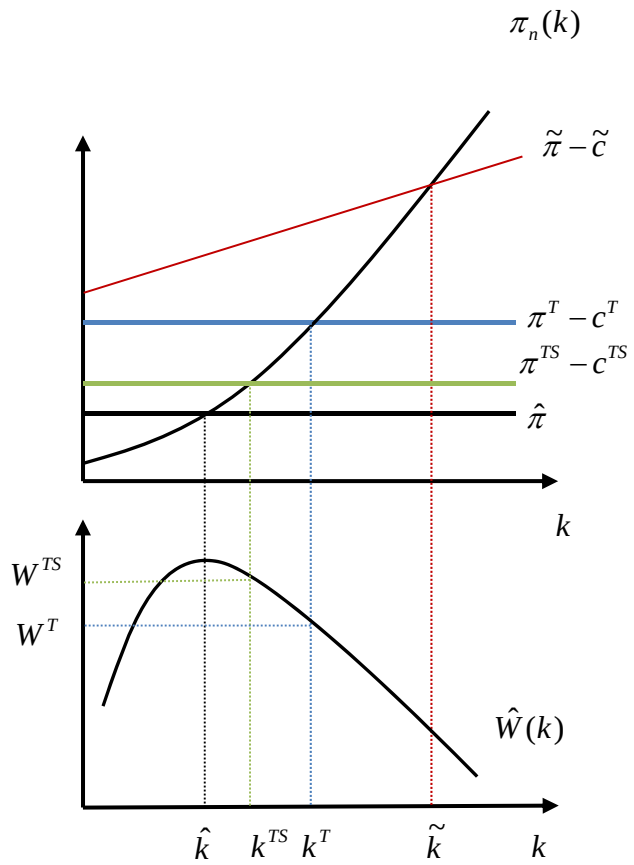

Figure 2: Capital allocations and welfare

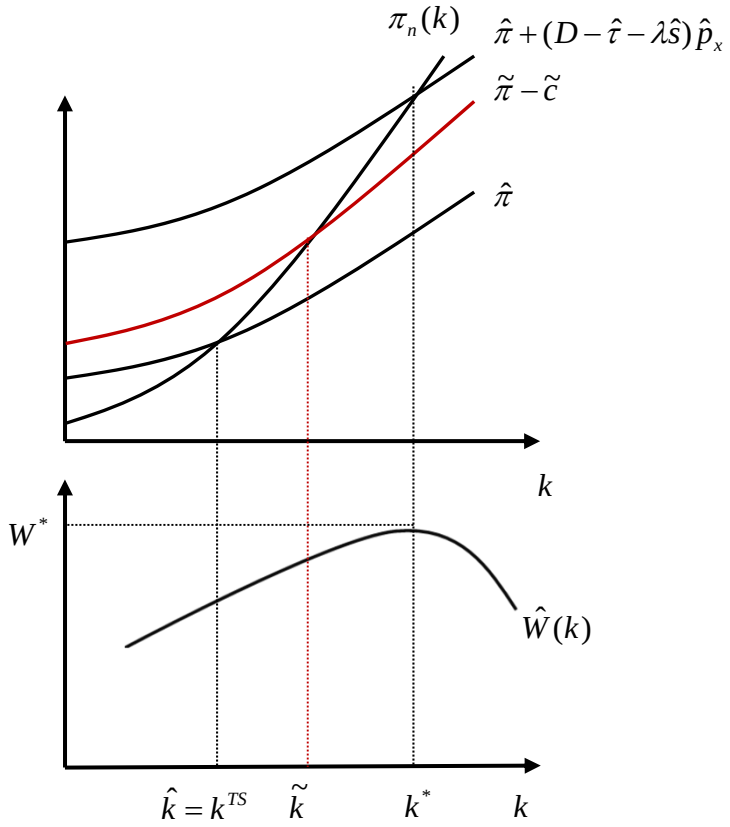

Figure 3: Capital allocations with large externality