NBER WORKING PAPER SERIES

IMPORT PENETRATION AND THE POLITICS OF TRADE PROTECTION

Giovanni Maggi
Andrés Rodríguez-Clare

Working Paper 6711
http://www.nber.org/papers/w6711

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
August 1998

We thank Avinash Dixit, Penny Goldberg, Gene Grossman, Dani Rodrik, Bob and Rob Feenstra for very useful comments. During part of this project Giovanni Maggi was visiting the Economics Department at NYU, which he thanks for the hospitality. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

Import Penetration and the Politics
of Trade Protection
Giovanni Maggi and Andrés Rodríguez-Clare
NBER Working Paper No. 6711
August 1998
JEL No. F13, D72

ABSTRACT

In this paper we reconsider a key empirical prediction generated by an important class of political-economy models of trade policy, namely that trade protection should be higher in sectors characterized by lower import penetration (we call this the "standard" prediction). The existing empirical evidence offers little support for this prediction. In this paper we argue that the standard prediction depends critically on the assumptions that trade taxes are the only policy instruments and that the government has access to non-distortionary taxation. We analyze a model in which the government can use quotas and VERs in addition to trade taxes and raising public funds may be costly. Under a simple sufficient condition, our model predicts that the protection level increases with import penetration, both in sectors that are protected with tariffs and in sectors that are protected with quantitative restrictions.

Giovanni Maggi
Department of Economics
Princeton University
Princeton, NJ 08544
and NBER
maggi@princeton.edu

Andrés Rodríguez-Clare
Graduate School of Business
University of Chicago
1101 East 58th Street
Chicago, IL 606373

1. Introduction

The main purpose of this paper is to reconsider an empirical prediction generated by an important class of political-economy models of trade policy. We will use the label "Standard Short-run Political Economy" (SSPE) model to indicate a model in which (i) some factors of production are "stuck" in their sectors (specific factors), and (ii) the government maximizes an objective that diverges from social welfare by attaching some extra weight to producer surplus, in some or all sectors. One of the predictions of the SSPE model is that, other things equal, trade protection should be higher in sectors characterized by a lower level of import penetration. This empirical prediction is the focus of our paper. We will refer to this as the "standard" prediction.

A prominent example of an SSPE model is Grossman and Helpman (1994), which starts from the more primitive assumption that the government maximizes a combination of welfare and contributions from industrial lobbies, and shows that trade policy is ultimately chosen to maximize an objective as in point (ii). Another example is Baldwin (1987). In this model the government maximizes the number of votes, which is influenced by lobbying expenditures (such as campaign contributions), and producers maximize profits minus lobbying expenditures. Baldwin shows that in this case the equilibrium tariff maximizes an objective as in point (ii).[1] Furthermore, Helpman (1995) shows that a number of recent political economy models — including Findlay and Wellisz (1982), Hillman (1982) and Mayer (1994) — give rise to the standard prediction, if they are developed in a specific-factor framework.

The existing evidence on the relationship between trade protection and import penetration is mixed, but it is safe to say that it casts some doubt on the validity of the standard prediction. Several studies (for example, Anderson, 1980, Finger and Harrison, 1994, Lee and Swagel, 1996) find that protection tends to be higher in sectors with higher import penetration. Trefler (1993) finds that the impact of the level of import penetration on trade protection is not significant. Goldberg and Maggi (1996), in testing the implications of Grossman-Helpman's (1994) model, find that the impact of import penetration on trade protection within the group of politically organized sectors is negative but not statistically significant.[2]

[1] Baldwin phrases the model in a partial-equilibrium framework, but this can be reformulated in general-equilibrium terms, provided some factors are sector-specific. Baldwin's approach is adopted also in subsequent theoretical work, for example Bagwell and Staiger (1995).

[2] One might think that a reason for the divergence between the standard prediction and the

An even more problematic implication of the standard prediction, as pointed out by Levy (1995), is that political pressures would tend to encourage trade *expansion*.[3] This is because, according to the SSPE model, protection tends to be larger in exporting sectors, making export subsidies larger than import tariffs. As a result, political-economy forces tend to promote trade. This prediction seems rather counter-factual.

In this paper we argue that the standard prediction depends crucially on two assumptions of the SSPE model: (i) that trade taxes are the only policy instruments, and (ii) that the government has access to non-distortionary taxation. To consider this issue formally, we extend the SSPE model in two ways. First, we allow the government to use quantitative restrictions (quotas and VERs) in addition to trade taxes. Second, we allow for the possibility that raising public funds may be costly (for example because this must be done through distortionary taxation).

Why would the government want to use quotas or VERs rather than tariffs to protect a particular sector? Our approach here is to extend the standard analysis, which typically focuses on political influence by domestic producers, to consider also political influence by foreign exporters and domestic importers.

First, we allow the domestic government to place some weight on the rents that accrue to foreigners. This can be interpreted in two ways. A more direct interpretation is that foreign exporters may be able to offer contributions to the domestic government. This idea is in line with some of the literature on VERs, such as Hillman and Ursprung (1988).[4] An alternative, broader interpretation is that the domestic government attaches some importance to gaining the support (or limiting the opposition) of the foreign government(s) when imposing trade restrictions; leaving the rents to foreigners could serve this function.[5]

---

studies that find positively correlation between trade protection and import penetration is that trade protection is influenced by dynamic factors that are absent from the SSPE model, and in particular that declining sectors are generally granted more protection, and these tend to have higher import-penetration levels. However, these studies typically control for measures of sectoral decline or growth (for example, Trefler controls for the change in import penetration; Lee and Swagel control for the change in sectoral wages): thus, even within the set of sectors that have experienced no decline, the relationship predicted by the SSPE model does not seem to find much support.

[3]Levy focuses on the Grossman-Helpman (1994) model, but his point is valid essentially for the whole class of SSPE models.

[4]This view is supported by some empirical evidence. Husted (1986) provides a comprehensive account of foreign lobbying expenditures.

[5]These are by no means the only possible motivations for the use of VERs. Later in the introduction we will briefly mention alternative explanations of VERs that have been proposed

Second, we model importers as an interest group distinct from that of producers. This feature of the model, which to our knowledge is novel in the literature, captures the fact that the economic interests and the political strength of importers may not coincide with those of producers. For example, the group of importers benefits from an import quota (if the licenses are given to them for free), but not from a tariff. Distinguishing between the lobby of importers and that of producers is particularly important in sectors where there is no domestic production, hence there is no producers' lobby. In this situation, the SSPE models would predict no trade protection; in our model, on the other hand, if importers are organized the government will impose a quota.[6] At the same time, we should emphasize that the model allows for the case in which importers and producers are the same agents;[7] as we will point out shortly, this case is particularly interesting for the cross-sectoral predictions of our model.

By considering the political influence of producers, importers and foreign exporters, our model determines in a very simple way the choice between tariffs, quotas and VERs. We show that the choice of instrument in a given sector depends on which of the following three parameters is highest: (1) the political influence of *importers* (not that of producers), (2) the weight attached to foreign exporters, and (3) the cost of public funds. If the first one is the highest, a quota is selected; if the second one, a VER is granted; if the third one, a tariff is levied. Note that the political influence of domestic producers in itself has no role in determining the mode of import protection.

Coming to the cross-sectoral pattern of protection, we examine how the protection level depends on industry size and import penetration. In general, the impact of these variables on the level of protection can be positive or negative, depending on the parameters. However, we have a strong result on the impact of import penetration for the case in which the government attaches a similar weight to the group of importers and to the group of producers: in this case, the level of protection increases with import penetration, both in sectors that are protected with tariffs and in sectors that are protected with quantitative restrictions. The sufficient condition under which this result holds is satisfied for

in the literature.

[6] An example of this situation is given by the banana sector in the EU: banana imports in the EU are currently restricted by quotas, a policy whose main beneficiaries have been European importers. Borrell and Yang (1992) estimate that, for each dollar the policy costs to EU consumers, EU importers gain $ .42.

[7] One example of this situation is represented by the U.S. dairy quotas. In this case, U.S. producers are the holders of the quota licenses. See Feenstra (1992).

example if producers and importers are the same agents. We also show that, if political-influence parameters are endogenized along Grossman-Helpman (1994) lines, the sufficient condition is satisfied if ownership is very concentrated both in the importing business and in the production activity.

In sum, we view our contribution as two-fold. First, we show that, if the SSPE model is extended to allow for quantitative restrictions, its predictions on the cross-sectoral pattern of protection may change dramatically, and in a way that seems more in line with the existing evidence. Second, our model contributes to the literature on the endogenous determination of trade policy instruments, providing interesting predictions on the emergence of tariffs, quotas or VERs in each sector.

In the existing literature, there are several papers that examine the choice of trade instruments in the presence of political pressures, but none (that we are aware of) addressing the cross-sectional relationship between trade protection and import penetration. Hillman and Ursprung (1988) examine the choice between tariffs and VERs in a political-economy setting. They consider two political candidates who choose trade policies in the anticipation of campaign contributions from foreign and domestic firms, and these firms compete in a Cournot fashion. In their model, a VER is always preferred to a tariff, but this is a consequence of their assumption that candidates put no weight on tariff revenues. In a similar context, Rosendorff (1996) shows that even with no contributions from foreign exporters the government may prefer a VER to a tariff; this happens if the government places enough extra weight on the profits of domestic producers. Notice however that his conclusion would change if quotas were allowed, for in this case a quota would be preferred to a VER. Feenstra and Lewis (1991) argue that VERs may have desirable incentive-compatibility properties, in situations where two governments negotiate over trade restrictions, and the domestic government has an incentive to overstate the extent of domestic political pressures: by requiring that rents be given to foreigners, a VER induces the domestic government to restrict trade only when political pressures are truly high.[8]

The structure of the paper is as follows. In section 2 we present a model in which the government has access to tariffs and quotas. In Section 3 we extend the model to allow for VERs, and endogenize the political-influence parameters. Section 4 offers some conclusive comments.

[8] Other papers that examine the choice between tariffs and quantitative restrictions under political pressures include Cassing and Hillman (1985), Mayer and Riezman (1987) and Rosendorff (1996).

2. The model

Consider a small country that can produce $n+1$ goods. Let good 0 be the numeraire. The population consists of a continuum of identical agents, each of whom is endowed with a unit of labor. The size of the population is normalized to one. The numeraire good is produced one-for-one from labor, so that the wage is equal to one. Each of the other goods is produced with a sector-specific factor and labor, which is perfectly mobile. The international price of good j is denoted by p_j^*.

For expositional purposes, we first consider trade taxes and import quotas, then in the next section we introduce VERs as well. Trade policies create a wedge between the domestic price of good j, which we denote p_j, and the world price. If there is no binding quota on imports of good j, then $p_j = p_j^* + \tau_j$, where τ_j represents a (specific) tariff if the good is imported, and an export subsidy if the good is exported. If there is a binding quota on imports of good j, then $p_j > p_j^* + \tau_j$, and $p_j - p_j^* - \tau_j$ represents the tariff equivalent of the quota. We do not allow for import subsidies or export restrictions; the reason for these assumptions will be explained later in this section.

Preferences are given by

$$U = q_0 + \sum_{j=1}^{n} u_j(q_j)$$

where q_j is the quantity consumed of good j and u_j is a concave function. With this utility function, the demand for good j is only a function of p_j, $d_j(p_j)$, and $\hat{s}_j(p_j) = u_j(d_j(p_j)) - p_j d_j(p_j)$ is the consumer surplus for good j.

The total returns to the specific factor in sector j also depend only on p_j: $\pi_j = \pi_j(p_j)$. The supply function of good j is given by the derivative of the profit function: $y_j(p_j) = \pi_j'(p_j)$.

We assume that quota licenses are given to importers for free. This is without loss of generality within this model, since the government could always impose a tariff to replicate the effects of auctioning off the quota licenses.[9] We think

[9] We abstract here from issues of rent-seeking activities, that can arise for example if individual importers engage in wasteful activities in the attempt to increase their share of quota rights. Assuming away rent seeking inside a lobby is a limitation of the model, but is consistent with the assumption – standard in this literature – that lobbies are somehow able to solve free-rider problems among its members. One way for a lobby to prevent internal rent seeking would be to ask the government to allocate licenses according to some fixed scheme (the simplest one being an even lump-sum distribution).

of importers in sector j as a group of people who own a specific factor that is necessary to trade good j internationally. Owning this specific factor enables an individual to conduct the trading and marketing activity, without further costs. Thus importers get no rents in the absence of quotas, and have nothing to gain from a tariff. They do earn rents, however, if the government imposes a binding quota and gives them quota licenses for free. The assumption that the importing business requires a specific factor that only some people own allows us to think about importers as a distinct interest group, whose feelings about trade policies may not coincide with those of the group of producers. Any form of capital that is invested in the importing and marketing activity in a given sector, and "stuck" there for the short run, can be thought of as a specific factor.

For a sector j with positive imports, quota rents are:

$$Q_j \equiv (p_j - p_j^* - \tau_j)[d_j(p_j) - y_j(p_j)]$$

For an exporting sector, quota rents are zero ($Q_j = 0$), since we do not allow for export restrictions. Tariff revenue is given by:

$$R_j \equiv \tau_j \left[d_j(p_j) - y_j(p_j)\right]$$

The government's objective is taken to be a weighted sum of consumers' surplus, producers' surplus, rents to importers and revenue from trade policy (positive or negative):

$$\Omega = \sum_{j=1}^{n} \left[\hat{s}_j(p_j) + \gamma_j \pi_j(p_j) + \gamma_j^R Q_j + \lambda R_j\right] \tag{2.1}$$

where $\gamma_j \geq 1$, $\gamma_j^R \geq 1$ and $\lambda \geq 0$. We will generally think of λ as being at least equal to one, but we do not need to impose this restriction, as our results hold also if $\lambda < 1$. If $\gamma_j = \gamma_j^R = \lambda = 1$ then the government's objective function is the standard social welfare function, in which case the government would choose free trade. If $\gamma_j > 1$, the government values a dollar of rents to owners of specific factor j by more than a dollar of consumer surplus. This is in line with the political economy models mentioned in the introduction, in particular Baldwin (1987) and Grossman and Helpman (1994). Similarly, if $\gamma_j^R > 1$ the government attaches some extra weight to the rents obtained by importers; γ_j^R can thus be interpreted as capturing the political strength of importers in sector j. Below we will explain how these political weights can be endogenized if one specifies an explicit lobbying game *a' la* Grossman-Helpman.

The parameter λ reflects the importance of revenue considerations in the government's objective. A case of particular interest, we believe, is the one in which $\lambda > 1$. This case is the relevant one, for example, if public funds must be raised through distortionary taxation: in this case, a dollar spent on export subsidies will have a social cost higher than one, and a dollar of tariff revenue will have a social value higher than one, because it allows the government to reduce other forms of distortionary taxation.[10] Also, a value of λ higher than one could capture broadly the political cost of increasing taxation, which seems to be an important concern for many governments in reality. The reason we emphasize the case $\lambda > 1$ even though we do not impose this restriction on the model is that, if $\lambda < 1$, the model predicts that only quantitative restrictions will be used whereas, if $\lambda > 1$, it yields the more appealing prediction that, if the distribution of the political-influence parameters is spread enough across sectors, some of them will be protected by tariffs and others by quantitative restrictions.[11]

To determine the government's choice of policy, the first step is to show that, in a given importing sector, the government grants protection with a tariff or a quota, not both. A heuristic argument will suffice here. Suppose there is a binding quota in sector j, so that $p_j > p_j^* + \tau_j$, and consider a small increase in the tariff. All a tariff does in this case is divert into the government's coffers some rents that would otherwise go to the group of importers. If $\gamma_j^R < \lambda$ then the government values revenue more than rents to importers, so it has an incentive to increase the tariff as long as $p_j > p_j^* + \tau_j$. This implies that if $\gamma_j^R < \lambda$ protection is granted in the form of a tariff; quotas are not used in this case. If $\gamma_j^R > \lambda$, on the other hand, the government values importers rents by more than tariff revenue, so it will lower the tariff all the way to zero; in this case only a quota is used. To rephrase this discussion, quotas are politically more efficient than tariffs when the cost of taxation is low relative to the political strength of importers, and tariffs

[10] One could endogenize λ within a richer model in which the government finances public expenditures with income taxation, and income taxation distorts the individuals' allocation of time between work and leisure. We worked out a special case in which the government finances a given amount of public expenditures by taxing only labor income. Here, λ is interpreted as the Lagrange multiplier of the government's constrained maximation problem. We find that, if the elasticity of labor supply to the tax rate (ε^L) is constant, the equilibrium level of λ is given by $\frac{1}{1+\varepsilon^L}$. In this example, then, treating λ as endogenous or exogenous makes no difference. This is a special case, but we believe that even in more general settings the results of the model would not get upset if λ were endogenized.

[11] As Rodrik (1995) points out, revenue considerations have historically been an important motive for the use of tariffs, and are still often put forward as a reason for less developed countries to maintain some tariff protection.

are politically more efficient in the opposite case.[12]

This is the right juncture to discuss our assumptions of no export restrictions or import subsidies. In this small-country setting, assuming away export restrictions is not a great loss of generality. An export restriction would have two effects: depressing the domestic price of the good and creating rents. It is direct to verify that its net effect would be negative, i.e. it would reduce the sum of profits and rents. In this setting there would be scope for export restrictions only if domestic exporters were a distinct interest group, and if they were politically much stronger than domestic producers, a possibility that seems unlikely in reality. We chose to keep the model simple and abstract from this possibility. The assumption of no import subsidies is less innocuous. If the government could, it would grant an import subsidy together with an import quota, since in this way it could effectively transfer resources "lump sum" to importers. To avoid this pathological result we impose $\tau_j \geq 0$. This ad-hoc restriction is of course a limit of this model, but it is in the same spirit of the assumption made in practically all political-economy models of trade policy, that the government cannot use targeted lump-sum transfers. A related limitation of the model is that we do not consider domestic policy instruments such as production subsidies or consumption taxes, but again, we share this limitation with most of the existing literature.

We now turn to the determination of the equilibrium levels of tariffs and quotas. Consider first sectors in which $\gamma_j^R < \lambda$. Since quotas are not used, then $Q_j = 0$ for all j. In this case the government chooses p_j to maximize:

$$\Omega_j = \gamma_j \pi_j(p_j) + \hat{s}_j(p_j) + \lambda(p_j - p_j^*)[d_j(p_j) - y_j(p_j)] \tag{2.2}$$

Differentiating this expression with respect to p_j yields the first order condition

$$\frac{\partial \Omega_j}{\partial p_j} = \gamma_j y_j - d_j + \lambda \left[(d_j - y_j) + (p_j - p_j^*)(d_j' - y_j')\right] = 0$$

Rearranging, we get that the equilibrium tariff in sector j satisfies:

$$\tau_j = \frac{(\gamma_j - \lambda)y_j + (\lambda - 1)d_j}{\lambda(y_j' - d_j')} \tag{2.3}$$

[12]The fact that the government will use either a tariff or a quota, not both, depends on the quasi-linearity of the government's objective function. With more general nonlinear objectives, one could obtain that both trade instruments are used in the same industry. In particular, this might be the case if the importers' rents and/or tariff revenues enter the government's objective in a concave way. Even in this case, however, our qualitative results are unlikely to be overturned.

We assume that expression 2.2 is concave in p_j, so that the second-order condition is satisfied. A sufficient condition is that the demand and supply curves are linear, and γ_j is not too large.

Now consider the case $\gamma_j^R > \lambda$. For exporting sectors the government uses only export subsidies, and the equilibrium export subsidy satisfies 2.3. For importing sectors the government gives protection through quotas. To find the equilibrium quota, we can set $R_j = 0$ and $Q_j = (p_j - p_j^*)[d_j(p_j) - y_j(p_j)]$ in (2.1). The government's objective is thus identical to (2.2) except that now λ is replaced by γ_j^R, since what used to be government revenues in the case of a tariff become importers' rents in the case of a quota. The tariff equivalent of the quota is then given by:

$$p_j - p_j^* = \frac{(\gamma_j - \gamma_j^R)y_j + (\gamma_j^R - 1)d_j}{\gamma_j^R(y_j' - d_j')} \tag{2.4}$$

These results are summarized in the following proposition:

Proposition 1. *Suppose in sector j there are positive imports in equilibrium. Then: (i) if $\gamma_j^R < \lambda$, this sector is protected with a tariff, which satisfies (2.3); (ii) if $\gamma_j^R > \lambda$, it is protected with a quota. The tariff equivalent of the quota satisfies (2.4). Exporting sectors receive export subsidies (or taxes) satisfying (2.3).*

We now discuss this proposition, focusing on the impact of the industry size (y_j) on the level of protection; later on we will draw the implications of the model for the impact of import penetration on the level of protection. Consider first part (i) of Proposition 1, which refers to importing sectors where $\gamma_j^R < \lambda$ (an analogous argument applies for exporting sectors[13]). In these sectors, the impact of industry size on protection depends on the cost of taxation λ relative to the political strength of the industry. In the benchmark case of costless taxation, $\lambda = 1$, we have $\tau_j = \frac{(\gamma_j - 1)y_j}{y_j' - d_j'}$: other things equal, tariffs are higher in bigger sectors. On the other hand, if taxation is costly, this prediction can get reversed; in particular, protection decreases with industry size if and only if $\gamma_j < \lambda$.

[13] As stated in Proposition 1, exporting sectors may receive an export subsidy or an export tax. The latter possibility arises when λ is sufficiently high. In particular, it is easy to show that for λ below the critical level $1 + (\gamma_j - 1)\left(\frac{y_j}{y_j - d_j}\right)$ (which is higher than γ_j) the government gives an export subsidy, and for λ above this critical level, it imposes an export tax. The reason why the government may give an export subsidy even when $\lambda > \gamma_j$ is that the government only pays for part of the cost of protection to exporters, the rest being paid by domestic consumers.

To get intuition, let us consider the gain to the government from imposing a small tariff, starting from free trade, in two sectors that differ in size but where producers have the same political influence ($\gamma_l = \gamma_k$) and demand is the same ($d_l = d_k$). A small tariff has a second-order effect on welfare ($\pi_j + \hat{s}_j + R_j$), so we only need to look at its impact on the "political" component $(\gamma_j - 1)\pi_j$ and on the cost-of-taxation component $(\lambda - 1)R_j$. A small tariff implies a political gain of $(\gamma_j - 1)y_j$ and a revenue gain of $(\lambda - 1)(d_j - y_j)$. The political gain of a small tariff is thus higher in the larger sector, but the revenue gain is higher in the *smaller* sector, because (demands being equal) imports are larger in the smaller sector. It is then intuitive that the government has a stronger incentive to protect the smaller sector if and only if its valuation of one dollar in the public coffers exceeds its valuation of a dollar in the producers' pockets ($\gamma_j < \lambda$).

Let us now focus on part (ii) of Proposition 1, which refers to importing sectors where $\gamma_j^R > \lambda$. As can be seen from equation 2.4, when protection is granted in the form of quotas the impact of sector size on the level of protection depends on the comparison between γ_j and γ_j^R. In particular, protection is increasing, decreasing or independent of industry size according to whether the political influence of producers is higher, lower or equal to that of importers.

To gain intuition about this result, consider again two sectors where producers have the same political influence ($\gamma_l = \gamma_k$) and demand is the same ($d_l = d_k$), and suppose they differ in size. Recalling that a quota has the same effects as a tariff except that its revenues accrue to importers rather than to the government, a small quota causes a second-order welfare loss, which we can ignore, and two first-order political benefits for the government: an increase in rents to producers and an increase in rents to importers. The political benefit on the producers' side is higher in the larger sector, but the political benefit on the importers' side is higher in the smaller sector, because (holding demands equal) imports are larger in the smaller sector. Thus the government has a stronger incentive to protect the smaller sector if and only if its valuation of one dollar in the importers' pockets exceeds its valuation of a dollar in the producers' pockets.

Next we focus on the predictions of our model about the impact of import penetration on the level of protection. These predictions are clearest for the case of constant-elasticity supply and demand functions. In the standard model, where tariffs are the only instrument and $\lambda = 1$, tariffs satisfy:

$$\frac{\tau_j}{p_j} = \frac{(\gamma_j - 1)z_j}{z_j(e_j^s + e_j^d) + e_j^d} \tag{2.5}$$

where $z_j \equiv y_j/(d_j - y_j)$ (i.e., the inverse import-penetration ratio), $\frac{\tau_j}{p_j}$ represents the ad-valorem tariff and $e_j^d \equiv -d_j' p_j/d_j$ and $e_j^s \equiv y_j' p_j/y_j$ are the demand and supply elasticities, respectively. The standard model predicts that, all else equal, the rate of protection is increasing in z_j (i.e., decreasing with the import-penetration ratio).

Coming to the predictions of our model, let us focus separately on tariff-protected and quota-protected sectors. In sectors where $\gamma_j^R < \lambda$, the equilibrium tariff can be expressed as follows:

$$\frac{p_j - p_j^*}{p_j} = \frac{\tau_j}{p_j} = \frac{(\gamma_j - 1)z_j + \lambda - 1}{\lambda[z_j(e_j^s + e_j^d) + e_j^d]} \tag{2.6}$$

This expression can be shown to be decreasing in z_j if and only if $\lambda > \frac{e_j^s + \gamma_j e_j^d}{e_j^s + e_j^d}$ (note that a sufficient condition for this is $\lambda \geq \gamma_j$). Next consider sectors where $\gamma_j^R > \lambda$. Here, the equilibrium (tariff equivalent of the) quota satisfies:

$$\frac{p_j - p_j^*}{p_j} = \frac{(\gamma_j - 1)z_j + \gamma_j^R - 1}{\gamma_j^R[z_j(e_j^s + e_j^d) + e_j^d]}$$

This expression is decreasing in z_j if and only if $\gamma_j < \frac{\gamma_j^R(e_j^s + e_j^d) - e_j^s}{e_j^d}$ (note that a sufficient condition for this is $\gamma_j \leq \gamma_j^R$) Figure 1 illustrates how the sign of the derivative $\partial(\frac{p_j - p_j^*}{p_j})/\partial z_j$ depends on the three key parameters, γ_j, γ_j^R and λ. Overall, as the picture suggests, import penetration tends to have a positive impact on protection (i.e. z_j tends to have a negative impact) if γ_j is not too high relative to γ_j^R and λ.

The model has strong implications for the case in which importers and producers have similar political strength, i.e. γ_j is close to γ_j^R. In this case, by inspection of Figure 1, higher import penetration always implies higher protection for importing sectors. The following proposition states this result:

Proposition 2. *Suppose demand and supply curves have constant elasticity, and γ_j is close to γ_j^R for all j. Then in all importing sectors the rate of trade protection increases (strictly) with import penetration.*

The condition that γ_j is close to γ_j^R is satified, for example, if the importing activity is conducted by producers themselves, so that producers are the ones

who get the quota licenses. Second, as we will discuss in the next section, if the political-influence parameters are endogenized along the lines of Grossman and Helpman (1994), γ_j is close to γ_j^R if producers and importers are both organized and ownership is very concentrated in both activities, so that both lobbies represent a small fraction of the total population.

We want to emphasize that this is not a comparative-statics result, since import penetration is endogenous. Still, this result has empirical relevance: the structural relationship between trade protection and import penetration has been the focus of a number of empirical studies; needless to say, when one estimates this kind of relationship one has to take into proper account the endogeneity of import penetration.

3. Voluntary Export Restraints

In this section we allow the government to use VERs in addition to tariffs and quotas. A VER is a quantitative restriction on imports, and differs from an import quota in that the licenses are given not to domestic firms, but to foreign exporters (for free). If the government attaches no value to rents accruing to foreigners, then a VER is dominated by a quota, since the two measures have the same economic effects, while rents go to foreigners in case of a VER and to domestic agents in case of a quota. However, things may be different if the government's objective places some weight on foreign exporters' rents. This may be the case if foreign exporters are able to lobby the domestic government directly, perhaps by offering contributions, or if the domestic government cares about getting support (or limiting trouble) from foreign government(s) when imposing trade restrictions.[14] The rents generated by a (binding) VER in sector j are given by an analogous expression as quota rents: $Q_j = (p_j - p_j^* - \tau_j)m_j(p_j)$. Now the government's objective can be expressed as:

$$\Omega = \sum_{j=1}^{n} \left[\gamma_j \pi_j(p_j) + \hat{s}_j(p_j) + v_j \gamma_j^R Q_j + (1 - v_j)(\gamma_j^X - 1)Q_j + \lambda R_j\right] \qquad (3.1)$$

[14]The reader may perceive a tension between the small-country assumption and the fact that foreign exporters care about VER rents. This should not be seen as an inconsistency, however, because in our model exporting firms are atomistic, so they may well care about rents coming from a small country. At any rate, the small-country assumption should not be taken literally; it is a way to abstract from terms-of-trade issues, that would obfuscate the key effects that we want to highlight.

where $v_j = 1$ if a binding quota is in place and $v_j = 0$ if a binding VER is in place. The coefficient $(\gamma_j^X - 1)$ captures the political influence of foreign exporters. The benchmark case of unorganized foreign interests is given by $\gamma_j^X = 1$, in which case the objective reduces to the one we had in the previous section. In the next section we will indicate how the parameters γ_j^X can be endogenized if the political process is represented by a lobbying game a' la Grossman-Helpman (1994) in which foreign exporters can offer contributions to the government.

The determination of the optimal trade instrument is intuitive. Exporting sectors of course are protected with export subsidies. In each importing sector, only one trade instrument is used. The optimal import policy in sector j is a tariff if $\max\{\lambda, \gamma_j^R, (\gamma_j^X - 1)\} = \lambda$, a quota if $\max\{\lambda, \gamma_j^R, (\gamma_j^X - 1)\} = \gamma_j^R$, and a VER if $\max\{\lambda, \gamma_j^R, (\gamma_j^X - 1)\} = (\gamma_j^X - 1)$. The logic of this result is similar as the one in the previous section: a tariff, a quota and a VER differ only in the destination of the rents generated by the import restriction (government coffers, importers, or foreign exporters); the choice of instrument depends on which of the three possible rent receivers has the highest weight in the government's objective.

A VER is preferred to tariffs and quotas if the political influence of foreign exporters is very high relative to the political influence of importers and the government's valuation of tariff revenue. Notice that the selection of trade instrument does not depend on the relative strength of foreign exporters versus domestic producers, and that the interests of these two groups are not in conflict, in the sense that a VER favors both of them. This point is made, though in a more complex model, by Hillman and Ursprung (1988). On the other hand, the interests of foreign exporters are in direct conflict with those of importers, and the selection of trade instrument depends on the relative strength of these two groups.

In sectors which are protected with tariffs or quotas, the analysis of the previous section applies. In sectors protected with a VER, it can be checked that the optimal level of the VER (in tariff-equivalent terms) is given by:

$$p_j - p_j^* = \frac{(\gamma_j - \gamma_j^X + 1)y_j + (\gamma_j^X - 2)d_j}{(\gamma_j^X - 1)(y_j' - d_j')}$$

In the case of constant-elasticity demand and supply, the expression above can be written as:

$$\frac{p_j - p_j^*}{p_j} = \frac{(\gamma_j - 1)z_j + \gamma_j^X - 2}{(\gamma_j^X - 1)[z_j(e_j^s + e_j^d) + e_j^d]}$$

This expression is decreasing in z_j if and only if $\gamma_j < \frac{(\gamma_j^X - 1)(e_j^s + e_j^d) - e_j^s}{e_j^d}$. This

condition appears more stringent than the corresponding condition for quota-protected sectors, but notice what happens if γ_j is close to γ_j^R: in this case, we know that VERs are used only in sectors where $\gamma_j^X - 1 > \gamma_j$. This (one can check) implies that the condition $\gamma_j < \frac{(\gamma_j^X - 1)(e_j^s + e_j^d) - e_j^s}{e_j^d}$ is satisfied, hence the VER level (in tariff-equivalent terms) is increasing in import penetration. The following proposition summarizes:

Proposition 3. *In importing sector j, a tariff is used if* $\max\{\lambda, \gamma_j^R, (\gamma_j^X - 1)\} = \lambda$, *a quota is used if* $\max\{\lambda, \gamma_j^R, (\gamma_j^X - 1)\} = \gamma_j^R$, *and a VER is used if* $\max\{\lambda, \gamma_j^R, (\gamma_j^X - 1)\} = (\gamma_j^X - 1)$. *Furthermore, if the demand and supply curves have constant elasticity and γ_j is close to γ_j^R for all j, then in all importing sectors the rate of trade protection increases (strictly) with import penetration.*

3.1. Endogenizing the political-influence parameters

Before concluding, it is interesting to examine how the political-influence parameters are determined if the reduced-form government objective arises from a lobbying game *a' la* Grossman-Helpman (1994), in which producers, importers and foreign exporters offer contributions to the government.

There are two versions of the Grossman-Helpman lobbying game: (A) the original formulation, in which each lobby can link its contribution to the entire vector of trade policies, and (B) an alternative formulation, presented in Helpman (1995), where each lobby can link its contributions only to the trade policy in its sector. The equilibrium outcome differs only in one respect: in the first case, equilibrium trade policies maximize the joint surplus of government and all lobbies; in the second case, the trade policy in each given sector maximizes the joint surplus of the government and the lobby in that particular sector, taking as given trade policies in all other sectors.[15] In both cases, the equilibrium trade policies maximize a weighted welfare function, where the weights depend on the the government's valuation of welfare relative to contributions, the set of organized lobbies, and the shares of population represented by each lobby.

[15] This statement is true if contribution schedules are restricted to be differentiable around the equilibrium point, as shown by Grossman and Helpman (1994). An interesting point to notice is that, in the first version of the game, the equilibrium outcome is the same as if government and all lobbies engaged in a multilateral Nash-bargaining game, whereas in the second version the equilibrium outcome is the same as if government and lobbies engaged in a web of *bilateral* Nash-bargaining games (i.e., in each bilateral negotiation government and lobby take the outcome of other bilateral negotiations as given).

The government objective assumed in our model can be seen as resulting from a type-B lobbying game.[16] In the appendix we give more details; here we just state how the γ parameters can be expressed in terms of more fundamental parameters. We obtain:

$$\gamma_j = \frac{a + I_j}{a + I_j\alpha_j + I_j^R\alpha_j^R}\ , \quad \gamma_j^R = \frac{a + I_j^R}{a + I_j\alpha_j + I_j^R\alpha_j^R}\ , \quad \gamma_j^X = 1 + \frac{I_j^X}{a + I_j\alpha_j + I_j^R\alpha_j^R} \tag{3.2}$$

where a is the government's valuation of welfare relative to contributions, α_j (resp. α_j^R) is the share of domestic population who has a stake in the lobby of producers (resp. importers) in sector j, and I_j (resp. I_j^R, I_j^X) is a dummy that takes value one if producers (resp. importers, foreign exporters) in sector j are politically organized. There are three points to note about these formulas. First, all the γ parameters can take values in $[1, 1 + \frac{1}{a}]$. Second, as one should expect, a lower value of a implies more political power for the organized sectors. Finally, a lower share of the population represented by a lobby increases the political-influence parameters.

Propositions 2 and 3 state that if γ_j is close enough to γ_j^R then protection increases with import penetration. This exercise suggests two sufficient conditions for this to hold. The first is that the same people own the production and importing businesses. The second is that producers and importers both represent a small fraction of the total population (i.e., both α_j and α_j^R are close to zero) and are both organized for political action (i.e., $I_j = I_j^R = 1$): in this case, γ_j and γ_j^R are both close to $\frac{a+1}{a}$.

Something else can be learned from this exercise. We know from Proposition 2 that the choice of trade instrument depends on the relative values of γ_j^R, $\gamma_j^X - 1$ and λ. Suppose λ is smaller than the other two parameters in sector j, so that the government uses a quota or a VER depending on the comparison between γ_j^R and $\gamma_j^X - 1$. Then, using the expressions just derived, one finds that a VER is used only if importers are not organized, foreign exporters are organized *and* $a < 1$, i.e. the government cares relatively little about welfare.

[16] The reason our model cannot be seen as a reduced form of a type-A lobbying game is the following. As Helpman (1995) points out, in version A the unorganized sectors receive negative protection, whereas in version B the unorganized sectors receive no protection. Since we assumed that γ_j and γ_j^R are no less than one, our model never yields negative protection for any sector.

4. Conclusion

Most political-economy models of trade policy assume that the government can protect domestic industries only with trade taxes, and that the government has access to non-distortionary taxation. These models predict that trade protection should be higher in sectors where import penetration is low, a prediction that finds little support in the existing empirical works. In this paper we have argued that a simple extension of the standard model – in particular, allowing for quantitative restrictions and for a cost of public funds – can radically change its predictions, in a way that makes them more in line with the existing empirical evidence. In particular, we have showed that, if a simple sufficient condition is satisfied, the level of protection increases with import penetration, both in sectors that are protected with tariffs and in sectors that are protected with quantitative restrictions. Also, this paper contributes to the literature on the endogenous determination of trade policy instruments, pointing out conditions under which tariffs, quotas or VERs are utilized in the various sectors.

As we mentioned in the introduction, another problematic implication of the standard prediction – as pointed out in Levy (1995) – is that political pressures should encourage net trade expansion. In the same paper, Levy proposes a resolution to this puzzle: in a symmetric two-country world, if export subsidies are unavailable and governments do not cooperate, he shows that political pressures tend to restrict trade. The model we analyzed here is suggestive of an alternative resolution to the puzzle. If the standard prediction is overturned, Levy's puzzle is likely to be overturned as well. Here we do not address this issue formally, because it requires a fully-fledged large-country model, which is beyond the scope of this paper. A reasonable conjecture is that Levy's puzzle would be overturned at least for certain parameter ranges. We leave a more thorough investigation of this issue for future research.

5. Appendix

Here we show how to derive expressions (3.2) in section 3.1. Define aggregate welfare to be $W = \sum_{i=1}^{n} (\hat{s}_i + \pi_i + v_i Q_i + \lambda R_i)$ (notice that rents from quantitative restrictions are included in welfare only if they accrue to domestic importers, i.e. $v_i = 1$). The government's objective function is assumed to be a linear combination of welfare and total contributions received from lobbies:

$$aW + TC$$

Assuming that each individual owns at most one type of specific factor, the aggregate well-being of the members of producers' lobby j is given by

$$W_j^P = \pi_j + \alpha_j \sum_{i=1}^{n} (\hat{s}_i + \lambda R_i)$$

where α_j is the share of population that owns some specific factor used in the production of good j. If C_j^P is the contribution paid by this lobby to the government, the objective function of the lobby is $W_j^P - C_j^P$. The aggregate well being of the group of importers in sector j is

$$W_j^R = v_j Q_j + \alpha_j^R \sum_{i=1}^{n} (\hat{s}_i + \lambda R_i)$$

where α_j^R is the share of population that owns some specific factor employed in the importing activity in sector j. The objective function for this lobby is $W_j^R - C_j^R$. Finally, the lobby of foreign exporters maximizes $W_j^X - C_j^X$, where

$$W_j^X = (1 - v_j) Q_j$$

The timing of the game is the following: lobbies simultaneously select contribution schedules $C_j^k(p_j, \tau_j, v_j)$ $(k = P, R, X)$ that link payments to the trade policy variables in sector j, then the government chooses the whole vector of trade policies. (Here v_j can be thought of as a continuous variable, representing the share of licenses that accrue to importers as opposed to exporters.)

It can be shown that if contribution schedules are restricted to be differentiable around the equilibrium point, then trade policies in sector j maximize the joint surplus of government and lobbies in sector j given trade policies in other sectors.

Choosing (p_j, τ_j, v_j) to maximize the joint surplus of government and lobbies in sector j is equivalent to maximizing the following expression:

$$a(\hat{s}_j + \pi_j + v_j Q_j + \lambda R_j) + I_j[\pi_j + \alpha_j(\hat{s}_j + \lambda R_j)] + I_j^R[v_j Q_j + \alpha_j^R(\hat{s}_j + \lambda R_j)] + I_j^X(1 - v_j) Q_j$$

which is equivalent to maximizing

$$\left(\frac{a + I_j}{\Psi_j}\right) \pi_j + \hat{s}_j + \left(\frac{a + I_j^R}{\Psi_j}\right) v_j Q_j + \left(\frac{I_j^X}{\Psi_j}\right) (1 - v_j) Q_j + \lambda R_j$$

where $\Psi_j = a + I_j \alpha_j + I_j^R \alpha_j^R$. The expressions (3.2) in the text follow directly.

6. References

Anderson, K. (1980): "The Political Market for Government Assistance to Australian Manufacturing Industries", *The Economic Record* 56, pp. 132-44.

Bagwell, K. and R. Staiger (1995): "Reciprocal trade liberalization", NBER Working Paper n.5488.

Baldwin, R. (1987): "Politically Realistic Objective Functions and Trade Policy," *Economic Letters* 24, pp. 287 - 290.

Borrell, B. and M. Yang (1992): "EC Bananarama 1992: The Sequel – The EC Commission Proposal," Working Paper Series No. 958, World Bank, Washington DC.

Cassing and Hillman (1985), "Political-influence motives and the choice between tariffs and quotas," *Journal of International Economics* 19, pp. 279-290.

Feenstra, R. (1992): "How Costly is Protectionism?", *Journal of Economic Perspectives* 6(3), pp. 159-178.

Feenstra, R. and T. Lewis (1991): "Negotiated Trade Restrictions with Private Political Pressures", *Quarterly Journal of Economics*, November 1991, pp. 1287-1307.

Findlay, R. and S. Wellisz (1982): "Endogenous tariffs, the political economy of trade restrictions, and welfare," in Bhagwati, J. N. (ed.) *Import Competition and Response.* Chicago: University of Chicago.

Finger, M. and A. Harrison (1994): "The MFA Paradox: More Protection and More Trade?", unpublished paper, The World Bank.

Goldberg, P. and G. Maggi (1996): "Protection for Sale: an Empirical Investigation", NBER Working Paper n.5942.

Grossman, G. and E. Helpman (1994): "Protection for Sale," *American Economic Review,* vol. 84, pp. 833-50.

Helpman, E. (1995): "Politics and Trade Policy," The Sackler Institute for Economic Studies Working Paper No. 30-95.

Hillman, A. L. (1982): "Declining Industries and Political-Support Protectionist Motives," *American Economic Review* 72,pp. 1180-1187.

Hillman, A. L. and Ursprung, H.W. (1988): "Domestic Politics, Foreign Interests and International Trade Policy," *American Economic Review* 77, pp. 729-45.

Husted, S. (1986): "Foreign lobbying and the formation of domestic trade policy," presented at the Meetings of the Western Economic Association, San Francisco, July 1986.

Lee, J.-W. and P. Swagel (1996): "Trade Barriers and Trade Flows Across

Countries and Industries", mimeo.

Levy, P. (1995): "Lobbying and international cooperation in tariff setting," mimeo.

Mayer, W. (1984): "Endogenous Tariff Formation," *American Economic Review* 74: 970-985.

Mayer, W. and R. Riezman (1987): "Endogenous choice of trade policy instruments," *Journal of International Economics* 23, 377-381.

Rodrik, D. (1995): Political Economy of Trade Policy," in Grossman G. and Rogoff K. (eds.), *Handbook of International Economics* vol.3, North Holland.

Rosendorff, P. (1996): "Endogenous Trade Restrictions and Domestic Political Pressure," in Feenstra, R., Grossman, G. and D. Irwin (eds.), *The Political Economy of Trade Policy,* MIT Press.

Rosendorff, P. (1996): "Voluntary Export Restraints, Antidumping Procedure, and Domestic Politics," *American Economic Review* 86(3), pp.544-561.

Trefler, D. (1993): "Trade liberalization and the theory of endogenous protection," *Journal of Political Economy,* 101: 138-160.

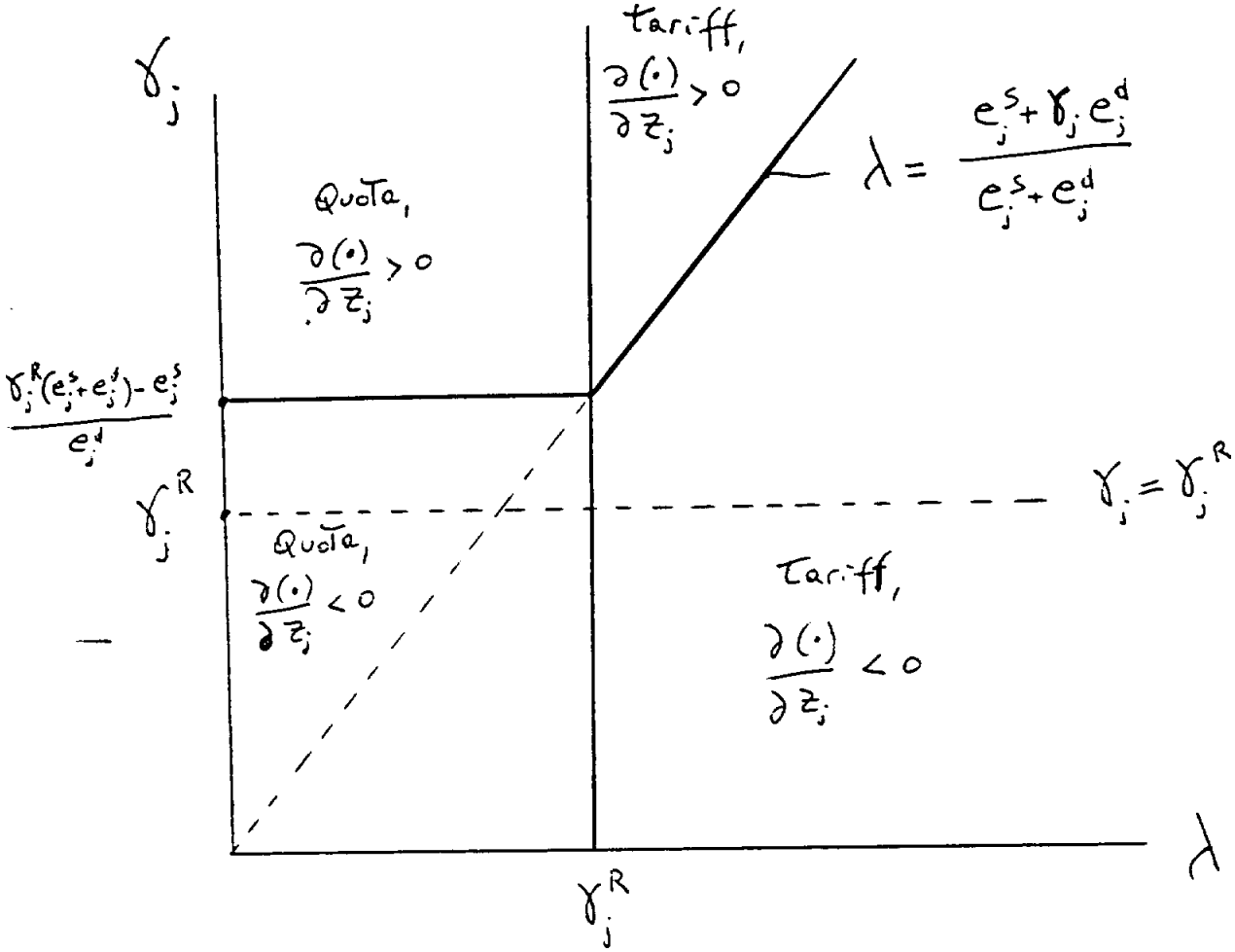
γ_j
tariff,
$\frac{\partial(\cdot)}{\partial z_j} > 0$
$\lambda = \frac{e_j^s + \gamma_j e_j^d}{e_j^s + e_j^d}$
Quota,
$\frac{\partial(\cdot)}{\partial z_j} > 0$
$\frac{\gamma_j^R(e_j^s+e_j^d) - e_j^s}{e_j^d}$
γ_j^R
$\gamma_j = \gamma_j^R$
Quota,
$\frac{\partial(\cdot)}{\partial z_j} < 0$
tariff,
$\frac{\partial(\cdot)}{\partial z_j} < 0$
λ
γ_j^R

Figure 1