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# **Endogenous Protection in Mercosul: An Empirical Analysis**

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## ABSTRACT

This paper analyses the equilibrium structure of protection in Mercosul, developing empirical analyses based on the literature ensuing from the sequence of models set forth by Grossman and Helpman since 1994. Not only Mercosul's common external tariff (CET) may be explained under a political economy perspective, but the existence of deviations, both at the level of the external tariffs and at that of the internal ones, make it interesting to contrast several structures under this approach. Different general equilibrium frameworks, in which governments are concerned with campaign contributions and with the welfare of the average voter, while organized special-interest groups care only about the welfare of their members, are used as the theoretical basis of the empirical tests. We build a single equation for explaining the CET and two four-equations systems (one equation for each member) for explaining deviations from the CET and from the internal free trade between members. The results (at the two-digit level) shed an interesting light on the sectoral dynamics of protection in each country; notably, Brazil seems to fit in better in the model framework, followed by Uruguay. In the case of the CET, and of deviations from it, the interaction between the domestic lobbies in the four countries plays a major role. There is also suggestion that the lobby structure that bid for deviations, be they internal or external, differs from the one which bid for the CET.

## 1. Introduction

Quite often countries design their trade policies in a way that yields to pressure from special interest groups. Trade negotiations in the international arena respond similarly. Political economy explanations of trade policies are important in order to understand the structure of trade protection that arises not only in a particular country but also in international agreements.

Foremost among Mercosul's objectives are the elimination of internal tariffs between members and the establishment of common external tariffs with the rest of the world.<sup>1</sup> The structure of the common external tariff (CET) committed to by members may be explained from a political economy viewpoint. Moreover, deviations from it as well as from free trade among members, though lasting for a transitional period, reflect a *protection* beyond that underlying the agreed structure. Hence, these features should also be analysed from a political economy approach.

In an attempt at explaining protection in Mercosul, Olarreaga and Soloaga (1998) – and, later, Olarreaga et al. (1999) - provided empirical evidence about tariff formation, by focussing on seven predictions of the correlate of expected cross-sectoral variation in tariff formation. These predictions – in a partial equilibrium context, where protection is estimated by incorporating explanatory variables additively - were based not only on the theoretical frameworks but also on empirical grounds.

This paper departs from the partial equilibrium analysis and considers alternative general equilibrium formulations, inspired in the series of theoretical models developed by Grossman and Helpman (1994, 1995a, 1995b, 1996) for analysing the settling on of trade policies in representative democracies (see also Helpman (1995)). In their first paper, they built a general equilibrium model in which governments are concerned both with campaign contributions and with the welfare of the average voter, and there exists a set of organized special-interest groups that care only about the welfare of their members and exchange contributions for protection. The interaction between the government and the set of interest groups results in the structure of protection. Taking this approach as the basis of our specifications, we extend it in different ways in order to analyse the structure of protection in Mercosul.

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<sup>1</sup> The Mercosul agreement has other requirements besides those related to customs duties. As it envisages the free movement of goods, services and factors, measures such as the elimination of non-tariff

The paper is structured as follows. Section two provides a background for the analyses that follow, giving a general information on the institutional and legal features of the Mercosul agreement. Section three reviews the Grossman-Helpman models and discusses the three extensions, and corresponding specifications, made. Section four describes the variables and touches a few important econometric issues. Section five presents the empirical findings and section six concludes.

## **2. Mercosul: Institutional and Legal Aspects**

### **2.1 Basic facts**

Mercosul, the Southern Cone Common Market, was formed on March 1991 by the Treaty of Asunción, and consists of Argentina, Brazil, Paraguay and Uruguay. Later, Chile and Bolivia became associate members in October 1996 and March 1997, respectively, forming a Free Trade Area with Mercosul.

The Treaty of Asunción in its Chapter II and the 1994 Ouro Preto Protocol created six different institutions to implement Mercosul's principles and purposes. They are the Council, the premier political institution; the Common Market Group, Mercosul's executive organization with both policy-making and administrative responsibilities; the Commerce Commission, responsible for monitoring the application of a common commercial policy; the Joint Parliamentary Commission, a consultative body; the Social-Economic Consultative Forum, an advisory body, and the Administrative Secretariat, which provides operational support.

The Mercosul legal system consists of the Treaty of Asunción, its Protocols, Annexes and related agreements. The effectiveness of these documents and the place they occupy in the legal hierarchy of each member state depends on the respective national laws. The second level of the system consists of the Council *decisions*, Group *resolutions* and Commerce Commission *directives*, Rowat et al. (1997).

The Common Market envisages the free movement of goods, services and factors of production, the elimination of customs duties and non-tariff restrictions, the establishment of a common external tariff (CET) and the adoption of a common trade policy, and the coordination of macroeconomic and sectoral policies. These goals are being progressively achieved and, taking into account the speed of a similar experiment

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restrictions, the adoption of a common trade policy, and the coordination of macroeconomic and sectoral

– the European Union, and the great macroeconomic instability which plagued all its members in the recent past, Mercosul can only but be considered a successful work in progress.

## **2.2 Internal trade liberalization and the Common External Tariff**

Article 5 of the Treaty of Asunción set out the agreed Trade Liberalization Programme. Between June 1991 and December 31, 1994, barriers to trade among Mercosul partners covering close to 95 percent of intra-regional trade were eliminated. An adjustment regime, agreed in August 1994, led to a progressive phase out of the remaining tariffs on intra-regional trade. Sensitive items, contained in individual exceptions/adjustment lists, were supposed to be phased in between January 1, 1995 and December 31, 1998, for Argentina and Brazil, and between January 1, 1996 and December 31, 1999 for Paraguay and Uruguay. The main list of goods covered is not extensive, though comprising (sensitive) agricultural as well as industrial products, and is estimated to cover 5 percent of intra trade. However, this does not include the exceptions made for sugar or automobiles, the latter being of particular importance in the Argentina-Brazil trade.

Mercosul's Common External Tariff (CET) has been in force since January 1995, covering 85 percent of the goods traded within the group. During a transitional period, sensitive sectors have also been excluded, there existing common and national lists of exceptions to the CET. The common list includes items such as capital goods, informatics and telecommunication products. The national lists allow Argentina, Brazil and Uruguay to have 300 national exceptions to the CET while Paraguay has 399 exceptions. Full implementation of the CET is to take place by 2006<sup>2</sup>.

Besides their national lists of exemptions, each country has its own special *concessionary régimes*, where the rates may be reduced below the scheduled values. Examples are investment items and the temporary admission of goods to be re-exported. These régimes will be consolidated into a common Mercosul set of rules (see, for instance, Laird (1997)).

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policies are also in progress.

<sup>2</sup> A temporary increase of the CET by 3 percent points on most tariff items was agreed on in December 1997 to accommodate Brazil's external imbalance and allow Argentina to reduce the levels of its statistical tax.

### *Non-tariff measures*

Safeguards were regulated in Annex IV of the Treaty, following the guidelines laid down in Article XIX of the GATT. Actions against third countries may be taken by Mercosul as a group or on behalf of a single member. On the other hand, safeguard actions by one member against another are forbidden. Concerning antidumping and countervailing measures, there is no agreement yet among members. These actions are allowed and can be in force until December 2000, when a set of common rules on the Defence of Internal Competition shall then prevail.

In fact, co-ordination of sectoral policies in agriculture, industry, energy, transport and labour has been discussed. Negotiations are under way for the harmonization of remaining restrictions on internal trade in agricultural products. In March 1998, the scope of the work was expanded to include the analysis and discussion of individual agricultural and agro-industrial policies. In order to foster the rationalization of investments and the increase in the competitiveness of firms, the private sector may negotiate production-sharing arrangements.

Bilateral arrangements between Argentina/Brazil, Argentina/Uruguay and Brazil/Uruguay in the automotive sector are in force until a common sectoral policy be established.<sup>3</sup> The trade arrangement between Argentina/Brazil, in which the sector benefits from local content plants, allows concessional entry for vehicles and parts as well as export balancing requirements.

Finally, it is important to mention that no improvement has been reached yet on the free movement of services, capital and workers. Although there exists a framework agreement, signed in December 1997, for freeing trade in services within Mercosul over a ten-year period, much remains to be done in such areas.

## **3. The Theoretical Framework and the Derived Specifications**

### **3.1 The basic model**

The Grossman-Helpman (1994) model, which pursues a line opened by works line Hillman (1982)'s, can be viewed as a two-stage non-cooperative game in which interest groups move in the first stage, offering political contribution schedules that depend on their policy stance, while the government chooses, in the second stage,

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<sup>3</sup> After intensive negotiations, a new common sectoral policy between Argentina and Brazil is due to be settled in 2000.



policy stances maximizing a political objective function that depends on contributions and the well-being of the average voter (see also Mayer (1984)). The model has the structure of a common agency problem: several principals, the special interest groups, attempt to induce a single agent, the government, to take an action that may be costly for him to perform.

The formal framework considers a small and competitive economy, integrated by individuals with identical, completely additive preferences on  $n+1$  goods, the last one serving as numeraire. For each good  $i$  the sub-utility function is differentiable, increasing and strictly concave; and the derived demand is  $x_i = d_i(p_i)$ . The indirect utility at expenditure level  $E$  and a vector  $p$  of domestic prices takes the form  $V(p, E) = E + s(p)$ , where  $s(p)$  is the consumer surplus.

The numeraire good is produced with a labour input-output coefficient equal to one, so that the wage rate is also one. Non-numeraire goods are produced from labour and sector-specific inputs. With constant returns to scale and the wage rate equal to one, the aggregate reward to sector's  $i$  specific factor,  $\pi_i(p_i)$ , depends only on  $p_i$ .

The government implements trade taxes and subsidies, introducing a wedge between domestic and world prices. If a domestic price  $p_i$  exceeds the world price  $p_i^*$ , an import tariff for a good that is imported or an export subsidy for one that is exported, is implemented. Conversely, domestic prices below world prices correspond to import subsidies or export taxes. Government revenue is distributed in a lump-sum fashion.

The government cares about total political contributions and aggregate welfare. The government's linear objective function is

$$G(p) = \sum_{i \in L} C_i(p) + aW(p) \quad a \geq 0 \quad (1)$$

where:

$a$  is the government's sensitivity to the average voter's well-being relative to its taste for campaign contributions: it can be thought of as the *absolute* weight given to one peso (or real, or dollar) of welfare against one peso of political contributions;

$C_i(p)$  is the political contribution of the (existing) lobby in sector  $i$ , given domestic prices  $p$ ;

and  $W(p)$  is the aggregate welfare, equal to the sum of the indirect utilities of all individuals (considering that aggregate income is the sum of labour income, rewards to the specific inputs and tariff revenue):

$$W(p) = l + \sum_{i=1}^n \pi_i(p_i) + N[r(p) + s(p)] \quad (2)$$

where  $r(p)$  is the tariff revenue received by one voter/consumer:

$$r(p) = \sum_i (p_i - p_i^*) \left[ d_i(p_i) - \frac{1}{N} y_i(p_i) \right] \quad , \text{ with } N \text{ the number of}$$

consumers and  $y_i(p_i)$  total output for good  $i$ ,  $1 \leq i \leq n$ .

An existing lobby, in sector  $i$  for instance, tailors the schedule of contributions to maximise the total welfare of its members. The joint welfare is  $V_i = W_i - C_i$ , where  $W_i$  is their gross-of-contributions joint welfare, which is an immediate adaptation of (2) above:

$$W_i(p) = l_i + \pi_i(p_i) + \alpha_i N[r(p) + s(p)] \quad (3)$$

where  $l_i$  is the labour income and  $\alpha_i$  the fraction of population who owns (some of) the specific input used in industry  $i$ .

Grossman and Helpman consider that the interaction between the government and lobbies has the structure of a menu-auction characterized by Bernheim and Whinston (1986).<sup>4</sup> The equilibrium outcome for this structure is the same as that from maximizing the joint surplus

$$\Omega = aW + \sum_{i \in L} W_i = a \sum_{i \notin L} W_i + (a+1) \sum_{i \in L} W_i \quad . \quad (4)$$

In equilibrium, *truthful contribution schedules* induce the government to behave as if it were maximizing a social-welfare function that weights differently the members of society. Lobby groups receive a weight of  $1+a$  and individuals that are not organized receive a smaller weight of  $a$ . Instead of looking at  $a$ , it is sometimes preferable to make in (1)

$$a = \beta/(1-\beta) \quad , \quad 0 \leq \beta < 1 \quad , \quad (5)$$

so that  $\beta$  is now the relative weight given to consumers' welfare, while  $1-\beta$  that given to the lobbies.

Operating in equation (4) and defining variable  $I_i$  as taking value one when the group is organized or zero otherwise,  $I_i = \begin{cases} 1 & \text{if } i \in L \\ 0 & \text{otherwise} \end{cases}$ ,  $\Omega$  can be rewritten as

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<sup>4</sup> See also, for modern extensions, Dixit et al. (1997).

$$\Omega = (a + \alpha_L)l + \sum_{i=1}^n (a + I_i)\pi_i + N[r(p) + s(p)](a + \alpha_L) \quad (6)$$

where  $\alpha_L = \sum_{i \in L} \alpha_i$  characterizes the share of voters who own specific factors and manage to organize themselves in lobbies.

By conveniently using Hotelling's Lemma and the Envelope Theorem, the first order condition becomes:

$$\frac{\partial \Omega}{\partial p_i} = (a + I_i)y_i(p_i) + (a + \alpha_L)[-y_i(p_i) + (p_i - p_i^*)m'_i] = 0 \quad (7)$$

where  $m'_i$  is the derivative of sector  $i$ 's import function  $m_i = Nd_i(p_i) - y_i(p_i)$ . With a little algebra one arrives at

$$(p_i - p_i^*) = \frac{I_i - \alpha_L}{a + \alpha_L} \frac{y_i(p_i)}{-m'_i} \quad (8)$$

that gives the structure of protection.

Formula (8), which is the point of departure of all econometric work, may be expressed in terms of the import elasticity  $e_i$  and the import penetration ratio  $z_i$ . Knowing that  $p_i = p_i^*(1 + t_i)$ , where  $t_i$  is the ad-valorem tariff rate, and given that the trade elasticity is  $e_i = -\frac{m'_i}{m_i} p_i$  and  $z_i = \frac{y_i(p_i)}{m_i(p_i)}$ , it can be rewritten as

$$\frac{t_i}{1 + t_i} = \frac{I_i - \alpha_L}{a + \alpha_L} \frac{z_i}{e_i} \quad (9)$$

This equation represents the political equilibrium described in Grossman and Helpman (1994)'s Proposition 2. Industries that have high import demand or high import supply elasticities will have smaller ad valorem deviations from free trade. This may be explained by two reasons. First, if  $a > 0$  the incumbent government may bear a political cost from creating deadweight loss. Second, even if  $a = 0$ , if  $\alpha_L > 0$  the

owners of specific inputs to industries other than  $i$  will bid more to avoid protection in sector  $i$  the greater the social cost of that protection is.

Proposition 2 also shows that all sectors that are organized are protected by either an import tariff or export subsidies. Conversely, sectors that are not represented by lobbies are burdened with import subsidies or export taxes. The political power of a particular organized sector is reflected by the ratio of domestic output to imports. In sectors with large domestic output, the specific-factor owners have much to lose from free trade. On the other hand, when the volume of imports is low, the economy has relatively little to lose from protection.

Besides, the smaller the weight the government places on aggregate welfare, the larger in absolute value all trade taxes and subsidies will be. If  $a = 0$ , an interior solution remains possible due to the fact that the interest groups themselves do not want to distort too much. As the share of voters who are members of one interest group or another grows, the equilibrium share of protection for organized sectors declines. When all voters belong to an interest group ( $\alpha_L = 1$ ) and, consequently, all sectors are represented ( $I_i = 1$  for all  $i$ ), then free trade emerges in all markets as the various interest groups neutralise one another. On the other hand, if interest groups are a negligible fraction of the voting population ( $\alpha_L \approx 0$ ), then no trade taxes or subsidies will be applied to goods not represented by lobbies. Indeed, when the potential political contributions are too few, they stand little to gain from free trade interventions in sectors other than their own.

The theoretical model above corresponds to the analysis of one country. In the case of Mercosul, it would be correct to use an approach where more than one country set trade policies cooperatively. Grossman and Helpman (1995a) have extended the influence-driven contribution approach to a situation in which two countries design trade policies cooperatively. The outcome is revealed in the ratio of domestic country tariff to foreign country tariff. The equation of the ratio tells that, relative to free trade, the negotiated trade agreement favours the interest group that has greater political clout between the two countries. Hence, the model explains deviations from common external tariffs and from free trade rather than the structure of common external tariffs. Moreover, the specification of such models with more than two countries turns out to be very difficult and complicated.

Finally, Grosman and Helpman (1995b) introduce the possibility of industry exclusions from free trade, when establishing a free trade area. This concept is extended here for the exclusion from the CET, as well as, in a case closer to theirs, in the internal Mercosul trade.

### 3.2 Model extensions

Equation (9) applies to the case of a small country, internally designing its trade policy. Mercosul negotiations involve – directly or indirectly – interactions of the lobbies in the four member countries, thus requiring further assumptions and extensions. We consider first the two cases where the simultaneous interaction is relevant: the establishment of the common external tariff and the national deviations from the CET; then, we try to explain the deviations from internal free trade within member countries<sup>5</sup>. Our specifications will broadly consist in additive extensions of (9). We begin with the one for the CET.

Following already standard practices, Goldberg and Maggi (1999), in equation (9) the error term is introduced additively; as it can be thought of as a composite of variables that potentially may affect protection and have been left out of the theoretical model, and also as an error in the measurement in the dependent variable. Besides, the import demand elasticity is brought beforehand to the left hand side (lhs).

The model to estimate Mercosul's common structure of protection supposes that four equations like (8) are “behind the negotiations”, one for each member. Supposing identical import elasticities (by country/member)<sup>6</sup>, final establishing of the CET implies that the lhs of the four equations will be the same. We shall then write this term as if resulting from a weighted average of the four original equations, giving rise to the following CET equation (10):

$$\begin{aligned} \frac{t_i^{CET}}{1+t_i^{CET}} e_i &= \sum_{j=A}^U \theta_{ij} \frac{I_i^j - \alpha_L^j}{a^j + \alpha_L^j} z_i^j + \varepsilon_i \\ &= \sum_{j=A}^U \gamma^j \theta_{ij} z_i^j + \sum_{j=A}^U \delta^j \theta_{ij} I_i^j z_i^j + \varepsilon_i ; \quad \gamma^j = \frac{-\alpha_L^j}{a^j + \alpha_L^j} \quad \text{and} \quad \delta^j = \frac{1}{a^j + \alpha_L^j} \end{aligned}$$

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<sup>5</sup>As a Common Market, Mercosul must not have internal tariffs. The existence of these tariffs are considered as an instrument of protection that should be explained by the Grossman-Helpman approach.

<sup>6</sup> This assumption is not crucial and is neither the most debatable part of this extension. Moreover, in the empirical estimations, for lack of better data, the values of the elasticities were actually *the same* for all the four countries.

Equation (10) expresses the structure of protection for the union as whole, with each country entering additively in the formation of  $t_i^{CET}$ , the common external tariff for good  $i$ . Two options are available for the weights  $\theta_{ij}$ . The first is to consider that, in spite of the clear size differences, in the negotiating table, Mercosul – like the EU – gives the same importance to all its members, the CET being the result of reasonably balanced negotiations. This makes for setting all  $\theta_{ij} = 1/4$ . The other, as suggested by Cadot et al. (1997) and used by Olarreaga and Soloaga (1998), is to consider that size matters in the negotiations and weight the countries differently by setting the  $\theta_{ij}$  equal to the ratio of the country's domestic output to total Mercosul output for sector  $i$ .

The political power of each country, in an organized sector, is reflected by the ratio of domestic output to imports; equation (10) shows that the domestic political environment constrains the actions that the governments can take regionally and that regional interdependence (additively) sets the final parameters. The weighted sum of the political variables of each country makes the CET dependent on the power of all lobbies in the integration and the structure of protection determined by their interaction.

Equation (9) implies that, for each country  $j$  ( $j$ = Argentina, Brazil, Paraguay and Uruguay),  $\gamma^j < 0$ ,  $\delta^j > 0$  and  $\gamma^j + \delta^j > 0$ . These sign relationships should continue to be valid in the aggregate relationship (10). Moreover, knowledge of  $\gamma^j$  and  $\delta^j$  allows to compute three key parameters of the model: the fraction of voters represented by lobbies,

$$\alpha_L^j = -\gamma^j / \delta^j, \quad (11)$$

the (absolute) weight that the government gives to consumers' welfare,

$$a^j = (1 + \gamma^j) / \delta^j, \quad (12)$$

and, from (5) and (12), the relative weight:

$$\beta^j = (1 + \gamma^j) / (1 + \gamma^j + \delta^j). \quad (13)$$

The  $z_i^j$  variables, representing the ratio of domestic output to imports by each member, are clearly endogenous. A reduced form specification

$$z_i^j = \frac{y_i^j}{m_i^j} = \xi Z_i^j + v_{ii}^j \quad (14)$$

where the elements in vector  $Z_i^j$  are variables such as the number of employees, capital and industry concentration indexes (see Goldberg and Maggi (1999)), is needed.

When the deviation from the CET is examined, the quantity  $p_i = p_i^*(1 + t_i)$  may be looked at as the “new world price”, so that, in a given country, the lobby in sector  $i$  would be fighting for an additional tariff revenue, per unit of import, equal to

$$p_i^*(1 + t_i^{ET}) - p_i^*(1 + t_i^{CET}) = p_i^*(t_i^{ET} - t_i^{CET}) \quad (15)$$

where  $t_i^{ET}$  is the deviant external tariff.

Moreover, we suppose that for setting rates different from the CET, domestic lobbies will have to face the interests of the other member’s lobbies, not necessarily identical to theirs. In sectors where producers/owners are similarly organised in the four countries, obtaining the deviation will require an effort like in (9), but if the combined lobby structure of the other partners differs substantially from the domestic one, it might either be easier or more difficult to get the overprotection. The above considerations lead to modify (9), for each country  $j$ , into:

$$\frac{t_i^{ET} - t_i^{CET}}{1 + t_i^{CET}} e_i^j = \gamma^j z_i^j + \delta_1^j I_i^j z_i^j + \delta_2^j (I_i^j z_i^j - \sum_{j'} \theta^{*}_{ij'} I_i^{j'} z_i^{j'}) + \varepsilon_i \quad (16)$$

The correction in the lhs answers for the incremental character of the negotiation, and comes from (15). The term added to the rhs

$$w_i^j = I_i^j z_i^j - \sum_{j'} \theta^{*}_{ij'} I_i^{j'} z_i^{j'}$$

tries to account for the interaction with the other members’ lobbies. If  $w_i^j > 0$ , the domestic lobby is supposed to be “more powerful (or aggressive)” than the combined others, this meaning that it will be more difficult to win the overprotection, as it will find less support for this in the other members. If  $w_i^j < 0$ , the reverse applies, and an extra support for its claims will come from the other members. Finally,  $w_i^j = 0$  makes the negotiation identical to the situation in (9).

Overall, governments – here, a common Mercosul authority - may consider the deviations from the CET, allowed during the so-called adjustment periods, as necessary in order to make the agreement palatable to opposing interests. It seems reasonable to suppose that, in their decision making, they will judge each domestic claim against the

situation prevailing in the rest of Mercosul. The interaction between  $I_i^j z_i^j$  and  $w_i^j$  tries to capture this.<sup>7</sup>

Weights  $\theta_{ij}^*$  are, now, the ratio between country  $j$ 's output in sector  $i$  and the total output, for the same sector, of the three “outside” countries. From the previous discussion, we expect that  $\delta^j < 0$ . We also expect that the other coefficients guard their usual signs, though there are really no theoretical grounds to sustain this. It seems more reasonable to claim that only  $\delta^j$  should be positive.

There are four equations equal to (16) and, of course, the four reduced forms (14). Together, they represent the ‘over-protection’ by each country, i.e., the one beyond that already existing in the bloc against the rest of the world.

The fact that several goods were excluded from the elimination of internal tariffs within Mercosul shows that their sectors have political power in the determination of tariffs and could perhaps also be explained in the above lines. These interest groups receive protection not only with regard to the rest of the world through the CET but also within the bloc and, as mentioned above, the exclusion of sectors over long periods of adjustment may make an agreement politically viable.

Specification of the internal tariff model should maybe consider the role played by the other members. Notwithstanding, we shall consider that this situation is the one closest to the Grossman and Helpman (1994) context, with the equilibrium being truly free trade, and apply it with the slight modification that variable  $z_i^j$  - now called  $z_i^{j*}$  - will be the ratio of domestic output to imports from Mercosul members:

$$\begin{aligned} \frac{t_i^{IT}}{1+t_i^{IT}} e_i^j &= \frac{I_i^j - \alpha_L^j}{a_i^j + \alpha_L^j} z_i^{j*} + \varepsilon_i \quad \text{for country } j = A, B, P, U \\ &= \gamma^j z_i^{j*} + I_i^j \delta^j z_i^j + \varepsilon_i \end{aligned} \quad (17)$$

where  $t_i^{IT}$  is the internal tariff applied by country  $j$ . Here, there are also four pairs of equations, one for each country.

#### 4. Data and Econometrics

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<sup>7</sup> Of course, other kinds of interactions are possible, and further exploration of this is needed. It might also be argued that (economic) size matters in this case and we are not accounting for it. Indeed,



#### 4.1 The data

The data used refer to the four members: Argentina, Brazil, Paraguay and Uruguay. Though it is arguable whether Paraguay should be included, due to the lesser reliability of its trade statistics and the small magnitude of several observations, we decided to incorporate it in order to have a full picture of Mercosul.

The basic data file is the same used by Olarreaga and Soloaga (1998). They aggregated tariffs and trade data up to the eight-digit level of the harmonized system. These were then converted to UNIDO's three digit level, as industrial data for Mercosul countries came from UNIDO's three digit database. We shall now briefly discuss each of the variables in the model.

##### *Protection measures*

Tariffs are used to measure protection. Import-weighted or simple average tariffs were considered, covering the 27 sectors which make the three-digit aggregation level. It would have been more correct to include non-tariff measures as well, in the structure of protection. These are applied by Mercosul members, Argentina, for instance, having quite frequently used this instrument against Brazil.

The fact that non-tariff measures are not considered underestimates the structure of protection; however, given the problem in combining tariff and non-tariff barriers in a single index, this was left for a future improvement.

##### *Elasticities*

Though estimates of trade elasticities exist, in different aggregation levels and for varied periods and scenarios (see, as an example, Braga et al. (1988) and Zini (1988) for Brazil), we did not find a homogenous set, referring approximately to the same date. Following other authors, we took Shiells et al. (1986) estimates of US import demand elasticities at the industry level as proxies to the Mercosul countries's elasticities. As Goldberg and Maggi (1997) do, the import demand elasticity of good  $i$ ,  $e_i$ , is brought to the left hand side of the estimating equation to consider a measure of error in the elasticities as a component of the measurement error of the dependent variable. Export supply elasticities are not considered in the analysis due to the impossibility to obtain reliable data on them.

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exceptions were granted to Paraguay, for instance, under these grounds.

### ***Political organization dummies***

In principle, one should be able to identify the organized industries by looking at the contribution level of the respective group. However, data on contributions of lobbies are not available for Mercosul countries. The  $I_i$  dummies must then be created with the help of proxies. Olarreaga and Soloaga (1998) used an industry concentration index to infer which sector is an organized group. This index is calculated as

$$(\text{number of firms in the whole economy})/(\text{number of firms in sector } i) .$$

If concentration is high, the free riding incentives could be solved and firms might form a lobby. The political organization dummy is constructed somewhat arbitrarily, considering a value of 1 whenever the index is above a threshold of 50 – which represents 2 percent of the total number of firms in the economy –, otherwise the dummy is set equal to zero. This leads to a few awkward results, partially due to the aggregation level used; the most conspicuous being a zero for the transport material sector. Also, for sectors such as beverages (ISIC 313); textiles (321); wearing apparel, except footwear (322); footwear, except rubber or plastic (324); furniture, except metal (332) and printing and publishing (342), which present a low index of concentration, there exists the suspicion that, in some of the four countries, they overcame the free riding incentives and bid for protection.

We combined the concentration index with other measures that might suggest the possibility of lobby formation to arrive at an alternative identification of the endogenously protected sectors. This second option significantly improved one set of results<sup>8</sup>.

### ***Import penetration ratio***

The import penetration ratio is perhaps the worst measured variable in our model. The reason may be that the numerator and denominator come from different statistical sources, raising the suspicion that the different measurement errors may sometimes oddly combine in the ratio.

## **4.2 A few points on the econometrics**

Model (10) is a one-equation system, while models (16) and (17) are four-equations systems. In the three cases there are 27 observations and variables  $z_i^j$  - or  $z_i^{j*}$  - are considered as endogenous, i.e. correlated with the shocks in the model. To solve

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<sup>8</sup> See the analysis of Table 2 results, in the next section.

this problem, a reduced form like (14), where the import penetration ratio is written as a function of exogenous variables that may indirectly affect protection was estimated. Following previous empirical exercises like Goldberg and Maggi (1999), we started by considering as exogenous variables the number of employees, capital and the industry concentration index. Table A.1 in the Annex shows the results: with the exception of Brazil, the fits are not very good (the  $R^2$  's are also low). A main reason for this is the fact that the output-import ratio, for all countries but Paraguay, has a very skewed distribution, with one or two values for each country standing as true outliers. We then expanded the set of “exogenous” and, in model (16), removed an “outlier sector” from the Argentinian data.

When estimating the systems, we took also into account the correlation between the shocks for the same sectors in different countries, what, taking into account the previous estimation of the output-import ratio, amounts to using the three-stage least squares technique. Moreover, heteroskedasticity corrections were also employed.

Finally, all equations were estimated without a constant, so that care must be taken in the interpretation of the  $R^2$  in the next section.

## 5. Results

There are five equations to be estimated in the model that represents the structure of protection of the CET. Table 1 reports the coefficients of the trade protection equation (10), corresponding to the uniform weighting case, which proved superior to the proportional one. This might signal that, for establishing the CET, the four members had a balanced influence.

The signs and the t statistics of coefficients  $\gamma$  and  $\delta$  for Brazil and Uruguay are significant and consistent with the Grossman-Helpman model. But for Brazil's  $\gamma$ , all the other estimates are statistically significant at the 5% level. The other implication of the Grossman-Helpman model,  $\gamma + \delta > 0$ , is also statistically confirmed, at the 10% level, for the same two countries. Estimates for Paraguay present sensible signs, but are not statistically significant. The odd result concerns Argentina, with significant but reversed sign coefficients; their sum, however, is statistically accepted as positive at 10%.

**Table 1: Estimation of the Common External Tariff model**

	Coefficient	t-Statistic	Prob.
$\gamma^A$	23.5E-5	2.318	0.022
$\delta^A$	-21.4E-5	-2.325	0.022
$\gamma^B$	-1.2E-5	-1.676	0.010
$\delta^B$	1.8E-5	2.185	0.031
$\gamma^P$	-2.0E-5	-0.543	Ns
$\delta^P$	3.1E-5	0.820	Ns
$\gamma^U$	-39.5E-5	-2.432	0.016
$\delta^U$	45.9E-5	2.500	0.016
R-squared	0.56		

For the countries with wholly significant results, we computed the values of  $\beta$  and  $\alpha_L$ . They are,

$$\alpha_L = 2/3 \quad \text{and} \quad \beta = 1.000 \quad \text{for Brazil}$$

$$\alpha_L = 0.86 \quad \text{and} \quad \beta = 0.999 \quad \text{for Uruguay} \quad .$$

These values indicate that lobbies are perhaps more present in Uruguay than in Brazil, though both governments give a negligible weight to them in setting trade policies. The first point seems reasonable: the small dimensions of the Uruguayan economy make it easier to get producers with similar interests together; as for the second, it might mean that, at the level of aggregation we are working, strong lobbies – like the automotive sector – are diluted within the bigger industry.

The findings broadly support the model predictions, with politically organized sectors clearly receiving more protection from Brazil and Uruguay. The structure of the CET is thus the combined result of the pressure of sensitive sectors that ask for protection in each of the member countries. When sector  $i$  is organized in all countries of the agreement, the power to obtain protection from the rest of the world is enforced and a high common external tariff may be imposed. Conversely, when organization differs within the Mercosul, the various interest groups are less able to bring together their power at the negotiating table.

Table 2 reports the results on the deviations from the CET. The signs of the  $\delta_2$  coefficients are all consistent and significant. The estimated  $\gamma$ s are also all negative and, but for Paraguay, statistically significant. The estimated  $\delta_i$ 's are positive for Argentina, Brazil and Uruguay, but significant only for Brazil. These findings indicate a clear interaction between the domestic lobbies in the bidding for the exceptions to the CET;

however, only in Brazil the expected structure of protection is wholly significant, the model finding a weaker support in Argentina and Uruguay and almost none in Paraguay.

Though the signs of the coefficients in Argentina and Uruguay are as expected, the “domestic lobby coefficients” are not statistically significant. This raises the suspicion that a different structure of internal lobbies might bid for protection beyond that one obtained in the CET. In fact, some sectors may want to form a pressure group to influence the design of the CET but may not be interested in influencing the structure of deviations from it.<sup>9</sup>

The results of a sensitivity analysis considering an alternative specification of the lobby representation dummy, in which several sectors are not considered as pressure groups to influence the structure of the external tariff for Argentina (322, 332, 342), Brazil (321, 342), Paraguay (313, 321, 322, 332, 342) and Uruguay (321, 324, 332) present a slight improvement. The Argentinian  $\delta_i$  becomes significant at 10%, and the one for Paraguay changes to the “correct” sign, though remaining not significant.

**Table 2: Estimation of the External Tariff Deviations model**

	Coefficient	t-Statistic	Prob.
$\gamma^A$	-1.43E-6	-2.066	0.050
$\delta_1^A$	2.82E-6	0.681	Ns
$\delta_2^A$	-1.31E-6	-3.600	0.000
R-squared	0.37		
$\gamma^B$	-2.20E-6	-1.931	0.069
$\delta_1^B$	2.57E-6	1.823	0.084
$\delta_2^B$	-0.52E-6	-1.960	0.065
R-squared	0.28		
$\gamma^P$	-3.44E-6	-0.448	Ns
$\delta_1^P$	-0.27E-6	-0.491	Ns
$\delta_2^P$	-0.65E-6	-2.090	0.044
R-squared	0.12		
$\gamma^U$	-0.26E-6	-1.712	0.010
$\delta_1^U$	1.91E-6	0.289	Ns
$\delta_2^U$	-0.35E-6	-2.980	0.000
R-squared	0.49		

<sup>9</sup> The cost of bidding for protection could then be greater than the benefit from it.

Therefore, through the second specification of the external tariff model, it may be seen that the power of the interest groups to bid for protection would also be present, at least in one of the four countries that make up Mercosul: Brazil. Interest groups that are organized and have much to lose with the agreement achieve protection from the government of their respective country. However, this *over-protection* in some sensitive sectors happens during a transitional period. All members countries have to converge to common external tariffs.

Finally, it is important to note that the deviations are not positive in all countries. Paraguay and Uruguay will converge upwards to the CET in several sectors. In these small and relatively more open economies, organized sectors may fail to obtain protection due to the fact that their ratios of domestic output to imports are low. As Grossman and Helpman (1994) explain, if the share of voters belonging to an interest group is high, the equilibrium share of protection for organized sectors is low: the various interest groups neutralize each another. Interest groups with a low ratio of domestic output to imports, which – in the model - represents their power, fail to obtain protection with a relatively high  $\alpha_L$ . This seems to be the case of Uruguay, whose estimated  $\alpha_L$  was equal to 0.86.

Table 3 reports the results of the within Mercosul tariff model, which aims at explaining the deviations from free trade among member countries. The signs of the coefficients  $\gamma$  and  $\delta$  are consistent with the theoretical model in the cases of Argentina, Brazil and Uruguay. The estimated  $\gamma$ s are negative and statistically significant for these three countries. The  $\delta$ s are positive but significant only for Brazil. The estimates for Paraguay present unexpected signs and no significance. The relation  $\gamma + \delta > 0$  seems valid, at 10%, for Argentina; but the null  $\gamma + \delta \leq 0$  cannot be rejected at this level either for Brazil or Uruguay. As in the previous model, these findings may suggest that a different structure of internal lobbies might bid for protection within the free trade area, what would call for a reappraisal of the dummies  $I_i^j$ .

**Table 3: Estimation of Internal Tariff model**

	Coefficient	t-Statistic	Prob.
$\gamma^A$	-1.11E-6	-1.711	0.098
$\delta^A$	2.23E-6	0.678	ns

R-squared		0.21		
$\gamma^B$		-0.05E-6	-2.061	0.050
$\delta^B$		0.05E-6	1.751	0.092
R-squared		0.37		
$\gamma^P$		1.82E-6	0.219	ns
$\delta^P$		-3.00E-6	-0.347	ns
R-squared		0.09		
$\gamma^U$		-1.97E-6	-1.876	0.089
$\delta^U$		1.83E-6	-0.584	ns
R-squared		0.32		

Brazil, then, stands out as the most consistent country, in terms of the uniformity of its lobbies in all three situations analysed. It is however telling the much lower value of its coefficients, signalling that the resultant protection is lower than in the other members – what is indeed true in the case at stake. In fact, all members deviate from free trade in only few sectors. Brazil deviates in 3 of the 27 (aggregate) sectors that are being considered; Paraguay and Uruguay deviate in a greater percent than Brazil and Argentina but the deviations represent less than 5 percent of the total tariff lines.<sup>10</sup>

Summing up the findings in the three models, in the case of Brazil, though the government attaches considerable weight to social welfare, protection arises in the external tariff structure of Mercosul. The multiplicity of lobby representations in the country is not so high as to neutralize the power of the interest groups that stand to lose. The pattern of protection in Mercosul, through the CET, external and internal tariff models is quite consistent with the basic predictions of the theory. Explanation of specific protection in Uruguay seems however different; though the degree of lobby representation and the relative weight of social welfare are high, protection exists. The reason must lie in the fact that there are important sectors that are not organized. The case of Argentina deserves further thoughts. A possible cause for the odd signs found for its coefficients might lie in the serious dismantling of the industrial structure during the high inflation years and even beyond, after the 1991 stabilisation plan (see also WTO (1998)).

## 6. Concluding Remarks

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<sup>10</sup>As Olarreaga and Soloaga (1998) indicate, in 1996 deviations from internal trade only corresponded to 0.2 percent of total lines for Brazil, 2.5 percent for Argentina, 3.3 percent for Paraguay and 4.4 percent for Uruguay.

The Grossman-Helpman model seems to be a parsimonious, promising approach to explain the structure of protection that springs from the Mercosul agreement.

We considered in our analysis two of the three variables that explain protection: the political organization dummy and the ratio of domestic output to imports. Trade (import) elasticities were incorporated in a particular, less precise manner. Indeed, import elasticities appear on the left hand side of the equation in order to consider its measure error as a component of the measurement error of the dependent variable. Export elasticities were not used in the analysis due the fact that no reliable estimates were found. Therefore, term-of-trade effects did not enter in the argument.

The estimations confirm that some sectors receive protection both through the CET and its deviations. The common external tariff model gives evidence on protection in Brazil and Uruguay. Furthermore, the deviations-from-the-external-tariff model supports protection to sensitive groups in Brazil.

The structural parameters confirm that a certain degree of protection in Brazil and Uruguay does exist. Though in Brazil there is a relatively high degree of lobby representation, it is not so high as to neutralize the power of interest groups. Uruguay presents a different picture. The degree of lobby representation is higher, but protection may exist due to the fact that all sectors are not represented and the output/import ratio is very high for some of them.

An important empirical result has also been achieved: distinct patterns of protection arise, depending on whether or not a given sector is organized. In other words, the Grossman-Helpman model is extremely sensitive to the definition of the “lobby sectors”. We also confirmed that the positive correlation between protection and the import penetration ratio (the inverse of the domestic output to imports ratio), usually considered in partial equilibrium analysis, applies only to the non-organized sectors; within organized sectors this correlation is negative.

In terms of future improvements two tasks stand out. One is a better theoretical support for the extensions portrayed in systems (10), (16) and (17). This should try to further the matching of the actual negotiation procedures with the formal ways available to enlarge the scope of the Grossman-Helpman framework; something which seems more feasible in the two first cases (systems (10) and (16)). The second is a deeper analysis of the set of instruments for the output-import ratio, certainly another source of possible instabilities in the final results.



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## ANNEX: The Reduced Form for the Output-import Ratio

**Table A.1: Estimation of the reduced form of the output-import ratio equation**

	Coefficient	t-Statistic	Prob.
<b><i>Argentina</i></b>			
<i>Constant</i>	32201.29	1.023	Ns
<i>Employment<sup>A</sup></i>	0.001272	0.002	Ns
<i>Concentration Index<sup>A</sup></i>	8.488905	0.447	Ns
<i>Capital<sup>A</sup></i>	1.36E-06	0.043	Ns
<b><i>Brazil</i></b>			
<i>Constant</i>	17906.30	2.588	0.010
<i>Employment<sup>B</sup></i>	0.084413	2.321	0.021
<i>Concentration Index<sup>B</sup></i>	32.95789	1.930	0.055

<i>Capital</i> <sup>B</sup>	-6.21E-.06	-2.288	0.023
<b><i>Paraguay</i></b>			
<i>Constant</i>	-1623.468	-0.252	Ns
<i>Employment</i> <sup>P</sup>	2.403643	0.267	Ns
<i>Concentration Index</i> <sup>P</sup>	79.50768	1.386	0.167
<i>Capital</i> <sup>P</sup>	4.38E-05	0.445	Ns
<b><i>Uruguay</i></b>			
<i>Constant</i>	9000.865	0.468	Ns
<i>Employment</i> <sup>U</sup>	1.508987	0.806	Ns
<i>Concentration Index</i> <sup>U</sup>	49.40697	2.445	0.015
<i>Capital</i> <sup>U</sup>	-0.000127	-0.555	Ns