

# What's behind Mercosur's Common External Tariff? \*

*Marcelo Olarreaga*<sup>+</sup>

*Isidro Soloaga*<sup>⊥</sup>

*L. Alan Winters*<sup>\*</sup>

**November 1999**

**Abstract.** The theoretical literature follows two different approaches to explain the endogenous formation of a Customs Union (CU). The first one explains CU formation through the willingness of integrating partners to exploit terms-of-trade effects. Indeed, as the union forms, the “domestic market” gets larger and members’ international market power increases. The alternative explanation is related to political-economy aspects such as the CU offering the possibility of exchanging markets or protection within the enlarged market. Which is the engine behind CU formation? This is the question at the core of this paper. Results suggest that in the case of the Common Market of the Southern Cone (Mercosur) both forces were important. Terms-of-trade effects account for between 6 and 28 percent of the explained variation in the structure of protection. There is also evidence that the terms-of-trade externalities among Mercosur’s members have been internalized in the Common External Tariff (CET).

*JEL classification numbers:* F13, F14, F15.

*Keywords:* Endogenous tariffs, Political-economy, Terms-of-trade effects, Mercosur.

---

\* We are grateful to Antoni Esteveordal, Luis Felipe Quintero, Maurice Schiff, Howard Shatz and participants at the Latin American Economic Association Meeting in Santiago de Chile, at the Trade Seminar at the World Bank and at the Universidad del Rosario-World Bank Institute conference in Bogotá for very useful comments. We are also indebted to Lili Tabada for excellent assistance. The views expressed here are those of the authors and do not necessarily represent those of the institutions to which they are affiliated.

<sup>+</sup> Development Research Group (DECRG), The World Bank, 1818 H Street, NW, Washington DC 20037; and Centre for Economic Policy Research (CEPR), London; e-mail: molarreaga@worldbank.org.

<sup>⊥</sup> DECRG, The World Bank; University of Maryland; e-mail: isoloaga@worldbank.org

<sup>\*</sup> School of Social Sciences, University of Sussex, Falmer BRIGHTON, BN1 9SN, UK; CEPR; and Centre for Economic Performance, LSE, London; e-mail: L.A.Winters@Sussex.ac.uk.

## Non Technical Summary

The international trade literature has followed at least two distinct approaches to explain the existence of tariffs. The first one is known as the *terms-of-trade approach*. It explains the presence of tariffs in terms of the ability of large countries to influence world prices. A tariff reduces the international demand for the import-good and therefore decreases its international prices, which in turn improves the terms-of-trade of the importing country. This allows the tariff-imposing country to redistribute revenue from the rest-of-the-world to itself. The second approach is known as the *endogenous tariff formation* theory and views trade policy as a way of redistributing income towards preferential groups or lobbies --preferred in a political-economy sense.

In analyzing the effects of regionalism on the multilateral system, these two approaches may lead to different conclusions. For example, using the terms-of-trade approach, Krugman (1991) concludes that tariffs on rest-of-the-world imports should increase after the formation of a regional block. This is related to the internalization of terms-of-trade effects in the Common External Tariff (CET). Indeed, if potential members of a CU tend to import similar goods, then the formation of a larger block will naturally lead to higher tariffs, as market power in international markets increase. Other authors, such as Richardson (1994) using political economy arguments find that tariffs, with respect to the rest-of-the world, should decline after the formation of a customs union. This is generally due to Olson's free-riding problem in larger groups. As the lobbying group size increases, it becomes more difficult to get organized and the effectiveness of the lobbying group declines. Thus, it seems important to know what the forces are behind tariffs.

Surprisingly, empirical research on tariff structures has essentially focused on the political-economy determinants of protection and neglected the terms-of-trade as a possible explanatory variable. This study seeks to rectify this omission in a case-study of the formation of Mercosur's Common External Tariff (CET). The CET was negotiated in 1994 and has already been shown to owe quite a lot to political economy forces (Olarreaga and Soloaga, 1998). In this paper we add in terms of trade factors as an

additional explanatory variable and find that they account for between 6 and 27 percent of the explained cross-commodity variation in tariffs.

We model tariff formation both at the tariff-line level (or as close as we can get to it) – which is clearly the right level for identifying trade effects - and at the industry level – which may be more appropriate for some of the political economy factors. At each level considerable care is required to avoid econometric pitfalls arising from the facts that tariff data are truncated at exogenously determined maximum and minimum levels and that we need to convert data measured at one level of aggregation to the other. These complications aside, however, our approach just straight-forwardly regresses tariff levels on political economy variables, such as industry concentration, unionisation, capital-labour ratios and import-penetration, and on measures of Mercosur’s market-power – its power to influence its terms of trade. Our more successful equations measure the latter by the share of world exports of a commodity that it purchases as imports.

Our results do not undermine earlier findings that political economy factors were important to the determination of Mercosur’s CET, but they do suggest that they need to be supplemented by market-power effects. The importance of the latter for even relative small traders such as Mercosur is, perhaps, surprising (Mercosur accounts for only 1 percent of world markets). This suggests both that terms of trade effects should be included in other models of tariff determination and that the so-called “small-country assumption”, which rules out terms of trade effects for most countries, is of limited relevance.

## 1. Introduction

The international trade literature has followed at least two distinct approaches to explain the existence of tariffs. The first one is known as the *terms-of-trade approach*. It explains the presence of tariffs in terms of the ability of large countries to influence world prices. A tariff reduces the international demand for the import-good and therefore decreases its international prices, which in turn improves the terms-of-trade of the importing country (see Corden, 1974). This allows the tariff-imposing country to redistribute revenue from the rest-of-the-world to itself. The second approach is known as the *endogenous tariff formation* theory and views trade policy as a way of redistributing income towards preferential groups or lobbies --preferred in a political-economy sense (see Hillman, 1982 or Mayer 1984).<sup>1</sup>

The explanation for *regionalism* or Customs Union (CU) formation has also traditionally followed these two approaches (see Winters, 1996). The *terms-of-trade* theory has argued that the formation of a CU may also be explained by the willingness of integrating partners to internalize their terms-of-trade effect. Indeed, if countries tend to import the same product, then by forming a customs union they increase their international market power (see Riezman, 1985 or Krugman, 1991, and the literature that has followed). The endogenous tariff formation literature focuses on the ability to exchange markets or protection within CU (see Hillman, Long and Moser, 1995 or Grossman and Helpman, 1995a).

In analyzing the effects of regionalism on the multilateral system, these approaches lead to different conclusions (see Winters, 1996). For example, using the terms-of-trade approach, Krugman (1991) (or Bond and Syropoulos, 1996) concludes that tariffs on rest-of-the-world imports should increase after the formation of a regional block. This is related to the internalization of terms-of-trade effects in the Common External Tariff

---

<sup>1</sup> There is at least a third approach which emphasize on real world departures from Pareto optimality, providing a second-best argument for the use of protection based on economic efficiency (see Bhagwati, 1971). This includes: infant-industry arguments (which are of particular relevance in the case of Latin America), imperfect competition, tariff revenue motives, etc...In fact, the first approach above may be considered as a sub-category of the theory of tariffs as responses to distortions.

(CET). Indeed, if potential members of a CU tend to import similar goods, then the formation of a larger block will naturally lead to higher tariffs, as market power in international markets increase. Other authors, such as Richardson (1994) or Panagariya and Findlay (1994), using political-economy arguments, find that tariffs with respect to the rest-of-the world should decline after the formation of a customs union. This is generally due to Olson's free-riding problem in larger groups. As the lobbying group size increases, it becomes more difficult to get organized and the effectiveness of the lobbying group declines.<sup>2</sup> Thus, it seems important to know what the forces are behind tariffs.

This paper addresses the following questions: What is the dominating force behind regionalism? Are regional integration blocks formed to internalize terms-of-trade effects? Or are political-economy forces the predominant determinants? The analysis is conducted ex-post, in the sense that we take the regional block as given and identify the determinants of the CET. In other words, we do not explicitly study the ex-ante forces that led to the formation of the regional block, but infer this by identifying the determinants of the ex-post structure of the CET.

The Common Market of the Southern Cone (Mercosur) seems an interesting case from which to try to identify which of these motivations is behind regionalism, for at least three reasons.

First, Mercosur members have only recently negotiated a CET (the first decision was reached in December 1994 in Ouro Preto) and therefore the structure of their CET has limited external influence (e.g., no WTO offers). Moreover, if Latin American countries tariff structure may had been determined by "purely" political factors, such as the "import-substitution" of the 1970s and early 1980s, recent studies showed that in the

---

<sup>2</sup> In the absence of free-riding effects in group formation, some studies have found, within a political-economy setting, that protection may actually increase beyond the pre-regional integration levels after the formation of a CU or Common Market due to non-linearities in the determination of the CET (see Cadot, de Melo and Olarreaga, 1999, for an example, or Winters, 1996 for a comprehensive survey of the literature).

1990s tariffs have been primarily influenced by private interests (see Faina, 1995 and Olarreaga and Soloaga, 1998).

Second, the larger members of Mercosur (Argentina and Brazil) are sufficiently large trading countries to influence world prices, at least in some markets;<sup>3</sup> there is also recent evidence by Chang and Winters (1999) of the existence of terms-of-trade effects in Mercosur countries.

Third, and more practically, industrial data are available for the larger members of Mercosur at a relatively high level of disaggregation, which would be necessary when trying to identify terms-of-trade effects.

Our results suggest that in the case of Mercosur, both forces were important in the determination of the common external tariff. Terms-of-trade effects account for between 6 and 28 percent of the explained variance in the structure of protection. This is a surprising result given that the bloc is small in terms of world GDP. This result challenges researchers to reconsider how small a “small open economy” is. There is also evidence that Mercosur members have internalized in their CET the terms-of-trade externality that arises when members import the same products. Thus, although political-economy forces seem to explain a larger proportion of the common external tariffs, the terms-of-trade rationale for tariffs cannot be neglected.

## **2. Determining Mercosur’s Common External Tariff**

Mercosur’s CET varies between 0 and 20 percent. In 1996, the average CET over the whole universe was 11 percent, though in the sample analyzed it is 13 percent.<sup>4</sup> Figure 1

---

<sup>3</sup> Jointly Brazil and Argentina represent a little bit more than 1 percent of world imports. At the 4-digit level of the ISIC Rev. 2, the shares range from 0.024 percent (logging) to 5.8 percent (grain mill products). At the 6-digit level of the Harmonised system, the shares range from 0 percent (goat meat and insulin, for example) to more than 30 percent (ethyl alcohol, propylene dichloride, for example).

<sup>4</sup> The average CET over the whole tariff universe is close to 11 percent. Due to mapping of the data from trade to industrial classification some of the agricultural products had to be dropped.

illustrates the deviations from the average tariff for each of the 80 industries of the ISIC 4-digit classification. It suggests a significant variation that calls for an explanation.

Industries with large deviations above the mean, i.e., more than 6 percentage points, are concentrated in Distilled Spirits (ISIC 3131), Soft Drinks (3134), Textiles (3220, 3223 and 3240), and Transport Equipment (3849). Industries with large deviations below the mean, i.e., more than 6 percentage points, include Drugs and Medicine (3522), Petroleum Refineries (3530), and Cement (3692).

The remainder of the paper attempts to measure the relative importance of the terms-of-trade and political-economy effects in the determination of the structure of the CET.

## **2.1 Predictions of the endogenous tariff formation literature**

In the absence of lobbies, the presence of market power in international markets has been identified early as a rationale for tariffs by a benevolent government. In the presence of terms-of-trade effects, a welfare maximizing government sets tariffs so that they are negatively correlated with the elasticity of export supply faced by the country. It is only in the extreme case of a “small” country facing an infinitely elastic supply of exports (which implies no terms-of-trade effects) that the optimal tariff would be zero.

The political-economy literature has followed different approaches in providing explanations for the structure of protection. This has led to many predictions that relate industry characteristics and economy-wide fundamentals to tariff levels.<sup>5</sup> As suggested by Helpman (1995), different approaches tend to generate similar predictions. These predictions are discussed in appendix 3. As an example, the most common prediction in the literature is that highly concentrated sectors tend to have higher levels of protection as they can more easily overcome the free-riding problem in organising an interest group.

---

<sup>5</sup> For a discussion of the literature see Rodrik (1995) and for a survey of empirical studies Magee (1997).

Grossman and Helpman (1995b) introduced the terms-of-trade motive for protection in a political-economy framework, where the government is subject to industry lobbying. Using the influence-driven approach, developed in Grossman and Helpman (1994), they show that in such a context the tariff structure can be disentangled into two components: a lobbying and a terms-of trade component. The sectoral pattern of protection is then determined by both the political-economy variables discussed in appendix 3 and the elasticity of export supply faced by the country:

$$T = f(PE; \varepsilon) \quad (1)$$

where  $T$  is the vector of tariffs across industries;  $PE$  is the matrix of political-economy variables across industries and  $\varepsilon$  is the vector of export supply elasticities faced by the country in each industry.

In a CU, such as Mercosur, the same forces are at work. However, the structure of the optimal CET will depend on the institutional set up. Several cases can be envisaged. The relevant case for Mercosur is one where the CET is the outcome of bargaining between member-country governments. Indeed, the Mercosur experience in the determination of the CET is one of bargaining between governments that were subject to national lobbying pressures. Thus, the CET reflects cooperation between member countries, but not the integration of their economies. In such a setup and using the influence-driven approach, Cadot *et al.* (1999) have shown that the CET is determined by the production-weighted sum of the different political-economy variables in member countries. This implies that the CET in sector  $i$  mainly reflects the preferences of the member country that has the largest level of production in sector  $i$ . Thus:

$$CET_i = f\left(\sum_c \gamma_i^c PE_i^c ; \sum_c \gamma_i^c \varepsilon_i^c\right) \quad (2)$$

where superscript  $c$  refers to member countries of the CU and subscript  $i$  refer to industries;  $CET_i$  is the CET in industry  $i$ ;  $\gamma_i^c$  is the share of country  $c$  in the whole CU

production of industry  $i$ . Equation (2) is at the heart of the empirical analysis below that attempts to explain the structure of Mercosur's CET .

### **3. Empirical Model**

As suggested above, the optimal tariff for a large country is negatively correlated with the elasticity of supply of foreign exporters to Mercosur's markets. The empirical estimation of these elasticities is beyond the purpose of this paper. It requires detailed information on bilateral trade flows at the tariff line level and the characteristics of producers based in countries exporting to the Mercosur's market. To our knowledge there are no estimates reported in the literature of the elasticity of export supply faced by any country in the world.

The alternative path, and the one we followed, is to identify the forces behind the elasticity of export supply faced by a country. As shown below, this elasticity can be written as a function of three elements. First, the market share of the importing country in world markets. Second, the total world export supply elasticity. And third, the import demand elasticities of other importing countries in the world (as well as their shares in world markets).

The empirical analysis mainly uses the import share of the importing country as a proxy, for reasons we make clear below. For now, note that this proxy has a straightforward intuitive rationale. At the limit, if a country has an infinitely small share of world markets, it will face an (almost) infinitely elastic supply function from foreign exporters. Its ability to influence world prices is going to be very small (price-taker). On the other hand, if a country has a share of 1 in world markets, then the supply function from foreign exporters will be more inelastic. Its ability to influence world prices is going to be relatively high (price-maker).

#### **3.1 Import shares as a proxy for elasticities of foreign export supply**

Are import shares a good proxy for elasticities of foreign export supply?<sup>6</sup> To answer this question, we first need to define what we mean by export supply faced by one country. A natural way of identifying the foreign export supply curve faced by country  $i$  is the following: whenever country  $i$  increases its import demand, this results in a price increase. This price increase will lead to an increase in quantities exported to country  $i$ , which country  $i$  perceives as a move along the export supply function it faces. This quantity increase is a combination of the increase in world export supply and the reduction of import demand in other markets due to the increase in prices. By observing the price and quantity increase, country  $i$  determines the export supply it faces. Formally, let us define world export supply as:

$$x_T = \sum_{i=1}^n x_i \quad (3)$$

where  $x_T$  is world export supply and  $x_i$  are quantities exported to country  $i$ . The (perceived) export supply function faced by country  $i$  is given by:

$$x_i = x_T - \sum_{j \neq i}^n x_j = x_T - \sum_{j \neq i}^n m_j \quad (4)$$

where  $m_j (\equiv x_j)$  are imports of country  $j$  (which by definition are equal to quantities exported to country  $j$  by the rest-of-the-world). The idea is that the price increase in world markets is due to a shift in demand in country  $i$ , and, therefore, all other countries will move along their import demand curve. This will be *perceived* by country  $i$  as a change in quantities exported to its market following the change in prices.<sup>7</sup> Differentiate both sides of (4) by  $p$ , multiply by  $p/x_T$  and rearrange, yielding:

---

<sup>6</sup> An alternative proof of the positive relationship between market share and optimal tariffs in a monopolistic competitive setting can be found in section 3 of Bond and Syropoulos (1996).

<sup>7</sup> This is not crucial to our proof. Note that had we assume that all import demands were perfectly inelastic, we would have obtained the same qualitative results.

$$\frac{x_i}{x_T} \varepsilon_i = \varepsilon_T - \sum_{j \neq i}^n \eta_j \frac{x_j}{x_T} \quad (5)$$

where  $\varepsilon_i$  is the elasticity of export supply faced by country  $i$ ;  $\varepsilon_T$  is the elasticity of world supply; and  $\eta_j$  is the elasticity of import demand in country  $j$ . Define  $\lambda_k = \frac{x_k}{x_T}$  as the share of country  $k$  in world markets and solve for  $\varepsilon_i$ :

$$\varepsilon_i = \frac{1}{\lambda_i} \left[ \varepsilon_T - \sum_{j \neq i}^n \eta_j \lambda_j \right] \quad (6)$$

Ideally, one can calculate the elasticities of export supply faced by a country using equation (6). Import shares can be easily calculated and there exist some estimates of export supply elasticities and import demand elasticities in the literature.<sup>8</sup>

Thus, to capture the elasticity of export supply we are left with two options. First, our preferred option is to use the market share of the importing country (Mercosur) as a proxy and thus avoid having to use trade elasticities, which are necessarily estimated with error. Second, we could use the estimates of import demand elasticities of the US estimated in Shiells *et al.* (1986). Then assuming that all countries in the world have the same import demand elasticities at the industry level, and given the lack of estimated export supply elasticities, that the latter are uniform across industries and equal to 0.5, equation (6) becomes:<sup>9</sup>

$$\varepsilon_i = \frac{1}{\lambda_i} [0.5 - \eta_{US} (1 - \lambda_i)] \quad (7)$$

---

<sup>8</sup> For a review of trade elasticities, see the classic work by Stern *et al.* (1976). There are some export supply elasticities estimates but they are mainly done for agriculture commodities, and not for industrial products. For estimates of U.S. import demand elasticities at the industry level, see Shiells, Stern and Deardoff (1986).

<sup>9</sup> The assumed export supply elasticity is consistent with the rare estimates reported in Stern *et al.* (1976).

To use equation (7) one needs to correct for the fact that it is a generated regressor that has been estimated with error (see Gawande, 1997). Results reported in appendix 4 use equation (7) and Gawande's correction method as a proxy for  $\varepsilon_i$ .<sup>10</sup> However, due to the fact that our estimates are sensitive to the choice of  $\varepsilon_T$ , we decided to use  $\lambda_i$  as a proxy for  $\varepsilon_i$  in the paper and leave the discussion of estimates using equation (7) for appendix 4. Note that the term in square brackets in equation (7) is always positive and therefore  $\lambda_i$  can be used as a proxy for  $\varepsilon_i$ .<sup>11</sup>

### **3.2 Determining the CET: at the tariff line or at the industry level?**

To understand how tariffs are set, one first needs to know at which level these are decided. Mercosur's tariff schedule has as many as 6000 tariff lines (at the 8 digit level of the harmonised system). This tends to suggest that the appropriate level of analysis for tariff formation is the tariff line. On the other hand, it could be argued that lobbying is done at the industry level, as for example the textile lobby represents textile producers and not producer's of certain type of textiles. However, the textile lobby will rationally lobby for protection only in certain tariff lines where there is local production.

A quick look at Mercosur's tariff schedule confirms this. In 1996, the tariff level for "High tenacity nylon for retail market" (HS 54021010; a textile product) was 16 percent. At the same time, the tariff level for "High tenacity amid for retail market" (HS 54021020; another textile) was 2 percent. All other "High tenacity yarn" (HS 54021090) had a 16 percent tariff also. If lobbying was done at the industry level, all these tariffs should be the same (if only determined by lobbying activities). However, we observed a

---

<sup>10</sup> For the exact formula, see equation (5) in Gawande (1997).

<sup>11</sup> A recent study studying the relevance of terms-of trade effects in a cross-section of countries and using relative sizxe as a proxy is Djankov and Freund (1999).

700 percent difference between them. From here we conclude that the right level of analysis for tariff formation is the tariff line and not the industry.<sup>12</sup>

Tariff data is available at the 8-digit level of the Harmonized System (HS, more than 6000 lines). Trade data is available at the 6-digit level of the HS (4261 lines), whereas industrial data is available only at the 4-digit level of the ISIC (80 sectors). Thus, analysis at the 8-digit level is not possible. We are left with two options: analysis at the 4-digit ISIC level or analysis at the 6-digit HS level. Running the regression at the 4-digit ISIC level implies an important loss of trade and tariff information available at the 6-digit level. To illustrate this, the horizontal axis of Figure 2 reports the CET coefficient of variation within each ISIC 4-digit industry. The average is around 0.5, but it reaches up to 3 in some industries. Moreover, as suggested in Figure 2, the coefficient of variation of Mercosur import shares seems to be positively correlated with the coefficient of variation of the CET at the 4-digit industry level. This variation within the ISIC 4-digit category calls for an explanation, which suggest running the regressions at the 6-digit level of the HS.

However, given the constraint on industrial data, which is available only at the 4-digit industry level, analysis at the 6-digit level may give too much importance to the terms-of-trade effects in explaining the structure of the CET. To check the robustness of our results we report regressions both at the 4-digit and 6-digit level.

### **3.3 Empirical CET determination**

The Common External tariff in Mercosur is double-censored between 0 and 20 percent and ignoring this censoring could bias our results.<sup>13</sup> In other words, if only industry-

---

<sup>12</sup> One could argue that the difference can be explained by terms-of-trade effects, but Mercosur's (Argentina and Brazil) imports of HS 54021010 are equal to US\$ 167000 dollars and imports of HS 54021020 are equal to US\$ 281000 dollars (according to WTO notifications). World trade at this level of disaggregation is not available, but such small absolute amounts and differences cannot explain such an important tariff differential.

<sup>13</sup> Some of the coefficients in the empirical section are quite sensitive to this tobit bias, signalling that some of these variables were constrained by the censoring.

specific political-economy and terms-of-trade factors determined tariffs, some tariffs could have been negative or larger than 20. To allow for censoring we estimate a tobit CET model:

$$CET_k = \begin{cases} CET_k^* & , \text{if } 0 < CET_k^* < 20 \\ 0 & , \text{if } CET_k^* \leq 0 \\ 20 & , \text{if } CET_k^* \geq 20 \end{cases}$$

$$\text{and } CET_k^* = \alpha^0 + \alpha^{\lambda}_+ \varepsilon_k + \alpha^{\theta}_+ \theta_k + \alpha^W_- W_k + \alpha^{\ell}_+ \ell_k + \alpha^I_- I_k + \alpha^c_+ C_k \quad (8)$$

$$+ \alpha^T_- T_k + \alpha^M_- M_k + \alpha^{\Delta M}_+ \Delta M_k + \alpha^N_- N_k + \mu_k$$

where  $\varepsilon_k$  is the elasticity of export supply faced by Mercosur members in sector  $k$  (we use import shares ( $\lambda_k$ ) as a proxy in the text and equation (7) in appendix 4);  $\theta_k$  is the labour share of sector  $k$  in total Mercosur employment;  $W_k$  is the wage level in sector  $k$ ;  $\ell_k$  is the labour-capital ratio in sector  $k$ ;  $I_k$  are purchases of sector  $k$  products by other sectors;  $C_k$  is the industry concentration in sector  $k$ ;  $T_k$  is a trade-creation proxy;  $M_k$  is the net import-penetration ratio in sector  $k$ ;  $\Delta M_k$  is the change in the import-penetration ratio for the period 1993-1996, and  $N_k$  is intra-industry trade in sector  $k$ . All the  $\alpha^s$  are parameters and  $\mu_k$  is the error term. All the explanatory variables are taken in logs (except for  $M_k$  and  $\Delta M_k$  which can take negative values). Expected signs are included below each variable. For a description of variable construction see the Data Appendix and for the economics (or political-economy) behind each of these variables see the Appendix on Endogenous Tariffs.

All the variables are constructed as described in section 2, i.e., each of them is given by the production-weighted average of the respective variable in each of the member countries.<sup>14</sup> As argued above, we believe that the tariff setting is done at the tariff line

---

<sup>14</sup> Due to the lack of industrial data at the 4-digit ISIC level for Uruguay and Paraguay, we only considered the weighted average of Argentina and Brazil's variables. In any case, the share in production of Uruguay and Paraguay in Mercosur at the 4 digit level should be sufficiently small for this not to be a

level. As industrial data is not available at such a high level of disaggregation we assumed that industrial data was uniformly distributed across tariff lines in a given industry. Thus, we divided all the industrial data by the number of lines existing at the 6-digit level of the HS within each 4-digit ISIC category.

We are conscious that some of the explanatory variables could be jointly determined with the dependent variable and therefore subject to endogeneity bias. For example, this is the case when using trade shares ( $\lambda_k$ ), defined as Mercosur's imports of good  $k$  over world trade of good  $k$ . To try to avoid this type of bias, we work with lagged explanatory variables.<sup>15</sup> Our endogenous tariff is then the CET of Mercosur in 1996, whereas trade data is the average for 1993-1996. Industrial data is based on 1985 censuses in Argentina and Brazil that we updated to 1993-1996 values to make them comparable to trade data (see Data Appendix).<sup>16</sup> Moreover, the endogeneity problem should tend to bias our estimated coefficient on trade shares ( $\alpha^\lambda$ ) towards zero. An alternative is then to consider our trade share estimates as lower bounds.

## 4. Results

The second column of Table 1 report the results of the estimation of equation (8) at the 4-digit ISIC level (80 observations). We report results using import shares ( $\lambda$ ) as a proxy for the elasticity of export supply. We obtained similar results using equation (7) and these are reported in appendix 4.

---

problem. At the 3-digit level (27 sectors), the share of Uruguay and Paraguay is always below 10 percent, except in the case of textiles, where it reaches 13 percent. (see Olarreaga and Soloaga, 1998).

<sup>15</sup> Obviously, serial correlation in some variables may have watered down this correction.

<sup>16</sup> One could argue that the 1996 CET is highly correlated with Argentina and Brazil's 1992 external tariff and therefore the bias correction, by using lagged variables is not without drawbacks. However, simple partial correlations between Argentina and Brazil's 1992 external tariff and the 1996 CET yield values of .64 and .74 respectively. We acknowledge that these are high, but at least not perfectly correlated.

As argued before, tariffs are determined at the tariff line level and therefore our data should be interpreted as group data. Traditional estimation with group data requires that each observation be weighted by the number of observations in each group (i.e., multiplied by the square root of the number of observations in each group). The rationale is that if the error term is independently distributed at the tariff line level, then the variance of the error term at the group level will be negatively correlated with the number of lines in each group (i.e., groups with large numbers of observations will have small variance). Given that the number of observations in each group varies from 1 (ISIC 3131 Distilling, rectifying and blending spirits) to 501 (ISIC 3511 Manufacture of basic industrial products), this could lead to serious heteroscedasticity problems.

A problem with the above correction is that it assumes that the errors at the tariff line are independently distributed. If one believes that observations in the same industry share common unobserved determinants, then the above correction may re-introduce some heteroscedasticity.<sup>17</sup> We tested for this after weighting our observations following Dickens' (1990) test and we could not reject the presence of a common unobserved determinant at the industry level.<sup>18</sup> Thus, we corrected for the presence of a common error component using a two-stage approach suggested by Dickens (1990). First, we consistently estimate the variance of the common and individual component of the error term by running the squared error of the weighted regression on a constant and  $1/n_j$ ; where  $n_j$  is the number of observations in group  $j$ . The coefficient of the constant is a consistent estimate of the common error component variance, and the coefficient  $1/n_j$  is

---

<sup>17</sup> The presence of common unobserved characteristics will lead to an error term at the tariff line level of the following form:  $\mu_{i,j} = v_j + u_{i,j}$  where  $v_j$  is the shared group  $j$  error component. If both components of the errors are independently distributed, then the variance of the error term at the group level is then given by:  $\text{var}(\bar{\mu}_j) = \sigma_v^2 + \sigma_u^2/n_j$  where  $n_j$  is the number of observations in each group and  $\sigma_u^2$  is the variance of the  $z$  component of the error term.

<sup>18</sup> Dickens (1990) suggests running the squared error term of the weighted regression on a constant and the number of observations. If the coefficient is significant (at the 99 percent level in our case), then one should try an alternative weighting method. Using Kennedy's (1985) rule of thumb, that the estimated variance of the common element over the variance of the number of observation should be smaller than 15 percent for the traditional weighting method to work, we also concluded against the traditional method.

a consistent estimate of the individual error component. Then we divide each observation by  $\sqrt{\hat{\sigma}_v^2 + \hat{\sigma}_v^2/n_j}$  which yields asymptotically efficient estimates for our regression. The results are presented in column 1 of table 1.

All the variables have the expected sign, with the exception of the labour share ( $\theta$ ), the net-import penetration ratio ( $M$ ) and its change ( $\Delta M$ ), all of which are statistically insignificant.<sup>19</sup> The significant variables are: the terms-of-trade proxy ( $\lambda$ ), suggesting that in the case of Mercosur, the market share of member countries in world trade had a significant effect on the CET structure; the labour-capital ratio ( $\ell$ ), suggesting that industry lobbying by capital owners was important; input sales to other sectors ( $I$ ) suggesting that counter-lobbying at the industry lobby was important. These three variables are also robust to both, exclusion of other variables and observations.

These results seem to show the significance of the terms-of-trade effect on tariff determination. However, by grouping data at the industry level (4-digit ISIC), we are losing an important amount of information of within industry tariff and import shares variation. Also, as argued before, there is strong evidence that tariffs are not determined at the industry level but at the tariff line level. To include this information, we therefore run the regression at the 6-digit HS level.

At the 6-digit level data there are only 126 different tariff levels over the 4200 tariff lines, indicating that clustering of data could present a problem for our estimations. We address this issue by applying the Generalised Huber correction procedure. Standard errors are corrected for within CET correlation and heteroscedasticity. As expected the overall significance of the regression after the correction falls. Again we comment only on results reported in column 3 using  $\lambda$  as a proxy for the elasticity of export supply, given the non-robustness of results using equation (7).

---

<sup>19</sup> This is consistent with Olarreaga and Soloaga (1998), which suggested that the explanation for this insignificant result is that labour-unions were excluded from the CET negotiations in Mercosur and that, as well as being potentially endogenous (Trefler, 1993), import-penetration-ratio effects are not uniquely signed even in theory.

All variables have the expected signs except for the labour-share ( $\theta$ ), the wage ( $W$ ) and the change in import penetration ( $\Delta M$ ). The statistically significant variables are: i) import-shares ( $\lambda$ ), suggesting that the terms-of-trade effect may partially explain the structure of the CET. The positive sign implies that sectors with larger import shares in world trade, and therefore smaller perceived elasticities of world export supply, have higher tariffs; ii) the labour-capital ratio ( $\ell$ ). The positive coefficient implies that labour-intensive sectors tend to be more protected; iii) the share of output purchased by other sectors as inputs ( $I$ ). The negative coefficient suggests that sectors that sell large shares of their output as intermediate inputs to other sectors will tend to have lower tariffs. This reflects counter-lobbying by purchasing sectors.; iv) the industry concentration ( $C$ ). The positive sign suggests that more concentrated industries will have higher tariffs, reflecting free-riding effects in larger groups, *a la* Olson; and v) intra-industry trade ( $N$ ). The negative coefficient implies that sectors in which there are large amounts of intra-industry trade tend to have lower tariffs, also reflecting counter-lobbying by input purchasers.

The above analysis that both lobbying by industries (pro-lobbying and counter-lobbying) and terms-of-trade effects can contribute to the explanation of the structure of the CET in Mercosur. Our results suggest that labour-unions do not contribute to the explanation of the structure of the CET. The relative contribution of the terms-of-trade effect to the overall explanation of the tariff structure is studied in section 5.

#### **4.1 Internalization: did it occur?**

Terms-of-trade effects lead to price externalities among countries that trade similar goods. When Brazil raises its tariffs on imported goods, this leads to a fall in international prices. If Argentina imports similar goods, this causes a positive externality for Argentina, as imports are now cheaper. In other words, had Brazil considered the effects of its tariffs not only on its terms-of-trade, but also on Argentina's terms-of-trade, it would have set a higher tariff. Obviously, the externality would have been negative had Argentina's exports to the world been of mainly the same products as Brazil imported.

The creation of a CU raises the opportunity for the internalization of the terms-of-trade externality, as suggested by Riezman (1985). Members of a CU should not be focusing any longer on the individual countries' market power when trying to set their tariffs, but on the market power of the whole CU. This section explores whether the Mercosur bargaining process over the CET has led to the internalization of this externality.

In terms of our empirical model, this implies that the terms-of-trade variable should not be constructed as the production weighted average of members' market share in world markets, but as the simple sum of members' market share in world markets. That sum is the share of the whole union in world markets.

In the case of Mercosur, the internalization of the terms-of-trade externality should lead to a larger effect of the terms-of-trade variable in the CET. The reason for this is that Argentina and Brazil tend to import similar products, as shown in figure 3. Indeed figure 3 shows that there is a positive relationship between the import shares of Argentina and Brazil in the world market at the 4-digit level of the ISIC classification.<sup>20</sup> This suggests a positive terms-of-trade externality between the two members of Mercosur.

Table 2 reports the results of the estimation of equation (8) when the terms-of-trade variable is constructed as the sum of Mercosur members' import shares. As expected, the coefficient on the terms-of-trade variable increases not only in terms of levels, but also in significance. All the other variables keep the same sign and same level of significance. The general fit of the regression also increases, both at the 4-digit ISIC and the 6-digit HS level.

To determine the correct empirical specification, i.e., whether one should specify the terms-of-trade variable as including internalization or not, we performed two different types of non-nested tests. The first, a "super model" test, includes all the variables that the two models have in common and also the variables that are different in one equation.

The test consists of verifying which of the non-common variables are significant and which are not. The largest drawback of this test is that it does not really distinguish between the two models, but rather between one of the models and a hybrid one. In our case, there may also be some collinearity between the two terms-of-trade variables, i.e., the internalized terms-of-trade variable and the non-internalized terms-of-trade variable. The *J* test proposed by Davidson and McKinnon (1981) overcomes these problems. To test which is the appropriate model, one estimates a regression with all the variables of the first model and the fitted value of the alternative. If the coefficient in front of the fitted value is insignificant, then one cannot reject the first model.

Using both types of tests for both levels of disaggregation (4-digit ISIC and 6-digit HS), we could never reject the hypothesis that the model capturing the internalization of the terms-of-trade was the true model, as shown in table 3. On the other hand, we could always reject the hypothesis that the model including the non-internalization of terms-of-trade variable was the true model.

This led us to conclude that in the case of Mercosur, the governments were aware of the terms-of-trade externalities and that these were internalized within the CET. This result supports the hypothesis that terms-of-trade effects were non-negligible determinants of Mercosur's CET. But how important were these effects in explaining the structure of the CET? This is the question addressed in the next section.

## **5. How important is the terms-of-trade effect?**

The previous section has identified terms-of-trade effects behind the structure of Mercosur's CET. Moreover, there is evidence that the terms-of-trade externality among Mercosur members has been internalized within the CET. This would suggest that even for "small" countries (around 1 percent of world markets), the terms-of-trade rationale for

---

<sup>20</sup> A similar positive correlation is found at the 6-digit of the HS classification.

tariffs may be valid. However, before concluding on the importance of this effect on the tariff structure, we need to measure the share of the CET variation that can be attributed to the terms-of-trade effect.

One way of answering this question is to run equation (8) with and without the import shares variable. We then calculate the different  $R^2$ s and respectively denote them  $FR^2$ ,  $WR^2$ . The share of the explained variation in the full-model that represents a clear association with the terms-of trade effect is then given by  $\Psi = (FR^2 - WR^2)/FR^2$ .<sup>21</sup>

The problem with censored regressions is that there exist many alternative  $R^2$ s. We calculate  $\Psi$  using three different pseudo- $R^2$ s: the McFadden (1973), the Aldrich and Nelson (1984), and the Veall and Zimmermann (1994) (*MF*, *AN*, and *VZ* respectively hereafter). The one reported in table 1 is the *VZ*. The most commonly used is the Mc Fadden. However, according to Veall and Zimmermann (1994) Monte-Carlo simulations, the McFadden pseudo- $R^2$  is severely downward biased. They tested 10 different possibilities and argued that *VZ* is the single best choice, whereas the one proposed in Aldrich and Nelson (1984) is a second-best.

The share of the explained variation that can be attributed to  $\lambda$ , according to these three pseudo- $R^2$ s is given in table 4. Our results suggest that in the case of Mercosur, terms-of-trade motivations explain between 6 and 18 percent of the total variation. At the 6-digit HS level, the simple average of the three alternative indicators suggests that 13 percent of the explanation can be attributed to terms-of-trade effects. Similarly, at the 4-digit ISIC level, the average is 8 percent. This suggests that an important share of the terms-of-trade action occurs within industries.

---

<sup>21</sup> The indicator  $\Psi$  may be seen as a maximum or minimum bound for the explained share depending on whether there is positive or negative correlation between the  $\lambda$  and the political-economy variables, respectively. Values in table 4 should be seen as minimum bounds at the 6-digit level of the HS and maximum bounds at the 4-digit level of ISIC, due to positive correlation at the 6-digit and negative at the 4-digit level.

Taking the total average over the 6 possible shares indicates that 13 percent of the explained CET variation can be clearly attributed to terms-of-trade effects. This is an extremely large value, especially in the case of Mercosur, whose member countries are not the first candidates when one thinks of price-makers in world markets.<sup>22</sup>

## 6. Conclusions

The trade literature has followed two different approaches to explain the existence of tariffs: the terms-of-trade approach and the interest group pressures approach. When analyzing the effects of regionalism on the multilateral system, the two approaches lead to different conclusions. For example, using the terms-of-trade approach, one concludes that tariffs on rest-of-the-world imports should increase after the formation of a regional block, because the market power of the region increases and terms-of trade externalities can be internalized in the CET of a CU. On the other hand, using a political-economy approach, one would usually conclude that tariffs with respect to the rest-of-the world decline after the formation of a CU. The rationale is related to free-riding effects in larger lobbying groups. Thus, it seems important to know what the forces are behind tariffs.

Surprisingly, when empirically studying tariff structures, researchers have essentially focused on the second approach and neglected the terms-of-trade as a possible explanatory variable. This study shows that in the case of Mercosur, between 6 and 27 percent of the explained variation of the CET can be attributed to terms-of-trade effects.

We also explore the possibilities of internalization of terms-of-trade effects when member countries import the same goods. There is evidence that Mercosur's bargaining process among members in the determination of the CET has led to the internalization of

---

<sup>22</sup> Using the VZ pseudo- $R^2$  we found that 17 to 48 percent of the variation in the CET can be attributed to counter-lobbying variables, and 10 to 41 percent to capital owners' pro-lobbying (depending on whether the regression is done at the tariff line or industry level. The contribution of the labour-union proxy is negligible. Note that the large share of counter-lobbying variables in the explanation of the structure may partially explain the significant unilateral tariff reduction in Mercosur's countries during the 1990s.

these effects. As Mercosur's members tended to import similar products, the internalization of the positive externality represented an upwards force in the CET.

More generally, these results tend to suggest that the relevance of the "small" country assumption may be limited to a small number of cases, as Mercosur represents only 1 percent of world markets, but terms-of-trade effects seem to be relatively important.

Finally, when studying the implications of regionalism on external tariffs towards non-members, one should try to simultaneously model the two rationales behind CU formation, as they both explain a significant share of tariff formation.

## References

Aldirch, J. and F. Nelson (1984), *Linear Probability, Logit and Probit Models*, Sage University Press, Beverly Hills.

Baldwin, Robert (1984), "Trade Policies in Developed Countries", in Ronald Jones and Peter Kenen, eds.; *Handbook of International Economics*, vol. I, Amsterdam: North Holland.

Bhagwati, Jagdish (1971), "The generalised theory of distortions and welfare", in: J. Bhagwati, R. Jones, R. Mundell and J. Vanek, eds., *Trade, Balance of Payments, and Growth: Papers in International Economics in Honor of Charles P. Kindleberger*, North Holland.

Bhargava, A., L. Franzini and W. Narendranathan (1981), "Serial Correlation and the Fixed Effects Model", *Review of Economics and Statistics*, 533-549.

Bond, Eric and Constantinos Syropoulos (1996), "The size of trading blocs Market Power and world welfare effects", *Journal of International Economics* **40**, 411-437.

Brander James. and Barbara Spencer (1981), "Tariffs and the extraction of foreign monopoly rents under potential entry", *Canadian Journal of Economics* **14**, 371-389.

Brainard Lael and Thierry Verdier (1994), "Lobbying and the adjustment in declining industries", *European Economic Review* **38**, 586-595.

Cadot, Olivier, Jaime de Melo and Marcelo Olarreaga (1999b), "Regional Integration and Lobbying for Tariffs Against non-members", *International Economic Review* **40** (3).

Caudill, Steven and John Jackson (1993), "Heteroscedasticity and Grouped Data Regression", *Southern Economic Journal* **61**, 128-135.

Chang, Won. and L. Alan Winters (1999), “The price effects of Regional Integration: non-member reaction to Mercosur”, Policy Research Working Paper No. 2157,. World Bank

Corden, Max (1971), *The theory of protection*, Oxford University Press.

Davidson Russell and James G. MacKinnon (1981), “Several tests for Model Specification in the Presence of Alternative Hypotheses” *Econometrica* **49** (3): 781-93.

Dickens, William (1990), “Error components in grouped data: is it ever worth weighting?”, *Review of Economics and Statistics* **72**, 328-333.

Djankov Simeon and Caroline Freund (1999), “The politics of trade liberalization: an empirical investigation”, mimeo, Washington DC.

Faina, José Carlos (1995), “Trade barriers in Brazil: an empirical application of the theory of endogenous protection”, mimeo, MIT, Boston.

Gawande, Kishore (1997), “Generated regressors in linear and nonlinear models”, *Economic Letters* **54**, 119-126.

Grossman, Gene and Elhanan Helpman (1994), “Protection for sale”, *American Economic Review* **84** (4), 667-690.

Grossman, Gene and Elhanan Helpman (1995a), “Trade wars and trade talks”, *Journal of Political-economy* **103**, 675-708.

Grossman, Gene and Elhanan Helpman (1995b), “The Politics of Free Trade Agreements”, *American Economic Review* **85**, 667-690.

Helpman, Elhanan (1997), "Politics and Trade Policy", Chapter 2 of Kreps D M and Wallis K F (eds.) *Advances in Economics and Econometrics: Theory and Applications, Volume I*, Cambridge University Press, London, pp.1945.

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

Hillman, Arye., N. Van Long and Peter Moser (1995), "Modelling reciprocal trade liberalization: the political-economy and national-welfare perspectives", *Swiss Journal of Economics and Statistics* **131**, 503-515.

Judge, G., W. Griffiths, R. Hill, H. Lutkepohl and T. Lee (1985), *The theory and practice of econometrics*. John Wiley and Sons.

Kennedy, Peter (1985), "A Rule of Thumb for Mixed Heteroskedasticity", *Economic Letters* **18**, 157-159.

Krugman, Paul (1991), "Is bilateralism bad?", in: E. Helpman and A. Razin, *International Trade and Trade Policy*, MIT Press.

Levy, Philip (1997), "A political-economy analysis of free-trade agreements", *American Economic Review* **87** (4), 506-519.

Mayer, Wolfgang (1984), "Endogenous tariff formation", *American Economic Review* **74**, 970-985.

Magee, Stephen (1997), "Endogenous protection: the empirical evidence" in D. Mueller, ed.; *Perspectives on Political Economy*, Cambridge: Cambridge University Press.

Moulton, Brent (1986), "Random Group Effects and the Precision of Regression Estimates", *Journal of Econometrics* **32**, 385-397.

O'Connell, Paul (1998), "The overvaluation of purchasing power parity", *Journal of International Economics* **44**, 1-19.

Olarreaga, Marcelo and Isidro Soloaga (1998), "Endogenous tariff formation: the case of Mercosur", *World Bank Economic Review* **12**, 297-320.

Panagariya Arvind, and Ronald Findlay (1994) "A Political Economy Analysis of Free Trade Areas and Customs Unions" Mimeo, University of Maryland.

Riezman, Ray (1985), "Customs Unions and the Core", *Journal of International Economics*, 19, 355-365.

Richardson, Martin (1994) "Why a free-trade area? The tariff also rises"; *Economics and Politics* 6, 79-96.

Rodrik, Dani (1995), "Political Economy of Trade Policies", in Gene Grossman and Kenneth Rogoff, eds.; *Handbook of International Economics*, vol. III, Amsterdam: North Holland.

Shiells, Clinton, Robert Stern and Alan Deardoff (1986), "Estimates of the elasticities of substitutions between imports and home goods for the United States", *Weltwirtschaftliches Archiv* **122**, 497-519.

Stern, Robert, Jonathan Francis and Bruce Schumacher (1976), *Price elasticities in international trade: an annotated bibliography*, London.

Veall, Michael and Klaus Zimmermann (1994), "Goodness of fit measures in the Tobit model", *Oxford Bulletin of Economics and Statistics* **56**, 485-499.

Winters, L. Alan (1996), "Regionalism versus Multilateralism", CEPR discussion paper # 1525.

**Table 1: Determining the CET<sup>a</sup>**

	4-digit ISIC	6-digit HS
<b>Terms-of-trade effects</b>		
$1/\varepsilon$ (using import shares ( $\lambda$ ) as a proxy)	0.72# (0.39)	1.49* (0.61)
<b>Labour union proxy</b>		
$\theta$ (labour-shares)	-0.05⊥ (0.50)	-0.64⊥ (0.77)
<b>Counter-lobbying in factor or input markets</b>		
$W$ (wage)	-0.60⊥ (1.64)	0.89⊥ (1.98)
$I$ (share sold as input)	-1.84** (0.61)	-4.99** (1.48)
$N$ (intra-industry trade)	-0.33⊥ (1.51)	-8.74** (3.29)
<b>Capital Owners Lobbying</b>		
$\ell$ (labour-capital ratio)	3.30** (1.11)	8.13** (1.91)
$C$ (Industry concentration)	0.58 (0.49)	1.45# (0.79)
$T$ (Trade creation)	-0.06⊥ (0.44)	-0.08 (0.63)
$M$ (net-import penetration)	0.00⊥ (0.00)	-0.00⊥ (0.00)
$\Delta M$ (changes in $M$ )	-0.00⊥ (0.01)	-0.00⊥ (0.00)
Constant	-1.73 (7.52)	-20.08 (14.62)

pseudo <sup>b</sup> -R <sup>2</sup>	0.28	0.50
Sigma	3.65**	7.68**
% of censored obs.	5	20
number of obs.	80	4261

<sup>a</sup>Estimation is done using a Tobit double censored regression. Figures in parenthesis are standard errors. \*\* denotes significance at the 1 percent level; \* at the 5 percent level and # at the 10 percent level; ⊥ indicates that the sign of the estimated coefficient is not robust to either variable or 4-digit industry exclusion from the regression.

<sup>b</sup>The pseudo-R<sup>2</sup> we used is the single best choice according to Mc Veall and Zimmermann (1994), i.e.,  $R^2 = \frac{\sum (CET^* - \bar{CET}^*)^2}{\sum (CET^* - \bar{CET}^*)^2 + n\sigma^2}$ , where  $\bar{CET}^*$  is the mean of the predicted value.

**Table 2: CET and internalization of terms-of-trade effects<sup>a</sup>**

	4-digit ISIC	6-digit HS
<b>Terms-of-trade effects</b>		
$\lambda$ (import shares)	0.87* (0.39)	3.04** (0.91)
<b>Labour union proxy</b>		
$\theta$ (labour-shares)	-0.08 (0.50)	-1.37 (0.84)
<b>Counter-lobbying in factor or input markets</b>		
$W$ (wage)	-.62 (1.62)	0.09 (2.51)
$I$ (share sold as input)	-1.88** (0.59)	-5.90** (1.62)
$N$ (intra-industry trade)	-.32 (1.51)	-15.60** (4.62)
<b>Capital Owners Lobbying</b>		
$\ell$ (labour-capital ratio)	3.36** (1.09)	9.95** (2.09)
$C$ (Industry concentration)	0.60 (0.49)	1.71* (0.81)
$T$ (Trade creation)	-0.06 (0.44)	-0.16 (0.69)
$M$ (net-import penetration)	0.00 (0.00)	-0.00 (0.00)
$\Delta M$ (changes in $M$ )	-0.00 (0.01)	-0.00 (0.00)
Constant	-2.16 (7.40)	-33.76* (13.82)

---

pseudo- $R^2$	0.30	0.70
Sigma	3.62**	7.60**
% of censored obs.	5	20
number of obs.	80	4261

<sup>a</sup>Estimation is done using a Tobit double censored regression. Figures in parenthesis are standard errors. \*\* denotes significance at the 1 percent level; \* at the 5 percent level and # at the 10 percent level.

**Table 3: Testing terms-of-trade internalization<sup>a</sup>**

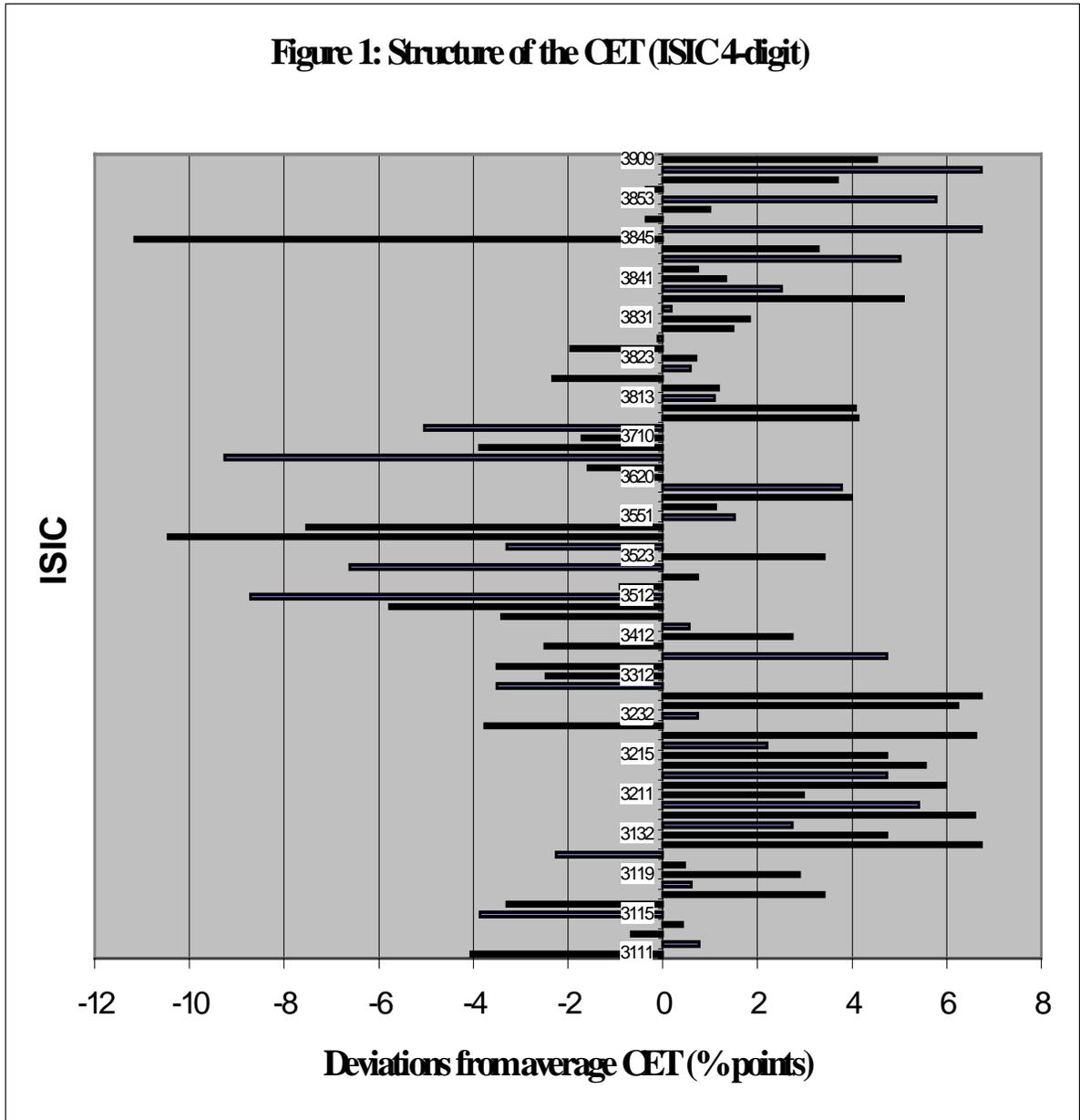
	<b>H0 Hypothesis</b>	<b>HS 6-digit</b>	<b>ISIC 4-digit</b>
<b>Davidson-McKinnon J-test</b>	H0: <i>Internalization</i> H0: <i>No-internalization</i>	No rejection Reject	No rejection Reject
<b>Non-nested “super model”</b>	H0: <i>Internalization</i> H0: <i>No-internalization</i>	No rejection Reject	No rejection Reject

<sup>a</sup>The degree of confidence for all test is 5 percent.

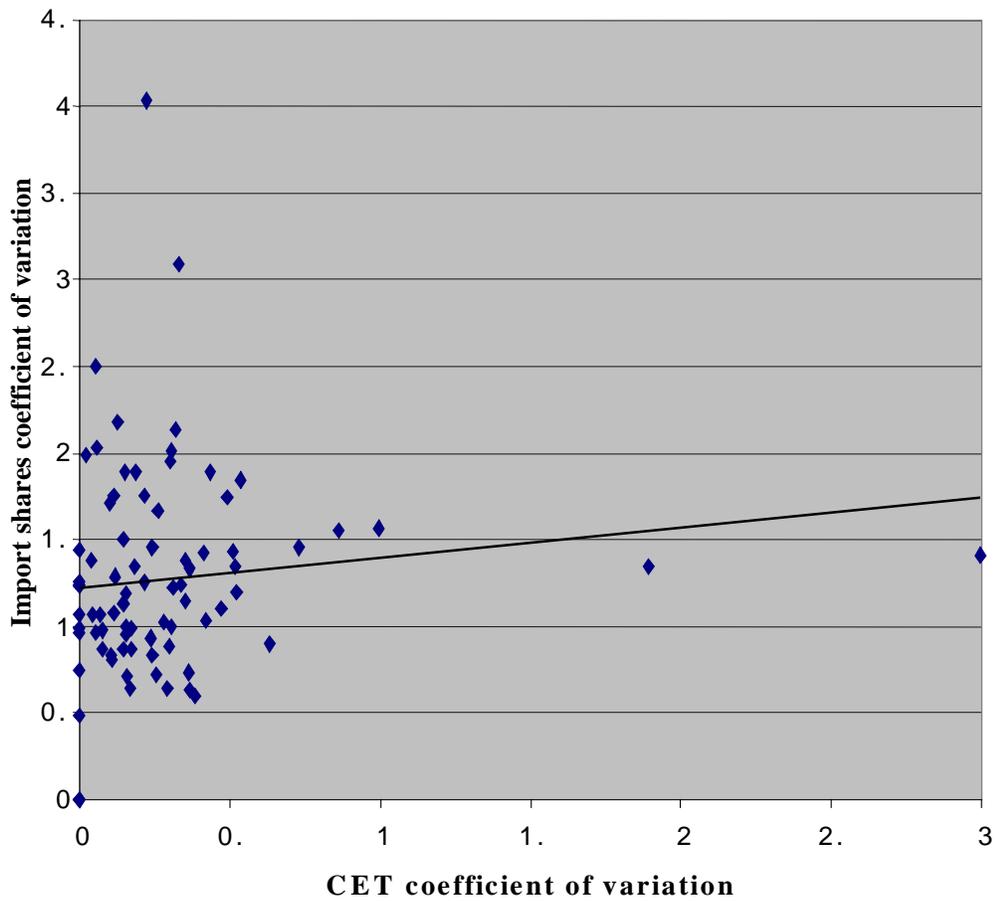
**Table 4: Share of the explanation attributed to the terms-of-trade proxy (in percentages)**

	<i>MF 6-digit</i>	<i>AN 6-digit</i>	<i>VZ 6-digit</i>	<i>MF 4-digit</i>	<i>AN 4-digit</i>	<i>VZ 4-digit</i>
$\Psi$	<b>18</b>	<b>11</b>	<b>12</b>	<b>8</b>	<b>6</b>	<b>10</b>
$\Psi * R^2$	4.4	4.8	5.8	0.5	1.5	2.9
$\Psi^{int}$	<b>28</b>	<b>27</b>	<b>6.0</b>	<b>12</b>	<b>9.1</b>	<b>14</b>
$\Psi^{int} * R^2$	14	15	3.6	0.7	2.3	4.1

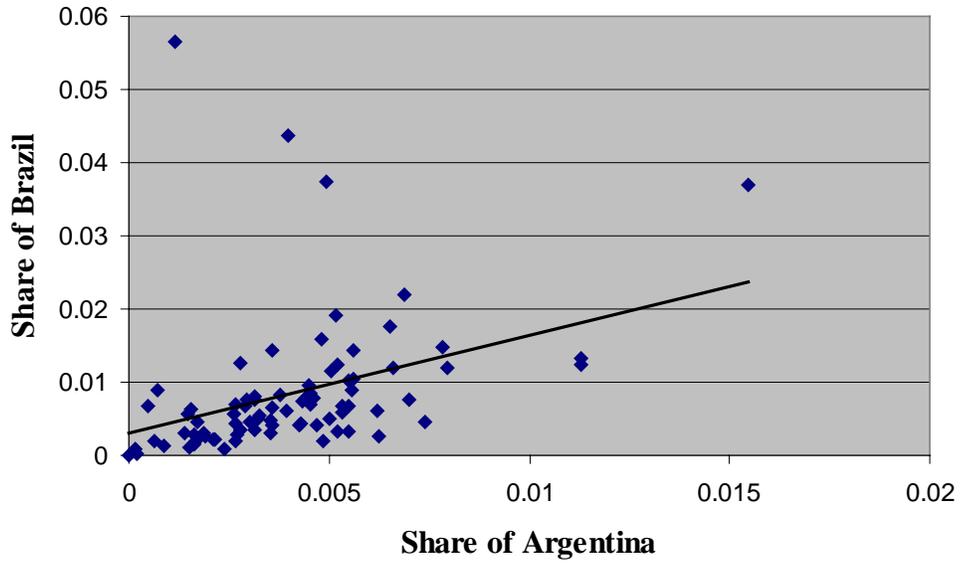
**Figure 1: Structure of the CET (ISIC 4-digit)**



**Figure 2: Within tariff and import share variation**



**Figure 3: Terms of trade externalities (ISIC 4-digit)**



## Appendix 1: Data Appendix

**Tariffs.** Common external tariff data were provided by the MERCOSUR secretariat (official tariffs for 1996, announced in December 1995). External and Internal tariffs of member countries were obtained from officials journal (Argentina, decree # 998/95 of 29/Dec/95 and resolutions # 649/96, 370/96, 111/96 and 735/96. Brazil, decree # 1767 of 29/Dec/95. Paraguay, decree # 12056 of 29/Dec/95. Uruguay, decree # 466/95 of 29/Dec/95 and decrees # 242/996, 282/996 and 316/996.), and from UNCTAD. Tariff data are disaggregated at the 8-digit level of the harmonised system (9119 items) and were converted to the 6-digit level by simple averages.

**Trade data.** The sources are national accounts (COMTRADE) in US dollars. Data were averaged for 1993-96 and disaggregated at the 6-digit level of the harmonised system. To convert them to ISIC 4-digit we use a filter that has been provided by Jerzy Rozanski of the World Bank.

**Industrial data.** The sources are the industrial censuses applied by Argentina and Brazil in 1985, and the GTAP database.

Census data consist of: i) number of firms, ii) wages, iii) total value of production, and iv) value of inputs. To make them comparable to trade data values, all the industrial data denominated in domestic currency were converted to 1993-96 US dollar values with the ratio of the average nominal GDP in Manufacture in 1993-96 (from National Accounts) to the total value added calculated from censuses figures. The data are disaggregated into 80 sectors corresponding to the 4-digit ISIC level.

GTAP data gave the input-output matrices, one for each country. We utilized them to calculate the share of production sold by sector  $i$  of country  $j$  ( $S_{ij}$ ) as intermediate good to other sectors in the same country. We then applied the  $S_{ij}$  to the corresponding sectors in our data set. Some  $S_{ij}$  were used more than once since GTAP data have fewer sectors (40) than that from censuses (80).

## Appendix 2. Variable construction and notation

The construction of the variables used in the empirical section is discussed below. Most of the exogenous variables may also be functions of tariffs (Trefler, 1993), but due to data restrictions, the empirical section does not deal with endogeneity problems.

We used in the paper two levels of aggregation. One was at the 6-digit level of the HS (6-HS for short), and the other was at the 4-digit of the ISIC (4-ISIC). Data for *tariffs*, *import shares*, and the proxy for *intra-industry trade* are at 6-HS (4261 observations). All the other variables are at 4-ISIC (80 observations). When we run the regression at 6-HS, we repeat the corresponding 4-ISIC information for each 6-HS line, following the filter.

All of MERCOSUR's political-economy variables are constructed as the sector-production-weighted sum of member countries' political variables, as discussed in subsection 2.1 Alternative specifications for MERCOSUR have been tested and are discussed in section 4.1.

- *Tariffs*. We converted the HS 8-digit tariff data to 6-HS levels by taking simple averages by 6-HS. We obtained 4-ISIC levels' tariffs by mapping 6-HS to 4-ISIC and then averaging the tariffs by 4-ISIC.
- *import shares*. We added up Argentine and Brazil imports' (at 6-HS), netted out intra-country trade, and divided the net sum by total world imports. For aggregation at 4-ISIC we followed the same procedure used above for *tariffs*. (denoted  $\lambda$ ). [+]
- *labor union proxy*. Was calculated as: (number of employees in sector  $i$ )/(total number of employees). (denoted  $\theta$ ). [+]
- *wages*. These were calculated as: (labour cost)/(number of employees). (denoted  $W$ )  
[+]
- *labour/capital ratios*. These were calculated as: (number of employees)/(value added - labour costs). (denoted  $\ell$ ). [+]

- *input sales*. These were calculated as the share of production sold by sector  $i$  of country  $j$  ( $S_{ij}$ ) as intermediate good to other sectors in the same country. (denoted  $I$ ).[-]
- *concentration index*. This was calculated as: (number of firms in the whole economy)/(number of firms in sector  $i$ ). (denoted  $C$ ) [+].
- *trade-creation term*. This was calculated as: (intra-MERCOSUR imports)/(total output). (denoted  $T$ ) [+].
- *net import penetration ratio*. This was calculated as: (imports - exports)/(gross output). (denoted  $M$ ) [-]. We used extra-MERCOSUR trade to calculate this variable. Note that for this variable we could not take logs.
- *Change in the net import penetration ratio*. This was calculated as  $M_{96}-M_{93}$ . Note that for this variable we could not take logs.
- *intra-industry trade*. This was calculated as:  $1/[(\text{imports}-\text{exports})^2/(\text{imports} + \text{exports})^2]^{0.5}$ . We used extra-MERCOSUR data. (denoted  $N$ ) [-].

## ISIC 4-digit Classification

3111	Slaughtering, preparing and preserving meat	3530	Petroleum refineries
3112	Manufacture of dairy products	3540	Manufacture of miscellaneous products of petroleum and coal
3113	Canning and preserving of fruits and vegetables	3551	Tyre and tube industries
3114	Canning, preserving and processing of fish, crustacea and similar foods	3559	Manufacture of rubber products not elsewhere classified
3115	Manufacture of vegetable and animal oils and fats	3560	Manufacture of plastic products not elsewhere classified
3116	Grain mill products	3610	Manufacture of pottery, china and earthenware
3117	Manufacture of bakery products	3620	Manufacture of glass and glass products
3118	Sugar factories and refineries	3691	Manufacture of structural clay products
3119	Manufacture of cocoa, chocolate and sugar confectionery	3692	Manufacture of cement, lime and plaster
3121	Manufacture of food products not elsewhere classified	3699	Manufacture of non-metallic mineral products not elsewhere classified
3122	Manufacture of prepared animal feeds	3710	Iron and steel basic industries
3131	Distilling, rectifying and blending spirits	3720	Non-ferrous metal basic industries
3132	Wine industries	3811	Manufacture of cutlery, hand tools and general hardware
3133	Malt liquors and malt	3812	Manufacture of furniture and fixtures primarily of metal
3134	Soft drinks and carbonated waters industries	3813	Manufacture of structural metal products
3140	Tobacco manufactures	3819	Manufacture of fabricated metal products except machinery and equipment not elsewhere classified
3211	Spinning, weaving and finishing textiles	3821	Manufacture of engines and turbines
3212	Manufacture of made-up textile goods except wearing apparel	3822	Manufacture of agricultural machinery and equipment
3213	Knitting mills	3823	Manufacture of metal and wood working machinery
3214	Manufacture of carpets and rugs	3824	Manufacture of special industrial machinery and equipment except metal and wood working machinery
3215	Cordage, rope and twine industries	3825	Manufacture of office, computing and accounting machinery
3219	Manufacture of textiles not elsewhere classified	3829	Machinery and equipment except electrical, not elsewhere classified
3220	Manufacture of wearing apparel, except footwear	3831	Manufacture of electrical industrial machinery and apparatus
3231	Tanneries and leather finishing	3832	Manufacture of radio, television and communication equipment and apparatus
3232	Fur dressing and dyeing industries	3833	Manufacture of electrical appliances and housewares
3233	Manufacture of products of leather, except footwear and wearing apparel	3839	Manufacture of electrical apparatus and supplies not elsewhere classified
3240	Manufacture of footwear	3841	Ship building and repairing
3311	Sawmills, planing and other woods	3842	Manufacture of railroad equipment
3312	Manufacture of wooden and cane containers	3843	Manufacture of motor vehicles
3319	Manufacture of wood and cork products not elsewhere classified	3844	Manufacture of motorcycles and bicycles
3320	Manufacture of furniture	3845	Manufacture of aircraft
3411	Manufacture of pulp, paper and paperboard	3849	Manufacture of transport equipment not elsewhere classified
3412	Manufacture of containers and boxes of paper and paperboard	3851	Manufacture of professional and scientific, and measuring and controlling equipment, not elsewhere classified
3419	Manufacture of pulp, paper and paperboard articles not elsewhere classified	3852	Manufacture of photographic and optical goods
3420	Printing, publishing and allied industries	3853	Manufacture of watches and clocks
3511	Manufacture of basic industrial chemicals except fertilizers	3901	Manufacture of jewelry and related articles
3512	Manufacture of fertilizers and pesticides	3902	Manufacture of musical instruments
3513	Manufacture of synthetic resins, plastic materials and man-made fibers except glass	3903	Manufacture of sporting and athletic goods
3521	Manufacture of paints, varnishes and lacquers	3909	Manufacturing industries not elsewhere classified
3522	Manufacture of drugs and medicines		
3523	Manufacture of soap and cleaning preparations, perfumes, cosmetics and other toilet preparations		
3529	Manufacture of chemical products not elsewhere classified		

## Appendix 3: Endogenous Tariff Appendix

Following is a list of predictions of expected cross-sectoral variations in tariff protection. Other things equal, the level of *protection* received by an industry *is higher*.<sup>23</sup>

### Terms-of-trade effects

- *the smaller the elasticity of export supply faced by the country*. This is the classic rationale for tariffs for a large country that can influence the terms-of-trade in its favour by setting non-zero tariffs.

### Labour union effects

- *the larger is the share of labour in this sector relative to total employment in the economy* (see Cadot *et al.*, 1997, for a theoretical justification and de Melo and Tarr, 1994, for an empirical example). The idea behind this result is that if labour unions are organised, then the larger is the share of employment in this sector, the larger is the weight of this sector's labour union in the political game.<sup>24</sup>

### Counter-lobbying in factor or input markets

- *the lower the equilibrium wage in this sector*. In a political game where there is rivalry in the labour market (which can be segmented for different groups of industries), the level of the equilibrium wage, *ceteris paribus*, will determine the incentives by other sectors to lobby against an increase in tariff in one of the industries. At the limit, if the wage is zero, there are no incentives to counter-lobbying.

---

<sup>23</sup> For a survey of the theoretical and empirical literature, see Baldwin (1984), Rodrik (1995) or Magee (1997). This appendix largely draws on section 2 of Olarreaga and Soloaga (1998).

<sup>24</sup> Alternatively, it may also be the case that votes may matter and a high labour/capital ratio indicates the presence of voters (see for example Potters, Sloof and van Winden, 1997).

- *the lower the share of sector production that is purchased by other sectors as intermediates* (see Cadot *et al.*, 1997, for a theoretical justification and Ray, 1991, or Marvel and Ray, 1983, for empirical examples). Here we are capturing lobbying rivalry. If sector  $j$  purchases goods from sector  $i$  then sector  $j$  will counter-lobby any increase in sector  $i$ 's level of protection. Thus, the higher the share of sector  $i$  production that is purchased by other sectors the smaller the endogenous tariff. Therefore, as long as consumers are not organised, consumer goods receive *ceteris paribus* higher levels of protection than intermediate goods.
- *the smaller the share of intra-industry trade*. Levy (1997) argues that an increase in intra-industry trade benefits all agents whereas an increase in inter-industry trade has the usual Stolper-Samuelson redistributive effects, and therefore is subject to more conflict and higher lobbying pressures. Marvel and Ray (1987) suggest an explanation based on intermediate inputs counter-lobbying. They argue that intra-industry trade essentially arises among producers (purchase of intermediate goods), and as producers are more concentrated than consumers, they tend to be more efficient in combating protectionist pressures. This, however, should be captured by our previous variable.

### **Capital Owners Pro-protectionist Lobbying**

- *the higher the labour/capital ratio* (for empirical evidence, see e.g., Finger and Harrison, 1994, and Rodrik, 1995). To explain this, one may need to rely on Cadot *et al.* (1997) who show that tariffs are higher in sectors where the share of capital remuneration in value added is large, after introducing lobbying rivalry on the labour market. A higher labour/capital ratio *ceteris paribus* has two opposing effects on the share of capital remuneration in value added. On one hand, the direct effect tends to reduce it, as a higher labour/capital ratio obviously implies a smaller capital/labour ratio. On the other hand, a higher labour/capital ratio implies a higher marginal productivity of capital relatively to labour which in turn raises the share of capital remuneration in value added. Under suitably general conditions, it can then be shown that the latter effect dominates the former if the elasticity of substitution between

labour and capital is smaller than 1 (which is a generally accepted value in the empirical literature).<sup>25</sup>

- *the higher the level of industry concentration* (see Rodrik, 1987, for a theoretical justification and Trefler, 1993, or Marvel and Ray, 1983, for empirical examples). This captures free-riding incentives à la Olson.
- *the lower the level of trade-creation*. The idea is simply that in sectors where there is an important amount of trade-creation within the region, there is no longer a need to protect domestic producers from rest-of-the world competition, as most foreign competition now comes from within the region.
- *the lower the import penetration ratio* (see Grossman and Helpman, 1994, for a theoretical justification).<sup>26</sup> The rationale for this is that the lower the import penetration ratio, the lower is the relative weight of consumers compared to producers in the government's objective function.<sup>27</sup>
- *the larger the increase in import penetration*. This captures the idea that declining sectors (those where there is a large increase in import penetration) will tend to be more protected by the government to reduce the adjustment costs (see Brainard and Verdier, 1994).
- 

---

<sup>25</sup> In a two factor sector, the share of capital remuneration in value added is given by:

$\beta = rk/[w\ell + rk] = 1/[w\ell/rk + 1]$ , where  $r$  is capital wage,  $k$  is the amount of capital,  $w$  is labour wage and  $\ell$  is the amount of labour. Then  $\partial\beta/\partial(\ell/k) = 1/[w\ell/(rk) + 1]^2 w/r(1 + \sigma)$  where  $\sigma$  is the elasticity of substitution between labour and capital. And the right hand side is larger than zero if  $|\sigma| < 1$ . Note that the empirical estimation of the elasticities of substitution between labour and capital generally yield values below one.

<sup>26</sup> This result has been challenged on empirical grounds, as discussed by Rodrik (1995). For empirical examples, see Anderson (1980) or Finger and Harrison (1994).

<sup>27</sup> To see this, note that  $m/y = (c - y)/y = c/y - 1$  where  $m$  are imports (or net imports),  $c$  is consumption and  $y$  the level of production.

#### Appendix 4: An alternative proxy for terms-of-trade effects

Table 5 report results using equation (7) as a proxy for the elasticity of export supply faced by Mercosur countries (and  $\varepsilon_T = 0.5$ ). Results are qualitatively robust to the alternative specification. The problem with using equation (7) is that results are sensitive to the choice of  $\varepsilon_T$ , which is arbitrarily chosen as being equal across sectors due to lack of estimates. For example, for any value of  $\varepsilon_T$  larger than 3 the estimate in front of  $1/\varepsilon_i$  is statistically insignificant.

**Table 5: Determining the CET**

	4-digit ISIC	6-digit HS
<b>Terms-of-trade effects</b>		
$1/\varepsilon$ (using eq (7) as a proxy)	0.31* (0.15)	0.19# (0.10)
<b>Labour union proxy</b>		
$\theta$ (labour-shares)	2.61** (0.85)	1.12 (0.70)
<b>Counter-lobbying in factor or input markets</b>		
$W$ (wage)	-3.88 (2.75)	0.01 (3.49)
$I$ (share sold as input)	-1.99** (0.57)	-4.51** (1.86)
$N$ (intra-industry trade)	-2.99** (0.97)	-0.93 (0.73)
<b>Capital Owners Lobbying</b>		
$\ell$ (labour-capital ratio)	0.77 (2.01)	6.03** (2.39)
$C$ (Industry concentration)	1.73* (0.74)	0.86 (1.20)
$T$ (Trade creation)	0.86 (0.64)	0.68 (0.80)
$M$ (net-import penetration)	0.00 (0.00)	-0.00 (0.00)
$\Delta M$ (changes in $M$ )	-0.00 (0.01)	-0.00 (0.00)
Constant	0.65 (11.59)	-5.90 (18.27)

pseudo- $R^2$	0.29	0.31
Sigma	2.75**	5.11**
% of censored obs.	5	20
number of obs.	80	4261