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Olivier Cadot, Jaime de Melo  
and Marcelo Olarreaga

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**Olivier Cadot**, Université de Lausanne and CEPR  
**Jaime de Melo**, Université de Genève and CEPR  
**Marcelo Olarreaga**, The World Bank and CEPR

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Centre for Economic Policy Research  
90–98 Goswell Rd, London EC1V 7RR, UK  
Tel: (44 20) 7878 2900, Fax: (44 20) 7878 2999  
Email: [cepr@cepr.org](mailto:cepr@cepr.org), Website: [www.cepr.org](http://www.cepr.org)

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## **ABSTRACT**

### **The Protectionist Bias of Duty Drawbacks and the New Regionalism\***

In a political-economy setting where tariffs and duty drawbacks are endogenously chosen through industry lobbying, it is shown that full duty drawbacks are granted to exporters who use imported intermediates in their production. This in turn decreases their incentives to counter-lobby against high tariff on their inputs. In equilibrium, higher tariffs will be observed on these goods. The creation of a regional bloc will change the political equilibrium. Duty drawbacks will be eliminated on intra-regional exports, which in turn will lead to lower tariffs for goods used as inputs by intra-regional exporters. Evidence from Mercosur suggests that the elimination of duty drawbacks for intra-regional exports led to increased counter-lobbying by users of intermediate products. In its absence the common external tariff would have been on average 3.5 percentage points (25%) higher.

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Olivier Cadot  
HEC  
Université de Lausanne  
BFSH 1 Bureau 317  
1015 Lausanne  
SWITZERLAND  
Tel: (41 21) 692 34 63  
Fax: (41 21) 692 34 95  
Email: olivier.cadot@hec.unil.ch

Jaime de Melo  
Département d'Economie Politique  
Université de Genève  
102 Boulevard Carl Vogt  
1211 Geneva 4  
SWITZERLAND  
Tel: (41 22) 705 8273/  
Fax: (41 22) 705 8293  
Email: jaime.demelo@ecopo.unige.ch

Marcelo Olarreaga  
DECRG  
World Bank  
1818 H Street  
Washington  
DC 20433  
USA  
Tel: (1 202) 458 8021  
Fax: (1 202) 522 1159  
Email: molarreaga@worldbank.org

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## NON-TECHNICAL SUMMARY

Reduction of the anti-export bias of existing trade policies in developing countries has been a key component of trade policy reform packages since the early 1980s. A quasi-universal instrument to achieve this objective has been the creation or improvement of duty-drawback systems and temporary admission regimes. The pervasiveness of duty-drawback systems is evident in a sample of 42 developing countries that have undertaken WTO Trade Policy Reviews, and in which all but three countries (Benin, Hong Kong and Singapore) were found to have in place some form of duty-drawback system.

Duty drawbacks (or rebate systems) reduce or eliminate the duties paid on imported intermediates or raw materials that are used in the production of exports. When a firm imports an intermediate product for use in the production of an export good, tariff payments on the imported intermediate are either waived (duty-drawback system) or returned to the producer once the final product is exported (rebate system). Thus, the objective of these mechanisms is to promote exports by partially or fully compensating exporters for the anti-trade bias of existing protection, since exporters have access to their imported inputs at world prices in spite of the existing levels of tariff protection. These incentive systems are often justified on the grounds that they tend to correct the anti-trade bias imposed by high tariff levels. The problem with this line of reasoning is that it assumes that tariffs are predetermined policy variables. If such were the case, the easiest way of reducing their anti-trade bias would be simply to eliminate them. The reason why this solution is rarely achieved is that existing levels of protection correspond to a political-economy equilibrium that is difficult to modify in the presence of lobbying pressures. A political-economy approach, such as the one used in this Paper, is thus necessary to understand the rationale for such systems.

Our analysis is cast around the many recently-formed regional blocs that have partially or completely phased out duty drawbacks on intra-regional exports. This type of policy change, which we derive endogenously as a response to shifting government incentives, is likely to trigger a re-balancing of domestic power and incentives.

Using a common agency model of endogenous protection with intermediate goods, we show that duty-drawback and rebate systems decrease exporter incentives to lobby against protection on imported intermediate goods. Indeed, under a full duty-drawback regime, tariffs on intermediates are irrelevant to exporters since they are fully rebated. This leads, *ceteris paribus*, to higher levels of protection on intermediate goods heavily used in export industries, penalizing non-exporting users of such goods.

We then analyse how the formation of a regional trading bloc alters these incentives. Intra-regional exporters may be, in terms of profit levels, better off

than before since they are now the beneficiaries of the area's external tariffs, but *at the margin*, their incentive to lobby against intermediate-good protection rises as duty-drawback and rebate schemes are endogenously eliminated on intra-regional exports. In equilibrium, this results in a lower level of external protection for those intermediate goods that are used heavily in sectors where intra-regional exports are large. Indirect effects of that type are at the very least consistent with the reduction in MFN tariffs that has accompanied the 'New Regionalism' that has been observed by several authors.

We then try to see if the model's predictions are borne out in the case of the Common Market of the Southern Cone (Mercosur) which is an interesting case study for at least three reasons. First, Mercosur members all had duty-drawback systems for exporters in place when they negotiated their Common External Tariff (CET) in 1994 which will no longer be allowed for intra-regional trade, once convergence to the CET is achieved in December 2000. Second, Mercosur has been identified as one of the recent regional blocs satisfying the *New Regionalism's* characteristics that preferential tariff reductions are accompanied by general MFN tariff reductions. Third, recent work has shown that industry lobbying was an important determinant of Mercosur's CET.

Our approach to testing the political-economy hypothesis explained above proceeds in two steps. First, we assume that the Mercosur's CET is endogenously determined through cooperative bargaining among its members, and there is evidence that this was indeed the case as will be discussed later. Then, using input-output tables to trace the use of imported intermediates in downstream industries, we test whether deviations from the optimal CET are correlated with the intensity of input use in downstream industries. The interest of the exercise is two-fold. First, it gives a statistical indication of the magnitude of the lobbying effects attributable to the elimination of duty-drawback schemes. Second, it provides an indirect test of the common-agency model of endogenous protection, whose empirical predictions have been the object of some controversy.

We find that during the negotiations for the Mercosur's CET, counter-lobbying against protection of intermediate goods increased following the elimination of duty drawbacks for intra-regional exports. In the absence of this mechanism, we estimate that Mercosur's CET would have been on average 3.5 percentage points (25%) higher.

# 1 Introduction

A key objective of trade reforms initiated since the early eighties was the reduction of the anti-export bias of existing trade policies in developing countries. For example, a component of the World Bank recommendations in their trade loans was the creation or improvement of duty-drawback systems and temporary admission regimes (see Krueger and Rajapatirana, 1999). The pervasiveness of duty-drawback systems is also evident in a sample of 42 developing countries having undertaken WTO Trade Policy Reviews, for which Michalopoulos (1999) finds that all but three countries (Benin, Hong Kong and Singapore) have in place some form of duty-drawback system.

Duty drawbacks (or rebate systems) reduce or eliminate the duties paid on imported intermediates or raw materials that are used in the production of exports. When a firm imports an intermediate product for use in the production of an export good, tariff payments on the imported intermediate are either waived (duty drawback system) or returned to the producer once the final product is exported (rebate system).<sup>1</sup> Thus, the objective of these mechanisms is to promote exports by partially or fully compensating exporters for the anti-trade bias of existing protection, since exporters have access to their imported inputs at world prices in spite of the existing levels of tariff protection.

These incentive systems are often justified on the grounds that they tend to correct the anti-trade bias imposed by high tariff levels. The problem with this line of reasoning is that it assumes that tariffs are predetermined policy variables. If such was the case, the easiest way of reducing their anti-trade bias would be simply to eliminate them. The reason why this solution is rarely achieved is that existing levels of protection correspond to a political-economy equilibrium that is difficult to modify in the presence of lobbying pressures. Thus, it is difficult to understand the rationale for such systems or to get a complete picture of their incentive effects in the absence

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<sup>1</sup>For a detailed description, and comparison of, the functioning of the duty drawback systems in Taiwan (China) and Costa Rica, see Wu and Chuang (1998).

of a political-economy approach, which is the one taken in this paper.

Moreover, many recently-formed regional blocs have partially or completely phased out duty drawbacks on intra-regional exports.<sup>2</sup> This type of policy change, which we derive endogenously as a response to shifting government incentives, is likely to trigger a re-balancing of domestic power and incentives (see Lawrence, 1999). This process and its effect on the structure of the regional bloc's external tariffs is the focus of our analysis.

Using a common agency model of endogenous protection (Grossman-Helpman, 1994) with intermediate goods (Cadot, de Melo and Olarreaga, 1997), we show that duty-drawback and rebate systems decrease exporter incentives to lobby against protection on their imported intermediate goods. Indeed, under a full duty-drawback regime, tariffs on intermediates are irrelevant to exporters since they are fully rebated. This leads, *ceteris paribus*, to higher levels of protection on intermediate goods heavily used in export industries, penalizing non-exporting users of such goods.

The formation of a regional trading bloc alters these incentives. Intra-regional exporters may be, in terms of profit levels, better off than before since they are now the beneficiaries of the area's external tariffs, but *at the margin*, their incentive to lobby against intermediate-good protection rises as duty-drawback and rebate schemes are endogenously eliminated on intra-regional exports. In equilibrium, this results in a lower level of external protection for those intermediate goods that are used heavily in sectors where intra-regional exports are large. Indirect effects of that type are at the very least consistent with the reduction in MFN tariffs that has accompanied the "new regionalism". Indeed, several authors (Ethier, 1998a; Lawrence, 1999) have argued that one of the important characteristics of the new wave of regional trade agreements is that they are accompanied by simultaneous reductions in MFN tariffs.<sup>3</sup>

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<sup>2</sup>In the case of NAFTA, for example, Canadian exporters to the US market do not necessarily benefit from the full duty-drawback, but the level of drawback is determined by the minimum amount between the tariff revenue paid on their inputs and the tariff revenue they avoid on their exports by benefitting from intra-Nafta free-trade.

<sup>3</sup>Some authors, including Ethier (1998b) or Freund (2000), have argued that the causality may



If substantial enough, they might even partially explain it.

We then try to see if the model's predictions are borne out in the case of the Common Market of the Southern Cone (Mercosur). Mercosur is an interesting case-study for at least three reasons. First, Mercosur members all had duty-drawback systems for exporters in place when they negotiated their Common External Tariff (CET) in 1994. And, as stipulated in Article 12 of mercosur/cmc/dec No. 10/94, these will no longer be allowed for intra-regional trade, once convergence to the CET is achieved in December 2000. Second, Ethier (1998a) has identified Mercosur as one of the recent regional blocs satisfying the "New Regionalism"'s characteristics that preferential tariff reductions are accompanied by general MFN tariff reductions (Estevadeordal et al. 1999). Third, recent work (Olarreaga et al. 1999) has shown that industry lobbying was an important determinant of Mercosur's CET.

Our approach to testing the political-economy hypothesis explained above proceeds in two steps. First, we assume that the Mercosur's CET is endogenously determined through cooperative bargaining among its members, and there is evidence that this was indeed the case as discussed later. Then, using input-output tables to trace the use of imported intermediates in downstream industries, we test whether deviations from the optimal CET are correlated with the intensity of input use in downstream industries. The interest of the exercise is two-fold. First, it gives a statistical indication of the magnitude of the lobbying effects attributable to the elimination of duty-drawback schemes. Second, it provides an indirect test of the political-support model of endogenous protection, whose empirical predictions have been the object of some controversy.<sup>4</sup>

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be reversed from unilateral (or multilateral) liberalization towards regional integration. Others, starting with Bhagwati (1993) have expressed the fear that, on the whole, the surge in RTAs is likely to diminish the incentives to engage in multilateral non-discriminatory tariff reductions. For formal models that lead to this conclusion, see Levy (1997) and Krishna (1998). For a comprehensive review of the literature see Panagariya (2000).

<sup>4</sup>Our empirical results indirectly confirm the prediction strength of both the common-agency model of Grossman and Helpman (1994) and the Nash bargaining model of Maggi and Rodriguez-Clare (1998).

To anticipate our main result, we find that during the negotiations for the Mercosur's CET, counter-lobbying against protection of intermediate goods increased following the elimination of duty-drawbacks for intra-regional exports. In the absence of this mechanism, we estimate that Mercosur's CET would have been on average 3.5 percentage points higher (25 percent higher).

The remainder of the paper is organized as follows. Section 2 develops a political-economy model à la Grossman and Helpman (1994) where, in the presence of imported intermediate products and duty-drawbacks, there are incentives to lobby for exporters. The characteristics and implications of a duty-drawback scheme are studied and compared with the alternative of no such incentive scheme. Section 3 focuses on how incentives to lobby and the resulting endogenously determined tariff structure is likely to change when two countries enter in a customs union (CU). Section 4 applies the model to the case of MERCOSUR, where, the formation of the CU resulted in a removal of duty rebates for exports to the region. Section 5 concludes.

## 2 Tariff drawbacks and lobbying

We explore exporter incentives to lobby against tariffs on intermediates products in a Grossman-Helpman (1994) model,<sup>5</sup> to which we add an intermediate good following Cadot, de Melo and Olarreaga (1997).<sup>6</sup> Consider, then, a small (price-taking) open economy, that produces 4 traded goods. Goods 0 and 1 are exported (but nevertheless consumed at home) while 2 and 3 are import-competing. Goods 0, 1 and 2 are final goods while 3 is an intermediate that is also used in final consumption. Good 0 is the

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<sup>5</sup>There are other approaches to endogenous tariff formation, but as suggested by Helpman (1995), they all tend to lead to similar predictions. For our purposes, the advantage of the Grossman and Helpman (1994) framework is that it allows us to derive estimable reduced-form equations for tariffs that are based on microanalytic foundations.

<sup>6</sup>The setup is similar to Cadot *et al.* (1997), but their focus is on explaining the determinants of protection in the presence of lobbies' rivalry in intermediate and factor markets, whereas here we explore exporters incentives in the presence of tariff drawbacks, and abstract from factor-market effects. This simplification is defensible if protection is not too high and duty-drawbacks are not a substantial part of government tariff revenue.

numéraire. It is produced with labor only under Constant Returns to Scale (CRTS); good 3 (the intermediate) is produced with labor and sector-specific capital; goods 1 and 2 are produced with labor and sector-specific capital, and with good 3. The focus of the model is on the interaction between sectors 1 (exported final good) and 3 (imported intermediate).

Technologies in sectors 1 and 2 are Leontief between intermediate consumption and value added, with value-added being generated with labor and sector-specific capital. Omitting sector-specific capital, value-added is an increasing and concave function of labor,  $f^i(\ell_i)$ ,  $i = 1, 2$ , and output is given by

$$y_i = \min \left\{ f^i(\ell_i); \frac{v_i}{\alpha_i} \right\},$$

where  $y_i$  is sector  $i$  output,  $v_i$  is its intermediate consumption, and  $\alpha_i \equiv \frac{v_i}{x_i}$  a fixed input-output coefficient. The tariff on good  $i$  is  $t_i$ ; export goods (0 and 1) are neither taxed nor subsidized.

In the three non-numéraire sectors, the presence of sector-specific capital implies diminishing returns to labor and hence rents accruing to owners of sector-specific capital, who are also the firms' residual claimants. These rents are affected by trade policy: they are the reason for lobbying and the source of political contributions. The presence of a good produced under CRTS with labor only has the effect of pinning down the wage rate, so that there is no interindustry rivalry on the labor market which simplifies considerably the model's structure.<sup>7</sup> Moreover, we assume that capital ownership is sufficiently concentrated for lobbies to disregard the effect of protection on consumer prices.

Together, these assumptions ensure that the only source of interindustry rivalry are input-output linkages. Given this supply-side structure, the political line-up is as follows: sector 3 lobbies for protection, sector 1 lobbies against the protection of

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<sup>7</sup>For an analysis with general equilibrium effects in the labor market, and orders of magnitude of its importance, see Cadot *et al.* (1997).

sector 3, and sector 2 lobbies for its own protection and against the protection of sector 3. We treat the game as if lobbies 1, 2 and 3 were acting as non-cooperative principals vying for influence over their common agent, the government, following the common-agency literature.

Consumers have identical tastes represented by a quasi-linear and additive utility function

$$u = c_0 + u(c_1) + u(c_2) + u(c_3)$$

where  $c_i$  stands for the consumption of final good  $i$  and the function  $u$  has the usual properties. It follows that, given that good 1 is consumed but also exported (hence not protected) while goods 2 and 3 are imported, in equilibrium  $u'(c_1) = p_1^*$ ,  $u'(c_2) = p_2^*(1 + t_2)$  and  $u'(c_3) = p_3^*(1 + t_3)$ , where  $p_i^*$  is the world price of good  $i$  and  $t_1$  and  $t_2$  are ad-valorem tariffs.

## 2.1 Initial equilibrium

The political process is as follows. Organized into lobbies, competitive firms in sectors 1, 2 and 3, simultaneously offer contribution functions  $C_1$ ,  $C_2$  and  $C_3$  to the government, all conditioned on a vector of trade-policy variables. The trade-policy variables are  $t_2$ ,  $t_3$ , and a duty-drawback system whereby a fraction  $\delta$  of the tariff paid on intermediate imports is rebated to exporters. Faced with these contribution functions, the government sets  $t_2$ ,  $t_3$ , and  $\delta$  so as to maximize a weighted average of social welfare and income from contributions, which we will call  $G$ . That is, the government's problem is

$$\begin{aligned} \max_{t_2, t_3, \delta} G(t_2, t_3, \delta) &= \sum_{i=1}^3 C_i(t_2, t_3, \delta) + aW(t_2, t_3, \delta) \\ \text{s.t. } t_2 &\geq 0, t_3 \geq 0, 1 \geq \delta \geq 0, \end{aligned}$$

for some constant  $a$ . Let

$$\mathcal{L} = G(t_2, t_3, \delta) + \lambda(1 - \delta)$$

where  $\lambda$  is a Lagrange multiplier. In a truthful equilibrium (see Bernheim and Whinston, 1986), the derivatives of contribution functions with respect to  $t_2, t_3$ , and  $\delta$  are equal to the derivatives of the sectorial profit functions. Using this property, equilibrium conditions are

$$\frac{\partial \pi_i}{\partial t_3} = \frac{\partial C_i}{\partial t_3}, \quad i = 1, 2 \quad (1)$$

$$\frac{\partial \pi_2}{\partial t_2} = \frac{\partial C_2}{\partial t_2}; \quad \frac{\partial \pi_2}{\partial \delta} = \frac{\partial C_2}{\partial \delta}, \quad (2)$$

$$\frac{\partial \mathcal{L}}{\partial t_i} \leq 0, \quad t_i \geq 0, \quad t_i \frac{\partial \mathcal{L}}{\partial t_i} = 0, \quad i = 2, 3 \quad (3)$$

$$\frac{\partial \mathcal{L}}{\partial \delta} \leq 0, \quad \delta \geq 0, \quad \delta \frac{\partial \mathcal{L}}{\partial \delta} = 0, \quad (4)$$

$$1 - \delta \geq 0, \quad \lambda \geq 0, \quad \lambda(1 - \delta) = 0. \quad (5)$$

Equations (1)-(2) are truthfulness conditions, while (3)-(5) are Kuhn-Tucker conditions for the government. Given the technologies postulated, profit functions can be written as

$$\begin{aligned} \pi_1(t_3, \delta) &= \{p_1^* - \alpha_1 p_3^*[(1 + (1 - \delta)t_3)]\}y_1 - w\ell_1, \\ \pi_2(t_2, t_3) &= [p_2^*(1 + t_2) - \alpha_2 p_3^*(1 + t_3)]y_2 - w\ell_2, \\ \pi_3(t_3) &= p_3^*(1 + t_3)y_3 - w\ell_3. \end{aligned}$$

Using the envelope theorem,

$$\begin{aligned}
\frac{\partial \pi_1}{\partial t_3} &= -(1-\delta)p_3^* \alpha_1 y_1 \leq 0, & \frac{\partial \pi_1}{\partial \delta} &= t_3 p_3^* \alpha_1 y_1 \geq 0, \\
\frac{\partial \pi_2}{\partial t_3} &= -p_3^* \alpha_2 y_2 < 0, & \frac{\partial \pi_2}{\partial t_2} &= p_2^* y_2 > 0, \\
\frac{\partial \pi_3}{\partial t_3} &= p_3^* y_3 > 0.
\end{aligned} \tag{6}$$

Note that with a full duty-drawback (i.e. when  $\delta = 1$ ), producers of good 1 become indifferent to the level of the tariff on the intermediate good, i.e.  $\partial \pi_1 / \partial t_3 = 0$ . This does not apply, however, to producers of good 2, who serve the domestic market and are consequently not eligible for the duty-drawback.

As consumers have identical quasi-linear preferences, social welfare is the sum of income and consumer surplus, income being itself the sum of labor income, industry profits and tariff revenue. The tariff-revenue term is complicated by the presence of the duty-drawback scheme, which segments the intermediate-good market between sector-1 users, who are eligible for it, and sector-2 users, who are not. Given the availability of the scheme, sector-1 firms use only imported intermediate goods. In order to avoid a taxonomy of cases, we will assume that the domestic output of the intermediate good is not enough to cover the needs of sector 2 and final users, who accordingly use a mixture of home-produced and imported intermediates all priced at  $p_3^*(1+t_3)$ . Let  $m_3 = c_3 + \alpha_1 y_1 + \alpha_2 y_2 - y_3$  stand for good 3's imports. Net tariff revenue on good-3 imports is, after deduction of duty-drawback repayments,  $p_3^* t_3 (m_3 - \delta \alpha_1 y_1)$ . Given this, welfare is:

$$\begin{aligned}
W &= w l + \pi_1(t_1, t_3, \delta) + \pi_2(t_2, t_3) + \pi_3(t_3) + p_2^* t_2 m_2 + p_3^* t_3 (m_3 - \delta \alpha_1 y_1) \\
&\quad + \sum_{i=1}^3 u(c_i) - p_1^* c_1 - p_2^* (1+t_2) c_2 - p_3^* (1+t_3) c_3,
\end{aligned}$$

where  $\ell = \sum_{i=0}^3 \ell_i$ . Welfare terms are thus

$$\begin{aligned} \frac{\partial W}{\partial t_2} &= p_2^* y_2 + p_2^* m_2 + p_2^* t_2 m'_2 + u'(c_2) c'_2 p_2^* - p_2^* c_2 - p_2^* (1 + t_2) c'_2 p_2^* \\ &= p_2^* t_2 m'_2 \leq 0 \end{aligned} \quad (7)$$

for protection in sector 2, and

$$\begin{aligned} \frac{\partial W}{\partial t_3} &= p_3^* y_3 - p_3^* (1 - \delta) \alpha_1 y_1 - p_3^* \alpha_2 y_2 + \frac{\partial}{\partial t_3} [p_3^* t_3 (m_3 - \delta \alpha_1 y_1)] \\ &\quad + u'(c_3) c'_3 p_3^* - p_3^* c_3 - p_3^* (1 + t_3) c'_3 p_3^* \end{aligned}$$

for protection in sector 3. But note that  $c_3 + \alpha_1 y_1 + \alpha_2 y_2 = y_3 + m_3$ , and that

$$\begin{aligned} \frac{\partial}{\partial t_3} [p_3^* t_3 (m_3 - \delta \alpha_1 y_1)] &= p_3^* \left[ m_3 - \delta \alpha_1 y_1 + t_3 \left( m'_3 - \delta \alpha_1 \frac{\partial y_1}{\partial t_3} \right) \right] \\ &= p_3^* \left[ m_3 - \delta \alpha_1 y_1 + t_3 \left( m'_3 - \delta \alpha_1 \frac{\partial^2 \pi_1}{\partial t_3 \partial t_1} \right) \right] \\ &= p_3^* \left[ m_3 - \delta \alpha_1 y_1 + t_3 \left\{ m'_3 - \delta \alpha_1 \frac{\partial}{\partial t_1} [-(1 - \delta) \alpha_1 y_1] \right\} \right] \\ &= p_3^* [m_3 - \delta \alpha_1 y_1 + t_3 [m'_3 + \delta (1 - \delta) \alpha_1^2 y'_1]], \end{aligned}$$

where  $y'_1$  is the own-price derivative of supply in sector 1. Combining these and rearranging slightly gives

$$\frac{\partial W}{\partial t_3} = p_3^* t_3 [m'_3 + \delta (1 - \delta) \alpha_1^2 y'_1]. \quad (8)$$

Finally, the welfare effect of the duty-drawback at rate  $\delta$  is

$$\frac{\partial W}{\partial \delta} = \frac{\partial \pi_1}{\partial \delta} + \frac{\partial}{\partial \delta} [p_3^* t_3 (m_3 - \delta \alpha_1 y_1)] = 0. \quad (9)$$

The absence of a welfare effect of the duty-drawback reflects the fact that it is a pure transfer entailing no welfare loss, since it affects neither the consumer price of

good 1 nor its producer price, but only the price of an input in a Leontief production function.<sup>8</sup> Combining (6) with (7), (8), and (9) gives

$$\frac{\partial G}{\partial t_2} = p_2^* (y_2 + at_2 m'_2), \quad (10)$$

$$\frac{\partial G}{\partial t_3} = p_3^* (y_3 - (1 - \delta)\alpha_1 y_1 - \alpha_2 y_2 + at_3 [m'_3 + \delta(1 - \delta)\alpha_1^2 y'_1]), \quad (11)$$

$$\frac{\partial G}{\partial \delta} = p_3^* t_3 \alpha_1 y_1. \quad (12)$$

The function  $G$  is globally concave in  $t_2$  and  $t_3$ , so the second-order condition holds for these instruments. We will assume in addition that interior solutions hold for both instruments since otherwise the whole problem of endogenous protection would become irrelevant. By contrast, (12) is clearly nonnegative no matter what, and strictly positive whenever  $t_3 > 0$  (the duty-drawback is irrelevant if  $t_3$  is zero). Therefore in equilibrium there is full drawback, i.e.  $\delta^* = 1$ . Using this condition to simplify (11), the first-order condition for  $t_3$  reduces to

$$y_3 - \alpha_2 y_2 + at_3 m'_3 = 0,$$

or

$$t_3^* = \frac{y_3 - \alpha_2 y_2}{-am'_3}. \quad (13)$$

Finally, setting (10) equal to zero and solving for  $t_2$  gives

$$t_2^* = \frac{y_2}{-am'_2}. \quad (14)$$

Together,  $t_2^*$ ,  $t_3^*$  and  $\delta^* = 1$  define the initial (pre-RTA) equilibrium.<sup>9</sup> Recall that sector

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<sup>8</sup>Note that this implies that duty-drawbacks cannot be justified on welfare grounds under the assumptions in this paper. Panagariya (1992) provides a more general model where duty-drawbacks have ambiguous effects on welfare.

<sup>9</sup>Note that we would have obtained similar optimal tariffs had we assume that the government



1 is the export sector and that sector 2 (along with sector 3) is an import competing sector. Hence sector 2 is not eligible for a duty-drawback.

Compared to a model with no intermediates, what is new here is the negative term involving the output of sector 2 in the numerator of (13). This term reflects counter-lobbying by producers in sector 2 against protection in sector 3, because protection raises the price of the intermediate good and consequently hurts their profits. However, sector 1, is not active in this counter-lobbying, because the full duty-drawback shelters it from the cost of intermediate-good protection. The absence of counter-lobbying by sector 1, because it benefits from full duty-drawback, tends *ceteris paribus*, to raise the equilibrium level of protection in sector 3 (and therefore to hurt sector 2 and consumers). Thus, duty-drawbacks have a protectionist bias.<sup>10</sup>

Note, incidentally, that the duty-drawback scheme creates intra-industry trade even under perfect competition. The reason is that producers of good 1 will always choose to export all their output if doing so makes them eligible for the duty-drawback (encouraging exports is indeed the scheme's objective) while domestic consumption of good 1 will be entirely covered by imports. A country having a duty-drawback scheme will then both export and import good 1.

### 3 Customs Union and duty-drawbacks

Suppose now that country *A* forms a Customs Union (CU) with the country absorbing sector 1's exports, country *B*, which then becomes its partner country. This situation will not be typical of most RTAs among, say sub-saharan African countries, since they trade small amounts of manufactures. But such a situation corresponds largely to the MERCOSUR case, at least between Argentina and Brazil, since they were both able to

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and the lobby engaged in Nash bargaining over contributions as in Maggi and Rodriguez-Clare (1998) instead of the common-agency game of Grossman and Helpman (1994).

<sup>10</sup>Note that the equilibrium tariffs reflect tariff escalation, in the sense that intermediate goods have higher levels of protection than consumer goods. The presence of duty-drawbacks, however reduces the extent of tariff escalation by increasing the tariffs on intermediate goods.

export substantial amount of manufactures to each other (see Yeats, 1998). It would also apply to countries in Asia that have duty-drawbacks and have the potential to export substantial amounts of manufactures to each other.

Suppose then that the governments of  $A$  and  $B$  agree on an efficient solution for the CET, and then bargain over how they share the benefits of cooperation via monetary transfers (“shallow integration” in the terminology of Cadot et al., 1999).<sup>11</sup>

In this setup, let us first examine under which conditions duty-drawbacks would be eliminated for intra-regional exports, and if so what are the consequences for external tariffs.

### 3.1 Elimination of duty-drawbacks after CU formation

Article 12 of MERCOSUR declaration cmc/dec No. 10/94 stipulates that intra-regional exporters can no longer benefit from duty-drawbacks. To explain Mercosur’s decision let us write the CU first order condition for the optimal level of duty-drawback for intra-regional trade. In view of the application in section 4, we use superscript  $M$  (for MERCOSUR) to denote the customs union. Recalling that country  $B$  absorbs all of country  $A$  exports of good 1 and using (12):

$$\frac{\partial G^M}{\partial \delta} = \frac{\partial G^A}{\partial \delta} + \frac{\partial G^B}{\partial \delta} = p_3^* \tau_3 \alpha_1^A y_1^A - a^B p_1^* \tau_1 \frac{\partial y_1^A}{\partial \delta} \quad (15)$$

where  $G^M$  is the CU’s objective function (given by the sum of  $A$ ’s and  $B$ ’s objective function) and  $\tau_i$  is the CET in sector  $i$ . The first term in (15) is as before the gain for the government of country  $A$  of imposing a duty-drawback. The second term is now the loss for country  $B$  in terms of tariff revenue of allowing exporters in  $A$  to

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<sup>11</sup>‘Shallow integration’ boils down to setting up the problem as if a common agency was maximizing the sum of member-country government’s welfare functions, whereas under ‘deep integration’, there is a single agency in charge of trade policy that takes into account union-wide lobbying, so that unlike shallow integration, country characteristics are aggregated.

benefit from duty-drawbacks. Indeed, the existence of a duty-drawbacks in intra-regional trade shifts outwards the export supply of exporters in  $A$ , which reduces tariff revenue for country  $B$  (as it diverts from rest-of-the world imports).

Using (6) and noting that  $\partial y_1^A / \partial \delta = \partial^2 \pi_1^A / \partial \delta \partial \tau_1$ , the right-hand-side of (15) is always negative, and therefore at the optimum there are no duty-drawbacks ( $\delta^M = 0$ ), if:

$$a^B > \frac{1 + \tau_1}{\tau_1 \epsilon_{S_1}^A} \quad (16)$$

where  $\epsilon_{S_1}^A$  stands for the price-elasticity of supply of good 1 in country  $A$ . Thus, if the weight given to social welfare in country  $B$ 's objective function is sufficiently high, then duty-drawbacks will be eliminated. The reason is that the gains in terms of contributions by producers of good 1 in  $A$  are not sufficient to compensate for the loss in terms of tariff revenue in  $B$ .

Taking as an example the average tariff in MERCOSUR which is around 14 percent, and assuming an average price-elasticity of supply around 1, 16 implies that  $a^B$  has to be larger than 8 for duty-drawbacks to be completely eliminated. Note that if import demand functions are non-concave, the second-order condition for the government's problem requires  $a^B$  to be larger than 1. Estimates of  $a$  for the United States in the 1980s yield values between 50 and 88 (see Goldberg and Maggi, 1999). Given that MERCOSUR has eliminated duty-drawbacks for intra-regional trade, one can infer that the constraint in (16) was satisfied. The implications for CET levels are studied in the next section.

### 3.2 CET after duty-drawback elimination

Several trade patterns can be envisaged when the CU is formed. Since we are interested in situations where lobbying takes place, we assume that exporters of good

1 in  $A$  sell in a protected market in  $B$ . This will be the case, if the following two assumptions are met.

First, let us assume that there is protection in sector 1, so that we can concentrate on the conditions when it will be profitable for  $A$ 's producers to sell in  $B$ . Since duty-drawbacks are eliminated for intra-regional trade, this creates an incentive for exporters to re-direct their production from the region to the rest-of-the world. In such a situation the increase in counter-lobbying will not occur. In order to avoid this, we need to assume that producers always find it more profitable to sell within the regional market with protection and paying duties on intermediate purchases, than selling on the world market at the world market price, but not paying duties on intermediate purchases. Letting  $\tau_1$  be the CET on good 1, as before, this requires that:

$$p_1^* [1 + \tau_1 - \alpha_1^A p_3^* (1 + \tau_3)] > p_1^* (1 - \alpha_1^A p_3^*)$$

which simplifies to :

**Assumption 1 :**  $\tau_1 > \alpha_1^A p_3^* \tau_3$

Assumption 1, which is similar to the expression determining whether firms will sell in markets protected by rules of origin requirements (see e.g. Krueger, 1993), guarantees that selling in the market protected by the CET is more profitable than selling in the world market even if it involves forsaking the benefit of the duty-drawback.

Second, we suppose that  $A$  and  $B$ 's combined output in sector 1 is not enough to serve the entire CU demand at the equilibrium price. Again, this situation is most representative of RTAs among developing countries, at least among countries that do not differ too much in size (like Argentina and Brazil). That is, letting  $c_1^A + c_1^B$  be the CU consumption of good 1 at price  $p_1^*(1 + \tau_1)$  and  $y_1^A + y_1^B$  the CU output, we assume:

**Assumption 2:**  $c_1^A + c_1^B \geq y_1^A + y_1^B$

Thus, after the CU is formed, firms in sector 1 sell in a protected market (the partner country's), which was not the case before. This gives them a direct benefit. However, they are no longer eligible for the duty-drawback scheme so that they become sensitive to the rate of protection of the intermediate good. Through the truthfulness restriction, the degree of their sensitivity, given by the derivative of their profit function with respect to the CET in sector 3, i.e.  $\tau_3$ , determines the intensity of their counter-lobbying.<sup>12</sup>

Turn now to the determination of the CET in sector 3. Recalling that duty-drawbacks are disallowed for intra-regional trade, i.e., that  $\delta^M = 0$ , the first order condition to the CET problem in the intermediate sector, is given by:

$$\frac{\partial G^M}{\partial \tau_3} = \frac{\partial G^A}{\partial \tau_3} + \frac{\partial G^B}{\partial \tau_3} \quad (17)$$

$$= p_3^* (y_3^A - \alpha_1^A y_1^A - \alpha_2^A y_2^A + a^A \tau_3 m_3^{A'}) \quad (18)$$

$$+ p_3^* (y_3^B - \alpha_1^B y_1^B - \alpha_2^B y_2^B + a^B \tau_3 m_3^{B'}) = 0 \quad (19)$$

Protection for sectors producing final goods would be given by an expression identical to (19), except that it would exclude the element that captures counter-lobbying on intermediate products.

Return to (19). To simplify, but also in view of empirical tractability for the application that follows, assume identical price effects on import demand for both countries in sector 3, i.e. that  $m_3^{A'} = m_3^{B'} = \mu < 0$ . Also, choose units so that  $y_3^A + y_3^B = 1$ . The assumption of identical price effects is motivated by lack of detailed information on import demand elasticities at a disaggregated level, whereas

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<sup>12</sup>Note that both assumptions would not be necessary, if we assumed that trade took place in differentiated products, which is probably a better approximation for trade in most manufactures, since then it would always pay to sell in both markets and it would always pay to obtain protection (a tariff would raise the price of the domestic substitute), though one would have to factor in terms-of-trade effects. In any event, a more general formulation would be considerably more cumbersome to develop.

the normalization assumption is to avoid ‘size’ effects in the estimation. Let  $t_3^A$  and  $t_3^B$  stand respectively for the levels of tariffs satisfying (13) for the home and partner countries respectively.

Then solving (19) for  $\tau_3$ , and rearranging using (13) yields the expression that will be used in the estimation below:

$$\tau_3^* = \frac{a^A}{a^A + a^B} t_3^A + \frac{a^B}{a^A + a^B} t_3^B + \frac{1}{\mu(a^A + a^B)} (\theta_3^A z_3^A + \theta_3^B z_3^B) \quad (20)$$

where  $\theta_j^A = (1 - \theta_j^B) = y_j^A / (y_j^A + y_j^B)$  is country  $A$ ’s share in the output of good  $j$  and

$$z_3^i = \frac{\alpha_1^i y_1^i}{y_3^i}$$

is the share of good 3’s output in country  $i$  used as an intermediate in sector 1.

Expression (20) indicates that the CET is given by a weighted average of the existing optimal tariffs in both countries (these are the first two elements on the RHS of (20) plus a third term that denotes the increase in counter-lobbying by the export sector against tariffs on the intermediate good due to the elimination of duty-drawbacks on intra-regional trade. The last term on the RHS of (20) is negative since  $\mu < 0$ , so its presence reduces the value of the CET. Note also that the increase in counter-lobbying would still be present in (20) if one did not impose a common import demand in each member country.<sup>13</sup>

Note that when substituting  $t_3^i$ ,  $i \in A, B$  in (20), we are implicitly assuming that, when lobbying the government, lobbies do not take into account the second-round effects of the adjustment in tariffs on their production levels. This assumption is not only probably closer to reality than the alternative which would take second-round

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<sup>13</sup>One can show that if government’s objective when setting tariffs is to maximize tariff revenue, then the CET would have been given by an expression similar to the one in (20), i.e.,  $\tau_3^* = 1/2(t_3^A + t_3^B) - 1/\mu(\theta_3^A z_3^A + \theta_3^B z_3^B)$ . The difference is that the elimination of duty-drawbacks would have led to a higher CET rather than lower. Note that it would not be possible to endogenously explain the existence of duty-drawbacks in the pre-CU equilibrium if governments maximized tariff revenue.

effects into account, but also it is the only possible assumption in our empirical application on Mercosur.<sup>14</sup> Most importantly, to be able to substitute the existing tariffs will avoid excluding from the empirical analysis some important determinants of the tariff levels which cannot be directly measured.

To recapitulate, the simple political-economy model developed here shows that, if there is a possibility for exporters to obtain a duty-drawback, they will lobby to obtain the full drawback (which is what is usually observed), and that duty-drawbacks tend to raise the equilibrium rate of protection on intermediate goods. More importantly for our purposes, the model shows that under plausible conditions, a CU will alter lobbying incentives, leading to pressures to eliminate duty-drawbacks and to reduce the external protection on intermediate goods.

## 4 Application to Mercosur

We use Mercosur data to check whether the model's predictions are consistent with observed outcomes. Beyond data issues and the reasons stated in the introduction, there are at least two practical reasons for our choice. First, steps towards putting in place a CET have gone much faster than in other recent RTAs; recall that the agreement was signed in 1991 and that the CET came into effect in 1995. Second, Mercosur is the only CU whose members previously had duty-drawbacks and which substantially eliminated barriers on internal trade. We discuss first data and econometric issues, then turn to results.

### 4.1 The empirical model

To estimate the effect of eliminating duty-drawbacks on the level of Mercosur's CET, we estimate a stochastic version of (20) on a cross-section of tariffs. To estimate the

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<sup>14</sup>This is because to our knowledge there exists no disaggregated production data available for Mercosur members after 1994, and Mercosur's CET was implemented in 1995.

expression, we need to calculate the third term in that expression which requires information on input-output relations and on production at a fairly disaggregated level (ISIC 4 digit-level which includes 80 sectors). A table describing the characteristics of the 80 sectors used in the estimation is provided in the data appendix. The only Mercosur members for which industrial data was available at this level of disaggregation were Argentina and Brazil. Given that together they represent more than 85 percent of Mercosur production in any sector at the 3 digit ISIC classification level, the exclusion of Uruguay and Paraguay from the empirical analysis should not unduly affect our results.<sup>15</sup> Moreover, in their study of the determination of Mercosur's CET, Olarreaga and Soloaga (1998) concluded that Brazil's political lobbying variables performed as well in explaining variations in Mercosur's CET on their own as those of the four members together.

In section 2, goods 1 and 2 were pure final goods whereas 3 only was usable both in final consumption and as an intermediate input. Now, let all goods be usable as final goods and as intermediates in the production of other goods. We need then to rewrite slightly the coefficient  $z_j^i$ . The total demand for good  $j$  as an intermediate in the production of all other goods  $k$  ( $k = 1, \dots, 80$ ), is  $\sum_k \alpha_{jk} y_k$ , where  $\alpha_{jk}$  is its per unit requirement in the production of good  $k$ ; thus,

$$z_j^i = \frac{\sum_k \alpha_{jk}^i y_k^i}{y_j^i}$$

and the share of good  $j$ 's Mercosur output used as an intermediate in the production of other goods in the Mercosur is

$$z_j^M = \sum_{i=A,B} \theta_j^i z_j^i \tag{21}$$

where  $\theta_j^i$  is  $i$ 's share in the Mercosur's output of  $j$ . The higher is  $z_j^M$ , the stronger

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<sup>15</sup>See Olarreaga and Soloaga (1998).



is the counter-lobbying against protection of  $j$ , and consequently, in accordance with (19) the lower is, *ceteris paribus*, the level of good  $j$ 's equilibrium external tariff under the CET.

At the 4 digit ISIC classification level, Mercosur's CET is censored from above at its upper limit of 20 percent (four sectors reach this upper bound at this level of disaggregation). To allow for censoring, we estimate (20) using a Tobit model; i.e.

$$\tau_j = \begin{cases} \tau_j^* & \text{if } \tau_j^* < 20 \\ 20 & \text{if } \tau_j^* \geq 20 \end{cases}$$

$$\begin{aligned} \text{and } \tau_j^* &= \frac{a^A}{a^A + a^B} t_j^A + \frac{a^B}{a^A + a^B} t_j^B + \frac{1}{\mu(a^A + a^B)} z_j^M + \epsilon_j \\ &= \beta_1 t_j^A + \beta_2 t_j^B + \beta_3 z_j^M + \epsilon_j \end{aligned} \quad (22)$$

where subscript  $j$  stands for a sector,  $j = 1, \dots, 80$ ,  $\epsilon_j$  is the error term, and the expected signs are  $\beta_1 > 0$ ,  $\beta_2 > 0$  and  $\beta_3 < 0$ .

As discussed in Olarreaga, Soloaga and Winters (1999), tariffs tend to be determined at the tariff line level and not at the industry level.<sup>16</sup> This implies that if the error is determined at the tariff line level and the number of tariff lines in each industry is not the same (as can be observed in the table in the data appendix the number of tariff lines varies from 1 in ISIC 3131 to 501 tariff lines in ISIC 3511), then the variance of the error term at the industry level will be negatively correlated with the number of lines in each industry, reducing the efficiency of our estimates. To correct for this potential heteroscedasticity, each observation at the industry level needs to be weighted by the number of tariff lines in each industry (i.e. multiplied by the square root of the number of tariff lines in each industry).

However, a problem with the above correction is that it assumes that the errors

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<sup>16</sup>If not we would not observe variation in tariff levels within industries.

at the tariff line level are independently distributed. If observations within the same industry share a common unobserved determinant, then the above correction may reintroduce some heteroscedasticity. To test for this possibility, we follow Dickens (1990) and when necessary, we apply the correction he suggests which yields asymptotically efficient estimates.<sup>17</sup>

In estimating (22), no constraints are imposed on the values taken by  $\beta_1$  and  $\beta_2$ , whereas the model suggests  $\beta_1 = 1 - \beta_2$ . The alternative then is to estimate this constrained version of (22) by taking  $t_j^A$  (for example) to the left-hand-side of the equation. Thus, the equation to be estimated becomes:

$$\tau_j^* - t_j^A = \beta_2 (t_j^B - t_j^A) + \beta_3 z_j^M + \epsilon_j \quad (23)$$

where the expected signs are as before. The advantage of (23) is that it is no longer censored and can therefore be estimated by OLS (or by weighted least squares to control for potential group data heteroscedasticity).

The data appendix describes data sources and provides a table with the data used in the estimations. The CET is the one negotiated in Ouro Preto in 1994 by Mercosur members. Tariffs on Argentina and Brazil are 1994 external official tariffs (corresponding to an FTA situation as by then more than 95 percent of their internal trade was free of tariffs). Trade data is the average of 1993, 1994 and 1995 whereas production data correspond to the industrial census of 1985 in Argentina and Brazil updated to 1994 using industrial production indices provided by UNIDO.

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<sup>17</sup>The test consists in verifying whether the error term of the weighted regression is correlated with the number of tariff lines in each industry. If this is the case, then one estimates consistently the variance of the common and individual error components by regressing the error of the weighted estimate on a constant and on  $1/n_j$ , where  $n_j$  is the number of tariff lines in industry  $j$ . To obtain asymptotically efficient estimates, one re-weights the observations at the industry level using these variance estimates.

## 4.2 Did counter-lobbying increase in Mercosur?

Table 1 reports results of the estimation of (22) in the first column and of (23) in the second column. In both regressions, the coefficients have the expected sign and are statistically significant at the 99 percent level.<sup>18</sup> The regressors “account for” around 60 percent of the cross-sectorial variation in Mercosur’s CET.

While it may be stretching the power of the model to interpret the values of  $\beta_1, \beta_2$  in terms of welfare weights, it is nonetheless worthwhile to note the following. Unconstrained estimates suggest that Argentina and Brazil give relatively similar weights to social welfare in their objective function. However, the constrained estimates suggest that Argentina’s trade policy authorities are significantly more concerned by social welfare than Brazil’s trade policy authorities ( $\hat{a}^A/\hat{a}^B = 1.27$ ). These estimates are consistent with the fact that, on average, Argentina’s pre-CET average tariff is lower than Brazil’s (see sample data in the appendix).

For our purposes, however, the most important result is that in both regressions, the sector’s share of sales to other sectors enters with a negative sign, suggesting that, indeed, as predicted by a political-economy approach to the determination of the CET, intermediate goods producing sectors get less protection.

The results seem sufficiently promising to use our estimates to calculate the marginal effect of counter-lobbying on the CET from the coefficient estimates in table 1. The results of this exercise are shown in table 2. Let a  $\bar{z}$  indicate the mean value of  $z^M$  in the sample, and  $\hat{\beta}_z$  the estimated marginal effect of regressor  $z^M$ , whose value is given in table 1. Then the change in the value of the mean value of the CET,  $\Delta\bar{\tau}$  is given by:  $\Delta\bar{\tau} = \hat{\beta}_z\bar{z}$ . In our sample  $\bar{z} = 0.68$ .

A slight complication arises from the presence of censoring in our tobit estimate since the marginal effects should not include observations for tariffs on the upper

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<sup>18</sup>Note that the negative coefficient on  $z^M$  also implies that government’s objective is closer to the political-economy function used in this paper than one where government’s maximise tariff revenue (see footnote 13).

bound, since these tariffs could not be higher in the absence of counter-lobbying given the structure of the tariff schedule. Therefore we need to weigh our estimated coefficients in the tobit regressions by the average probability of each observation being in the uncensored region. Given the low degree of censoring (5 percent) in our data, this probability is relatively high and equal to 0.98. Thus, for the tobit equation our estimated marginal effect is  $\Delta\bar{\tau} = 0.98\hat{\beta}\bar{z}$ .

Table 2 reports results of the importance of counter-lobbying in terms of percentage points reductions in the average CET for our different estimations using this procedure and one standard deviation below and above the estimated coefficient.<sup>19</sup> The total CET reduction associated with counter-lobbying varies from 2.2 to 4.4 percentage points (the average CET value in this sample is 13.9%). Hence, according to the model, in the absence of counter-lobbying, Mercosur's CET would have been between 16.1% and 18.3%. Taking the constrained estimates as reference, the average CET would have been 3.5 percentage points higher in the absence of increased counter-lobbying on intermediates' tariffs.

Table 3 indicates the top five and the bottom five industries where after the elimination of duty-drawbacks, counter-lobbying has led to the largest and smallest reductions in tariffs, respectively. The largest increase in counter-lobbying on intermediate products tariffs occurred in industries 3699 (non-metallic mineral products), 3692 (cement, lime and platter), 3610 (pottery, china and earthenware), 3620 (glass) and 3691 (structural clay). These tend to be sectors that are heavily used as intermediates in other sectors production and therefore which were more inclined to be subject to increase counter-lobbying on their tariffs. The smallest increase in counter-lobbying occurred in industries 3220 (wearing apparel), 3231 (tanneries and leather finishing), 3233 (leather products), 3240 (footwear) and 3112 (dairy products). These tend to be sectors which sell a little share of their output as input to other sectors. In

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<sup>19</sup>To give an example, the middle entry in row 1 of table 2,  $-3.0$  is obtained as follows:  $-3.0 = (0.98)(-4.51)(0.68)$

non-metallic mineral products (3692), the tariff could have been 5.4 percentage points higher in the absence of increased counter-lobbying, which represents more than 50 percent of the actual CET. At the other end of the spectrum, for wearing apparel, the fall in tariff was a low 0.1 percentage points, which represents around 0.5 percent of the actual CET.

## 5 Concluding remarks

This paper used a political-economy framework to study the implications of duty-drawback schemes (promoted by the World Bank in many developing countries as a mechanism mitigating the anti-trade bias of existing tariffs) for the incentives of export industries to lobby against upstream tariffs on imported intermediates. In a model where duty-drawback schemes are jointly determined with tariffs as part of a political-economy equilibrium, we show that they reduce counter-lobbying incentives, leading, *ceteris paribus*, to higher tariff rates on imported intermediates used heavily in export industries.

Moreover, we showed that the formation of a CU will endogenously lead to the elimination of duty-drawbacks for intra-regional exports. This re-creates an incentive for counter-lobbying by users of intermediate goods, resulting in lower external tariffs on intermediate products, thereby formalizing a channel through which the “new” regionalism may, in the terminology of Bhagwati, be a stepping stone rather than a stumbling block in the move towards greater integration of the world economy.

The model’s predictions were tested and confirmed in the case of Mercosur. Our estimates suggest that the CET would have been on average 3.5 percentage point higher (25 percent) in the absence of the increased counter-lobbying on intermediate products associated with the elimination of duty-drawbacks for intra-regional exports. Thus, the mechanism described above may partly explain the decline in external tariffs associated with the “new regionalism” defined by Ethier and Lawrence. Although our

results could no doubt have been derived from alternative political-economy models, they also provide indirect vindication of the empirical implications of common-agency (and Nash-bargaining) models of trade protection.

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Table 1: *Estimating the increase in counter-lobbying<sup>a</sup>*

	Tobit eq. (22)	Constrained eq. (23)
$t^A$	.34 (.09)**	
$t^B$	.42 (.06)**	
$z^M$	-4.51 (1.20)**	-5.19 (1.28)**
$t^B - t^A$		.44 (.07)**
Constant	7.58 (1.09)**	4.47 (1.00)**
R <sup>2</sup> -adj. <sup>b</sup>	0.68	.52
# obs.	80	80

<sup>a</sup>All estimations have used Dickens (1990) procedure to correct for group data heteroscedasticity. Figures in parenthesis are standard errors. \* stands for significance at the 95 percent level and \*\* at the 99 percent level.

<sup>b</sup>For the tobit regression the R<sup>2</sup> is calculated according to Mc Veall and Zimmermann (1994) best predictor.

Table 2: *Measuring the reduction in the CET due to counter-lobbying<sup>a</sup>*

	$z_{min}^b$	$\bar{z}^c$	$z_{max}^d$
Tobit: eq. (22)	-2.2	-3.0	-3.8
Const.: eq. (23)	-2.7	-3.5	-4.4

<sup>a</sup>See text on how entries were computed. Values are expressed in percentage points.

<sup>b</sup>One standard deviation below  $\hat{\beta}_3$ .

<sup>c</sup>At  $\hat{\beta}_3$ .

<sup>d</sup>One standard deviation above  $\hat{\beta}_3$ .

Table 3: *Top and Bottom 5 tariff reductions due to increased counter-lobbying<sup>a</sup>*

	ISIC	CET ( $\tau$ )	Fall in $\tau$
Top 5	Non-metallic mineral prod. (3699)	9.4	-5.4
	Cement, lime and plaster (3692)	4.0	-5.3
	Pottery, earthenware (3610)	17.0	-5.2
	Glass and glass prod. (3620)	12.7	-5.2
	Structural Clay prod. (3691)	11.7	-5.2
Bottom 5	Wearing apparel (3220)	19.9	-0.1
	Leather finishing (3231)	9.5	-1.1
	Products of Leather (3233)	19.5	-1.1
	Footwear (3240)	20.0	-1.2
	Dairy prod. (3112)	14	-1.3

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<sup>a</sup>Values of tariff reductions are expressed in percentage points and are computed using the constrained estimates.

# Data Appendix

## Tariffs.

Common external tariff data and external tariffs were provided by the MERCOSUR secretariat (official tariffs for 1995, announced in December 1994). Tariff data are disaggregated at the 8-digit level of the harmonized system (9119 items) and were converted to the 6-digit level by simple averages. To filter the data from the 6-digit harmonized system to the 4-digit ISIC classification we used a table provided by Jerzy Rozanski from the World Bank.

## Trade data.

The sources are national accounts (COMTRADE) in US dollars. Data were averaged for 1993-95 and disaggregated at the 6-digit level of the harmonized system. To convert them to ISIC 4-digit we used the same filter as for tariff data.

## Industrial data.

The sources are the industrial censuses of Argentina and Brazil in 1985 for production data, and the GTAP database for Argentina and Brazil in 1995 for input-output coefficients. The industrial data at the 4-digit level was converted into 1994 values using a production index at the 3-digit level available at UNIDO. Given that production data is denominated in domestic currency we converted them to 1993-95 US dollar values with the ratio of the average nominal GDP in Manufacture in 1993-95 (from National Accounts) to the total value added calculated from census figures (to which we also apply the production index). The data are disaggregated into 80 sectors corresponding to the 4-digit ISIC level. To convert the input-output data from the GTAP classification to the ISIC one, we used the tables provided by GTAP manuals.

ISIC	CET ( $\tau$ )	Sample Data			# lines
		$t^A$	$t^B$	$z^M$	
3111	9.2	4.2	7.9	0.260	77
3112	14.0	6.9	19.9	0.245	23
3113	12.6	6.9	9.4	0.312	63
3114	13.7	4.9	16.6	0.287	19
3115	9.4	4.0	7.2	0.397	47
3116	10.0	4.7	9.3	0.297	34
3117	16.7	7.8	20.7	0.287	13
3118	13.9	5.8	11.0	0.459	14
3119	16.2	8.0	14.6	0.288	13
3121	13.7	7.4	12.7	0.300	31
3122	11.0	5.0	11.2	0.315	2
3131	20.0	5.0	20.0	0.375	1
3132	18.0	7.0	18.1	0.278	7
3133	16.0	5.8	7.3	0.507	3
3134	19.9	7.0	18.6	0.334	9
3140	18.7	8.9	19.1	0.375	6
3211	16.2	12.8	14.4	0.752	389
3212	19.3	18.6	19.0	0.729	64
3213	18.0	15.0	16.0	0.686	18
3214	18.8	14.3	18.8	0.769	27
3215	18.0	10.0	16.0	0.813	12
3219	15.5	13.0	14.7	0.646	26
3220	19.9	19.7	19.9	0.029	257
3231	9.5	3.0	5.9	0.218	21
3233	19.5	18.7	19.5	0.225	20
3240	20.0	20.0	20.0	0.236	14
3311	9.8	9.8	6.7	0.575	25
3312	10.8	11.0	10.6	0.532	5
3319	9.8	9.1	8.8	0.566	8
3320	18.0	14.9	17.2	0.574	23
3411	10.8	13.1	7.0	0.784	104
3412	16.0	15.0	11.8	0.784	8
3419	13.8	15.0	11.4	0.791	11
3420	9.9	14.8	8.2	0.766	27
3511	7.5	7.0	6.9	0.848	501
3512	4.5	5.5	5.2	0.883	27
3513	12.4	10.4	12.0	0.838	114
3521	14.0	9.8	14.0	0.840	12
3522	6.6	5.5	5.4	0.785	60
3523	16.7	13.4	13.1	0.816	32
3529	10.0	10.4	8.3	0.833	76
3530	2.8	2.2	6.6	0.730	23
3540	5.7	6.3	3.0	0.971	8
3551	14.8	14.4	14.0	0.838	13
3559	14.4	11.9	14.8	0.823	36
3560	17.3	14.3	18.6	0.824	50
3610	17.0	12.3	15.3	1.017	14
3620	12.7	11.1	12.0	1.005	58
3691	11.7	9.8	9.4	1.004	14
3692	4.0	5.0	0.0	1.029	8
3699	9.4	10.3	5.6	1.039	56
3710	11.6	10.6	9.9	0.939	163
3720	8.2	8.4	5.9	0.964	152
3811	17.4	15.0	17.2	0.762	80
3812	17.3	15.0	17.3	0.939	3
3813	14.3	14.3	16.2	0.754	23
3819	14.4	14.5	13.5	0.798	124
3821	10.9	14.0	18.3	0.786	16
3822	13.8	14.0	18.9	0.878	33
3823	14.0	13.6	20.5	0.906	92
3824	11.3	14.7	18.6	0.791	136
3825	13.2	15.1	22.0	0.891	30
3829	14.7	14.6	19.1	0.872	192
3831	15.1	14.8	18.5	0.822	65
3832	13.4	15.3	21.1	0.799	81
3833	18.3	19.0	19.4	0.777	25
3839	15.8	14.9	16.3	0.736	35
3841	14.6	14.6	19.0	0.625	20
3842	14.0	13.6	20.0	0.669	22
3843	18.3	14.1	27.5	0.796	52
3844	16.5	15.2	25.0	0.698	22
3845	2.1	11.1	3.2	0.743	19
3849	20.0	20.0	20.0	0.779	1
3851	12.9	14.8	16.4	0.863	77
3852	14.3	15.2	17.7	0.898	59
3853	19.0	17.6	19.0	0.894	52
3901	12.9	10.8	12.6	0.751	22
3902	17.0	14.1	14.2	0.700	23
3903	20.0	15.0	19.5	0.615	22
3909	17.8	14.5	19.5	0.723	97
mean	13.9	11.6	14.3	0.676	53
stdev	4.3	4.4	5.7	0.244	79

## ISIC 4-digit classification

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