POLICY RESEARCH WORKING PAPER 2157

How Regional Blocs Affect Excluded Countries

The Price Effects of MERCOSUR

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Price data on exports to Brazil from countries excluded from MERCOSUR show that preferential trading agreements hurt nonmember countries by compelling them to reduce their prices to meet competition from suppliers within the regional trading bloc.

The World Bank
Development Research Group
Trade
August 1999

Summary findings

The welfare effects of preferential trading agreements are most directly linked to changes in trade prices — that is, the terms of trade.

Chang and Winters use a simple strategic pricing game in segmented markets to measure the effects of MERCOSUR on the pricing of "nonmember" exports to the regional trading bloc. Working with detailed data on unit values and tariffs, they find that the creation of MERCOSUR is associated with significant declines in the prices of nonmembers' exports to the bloc. These can be explained largely by tariff preferences offered to a country's partners.

Focusing on the Brazilian market (by far the largest in MERCOSUR), they show that nonmembers' export prices to Brazil respond to both most-favorable-nation and preferential tariffs. Preferential tariffs induce reductions in nonmember export prices.

This paper — a product of Trade, Development Research Group — is part of a larger effort in the group to understand the effects of regional integration. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Lili Tabada, room MC3-333, telephone 202-473-6896, fax 202-522-1159, Internet address ltabada@worldbank.org. Policy Research Working Papers are also posted on the Web at http://www.worldbank.org/html/dec/Publications/Workpapers/home.html. The authors may be contacted at wchang@worldbank.org or l.a.winters@sussex.ac.uk. August 1999. (57 pages)

How Regional Blocs Affect Excluded Countries:

The Price Effects of MERCOSUR*

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Keywords: Regional Integration; Terms of Trade; Imperfect Competition; MERCOSUR
JEL classification: F13; F15; C33

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* This work was partly conducted while the authors were Consultant and Research Manager in the Development Research Group of the World Bank. The views expressed in this paper are those of the authors and should therefore not be attributed to the World Bank or its member governments. The authors are grateful to Kyle Bagwell, Jagdish Bhagwati, Stephen Cameron, Richard Clarida, Antoni Estevadeordal, Junichi Goto, Ann Harrison, Ken Leonard, Will Martin, John McLaren, Andrew Newell, Robert Mundell, Marcelo Olarreaga, Maurice Schiff, Forhad Shilpi, Isidro Soloaga, Anthony Venables and Stan Wellisz for excellent comments and participation in the seminars at the Inter-American Development Bank, the World Bank, the US International Trade Commission, the University of Sussex and Columbia University.

1. INTRODUCTION

1.1 Introduction

Preferential Trading Arrangements (PTAs) have now become an integral and enduring aspect of the multilateral trading regime. Between 1990 and 1997, 87 PTAs were notified to the WTO, and nearly all signatories of the WTO are currently members of at least one PTA. Despite such widespread existence, concerns continue about the welfare impacts of PTAs, especially on excluded countries. The effects of PTAs on the volume and quantities of trade are studied quite frequently but, as Winters (1997a, b) argues, these variables are not a reliable guide to welfare effects for non-member countries. The latter are more directly related to price effects, and of these there are few studies. Indeed, there is, to our knowledge, no published *ex post* study of the price effects of a PTA on its trading partners.

This paper studies one of the most recently formed and controversial customs unions, MERCOSUR (between Argentina, Brazil, Paraguay, and Uruguay). It examines the effect that MERCOSUR has had on the prices of its imports from non-members, assuming that those countries export to two segmented markets, (1) Brazil and (2) rest of the world, in an imperfectly competitive setting with differentiated products. We concentrate on the Brazilian import market since it is a large market for imports, by far, the largest in MERCOSUR and it provides good data over the time period of interest.[1] We

[1] Yeats (1998) first raised the question of whether MERCOSUR may be a concern for non-members, since the most rapidly growing intra-MERCOSUR exports appear to be in products in which members do not have

postulate that changes in Brazilian m.f.n. tariff rates led directly to price changes by non-member firms exporting to Brazil, and that tariff preferences offered to members, e.g. Argentina, lead to additional 'strategic' price responses within the Brazilian market. We seek to identify both such responses in commodity-level import data from Brazil and in export data from its major overseas suppliers.

MERCOSUR nations have made significant tariff adjustments over our sample period (1989-1996). In addition to unilateral reforms over 1989-95, they largely abolished tariffs on imports from partners over 1991-95, as governed by the Treaty of Asunción, 1991. MERCOSUR's common external tariff (CET) is based on the Ouro Preto Protocol, agreed, after much contention, at the end of 1994 and implemented over the following two years. The different phasing of these adjustments, plus the exceptions to both the CET and internal free trade–see Olarreaga and Soloaga (1998)—mean that the margins of preference on internal trade show considerable variation both through time and across commodities. This helps us to identify their effects empirically.

In the remainder of the paper, Section 1.2 summarizes the literature on the effects of PTAs on non-members and on identifying price effects empirically. Section 1.3 discusses some stylized facts and descriptive statistics on the major exporters to the Brazilian market. The formation of MERCOSUR seems likely to have had an immediate effect on the pricing of non-member exports to the Brazilian market. The Treaty of Asunción cut members' internal tariffs by more than 50% of the m.f.n. rate at the end of

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a comparative advantage. Nagarajan (1998) argues instead that intra-regional trade should be compared with extra-regional imports, not extra-regional exports, and that by focusing on the latter, Yeats may exaggerate the effects of MERCOSUR. Our work is quite different, referring to the prices not the values of trade flows.

1991, with the rest of the cut to zero following over the next four years. Intuitively, the response to such a large discriminatory tariff cut should be for members to increase their pre-tariff prices, while non-members reduce theirs.

Section 2 briefly presents a model of this process. From this we derive reduced form estimation equations and a comparative statics exercise (Appendix I) to interpret their coefficients. The model has two firms, a 'non-member' and a 'member' firm, exporting a differentiated product to the Brazilian market. The two firms respond to each other's prices (as well as to their own tariffs, exchange rates, and wages), playing a Bertrand pricing game within the Brazilian market. We explore the game by examining relative member and non-member prices in Brazil, and, for certain exporters, the relative prices of exports to Brazil and to other markets.

Section 3 presents the empirical implementation of the reduced form equations solved in section 2. It also provides details of MERCOSUR's tariff policy during the integration period and of the data and their limitations. Section 4 examines the final results which suggest strongly that m.f.n. tariff changes and preferential tariffs both affect supplier prices significantly, and that MERCOSUR's preferential tariffs caused significant declines, *ceteris paribus*, in the prices of non-members' exports to Brazil.

1.2 Brief survey and motivation for the study

One of the major influences on the welfare of any trading economy is its terms of trade, and thus questions surrounding trade policy should be concerned with this variable.

But given its importance in theory this issue is addressed surprisingly rarely in empirical studies. A seminal contribution was Kreinin (1961) who considered the effects of US m.f.n. tariff concessions during the post-war years. Kreinin notes that a reduction in US tariffs would most immediately affect import prices and that only through this medium would changes in the volume of imports occur. He also shows that US m.f.n. tariff concessions did indeed lead to considerable changes in foreign export prices.[2]

By the same token the empirical analysis of the effects of PTAs should be at least as concerned with price as with volume effects. An elegant but relatively unremarked theoretical examination of the terms of trade effect of regional integration is given by Mundell (1964). He elucidates the terms of trade effects in a 3-country model in which goods are gross substitutes, and in which price changes occur to restore balance of payments equilibrium after an initial preferential tariff shock occurs. He shows that for a single tariff change by one member, the preferred exporting partner's terms of trade unambiguously improve, while the excluded country's deteriorate. The net effect of the active country's tariff concessions on its own terms of trade is ambiguous, but when two countries swap preferential concessions, as in a PTA, they collectively improve their terms of trade vis-à-vis the rest of the world.

More recent studies focusing on PTAs such as Bagwell and Staiger (1998, 1999) also show that the multilateral negotiations of the GATT and its principles of *reciprocity* and *non-discrimination* foster efficient outcomes which allow governments to escape from

[2] Kreinin states that "less than a third...of the tariff concessions granted by the US were passed on to the US consumer in the form of reduced import prices, while more than two-thirds...accrued to the foreign suppliers

a terms of trade driven Prisoners' Dilemma. The authors argue that PTA formation could enable member countries to exploit greater market power over their terms of trade and potentially undermine the efficient outcome of multilateral negotiations.

The last result is potentially very significant, for the terms of trade is by far the most direct way in which PTAs affect the rest of the world (RoW). Precisely paralleling Kreinin's complaint, the usual empirical approach to assessing the effects of a PTA is to ask whether, as a result of integration, the RoW's exports to the integrating bloc increase (which is held to be good) or decrease (bad). Winters (1997a) shows that this is a very inadequate indicator: first, RoW welfare will be related to its imports not its exports, and second, in a competitive economy, marginal changes in quantities hardly matter, whereas changes in the prices of traded goods matter considerably.[3] Given that the theoretical literature focuses so heavily on terms of trade effects, it is surprising that *ex-post* studies which examine these variables are so very sparse.

Turning to quantitative studies of the effects of integration, Winters (1997b) observes that the RoW's terms of trade do figure in a number of *ex ante* studies (although frequently with little emphasis), but that no *ex post* study addresses the issue. Winters and Chang (forthcoming) started to do so in the case of Spanish accession to the EC, but were severely hampered by a number of intractable data difficulties. This paper continues our efforts in a much more satisfactory empirical environment and generates stronger and more

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and improved the terms of trade of the exporting nations."

[3] Winters also argues that, contrary to the common belief, Kemp and Wan (1976) said nothing about whether RoW's welfare increases or decreases in the face of a PTA. They showed how it could be kept constant, completely obviating the need to discuss its determinants.

interesting results. Our focus is primarily on how regional schemes affect excluded countries: specifically, the effect that MERCOSUR has had on the prices of imports in Brazil since 1991.

A useful empirical literature, on which we build, relies on the micro-foundations of imperfectly competitive and segmented markets. The 'pass-through' literature attempts to explain the lack of import price changes following changes in the exchange rate, and the consequent implication that foreign suppliers' markups change.[4] Feenstra (1989) estimates a markup model for the US markets for motorcycles and trucks and obtains the useful result that changes in the exchange rate and in tariffs have equal effects on the net price of imports--the so-called 'symmetry' hypothesis. Feenstra, however, considered only the rivalry between domestic and imported varieties and so examined only the pass-through of the m.f.n. tariff. For the purpose of examining PTAs, however, we have to model the pricing game that occurs between rival foreign suppliers within a market under consideration. In imperfectly competitive settings, a firm's pricing depends not only on the tariff charged on its own product, but also on that charged on its rivals'. If a member-country firm receives a preferential tariff concession it becomes more competitive in PTA markets, and non-member firms are likely (although not bound) to reduce their prices in compensation. With this in mind we move on to present some stylized results and descriptive statistics.

1.3 Stylized results and descriptive statistics

We present three simple calculations of the mean changes in prices (unit values) since the formation of MERCOSUR[5]: for various suppliers, the average price of exports to Brazil relative to those to non-integrating markets (RoW); the prices of exports to Brazil and RoW in absolute terms; and, using Brazilian data, the relative prices of imports from members (Argentina) and non-members. To render commodities comparable, the starting year price has been normalized to be 1 for each commodity so that we are essentially measuring price changes. To be precise we estimate and plot the following statistics:

in Figure 1: $$\frac{1}{N}\sum_{i=1}^{N}\ln\left(\frac{\overline{p}^{\$}_{1it}/\overline{p}^{\$}_{2it}}{\overline{p}^{\$}_{1i90}/\overline{p}^{\$}_{2i90}}\right), \text{ i=(1,...,N) and t=(1,...,T),}$$

in Figure 2: $$\frac{1}{N}\sum_{i=1}^{N}\ln\left(\frac{\overline{p}^{\$}_{1it}}{\overline{p}^{\$}_{1i90}}\right), \text{ i=(1,...,N) and t=(1,...,T),}$$

in Figure 3: $$\frac{1}{N}\sum_{i=1}^{N}\ln\left(\frac{\overline{p}^{*\$}_{1it}/\overline{p}^{\$}_{1it}}{\overline{p}^{*\$}_{1i90}/\overline{p}^{\$}_{1i90}}\right), \text{ i=(1,...,N) and t=(1,...,T).}$$

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[4] Several recent studies analyze incomplete pass-through in the face of exchange rate fluctuations: for example, theoretical papers by Baldwin (1988), Dornbusch (1987) and Krugman (1987), and cross-sectional industry empirics by Knetter (1989), Froot and Klemperer (1989) and Schembri (1989).

[5] Because no price data are available we have to use unit value data, but since these are available at the 6-digit level of the Harmonized System (HS-6) which distinguishes 5113 commodities, we can have reasonable confidence in their accuracy. The 6-digit Harmonized System became the standard classification for trade and tariff data across countries starting in 1989. Unfortunately, many countries started reporting well after that date, and there is no other way to obtain data of this level and precision for earlier years.

Where the first subscript, 1 or 2, represents prices paid in Brazil and RoW respectively, the second, i=1,...,N, the commodity, and the third, t=1,...,T, time, with the beginning year as base. The bars above the prices indicate that these are pre-tariff prices, and the superscript $ denotes prices in dollars. We have averaged prices only over the set of commodities for which we have observations for all years for both markets or suppliers.

Figure 1 presents mean export prices for four major exporters to Brazil and RoW: the USA (for which 1356 commodities were exported to both markets in all years), Japan (580), Korea (99), and Argentina (686). The broken lines give the 95% confidence interval about the means. To infer from Figure 1 an effect of MERCOSUR on prices, we have implicitly to employ RoW as the 'anti-monde'. On this basis non-members' relative prices of exports to Brazil declined by approximately 15% between 1991 and 1996.[6] Conversely, for the integrating partner, Argentina, relative pre-tariff prices to Brazil increased. This latter result is not significantly different from no change, however, possibly because data on the critical years 1991 and 1992, during which the major shocks occured, are missing.

It is also interesting to see the pattern of the absolute export prices in Figure 2. For the USA and Korea absolute export prices declined by about 10% following the shock of MERCOSUR, and then began to rise somewhat afterwards. For Japan, absolute dollar prices to Brazil rose (presumably reflecting the yen's appreciation) but by less than export prices in general.

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[6] Similar results for USA exports have been obtained using the data provided in Feenstra (1997).

Finally, Figure 3 shows relative member/non-member import prices in the Brazilian market. Argentina's pre-tariff prices rise relative to USA, Korea, and the world as an aggregate. Japan is different presumably again explained by the appreciating Yen during the 1990-1995 period.[7]

These descriptive statistics match our *a priori* expectations surprisingly well. Moreover, they refer to significant volumes of international trade. In 1996, for example, Brazil imports of goods amounted to $56.5 billion: $12.5 billion from the USA (22.2% of the total), $7.1 billion from Argentina (12.6%), $5 billion from Germany (8.8%), $3.1 billion from Italy (5.4%), and $2.9 billion from Japan (5.1%). Other large suppliers examined are Korea and Chile, which account for $1.3 and $1.0 billion, (with 2.2 and 1.8% import share) respectively. At the commodity level the USA has a share of 10% or more of Brazilian imports in 60% of the HS-6 headings, Argentina in 17%, Germany in 30%, Italy in 16%, and Japan in 12%. Korea and Chile each have approximately 5% of HS-6 headings which have 10% or greater import share.

2. THE MODEL

2.1 Export Pricing under Imperfect Competition and Segmented Markets

While the pricing figures above are very informative, they are also very crude, and so we now include a series of controls to model the effects of MERCOSUR more formally.

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[7] The Yen appreciated by 54% from 144.8 in 1990 to 94.1 Yen/$ in 1995.

We use a parsimonious model of export pricing to illustrate the effects we expect to find. For each good we distinguish two segmented markets, Brazil and the Rest of the World (RoW), and two exporting firms, a non-member firm from outside MERCOSUR and a member firm from inside (always Argentina in our case).[8] The firms supply differentiated products[9] and maximize profits in their own currency by manipulating duty-paid prices in their markets (p). They take their input costs, exchange rates and tariffs as given. Costs ($\tilde{c}(x,w)$) are homogeneous of degree one in the price of a composite factor, loosely referred to here as the wage (w). Thus $\tilde{c}(x,w) = wc(x)$, where x is output and c(x) is unit costs.

The demand for the non-member's differentiated product in Brazil (market 1) is given by, $x_1(p_1,p_1^*,Q_1,Y_1)$, a function of the its own price, p, its major rival's (Argentina) product price, p*, the aggregate price index, Q, and nominal national income, Y, in Brazil. The demand for its product in the RoW (market 2) is a function of its own price, the aggregate price level and national income in RoW, $x_2(p_2,Q_2,Y_2)$. We are assuming here that Argentina is a sufficiently large supplier to the Brazilian market that the non-member firm's demand may be related to Argentina's prices, but that it is so insignificant in RoW markets that no separate Argentina price effect will be identifiable.[10] The non-member firm's objective function and first order conditions may thus be written:

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[8] We concentrate on the two largest traders of MERCOSUR, Argentina and Brazil because data on Paraguay and Uruguay are so sparse.

[9] We use Armington's (1969) distinction between a 'good' and 'product'. 'Goods' are distinguished only by kind whereas 'products' are distinguished by kind and origin of supply.

$$\underset{p_1,p_2}{Max}\left[\frac{e_1}{\tau_1}p_1x_1(p_1,p_1^*,Q_1,Y_1)+\frac{e_2}{\tau_2}p_2x_2(p_2,Q_2,Y_2)-c_1(x_1)w-c_2(x_2)w\right] \tag{1}$$

with F.O.C.s

$$p_1\left[1+\frac{1}{\eta_{1p}}\right]-\frac{w\tau_1}{e_1}c_{1x}(x_1(p_1,p_1^*,Q_1,Y_1))=0 \qquad \eta_{1p}=\frac{\partial x_1}{\partial p_1}\frac{p_1}{x_1} \tag{1a}$$

$$p_2\left[1+\frac{1}{\eta_{2p}}\right]-\frac{w\tau_2}{e_2}c_{2x}(x_2(p_2,Q_2,Y_2))=0 \qquad \eta_{2p}=\frac{\partial x_2}{\partial p_2}\frac{p_2}{x_2} \tag{1b}$$

where, in addition to the variables already defined, τ_1, and τ_2 are the ad-valorem tariff factors (1+t) charged by Brazil and RoW, and e_1 and e_2, the supplier countries' currency prices of a Brazilian REAL and RoW currency. Note that price elasticities, η_1, and η_2, are affected by the same variables as demand.

The member (Argentinian) firm's objective function and first order conditions may be written similarly, except in that demand in RoW depends explicitly on both Argentina and non-member prices, with the latter being treated as exogenous.

$$\underset{p_1^*,p_2^*}{Max}\left[\frac{e_1^*}{\tau_1^*}p_1^*x_1^*(p_1,p_1^*,Q_1,Y_1)+\frac{e_2^*}{\tau_2^*}p_2^*x_2^*(p_2,p_2^*,Q_2,Y_2)-c_1^*(x_1^*)w^*-c_2^*(x_2^*)w^*\right] \tag{2}$$

F.O.C.s $$p_1^*\left[1+\frac{1}{\eta_{1p^*}^*}\right]-\frac{w^*\tau_1^*}{e_1^*}c_{1x}^*(x_1^*(p_1,p_1^*,Q_1,Y_1))=0 \qquad \eta_{1p^*}^*=\frac{\partial x_1^*}{\partial p_1^*}\frac{p_1^*}{x_1^*} \tag{2a}$$

[10] Argentina's price is effectively rolled into the general price level in the rest of the world, captured by the world's price deflator Q_2. The assumption is not unreasonable. Argentina's share of Brazil's imports exceeds 5% in 22.6% of all HS-6 headings, but in only 3.1% of headings in RoW even using our limited set of exporters to define world sales.

$$p_2^*\left[1+\frac{1}{\eta_{2p^*}^*}\right]-\frac{w^*\tau_2^*}{e_2^*}c_{2x}^*(x_2^*(p_2,p_2^*,Q_2,Y_2))=0 \qquad \eta_{2p^*}^*=\frac{\partial x_2^*}{\partial p_2^*}\frac{p_2^*}{x_2^*} \tag{2b}$$

The first order conditions imply that, for any market and supplier, an increase in either the tariff or the supplying country's exogenous wage, or a decrease in the exchange rate will increase the marginal cost of delivering exports. The supplying firm must therefore increase its marginal revenue by altering its landed price (p). We have shown in Appendix I, that the nature of this change depends on how the price elasticity of demand changes as costs change.

By assuming that the two markets are segmented and have independent cost functions we are making them strategically separable, so that we can develop two separate pairs of price equations.[11] In Brazil:

$$p_1=f_1(\frac{w\tau_1}{e_1},p_1^*,Q_1,Y_1) \tag{1a}$$

$$p_1^*=f_1^*(\frac{w^*\tau_1^*}{e_1^*},p_1,Q_1,Y_1) \tag{2a}$$

and in RoW:

$$p_2=f_2(\frac{w\tau_2}{e_2},Q_2,Y_2) \tag{1b}$$

$$p_2^*=f_2^*(\frac{w^*\tau_2^*}{e_2^*},p_2,Q_2,Y_2) \tag{2b}$$

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[11] There is strong evidence to support that markets are in fact segmented—see for example Knetter (1989) and Marston (1990).

These equations are homogeneous of degree one in costs, competitor's price, the aggregate price and nominal income in local currency. Our assumptions imply that firms play an interactive pricing game in the Brazilian market, solving (1a) and (2a) simultaneously, while in RoW the solution is recursive with (1b) affecting (2b) but not vice versa.

For estimation purposes we log-linearize equations (1) and (2) and estimate reduced form equations for prices. Thus,

$$\ln p_1 = A_1 + \beta_1 \ln \frac{w\tau_1}{e_1} + \delta_1^* \ln \frac{w^*\tau_1^*}{e_1^*} + \alpha_1 \ln Q_1 + \lambda_1 \ln Y_1 \qquad (3a)^{12}$$

$$\ln p_1^* = A_1^* + \delta_1 \ln \frac{w\tau_1}{e_1} + \beta_1^* \ln \frac{w^*\tau_1^*}{e_1^*} + \alpha_1^* \ln Q_1 + \lambda_1^* \ln Y_1 \qquad (3b)$$

$$\ln p_2 = A_2 + \beta_2 \ln \frac{w}{e_2} + \alpha_2 \ln Q_2 + \lambda_2 \ln Y_2 \qquad (4a)$$

$$\ln p_2^* = A_2^* + \delta_2 \ln \frac{w}{e_2} + \beta_2^* \ln \frac{w^*}{e_2^*} + \alpha_2^* \ln Q_2 + \lambda_2^* \ln Y_2 \qquad (4b)$$

Equations (4a) and (4b) are written without tariffs in the RoW, i.e., without τ_2 and τ_2^*, because these variables are considered fixed over our sample period, and thus are absorbed into the constant term.[13] Feenstra (1989) uses a variant of equation (3a) to show that for US imports of Japanese trucks and cycles, the long-run pass-through of tariffs and

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[12] In accordance with the symmetry hypothesis we have given the tariff and wage the same coefficients in these equations, but in our estimations we separate out the tariffs.

[13] In fact these rates did actually change a little over time, but much less than in MERCOSUR. In any case, since we have no data on 'world' tariffs, these variables must either be taken as constant, or absorbed into the error term as white noise.

exchange rates are statistically identical. Essentially, it focused on the m.f.n. effects, β_1 of the equation, whereas the coefficient of interest in the 'strategic' pricing relevant to PTAs is δ_1^*. If marginal costs are fixed then the expected sign of δ_1^* depends only on how its 'perceived' price elasticity of demand gets altered from the preferential tariff induced reduction of its rival's price. If the non-member's demand becomes more elastic, then the optimal response is to reduce price, hence $\delta_1^* > 0$.[14] Detailed analysis and interpretations of the coefficients and comparative statics is relegated to Appendix I.

While (3) and (4) are estimable directly it is intuitively easier and econometrically more efficient to combine them into a series of relative price equations. Subtracting (3a) from (3b) generates an equation for the relative prices of member and non-member country exports to Brazil. Using the homogeneity assumption, i.e., $\alpha_1 = 1 - \beta_1 - \delta_1^* - \lambda_1$, and $\alpha_1^* = 1 - \beta_1^* - \delta_1 - \lambda_1^*$, we get:

$$\ln\frac{p_1^*}{p_1} = A + (\delta_1 - \beta_1)\ln\left[\frac{w\tau_1}{e_1 Q_1}\right] + (\beta_1^* - \delta_1^*)\ln\left[\frac{w^*\tau_1^*}{e_1^* Q_1}\right] + (\lambda_1^* - \lambda_1)\ln\frac{Y_1}{Q_1} \quad . \qquad (5)^{15}$$

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[14] Using the framework of Bulow, Geanakoplos, and Klemperer (1985), we say that the strategic interaction between these rivals' pricing would be 'strategic complements'. This is what one would expect under price competition. The less likely outcome is also possible: a reduction in the Argentine price can cause the non-member's demand curve to become less elastic, at least locally, hence making it optimal to raise price. Thus 'strategic substitutability' is also a possibility, though probably rare.

[15] If we were willing to assume symmetry between (3a) and (3b) such that $\beta_1 = \beta_1^* \equiv \beta$, $\delta_1 = \delta_1^* \equiv \delta$, and $\lambda_1 = \lambda_1^*$, (5) would simplify to a form expressing relative member/non-member pre-tariff prices for a product as a function of relative costs and the tariff preference margin: $\ln\frac{\bar{p}_1^*}{\bar{p}_1} = A + (\delta - \beta)\ln\frac{w/e_1}{w^*/e_1^*} + (1 + \delta - \beta)\ln\frac{\tau_1}{\tau_1^*}$. The bar over the price denotes pre-tariff prices.

Figure 4, summarizes the effect of a preferential tariff shock on the relative prices. Panel A describes the 'normal' effect of a preferential reduction of tariffs on a trade partner. The reduction shifts the member's reaction function rf_1^* to rf_2^*, less than proportionately if there is incomplete pass through. If this were all, and the new equilibrium were M, the partner price and the price relative (p*/p) would have shifted by no more than the proportionate change in the tariff factor τ^*. But, in fact, non-partner exporters react to the price change, ultimately shifting equilibrium to N. Here both prices have fallen but the price ratio has fallen by less than at M, and hence certainly less than proportionately to the tariff shock. In terms of equation (5) the elasticity (β_1^*-δ_1^*) lies between 0 and 1. It is also possible to have cases such as panel B, where a very responsive member reaction function causes the elasticity to be greater than 1, and panel C, in which a very responsive non-member implies a negative elasticity. We have shown that the cost elasticities can have a wide range, but it is also clear that in all three panels the non-member price falls. To measure this effect directly we need to isolate δ_1^*.

Turning to the non-members' equations (3a) and (4a) we can compare relative export prices to Brazil and RoW. Applying homogeneity again,

$$\ln\frac{p_1/Q_1}{p_2/Q_2} = c + \beta_1 \ln\left[\frac{w\tau_1}{e_1 Q_1}\right] - \beta_2 \ln\left[\frac{w}{e_2 Q_2}\right] + \delta_1^* \ln\left[\frac{w^*\tau_1^*}{e_1^* Q_1}\right] + \lambda_1 \ln\left[\frac{Y_1}{Q_1}\right] - \lambda_2 \ln\left[\frac{Y_2}{Q_2}\right] \tag{6}$$

Similarly equations (3b) and (4b) for Argentina imply

$$\ln\frac{p_1^*/Q_1}{p_2^*/Q_2} = c^* + \beta_1^* \ln\left[\frac{w^*\tau_1^*}{e_1^* Q_1}\right] - \beta_2^* \ln\left[\frac{w^*}{e_2^* Q_2}\right] + \delta_1 \ln\left[\frac{w\tau_1}{e_1 Q_1}\right] - \delta_2 \ln\left[\frac{w}{e_2 Q_2}\right] + \lambda_1^* \ln\left[\frac{Y_1}{Q_1}\right] + \lambda_2^* \ln\left[\frac{Y_2}{Q_2}\right] \tag{7}$$

In summary, while equation (5) shows how much the non-member's export price changes in Brazil relative the member's, export price, equation (6) shows how much the non-member export price changes relative to non-member exports to RoW, and (7) how much the member export price changes relative to its export prices to RoW. Our interest is primarily on how the tariff preferences inherent in MERCOSUR have changed Argentinian and non-member export prices--i.e. on the coefficients on τ_1^* in these equations. Figures 1 and 2 suggest that there were significant effects through time and (5)-(7) help as to identify whether those are due to tariff changes (MERCOSUR) or to other factors such as exchange rates or costs.

3. EMPIRICAL IMPLEMENTATION

3.1 MERCOSUR Tariff Policy

MERCOSUR (Mercado Común del Sur) was established under the Treaty of Asunción, signed by the Presidents of Argentina, Brazil, Paraguay and Uruguay in 26 March 1991 and ratified on 29 November 1991. This treaty extended the borders of the association between Argentina and Brazil dating from 1985 and culminating in The Treaty of Integration, Co-operation and Development of November 1988.[16]

[16] Nogues and Quintanilla (1993) note that regional integration efforts between Argentina and Brazil did not go beyond 'declarative' statements until the Protocols initiated between 1985-1989 on capital goods which was mainly designed to substitute imports from cheaper sources.

Article 5 of the Treaty of Asunción defined a path of tariff liberalization to achieve zero internal tariffs and the elimination of non-tariff barriers by the end of 1994. The immediate reduction of the internal applied tariff rates was by 47% of the m.f.n. rate after the ratification of the Treaty on 29 November 1991. Subsequent preferential reductions relative to prevailing m.f.n. rates were to occur semi-annually and automatically according to the following time table: 54% December 1991, 61% June 1992, 68% December 1992, 75% June 1993, 82% December 1993, 89% June 1994, and finally 100% December 1994.[17] Members were allowed to declare upto 300 exceptions to internal free trade, but by 1995 approximately 95% of intra-regional trade was duty-free--Laird (1997). In fact Brazil had only 27 exceptions and so effectively had open borders for its MERCOSUR partners.

MERCOSUR member countries had originally planned to align their external tariffs on the MERCOSUR common external tariff by 1 January 1995. However, this proved politically impossible and little progress was made in defining the CET until the Protocol of Ouro Preto was signed in December 1994. Under the Ouro Preto Protocol the CET was to be introduced beginning 1995. Each member was again allowed an exceptions list, the tariffs on which were to be aligned by 2001 for Argentina and Brazil, and 2006 for Paraguay and Uruguay, see Olarreaga and Soloaga (1998). Brazil named approximately 200 tariff lines in the exceptions list, mainly sensitive industries such as computers, electronics, chemical, agroindustry, textiles, capital goods (machinery), and the automotive industry. Unilateral liberalization followed by this negotiated changes reduced tariffs

[17] Article 3, Annex I, Trade Liberalization Program, Treaty of Asunción, 1991.

substantially in MERCOSUR countries, from an average of 50% in 1988 to a CET average of 12% in 1995. However, it remained the case that trade policy in Brazil was subject to vigorous debate and to frequent changes to meet short-run political objectives. For example, tariffs on textiles, toys and motor vehicles in particular were increased to 70% for non-members in 1995.[18]

The different phasing of internal and external tariff reductions, the large number of tariff rates and the use of exceptions mean that over 1989-96—our sample period—tariffs and preference margins varied widely over time and commodities. This allows us a good chance of identifying their effects empirically.

3.2 Data

Our trade data, used to obtain unit values from quantities and values, were taken from the UN's Comtrade database, at the Harmonized System (HS) 6-digit level. Although it was introduced in 1989 several countries did not start to use HS until somewhat later. Hence our sample periods vary by country.

HS 6-digit data offer two major advantages over other sources. First, they are very disaggregated--over 5,000 commodities are distinguished. This helps to minimize heterogeneity within each heading, which in turn improves the quality of our unit value

[18] Motor vehicles have been a special issue within Brazil. The Brazilian government applied special local content rules. Foreign multi-national firms which produced vehicles locally were given reduced rates of 35%. Japanese and Korean auto manufacturers in particular claimed that the moves put them at a considerable disadvantage since, not having local plants, they were not able to compete even with other non-member suppliers. These types of local content rules prompted several multi-nationals to set up automobile

data, and reduces the need for tariff averaging within headings—see next paragraph. Second, trade and tariff data match very well at the 6-digit level, because at this level the HS classification is universal across countries. At finer levels of disaggregation codes are country-specific.[19]

The tariff data were provided by UNCTAD and the MERCOSUR Secretariat—to whom we are grateful. Over the years 1989-1994 Brazil and Argentina defined their tariff data at HS 10-digits, while the Common External Tariff (CET) of 1995 and 1996, and the exceptions listed in the agreement of Ouro Preto Protocol, are defined at the HS-8 digit level. In order to concord the tariff and the price data we truncated the tariff codes up to the 6-digits and took simple averages. This averaging within the HS-6 level is not a serious problem because there is very little variation in tariffs within the HS-6 digit level.

As an empirical exercise on the price effects of integration, a study of MERCOSUR is relatively problem-free. There are few problems of changes in quotas confounding price movements, since on signing of the Treaty of Asunción, all non-tariff barriers were to be removed for all trade including imports from non-members.[20] Products having NTB measures before integration which could potentially affect prices over the series were

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plants within the MERCOSUR region. For details see Latin American Monitor—Brazil and Latin American Regional Report—Brazil, August (1996).

[19] There is a slight discrepancy between the HS-6 digit codes in HS92 and HS96. Commodities have been deleted when such concordance problems arise between years.

[20] See Laird (1997) and Frischtak, Leipziger, Normand (1996). The abolition was not entirely clean in practice, however. There are some instances where quotas may have been used, particularly in textiles. Due to heavy losses and high unemployment in the Brazilian textile industry there was great pressure to impose quotas and high duties, especially against Southeast Asian countries. Quota protection and local content rules were threatened by Brazil in the automobile industry as a means to attract foreign direct investment, but

deleted from our sample altogether.[21] Applied tariff rates are entirely ad valorem charged on the c.i.f. value of imports. There were no major prior associations between these countries and therefore changes in tariff preferences are defined by the Treaty of Asunción and the Ouro Preto Protocol. The first shock comes at the beginning of the transition period at the very end of 1991, and the effects can be seen in 1992, and 1993. Then another major shock comes in 1995, when the CET is implemented with exceptions which tend to increase tariffs on non-members.[22]

Internal tariff rates were calculated as the m.f.n. rate multiplied by (1 - average reduction rate for that year). Since the reductions take place semi-annually (see above) we have to average them for each year to match the annual trade data. The following chart provides a typical transition for most commodities, although we have incorporated the exclusions to this rule included in the agreement of Ouro Preto Protocol in December 1994, which took effect in 1995, as well as the changes that occurred subsequent to this Protocol.[23]

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after further negotiations with Argentina they were revised and ceased to be binding--see Latin American Monitor: Southern Cone Report, February 1996.

[21] This list, obtained from UNCTAD, includes products under quantity control measures such as quotas, and voluntary export restraints.

[22] Most of the applied m.f.n. tariff rates charged to non-members including exceptions were compiled by UNCTAD. We are grateful to Aki Kuwahara of UNCTAD and Jerzy Rosanski of the World Bank for their help in obtaining them. Detailed information can be obtained in United Nations Conference on Trade and Development (UNCTAD) "A User's Manual for TRAINS", 1996. The internal tariff rates are estimated using these m.f.n. rates and the Treaty of Asunción's time path. Brazil's detailed import and export data disaggregated by source country were also provided by Aki Kuwahara. Argentina's trade data, which was used in the intermediate stages of our research, was provided by Tony Estevadeordal and Raphael Cornejo of the Inter-American Development Bank to whom we are also grateful.

[23] This list was provided by the MERCOSUR Secretariat.

m.f.n rate	Internal rate
t89	t89
t90	t90
t91	t91
t92	t92*(1-0.61)
t93	t93*(1-0.75)
t94	t94*(1-0.89)
t95	Zero
t96	Zero

As an illustration of the evolution of tariffs, we have tabulated the tariffs charged to USA (m.f.n.) and Argentina (partner) and the preference margin in Table 1.[24] These are HS 6-digit tariffs truncated up to 2-digits and then averaged (unweighted) across the nine categories specified in Appendix II. Some notable features are evident even at this aggregated level. First, although the m.f.n. rates are generally falling after 1991, there are also some increases in 1995 and 1996 as a result of Ouro Preto--in HS Chapters 16-27 (prepared foodstuffs), 41-63 (which includes textiles), 64-83 (which includes footwear, headgear, glass etc.,) 86-89 (which includes vehicles, aircraft, vessels, transportation equipment, etc.) and 93-96 (which includes toys). The increases in 1995 and 1996 were within Brazil's overall binding commitments at the WTO.

Second, while m.f.n. rates decline from 1991 to approximately 1994 and then stabilize or rise, the tariffs on partners continue to fall until 1995. Thus member and non-member tariffs are not perfectly correlated, which greatly facilitates the identification of

[24] This table is confirmed by Laird (1997), but unlike Laird, who averages all tariff data available, we provide the average tariffs only for the commodities for which US export price data are available over the years 1991-1996, since these are the tariff rates used in the estimation for USA export pricing behavior in the following section.

separate effects econometrically. Third, preference margins did not rise monotonically as MERCOSUR was implemented.

Finally, member and non-member wage rates or labor costs could not be obtained at the industry level and certainly not at the commodity level over the time period necessary in this analysis. Thus in order to obtain data and also to recognize a wider range of inputs than just labor, we used GDP deflators to proxy export country costs (using aggregate export weights to Brazil to construct non-member costs). These variables could easily be converted into the currency of the importer.[25] For the aggregate price index in Brazil and RoW we employed GDP deflators.

4. RESULTS

4.1 (A) Relative Import Prices in Brazil

Our main results appear in Tables 2 through 6. As well as pooling all commodities, these also consider 9 sub-groups of commodities. The disaggregation allows scope for some variability in the degrees of competition and product substitutability (differentiation) across sectors. In every panel all variables are expressed in natural logs and as deviations from commodity-specific means. This is equivalent to allowing commodity-specific fixed effects. We also corrected for heteroskedasticity by collecting the residuals from the

[25] The GDP deflator for the world in dollar terms was taken to be an export weighted average of the GDP deflators of supplying countries, with weights coming from the International Monetary Fund, Direction of Trade Statistics: Yearbook (1996, 1997). The representative countries included in the weighted average are:

estimated unweighted equations and reweighting each of the variables by the inverse of the estimated commodity-specific residual standard deviations.[26] This procedure improves the efficiency of our estimates and permits more accurate inference.

First we examine the prices of Brazil's imports from Argentina relative to a series of non-member countries, equation (5).[27] To try to isolate the effects of most interest, we have separated out the tariff effects.[28] These initial estimates appeared to suffer very seriously from multicollinearity. This seemed traceable to the coefficients of the real income terms (Y/Q), which regularly had variance inflation factors above 20 and frequently much higher. The problem is three-fold. First, Brazil's measured real income was rather stable over 1989-96 so that there was little identifying power in the series. Second, with inflation reaching 2308 % in 1994, it was unclear whether deflated nominal income is really very informative anyway. Third, all the explanatory data except tariffs refer to macroeconomic variables (the exchange rate, costs, aggregate prices and incomes) which are invariant over commodities. Thus in effect we are seeking to identify three effects with eight observations.

Belgium, Bolivia, Canada, Chile, China, Colombia, Denmark, France, England, Germany, Indonesia, Italy, Korea, Mexico, Malaysia, Netherlands, Peru, Philippines, Singapore, USA, Venezuela.

[26] The homoskedasticity assumption was tested by using the log-likelihood ratio test and the null was always strongly rejected. The procedure adopted is a two step Feasible Generalized Least Squares (FGLS) estimation, which is unbiased. The coefficient estimates in the first stage regressions were quite similar to the cross commodity heteroskedasticity corrected set and can be obtained from the authors on request. The uncorrected estimations tended to yield very low R-squares, however.

[27] Brazil is used as the reporter country for the data used in Table 2A and 2B, and therefore the data run from 1989-1996, with the exception of Germany which Brazil only reports from 1991-1996. The countries represented in Table 2 make up most of the imports to the Brazilian market.

We have adopted two approaches to the multicollinearity problem. In estimate (A) we have assumed that $\lambda_1 = \lambda_1^*$ and dropped the real income term. Strictly this implies that for each good, the Argentinian and non-member varieties have the same income elasticities of demand, but it is better thought of as merely as indicating that we have insufficient information to identify different elasticities. In estimate (B) we have swept out the macroeconomic effects with time dummies for each year, leaving the tariff effects as the only explanatory variables. Essentially relative Argentinian and non-member prices comprise a time-related component, which we isolate and ignore in these equations, and a commodity-specific component related to the two tariff rates. With some exceptions, the estimates of the tariff effects--our variables of interest--are similar between the two approaches.

Tables 2(A) and 2(B) report the results from the overall pooled samples. They display a number of interesting features. First, tariffs matter for firms' pricing decisions. Both member and non-member tariffs are strongly statistically significant in explaining the relative prices of imports within the Brazilian market. Nearly all of the overall results are highly significant, have the correct signs and have reasonable magnitudes according to our discussion above.

Second, Brazil's tariff factor on Argentinian imports (τ^*) affects relative member/non-member prices less than proportionately in ten out of the twelve cases. With the exception of Mexico and Japan, the member's tariff coefficients are less than one in

[28] The results of equation (5) with the tariffs combined with the rest of costs are shown in the Appendix, Table A1.

Table 2A and not significantly above in Table 2B. The remaining estimates range from 0.282 for Korea to 0.884 for France, and all are statistically significantly different from one. These latter results reflect some convex combination of (a) Argentinian firms passing only part of the tariff cut onto consumers (partial pass-through) and non-members holding their prices constant (δ_1*=0), and (b) Argentinian firms passing the tariff cut through fully (β_1*=1) and non-member firms partially following their prices down ($0<\delta_1$*<1). We can eliminate the extreme case of no pass-through in (a) because the tariff coefficients are all statistically different from zero; hence we can conclude that Brazilian consumers receive some benefit from the preferences in terms of lower prices. It is not clear, however, whether--or in what proportions--Argentinian firms earn higher pre-tariff prices, worsening the Brazilian terms of trade *ceteris paribus*, or non-member firms earn lower pre-tariff prices, thus improving the Brazilian terms of trade. Neither--for obvious reasons--is the net effect on Brazilian terms of trade or economic welfare obvious.

The case of Japan and Mexico needs a little separate thought. The elasticities of 1.6 and 1.4 respectively suggest that the relative Argentinian/Japanese tariff inclusive price changed more than proportionately to tariffs over the period of integration. This result seems to imply that the tariff preference had the effect of reducing Argentina's prices by more than the tariff with respect to Japan and Mexico. We cannot rule this out as Figure 4 panel B shows. The Argentinian reaction function may be particularly responsive in the case of Japan because most of the products supplied by Japan are highly manufactured in HS category 64 and above and particularly 84-85, and 86-92 where the Japanese market share is approximately 15%.

The R^2s in Table 2A and 2B give a generally favorable view of the explanatory power of the model. They refer to the second-stage, weighted, regressions, and exceed the first-stage unweighted ones, which are statistically significant but rarely above 0.5. The weighting process greatly devalues atypically noisy commodities with the result that fit looks better. It is also notable that some of the R^2s differ a lot between 2A and 2B, because the weights implied by the two models are very different (they devalue different commodities). If we estimate the equation from 2A using weights from a first stage of type 2B, the R^2s are very close to those in Table 2B, and vice versa.[29]

Tables 3A and 3B show the analogous results to Tables 2A and 2B for major suppliers, France, Great Britain, Germany, Italy, USA, and an aggregate for the non-MERCOSUR world, and the sub-groups of commodities defined in Appendix II. These estimates are not as well defined as the overall estimates presented above, but the variables of interest are still very significant and most often have a reasonable sign and magnitude. Variations in the estimated coefficients are not unexpected since elasticities could vary across commodities according to the differences in strategic interactions, which, in turn, depend on the characteristics of demand, such as convexity and substitutability of the differentiated products between rival firms.

The estimates seem most robust across countries for the commodities in group 16-27 processed foods, 64-83 manufactures products and 84-85 engineering products. Again we see that the tariff coefficients are reasonably similar between the two different

[29] Available from the authors upon request.

specifications (Table 3A and 3B). The incomplete pass-through is most consistently evident in the engineering products 84-85, which seems, perhaps, the most likely place for it to occur. It is also the sub-aggregate with the largest sample of observations, which increases our faith in the estimates. The coefficients are all significantly greater than 0 (except Great Britain) and less than 1. At the other extreme, a notable concern is the results for commodities 41-63, which include textiles and leathers. These generally have counterintuitive signs and magnitudes, possibly due to the fact that, over the sample period, these commodities had many changes in industrial and trade policy other than tariffs—possibly including unofficial quotas on textiles. Among the primary products, 01-15, the only significant results are for the USA, the biggest competitor of Argentina. The others are not statistically distinguishable from either 0 or 1.

Overall, given the simplicity of the model, the noisy data and the small samples for some sub-aggregates, the results in Tables 3A and 3B suggest a reasonable level of support for the view that preferential tariff concessions affect firms' pricing decisions, raising prices for the preferred suppliers and/or lowering those of non-preferred ones.

4.2 (B) Relative Export Prices

Although the previous section identified changes in the relative prices of imports from member and non-member sources, it could not determine which prices moved. Thus it was not clear whether--and in what proportions--Argentinian firms gained and non-member firms lost from MERCOSUR. We now turn to export data to try to make this determination.

For each of several non-member exporters we explore changes in the relative prices of their exports to Brazil and to the rest of the world (RoW) as the former offered preferences to Argentina. Essentially, appealing to the complete segmentation of export markets, we are using export prices to the rest of the world as the *anti-monde* for those to Brazil. Equation (6) above is the estimating equation and the results are reported in Table 4A (equation 6 per se) and 4B (with time dummies).[30]

The results in Table 4A are quite intuitive. An increase in the exporter's costs (w) has hardly any effect on the relative prices of exports to Brazil and the RoW--both sets of prices rise roughly equally. (This is β_1-β_2). Changes in the prevailing prices in one or other of the markets (Q_1 or Q_2) get reflected, *ceteris paribus*, nearly one-for-one in the price of exports relative to prevailing prices--i.e. export prices do not change very much. Changes in the exchange rate between the exporter's and one importer's currency (e_1 or e_2), on the other hand, do get reflected--again almost proportionately--in the price relatives. Changes in Argentina's costs--which impinge on the dependent variable via their effect on Argentina's export prices to Brazil and hence on other exporters' prices in that market--have negligible effects. These results seem a little extreme, but given that they are not our focus of interest, not alarmingly so.

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[30] It is important to note that we are now using export data reported by the exporter in question. These data are broadly similar to the data on Brazil's imports, except, (a) we have exports by these countries to the non-MERCOSUR market as the counterfactual or control group and (b) the sample is restricted to the sub-set of countries that report HS-6 data for sufficient years to allow estimation. In estimating the results which follow we use only commodity headings that are supplied to Brazil by both the non-member and Argentina. Although this raises the question of whether those product varieties exported by non-members but not by Argentina have also been effected by potential entrants within that product category that is a different issue which will not be examined here.

Turning to the tariff effects, the results are strong and consistent. In two cases Chile and Japan, exporters seem to pass the full effect of tariffs on their goods through to purchasers, while for the other three pass-through ranges from small to substantial. At the extreme, a change in the tariff on Korean suppliers seems to affect its export prices less than proportionately: tariff inclusive prices rise by approximately one-fifth to one-third of the increase in the tariff, resulting in a substantial loss in revenue for these suppliers. Korea is a much smaller supplier than Japan or the USA, and exports mainly textiles 41-63, manufactures 84-85 and auto parts 86-93. Other suppliers seem less affected by multilateral tariff changes. Overall the degree of pass-through observed here is similar to that from the exercise on Brazilian import prices, but, except for the USA, the largest supplier and with the largest sample of commodities, the correspondence is not particularly good at the country level. This is not particularly surprising, however, for the two exercises rely on completely different data for prices and it is well known that the two countries involved in the bilateral trade flow frequently report it quite differently.

Even more interesting are the estimates of the effects of the tariffs levied on Argentinian exports to Brazil. These also appear to matter in non-member pricing in the Brazilian market. In Table 4A, *ceteris paribus* around one third of any tariff changes facing Argentinian exports is reflected in their rivals' pre-tariff (and post-tariff) export prices. It is also interesting to note that Japan shows the smallest effect from the Argentinian tariff coefficient, confirming to some degree that panel B of Figure 4 may be the correct representation of the Japan-Argentina price competition.

The corresponding results in Table 4B, in which we have swept out all the macro effects, suggest rather larger effects from Argentinian tariffs, although again, the results for the USA are perfectly robust across the two specifications. Including the fixed time effects neutralizes the effects on the estimates of the variation through time in the mean tariff on Argentinian exporters. Thus the tendency for the estimates of the 'cross-tariff' effects to be higher in Table 4B suggests that the macro-economic consequences of MERCOSUR or some other aspect of macro-economic evolution over 1991-96 allowed exporters to off-set some of the direct 'strategic' price reductions that preferences would otherwise have induced in individual markets. For example, this result might reflect the optimism and growth that accompanied MERCOSUR and the Real Plan and their investment effects.

There is no reason to believe that exporters' prices to RoW are responding materially to Brazil's tariffs against Argentina, so we take Table 4 as strong confirmation that preferential tariff reductions in MERCOSUR forced down the pre-tariff export prices of non-members, turning, *ceteris paribus*, the terms of trade against the latter.

As we did previously in the importer analysis, we have also disaggregated these results into 9 sub-groups. Most cases in Table 5A and 5B show that the coefficient of the own tariff is positive, but, not surprisingly, the range is large in some cases. If we ignore estimates with fewer than 100 error degrees of freedom (EDF), we are left with all positive elasticities except one, of negative 0.710 for Korea in the sub-group 41-63. Overall, three-quarters of the estimates of the 'own tariff' effects are below one and one quarter of them are significantly less than one statistically with 95% confidence.

The coefficients on the rival (members') tariffs are also significant. They tend to be positive and significant in manufacturing sectors such as chemical products 28-38, textiles 41-63, engineering products 84-85 and vehicles 86-92. Processed foods 16-27 and textiles 41-63 show largest effects, while the least affected by integration are the primary sectors 01-15, which are the most homogeneous products, and the miscellaneous group 93-96, which includes things such as works of art, and arms and ammunition which are not substitutable in general. Table 5B broadly confirms the results on the tariff variables, although, again, the rival's tariff effects tend to be larger.

Although we are sometimes struggling to separate the various effects in this exercise, these results strongly suggest that preferential tariff reductions force cuts in the export prices of countries excluded from regional arrangements. A second exercise on exporter data considers Argentina's relative export prices. This is the estimation equation (7) which is reported in Table 6A and 6B. Unfortunately, the most crucial years for identifying tariff cuts, 1991 and 1992, can not be included because Argentina started reporting HS data only in 1993; hence the results in this section are very tentative. In particular, because tariffs on Argentina were almost insignificant from 1993 on, we have to combine this variable with the other costs. The effect of non-members' tariffs on Argentina's export prices is clearly significant for the overall sample at 0.245, but the own cost effect is small and insignificant. The disaggregated results and those from Table 6B are even less informative. Thus all we can confidently conclude from the exercise on Argentinian data is that they are not inconsistent with our basic hypothesis.

5. CONCLUSION

This paper is intended primarily as an exercise of positive economics, but it is interesting to ask whether the effects uncovered are significant in welfare terms. The first-order estimate of the welfare effect of a price change is $q^*\Delta p$. Assuming that all variables except tariff rates were uneffected by MERCOSUR and taking unweighted averages of the latter we can use the coefficients of Table 4A to make such estimates. The USA exported $5.4 billion to Brazil in 1991. With partner tariffs falling by an average of 26 percentage points by 1996 and a coefficient of 0.445, this implies a loss of $624.1 million, in that year. Similar losses occurred for the other countries which reported export data—see Table 7, column 4A: Japan (with losses of $58.8 mil.), Germany ($236 mil.), Korea ($13.7 mil.), and Chile ($17.3 mil.). These estimates are very crude—for example not all US exports may have been affected, and there may have been partly off-setting changes in quantities—but they are indicative of the magnitudes of losses in export revenue that countries left out of regional arrangements may suffer. Column 5A of Table 7 repeats the exercise using disaggregated tariffs and estimates from Table 5A. The estimates are quite similar when summed over the whole set of goods.

Some have argued that the m.f.n. reductions which accompanied MERCOSUR were also a part of the MERCOSUR program—see Cadot, de Melo and Olarreaga (forthcoming) for a discussion—and that these should be included in the pricing calculation. Columns 4A* and 5A* present analogous results which additionally incorporate the terms of trade gains that non-members may have earned as m.f.n. tariffs

fell. The 'pass-through' of m.f.n. tariff changes to consumers is quite large (close to one in the aggregate, except for Korea) and the changes in tariffs are much smaller for non-members than for members, however, so that the gains from the m.f.n. reductions are not large, and do not off-set the effects of the preference.

We have shown empirically that regional integration does affect traded goods prices, and that it matters significantly for non-member exporters supplying an integrating market. Even if a PTA aims only to "facilitate trade between the constituent territories and *not* to raise barriers to the trade of other contracting parties with such territories" (GATT, Article XXIV),[31] and indeed, even if, as with MERCOSUR, it simultaneously undertakes a general trade liberalization, other contracting parties may still be affected adversely, because they are compelled to reduce their prices to meet competition from suppliers within the PTA. Given their excellent data, we have studied this phenomenon in the two major MERCOSUR members, but it seems just as likely to pertain to other regional groups. Of course, this is only one part of the overall welfare calculus for non-members. One needs also to consider the prices of their imports from the bloc and any volume effects on trade, which could tip the balance and generate overall gains. Nontheless, the effects identified here are large enough to warrant serious consideration.

[31] There is a similar clause in the Differential and More Favourable Treatment, Reciprocity and Fuller Participation of Developing Countries, Decision of 28 November 1979 (L/4903).

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Appendix I Comparative Statics

The Appendix explores the meaning behind the coefficients in the reduced forms presented in the set of equations (3) and (4).

The comparative statics for the Brazilian market are obtained by totally differentiating the first order conditions (1a) and (2a). Writing z for (wτ/e) and correspondingly for z*, and dropping the market subscripts we obtain,

$$\left[\theta_p - \gamma\eta_p\right]\hat{p} + \left[\theta_{p^*} - \gamma\eta_{p^*}\right]\hat{p}^* + \left[\theta_Y - \gamma\eta_Y\right]\hat{Y} + \left[\theta_Q - \gamma\eta_Q\right]\hat{Q} - \hat{z} = 0 \qquad (8a)$$

$$\left[\theta^*_p - \gamma^*\eta^*_p\right]\hat{p} + \left[\theta^*_{p^*} - \gamma^*\eta^*_{p^*}\right]\hat{p}^* + \left[\theta^*_Y - \gamma^*\eta^*_Y\right]\hat{Y} + \left[\theta^*_Q - \gamma^*\eta^*_Q\right]\hat{Q} - \hat{z}^* = 0 \qquad (8b)$$

where

$$\theta_p = \frac{\partial m}{\partial p}\frac{p}{m}, \qquad \eta_p = \frac{\partial x}{\partial p}\frac{p}{x}, \qquad \gamma = \frac{c_{xx}x}{c_x}$$

$$\theta_{p^*} = \frac{\partial m}{\partial p^*}\frac{p^*}{m}, \qquad \eta_{p^*} = \frac{\partial x}{\partial p^*}\frac{p^*}{x}$$

$$\theta_Y = \frac{\partial m}{\partial Y}\frac{Y}{m}, \qquad \eta_Y = \frac{\partial x}{\partial Y}\frac{Y}{x},$$

and where the member variables have stars superscripted and non-member variables none.

Solving the two equations simultaneously will define the equilibrium reactions of the firms to changes in the exogenous variables that we have defined, i.e., z, Y, and Q. This system of equations are put in matrix form and solved for the equilibrium conditions we are concerned with.

$$\begin{pmatrix} \theta_p - \gamma\eta_p & \theta_{p^*} - \gamma\eta_{p^*} \\ \theta_p^* - \gamma^*\eta_p^* & \theta_{p^*}^* - \gamma^*\eta_{p^*}^* \end{pmatrix}\begin{pmatrix} \hat{p} \\ \hat{p}^* \end{pmatrix} = \begin{pmatrix} \hat{z} - (\theta_Y - \gamma\eta_Y)\hat{Y} - h\hat{Q} \\ \hat{z}^* - (\theta_Q^* - \gamma^*\eta_Q^*)\hat{Y} - h^*\hat{Q} \end{pmatrix} \equiv \begin{bmatrix} 1 & 0 & -(\theta_Y - \gamma\eta_Y) & -h \\ 0 & 1 & -(\theta_Y^* - \gamma^*\eta_Y^*) & -h^* \end{bmatrix}\begin{bmatrix} \hat{z} \\ \hat{z}^* \\ \hat{Y} \\ \hat{Q} \end{bmatrix}$$

$$\begin{pmatrix} \hat{p} \\ \hat{p}^* \end{pmatrix} = \frac{1}{\Delta}\begin{bmatrix} (\theta_{p^*}^* - \gamma^*\eta_{p^*}^*) & -(\theta_{p^*} - \gamma\eta_{p^*}) \\ -(\theta_p^* - \gamma^*\eta_p^*) & (\theta_p - \gamma\eta_p) \end{bmatrix}\begin{bmatrix} 1 & 0 & -(\theta_Y - \gamma\eta_Y) & -h \\ 0 & 1 & -(\theta_Y^* - \gamma^*\eta_Y^*) & -h^* \end{bmatrix}\begin{bmatrix} \hat{z} \\ \hat{z}^* \\ \hat{Y} \\ \hat{Q} \end{bmatrix} \qquad (9)$$

where

$h = 1 - (\theta_p - \gamma\eta_p) - (\theta_{p^*} - \gamma\eta_{p^*}) - (\theta_Y - \gamma\eta_Y)$, similarly for h^*, since equations (8a) and (8b) above are homogeneous of degree one. Also,

$$\Delta = (\theta_p - \gamma\eta_p)(\theta_{p^*}^* - \gamma^*\eta_{p^*}^*) - (\theta_{p^*} - \gamma\eta_{p^*})(\theta_p^* - \gamma^*\eta_p^*).$$

Two reduced form pricing equations for the non-member and member firms which are also homogeneous of degree one in the costs, general price and income, are shown here as equations (10), and are analogous to (3a) and (3b).

$$\hat{p}_1 = \beta_1 \cdot \hat{z}_1 + \delta_1^* \cdot \hat{z}_1^* + \lambda_1 \cdot \hat{Y}_1 + \alpha_1 \cdot \hat{Q}_1 \tag{10a}$$

$$\beta_1 = \left(\frac{\theta_{p^*}^* - \gamma^* \eta_{p^*}^*}{\Delta} \right)$$

$$\delta_1^* = \left(-\frac{\theta_{p^*} - \gamma \eta_{p^*}}{\Delta} \right)$$

$$\lambda_1 = \left(\frac{(\theta_Y^* - \gamma^* \eta_Y^*)(\theta_{p^*} - \gamma \eta_{p^*}) - (\theta_Y - \gamma \eta_Y)(\theta_{p^*}^* - \gamma^* \eta_{p^*}^*)}{\Delta} \right)$$

$$\alpha_1 = 1 - \beta_1 - \delta_1^* - \lambda_1$$

$$\hat{p}_1^* = \delta_1 \cdot \hat{z}_1 + \beta_1^* \cdot \hat{z}_1^* + \lambda_1^* \cdot \hat{Y}_1 + \alpha_1^* \cdot \hat{Q}_1 \tag{10b}$$

$$\delta_1 = \left(-\frac{\theta_p^* - \gamma^* \eta_p^*}{\Delta} \right)$$

$$\beta_1^* = \left(\frac{\theta_p - \gamma \eta_p}{\Delta} \right)$$

$$\lambda_1 = \left(\frac{(\theta_p^* - \gamma^* \eta_p^*)(\theta_Y - \gamma \eta_Y) - (\theta_p^* - \gamma^* \eta_p^*)(\theta_Y^* - \gamma^* \eta_Y^*)}{\Delta} \right)$$

$$\alpha_1^* = 1 - \delta_1 - \beta_1^* - \lambda_1^*$$

To simplify these unwieldy elasticities, assume that the marginal costs of both member and non-member firms are fixed, γ, $\gamma^*=0$. Then the elasticities can be neatly defined as:

$$\beta_1 = \frac{\theta^*_{p\cdot}}{\theta_p\theta^*_{p\cdot} - \theta_{p\cdot}\theta^*_p}, \qquad \delta^*_1 = \frac{-\theta_{p\cdot}}{\theta_p\theta^*_{p\cdot} - \theta_{p\cdot}\theta^*_p}$$

Assuming the denominator is positive, the signs of these elasticities depend on the signs of the elasticity of an exporter's 'marginal revenue' with respect to its own price, and its rival's price. The denominator being positive merely implies that "own" effects on marginal revenue are greater than that of the "cross" effects. The elasticity of marginal revenue with respect to own price is,

$$\theta_p = \frac{\partial m}{\partial p}\frac{p}{m} = 1 - \frac{p^2}{m\eta_p^2}\left(\frac{\partial \eta_p}{\partial p}\right) = 1 - \left(\frac{1}{1+\eta_p}\right)\left(\frac{\partial \eta_p}{\partial p}\right)\frac{p}{\eta_p}.$$

Its sign only depends on the sensitivity of the own price elasticity to changes in its own price:

$$\left(\frac{\partial \eta_p}{\partial p}\right) = \frac{px_{pp}}{x} + \frac{x_p}{x} - \frac{px_p^2}{x^2} = \frac{px_{pp}}{x} + \frac{x_p}{x}\left(1 - \frac{x_p p}{x}\right) = \frac{px_{pp}}{x} + \frac{x_p}{x}\left(1 - \eta_p\right),$$

which is negative given that demand is not too convex. For instance, given a linear demand curve, raising the price would reduce the price elasticity of demand (higher absolute number, i.e., more elastic). This implies that $\beta_1 > 0$, but it is also notable that it is

possible to have $\beta_1 > 1$ when firms behave in a strategic manner even when you have the normal case, $(\partial\eta_p/\partial p)<0$.[32]

The sign of the elasticity of 'marginal revenue' with respect to its rival's price (θ_{p^*}) is essential in determining strategic effects on prices.

$$\theta_{p^*} = \frac{\partial m}{\partial p^*}\frac{p^*}{m} = -\frac{pp^*}{\eta_p^2 m}\left(\frac{\partial \eta_p}{\partial p^*}\right) = -\left(\frac{1}{1+\eta_p}\right)\left(\frac{\partial \eta_p}{\partial p^*}\right)\frac{p^*}{\eta_p},$$

where the sign is only dependent on the sensitivity of the own price elasticity to a change in the rival's price,

$$\left(\frac{\partial \eta_p}{\partial p^*}\right) = \frac{1}{x}\left(\frac{\partial^2 x}{\partial p \partial p^*} - \eta_p \frac{\partial x}{\partial p^*}\right) = \frac{1}{x}\left(x_{pp^*} - \eta_p x_{p^*}\right).$$

The slope of the 'perceived' price elasticity of demand with respect to the rival's price is positive if the products involved are substitutes, $x_{p^*} > 0$, and the magnitude of x_{pp^*} is small. The strategic effect, δ_1^*, is then also positive.[33] Symmetric results will be found for its rival's variables.

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[32] This is a distinction from Feenstra (1989), since in his outcome the 'normal' case is such that the pass-through (β) is between 0 and 1.

[33] This result can be expressed more elegantly by using the framework of Bulow, Geanakoplos, and Klemperer (1985) and recognizing that price competition in a Bertrand model is usually considered 'strategic complements', i.e., $\frac{\partial^2 \Pi}{\partial p \partial p^*} > 0$ by definition. Differentiating equation (1) by p_1 and obtaining $\frac{e_1}{\tau_1}\frac{\partial x_1}{\partial p_1}H(p_1, p_1^*, \ldots) = 0$, where $H(p_1, p_1^*, \ldots) = p\left(1 + \frac{1}{\eta_{1p}}\right) - \frac{\partial c_1}{\partial x_1}\frac{w\tau_1}{e_1}$ as in (1a), it is then apparent that the cross derivative is: $\frac{\partial^2 \Pi}{\partial p \partial p^*} \equiv \frac{e_1}{\tau_1}\frac{\partial x_1}{\partial p_1}H_{p^*}(p_1, p_1^*) + \frac{e_1}{\tau_1}\frac{\partial^2 x_1}{\partial p_1 \partial p_1^*}H(p_1, p_1^*) > 0$ and so $H_{p^*}(p_1, p_1^*) < 0$ (equivalent to θ_{p^*} in the text above) since the second term is 0 when firms are optimizing profits and therefore $\delta_1^* > 0$. 'Strategic substitutes' would imply the opposite sign.

Let's consider a shift in the member's tariffs, hence a change in the member's price (p*). Since we have assumed that marginal costs are fixed, a shock that shifts this exogenous marginal costs such as a tariff change, will alter its marginal revenue. A decline in the member's tariffs will reduce the landed price, p*, of the member country's product. The non-member will alter his price depending on the effect it has on its marginal revenue. We first begin with the case that is more likely. If a reduction in the price causes the non-member's demand to become more elastic, $\left(\partial \eta_p / \partial p^*\right) > 0$, then the optimal response is to reduce price (p), where the elasticity is defined here so that it is negative and that more elastic implies that η_p is a larger negative number. On the other hand, the less likely outcome which is also possible is that if the reduction in p* causes the non-member's demand to become less elastic, i.e., $\left(\partial \eta_p / \partial p^*\right) < 0$, then it is optimal for this firm to raise its price (p). Both signs are theoretically possible when we are concerned with the price effect due to shifts in the rival's costs.

Appendix II: HS-2 Sub-Group Description

01-15 Live Animals, Animal Products,Vegetable Products,
Animal or Animal Fats and Oils

16-27 Prepared Foodstuffs, Beverages, Tobacco and Tobacco Substitutes
Mineral Products

28-38 Products of Chemicals and Allied Industries,
Organic and Inorganic Chemicals
Fertilizers, Pharmaceuticals, Perfumery
Photographic and Cinematographic Goods

39-40 Rubber and Plastics

41-63 Raw Hides and Skins, Leather, Furskins, Travel Goods, Handbags
Wood and Articles of Wood, Manufactures of Straw
Textiles and Articles of Textiles

64-83 Footwear, Headgear, Umbrellas, Walking Sticks, Articles of Human Hair
Articles of Stone, Plaster, Cement, Mica or similar Materials,Ceramics,
Glass and Glassware
Natural or Cultured Pearls, Precious Stones, Precious Metals, Jewelry
Base Metals, Articles of Base Metals, Iron,Steel, Aluminum, Zinc, Lead, Tin, Copper, Nickel

84-85 Machinery and Mechanical Appliances, Electrical Equipment and Parts
Sound Recorders and Reproducers
Nuclear Reactors, Television Image and Sound Recorders

86-92 Vehicles, Aircraft, Vessels and Associated Transport Equipment
Optical, Photographic, Cinematographic, Measuring, Precision Medical Instruments
Clocks, Watches, Musical Instruments,

93-96 Arms and Ammunition
Miscellaneous Manufactured Articles, Furnitures, Bedding, Mattresses
Works of Art

Figure 1: Average relative price to Brazil, and the rest of the world.

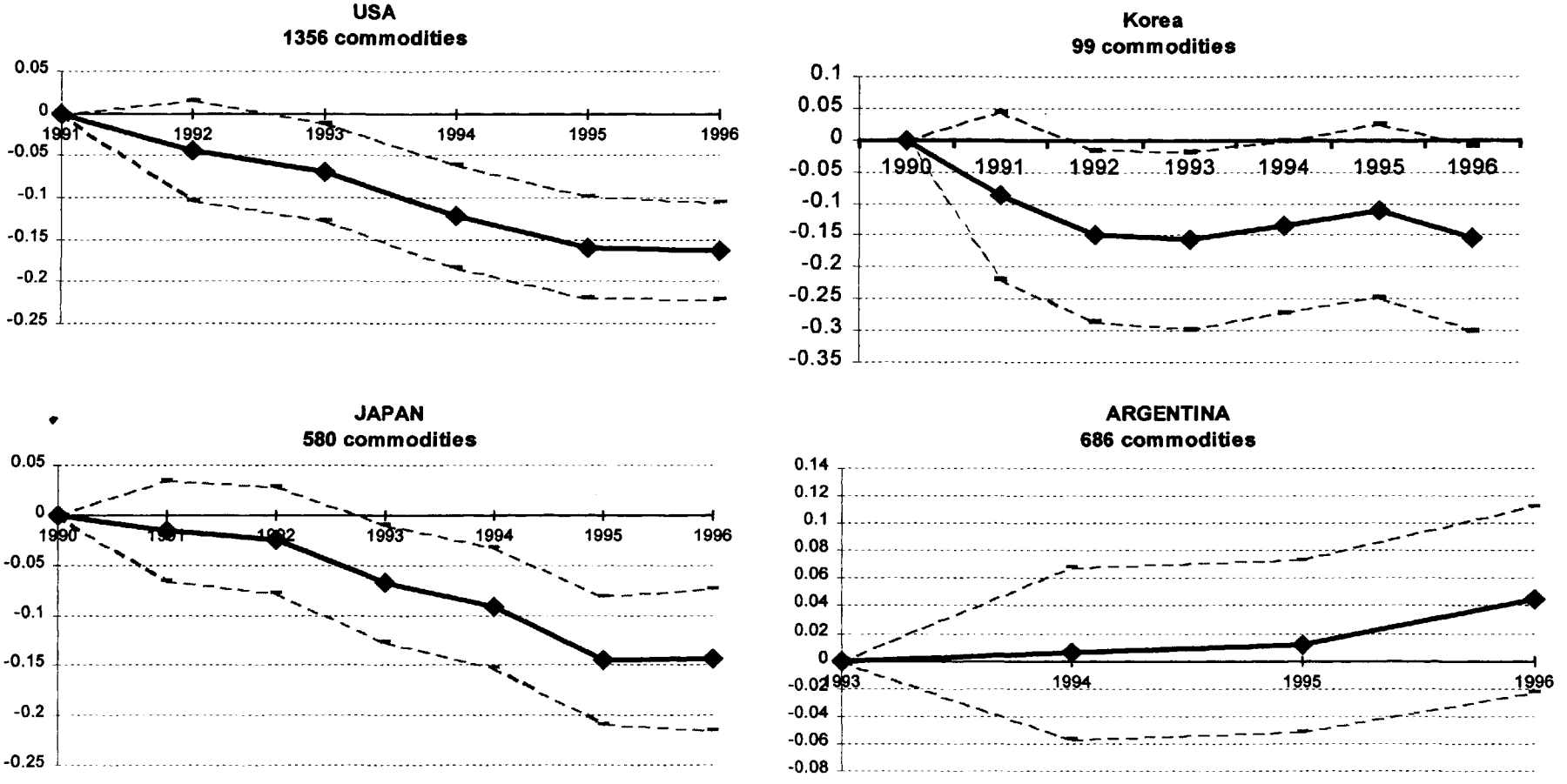


Figure 2: Average absolute export prices to Brazil and to the non-MERCOSUR world.

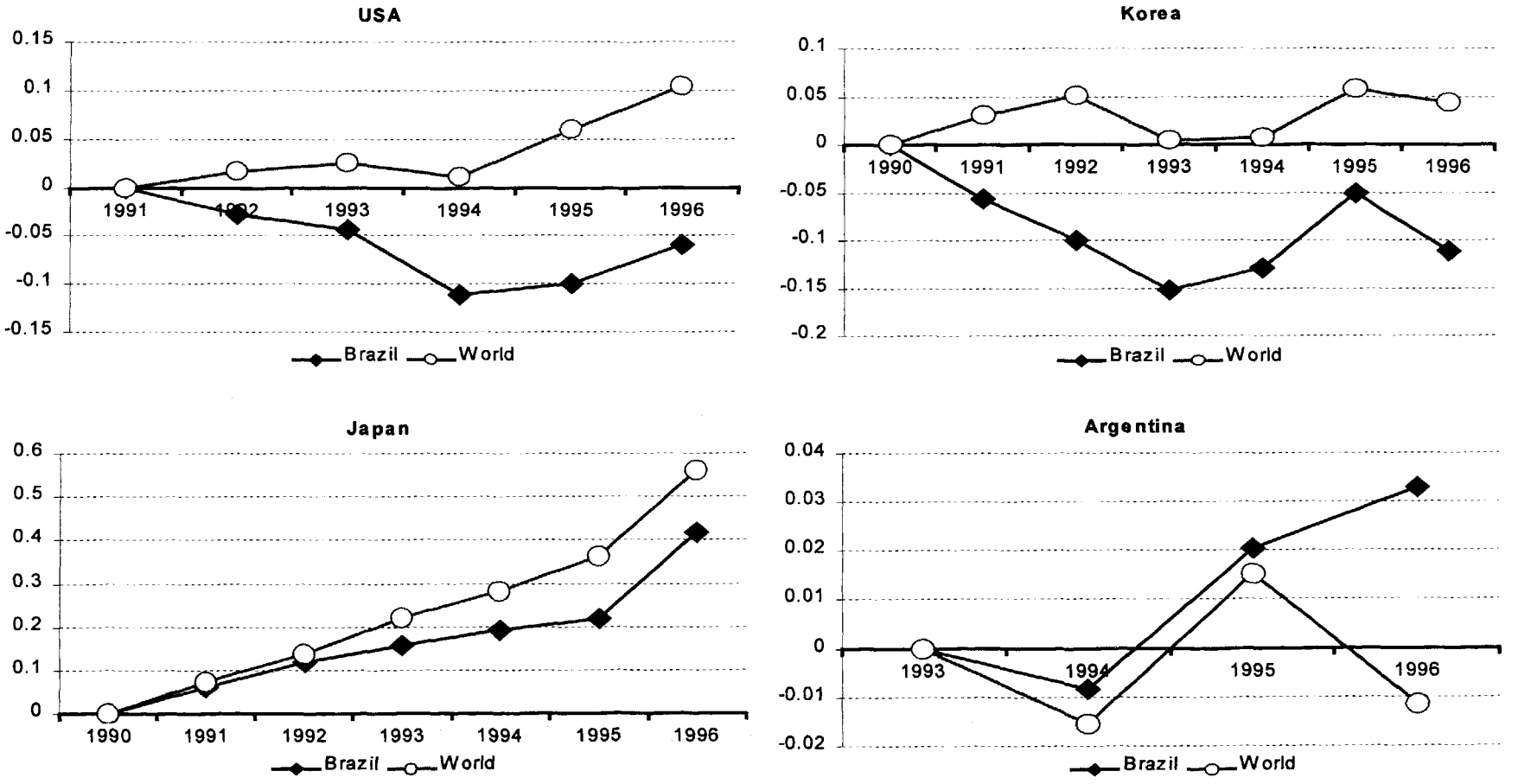


Figure 3: Average relative price of Argentina/rest of the world (RoW), in the Brazilian market.

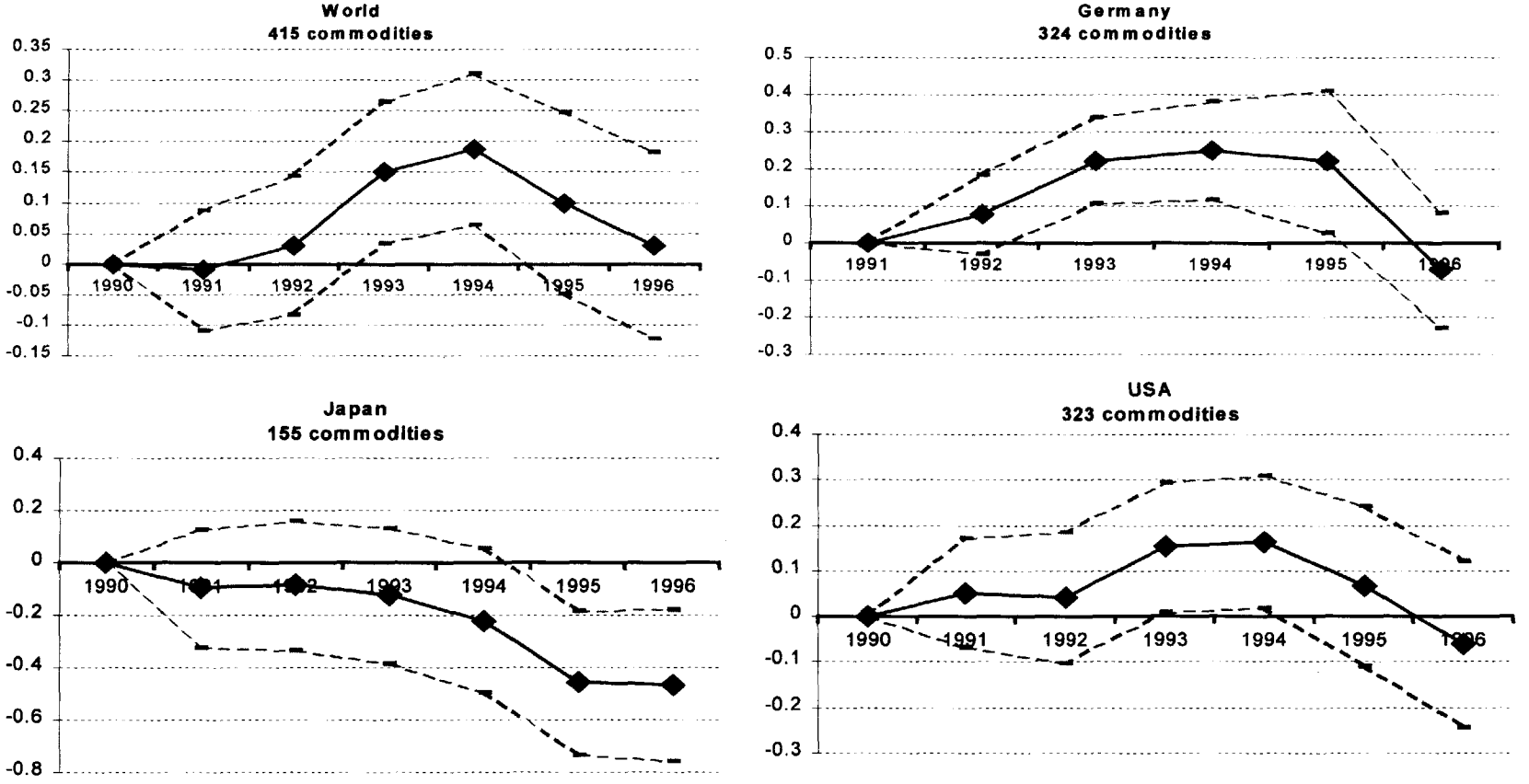
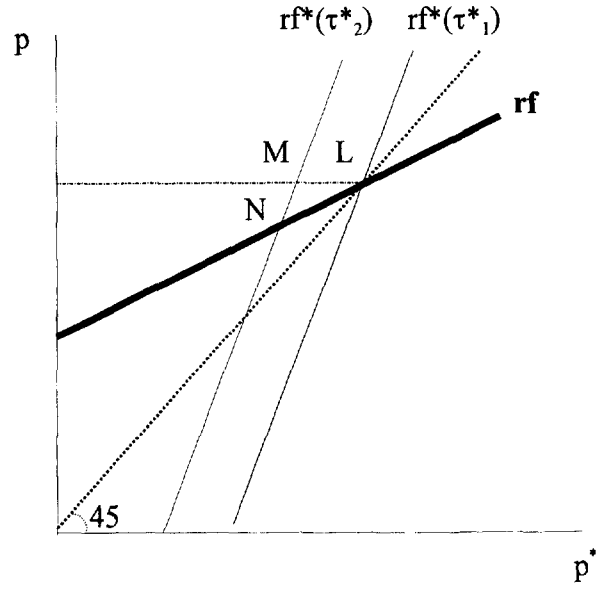
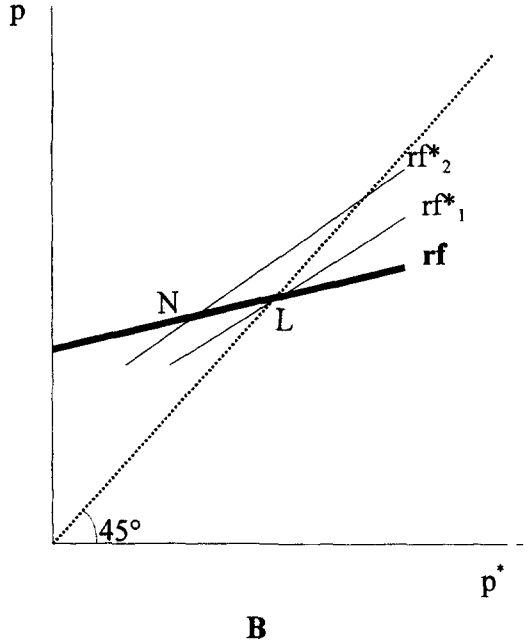


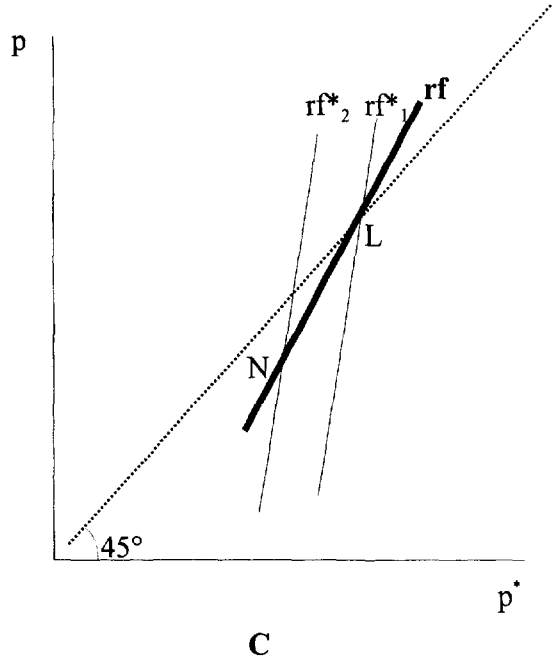
Figure 4: The effect of a PTA on member and non-member prices.



A



B



C

Table 1: HS-6 tariff average (unweighted) for non-member, member and preference margin by sub-group and by year.

HS-2*	YEAR	M.F.N.	PARTNER	PREF. MARGIN♦
01-15	1991	16.7	16.7	0.00
(55)*	1992	11.5	4.5	6.56
	1993	8.3	2.1	6.08
	1994	7.4	0.8	6.55
	1995	7.6	0.0	7.63
	1996	7.8	0.0	7.78
16-27	1991	28.7	28.7	0.00
(61)*	1992	22.5	8.8	11.86
	1993	9.3	2.3	6.68
	1994	8.3	0.9	7.30
	1995	11.2	0.0	11.17
	1996	11.5	0.0	11.53
28-38	1991	19.2	19.2	0.00
(340)*	1992	15.3	6.0	8.62
	1993	11.8	3.0	8.55
	1994	7.4	0.8	6.54
	1995	8.0	0.0	8.00
	1996	8.0	0.0	8.04
39-40	1991	26.4	26.4	0.00
(107)*	1992	22.4	8.7	12.40
	1993	13.8	3.5	9.97
	1994	12.2	1.3	10.69
	1995	12.2	0.0	12.20
	1996	12.1	0.0	12.05
41-63	1991	26.4	26.4	0.00
(141)*	1992	20.6	8.0	11.37
	1993	14.4	3.6	10.39
	1994	13.1	1.4	11.50
	1995	14.9	0.0	14.95
	1996	14.2	0.0	14.17
64-83	1991	18.9	18.9	0.00
(150)*	1992	15.9	6.2	8.99
	1993	11.4	2.9	8.24
	1994	10.4	1.1	9.08
	1995	12.2	0.0	12.21
	1996	12.7	0.0	12.66
84-85	1991	30.8	30.8	0.00
(363)*	1992	26.1	10.2	14.33
	1993	19.5	4.9	13.88
	1994	19.3	2.1	16.76
	1995	17.0	0.0	17.04
	1996	17.2	0.0	17.17
86-92	1991	36.6	36.6	0.00
(110)*	1992	29.7	11.6	15.94
	1993	20.9	5.2	14.80
	1994	20.5	2.3	17.78
	1995	16.4	0.0	16.42
	1996	22.2	0.0	22.17
93-96	1991	48.3	48.3	0.00
(29)*	1992	40.6	15.8	20.98
	1993	20.0	5.0	14.24
	1994	17.8	2.0	15.50
	1995	18.2	0.0	18.21
	1996	19.9	0.0	19.93

* The parenthesis under the sub-group heading is the number of commodities available.

♦ The preference margin is calculated at the commodity level using $\{[(1+t_{mfn})/(1+t_{partner})]-1\}*100$.

Table 2A: Estimation results of equation (5) over all commodities.**

COUNTRY	τ	SE	τ^*	SE	w/e_1Q_1	SE	$w^*/e_1^*Q_1$	SE	R^2	EDF
CANADA	**-0.692**	0.133	**0.478**	0.093	**0.490**	0.037	**-0.239**	0.039	**0.399**	**1178**
CHILE	**-0.242**	0.096	**0.601**	0.065	**-0.060**	0.041	**0.300**	0.023	**0.232**	**1138**
CHINA	**-0.739**	0.041	**0.470**	0.039	**-0.344**	0.022	**0.631**	0.038	**0.403**	**1029**
FRANCE	**-1.136**	0.201	**0.884**	0.141	**0.226**	0.097	**-0.147**	0.064	**0.032**	**2278**
UK	**-0.680**	0.152	**0.417**	0.093	**0.245**	0.041	**0.084**	0.033	**0.075**	**2800**
GERMANY♣	**-0.570**	0.111	**0.338**	0.063	**-0.104**	0.022	**0.318**	0.028	**0.091**	**4076**
ITALY	**-0.465**	0.120	**0.754**	0.076	**-0.151**	0.020	**0.361**	0.027	**0.058**	**3901**
JAPAN	**-0.690**	0.095	**1.636**	0.059	**0.041**	0.003	**0.183**	0.010	**0.873**	**2836**
KOREA	**-1.200**	0.120	**0.282**	0.073	**1.024**	0.102	**-0.299**	0.065	**0.299**	**1276**
MEXICO	**-0.648**	0.163	**1.429**	0.116	**0.225**	0.034	**0.393**	0.042	**0.741**	**943**
USA	**-0.822**	0.129	**0.636**	0.094	**-0.052**	0.044	**0.066**	0.035	**0.012**	**4699**
WORLD	**-0.915**	0.038	**0.332**	0.026	**-0.019**	0.012	**-0.032**	0.011	**0.092**	**9049**

Table 2B: Estimation results of equation (5) over all commodities with year time dummies.**

COUNTRY	τ	SE	τ^*	SE	R^2	EDF
CANADA	**-0.968**	0.226	**1.195**	0.149	**0.195**	**1172**
CHILE	**-0.876**	0.213	**1.073**	0.139	**0.275**	**1132**
CHINA	**-0.482**	0.116	**0.087**	0.140	**0.203**	**1023**
FRANCE	**-0.948**	0.234	**0.894**	0.185	**0.091**	**2272**
UK	**-1.090**	0.227	**0.916**	0.160	**0.055**	**2794**
GERMANY♣	**-0.076**	0.159	**0.110**	0.105	**0.070**	**4072**
ITALY	**-0.886**	0.161	**0.768**	0.116	**0.102**	**3895**
JAPAN	**-0.776**	0.178	**1.455**	0.128	**0.198**	**2830**
KOREA	**-0.765**	0.169	**0.525**	0.118	**0.051**	**1270**
MEXICO	**-0.389**	0.199	**1.288**	0.149	**0.270**	**937**
USA	**-0.446**	0.110	**0.329**	0.093	**0.025**	**4693**
WORLD	**-0.558**	0.079	**0.092**	0.057	**0.031**	**9043**

** Estimates are in bold and standard errors SE are beside the estimates; Data used is reported by Brazil therefore unit values are reported as c.i.f.; all variables represented above are in natural logs. The 'WORLD' represents the non-MERCOSUR world as an aggregate.

♣ Germany's data period runs from 1991-1996. All others 1989-1996.

Table 3A: Estimation results for equation (5), by 9 commodity groups.**

HS-2	COUNTRY	τ	SE	τ^*	SE	w/e_1Q_1	SE	$w^*/e_1{}^*Q_1$	SE	R^2	EDF
01-15	fra	-0.816	0.995	0.506	0.616	-0.274	0.250	-0.216	0.203	0.105	134
	gbr	-0.782	1.458	1.845	0.939	-0.585	0.265	0.682	0.227	0.137	84
	ger♣	-1.410	0.640	0.489	0.358	-0.789	0.127	0.851	0.137	0.290	162
	ita	-0.098	1.341	0.255	1.054	-0.433	0.035	0.775	0.167	0.605	100
	usa	-1.613	0.412	0.948	0.314	0.084	0.114	0.289	0.089	0.141	328
	wld	0.078	0.328	-0.007	0.256	0.222	0.059	0.053	0.054	0.209	931
16-27	fra	-2.835	0.661	1.952	0.488	0.905	0.425	-0.596	0.283	0.169	136
	gbr	-2.635	0.551	0.647	0.445	1.289	0.271	-0.867	0.267	0.223	140
	ger♣	0.547	0.195	-0.055	0.269	-1.983	0.460	1.695	0.332	0.219	187
	ita	-1.167	0.391	0.515	0.269	0.196	0.160	-0.099	0.150	0.035	253
	usa	-1.131	0.525	0.111	0.372	0.022	0.190	-0.025	0.166	0.066	289
	wld	-2.339	0.206	1.371	0.177	0.079	0.076	0.157	0.072	0.567	634
28-38	fra	-1.605	0.461	1.024	0.368	0.403	0.219	-0.281	0.159	0.031	552
	gbr	-0.283	0.460	-0.235	0.367	0.339	0.120	-0.359	0.122	0.014	677
	ger♣	-0.750	0.099	0.338	0.158	0.295	0.050	0.381	0.042	0.990	922
	ita	0.697	0.369	-0.983	0.252	0.494	0.067	-0.480	0.077	0.125	526
	usa	0.043	0.259	0.347	0.162	0.099	0.086	0.160	0.068	0.123	905
	wld	-0.834	0.203	0.362	0.174	0.290	0.023	-0.102	0.024	0.718	1394
39-40	fra	0.304	0.814	-0.692	0.519	0.527	0.377	-0.147	0.253	0.017	284
	gbr	-0.762	0.806	-0.112	0.578	0.840	0.281	-0.077	0.240	0.088	333
	ger	-2.036	0.680	0.826	0.462	0.075	0.490	0.645	0.402	0.087	408
	ita	-1.142	0.727	1.902	0.491	-0.500	0.179	0.843	0.176	0.068	400
	usa	-1.363	0.626	0.519	0.382	0.250	0.203	0.038	0.156	0.023	497
	wld	-1.420	0.448	0.844	0.300	0.039	0.147	0.154	0.109	0.026	643
41-63	fra	2.431	0.893	-1.935	0.679	0.696	0.365	0.129	0.245	0.101	164
	gbr	2.487	1.159	-0.470	0.847	-0.282	0.205	0.460	0.177	0.044	247
	ger♣	2.914	0.789	-3.729	0.468	-0.853	0.312	1.560	0.274	0.849	338
	ita	0.574	0.629	1.543	0.445	-1.052	0.112	1.576	0.113	0.488	429
	usa	-0.901	0.740	0.674	0.514	-0.225	0.150	0.338	0.125	0.028	521
	wld	0.512	0.316	-0.987	0.212	-0.179	0.069	0.077	0.061	0.096	1378
64-83	fra	-2.468	0.786	2.099	0.440	0.138	0.388	-0.104	0.241	0.102	269
	gbr	-2.765	0.772	1.973	0.530	-0.360	0.237	0.631	0.211	0.088	361
	ger♣	-1.996	0.516	1.208	0.168	-0.686	0.257	0.333	0.190	0.194	657
	ita	-3.090	0.084	1.013	0.164	0.622	0.102	-0.495	0.062	0.754	547
	usa	-2.222	0.203	0.516	0.286	0.076	0.142	-0.443	0.130	0.185	621
	wld	-2.326	0.348	1.549	0.223	-0.594	0.097	-0.043	0.087	0.950	1337
84-85	fra	-0.154	0.697	0.868	0.369	0.041	0.285	-0.072	0.180	0.059	560
	gbr	0.071	0.589	0.435	0.435	0.474	0.248	-0.238	0.194	0.066	729
	ger♣	-0.323	0.309	0.673	0.105	-1.268	0.149	1.235	0.108	0.459	1076
	ita	-0.060	0.374	0.814	0.252	-0.160	0.106	0.188	0.096	0.046	1219
	usa	-0.571	0.346	0.865	0.196	-0.198	0.097	-0.003	0.070	0.041	1135
	wld	0.104	0.199	0.089	0.115	-0.182	0.074	0.092	0.052	0.004	1942
86-92	fra	0.522	0.532	1.032	0.539	-1.081	0.599	0.183	0.408	0.111	104
	gbr	-0.739	0.386	-0.014	0.406	0.180	0.382	0.043	0.294	0.033	152
	ger♣	-0.843	0.134	-0.759	0.076	8.097	0.275	-7.755	0.243	0.959	204
	ita	-1.451	0.286	2.219	0.358	-1.016	0.155	1.458	0.121	0.466	250
	usa	-0.013	0.299	0.811	0.241	-0.803	0.228	0.481	0.167	0.071	224
	wld	-0.578	0.173	0.368	0.189	-0.543	0.158	0.259	0.108	0.076	452
93-96	fra	-4.027	2.126	2.647	1.585	0.361	1.238	0.556	0.775	0.097	43
	gbr	-0.282	1.405	-0.690	1.167	0.186	1.088	1.818	0.830	0.320	45
	ger♣	2.085	0.612	-0.722	0.717	-1.221	1.105	1.355	0.834	0.176	90
	ita	0.530	0.680	1.501	0.641	-0.264	0.051	-0.614	0.122	0.416	145
	usa	-0.966	0.515	0.503	0.429	-0.344	0.477	0.436	0.438	0.037	147
	wld	-0.470	0.416	-1.235	0.305	0.219	0.265	-0.744	0.214	0.690	306

**Estimates are in bold and standard errors are beside the estimates; all variables are in natural logs. Countries represented are France (fra), Great Britain (gbr), Germany (ger), Italy (ita), USA (usa), and the non-MERCOSUR world as an aggregate (wld).
♣Germany's data period runs from 1991-96. All others are from 1989-1996.

Table 3B: Estimation with Time Dummies by 9 commodity groups.**

HS-2	COUNTRY	τ	SE	τ^*	SE	R^2	EDF
01-15	fra	-1.277	1.002	0.537	0.639	0.135	128
	gbr	-2.316	1.677	2.166	1.057	0.189	78
	ger♣	-1.866	0.581	0.504	0.378	0.199	158
	ita	0.000	1.931	0.075	1.525	0.162	94
	usa	-1.372	0.478	0.840	0.367	0.242	322
	wld	0.087	0.379	0.001	0.301	0.032	925
16-27	fra	-0.831	1.399	0.943	1.070	0.265	130
	gbr	-2.762	0.510	2.008	0.459	0.315	134
	ger♣	1.325	0.473	-0.377	0.507	0.105	183
	ita	-0.198	0.451	0.173	0.325	0.128	247
	usa	0.139	0.743	-0.686	0.529	0.097	283
	wld	-1.721	0.439	1.052	0.321	0.074	628
28-38	fra	-0.841	0.560	0.698	0.508	0.122	546
	gbr	-0.849	0.652	0.550	0.486	0.049	671
	ger♣	-0.557	0.353	0.308	0.320	0.057	918
	ita	0.034	0.679	-0.380	0.528	0.082	520
	usa	0.176	0.394	0.124	0.335	0.030	899
	wld	-0.789	0.279	0.554	0.236	0.022	1388
39-40	fra	1.248	1.258	-1.027	0.958	0.120	278
	gbr	-0.173	1.249	-0.126	0.985	0.070	327
	ger♣	-2.379	1.113	1.804	0.930	0.205	404
	ita	-0.773	1.108	0.889	0.816	0.158	394
	usa	-0.932	1.065	0.224	0.816	0.054	491
	wld	-1.021	0.686	0.508	0.553	0.054	637
41-63	fra	1.231	1.132	-1.469	0.804	0.175	158
	gbr	3.179	1.301	-1.326	0.880	0.129	241
	ger♣	1.060	0.826	-1.655	0.529	0.302	334
	ita	-1.460	0.929	1.665	0.609	0.175	423
	usa	-0.776	0.896	0.492	0.621	0.037	515
	wld	0.968	0.300	-1.438	0.204	0.100	1372
64-83	fra	-1.477	1.035	0.769	0.641	0.361	263
	gbr	-3.218	1.117	1.873	0.750	0.112	355
	ger♣	0.461	0.769	-0.734	0.473	0.051	653
	ita	-2.616	0.495	1.713	0.387	0.229	541
	usa	-2.045	0.417	0.399	0.354	0.151	615
	wld	-1.345	0.391	0.554	0.262	0.066	1331
84-85	fra	-0.675	1.004	1.173	0.598	0.077	554
	gbr	-0.763	0.840	1.130	0.534	0.142	723
	ger♣	-0.409	0.440	0.816	0.261	0.066	1072
	ita	-0.227	0.525	0.619	0.320	0.033	1213
	usa	-0.297	0.435	0.586	0.300	0.040	1129
	wld	0.525	0.246	-0.394	0.167	0.020	1936
86-92	fra	1.245	0.749	0.630	0.589	0.644	98
	gbr	-1.417	0.482	-0.456	0.478	0.086	146
	ger♣	-0.040	0.599	-2.265	0.560	0.519	200
	ita	0.124	0.423	0.017	0.356	0.669	244
	usa	-0.068	0.395	0.409	0.386	0.078	218
	wld	0.303	0.251	-0.403	0.241	0.170	446
93-96	fra	-4.085	2.327	3.440	1.276	0.709	37
	gbr	2.877	1.710	-2.691	1.638	0.464	39
	ger♣	2.558	0.792	-0.542	1.066	0.190	86
	ita	1.265	0.584	0.198	0.872	0.452	139
	usa	-1.124	0.617	0.221	0.522	0.106	141
	wld	0.452	0.411	-1.824	0.311	0.339	300

** Estimates are in bold and standard errors are beside the estimates; all variables are in natural logs. The countries represented are France (fra), Great Britain (gbr), Germany (ger), Italy (ita), USA (usa), and the non-MERCOSUR world as an aggregate (wld). ♣ Germany's data period runs from 1991-96. All others 1989-96.

Table 4A: Estimated coefficients of equation (6) over all commodities.**

COUNTRY (years)	τ	SE	τ^*	SE	w/e_1Q_1	SE	w/e_2Q_2	SE	$w^*/e_1{}^*Q_1$	SE	R^2	EDF
CHILE (91-96)	**1.353**	0.10	**0.127**	0.08	**0.828**	0.13	**-0.895**	0.17	**0.091**	0.13	**0.89**	**1042**
GERMANY (91-96)	**0.737**	0.09	**0.447**	0.08	**1.081**	0.08	**-1.280**	0.17	**-0.033**	0.08	**0.61**	**4959**
JAPAN (89-96)	**1.071**	0.09	**0.168**	0.07	**1.083**	0.03	**-1.055**	0.05	**0.015**	0.02	**0.72**	**2754**
KOREA (89-96)	**0.184**	0.07	**0.360**	0.06	**1.385**	0.05	**-0.073**	0.12	**-0.145**	0.03	**0.75**	**1372**
USA (91-96)	**0.883**	0.08	**0.445**	0.08	**0.779**	0.16	**-0.843**	0.25	**0.379**	0.16	**0.60**	**5463**

Table 4B: Estimated coefficients of equation (6) over all commodities with time dummies.**

COUNTRY	τ	SE	τ^*	SE	R^2	EDF
CHILE	**1.126**	0.13	**0.711**	0.12	**0.84**	**1039**
GERMANY	**0.650**	0.10	**0.827**	0.10	**0.59**	**4956**
JAPAN	**1.029**	0.11	**0.370**	0.09	**0.70**	**2749**
KOREA	**0.373**	0.13	**0.838**	0.11	**0.64**	**1367**
USA	**0.881**	0.10	**0.495**	0.09	**0.58**	**5460**

** Estimates are in bold and standard errors SE are besides the *estimates*; all variables are in natural logs. The parenthesis next to the country is the range of the data. The unit values used here are f.o.b. since we are using the exporters as reporters here.

Table 5A: Estimated coefficients of equation (6), by 9 commodity groups.**

HS-2		τ	SE		τ^*	SE		w/e_1Q_1	SE	w/e_2Q_2	SE	$w^*/e_1{}^*Q_1$	SE	R^2	EDF †
01-15	chl	1.384	0.22		-0.190	0.18		1.279	0.27	-1.261	0.37	-0.332	0.28	0.87	378
	ger	0.231	0.33	♠	-0.633	0.21		1.706	0.10	-2.224	0.13	-0.926	0.11	0.94	184
	jpn	-	-		-	-		-	-	-	-	-	-	-	10
	kor	-	-		-	-		-	-	-	-	-	-	-	2
	usa	0.090	0.50	♠	0.127	0.42		1.743	0.46	-0.531	0.61	-0.703	0.49	0.75	279
16-27	chl	0.833	0.21		0.281	0.17	♣	0.945	0.32	-1.912	0.45	-0.242	0.33	0.87	181
	ger	0.749	0.53		1.248	0.44	♣	-1.518	0.75	2.819	1.38	2.027	0.67	0.46	160
	jpn	0.033	0.40	♠	0.996	0.30	♣	1.456	0.16	-1.189	0.25	-0.061	0.12	0.85	66
	kor	0.124	0.52	♠	0.386	0.37		1.600	0.30	0.385	0.35	0.085	0.15	0.90	57
	usa	0.545	0.30		0.830	0.31	♣	0.121	0.85	-2.652	1.14	1.120	0.87	0.66	301
28-38	chl	3.826	0.53		-1.655	0.44		1.065	0.54	-2.902	0.78	-1.025	0.60	0.78	139
	ger	0.316	0.19	♠	0.283	0.17	♣	0.800	0.14	-1.524	0.26	0.173	0.13	0.67	933
	jpn	0.343	0.32	♠	0.642	0.23	♣	1.091	0.09	-1.157	0.14	-0.074	0.06	0.76	452
	kor	-0.224	0.78		-0.640	0.55		1.616	0.36	0.906	0.68	-0.173	0.21	0.57	86
	usa	0.762	0.23		0.639	0.22	♣	0.641	0.30	-0.425	0.43	0.422	0.32	0.62	1300
39-40	chl	-0.655	2.03		2.636	1.17	♣	-1.704	2.01	1.401	1.81	1.845	1.71	0.56	49
	ger	0.916	0.40		0.246	0.33		0.813	0.33	-0.224	0.81	0.533	0.32	0.69	422
	jpn	0.889	0.45		0.544	0.32	♣	1.359	0.15	-1.338	0.25	0.109	0.10	0.69	270
	kor	0.432	0.60		0.120	0.44		2.147	0.38	-1.015	0.55	-0.780	0.28	0.65	142
	usa	0.354	0.39	♠	0.118	0.35		2.065	0.63	-1.908	0.66	-0.610	0.62	0.76	475
41-63	chl	2.566	0.60		0.200	0.41		0.677	0.43	-0.400	0.60	0.480	0.45	0.72	152
	ger	0.423	0.47		1.159	0.37	♣	0.840	0.25	0.458	0.52	0.140	0.23	0.55	348
	jpn	3.546	0.56		-1.084	0.40		0.459	0.15	-0.538	0.25	0.396	0.12	0.63	150
	kor	-0.710	0.37	♠	1.245	0.23	♣	0.904	0.23	0.098	0.35	0.245	0.12	0.65	385
	usa	0.757	0.42		0.607	0.32	♣	0.853	0.43	0.224	0.76	0.457	0.45	0.58	633
64-83	chl	1.311	0.42		0.775	0.28	♣	0.024	0.61	-0.541	0.86	0.702	0.63	0.89	78
	ger	0.604	0.38		0.717	0.33	♣	1.280	0.22	-2.196	0.56	-0.349	0.21	0.57	937
	jpn	0.612	0.39		0.495	0.28	♣	1.033	0.13	-0.899	0.19	0.036	0.09	0.54	471
	kor	2.810	0.91		-0.334	0.65		1.749	0.40	-2.631	0.73	-0.432	0.24	0.55	147
	usa	1.372	0.52		-0.460	0.48		0.877	0.76	-0.180	1.03	0.348	0.77	0.34	637
84-85	chl	0.900	1.88		-0.238	1.16		1.449	2.64	1.415	3.37	0.486	2.65	0.51	22
	ger	0.909	0.23		0.669	0.20	♣	1.122	0.19	-0.804	0.51	0.076	0.19	0.62	1579
	jpn	1.148	0.22		-0.319	0.15		1.274	0.07	-1.442	0.13	-0.121	0.05	0.58	1044
	kor	0.570	0.19	♠	0.347	0.19	♣	1.420	0.15	-0.345	0.31	-0.174	0.08	0.70	312
	usa	1.177	0.38		0.629	0.37	♣	0.297	0.82	-1.944	0.91	0.725	0.81	0.29	1464
86-92	chl	-	-		-	-		-	-	-	-	-	-	-	3
	ger	1.789	0.43		-0.450	0.46		2.681	0.60	-4.461	1.54	-1.587	0.60	0.54	269
	Jpn	1.362	0.32		0.559	0.20	♣	0.986	0.13	-0.368	0.24	0.095	0.09	0.71	206
	Kor	0.955	0.14		0.606	0.40		0.346	0.52	-1.526	0.69	-0.153	0.32	0.64	90
	Usa	0.739	0.40		0.077	0.47		1.969	1.87	1.275	2.45	-0.388	1.85	0.48	183
93-96	chl	-	-		-	-		-	-	-	-	-	-	-	1
	Ger	0.669	0.77		-1.572	0.73		6.498	1.52	-13.371	3.00	-5.725	1.35	0.45	87
	Jpn	2.515	0.51		-0.437	0.52		0.369	0.42	0.653	0.82	0.291	0.28	0.52	45
	Kor	-0.078	0.44	♠	0.094	0.36		1.244	0.43	0.844	1.43	-0.015	0.22	0.25	111
	Usa	0.792	0.80		-1.126	1.06		6.903	3.97	1.749	3.75	-5.176	3.93	0.30	151

** Estimates are in bold and standard errors SE are besides the estimates; all variables listed above are in natural logs. To the right of the SE we have indicated ♠ if the estimate is less than one with 95% confidence, and ♣ if the estimate on the rival's tariff are greater than zero at the same level of confidence. † Missing values are assigned only to those estimates with very small error degrees of freedom (EDF) as shown.

Table 5B: Estimation with time dummies by 9 commodity groups.**

HS-2	COUNTRY	τ	SE		τ^*	SE		R^2	EDF †
01-15	chl	**0.442**	0.35	♠	**1.486**	0.37	♣	**0.84**	**375**
	ger	**0.418**	0.34	♠	**-0.812**	0.28		**0.60**	**181**
	jpn	-	-		-	-		-	**5**
	kor	-	-		-	-		-	**0**
	usa	**0.565**	0.67		**-0.159**	0.56		**0.64**	**276**
16-27	chl	**1.049**	0.25		**0.274**	0.23		**0.83**	**178**
	ger	**2.044**	0.72		**0.227**	0.62		**0.49**	**157**
	jpn	**-0.284**	0.53	♠	**1.298**	0.43	♣	**0.84**	**61**
	kor	**0.074**	0.67		**1.068**	0.54	♣	**0.78**	**52**
	usa	**0.953**	0.45		**0.740**	0.41	♣	**0.68**	**298**
28-38	chl	**3.989**	0.58		**-1.579**	0.56		**0.73**	**136**
	ger	**0.358**	0.22	♠	**0.392**	0.19	♣	**0.65**	**930**
	jpn	**0.019**	0.42	♠	**1.139**	0.34	♣	**0.73**	**447**
	kor	**-0.660**	1.12		**0.376**	0.81		**0.42**	**81**
	usa	**0.858**	0.24		**0.597**	0.22	♣	**0.62**	**1297**
39-40	chl	**-0.778**	2.21		**2.669**	1.59	♣	**0.59**	**46**
	ger	**0.800**	0.52		**0.959**	0.55	♣	**0.67**	**419**
	jpn	**0.903**	0.60		**0.660**	0.52		**0.68**	**265**
	kor	**0.503**	0.92		**0.920**	0.70		**0.61**	**137**
	usa	**1.302**	0.54		**-0.743**	0.55		**0.76**	**472**
41-63	chl	**1.477**	0.66		**1.392**	0.50	♣	**0.61**	**149**
	ger	**-0.255**	0.50	♠	**1.899**	0.39	♣	**0.55**	**345**
	jpn	**2.773**	0.78		**-0.474**	0.58		**0.60**	**145**
	kor	**-0.352**	0.91		**1.516**	0.60	♣	**0.58**	**380**
	usa	**0.288**	0.51		**0.965**	0.38	♣	**0.57**	**630**
64-83	chl	**0.726**	0.71		**1.524**	0.60	♣	**0.72**	**75**
	ger	**0.146**	0.41	♠	**2.110**	0.39	♣	**0.57**	**934**
	jpn	**0.756**	0.57	♠	**0.564**	0.49		**0.54**	**466**
	kor	**2.843**	1.31		**0.287**	0.89		**0.47**	**142**
	usa	**1.560**	0.64		**-0.530**	0.60		**0.32**	**634**
84-85	chl	**1.093**	1.93		**1.083**	1.69		**0.49**	**19**
	ger	**0.919**	0.27		**0.968**	0.32	♣	**0.60**	**1576**
	jpn	**0.908**	0.29		**0.238**	0.26		**0.58**	**1039**
	kor	**0.391**	0.30	♠	**1.498**	0.24	♣	**0.64**	**307**
	usa	**0.915**	0.43		**1.107**	0.45	♣	**0.29**	**1461**
86-92	chl	-	-		-	-		-	**1**
	ger	**2.070**	0.45		**0.488**	0.59		**0.54**	**266**
	jpn	**1.556**	0.31		**0.309**	0.27		**0.66**	**201**
	kor	**0.912**	0.24		**0.354**	0.33		**0.68**	**85**
	usa	**0.445**	0.46		**0.242**	0.58		**0.49**	**180**
93-96	chl	-	-		-	-		-	**0**
	ger	**1.099**	0.89		**-1.471**	0.96		**0.39**	**84**
	jpn	**3.305**	0.99		**-0.964**	0.79		**0.56**	**40**
	kor	**-0.334**	0.52	♠	**0.424**	0.45		**0.26**	**106**
	usa	**-0.420**	1.04		**-0.880**	1.31		**0.34**	**148**

** Estimates are in bold and standard errors SE are besides the estimates; all variables listed above are in natural logs. To the right of the SE we have indicated ♠ if the estimate is less than one with 95% confidence, and ♣ if the estimate on the rival's tariffs are greater than zero at the same level of confidence. † Missing values are assigned only to those estimates with very small error degrees of freedom (EDF) as shown.

Table 6A: Estimation results of equation (7).**

HS-2	τ	SE	$w^*\tau^*/e_1^*Q1$	SE	$(w^*/e2^*)/Q2$	SE	$(w/e1)/Q1$	SE	R^2	EDF
01-15	**0.378**	0.230	**0.887**	0.444	**2.926**	0.642	**-0.265**	0.466	**0.794**	**327**
16-27	**-0.028**	0.404	**3.383**	0.828	**-2.215**	1.353	**-2.794**	0.886	**0.486**	**183**
28-38	**-0.581**	0.336	**1.883**	0.507	**-0.180**	0.693	**-0.876**	0.530	**0.747**	**495**
39-40	**-0.581**	0.635	**4.575**	0.347	**-0.721**	0.474	**-3.852**	0.373	**0.938**	**239**
41-63	**1.905**	0.622	**0.476**	1.032	**5.345**	1.430	**0.076**	1.117	**0.466**	**307**
64-83	**-0.745**	0.503	**1.363**	0.871	**-1.170**	1.081	**-0.347**	0.947	**0.653**	**275**
84-85	**0.226**	0.552	**-1.240**	0.979	**-0.078**	1.453	**1.864**	1.105	**0.083**	**583**
86-92	**0.413**	0.270	**0.043**	1.342	**-4.064**	2.792	**1.550**	1.542	**0.427**	**183**
93-96	**0.124**	0.913	**-5.429**	3.202	**-7.324**	6.408	**8.615**	3.636	**0.425**	**59**
ALL	**0.245**	0.086	**0.202**	0.173	**0.808**	0.287	**0.671**	0.185	**0.689**	**2691**

** The estimates are in bold and standard errors are besides the estimates. All variables are in natural logs. The member tariff factor has been rolled into the real exchange rate variable due to lack of time series in Argentina data. The unit values used here are in f.o.b. since we are using the exporter as the reporter.

Table 6B: Estimation with Time Dummies.**

HS-2	τ	SE	$w^*\tau^*/e_1Q_1$	SE	R^2	EDF
01-15	**0.383**	0.224	**-0.226**	0.073	**0.114**	**326**
16-27	**2.199**	0.334	**-0.396**	0.075	**0.797**	**182**
28-38	**-0.201**	0.255	**0.200**	0.065	**0.139**	**494**
39-40	**-0.509**	0.840	**0.215**	0.126	**0.107**	**238**
41-63	**1.811**	0.568	**-0.237**	0.171	**0.113**	**306**
64-83	**-1.305**	0.434	**0.173**	0.122	**0.104**	**274**
84-85	**0.137**	0.528	**-0.486**	0.141	**0.101**	**582**
86-92	**0.443**	0.274	**0.476**	0.271	**0.061**	**182**
93-96	**0.172**	0.862	**0.957**	0.725	**0.109**	**58**
ALL	**0.188**	0.083	**-0.055**	0.030	**0.025**	**2690**

** The estimates are in bold and standard errors are besides the estimates. All variables are in natural logs. The unit values used here are in f.o.b. since we are using the exporters as the reporter.

Table 7: Total 1991 Exports to Brazil Terms of Trade Losses ($ million).**

COUNTRY	EXPORTS	TOTAL EXPORT REVENUE LOSSES			
		4A	5A	4A*	5A*
CHILE	524.4	-17.3	-25.7	-40.4	-51.2
GERMANY	2,030.0	-236.0	-198.8	-169.4	-165.2
JAPAN	1,349.6	-58.8	-13.1	-70.6	-20.8
KOREA	146.7	-13.7	-19.1	1.2	-8.3
USA	5,395.5	-624.1	-690.5	-545.3	-556.8
SUM	9,446.2	-950.0	-947.2	-824.4	-802.3

** Revenue losses were calculated using the elasticities of the rival's tariffs from Table 4A and 5A. 4A* and 5A* also incorporates the own tariff effects due to MFN reductions.

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