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A Comparative Analysis of Elasticities in the European Union External Trade with Mercosur and Nafta

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Paper Number 1-04

Research Papers in International Business

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Abstract

This paper aims to testing for long- and short-run differences in the elasticities of aggregate demand of Mercosur and Nafta for European Union exports during the 1967-1999 period. Based on the *imperfect substitutes* model proposed by Goldstein and Khan (1985), the long-run results provide consistently enough evidence about the existence of differences in the size of both income and price elasticities with respect to Mercosur and Nafta. The error correction model appears to predict the adjustment of variables to long-run equilibrium reasonably well.

JEL: F15; F41
Key words: Exports; Trade elasticities; EU; Mercosur; Nafta.

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I. Introduction

Few areas in economics have been subject to so much empirical investigation as the behavior of foreign trade flows. Most studies have been focused on the analysis of trade between individual countries and the rest of the world. However, a relatively new phenomenon that is shaping the current international economy is being witnessed: the emergence of effective regional trade blocs all over the world. Between 1990 and 1999, 87 Preferential Trading Arrangements (PTAs) were notified to the World Trade Organization (WTO).[i]

The widespread existence of Preferential Trade Arrangements (PTAs) has motivated a large amount of research on this matter. Most existing contributions investigate the effects of integration on the volume of trade among member countries as well as the welfare effects of PTAs on non-members.[ii] The recent proliferation of regions of economic integration has also raised the question of whether such arrangements will serve as building blocks or stumbling blocks to global free trade (Andriamananjara, 2002).[iii] The "new wave" of regionalism in the nineties has been defined as an "open regionalism" as its main objective seems to be the promotion of both intra-regional and multilateral trade.

In spite of the increasing interest about the effects of regionalism, empirical work on the determinants of trade relationships between different areas of economic integration is scarce. This paper tries to contribute to this debate by considering three of the most important areas of economic integration: European Union, Mercosur and Nafta. The founding of the last two blocs in 1991 and 1994, respectively, has been especially relevant and considered as an opportunity for real convergence and economic growth. The consideration of both Mercosur and Nafta will allow us to examine trade elasticities in areas with different levels of economic development when explaining their behavior as importers from a common trade partner as the European Union (EU).

The evidence obtained in this analysis would also reveal valuable information for policy purposes. In formulating either a commercial or an exchange rate policy, one major concern of policy makers is the responsiveness of trade flows to relative price changes.[iv] This question is particularly relevant, as the EU has recently signed two preferential agreements with Mercosur and Mexico in 1999 and 2000, respectively.

The European Union is one of the most important integrated areas. Even if the considerable flow of trade between its member countries is disregarded, trade among the EU and other nations covers around 20 percent of total world trade (WTO, 2002). Consequently, as a customs union, it is considered to be the world's major export region in terms of both goods and services.

The North American Free Trade Area (Nafta) - United States, Canada and Mexico –received in 2001 around 28 percent of all EU foreign trade. Trade flows between the European Union and Nafta are highly unbalanced in favor of the United States, which absorbs over 85 percent of the EU exports arriving in Nafta (Eurostat, 2002). European exports to Nafta represent an exchange of goods based on a typical pattern of intra-industry trade between developed countries.

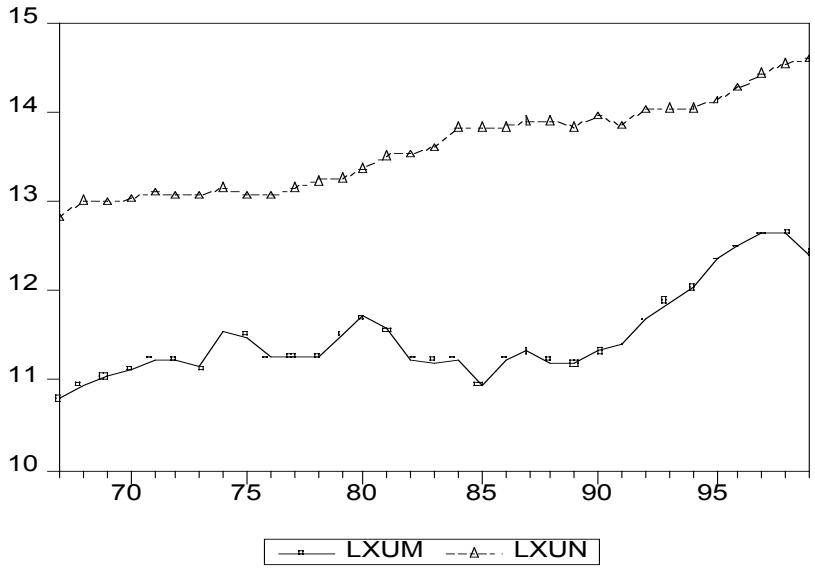

Figure 1. Exports from the EU to Mercosur and Nafta, 1965 to 2000.

Note: *LXUM* and *LXUN* represent the EU exports to Mercosur and Nafta, respectively. Both variables are expressed in logs.

Mercosur is the most recent and ambitious project of regional integration among the more dynamic economies of the South Cone. It encompasses Argentina, Brazil, Paraguay and Uruguay, with Chile as an associated country (Velasco, 1998).[v] In 2001, Latin America as a whole accounted for 5,8 percent of European external trade, of which around 3 percent corresponded to the countries of Mercosur (Eurostat, 2002).[vi]

The trade liberalization stemming from the creation of Mercosur has drastically reduced trade barriers on imports entering the integrated area (Laird, 1998). This process explains the fact that trade from the rest of the world, basically from the United States and EU, increased at an annual rate of over 20 percent between 1991 and 1996 (Yeats, 1997).

Figure 1 shows the evolution of trade flows between the EU and both, Mercosur and Nafta for the 1967-1999 period. On the one hand, trade between industrialized areas (EU and Nafta) shows an increased trend combined with short periods of slowdown which correspond to the oil crises of 1973 and 1979, and the Gulf War in 1991. On the other hand, the autarchic options of the seventies, as well as the problems of foreign debt that characterized most of Mercosur members at the beginning of eighties explain the decline in the importance of these markets for the European Union. The upswing in trade over the last decade has however been closely linked to the integration process carried out by member countries of Mercosur and Nafta.

The rest of the paper is organized as follows. Section II presents the export demand model between the considered areas derived from the *imperfect substitutes* model of international trade. The long- and short-run estimates of the European Union export demand elasticities are given in section III. The paper ends with a summary of the main conclusions (section IV).

II. The analytical framework

The purpose of this paper is to ascertain whether there exist significant differences in the size of both price and income elasticities of EU exports demand to Mercosur and Nafta. To this aim, two export demand equations have been estimated: one for Mercosur and the other one for Nafta.

This approach is embedded in a relevant amount of empirical literature on the behavior of trade flows. The majority of import and export models are derived from what Goldstein and Khan (1985) termed 'the *imperfect substitutes* model'. More specifically, empirical analyses are focused on the effects that income and especially exchange rates have on a country's trade balance. In Marquez and McNeilly (1988), both income and price elasticities play a significant role in the determination of trade flows for developing and developed countries, whereas in Bahmani-Oskooee and Niroomand (1998) this result holds only for less developed countries. Similarly,

Senhadji and Montenegro (1999) show that exports do react to both the trade partner's income and to relative prices in a large sample of both developing and industrial countries. Nevertheless, Bahmani-Oskooee and Alse (1994), Rose (1990,1991) and Ostry and Rose (1992) find that a real devaluation has generally no significant impact on the trade balance. Finally, the elasticities estimates of Hooper *et al*. (2000) for the G-7 countries support that the price channel is weak, if not wholly ineffective, with respect to continental European countries; it is the income variable that becomes more important when explaining the trade balance of this nations.

However, to the authors knowledge, only a few attempts have been made to examine bilateral trade just between two areas (EU and Mercosur). This is, for instance, the case of Cuadros *et al*. (1999) who model EU exports to Mercosur for the period 1967-95.[vii]

The basic theoretical framework we use to estimate a demand function of European Union exports to the main integrated areas of the Atlantic (Mercosur and Nafta) is a modified version of the above mentioned *imperfect substitutes* model (Goldstein and Khan, 1985). It is known that the key premises of this approach are, first, that the analysis is set in a conventional *two-country* model of trade and secondly, that neither imports nor exports are perfect substitutes for the consumption of domestic non-traded goods. According to these assumptions, an export demand function can be derived as the outcome of maximizing utility subject to a budget constraint. Under this approach, the export function structure to be estimated is a demand equation representing the quantity demanded which depends on the exported good's own price with respect to the price of domestic substitutes and the level of income in the importing area.[viii]

Nevertheless, exports from a bloc face competition not only from domestic producers in the importing region but also from third area exporters to that region. In this case, the symmetry between the import demand and export demand equations disappears. Therefore, in this study, as well as including a price which reflects the competitiveness of European exports to Mercosur or Nafta, we also incorporate other prices in order to capture the substitutability between European exports and production from competing areas.[ix] The expected sign of these two price variables is negative and their value will depend on the degree of substitutability. Thus, the first relative price (RP^h) can be written in a general form as:

$$RP^h = \frac{\sum_{i=1}^{n} UVI_i \frac{X_i}{X_{TOTAL}}}{\sum_{i=1}^{m} P_i \frac{GDP_i}{GDP_{TOTAL}}} \quad (1)$$

h = Mercosur, Nafta

i = 1.....n and 1.....m countries

where UVI is a unit value index, X denotes exports, P is a domestic price index and GDP is gross domestic product in the target market (see Appendix for more details). These relative prices appear as the ratio of the summatory of European Union export prices proxied by UVIs and weighted by export volume to the importers' domestic prices, either Mercosur or Nafta (weighted by the economic size of the country).

Now, in order to capture the potential substitutability between the European Union and third area exporters to either Mercosur or Nafta, a second relative price (RP^c) can be expressed as follows:

$$RP^c = \frac{\sum_{i=1}^{n} UVI_i \frac{X_i}{X_{TOTAL}}}{\sum_{i=1}^{m} UVI_i \frac{X_i}{X_{TOTAL}}} \quad (2)$$

c = nearest competitor of EU in either Mercosur or Nafta

i = 1.....n and 1.....m countries

where the numerator should be read as in formula (1) and the denominator reflects export prices of the main competitors of the European Union in either Mercosur or Nafta. Since we are dealing with trade effects among regional areas, it has been considered that the nearest trading rival of the European Union in Mercosur is Nafta. By contrast, there is no relevant regional integrated area that can be considered as a competitor of the European Union in Nafta. This is the reason why an individual country (Japan) has been chosen in this case.[x]

The conventional practice in specifying export demand equations (Marshallian type) is to include, besides the price, an income variable representing the budget

constraint in the target markets. The sign of this variable is expected to be positive and greater than one given that those markets do not import inferior goods from the EU.

Thus the general model can, finally, be expressed as follows:

$$X_t^h = a_0 + a_1 RP_t^h + a_2 RP_t^c + a_3 Y_t^h + \mu_t \qquad (3)$$

where X holds for the European Union exports to either Mercosur or Nafta; RP^h is the ratio of EU prices to importer area prices; RP^c is the ratio of EU prices with respect to the nearest competitor of European Union in the target market and Y^h represents domestic income. All variables are expressed in natural logarithms so that elasticities can be directly interpreted from the value of the estimated parameters.

III. Empirical Results

Cointegration techniques provide an appropriate method of estimating long-and short-run trade elasticities when using time series. To the authors' knowledge, this paper presents the first application of the Johansen (1988) and Johansen and Juselius (1990) cointegration technique to estimate price and income elasticities for European Union exports to different areas of economic integration.[xi]

The results of cointegration tests are shown in Table 1: λMAX tests for at most r cointegrating vectors against the alternative of exactly r+1 cointegrating relationships; while Trace tests for at most r cointegrating vectors against the alternative of at least r+1 vectors.[xii] Taking into account that the analysis is based on annual data and given that the sample period is not particularly long, only one lag for each of the variables has been included in the two export demand equations. According to the Akaike Information Criteria (AIC), this is the lag length of the level VAR system that has been determined by minimizing it.

Table 1 (Panel A) reports the existence of cointegration for the two estimated export demand functions. Normalized cointegrating vectors can be observed in Panel B. For the EU-Mercosur equation, two cointegrating vectors were found. In order to continue the analysis, the first one was chosen for two reasons: first, because it is significant in its corresponding error correction model, whereas the second one is not;

second, because it makes more sense from the economic perspective. Regarding the EU-Nafta equation, a single cointegrating vector is obtained.

Table 1 Johansen's Maximum Likelihood Cointegration Tests 1967-1999

A. λMAX and Trace Statistics

r: number of cointegrating vectors (null hypothesis)	EU-Mercosur λ*MAX*	EU-Mercosur Trace	EU-Nafta λ*MAX*	EU-Nafta Trace
	(eigenvalues in descending order: 0.52, 0.40, 0.31, 0.13)		(eigenvalues in descending order: 0.62, 0.25, 0.12, 0.01)	
$r = 0$	23.55	55.91*	31.45*	45.11*
$r \leq 1$	16.13	32.35*	9.08	13.66
$r \leq 2$	11.95	16.22	4.11	4.58
$r \leq 3$	4.27	4.27	0.46	0.46

B. Parameter Estimates (normalized)

Variables	EU-Mercosur Cointegrating vector	EU-Nafta Cointegrating vector
LX^h	-1	-1
LRP^h (-)	-2.10	-0.80
LRP^c (-)	0.52	0.06
LY^h (+)	1.37	1.75

Notes: Panel A: λ*MAX* and Trace are the likelihood ratio statistics for the number of cointegrating vectors. Estimation has been performed by using Microfit 3.0. * Indicates significance at 5 percent level; critical values are based on Osterwald-Lenum (1992).
Panel B: The variables are given in general terms and taken in natural logarithms hence, LX^h expresses EU exports to Mercosur and Nafta; LRP^h is relative price index of the European Union as regards Mercosur and Nafta; LRP^c is the EU-Nafta relative price index and the EU-Japan relative price index; LY^h is Mercosur and Nafta income. The expected sign for each variable is given in brackets. Parameter estimates express different elasticities.

The coefficients of both long-run relationships have been tested in order to examine whether or not they are significantly different from zero. Thus, Table 2 presents the

results of the parameter restriction test. For the European Union-Mercosur equation, the Chi-squared statistics for all the estimates are greater than the 95 percent critical value, rejecting thus the null hypothesis that the corresponding coefficients are zero.

Table 2 Tests of Parameter Restrictions

	EU-Mercosur	EU-Nafta
Chi-squared test statistic (LX^h)	13.55	21.52
Chi-squared test statistic (LRP^h)	15.38	15.12
Chi-squared test statistic (LRP^c)	8.41	0.08
Chi-squared test statistic (LY^h)	18.18	20.16

Note: the critical value with one degree of freedom at 5 percent significance level is 3.84

Therefore, the EU-Mercosur demand equation can be formulated with the following structure:

$$LXUM = -2.10LRPUM + 0.52LRPUN + 1.37LYM \quad (4)$$

where *LXUM* is EU exports to Mercosur*; LRPUM* is EU relative prices with respect to Mercosur; *LRPUN* is EU relative prices with respect to Nafta (the nearest competitor of EU in Mercosur); *LYM* is Mercosur income.

In the European Union-Nafta equation, only the second relative price (LRP^c) is not significant (see Table 2). Therefore, we have proceeded to re-estimate the equation without this variable. A new long-run linear combination among the rest of the variables is found which means that we can omit LRP^c in this model. In line with this, the following structure was finally adopted:[xiii]

$$LXUN = -0.78LRPUN + 1.74LYN \quad (5)$$

where *LXUN* is EU exports to Nafta*; LRPUN* is EU relative prices with respect to Nafta; *LYN* is Nafta income.

As shown in equation 4, the first price elasticity of EU exports has a negative sign, as expected, and a magnitude (-2.10) leading to a high sensitivity to prices. In equation 5, this price elasticity still has a negative sign but in this case (Nafta) its value is less than one (-0.78). These results seem to be coherent with existing differences in the trade pattern between EU and these two areas of economic integration. EU exports to both Mercosur and Nafta is highly biased toward manufactured goods. While European Union-Mercosur trade is more inter-industry, European Union-Nafta is mainly intra-industry due to the prevalence of trade among industrialized countries (the EU, the United States and Canada). Consequently, a higher long-run price elasticity for Mercosur than for Nafta indicates that trade price competition is important when trading with this area. Since intra-industry trade predominates in the EU-Nafta relationship, the lower price elasticity would suggest that other product features such as product quality, design, trademark and post-sales service might be more relevant than price competition.[xiv]

Going back to equation 4, the elasticity of EU exports with respect to EU-Nafta relative prices has a positive sign and a magnitude much lower than the first price elasticity. This value may indicate the relative inelasticity of EU exports regarding Nafta as a competing area. In equation 5, as mentioned before, second relative prices were not significant and therefore we did not include them in the corresponding equation. According to this result, Japanese prices behavior does not seem to affect EU exports to Nafta. [xv]

The Mercosur and Nafta income elasticities that capture the budget constraints of the two areas, have the expected positive sign, although their values differ; the one corresponding to Nafta is larger than the one for Mercosur (1.74 and 1.37, respectively). A possible explanation to those estimates can be based on the following argument: Nafta is a large market in both quantitative and qualitative (variety of products) terms. It is composed by two industrialized countries (the United States and Canada) and Mexico which is a fast-growing economy. These elements, together with the existence of foreign debt problems and trade policy restrictions in Mercosur, would justify a higher income elasticity in Nafta. Nevertheless, both elasticities remain larger than one. Consequently, income expansion in either Mercosur or Nafta countries will translate into a more than proportional European Union export growth to these areas.

Once long-run estimates are obtained from the equation expressing the flow of exports from the EU to either Mercosur or Nafta, the next step is to obtain more in-depth information about what happens in the short run. The different trade variables that have been analyzed so far are not always in equilibrium. They fluctuate before attaining long-run equilibrium. The long-term relationship is therefore complemented by the construction of an error-correction model. In order to do so, one should incorporate not only the variables which contain the short-run information, but also the cointegrating relationship (long-run information) calculated previously. The structure of this model is the following:

$$\Delta LX_t^h = c + \sum_{i=1}^{k} \tau_i \Delta LX_{t-i}^h + \sum_{i=1}^{k} \beta_i \Delta LRP_{t-i}^h + \sum_{i=1}^{k} \gamma_i \Delta LRP_{t-i}^c + \sum_{i=1}^{k} \eta_i \Delta LY_{t-i}^h + \sum_{i=1}^{3} DU_i + \vartheta RES_{t-1} + \varepsilon_t \quad (6)$$

where Δ expresses the first differences of the variables and *RES* is the error correction term derived from the long-run equation. In order to obtain a model that explains better the dynamics, qualitative variables (dummies, DU) are also introduced.[xvi] The error correction term coefficient is expected to be negative. The closer to unity this coefficient is, the greater will be the adjustment speed in the existing disequilibrium between EU exports and the rest of variables. This is how these variables achieve the long-run equilibrium. The general adequacy of this model is given by specific diagnostic tests on residuals such as serial correlation, functional form, normality and heteroskedasticity.[xvii]

Table 3 shows the error correction model (ECM) finally considered according to the corresponding results of equations 4 and 5. Either standard statistics and diagnostic tests indicate that the constructed model can provide a valid explanation of the short-run dynamics of EU exports to Mercosur and Nafta. The error correction term (*RES(-1)*) has the expected sign and its magnitude shows a reasonable adjustment in the two cases (-0.45 and -0.71, respectively). The significance of this variable reflects an adjustment in EU exports towards a long-run equilibrium between - approximately - 45 and 70 percent per year and for each case respectively. These results demonstrate, at the same time, the existence of the cointegrating vector, which has been incorporated in the error correction model.

Table 3. Error correction model

Variables	EU-MERCOSUR Coefficients (*t*-Statistics)	EU-NAFTA Coefficients (*t*-Statistics)
C	-8.29 (-4.88)	-24.57 (-3.41)
$\Delta LX^h(-1)$	0.24 (1.92)	-
ΔLRP^h	-0.43 (-2.24)	-0.62 (-3.54)
ΔLRP^c	0.85 (1.12)	-
ΔLY^h	2.77 (4.21)	-
DU85	-0.36 –3.11)	-
DU89	-	-0.13 (-2.09)
DU91	-	-0.17 (-2.74)
RES(-1)	-0.45 (-4.87)	-0.71 (-3.42)
Statistics and diagnostic tests		
R^2	0.69	0.50
Adjusted R^2	0.62	0.42
Standard error	0.11	0.06
F	9.07	6.46
Serial correlation*	(0.166)	(0.089)
Functional form*	(0.969)	(0.529)
Normality*	(0.322)	(0.448)
Heteroskedasticity*	(0.354)	(0.177)

Notes: the variables are expressed in general terms, therefore ΔLRP^h is the EU-Mercosur and EU-Nafta relative price index in first differences; ΔLRP^c is the EU-nearest competitors relative price index in first differences; ΔLY^h is Mercosur and Nafta income in first differences, *RES(-1*) is the error term. The numbers in brackets are the *t*-statistics. *The probability values of the diagnostic tests which are higher than 5% of significance level cannot reject the corresponding null hypothesis.

All the variables finally included in the error correction model are jointly significant. The structure of the European Union-Mercosur error correction model incorporates past information of exports which helps us to explain part of the dynamics on trade flows towards Mercosur. First relative price elasticity does have a negative sign and its value (-0.43) is lower than in the long-run equation (-2.10). Again, a positive sign in second relative price elasticity is obtained although its significance is weak. Short-run income elasticitiy shows a greater effect than in the long run.[xviii] This indicates a high sensitivity of Mercosur imports coming from the EU to transitory income rises. Regarding the qualitative variables, DU85 tries to capture foreign debt problems experienced by a large group of Latinamerican countries in the eighties. This variable had a negative impact on European Union exports to Mercosur (-0.36).

The structure of the European Union-Nafta equation is simpler. It is only explained by first relative prices and two dummy variables (DU89, DU91). Concerning their estimates, the short-run price elasticity (-0.62) is again lower than that of the long run (-0.78) and higher than the corresponding elasticity for Mercosur. Some negative effects for Europena Union exports towards Nafta appears to be related to the Golf War in 1991 (*DU91*). Finally, both second relative prices and income were not significant. We did not leave them in the final equation since its incorporation worsened the fit of the model.

IV. Concluding remarks

This paper offers some empirical estimates on long- and short-run elasticities of aggregate demand of Mercosur and Nafta for the European Union exports. The findings indicate the existence of significant differences in income and price elasticities with respect to these two areas of economic integration.

A long-run first price elasticity for Mercosur higher than the one for Nafta confirms that any variation in relative prices between EU and Mercosur will have a significant impact on EU exports to this area. Therefore, changes that might occur in the trade or exchange rate policies of either Mercosur or the EU will probably have a substantial effect on commercial transactions. In contrast, for the EU-Nafta, price seems to have a lower influence and probably other aspects such as product differentiation may play a more relevant role on their flows of trade.

When we introduce a second relative price with the aim of capturing the potential substitutability between the EU and third exporters, we observe that the EU exports to Mercosur increase less than proportionally as Nafta competes in the same market. The estimate of this second price elasticity might be related to the nature of the products traded by EU and Nafta in Mercosu as those goods are not perfect substitutes. When considering Nafta as the target market, no third exporters have been found to be significant competitors of EU products.

EU exports appear to be sensitive to changes in income in both Mercosur and Nafta countries, although the estimate for Nafta is larger as this is a greater market in both quantitative and qualitative terms. Thus, this variable becomes an engine of export growth for EU exports towards Nafta.

The short-run adjustment of EU export demand offers interesting dynamics. First price elasticities in this case are both below unity. They are higher for Nafta than for Mercosur indicating, in general, low effects when comparing to those of long run. Estimates for second price elasticities in the short term proved to be insignificant for both areas and regardless of the alternative specifications of prices. Income effects now seems to play a dominant role in determining EU exports toward Mercosur but not Nafta. This implies that Mercosur may face an external short-run constraint on growth larger than Nafta because its tendency for imports to rise sharply over the upswing of its economic cycle. Several dummies have been included to better model de dynamic adjustment process of export demand towards equilibrium. Thus, foreign debt problems for Mercosur and the Gulf War for Nafta became significant short-term variables in order to explain some negative effects in the eighties and nineties on EU exports towards those two regions. Finally any disequilibrium of EU exports towards either Mercosur and Nafta has been confirmed to rapidly adjust in a period span of a little more than a year.

Appendix: Statistical sources

The data used in this study are annual and cover the 1967-1999 period. The sample period was restricted by the lack of available data on Mercosur countries. It has been necessary to deal with the problem of aggregating the variables to make them homogeneous and applicable to the group of countries.

The variables included in this study are defined as follows:

- European Union exports to either Mercosur or Nafta (X^h) are in constant 1995 US dollars. The original data was obtained from the International Trade by Commodities Statistics (ITCS) CD-ROM (OECD, 2000/2001). They were expressed in current dollars and deflated by export unit values in terms of US dollars (base year: 1995) of industrial countries (source: International Financial Statistics, IFS, 2002) in order to have real exports data.
- First relative prices of the European Union as regard either Mercosur or Nafta (RP^h) are defined as the ratio of European Union unit value indeces (weighted by export shares) to gross domestic product deflator (weighted by economic size) in the target market. Exports are taken from IFS (2002); GDPs and GDP deflators from World Development Indicators CD-ROM, 2001.
- Second relative prices of the European Union as regard either Nafta or Japan (RP^c) are defined as the ratio of European Union unit value indices (weighted by export shares) to unit value indices (weighted by export shares) of either third-competing area or country in the target market. For Mexico no export unit values were found in IFS and therefore an export deflator obtained from the World Development Indicators CD-ROM, 2001 was used.
- Income in the target markets (Y^h) was calculated as the sum of individual GDPs for each area (Mercosur and Nafta) expressed in 1995 US dollars. We proxied income by GDP in constant US dollars (1995). Data was collected from the World Development Indicators CD-ROM, 2001.

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Endnotes

[i] Chang and Winters (2002: 889).

[ii] In relation with the welfare effects of PTAs on excluded countries, Chang and Winters (2002) argue that the traditional method of assessing effects on non-members countries by examining whether the bloc imports more or less from the rest of the world is deeply flawed. The authors suggest that these effects are most directly linked to changes in prices than to the volume of trade. The outcomes obtained indicate that the creation of Mercosur was associated with significant declines in the prices of non-members' exports to the region. A previous work by Winters and Chang (2000) obtained similar results by exploring the effects of Spanish accession to the EU on the prices of imports from major OECD suppliers.

[iii] Bhagwati and Panagariya (1996) and Winters (1996) provide surveys of the literature on this subject.

[iv] Bahmani-Oskoee and Niromand (1998: 101).

[v] Although Bolivia is also an associated country since 1996, it has not been considered in the analysis since its inclusion would have made it more difficult to obtain homogeneous series. Moreover, its weight in Mercosur trade with the EU is very low.

[vi] These flows are more important from a Mercosur perspective. According to Eurostat (2002), EU exports to Mercosur in 2001 represent 25 percent of total Mercosur imports. The corresponding percentage for the United States is 24,87 percent, in spite of its relatively higher geographic proximity.

[vii] Balaguer and Martínez Zarzoso (2000), follow an approach quite different to the one used in this paper, as it is based on the estimation of a gravity model for one single year (1995).

[viii] Note that in order to work with a single equation framework and to avoid the identification problem on variables, infinite supply elasticities are assumed.

[ix] It is assumed that the dominant relative price competition occurs among exporters.

[x] As it will be indicated in section III, we have also examined a group of Southeast Asian countries. However, the results were similar to those obtained by considering only Japan.

[xi] A comprehensive description of estimating cointegrating vectors and testing hypotheses can be found in Johansen (1988, 1995) and Johansen and Juselius (1990, 1992).

[xii] Previously, the order of integration of the series has been tested by means of the Dickey-Fuller test (ADF) (Dickey and Fuller 1979, 1981). The results obtained indicate that the null hypothesis on the existence of a unit root in levels cannot be rejected for any of the variables.

[xiii] Note that the coefficients of this equation are very similar to the ones firstly obtained when the original four variables were incorporated.

[xiv] Goldsbrough (1981) also detects lower price elasticities for intra-firm trade than for conventional trade.

[xv] We also tried to estimate EU export elasticity with respect to second relative prices by considering a group of Southeast Asian countries including Japan, Australia, Malaysia, New Zealand, Singapore, Thailand, Philippines, South Korea and Taiwan. However, the results obtained were again not significant.

[xvi] It should be noted that all variables incorporated in the error correction model are stationary and therefore ordinary least squares can be applied.

[xvii] No structural changes were found during the sample period according to different stability tests.

[xviii] According to Khan and Ross (1975), the income elasticity of exports is significantly higher in the short run than in the long run.