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DO NATIONAL BORDERS MATTER?
EVIDENCE FOR THE MERCOSUR TRADE BLOC

PAR
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CE RAPPORT DE RECHERCHE INTITULÉ :

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DENISE CAMPOS VASCONCELOS

A ÉTÉ ÉVALUÉ PAR UN JURY COMPOSÉ DES PERSONNES SUIVANTES :

PROF. EMANUELA CARDIA

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RESUMÉ

Le Modèle de Gravité est utilisé avec succès dans les études empiriques sur les flous de commerce international entre les pays. Le présent travail, d'après McCallum (1995), Helliwel (1995), Wei (1996), Nitsch (2000), parmi autres, cherche à appliquer le Modèle de Gravité à un échantillon de 22 pays, y comprises les pays de l'Amérique du Sud et les principaux partenaires commerciaux des pays membres du Mercosur, pour établir s'il existe une préférence révélé pour les biens produits chez eux en comparaison avec des biens étrangers. Les résultats montrent qui le degré de ce *home bias* dans le marché des biens est considérable pour les pays dans l'échantillon, quoique décroissante sur la période 1991-1997. Pour le Mercosur, considéré comme un seul marché domestique, l'évidence suggère que le degré de *home bias* est bas, alors que croissante, relative à la moyenne des pays dans l'échantillon. Cette tendance croissante du degré de *home bias* du Mercosur est interprétée comme un signal que la création du bloc a été effective dans la promotion de l'intégration économique entre les pays du Mercosur. Toutes ces conclusions sont, en gros, robustes aux changements dans la spécification du modèle, dans la méthode d'estimation et/ou dans la façon de mesurer les variables utilisées. Finalement, si nous interprétons le degré de *home bias* comme un index d'ouverture au commence international, le présent travail offre de l'évidence que les pays plus développés sont plus ouverts au commerce international que les moins développés.

Mots Clés : Modèle de Gravité, commerce internationale, Mercosur.

ABSTRACT

The so-called Gravity Model has been successfully used in empirical studies of trade flows between countries. In this paper, following McCallum (1995), Helliwel (1995), Wei (1996), Nitsch (2000), among others, we apply the Gravity Model to a sample of 22 countries, including South-American countries and the main trade partners of the Mercosur country-members, in order to infer if there is, among these countries, a manifested preference for the domestic-produced goods in comparison to foreign-produced goods. The results indicate that the degree of this "home bias" in the goods markets is substantial among the countries included in the sample, although decreasing over the period 1991-1997. For the Mercosur Bloc, treated as a single market, the evidence suggests a low, but consistently increasing over time, degree of home bias in comparison with the average home bias for the countries in the sample. This upward trend in Mercosur's home bias is interpreted as a sign of effectiveness of the bloc in promoting the integration between the Mercosur national economies. These general conclusions are roughly robust to changes in model specification, estimation method and/or in the measurement of the variables used. Finally, if one interprets the degree of home bias as an index of openness to the international trade, this study have provided some evidence that the developed countries are more open to trade than the developing countries.

Key Words: Gravity Model, home bias, international trade, Mercosur

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I. Introduction

In the post-World War II period a general amplification and intensification on the international relations has been observed, including both capital and trade flows. Despite this ongoing liberalization process, it is a relatively well-known fact that domestic agents, resident-based in a particular national economy, all other things equal, tend to prefer buying assets in their own (domestic) capital markets. This lack of international portfolio diversification phenomena, or a country "home bias"' in the assets markets, is discussed in French and Poterba (1991), Tesar and Werner (1992), Tesar and Werner (1995), Lewis (1996), among others. For an overview, see Obstfeld and Rogoff (1998).

A recent research agenda tries to identify and measure the existence of a similar home bias on the merchandise trade. We define "home bias" in the context of merchandise trade as the manifested preference of the residents within a country for national goods, relatively to foreign goods.

The question is whether there is, or there is not, any evidence showing that residents in a given country tend to trade more among themselves in comparison to foreign partners; that is, if they prefer domestic-made over foreign produced goods, *ceteris paribus*. McCallum (1995), using data from Canada and the U.S. for 1988, shows that Canada's provinces tend to trade about twenty times more with each other than they trade with U.S.'s states. These results were confirmed, using Canada-US data for 1993, by Anderson and Van Wincoop (2003), who showed that the inter-province trade is 16.4 times greater than the state-province trade and that the inter-state trade is 1.50 times higher than the state-province trade. Anderson and Van Wincoop's findings suggest that the home bias observed in the U.S. is much lower than Canada's. Their results also suggest that Canada's home bias has decreased over the 1988-93 period.

Wei (1996) and Nitsch (2000) presented similar studies for OECD and European countries, respectively. Wei (1996) found and measured the degree of the home bias existent in the trade among OECD countries for the years 1982, 1986, 1990 and 1994. He

also measured it for the European Community and in the European Free Trade Area. Nitsch (2000) pointed out that Wei's results might not be representative for the European Union because not all the country-members were included in order to measure the home bias of the bloc. Then, using data from selected years in the 1979-1990 period, he found that the home bias in the European Union was substantially larger than Wei's estimates and considerably lower than the one implied by McCallum (1995) for Canada.

As far as I know, there is no such investigation applied to the country-members of the Southern Cone Common Market (Mercosur). To fill this gap, this paper will try to measure the existence, and if any, the degree of "home bias" on the merchandise trade among Mercosur country-members (Brazil, Argentina, Uruguay and Paraguay) and both some (selected) of their main trade partners and the remaining South-American countries. Given the possible implications of the results that could emerge from this kind of study, we will use the same methodology proposed by the literature mentioned above in order to measure the degree of home bias on Mercosur as a trade bloc and analyze its behavior over the period 1991-1997.

The paper is organized as follows. Section II shows a brief review of the related literature. Then, in the Section III, we present the "Gravity Model" which is the theoretical approach most commonly used in this literature. The data used in the empirical work is discussed in Section IV. Section V provides the results, including some robustness checks, and the last section concludes.

II. Related Literature

The seminal work, which would provide the theoretical background to the model we will use in this paper, is a book by Linnemann (1966). In his book, in order to try explaining the trade flow between two countries, he presented what is known today as the "Gravity Model", using a terminology borrowed from physics. Although this model was criticized for its lack of microfoundations, it was empirically useful to explain the trade flow.[1] In the words of Deardorff (1984, p.503):

> "In spite of their somewhat dubious theoretical heritage, gravity models have been extremely successful empirically".

According to this model, the trade flow between two countries should depend on their potential demand and supply, represented by both countries' Gross Domestic Products (GDP) and on some "resistance factor", represented by the distance between them. More specifically, the model predicts that, *ceteris paribus*, the trade flow should correlate positively to both GDP's and negatively to the distance between the two countries.

Anderson (1979) provided a theoretical explanation for the Gravity Model exploring the properties of an expenditure system in a model displaying homothetic preferences (Cobb-Douglas and Constant Elasticity of Substitution) across different regions or countries and country-specialization in the production of one good. Deardorff (1995), following the steps of Anderson (1979), have demonstrate that the Gravity Model could be obtained from the Hecksher-Ohlin Model. One of his results was to show that bilateral trade is not only function of the direct distance between two countries but it also depends on the relative (to other trade partner countries) distance of the countries or *remoteness*, as we shall see later.

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[1] Actually, Linneman (1966) tried to provide some theoretical foundation to this model by using Walras' equilibrium. We will discuss it in more detail in the next section.

With the ongoing liberalization process across countries, one could think that the borders have not more significant influence on trade flows. To access this proposition, about the importance of the national borders for trade flows, a recent research agenda has emerged whose literature has been used different versions of the Gravity Model. McCallum (1995) used a version of the Gravity Model to study the impact of the border on the trade between Canada and the U.S. Although these two economies are very similar on size, culture, language etc, and despite intensification of trade flows, he showed that, *ceteris paribus*, the border has an important effect on the trade between these two countries. He used data for all Canadian provinces and thirty American states for the year 1988 (when the Canada-U.S. Free Trade Area was signed) and concluded that the Canadian provinces trade 22 times more among them than they trade with the American states, after controlling for economy size and distance.

Anderson and Van Wincoop (2003) have also used the Gravity Model to study the effect of the border on the trade between Canada and the U.S. With respect to McCallum's (1995) work, their model presents some additional features. First, they included both the trade among the U.S.'s states and the trade between each state and each Canadian province, while McCallum only used data on the trade among Canadian provinces and on the province-state trade. Second, they also provide a different theoretical foundation to the Gravity Model. Their contribution to the model is the inclusion of the average barrier among the trade between two countries or, as they called, a "multilateral resistance". This new variable is different from the *remoteness* variable introduced by in Deardorff (1995) in the sense that "remoteness index does not capture any of the other trade barriers...[than the relative distance between countries, a proxy for the transportation costs]". [2]

When they used the same model, with the same set of variables, the empirical results of Anderson and Van Wincoop's study were slightly different from McCallum's. Their findings, from data for the year 1993, show that the Canadian provinces trade 16.4

[2] See Anderson and Wincoop (2003, p.170). Despite the fact that it does not capture any other "resistance factor" than the relative distance between countries, the *remoteness* variable will still be used in this paper. In a future work, we intend to introduce the multilateral resistance.

times more (22 times, according to McCallum, for 1988) with themselves than with a U.S. state, after controlling for size and distance. Since the data set on this work corresponds to the year 1993 while McCallum (1995) used data for the year 1988, and given the same methodology, one could conclude that from 1988 to 1993 the borders effect on the trade flows from Canada to the U.S. has been diminishing. On the other hand, Anderson and Van Wincoop (2003) found a much smaller home bias coefficient for the U.S. if compared with the Canadian coefficient. According to the results, the trade among the Americans states is 1.50 times bigger than the trade among the states and a Canadian province, other things equal. None conclusion can be drawn about what happened to the border's effect on the trade flows from the U.S. to Canada since McCallum's work does not provide a basis for comparison. [3]

An empirical application of Deardorf's (1995) theoretical foundation for the Gravity Model is due to Wei (1996). In his paper, He uses a standard version of the model to measure the existence of the home bias among OECD countries for the years 1982, 1986, 1990 and 1994. He confirmed the existence of home bias for these countries, with a coefficient that suggests that the trade within an OECD country-member is 9.7 times higher than its trade with another country, after controlling for size and distance. He also uses an "expanded" model, which includes the measure for *remoteness* (relative distance, the average distance of a country and the other countries in the sample) and dummy variables for those countries that speak the same language and for countries that share a common border. With these modifications, he verified a smaller degree (2.6 instead of 9.7) of home bias for the OECD countries over the period.

Wei (1996) was also interested in measuring the degree of home bias for the two trade blocs included in the sample: the European Community (EC) and the European Free Trade Area (EFTA). As a bloc, he found the EC's home bias, although constantly increasing over the period 1982-1994, to be extremely low in comparison to that found

[3] However, Anderson and Van Wincoop (2003) argue that McCallum's method produces biased results (too high) because "...his estimate is based on a regression with omitted variables, the multilateral resistance terms." When they estimated the model including the multilateral resistance terms they found the Canadian border's effect on the trade flow to be only 10.7 instead of the 16.4 obtained when using the McCallum approach.

for the OECD's average. As for the European Community's country-members, Wei (1996) found that they also "exhibit some degree of home bias, although much smaller than the OECD average",[4] but contrarily to what happens to the trade bloc as a whole, the home bias of the EC country-members have decreased during the same period.
The results concerning to the European Free Trade Area also show a low degree of home bias both for the EFTA trade bloc as a whole and for its country-members.

With the same methodology from Wei (1996), Nitsch (2000) also measured the home bias for the EC countries. The main differences between the two studies are the samples used (while Nitsch's sample includes all European Union country-members over the time 1979-1990, "Wei's OECD sample does not include Belgium/Luxembourg, Greece and Ireland")[5] and the method used to measure the distance and the average distance between a country and the rest of the countries in the sample.[6]

Nitsch's results imply a larger home bias for the EC than that found by Wei (1996). On average, according to Nitsch's results, any country-member of the European Community trades 8.17 times more "with itself" than they trade with another country in the EC, after controlling for country sizes and distance, comparing to 4.71 times, according to Wei's results. However, the results are robust to that found by Wei (1996) when he examines the evolution of the home bias over time, confirming the decline of the home bias among the European Union country-members.

On the present study, we will follow the same approach of Wei (1996), based on the Gravity Model, to measure the home bias on the Mercosur bloc. Therefore, a more detailed presentation of the model is necessary. That is the subject of the next section.

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4 See Wei (1996), p. 15.

5 See Nitsch (2000), p.1092.

6 As we shall see on Section V, Nitsch (2000) noted that the Wei's measure of *remoteness* (average relative distance between two countries) is "inconsistent with the theoretical requirements of the gravity approach".

III. The Gravity Model

As pointed out in the previous section, the original Gravity Model (GM) has been successfully used in empirical studies to explain trade flows between a pair of countries. The first version of the GM, due to Linneman (1966), emphasized three factors that should influence the trade flows between the countries: the potential supply of the exporting country, the potential demand of the importing country and the factor "resistance". Using a Quasi-Walrasian model to link the trade flow equation to the Economic Theory, Linneman (1966, p. 42) proposed an equation of the type:

$$X_{ij} = \gamma W_i^{\alpha} W_j^{\beta} t_{ij}^{\delta}$$

where α, β, δ and γ are constants; X_{ij} is the value of the trade flow between the exporter (country i) and the importing country (indexed by j); For the exporting and importing countries, respectively, W_i and W_j are functions of country's GDP and its population size; is its corresponding similar for the importing country. It should be noticed that the variables W_i and W_j try to capture Linneman's "potential supply and demand", not a complete measure. The variable t_{ij} represents the "resistance factors" that influence the trade flow.[7]

Although Linneman's model was criticized in its theoretical foundations, the basic elements were already there. Subsequent studies improved considerably in providing better microeconomic foundation to the Gravity Model. We are not going to provide the foundations to the empirical model we use, for it is beyond the scope of this paper. For the purpose of this work, that of measuring the degree of home bias on Mercosur bloc and

[7] The resistance factors can be classified as natural and artificial. Examples of natural resistance factors are the cost and time of transportation. Artificial factors would be mainly tariffs, quotes and other institutional barriers to trade. Since cost and time of transportation are related to the distance between two countries, Linneman proposed to use only a simple measure of distance as a proxy variable for natural resistance factors. In addition, because of the difficult of measurement, he did not use the artificial resistance factors on his empirical work.

on its country-members, we will rely on Wei's (1996) work and refer the reader to his theoretical formulation, which produces the equations used here. Alternative theoretical approaches are Anderson (1979), Deardorff (1995), and Anderson and van Wincoop (2003).

The "home bias" in the context of merchandise trade, that is the revealed relative preference of a country's residents for national goods, in comparison to foreign goods, has been documented to exist despite trade liberalization reforms and formation of trade blocs. We will try to find the same kind of evidence for the Mercosur countries, following the literature that uses a *dummy* variable (here, called *Home*) on the standard Gravity Model. The basic version of the GM used here is given by equation (1):

$$\ln(x_{ij}) = \alpha + \gamma Home_{ij} + \beta_1 \ln(Y_i) + \beta_2 \ln(Y_j) + \beta_3 \ln(D_{ij}) + \varepsilon_{ij} \qquad (1)$$

where: x_{ij} is the exports of country i to country j; $Home_{ij}$ is a *dummy* variable that takes the value of 1 if $i = j$ (the country "trades with itself"), and 0, otherwise; Y_i and Y_j are the gross domestic products (GDP) of countries i (the exporter) and j (the importer), respectively; D_{ij} is the distance between country i and j; and, ε_{ij} an error term. The rationalization of the empirical model given by equation (1), in terms of a utility-maximizing frame work, which is beyond the scope of this paper, can be found in Wei (1996).

Other variables can be introduced on equation (1). For example, another *dummy* for language (1 if both countries i and j speak the same language and 0, otherwise). Another possible extension is the inclusion of a measure of the *remoteness* of a country. This variable should capture the idea that not only a smaller absolute distance is important to ease the trade between to countries. The fact that a country has few or many neighbors could be important as well; for example, every other things being equal, Australia and New Zealand, good examples of "remote" countries, may trade more with each other than two other countries separated by the same distance. Wei (1996) and

Nitsch (2000) use the extended version of equation (1). Here, we will make these extensions as well (see Section V).

In the equation (1), the coefficients β_1, β_2 and β_3 show the elasticity of exports of country *i* to country *j* with respect to Y_i, Y_j and D_{ij}, respectively. The home bias is measured by the coefficient γ on the dummy variable *Home*. Notice that $\partial \ln x_{ij} / \partial Home_{ij} = \gamma$. Thus, an increase of one unit in *Home* such as the caused by changing from an inter-national (*Home* = 0) to a intra-national trade (*Home* = 1) implies a change of γ units in $\ln x_{ij}$ or, that $x_{ii} / x_{ij} = e^{\gamma}, i \neq j$. That is, the coefficient γ on the *Home* variable indicates that a given country *i* exports e^{γ} times more to itself than to a foreign country *j*, *ceteris paribus*. In this sense, if $e^{\gamma} > 1$, we can conclude that there is "home bias" on the merchandise trade for the sample of countries in study and a typical country in the sample has a preference for their own product vis-à-vis foreign goods.

In section V, we further discuss the estimation of equation (1) and its extensions. We also present the estimation of the parameter γ as well the evolution of the degree of home bias, e^{γ}, for a group of countries that include the Mercosur members, their main trade partners and the remaining South-American countries. First, in the next section, we provide some pertinent information about the data set used on this study.

IV. Data

For the purpose of this study we need cross-country data on the GDP, the direction of the exports or bilateral trade (that is, the exports from a country to another, including the "exports of a country to itself", to be defined later) and the distance between all possible pairs of countries in the sample. GDP and the bilateral trade between two different countries came from the *World Development Indicators* and from the *IMF's Direction of Trade*, respectively. To get the "exports of a country to itself" we used a methodology suggested by Wei (1996). In order to compute the distances between two countries we used the program available in **http://www.wcrl.ars.usda.gov/cec/java/lat-long.htm.** Both approaches, to compute the intra-national trade and the distance, will be described in the next paragraphs.

The criteria for the selection of the countries and for the time-period to include in the sample were the following. First, because of geographical and economical similarities, we considered all South-American countries including, of course, the four Mercosur members (Argentina, Brazil, Paraguay and Uruguay). The exceptions are Guyana and Suriname, which are more closely related to the Caribbean countries than to South America. Availability of data on bilateral exports constrained our sample to the time period 1991-1997.

Second, based on the US$ level of exports, for each year from 1991 to 1997, and for each of the Mercosur country-members, we selected the 10 countries that were the main destination of their exports.[8] Whenever the data for a selected country was not available, we replaced it for the eleventh, twelfth etc. country on the ranking of main importers.[9]

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[8] Of course, it could be possible that a previously selected South-American country was among the 10 main trade partners of a given Mercosur country-member. When this occurred we did not choose another country (the 11th main importer, for instance) to replace it.

[9] This was the case for Bermuda, Taiwan and Switzerland, which were among the main buyers of Paraguay's exports, and for Israel, which was in the top 10 list of importers from Uruguay.

As usual in this literature, in order to measure the distance between two countries, we adopted the "greater circle distance" criterion, whereby the distance between two countries is equal to the surface distance (based on the latitudes and longitudes). As a reference for each country, we used their capital cities, with the exceptions of Brazil and the U.S. for wich the selected cities were São Paulo and Chicago, respectively. Within a country, that is the "distance between a country and itself", or the intra-national distance, we also followed Wei (1996) in using a quarter of the distance between the country (its capital) and it nearest neighbor on the sample[10].

Now, we discuss the concept of a country's "trade with itself". One problem is that data for the trade volume within countries are not available. Wei (1996) overcame this issue by creating a method that has been used in the literature [for example, Nitsch (2000)]. Here, we are going to follow the same approach. Wei's method is based on the assumption that what a country "exports to itself" is the total domestic production minus the total exports to foreign countries. However, it should be noted that the measure of a country's "exports to itself" is not simply the GDP minus the total exports. Two main adjustments are necessary.

First, since the data set on bilateral trade usually includes only the exports of goods (not services) and the GDP involves both the production of goods and services (including the transport sector), one must exclude the services and transport sector share of the GDP. The data on services (including transport) used in this paper also come from the *World Development Indicators*. Wei defines this new variable as the "goods part of GDP", or GGDP:

$$GGDP = GDP - services - transport$$

Another adjustment is needed to take into account that the value of the exports in the data set of bilateral trade is usually measured in terms of "shipment value" (that is, it

[10] Exception were to Japan, China and Iran for which we measure the intra-national distance as the half of the average distance among the North, South, East and West borders.

includes the value of all the intermediary transactions, not only the value added or the final demand) while GDP is computed in value added terms. To get the shipment counterpart of GGDP, Wei multiplied the GGDP for the shipment-to-value added ratio:

$$GGDP_{shipment} = \left(shipment / value\ \ added \right) * GGDP_{value\ \ added}$$

Once the value of the GGDP adjusted in "shipment-value" is computed, in order to compute a country's "exports to itself", one has to exclude the total exports to the rest of the world from the GGDP:

$$x_{ii} = GGDP_{shipment} - \text{total exports of country } i$$

In this paper, we faced an additional restriction. For our country sample we did not have access to the shipment-to-value added ratio for all countries[11] and also for all periods. The shipment-to value added ratio is computed from the ratio between the gross value of total production (including intermediary production, that is, the "shipment value") to the production in terms of value added.

At the Table 1 below, with the exception of the values marked with an (*) or (**), all the information was computed using data directly collected from different sources. For the ten OECD countries (Belgium-Luxembourg, Germany, France, Italy, Japan, Mexico, Netherlands, Spain, United Kingdom and the U.S.) the information came from the OECD's *Industrial Structure Statistics*. For Chile, Ecuador, Paraguay, Uruguay and Venezuela we used data from their respective Central banks. For Argentina, Bolivia, Brazil and Colombia we used data their respective national statistics institutes.[12]

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11 That is the case of Iran, China and Peru.

12 Argentina: Instituto Nacional de Estadística y Censos; Bolivia: Instituto Nacional de Estadística; Brazil: Instituto Brasileiro de Geografia e Estatística; Colombia: Departamento Administrativo Nacional de Estadística.

For the missing data in the middle of a time sample for a given country (see the values marked with an (*), for Argentina in 1994-1996 and Italy in 1995), we used the available data points to construct linear interpolated values. Then, we computed the average growth rate between the first and the last available data point to construct linear extrapolated values, marked with an (**).

Table 1
Shipment-to-Value Added Ratio

	1991	1992	1993	1994	1995	1996	1997
Argentina	2,42**	2,45**	2,49	2,53*	2,57*	2,60*	2,64
Belgium-Luxembourg	2,31	2,34	2,39	2,43	2,62	2,71	2,70
Bolivia	1,78	1,79	1,81	1,82	1,82	1,82	1,83
Brazil	2,73	2,71	2,55	2,54	2,53	2,63	2,63
Chile	2,27	2,29	2,31	2,21	2,10	2,21	2,17
Colombia	1,74	1,74	1,73	1,72	1,73	1,72	1,72
Ecuador	1,94	1,92	1,93	1,94	1,96	1,95	1,95
France	2,58	2,59	2,55	2,59	2,60	2,61**	2,62**
Germany	2,03	2,00	2,08	2,10**	2,11**	2,12**	2,14**
Italy	3,12**	3,22	3,19	3,43	3,53*	3,64	3,74
Japan	2,15**	2,23**	2,32**	2,41	2,62	2,63	2,70
Mexico	2,54	2,52	2,50	2,48	2,44**	2,41**	2,38**
Netherlands	3,32**	3,33	3,24	3,14	3,25	3,34	3,41
Paraguay	1,14	1,12	1,12	1,12	1,11	1,11	1,12
Spain	3,02**	3,04**	3,07	3,00	3,13	3,14	3,16
United Kingdom	2,36	2,32	2,30**	2,29**	2,27**	2,25**	2,23**
Uruguay	2,01	2,00	1,95	1,89	1,84	1,89	1,89
United States	2,15	2,11	2,10	2,09	2,10	2,08	2,07
Venezuela	2,03	2,03	2,05	1,97	2,00	1,80	1,91

Notes: Values not marked: computed from actual data;
(*) Linear interpolation;
(**) Linear extrapolation.

For the three countries for which we did not find the shipment-to-value added ratio data set (Iran, China and Peru) we used an econometric strategy. In order to get estimates of the shipment-to-value ratio for those countries, we assumed that the

shipment-to value added ratio is linearly related to the proportion of exports to the GDP. We propose the following cross-section regression model:

$$(shipment/va)_i = \alpha + \beta(\text{exports}/GDP)_i$$

We used applied this regression equation to the data of Table 1. Then, we used the information of the exports/GDP for the three countries in order to get their (estimated) shipment-to value ratios. Table 2 displays the results of the estimation based on this method.

Table 2
Shipment-to-Value Added Ratio Estimated

	1991	1992	1993	1994	1995	1996	1997
China	2,43	2,45	2,46	2,46	2,46	2,44	2,46
Iran	2,44	2,56	2,62	2,57	2,46	2,48	2,53
Peru	2,35	2,30	2,30	2,28	2,30	2,32	2,33

Note: Data based on the estimation.

Now, in the next section, we discuss the estimation of the equation (1) and its extensions.

V. Results

As showed in Section III, the framework used to measure the home bias is the Gravity Model equation, complemented with the *Home* dummy variable. We re-write the standard equation of the simplest Gravity Model, used by McCallum (1995) and Helliwell (1996):

$$\ln(x_{ij,t}) = \alpha_t + \gamma Home_{ij,t} + \beta_1 \ln(Y_{i,t}) + \beta_2 \ln(Y_{j,t}) + \beta_3 \ln(D_{ij,t}) + \varepsilon_{ij,t} \qquad (1)$$

However, following Wei (1996), we will extend the model to account for the relative distance between a country and the others countries in the sample (the *remoteness* variable) and to control for the effects of the languages spoken and the common borders (the *Language* and *Adjacency* dummy variables, respectively). The empirical equation becomes:

$$\ln(x_{ij,t}) = \alpha_t + \gamma Home_{ij,t} + \beta_1 \ln(Y_{i,t}) + \beta_2 \ln(Y_{j,t}) + \beta_3 \ln(D_{ij,t}) + \beta_4 \ln(R_{i,t}) + \\ + \beta_5 \ln(R_{j,t}) + \beta_6 Language_{ij,t} + \beta_7 Adjacency_{ij,t} + \varepsilon_{ij,t} \qquad (2)$$

In the equation (2), above, $\ln(R_i)$ and $\ln(R_j)$ are the measures of (the natural log of) *remoteness* for the exporter and the importing country, respectively. The dummy variables for the language and for the common border are defined as follows: $Language_{ij}$ = 1, if countries *i* and *j* speak the same language, and zero, otherwise; and $Adjacency_{ij}$ = 1, if countries *i* and *j* share a common border, and zero, otherwise.

We included the subscript *t* in the equation (2) in order to represent it, following Wei (1996) and Nitsch (2000), as a system of seven (one for each year of the 1991-1997 period) cross-section equations. Also following the literature, we allow for year-specific intercepts, but the remaining coefficients are fixed for all years. Because some of the observations, for some countries, on export direction (bilateral trade, $x_{ij,t}$) were reported by the *IMF's Direction of Trade yearbook* as (...), indicating that a value is not available, insignificant or zero, we worked with an unbalanced sample. That is, depending on the missing values, we excluded the corresponding observations in a way that the number of observations in each cross-section equation was not necessarily the same. For robustness,

we also made all the estimations considering a balanced sample, by taking the observations reported as (...) to be equal to zero. Since the results were virtually the same, we will only report those of the unbalanced sample.[13]

Three estimation methods were used: 1) a simple cross-section or Pooled Least Squares, in which the error terms are not contemporaneously nor inter-period correlated; 2) a Generalized Least Squares (GLS), in which the errors are not contemporaneously correlated but may covariate across equations; and 3) a Seemingly Unrelated Regression (SUR) model that allows for contemporaneous and cross-equation correlations. In general, the results were robust to these variations.

First, we consider the existence of home bias in the specific countries of the sample. We consider a version of the equations (1) and (2) in which the dummy variable $Home_{ij}$ takes the value of 1 whenever $i = j$ and zero otherwise, where i is the exporting country and j, the importer. In this version, the factor e^{γ} refers to the home bias observed for the whole group of countries included in our sample.

The results are reported on Table 3. For each of the three estimation methods, Table 3 displays three columns. Columns 2, 4 and 6 display the results for the estimation of the simplest Gravity Model (we call it, Model 1), used by McCallum (1995) and Helliwell (1996), given by equation (1). The columns 3, 5 and 7 show the estimation of the Model 2, represented by the equation (2), which is the equation (1) extended with a measure of (the log of) *remoteness* and the dummy variables *Language* and *Adjacency*.

In this section, the *remoteness* variable is measured following Wei (1996), as the average, weighted by the share of a country's GDP in the total GDP of the sample, of the distance between a country and the rest of the other countries in the sample:

$$R_i = \sum_h w_h D_{hi} = RW_i$$

[13] We also estimated the models for the whole sample and for the sample excluding the three countries Iran, China and Peru which ones we does not have all data set. The results, not reported, were robust.

where RW_i is Wei's measure of the *remoteness* of a country *i*, w_h is the country *h*'s share on the sample total GDP and D_{hi} is the distance between countries *h* and *i*.[14] Later, in Section V.3.1, we will re-estimate the model using $R_i = RN_i$, the measure proposed by Nitsch (2000).

We summarize the estimated models:

Model 1 (simplest Gravity Model, equation 1):

$$\ln(x_{ij,t}) = \alpha_t + \gamma Home_{ij,t} + \beta_1 \ln(Y_{i,t}) + \beta_2 \ln(Y_{j,t}) + \beta_3 \ln(D_{ij,t}) + \varepsilon_{ij,t}$$

Model 2 (GM including *remoteness*, language and common border, equation 2):

$$\ln(x_{ij,t}) = \alpha_t + \gamma Home_{ij,t} + \beta_1 \ln(Y_{i,t}) + \beta_2 \ln(Y_{j,t}) + \beta_3 \ln(D_{ij,t}) + \beta_4 \ln(RW_{i,t}) + \\ + \beta_5 \ln(RW_{j,t}) + \beta_6 Language_{ij,t} + \beta_7 Adjacency_{ij,t} + \varepsilon_{ij,t}$$

We are primarily interested in the estimation of the parameter γ, which gives the degree of home bias, e^{γ}. When $\gamma > 0$, we conclude that there exists home bias because the country is trading $e^{\gamma} > 1$ times more with itself than its trade with other countries in the sample. On the other hand, $\gamma \leq 0$ implies that the country trades $e^{\gamma} \leq 1$ times more with itself than it does with other countries in the sample and no home bias is present. For all the remaining parameters, the $\beta's$,[15] we expected them be positive with the exception of β_3, the coefficient of the "resistance factor", represented by the (natural log of) the distance between countries *i* and *j*, $\ln(D_{ij,t})$. Of course, the higher is the absolute distance between two countries (a proxy for the transportation costs), the lower should be the trade flows.

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[14] Later, in Section V.3.1, we will re-estimate the model using $R_i = RN_i$, the measure proposed by Nitsch (2000).

[15] There is no "expected sign" for the year-specific intercepts α_t. They are simply real numbers.

The coefficients $\beta_1 > 0$ and $\beta_2 > 0$ represent the effects of the potential supply and demand, given by the GDP's of the exporter and importer countries, respectively. The higher these effects are, the higher should be the exports from a country to another. Coefficients $\beta_4 > 0$ and $\beta_5 > 0$ represent the remoteness effect. The more remote a country is (the higher is the average distance from it to the other countries in the sample, which should be thought as "third" country), the more likely it is to trade with any given country. Coefficients $\beta_6 > 0$ and $\beta_7 > 0$ indicate that countries that speak the same language and share a common border should trade more with each other.

Table 3 displays the results of the estimation of Models 1 and 2. Notice that all the variables have the expected sign and are statistically significant (at the 10% level, at least), regardless of the estimation method used, in the case of Model 1. For example, according to the column 6, corresponding to the SUR estimation method for Model 1, a one percent increase on the GDP of the importer's countries causes the exports to rise 0.7484 percent. In addition, if the distance is one percent higher, the trade flows between a pair of countries is reduced by 1.1741 percent.

In addition, still considering the Model 1, the estimated coefficient of the dummy variable *Home*, γ, was positive (2.9267, 2.9335 or 2.7115, depending on the estimation method, columns 2, 4 or 6) and statistically significant. Since this is the coefficient of interest to evaluate the degree of home bias, the results indicate that there is a home bias in the trade of goods among the 22 countries in the sample, for the period of analysis. For the Model 1, let us consider the estimation based on the SUR method (which tends to be more efficient since we use more information about the error structure) at column 6. According to it, the degree of home bias, measured by the estimated e^{γ}, indicates that, on average, a country in the sample exports 15.05 (= exp [2.7115]) times more to itself than it does to a foreign country, after controlling for size and distance.[16]

[16] Estimation based on the other two methods indicates this number to be about 19 times (18.67 or 18.79, according to the Pooled LS or GLS, respectively), other things being equal.

Table 3
Home Bias, 1991-1997

Model:	1	2	1	2	1	2
$Home_{ij}$	2.9267	2.7134	2.9335	2.7248	2.7115	2.5067
	(0.1205)	(0.1211)	(0.1202)	(0.1206)	(0.2402)	(0.2354)
Ln(Yi)	0.8478	0.9336	0.8474	0.9332	0.8742	0.9108
	(0.0093)	(0.0124)	(0.0092)	(0.0123)	(0.0163)	(0.0233)
Ln(Yj)	0.7267	0.6905	0.7267	0.6888	0.7484	0.6907
	(0.0086)	(0.0124)	(0.0086)	(0.0123)	(0.0184)	(0.0242)
Lln(Dij)	-1.0282	-0.9043	-1.0271	-0.9038	-1.1741	-1.0023
	(0.0168)	(0.0205)	(0.0167)	(0.0204)	(0.0390)	(0.0551)
Ln(RWi)		0.7580		0.7654		0.3732
		(0.0689)		(0.0685)		(0.1799)
Ln(RWj)		-0.5143		-0.5232		-0.6729
		(0.0862)		(0.0857)		(0.1794)
$Language_{ij}$		0.0843		0.0752*		0.0790*
		(0.0462)		(0.0460)		(0.1117)
$Adjacency_{ij}$		0.6487		0.6504		0.8035
		(0.0542)		(0.0539)		(0.1546)
# Obs.	3327	3327	3327	3327	3327	3327
Adj.R^2	0.8785	0.8869	0.8790	0.8876	0.8753	0.8832
S.E.of regression	0.9931	0.9579	0.9931	0.9579	1.0060	0.9734
Estimation method	POLS	POLS	GLS	GLS	SUR	SUR

Notes: (1) Standard errors in parenthesis;
(2) * indicates a coefficient that is NOT statistically significant at the 10% level;
(3) Year-specific intercepts are included in all regressions but not reported here.

Those figures are comparable in size with the results that McCallum (1995) and Van Wincoop (2003) found to the provinces of Canada. However, when compared with Wei (1996) and Nitsch (2000), whose methodology are similar to ours (and, therefore, the comparison is more pertinent), results indicate a higher degree of home bias. Perhaps, one explanation for these findings relies on the fact that our sample includes many developing countries, not as integrated as North-American, European or OECD countries, which were the basis for those studies.

For the extended Model 2, Table 3 shows the results in columns 3, 5 and 7. For the three methods of estimation, we can conclude that almost all the coefficients have the correct sign and are statistically significant at the 10% level. The exceptions are the coefficient of *remoteness* for the importing country [$ln(RW_j)$], which is statistically significant but does not have the expected sign, and the coefficient of the language dummy, which is not statistically significant at the 10% level when we used GLS and SUR estimation (although it shows the expected signs).

It should be noticed that the results do not change qualitatively with the extension from equation (1) to equation (2). Quantitatively, however, the home bias effect tends to be reduced with the inclusion of all the other control variables (remoteness, language and common border). For example, analyzing the results shown at column 7, corresponding to the SUR method applied to Model 2, the effect of the border on the trade among the countries is 2.5067 (against 2.7115, for Model 1). That is, other things being equal, on average, a country trades 12.26 (= exp [2.5067]) times more with itself then with another country in the sample. This reduction in the home bias when the controls are included suggest that part of the home bias effects captured in the estimated equation (1) is, in fact, due to other factors, which are omitted in the simplest Gravity Model equation.

Regarding the control variables added to Model 1, with the exception of the remoteness effect for the importing country (whose signs were "wrong") the results were the expected. For example, according to estimation of Model 2 by the SUR method, the rise by one percent on the average distance (*remoteness*) of the exporting country would increase its exports to another country by 0.37 percent. The results also show us that those countries that speak the same language do not tend to trade more between them in comparison with another country that speaks a different language (notice that the estimated elasticity is 8.22% = exp [0.0790] - 1, but the coefficient is not significant). On the other hand, sharing a common border has a great influence on the trade between two countries: countries in the sample tend to export 123.33% (= exp [0.8035] – 1)[17] more to

[17] Wei (1996, p.11) found that countries speaking the same language tend to trade 80% more and for those that share the land tend to trade 30% more than otherwise.

a country with which it shares a common border than to a country that is geographically more distant.

Table 4
Evolution of the Home Bias

	1991	1992	1993	1994	1995	1996	1997
$Home_{ij}$	2,9015	2,8629	2,8324	2,7540	2,6692	2,5030	2,4603
	(0,3197)	(0,3225)	(0,3117)	(0,3216)	(0,3255)	(0,3333)	(0,3267)
ln(Yi)	0,9120	0,9503	0,9356	0,9191	0,9374	0,9434	0,9435
	(0,0307)	(0,0323)	(0,0316)	(0,0330)	(0,0329)	(0,0347)	(0,0358)
ln(Yj)	0,6770	0,6638	0,6511	0,6927	0,7048	0,7257	0,7217
	(0,0314)	(0,0316)	(0,0311)	(0,0324)	(0,0326)	(0,0352)	(0,0362)
ln(Dij)	-0,8912	-0,9180	-0,8901	-0,9077	-0,8947	-0,9256	-0,9050
	(0,0536)	(0,0550)	(0,0522)	(0,0543)	(0,0541)	(0,0571)	(0,0566)
ln(RWi)	0,8778	1,0105	0,8600	0,6718	0,6408	0,5834	0,6320
	(0,1685)	(0,1793)	(0,1845)	(0,1843)	(0,1826)	(0,1824)	(0,2029)
ln(RWj)	-0,7128	-0,6776	-0,6220	-0,5082	-0,4058	-0,2679*	-0,3888*
	(0,2225)	(0,2259)	(0,2197)	(0,2332)	(0,2229)	(0,2338)	(0,2442)
$Language_{ij}$	-0,0089*	-0,0295*	-0,0263*	-0,0578*	0,1458*	0,3394	0,2417
	(0,1209)	(0,1198)	(0,1187)	(0,1232)	(0,1244)	(0,1270)	(0,1233)
$Adjacency_{ij}$	0,6682	0,6254	0,7097	0,7081	0,6133	0,5518	0,6587
	(0,1419)	(0,1370)	(0,1354)	(0,1498)	(0,1482)	(0,1515)	(0,1473)
# Obs.	472	476	476	475	478	473	477
Adj. R^2	0,8944	0,8930	0,8937	0,8887	0,8906	0,8739	0,8655
S.E. of regression	0,9305	0,9434	0,9233	0,9515	0,9361	1,0050	1,0358
Estimation method	LS	LS	LS	LS	LS	LS	LS

Notes: (1) Standard errors in parenthesis;
(2) * indicates a coefficient that is NOT statistically significant at the 10% level;
(3) Year-specific intercepts are included in all regressions but not reported here.

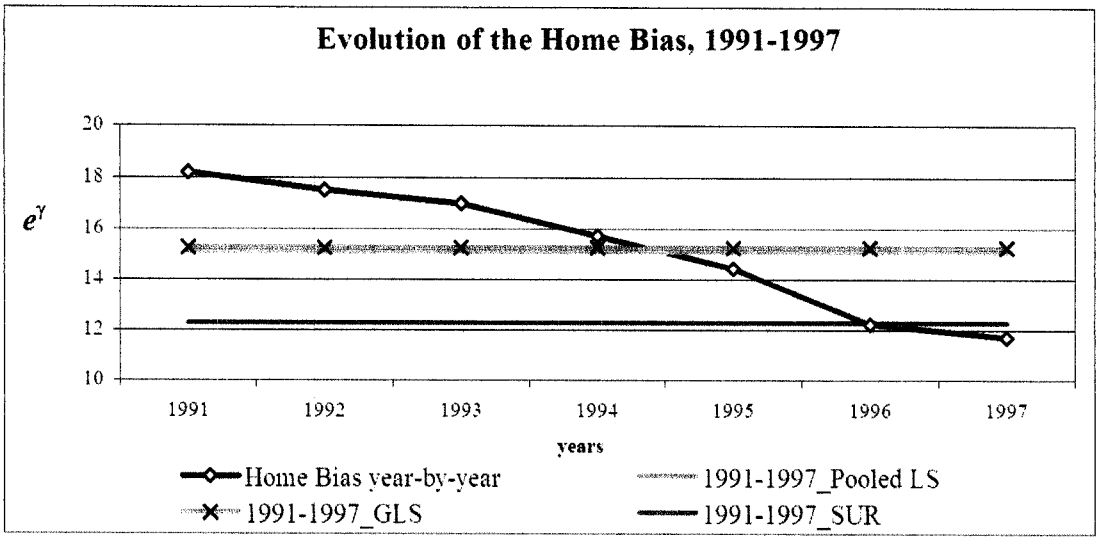
The second exercise we implemented intended to capture the behavior of the home bias over time. For that purpose, following Nitsch (2000), we estimated seven separated Least Squares (LS) regressions of equation (2), one equation for each year in the sample. The results are shown in Table 4, above. Again, all the coefficients show the

expected sign and are highly significant, with the exceptions of the coefficients for the *remoteness* effect of the importing country and those for the variable *Language*.[18]

In particular, the coefficient of the home bias behaved as expected in a context of increasing trade liberalization and integration. Following Wei (1996), an increase in the integration among the countries in the sample should be reflected in a decrease on the home bias over time. Wei (1996) found evidence of this decreasing trend in the home bias, for the OECD countries, and Nitsch (2000) got similar results for the European countries.

This decreasing in the degree of home bias seems to happen for the 22 countries in our sample, too. To see this, in comparison to the results for the whole sample (reported in Table 3), let us consider the Figure 1. Notice that the degree of home bias has decreased continuously from 1991 to 1997. Using the same interpretation as Wei and Nitsch, we see this result as evidence that the trade liberalization process has come to the 22 countries in the sample.

Figure 1



Note: the lines correspond to the average home bias for the 1991-1997 period, according to the three estimation methods used.

[18] The coefficients of the importing country's *remoteness* effect do not have the expected signs, but are significant for the years 1991 to 1995; those for the variable *Language* also do not have the expected signs for the years 1991 to 1994, but are not statistically significant for the years 1991 to 1995. However, for the years 1996 and 1997, the coefficients on *Language* are positive and significant.

Table 5
Mercosur Trade Bloc Home Bias, 1991-1997

Model:	3	4	3	4	3	4
$Merc_{ij}$	0,3288	0,0056*	0,3243	-0,0055*	0,3299*	0,0950*
	(0,0868)	(0,0977)	(0,0864)	(0,0968)	(0,2758)	(0,2931)
$Intra_{ij}$	2,8511	2,9296	2,8628	2,9483	2,6139	2,8146
	(0,2208)	(0,2201)	(0,2201)	(0,2188)	(0,5304)	(0,5081)
$Other_{ij}$	2,9483	2,6694	2,9538	2,6785	2,7256	2,4482
	(0,1353)	(0,1355)	(0,1350)	(0,1349)	(0,2588)	(0,2566)
ln(Yi)	0,8505	0,9330	0,8502	0,9327	0,8753	0,9092
	(0,0094)	(0,0124)	(0,0093)	(0,0123)	(0,0163)	(0,0234)
ln(Yj)	0,7295	0,6899	0,7294	0,6883	0,7494	0,6894
	(0,0087)	(0,0125)	(0,0086)	(0,0124)	(0,0184)	(0,0243)
ln(Dij)	-1,0120	-0,8984	-1,0111	-0,8985	-1,1596	-0,9890
	(0,0173)	(0,0216)	(0,0172)	(0,0215)	(0,0407)	(0,0581)
ln(RWi)		0,7372		0,7468		0,3303
		(0,0728)		(0,0724)		(0,1887)
ln(RWj)		-0,5353		-0,5419		-0,7163
		(0,0929)		(0,0924)		(0,1884)
$Language_{ij}$		0,0934		0,0833		0,1006*
		(0,0473)		(0,0471)		(0,1152)
$Adjacency_{ij}$		0,6591		0,6615		0,8094
		(0,0554)		(0,0551)		(0,1573)
# Obs.	3327	3327	3327	3327	3327	3327
Adj. R^2	0,8787	0,8869	0,8792	0,8876	0,8756	0,8832
S.E. of regression	0,9920	0,9580	0,9920	0,9580	1,0049	0,9734
Estimation method	POLS	POLS	GLS	GLS	SUR	SUR

Notes: (1) Standard errors in parenthesis;
(2) * indicates a coefficient that is NOT statistically significant at the 10% level;
(3) Year-specific intercepts are included in all regressions but not reported here.

The Table 5 shows the results of a third experiment. Here, we divided effect of the dummy variable *Home* into three different dummies. The first dummy, named $Merc_{ij}$, takes the value of 1 when both countries i and j are Mercosur members (including $i = j$), and zero otherwise. It is supposed to measure the home bias for the Mercosur Bloc as a whole, relatively to the other countries in the sample. The 2nd dummy, $Intra_{ij}$, is equal to 1 when $i = j$ and both i and j are Mercosur country-members, and zero otherwise. This dummy gives us the degree of home bias within the Mercosur country-members. The last

dummy ($Other_{ij}$) takes the value of 1 when $i = j$ and both i and j are non members of the Mercosur, and zero otherwise, indicating the average home bias for non country-members. With those modifications, Models 1 and 2 become:

Model 3:

$$\ln(x_{ij,t}) = \alpha_t + \gamma_1 Merc_{ij,t} + \gamma_2 Intra_{ij,t} + \gamma_3 Other_{ij,t} + \beta_1 \ln(Y_{i,t}) + \beta_2 \ln(Y_{j,t}) + \beta_3 \ln(D_{ij,t}) + \varepsilon_{ij,t}$$

Model 4:

$$\ln(x_{ij,t}) = \alpha_t + \gamma_1 Merc_{ij,t} + \gamma_2 Intra_{ij,t} + \gamma_3 Other_{ij,t} + \beta_1 \ln(Y_{i,t}) + \beta_2 \ln(Y_{j,t}) + \beta_3 \ln(D_{ij,t}) + \\ + \beta_4 \ln(RW_i) + \beta_5 \ln(RW_j) + \beta_6 Language_t + \beta_7 Adjacency_t + \varepsilon_{ij,t}$$

For the Model 3 (see columns 2, 4 and 6), on average, the Mercosur Bloc, seem as a whole, has a lower degree of home bias (the coefficient on *Merc*) in comparison both with the home bias observed for its country-members taken in separate (*Intra*) and with the home bias for the non-members (*Other*).[19] Even when we included the other control variables (Model 4, in columns 3, 5 and 7) the home bias coefficient for the Mercosur Bloc, γ_1, continued to be low. For instance, considering the SUR estimation, the home bias for the Mercosur Bloc indicates that the Mercosur Bloc export to itself only 1.10 times (= exp [0.0950]) more than it does to the others non-member countries. Not only low is the home bias coefficient, but not significant at the 10% level in all three estimation methods used.

The coefficients on the *Intra* and *Other* dummies, however, are estimated (SUR method, Model 4) to be 2.8146 and 2.4482, respectively. This suggests that, other things being equal, the Mercosur country-members and non-Mercosur members trade 16.69 (= exp [2.8146]) and 11.57 (= exp [2.4482]) times more with themselves than with another country, respectively.[20] We can interpret a low home bias for the Mercosur as a bloc,

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[19] Notice that the estimated γ_1 coefficient is even non-significant at the 10% level when we estimated by the SUR method.

[20] Notice that the *remoteness* coefficient for the importing country has not the expected sign, but it is significant. In addition, the coefficient on *Language* is not statistically significant when the SUR method of

combined with high degrees of home bias for its country-members taken in separate and for the non-members, as suggesting that the residents of the Mercosur bloc have not a revealed preference for Mercosur-produced goods (although they tend to prefer the goods produced in their own countries).

Table 6
Evolution of the Mercosur Trade Bloc Home Bias

	1991	1992	1993	1994	1995	1996	1997
$Merc_{ij}$	-0,3081*	-0,1119*	-0,0950*	0,0277*	0,0945*	0,1977*	0,2421*
	(0,2495)	(0,2416)	(0,2226)	(0,2316)	(0,2713)	(0,2951)	(0,2757)
$Intra_{ij}$	3,3614	3,1487	3,0772	2,9647	2,8421	2,5711	2,5311
	(0,5603)	(0,5988)	(0,5519)	(0,5625)	(0,5913)	(0,6294)	(0,6029)
$Other_{ij}$	2,7844	2,7964	2,7756	2,7121	2,6391	2,5028	2,4634
	(0,3575)	(0,3602)	(0,3514)	(0,3646)	(0,3658)	(0,3709)	(0,3643)
ln(Yi)	0,9136	0,9506	0,9359	0,9182	0,9362	0,9417	0,9416
	(0,0307)	(0,0322)	(0,0316)	(0,0329)	(0,0328)	(0,0347)	(0,0356)
ln(Yj)	0,6787	0,6641	0,6513	0,6918	0,7035	0,7239	0,7198
	(0,0316)	(0,0319)	(0,0314)	(0,0327)	(0,0328)	(0,0353)	(0,0363)
ln(Dij)	-0,9042	-0,9197	-0,8914	-0,9002	-0,8828	-0,9082	-0,8845
	(0,0562)	(0,0583)	(0,0561)	(0,0587)	(0,0564)	(0,0586)	(0,0589)
ln(RWi)	0,9165	1,0142	0,8630	0,6440	0,5996	0,5257	0,5622
	(0,1758)	(0,1872)	(0,1968)	(0,1981)	(0,1943)	(0,1932)	(0,2143)
ln(RWj)	-0,6739	-0,6738	-0,6190	-0,5360	-0,4472	-0,3258*	-0,4585
	(0,2399)	(0,2449)	(0,2399)	(0,2565)	(0,2406)	(0,2494)	(0,2596)
$Language_{ij}$	-0,0248*	-0,0308*	-0,0273*	-0,0465*	0,1639*	0,3642	0,2697
	(0,1240)	(0,1240)	(0,1219)	(0,1269)	(0,1275)	(0,1290)	(0,1253)
$Adjacency_{ij}$	0,6996	0,6426	0,7245	0,7180	0,6193	0,5492	0,6537
	(0,1459)	(0,1393)	(0,1378)	(0,1534)	(0,1518)	(0,1546)	(0,1501)
# Obs.	472	476	476	475	478	473	477
Adj. R^2	0,8943	0,8926	0,8933	0,8883	0,8902	0,8735	0,8652
S.E. of regression	0,9312	0,9451	0,9250	0,9533	0,9378	1,0066	1,0373
Estimation method	LS	LS	LS	LS	LS	LS	LS

Notes: (1) Standard errors in parenthesis;
(2) * indicates a coefficient that is NOT statistically significant at the 10% level;
(3) Year-specific intercepts are included in all regressions but not reported here.

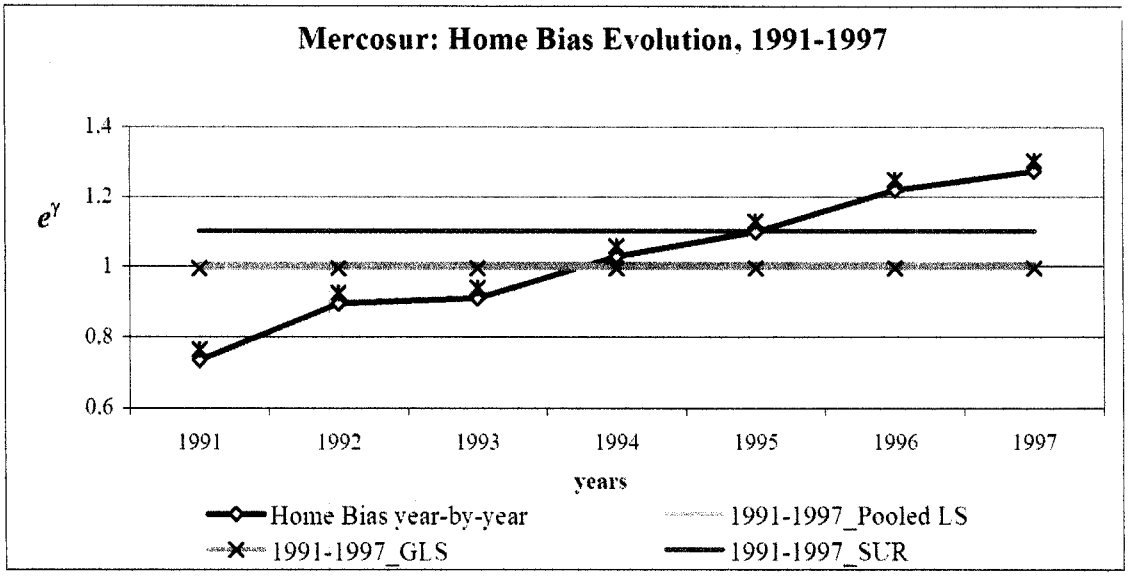
estimation is used. The fact that language seems to plays no role on the trade flow among the 22 countries on the sample was also verified in the previous experiment.

Our final experiment is designed to capture the evolution of the Mercosur Bloc's home bias vis-à-vis the home bias of the individual countries inside the Mercosur Bloc and the non-Mercosur members. In particular, we are interested in observing if the home bias of the Mercosur bloc, despite its low level (as we saw above), has a tendency to increase overtime. If this were true, we would have evidence that the creation of the bloc in 1990 has been effective in increasing the integration among its country-members.

Again, following Nitsch (2000), we estimated seven separate LS regressions of Model 4, for each year in the sample period. Table 6 reports the results. Once again, the coefficients have the expected sign with the exceptions of the *remoteness* for the importing country and the *Language* dummy.

We reproduce the results of Table 6 in Figures 2, 3 and 4. First, consider the Figure 2. Notice that, for every year in the sample, the degree of home bias is low (less than 1.4) for the Mercosur Bloc as a bloc. Most important result, however, is the fact that the degree of home bias has been increasing over the period, which suggests an increase in the relative preference of the bloc's residents for Mercosur-produced goods.

Figure 2

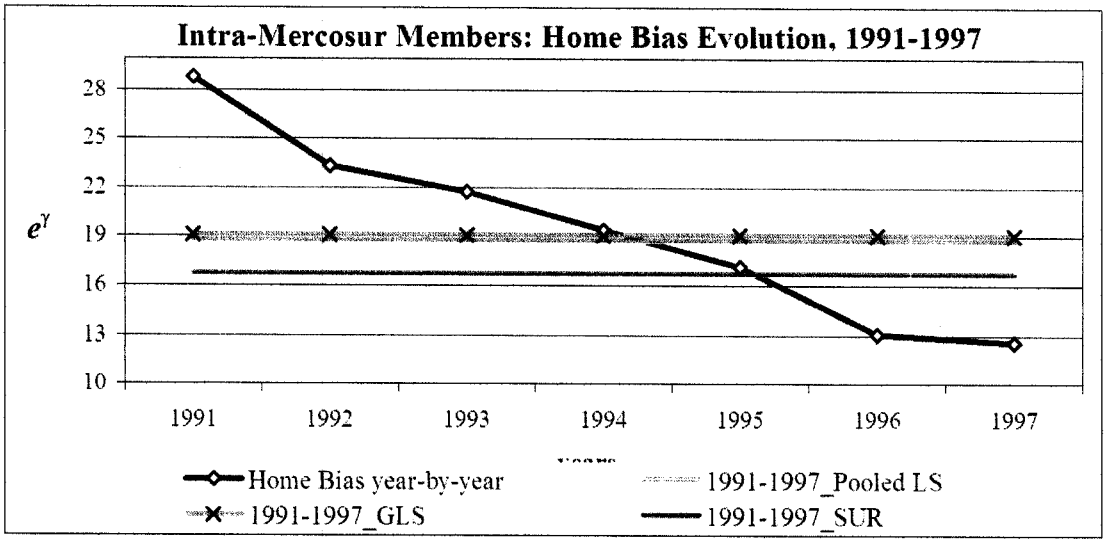


Notes: (1) The (*) next the Home Bias curve indicates a coefficient that is not statistically significant at the 10% level;

(2) The lines correspond to the average home bias for the 1991-1997 period, according to the three estimation methods used.

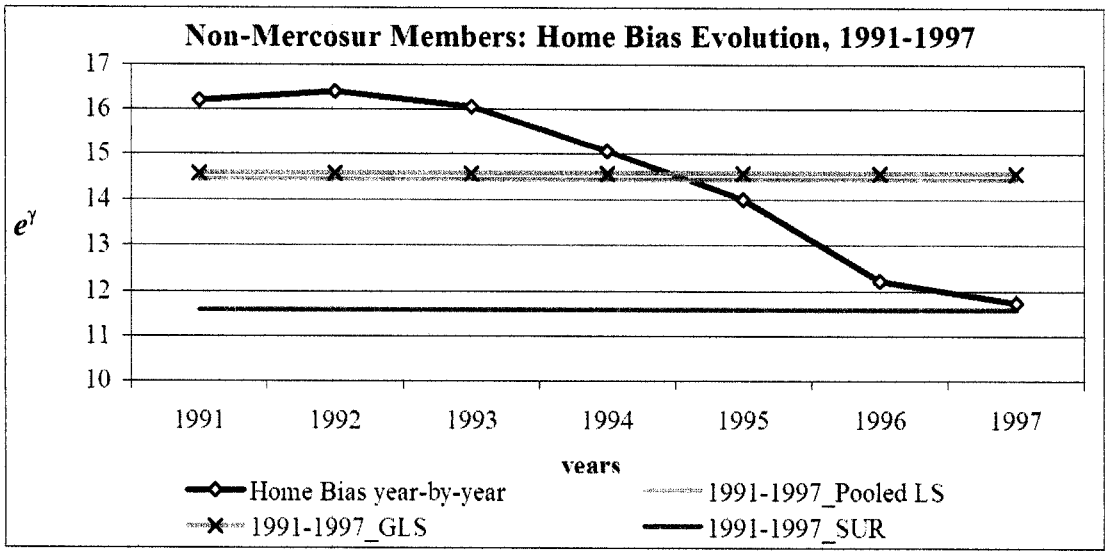
In contrast, as shown at the Figure 3, the home bias for intra-Mercosur members (that is, for the country-members taken individually) has decreased (from almost 30 to less than 13) over the same period, suggesting that the countries within the bloc are more open to trade with other countries in the sample.

Figure 3



Note: The lines correspond to the average home bias for the 1991-1997 period, according to the three estimation methods used.

Figure 4



Note: The lines correspond to the average home bias for the 1991-1997 period, according to the three estimation methods used.

Finally, Figure 4 shows the reduction of the home bias for the non-Mercosur country-member in the sample, following the observed trade liberalization patterns for other regions.

We interpret these findings as evidence:

1) For an increasing integration inside the Mercosur bloc, as indicated by the increase of the home bias coefficient (that of the *Merc* dummy). If a higher integration among the countries inside the bloc was an objective when the creation of the bloc, our results support the conclusion that this goal has been achieved;

2) For an improvement in the trade liberalization process, both for the Mercosur country-members (taken individually, in their trade with the rest of the world, as indicated by the coefficients of the *Intra* dummy) and for the non-members (the *Other* dummy), following what seems to be happening in other regions [as the studies of Wei (1996) and Nitsch (2000) show].

VI. Robustness Checks

VI.1 Collinearity Problems

We recall the two dummy variables included in the Models 3 and 4:

$Merc_{ij}$ = 1, if countries i and j are both members of the Mercosur
= 0, otherwise

$Intra_{ij}$ = 1, if countries i and j are both members of the Mercosur AND $i = j$.
= 0, otherwise

Notice that, the way they are defined implies that $Intra_{ij} = Merc_{ij}$ whenever one of the two following situations is verified:

1) The countries i OR j are not a member of the Mercosur Bloc (in which case, $Intra_{ij} = Merc_{ij} = 0$);

2) The countries i AND j are BOTH members of the Mercosur AND $i = j$ (in which case, $Intra_{ij} = Merc_{ij} = 1$).

That is, whenever the *Intra* dummy takes the value of 1, so does the *Merc* dummy (although the inverse is not true); whenever the *Merc* dummy takes the value of 0, so does the *Intra* dummy. Another way to put it is that all the information contained in the *Intra* dummy is already included in the *Merc* dummy. This could raise a problem of multicollinearity.

The multicollinearity usually occurs when the explanatory variables display high intercorrelation, which seems to be the case here as we explained in the previous

paragraph, although it is not well captured by a simple correlation coefficient (here, because the observations of the two variables consist only of zeros and 1's). When the multicollinearity problem is high enough, "it becomes difficult to disentangle the separate effects of each of the explanatory variables on the explained variable." [21]

In order to account for the possibility of multicollinearity, in this section we will do the same exercise as in the previous section, but we will divide the effects of the *Home* dummy on equations (1) and (2) in only two dummies (differently of the three dummies in the previous section). First, we are going to consider a case in which the *Home* dummy will be replaced only by the dummies *Merc* and *Other* (not *Intra*). By doing that, we are explicitly separating the effects of the two variables. Therefore, for the first exercise, the Models 3 and 4 become:

Model 5:

$$\ln(x_{ij,t}) = \alpha_t + \gamma_1 Merc_{ij,t} + \gamma_3 Other_{ij,t} + \beta_1 \ln(Y_{i,t}) + \beta_2 \ln(Y_{j,t}) + \beta_3 \ln(D_{ij,t}) + \varepsilon_{ij,t}$$

Model 6:

$$\ln(x_{ij,t}) = \alpha_t + \gamma_1 Merc_{ij,t} + \gamma_3 Other_{ij,t} + \beta_1 \ln(Y_{i,t}) + \beta_2 \ln(Y_{j,t}) + \beta_3 \ln(D_{ij,t}) + \\ + \beta_4 \ln(RW_i) + \beta_5 \ln(RW_j) + \beta_6 Language_t + \beta_7 Adjacency_t + \varepsilon_{ij,t}$$

Table 7 shows the results of the estimations of Models 5 and 6. Comparing to the results of the Table 5, and considering the estimation of the Model 6 by the SUR method, one can conclude that other things being equal, the home bias for the Mercosur Bloc is 2.05 (= exp[0.7179]) against 1.10 (= exp[0,0950]), from Table 5. Despite the fact that this new estimation (without the *Intra* dummy) reveals a degree of home bias twice as higher than that shown in the Table 5 (when the *Intra* variable was included) it is also statistically significant, differently from then. All the other coefficients are robust to this experiment.

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[21] See Maddala (1992), p. 270.

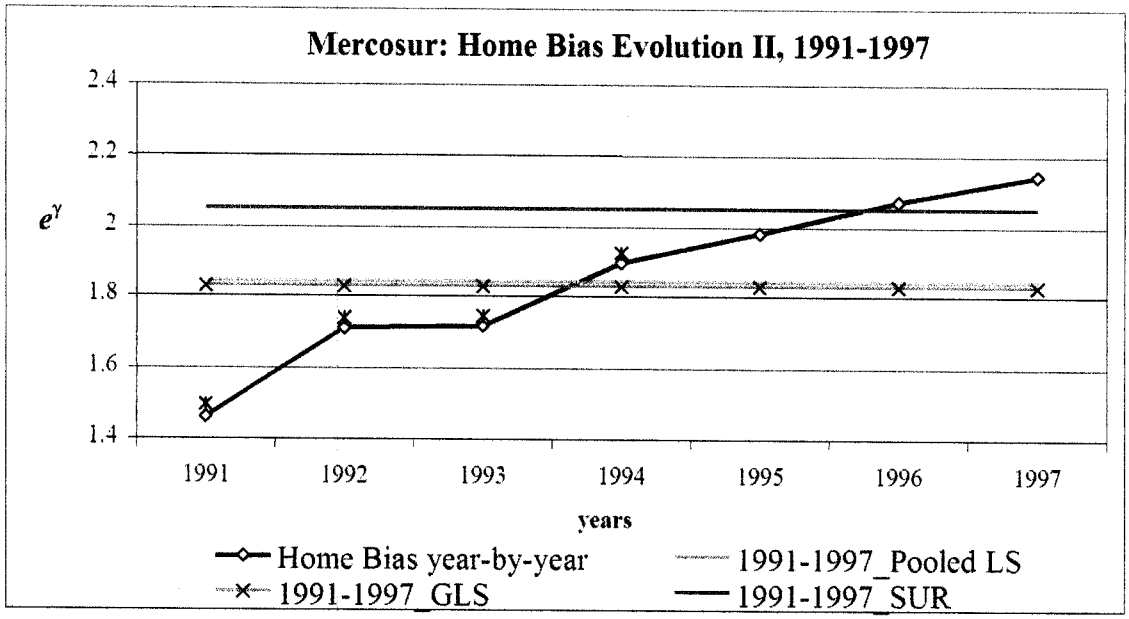
Table 7
Mercosur Trade Bloc Home Bias II, 1991-1997

Model:	5	6	5	6	5	6
$Merc_{ij}$	0,9427	0,6093	0,9412	0,6037	0,9133	0,7179
	(0,1347)	(0,1478)	(0,1347)	(0,1477)	(0,2572)	(0,2817)
$Other_{ij}$	2,8048	2,5280	2,8088	2,5349	2,5982	2,3187
	(0,1378)	(0,1377)	(0,1376)	(0,1373)	(0,2655)	(0,2649)
ln(Yi)	0,8513	0,9406	0,8511	0,9404	0,8768	0,9113
	(0,0096)	(0,0128)	(0,0095)	(0,0128)	(0,0166)	(0,0239)
ln(Yj)	0,7301	0,6972	0,7300	0,6959	0,7512	0,6953
	(0,0088)	(0,0129)	(0,0088)	(0,0129)	(0,0188)	(0,0249)
ln(Dij)	-1,0550	-0,9594	-1,0544	-0,9598	-1,1999	-1,0424
	(0,0177)	(0,0221)	(0,0176)	(0,0221)	(0,0411)	(0,0593)
ln(RWi)		0,8078		0,8156		0,3382
		(0,0745)		(0,0742)		(0,1937)
ln(RWj)		-0,4652		-0,4701		-0,6709
		(0,0943)		(0,0940)		(0,1934)
$Language_{ij}$		0,1041		0,0958		0,1004*
		(0,0483)		(0,0482)		(0,1188)
$Adjacency_{ij}$		0,5892		0,5908		0,7675
		(0,0551)		(0,0549)		(0,1625)
# Obs.	3327	3327	3327	3327	3327	3327
Adj. R^2	0,8726	0,8805	0,8730	0,8810	0,8694	0,8764
S.E. of regression	1,0167	0,9847	1,0167	0,9847	1,0296	1,0013
Estimation method	POLS	POLS	GLS	GLS	SUR	SUR

Notes: (1) Standard errors in parenthesis;
(2) * indicates a coefficient that is NOT statistically significant at the 10% level;
(3) Year-specific intercepts are included in all regressions but not reported here.

In order to evaluate the evolution of the Mercosur bloc's home bias, we repeated the series of seven LS regressions (one for each year in the sample), only this time we used the Model 6. The results from this experiment are reported in the Table A, in the Appendix and, below, in the Figures 5, we only show the evolution of the coefficients of the *Merc* dummy, which indicates the degree of home bias for the Mercosur as a bloc.

Figure 5



Note: the lines correspond to the average home bias for the 1991-1997 period.

We also considered an experiment where the *Home* dummy was replaced only by the dummies *Intra* and *Other* (not *Merc*), both in the estimation for the whole period and for each year individually. Since the results did not change much in comparison to those shown in the Tables 5 and 6, we did not report they here. The reader can see them at the Tables B and C, in the Appendix .[22] We display in the Figure 6, however, the evolution of the coefficients of the *Intra* dummy.

Notice that, similarly to our conclusion based on Table 6 and Figures 2 and 3, we can also observe that the home bias for the Mercosur Bloc has been increasing over the period 1991 to 1997 and that the home bias for the other countries in the sample follows the reverse trend. There are two main differences of these results from those of Table 6.

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22 In this experiment, the Models 3 and 4 became, respectively:

Model 5a:

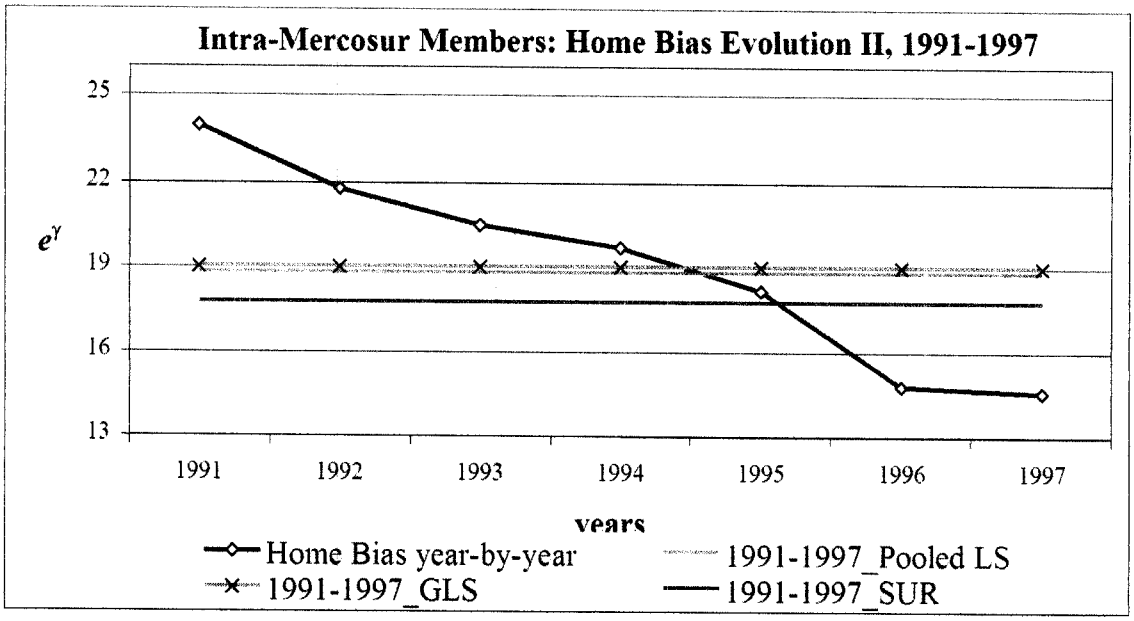
$$\ln(x_{ij,t}) = \alpha_t + \gamma_2 Intra_{ij,t} + \gamma_3 Other_{ij,t} + \beta_1 \ln(Y_{i,t}) + \beta_2 \ln(Y_{j,t}) + \beta_3 \ln(D_{ij,t}) + \varepsilon_{ij,t}$$

Model 6a:

$$\ln(x_{ij,t}) = \alpha_t + \gamma_2 Intra_{ij,t} + \gamma_3 Other_{ij,t} + \beta_1 \ln(Y_{i,t}) + \beta_2 \ln(Y_{j,t}) + \beta_3 \ln(D_{ij,t}) + \\ + \beta_4 \ln(RW_i) + \beta_5 \ln(RW_j) + \beta_6 Language_t + \beta_7 Adjacency_t + \varepsilon_{ij,t}$$

First, the degree of home bias for the Mercosur Bloc is higher now. Second, from the year 1995 on, the coefficient that measure the home bias is statistically significant, differently from the previous exercise (see Appendix, Table A).

Figure 6



Note: the lines correspond to the average home bias for the 1991-1997 period.

Therefore, the evidence that the Mercosur residents have been showing an increasing preference for the bloc-produced goods is robust to this experiment. The same is true for the decreasing trend in the degree of home bias for the Mercosur country-members considered individually (not as a bloc).[23]

[23] As for the non-member countries, the evolution of the coefficient of the *Other* dummy can be seen both in Tables A and C, in the Appendix. The general trend of a decrease in their degree of home bias is observed in both Tables.

VI.2 Nitsch's Definition of Remoteness

One potential problem for the estimations we did so far is the measure of *remoteness* that we have been using. According to Nitsch (2000, p. 1093) the measure of *remoteness* used in the previous exercises [proposed by Wei (1996)] "in which both third-country GDP and bilateral distance enter with the same sign, is inconsistent with the theoretical requirements of the gravity approach." To check for robustness to the measure of *remoteness*, we are going to repeat some of the exercises above, this time using the measure of *remoteness* proposed by Nitsch, which is given by:

$$R_i = \left(\sum_k \left[Y_k / D_{ik} \right] \right)^{-1} = RN_i$$

where, RN_i is the Nitsch-*remoteness* of country i, Y_k is the GPD of country k and D_{ik} is the distance between country i and k.

Table 8 shows the results of the re-estimation of the Model 2 (that is, the simple Gravity Model extended by the *remoteness* effect, the *Language* and the *Adjascency* dummies) and Table 9 shows the results for the re-estimation of Model 4 (the same as Model 2, but in which the effects of the *Home* dummy is divided into three different effects). The difference here is the use of the Nitsch-*remoteness* RN_i instead of the Wei-*remoteness*, RW_i.

First, we estimated the average home bias for all countries in the sample (that is, we used Model 2). By comparing the Table 8 with its analogous, the part of Table 3 related to the Model 2, one could conclude that the results for the degree of home bias are robust when we use a different measure for *remoteness*. As before, the coefficients for the GDP's, distance and adjacency have the expected signs and are highly significant while

the *remoteness* of the importing country has the "wrong" sign (and it is insignificant). Once again, language seems to play no role on the trade flow.

Table 8
Home Bias II, 1991-1997
Re-Estimation of Model 2 (Nitsch's *Remoteness*)

$Home_{ij}$	2,6776	2,6860	2,6137
	(0,1197)	(0,1192)	(0,2417)
$Ln(Y_i)$	0,9308	0,9305	0,8639
	(0,0129)	(0,0128)	(0,0277)
$Ln(Y_j)$	0,7233	0,7226	0,6462
	(0,0137)	(0,0137)	(0,0287)
$ln(D_{ij})$	-0,9267	-0,9266	-0,9290
	(0,0194)	(0,0193)	(0,0588)
$ln(RN_i)$	0,2175	0,2190	-0,0263*
	(0,0267)	(0,0265)	(0,0717)
$ln(RN_j)$	-0,0413*	-0,0414*	-0,3423
	(0,0334)	(0,0332)	(0,0697)
$Language_{ij}$	0,0475*	0,0399*	0,1521*
	(0,0508)	(0,0506)	(0,1132)
$Adjacency_{ij}$	0,6332	0,6338	0,8700
	(0,0520)	(0,0518)	(0,1539)
# Obs.	3327	3327	3327
Adj. R^2	0,8842	0,8848	0,8772
S.E. of regression	0,9694	0,9694	0,9981
Estimation method	POLS	GLS	SUR

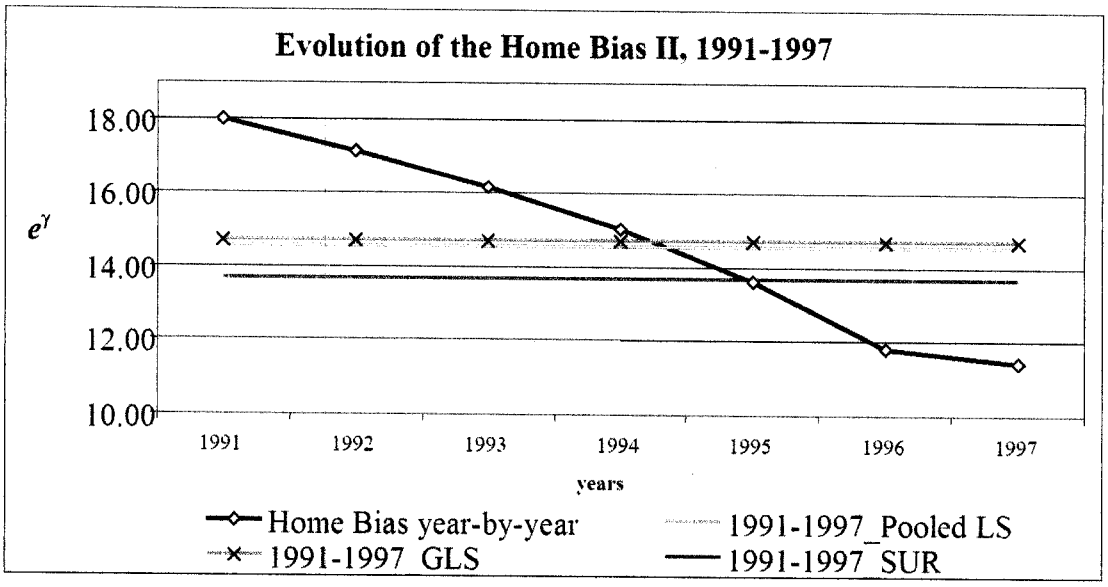
Notes: (1) Standard errors in parenthesis;
(2) * indicates a coefficient that is NOT statistically significant at the 10% level;
(3) Year-specific intercepts are included in all regressions but not reported here.

We also estimated (LS regressions) the Model 2 for each year of the sample. We show, in the Figure 7, only the estimated coefficients of the *Home* dummy over the seven regressions.[24] This should give an idea of the evolution of the effect that the border has on trade flows among the 22 countries in the sample. We observe that, in line with our previous estimations (see Figure 1) and with other studies mentioned, the home bias

[24] The author, upon request, can provide the complete results of the estimations.

shows a unequivocally trend to decrease, suggesting that the borders have been less and less important to the trade flows.

Figure 7



Note: the lines correspond to the average home bias for the 1991-1997 period.

According with the results reported in Table 9, which are analogous to that in Table 5 (only the part related to the Model 4), once again we can conclude that the Mercosur bloc has a low degree of home bias, which is even not statistically significant.

In order to verify the evolution of the home bias of the Mercosur as a bloc and for the Mercosur country-members, we estimated LS regressions of the Model 4 for each year of the sample. The estimated coefficients of the *Merc* and *Intra* dummies over the seven regressions are displayed in Figures 8 and 9, respectively.[25] Notice, from the Figure 8, that the home bias for the Mercosur as a bloc is increasing over the sample period. In addition, the home bias for the Mercosur country-members (from Figure 9) follows the reverse trend.

[25] The author, upon request, can provide the complete results of the estimations.

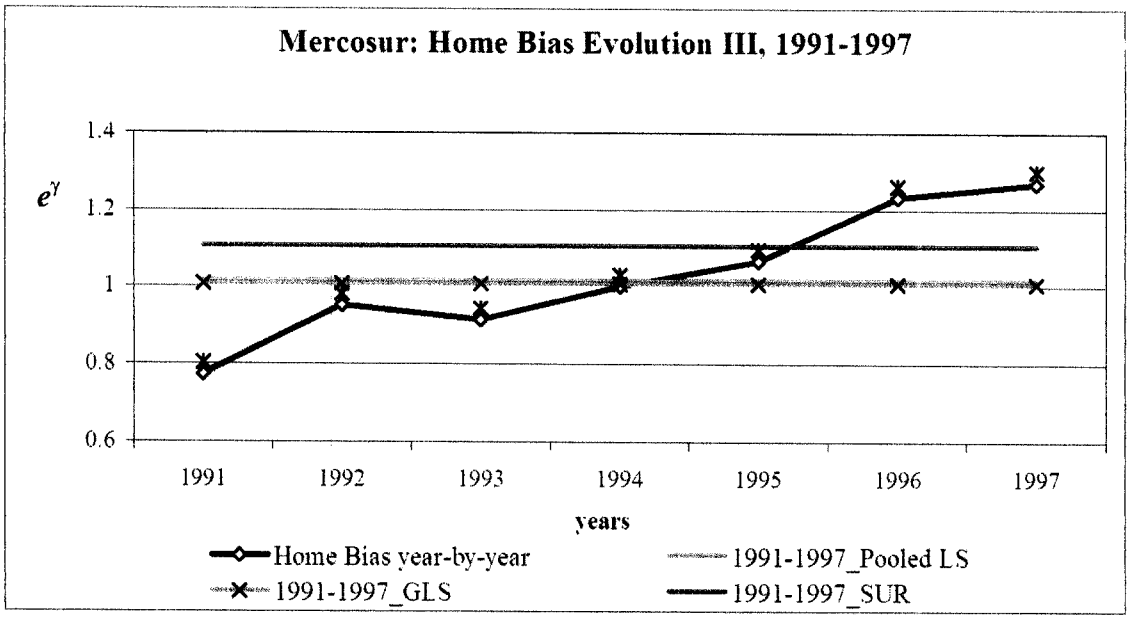
These results are, basically, the same we have found in Section V (compare Figures 7, 8 and 9 with their corresponding, in Section V, Figures 1, 2 and 3). One should conclude note that the estimation of the home bias using Nitsch's (2000) approach to define the *remoteness* effect does not change our previous results, based on Wei's (1996) *remoteness* measure.

Table 9
Mercosur Trade Bloc Home Bias III, 1991-1997
Re-Estimation of Model 4 (Nitsch's *Remoteness*)

$Merc_{ij}$	0,0157*	0,0074*	0,0990*
	(0,0922)	(0,0914)	(0,2825)
$Intra_{ij}$	2,9029	2,9168	2,8881
	(0,2185)	(0,2175)	(0,5166)
$Other_{ij}$	2,6316	2,6384	2,5635
	(0,1334)	(0,1329)	(0,2631)
$Ln(Y_i)$	0,9312	0,9309	0,8637
	(0,0129)	(0,0128)	(0,0277)
$Ln(Y_j)$	0,7237	0,7230	0,6465
	(0,0137)	(0,0136)	(0,0287)
$ln(D_{ij})$	-0,9222	-0,9224	-0,9198
	(0,0196)	(0,0196)	(0,0602)
$ln(RN_i)$	0,2143	0,2161	-0,0323*
	(0,0271)	(0,0269)	(0,0722)
$ln(RN_j)$	-0,0445*	-0,0444*	-0,3477
	(0,0338)	(0,0336)	(0,0701)
$Language_{ij}$	0,0557*	0,0475*	0,1672*
	(0,0521)	(0,0519)	(0,1149)
$Adjacency_{ij}$	0,6372	0,6388	0,8636
	(0,0537)	(0,0535)	(0,1583)
# Obs.	3327	3327	3327
Adj. R^2	0,8842	0,8848	0,8773
S.E. of regression	0,9694	0,9694	0,9979
Estimation method	POLS	GLS	SUR

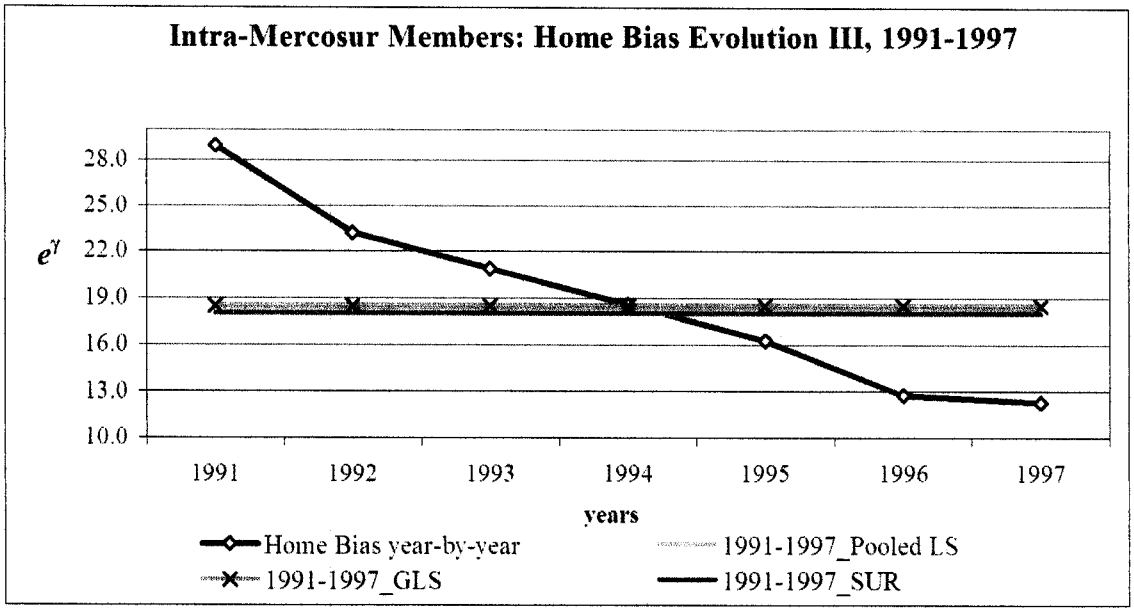
Notes: (1) Standard errors in parenthesis;
(2) * indicates a coefficient that is NOT statistically significant at the 10% level;
(3) Year-specific intercepts are included in all regressions but not reported here.

Figure 8



Note: the lines correspond to the average home bias for the 1991-1997 period.

Figure 9



Note: the lines correspond to the average home bias for the 1991-1997 period.

VI.3 Endogeneity Problem

The final robustness check we will pay attention refers to the problem of endogeneity of the GDP variable, that is, the potential correlation of this variable with the error term on our regressions. This econometric problem could occur because the level of exports, our dependent variable, might influence the level of the GDP (one of the regressors) by the accounting identity: exports are a component of the gross domestic production (GDP).

Following the literature [Wei (1996) and Nitsch (2000)], we will use the population size as an instrument for the GDP and re-estimate Models 1 to 4 using the instrument variable (IV) method. The results are displayed in the Tables 10 (Models 1 and 2) and 11 (Models 3 and 4).[26]

Other things being equal, the average degree of home bias for the 22 countries on the sample, estimated by the instrumental method, is higher than that using the methods in the Section V, using the GDP variable. For example, comparing the results for the estimation of the Model 2 by the SUR method, the estimated home bias for the countries in the sample was (see Table 3), on average, 12.26 (= exp [2.5067]), while by the IV SUR method this value is 15.46 (= exp [2.7384]).

We also remark that the coefficients on all other variables seem to corroborate, in general, the results shown in the Table 3. With the usual few exceptions (the *remoteness* effect of the importing country and the *Language* dummy) they have all the expected sign and are highly significant.

We now compare the outcomes on Table 5 with those on Table 11, which were obtained through regressions on the IV method. The general conclusion that the home bias of the Mercosur as a bloc (coefficient of the *Merc* dummy) is low and not

[26] Actually, we used *LN(POP)* as an instrument for LN(Y).

statistically significant (roughly, the same results on Table 5) persists here,[27] suggesting (again) that the residents of the Mercosur Bloc do not prefer the goods produced inside the bloc relatively to those produced in the rest of the word.

In addition, from the Table 11, we can see that the coefficients of the *Intra* and *Other* dummies are significant regardless the estimation method and of the same magnitudes as the estimated in Section V (see Table 5). This allows to maintain our previous conclusion that the degree of home bias both in the Mercosur country-members and in the non-members are high in comparison to the home bias of the Mercosur as a bloc.

Table 10
Home Bias III, 1991-1997
(Instrumental Variable)

$Home_{ij}$	2.9256	2.7471	2.9319	2.7574	2.8589	2.7384
	(0.1022)	(0.1016)	(0.1018)	(0.1010)	(0.2421)	(0.2393)
$ln(Y_i)$	0.8610	0.9000	0.8611	0.9001	0.9028	0.8916
	(0.0118)	(0.0164)	(0.0117)	(0.0163)	(0.0240)	(0.0357)
$ln(Y_j)$	0.7148	0.6798	0.7151	0.6793	0.6249	0.5178
	(0.0116)	(0.0161)	(0.0115)	(0.0160)	(0.0220)	(0.0312)
$ln(D_{ij})$	-1.0287	-0.8972	-1.0276	-0.8969	-1.1088	-0.9439
	(0.0180)	(0.0247)	(0.0180)	(0.0245)	(0.0404)	(0.0560)
$ln(RW_i)$		0.6149		0.6237		0.4902
		(0.0968)		(0.0964)		(0.2172)
$ln(RW_j)$		-0.5513		-0.5556		-1.3845
		(0.0966)		(0.0962)		(0.1970)
$Language_{ij}$		0.0471*		0.0393*		-0.1107*
		(0.0528)		(0.0525)		(0.1188)
$Adjacency_{ij}$		0.6683		0.6693		0.8509
		(0.0685)		(0.0681)		(0.1559)
# Obs.	3327	3327	3327	3327	3327	3327
Estimation method	IV PLS	IV PLS	IV GLS	IV GLS	IV SUR	IV SUR

Notes: (1) Standard errors in parenthesis;
(2) * indicates a coefficient that is NOT statistically significant at the 10% level;
(3) Year-specific intercepts are included in all regressions but not reported here.

[27] The common exceptions (in Tables 5 and 11) are the coefficients of *Merc* for both the Pooled LS and GLS estimations of the Model 3.

Table 11
Mercosur Trade Bloc Home Bias, 1991-1997
(Instrumental Variable)

$Merc_{ij}$	0.3289	0.0370*	0.3255	0.0248*	0.2536*	0.1560*
	(0.1165)	(0.1257)	(0.1160)	(0.1250)	(0.2769)	(0.2947)
$Intra_{ij}$	2.8505	2.9621	2.8617	2.9800	2.7368	3.0357
	(0.2201)	(0.2141)	(0.2191)	(0.2128)	(0.5312)	(0.5102)
$Other_{ij}$	2.9476	2.7040	2.9526	2.7120	2.8778	2.6892
	(0.1100)	(0.1103)	(0.1095)	(0.1097)	(0.2607)	(0.2604)
$ln(Y_i)$	0.8632	0.9000	0.8634	0.9001	0.9035	0.8884
	(0.0119)	(0.0164)	(0.0118)	(0.0163)	(0.0242)	(0.0356)
$ln(Y_j)$	0.7171	0.6798	0.7173	0.6792	0.6256	0.5154
	(0.0116)	(0.0161)	(0.0116)	(0.0160)	(0.0221)	(0.0311)
$ln(D_{ij})$	-1.0123	-0.8890	-1.0115	-0.8895	-1.0981	-0.9254
	(0.0188)	(0.0264)	(0.0187)	(0.0263)	(0.0418)	(0.0593)
$ln(RW_i)$		0.5893		0.6003		0.4251
		(0.1024)		(0.1019)		(0.2272)
$ln(RW_j)$		-0.5774		-0.5794		-1.4463
		(0.1022)		(0.1017)		(0.2065)
$Language_{ij}$		0.0610*		0.0521*		-0.0855*
		(0.0539)		(0.0536)		(0.1212)
$Adjacency_{ij}$		0.6770		0.6789		0.8573
		(0.0694)		(0.0690)		(0.1586)
# Obs.	3327	3327	3327	3327	3327	3327
Estimation method	IV PLS	IV PLS	IV GLS	IV GLS	IV SUR	IV SUR

Notes: (1) Standard errors in parenthesis;
(2) * indicates a coefficient that is NOT statistically significant at the 10% level;
(3) Year-specific intercepts are included in all regressions but not reported here.

VII. Home Bias as an Openness Index

Wei (1996) suggests that the measure of home bias could also be used as an index of openness:

> "It provides an additional cross-country openness index that has certain advantages over other commonly used measures". [28]

That is, bigger a country's degree of home bias is, the more closed tends to be its economy to international trade. By this association, one should conclude that if the home bias is decreasing over time, then countries are becoming more open to international trade, or more integrated. [29]

In line with this idea, we estimated specific home bias for each country on our sample. More specifically, we took the Model 2 (which is the simple Gravity Model extended to include the *remoteness*, the language and the common border effects) and divided the effect of the *Home* dummy into 22 country-specific dummies. The results of this estimation, for three different methods, are displayed at the Table 12, below. Notice that, considering the SUR estimation method, the country-specific coefficients of home bias are not significant for most of the developed countries in the sample (Italy is an exception).

Figure 10 is a rank of openness, based on the country-specific home bias estimated by the SUR method. According to this rank, Belgium-Luxembourg (degree of home bias = 0.93 = exp [-0.0739]) is the most open country in the sample, followed by France's home bias = 1.007 = exp [0.007]). They change ranks when we consider the other two estimation methods. On the other hand, Bolivia is the closest country, with a home bias of 126.76 (= exp [4.8423]). The Bolivian rank does not change when we use the two other estimation methods.

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[28] See Wei (1996, p. 17).

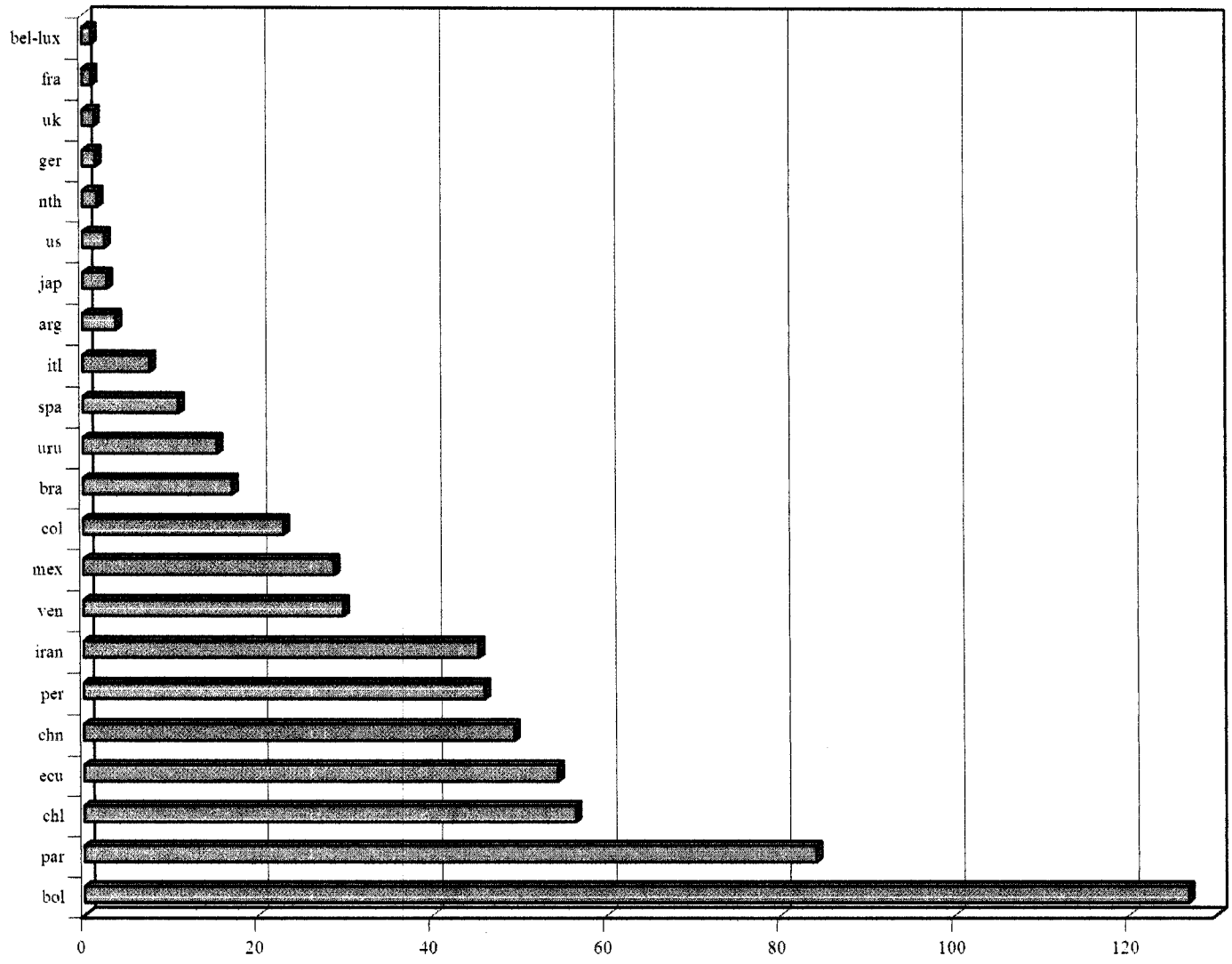
[29] See Wei (1996) pp. 19-20, where he examined the evolution of the home bias for the OECD countries.

Table 12
Country-specific Average Home Bias, 1991-1997

Argentina	1,3546	1,3639	1,3277*
Belgium-Luxembourg	0,4100	0,4163	-0,0739*
Bolivia	4,9760	4,9825	4,8423
Brazil	2,7423	2,7666	2,8391
Chile	3,9748	3,9899	4,0333
China	3,8542	3,8739	3,9000
Colombia	3,2465	3,2647	3,1329
Ecuador	4,2160	4,2257	3,9970
France	0,3752	0,3881	0,0070*
Germany	0,6263	0,6412	0,3694*
Iran	4,0573	4,0683	3,8154
Italy	2,2754	2,2823	2,0342
Japan	0,9981	1,0088	1,0151*
Mexico	3,4103	3,4230	3,3572
Netherlands	0,9707	0,9811	0,5209*
Paraguay	4,5437	4,5485	4,4316
Peru	3,8642	3,8747	3,8286
Spain	2,6315	2,6407	2,3936
United Kingdom	0,6243	0,6404	0,2627*
Uruguay	2,8451	2,8592	2,7302
United State	0,9908	1,0098	0,9077*
Venezuela	3,5924	3,6039	3,3948
$ln(Y_i)$	0,9655	0,9650	0,9295
$ln(Y_j)$	0,7215	0,7196	0,7102
$ln(D_{ij})$	-0,9329	-0,9324	-1,0169
$ln(RW_i)$	0,7093	0,7173	0,3380
$ln(RW_j)$	-0,5652	-0,5748	-0,7403
$Language_{ij}$	0,1906	0,1804	0,1639*
$Adjacency_{ij}$	0,6119	0,6137	0,7361
# Obs.	3327	3327	3327
Adj. R^2	0,8978	0,8986	0,8951
S.E. of regression	0,9107	0,9107	0,9226
Estimation method	POLS	GLS	SUR

Notes: (1) * indicates a coefficient that is NOT statistically significant at the 10% level;
(2) Year-specific intercepts are included in all regressions but not reported here.

Figure 10
Country-Specific Average Home Bias, 1991-1997



Note: Graphic based on the SUR estimation method

From Table 12 and Figure 9, it is quite evident, that the degree of home bias observed for developing countries is higher in comparison to the developed countries. The only exception to this general rule is Argentina, whose degree of home bias is surprisingly smaller than Italy's and Spain's regardless of the estimation method used. If we interpret the home bias as an index of openness to international trade, these findings suggest that these developed countries are more open than the developing countries in the sample, which comes as no surprise.

Regarding only the Mercosur country-members, the Argentina's border has, on average, the smallest effect on trade, or in other words, it is the most open country among the Mercosur members, followed by Uruguay, Brazil and Paraguay.

VIII. Conclusion

In this paper, we used the so-called "Gravity Model" to measure the degree of "home bias" among a sample of 22 countries, including South-American countries and the main trade partners of the Mercosur country-members. The results indicate that there is a substantial degree of home bias in the countries included in the sample. Furthermore, this measured home bias is decreasing over the period 1991-1997, suggesting an increase in the degree of integration of the goods markets, which is consistent with the ongoing worldwide trade liberalization process and has been documented in the literature.

We also observed that the home bias for the Mercosur Bloc, treated as a single market, is low in comparison with the home bias for the whole sample of countries. The estimates of the Mercosur bloc's home bias go from 1.01 to 2.57 (considering our "reference model", which is the Model 4 estimated by the SUR method, the estimate is 1.1). On the other hand, the home bias for the whole sample of countries it is roughly between 12 and 19 according to different models and methods (from Model 2 by the SUR method, our corresponding "reference model" for the whole sample, it is 12.26).

However, despite its low level, the Mercosur bloc's home bias is observed to be consistently increasing over time, suggesting that the creation of the bloc was effective in promoting the integration between the Mercosur national economies. These results are reinforced by the fact (see Figure 3) that, if we treat each Mercosur country-member individually, the home bias is consistently decreasing over the period of analysis, which suggests that the Mercosur country-members are following the path of general trade liberalization.

These general conclusions are fairly confirmed in all models and methods that we used in this study, suggesting that the Gravity Model is roughly robust to changes in model specification, estimation method and/or in the definition of the variables used.

Finally, if one interprets the degree of home bias as an index of openness to the international trade in the sense that the lower it is, the more open is the economy, this

study have provided some evidence, at least for the sample used, that the developed countries are more open to trade than the developing countries.

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APPENDIX

Table A (Multicollinearity Problem I)
Evolution of the Mercosur Trade Bloc Home Bias, 1991-1997

	1991	1992	1993	1994	1995	1996	1997
Merc	0,3806*	0,5357*	0,5399*	0,6395*	0,6833	0,7275	0,7636
	(0,4176)	(0,4043)	(0,3942)	(0,3903)	(0,3924)	(0,3846)	(0,3704)
Other	2,6191	2,6441	2,6293	2,5703	2,5040	2,3774	2,3398
	(0,3650)	(0,3665)	(0,3580)	(0,3705)	(0,3711)	(0,3745)	(0,3675)
ln(Yi)	0,9224	0,9585	0,9434	0,9258	0,9435	0,9486	0,9484
	(0,0324)	(0,0335)	(0,0331)	(0,0342)	(0,0340)	(0,0355)	(0,0364)
ln(Yj)	0,6870	0,6717	0,6587	0,6992	0,7105	0,7306	0,7264
	(0,0334)	(0,0333)	(0,0329)	(0,0341)	(0,0340)	(0,0361)	(0,0371)
ln(Dij)	-0,9755	-0,9860	-0,9547	-0,9614	-0,9411	-0,9620	-0,9372
	(0,0602)	(0,0603)	(0,0580)	(0,0599)	(0,0575)	(0,0585)	(0,0582)
ln(Rwi)	1,0003	1,0899	0,9363	0,7151	0,6650	0,5883	0,6249
	(0,1827)	(0,1917)	(0,2023)	(0,2026)	(0,1990)	(0,1968)	(0,2163)
ln(RWj)	-0,5919	-0,5991	-0,5460	-0,4654	-0,3820*	-0,2639*	-0,3957*
	(0,2448)	(0,2477)	(0,2446)	(0,2606)	(0,2444)	(0,2516)	(0,2618)
Language	-0,0127*	-0,0219*	-0,0168*	-0,0354*	0,1742*	0,3749	0,2804
	(0,1279)	(0,1271)	(0,1252)	(0,1296)	(0,1296)	(0,1304)	(0,1265)
Adjacency	0,6182	0,5674	0,6519	0,6472	0,5522	0,4872	0,5937
	(0,1461)	(0,1400)	(0,1392)	(0,1530)	(0,1499)	(0,1512)	(0,1473)
# Obs.	472	476	476	475	478	473	477
Adj. R^2	0,8859	0,8855	0,8862	0,8818	0,8843	0,8687	0,8605
S.E. of regression	0,9672	0,9760	0,9551	0,9804	0,9629	1,0258	1,0550
Estimation method	LS	LS	LS	LS	LS	LS	LS

Notes: (1) Standard errors in parenthesis;
(2) * indicates a coefficient that is NOT statistically significant at least at the 10% level;
(3) Year-specific intercepts are included in all regressions but not reported here.

Table B (Multicollinearity Problem II)
Mercosur Trade Bloc Home Bias, 1991-1997

Model:	5a	6a	5a	6a	5a	6a
Intra	3.1064	2.9329	3.1149	2.9450	2.8847	2.8757
	(0.2105)	(0.2129)	(0.2099)	(0.2117)	(0.4807)	(0.4719)
Other	2.8899	2.6684	2.8965	2.6796	2.6756	2.4300
	(0.1352)	(0.1354)	(0.1349)	(0.1348)	(0.2554)	(0.2503)
ln(Yi)	0.8483	0.9331	0.8479	0.9327	0.8745	0.9099
	(0.0093)	(0.0124)	(0.0092)	(0.0123)	(0.0163)	(0.0233)
ln(Yj)	0.7273	0.6900	0.7272	0.6883	0.7487	0.6900
	(0.0086)	(0.0124)	(0.0086)	(0.0123)	(0.0184)	(0.0242)
ln(Dij)	-1.0275	-0.8988	-1.0263	-0.8982	-1.1734	-0.9942
	(0.0169)	(0.0211)	(0.0168)	(0.0210)	(0.0390)	(0.0558)
ln(RWi)		0.7384		0.7457		0.3461
		(0.0695)		(0.0691)		(0.1823)
ln(RWj)		-0.5341		-0.5431		-0.7003
		(0.0876)		(0.0870)		(0.1818)
Language		0.0929		0.0838		0.0927*
		(0.0462)		(0.0460)		(0.1127)
Adjacency		0.6594		0.6612		0.8176
		(0.0550)		(0.0547)		(0.1553)
# Obs.	3327	3327	3327	3327	3327	3327
Adj. R^2	0.8785	0.8869	0.8790	0.8876	0.8753	0.8833
S.E. of regression	0.9931	0.9578	0.9931	0.9578	1.0060	0.9732
Estimation method	POLS	POLS	GLS	GLS	SUR	SUR

Notes: (1) Standard errors in parenthesis;
(2) * indicates a coefficient that is NOT statistically significant at least at the 10% level;
(3) Year-specific intercepts are included in all regressions but not reported here.

Table C (Multicollinearity Problem II)
Evolution of the Mercosur Trade Bloc Home Bias, 1991-1997

	1991	1992	1993	1994	1995	1996	1997
Intra	3.1770	3.0814	3.0203	2.9813	2.8991	2.6902	2.6775
	(0.5348)	(0.5809)	(0.5406)	(0.5581)	(0.5700)	(0.6023)	(0.5834)
Other	2.8454	2.8183	2.7936	2.7069	2.6214	2.4646	2.4159
	(0.3595)	(0.3606)	(0.3509)	(0.3618)	(0.3643)	(0.3696)	(0.3623)
ln(Yi)	0.9114	0.9498	0.9351	0.9184	0.9369	0.9430	0.9431
	(0.0307)	(0.0323)	(0.0316)	(0.0330)	(0.0329)	(0.0347)	(0.0358)
ln(Yj)	0.6764	0.6633	0.6505	0.6920	0.7042	0.7253	0.7213
	(0.0314)	(0.0316)	(0.0311)	(0.0324)	(0.0326)	(0.0353)	(0.0363)
ln(Dij)	-0.8841	-0.9124	-0.8854	-0.9019	-0.8888	-0.9208	-0.8997
	(0.0551)	(0.0561)	(0.0536)	(0.0560)	(0.0557)	(0.0588)	(0.0584)
ln(RWi)	0.8543	0.9920	0.8424	0.6501	0.6195	0.5667	0.6127
	(0.1695)	(0.1797)	(0.1861)	(0.1859)	(0.1847)	(0.1852)	(0.2063)
ln(RWj)	-0.7365	-0.6963	-0.6397	-0.5299	-0.4272	-0.2847*	-0.4082*
	(0.2260)	(0.2287)	(0.2230)	(0.2372)	(0.2270)	(0.2385)	(0.2483)
Language	0.0018*	-0.0208*	-0.0190*	-0.0489*	0.1553*	0.3468	0.2497
	(0.1211)	(0.1198)	(0.1188)	(0.1233)	(0.1243)	(0.1268)	(0.1232)
Adjacency	0.6817	0.6360	0.7190	0.7195	0.6248	0.5609	0.6689
	(0.1439)	(0.1386)	(0.1374)	(0.1523)	(0.1504)	(0.1539)	(0.1497)
# Obs.	472	476	476	475	478	473	477
Adj. R^2	0.8943	0.8928	0.8935	0.8885	0.8905	0.8737	0.8653
S.E. of regression	0.9311	0.9442	0.9241	0.9523	0.9369	1.0059	1.0367
Estimation method	LS	LS	LS	LS	LS	LS	LS

Notes: (1) Standard errors in parenthesis;
(2) * indicates a coefficient that is NOT statistically significant at least at the 10% level;
(3) Year-specific intercepts are included in all regressions but not reported here.