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EXPLAINING MERCOSUR SECTORAL EXPORTS TO THE EU: THE ROLE OF ECONOMIC AND GEOGRAPHICAL DISTANCE

By

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Explaining Mercosur sectoral exports to the EU: The role of economic and geographical distance

Abstract

We used a variant of the gravity equation to classify products according to their sensitivity to geographical and economic distance. We argue that products which are highly sensitive to economic distance (proxied with absolute differences in per capita income) and barely sensitive to geographical distance are the best candidates for future trade between the European Union and Mercosur. We estimated our empirical model by applying panel data methodology to allow for trading pair specific effects. In the estimation we made use of two additional explanatory variables which are found to be relevant when explaining trade, namely, infrastructure and exchange rates. Our results support the view that different products have a different sensitivity to distance and highlight the importance of using disaggregated data when analysing international trade flows.

Key words: gravity model panel data sectoral trade flows distance

JEL classification: F14

1. Motivation

Recent negotiations between the Southern Common Market (Mercosur) and the European Union (EU) offer the possibility of a Free Trade Agreement (FTA) between the two blocs. Since negotiations concerning tariff reductions started in July 2001, there has been uncertainty about the speed and deepness of the liberalisation process. For an analysis of future trade flows, assessments of the role of underlying trade structures and of the determinants of present trade flows are necessary. In this study emphasis will be put on the role played by 'distance' in Mercosur-EU trade flows. Two facets of 'distance' will be examined: economic distance, measured as the absolute difference in per capita incomes, and geographical distance, measured in miles/kilometres and infrastructure endowment, of trading locations. Since income differences melt down slowly and changes in infrastructure, which are captured in the geographical distance variable, take a long time to evolve, it must be assumed that 'distance' has a long-run effect on trade flows. A decrease in EU and Mercosur protectionism, in contrast, could have an immediate impact on trade flows between the two blocs. Therefore, trade liberalisation should be put on the agenda to promote economic growth via trade expansion in the near future. In this study we concentrate on the analysis of Mercosur exports to the EU.

To our knowledge, only a few attempts have been made to measure the effects on trade flows of the formation of Mercosur (Yeats (1998), Diao and Somwaru (2000)), most of which refer to aggregated trade flows and predict small net welfare gains for the country members. Additionally, Martinez-Zarzoso and Nowak-Lehmann (2001) analysed aggregated trade flows between the EU and Mercosur by estimating an augmented gravity model. Their results also suggest that Mercosur members trade more internally than one would expect from normal trade relations.

In this paper, we aim to identify sensitive products and to evaluate the potential for trade in these products from the perspective of Mercosur exports to the EU. The methodology employed is similar to that used by Hirsch and Hashay (2000). However, in our research we extended their study with two significant innovations. First, we use panel data methodology, which gives a richer data set and is far superior to cross-section analysis, since the time dimension of the data is also considered. Second, in our specification we added real exchange rates as an explanatory variable and in addition, we made use of an infrastructure index to construct a new geographical distance variable.

In Section two we show the selection of products for empirical analysis on the basis of their relative importance in Mercosur total exports. Section three presents a variant of the standard gravity model of trade. Section four discusses the results of the empirical application and Section five presents the conclusions.

2. Mercosur exports to the EU

Argentina, Brazil, Paraguay and Uruguay signed the Mercosur agreement in 1991 and it came into effect in 1995 as a Customs Union. Since the Common External Tariff came into force on January 1, 1995, the Mercosur countries have maintained a common commercial policy. Mercosur is also studying proposals for a closer relationship, i.e. a Customs Union with Chile (Chile signed a free-trade agreement with Mercosur in 1996).

There is a shared consensus that since its inception, Mercosur has outperformed expectations. This is revealed in part by rapidly growing trade and investment flows. Between 1991 and 1997 intra-Mercosur exports rose at a rate that trebled the growth of exports to the rest of the world. Nevertheless, if imports are taken as the indicator, the gap between the growth rates of intra- and extra-regional trade flows is considerably lower. This does not indicate evidence of significant trade diversion. Concerning extra-Mercosur exports, the most important trade partner is the EU, leaving the United States (US) in second place. The share of Mercosur exports to the EU is about 30% (in 1997) of total Mercosur exports, whereas only 19% goes to the US. Looking at exports disaggregated by sector, agricultural products are predominant, followed by raw materials and some traditional manufactured goods.

We have selected a number of sectors for empirical analysis at 2-digit level SITC. The selection of these products was made according to two criteria. First, we considered products with a share in total Mercosur exports to the EU of over 1%. Second, we also selected products whose exports have experienced a substantial growth or decay in the last nine years.

The first three columns of Table 1 show the selected categories with their percentage shares of total exports from Mercosur plus Chile to the EU. Column four presents their average growth rate over the period 1988-1996.

Since Mercosur countries have an apparently abundant supply of relatively cheap unskilled labour compared to the EU, we expect them to have a comparative advantage in labour intensive industries. These are traditional industrial sectors such as footwear, iron and steel, furniture, leather and textiles. Some of these countries are also well endowed with relatively cheap land and therefore their agricultural sector is also highly productive compared to EU countries. On the other hand, Mercosur countries have a comparative disadvantage in sectors producing capital intensive goods or high technology commodities, such as telecommunications, road vehicles or electronic components. We refer to Ventura-Dias, Cabezas and Contador (1999), Balaguer-Franch and Martínez-Zarzoso (2000) and Martínez-Zarzoso and Valencia-Parrilla (2001) for a deeper analysis of the structure and comparative advantages of Mercosur trade in recent decades.

In Table 1 we observe that agricultural products show the highest shares of total exports to the EU. These percentage shares, with the sole exception of coffee, increased from 1988 to 1996. In column four we observe positive average-growth rates over the period for meat, fish, vegetables and animal feed stuff. However, the issue of trade in agricultural products involves many complications. The EU is highly protectionist with respect to these products. Therefore, free trade negotiations concerning these product lines could be slow and might involve numerous difficulties. Moreover within Mercosur, whose country members are far from homogeneous, there is also opposition to free trade in some agricultural products.

Concerning industrial products within traditional industries, some, such as furniture and leather, have increased their share in total exports to the EU, while others, such as iron and steel and footwear, show a negative trend with a negative average-growth rate. High-tech sectors, such as telecommunications and office machinery, have clearly lost ground, showing a highly negative average-growth rate.

There are two main concerns about the future of these products. One question to be answered is what the effects are going to be of trade liberalisation and higher competition in goods within the EU-Mercosur market. A second concern is the search for the best strategy for Mercosur to follow in future negotiations.

3. The effects of geographical and economic distance on trade

When analysing potential trade between pairs of countries or pairs of economic blocs engaging in free trade agreements two different types of trade can be distinguished (Hirsch and Hashai (2000)). Part of this potential trade is based on existing trade; as a consequence, the current comparative advantages will be better exploited. The other part of this potential trade, called ‘new trade’ by Hirsch, Ayal and Fishelson (1995), refers to trade that did not exist in the past. This new trade could be based on economies of scale, input sharing, imitation and technology transfer as well as 'distance'.

In this paper we analyse new trade based on 'distance', in a similar way to Hirsch and Hashai (2000). The authors differentiated between geographical and economic distance. The first refers to miles or kilometres between capitals of the trading countries. Since local products are cheaper than products transported over long distances, we expect geographical distance to inhibit trade. The second refers to absolute differences in the per capita income of the trading countries. These differences are expected to play a crucial role in explaining trade between Mercosur and the EU. As we explain below, this factor might have a positive or negative effect on trade depending on the products exchanged.

We refer to Hirsch and Hashai (2000) for a deeper discussion of the importance of geographical and economic distance and their effects on trade flows. We slightly modify the geographical distance variable to account for the positive effect of infrastructure on trade flows (Bougheas et al. (1999). We believe that geographical distance affects trade negatively since commodities have to be transported across countries and transport is not cost free. Transport costs tend to increase with distance, but they tend to be reduced by a better infrastructure. Bougheas *et al* (1999) showed that transport costs are a function, not only of distance, but also of public infrastructure. They augmented the gravity model by introducing additional infrastructure variables public capital stock and length of motorway network). Their model predicts a positive relationship between the level of infrastructure and the volume of trade, which is supported using data from European countries. We took a further step in this direction by constructing an infrastructure index (taking information on roads, paved roads, railroads and telephones). Then, we scaled geographical distance by using the infrastructure index suggesting a new geographical-distance variable. Our index is similar to the Limao and Venables (1999) index.

Concerning economic distance, proxied with absolute differences in per capita income, we can identify two conflicting effects on trade. On one hand, when the trading countries have very different per capita incomes, higher economic distance might deter trade, due to a Linder effect. According to the Linder effect countries tend to increase their mutual trade (intra-industry trade) when their per capita incomes are more similar. On the other hand, higher economic distance might foster trade (inter-industry trade) if we consider the Heckscher-Ohlin (H-O) effect. Per capita income differences can represent inter-country differences in factor scarcity. We expect present trading patterns to be affected by both factors. For some commodities the Linder effect will dominate the H-O effect and economic distance will have a negative effect on trade, whereas for others, the opposite might occur and economic distance will have a positive effect on trade.

4. Empirical application

We used a variant of the gravity equation[1] to model bilateral export flows from Mercosur plus Chile to the EU-15. Our data consists of five Mercosur countries (Argentina, Brazil, Uruguay, Paraguay and Chile) exporting to fourteen EU partners (Belgium and Luxembourg are taken together). Export data, described in Section 2, cover 19 industries at 2-digit level SITC. Sources of the data are outlined in Appendix 1. The period covered goes from 1988 to 1996. We have 70 cross-section trade flows and 9 years with a maximum of 630 observations. However, due to missing data, we have a different number of observations for each industry. We tested for the specification of the estimated equation and a log-linear specification was selected. Exports from country i to country j in period t of commodity k are modelled as,

$$lx_{ijkt} = a_{jki} + g_{kt} + b_0 lyhd_{ijt} + b_1 ldin_{ijt} + b_2 lerr_{ijt} + m_{ijkt} \qquad (1)$$

where lx_{ijkt} are the natural logarithm exports of sector k from country i to country j in period t. $lyhd_{ijt}$ are the natural logarithm of differences in per capita income in absolute terms between the trading countries. $ldin_{ijt}$ stands for the natural logarithm of distance between countries i and j scaled by total infrastructure in year t. $lerr_{ijt}$ is the bilateral real

[1] We refer to Anderson (1979) and Anderson and Wincoop (2001), Bergstrand (1985) and (1989) and Deardorff (1995) for a theoretical foundation of the gravity equation.

exchange rate. α_{ijk} stands for the specific country-pair effects for sector k. γ_{kt} denotes the time-specific effects for sector k, common to all trading pairs.

The country-pair effects allow us to control for all omitted variables that are cross-sectionally specific but remain constant over time, such as contiguity, language and cultural ties. We take the time-specific effects as an indicator of a common trend towards greater trading volumes between both blocs, in a specific sector *k*, independently of the size of their economies.

Since individual effects are included in the regressions[2] we have to decide whether they are treated as fixed or as random. From a priori point of view, the random effects model (RE) would be more appropriate when estimating typical trade flows between a randomly drawn sample of trading partners from a larger population. On the other hand, the fixed effects model (FE) would be a better choice than RE when one is interested in estimating typical trade flows between an ex ante predetermined selection of nations (Egger, 2000). Following this argument, a fixed effect specification might be consistent with the aim of this research. However, to be econometrically correct, we conducted a Hausman test to check for the possible correlation between the individual effects and the regressors. According to this test, under the null hypothesis of ortogonality between the individual effects and the regressors, both the fixed and the random effect estimates are consistent, but the fixed effects estimates are inefficient. However, under the alternative hypothesis the random effects estimates are inconsistent, thus the fixed effects model are the right choice.

Table 2 reports the estimation results for the nineteen selected sectors. Estimates of the country-pair intercepts are omitted due to space considerations. We only report the best results for each sector. First, we estimated equation (1) for each sector using FE and RE

[2] See Mátyás (1997), Chen and Wall (1999) and Egger (2000) for a discussion of the advantages of using panel data methodology to estimate the gravity equation of trade.

and ran a Hausman test to discriminate between both methods. Results of this test are shown in Table 3.

We added individual and time-specific effects to the equation specification. The individual effects were always significantly different from zero whereas the time effects were non-significant in a number of cases (six out of nineteen). In those cases they were not added as explanatory variables in the final regression. The usual tests to check for the presence of autocorrelation and heteroskedasticity were performed. When necessary, we corrected for autocorrelation by adding an autoregressive term to the estimated equation. Heteroskedastic consistent standard errors were always calculated.

Table 4 lists industries ranked in descending order according to their sensitivity to geographical distance scaled by infrastructure. The table is divided into two parts. The first part lists industries with high and significant distance effects. At the top of the list are Footwear, Metal machinery, Leather and Fruit & Vegetables. The second part of the table lists industries with very low or positive distance effects. Almost all the coefficients have the expected negative sign apart from four industries, namely, Tobacco, Telecommunications, Iron and Steel and Industrial Machinery. Nevertheless, all the coefficients in this second part are non-significant. The statistical significance appears to be correlated with the level of the estimated coefficient. Higher values of the coefficient are associated to higher significance levels, for example Footwear with the highest coefficient (-0.53) has the highest t-statistic (-2.86), whereas, Beverages, with a low coefficient, (-0.04) have a very low statistical significance (-0.04). The implications for Mercosur-EU trade are that according to the sensitivity to geographical distance, products listed in the second part of the table, such as Coffee, Tobacco, Fish or Beverages will be the best candidates for future potential trade.

Table 5 shows the estimated results ranked by their sensitivity to economic distance. Industries are classified in two categories. The first category includes industries where the Linder effect dominates the H-O effect. The second lists industries where the H-O effect dominates the Linder effect. There are ten industries in the first group and nine in the second, which suggests that both effects are important, at least for the selected sectors, and that we cannot generalise by saying that aggregate trade flows are negatively correlated with economic distance.

Sectors with a dominant and significant Linder effect are Telecommunications, Iron and Steel, Metals, Industrial Machinery and Animal Feed Stuff, whereas sectors with a dominant and significant H-O effect are Furniture, Footwear, Beverages, Meat and Fish.

Since per capita income differences between EU countries and Mercosur countries are in most cases considerable, economic distance will have a positive effect on Mercosur trade potential in those branches where the H-O effect dominates. This leads us to the belief that Mercosur exports in Furniture, Footwear, Beverages, Meat and Fish have a great potential. We have to take into consideration that apart from Beverages and Fish, these are goods with a high and significant distance effect, and this will deter trade. However, if we observe the magnitude of the estimated coefficients: the coefficient on economic distance exceeds unity but the coefficient on geographical distance is always below one, this suggests higher sensitivity to economic distance than to geographical distance.

The real exchange rate variable was only significant in six out of nineteen regressions. Since exchange rates are known to affect trade flows with variable lags, more detailed empirical analysis into exchange rates is called for. This observation might also indicate that the exchange rate is not a good proxy for prices of goods at a disaggregated level. Export unit values could be a better approximation and their inclusion in our equation leads to better results. This will be a matter for further research. We also estimated a different form of equation (1), based on the regression model estimated by Hirsch and Hashay (2000),

$$lx_{ijkt} = a_{jki} + g_{kt} + b_0 lyhd_{ijt} + b_1 ldin_{ijt} + b_2 lx_{jkt} + m_{ijkt} \qquad (2)$$

where lx_{jkt} denotes the trading partner j's total exports of industry k. We obtained very similar results. The sign and significance of the economic and geographical distance parameters did not change and the fit of the equations improved only slightly.

Our results are not directly comparable to those of Hirsch and Hashai (2000) because we used a slightly different specification for the regression equation and a different level of disaggregation. Since we used panel data methodology, we believe that our specification improves the fit of the model and adds richness to results. We observed that in general, we obtained a higher significance level for the estimates and more mixed results for the economic-distance variable. We also found some similarities in both estimation results. For example, in both cases the economic distance coefficient is negative (Linder effect dominates H-O effect) for Telecommunications, Iron and Steel, Metals, Industrial Machinery and Vehicles, although in absolute value the coefficients are higher in our results. A positive economic-distance coefficient is found in both sets of results only for Footwear. We also found a dominant H-O effect in Furniture, Beverages, Meat, Fish, Non-ferrous Metals, Vegetables and Fruits, Paper and Metal Machinery. Therefore, we found that the H-O effect dominates the Linder effect in a greater number of cases than in Hirsch and Hashai's (2000) results. However, since we tested the model on a reduced number of industries, more industries should be analysed in order to validate our findings.

Appendix 2 shows the evolution of time dummies over time for 19 sectors. We observed a clear positive trend over the period 1989-1996 for a number of sectors.

These are Paper, Metals, Iron and Steel, Metal Machinery, Industrial Machinery, Telecommunications. A decrease in the absolute value of the time dummies is found for Fish, Vegetables and Fruits, Non-Ferrous Metals and Footwear. Finally, Leather, Furniture and Road Vehicles showed a mixed picture but with a slightly positive trend over the whole period. How can these results be interpreted? We noticed that for sectors with increasing time dummies the Linder effect dominates in most cases and the geographical-distance parameter is very often non-significant. The positive trend in the evolution of the time effects point towards the existence of some factors not included in the analysis, common to all trading-pairs, that foster Mercosur exports. On the other hand, for sectors with decreasing time dummies the H-O effect dominates, observing positive and significant coefficients for the economic-distance parameter. Further research is needed in order to identify these additional factors that might be influencing exports and help to disentangle the interpretation of the time dummies.

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5. Concluding remarks

The objective of this paper was to apply a modified gravity model to annual exports disaggregated by sector, from Mercosur+Chile to the 15 current members of the EU. In doing so, we aimed to classify products according to their sensitivity to geographical and economic distance and to identify which commodities enjoy export strength even without further progress in trade liberalisation with the EU. A number of sectors were selected for the empirical application according to their relative importance in total Mercosur exports.

In our analysis, two significant improvements were added to analyses found in previous literature on the subject. First, the use of panel data methodology allowed us to consider the time dimension of the data. Second, we introduced a modified geographical-distance variable using an infrastructure index.

Our results indicate that some industries show a high and significant geographical distance effect: Footwear, Metal machinery, Leather, Fruit & Vegetables and Furniture. On the other hand, other industries show a very low or positive distance effect, with almost all the coefficients having the expected negative sign, apart from Tobacco, Telecommunications, Iron and Steel and Industrial Machinery. The statistical significance appears to be correlated with the level of the estimated coefficient. Higher values of the coefficient are associated to higher significance levels.

Results concerning economic distance show that for ten industries, the Linder effect dominates the H-O effect, whereas for nine industries the opposite is true. This suggests that both effects are important, at least for the selected sectors, and that we cannot generalise by saying that aggregate trade flows are negatively correlated with economic distance. Sectors with a dominant and significant Linder effect are Telecommunications, Iron and Steel, Metals, Industrial Machinery and Animal Feed. A decrease in economic distance through the catching-up of Mercosur countries would promote trade in these products and would speed up intra-industry trade in general. Sectors with a dominant and significant H-O effect are Furniture, Footwear, Beverages, Meat and Fish. These are products in which Mercosur countries have a comparative advantage due to a relative abundance of cheap labour, land and natural resources. These products are characteristic for inter-industry trade and are bound to decrease with the economic development of Mercosur.

According to our results, Mercosur exports in Furniture, Footwear, Beverages, Meat and Fish present a high and significant H-O effect and a low (Footwear, Furniture, Meat) or non-significant (Fish and Beverages) distance effect. The economic distance coefficient exceeds unity for most of these sectors whereas the geographical distance coefficient is always below one, suggesting higher sensitivity to economic distance than to geographical distance. A deeper analysis, at a higher level of disaggregation within these sectors using data from factor endowments, will help to confirm our results. We plan to extend our research in this direction.

Our results concerning the evolution of the time dummies point to the existence of some factors not included in the analysis, common to all trading-pairs, that foster Mercosur exports in sectors where the Linder effects dominates and deter Mercosur exports in sectors where the H-O effect dominates. Investment in research and development and foreign direct investment might be some of these factors. This result is also in line with the theory of dynamic comparative advantage that predicts a continuous increase in the production and the export of products which require more processing and more knowledge at higher stages of economic development.

This study has laid the ground for the identification of the 'status quo' of Mercosur's exports. Mercosur's most important export sectors today contain about half H-O products and about half Linder products. Linder products would profit from diminishing income differentials between the Mercosur and the EU. An improvement in Mercosur's infrastructure would help both H-O products and Linder products, even though this effect is only slightly significant. Further research is needed to consider the influence of changes in trade policy on export flows, Loser and Guerguil (1999) in order to evaluate the potential impact of a FTA between the EU and the Mercosur.

Table 1. Selection of sectors according to their share in total exports and average-growth rates

Mercosur+Chile exports to the UE	% over total exports			Average Growth
Sectors (SITC at 2-Digit level)	1988	1992	1996	1988-96
01 Meat and meat preparations	5.14	7.14	5.61	1.92
03 Fish, crustaceans, molluscs, preparations (thereof) of same	2.07	3.37	2.56	3.51
05 Vegetables and fruit	7.98	11.21	8.01	0.87
07 Coffee, tea, cocoa, spices, (manufactures thereof) processing of same	7.78	3.95	4.37	-6.22
08 Feeding stuff for animals, not including unmilled cereals	15.00	13.79	15.10	0.89
11 Beverages	0.08	0.26	0.73	31.95
12 Tobacco and tobacco (manufactures) processing	1.81	2.56	2.28	3.75
22 Oil seeds and oleaginous fruit	7.91	6.96	5.78	-3.06
25 Pulp and waste paper	1.78	2.53	3.35	9.06
28 Metalliferous ores and metal scrap	7.30	9.53	10.35	5.31
61 Leather, leather manufactures, n.e.s.?? and dressed fur skins	2.43	2.22	3.61	5.91
67 Iron and steel	2.77	2.25	2.34	-1.30
68 Non-ferrous metals	8.78	6.85	7.58	-1.02
73 Metalworking machinery	0.03	0.11	0.22	29.85
74 General industrial machinery & equipment, and parts	0.44	0.90	1.19	14.27
76 Telecommunications & sound recording apparatus	0.79	0.48	0.15	-18.30
78 Road vehicles (including air-cushion vehicles)	2.54	2.35	1.84	-3.17
82 Furniture and its constituent parts (thereof)	0.08	0.42	0.94	36.82
85 Footwear	1.33	1.48	0.83	-4.91
Sum	76.04	78.38	76.85	

Note: *SITC stands for Standard International Trade Classification*

Table 2. Estimation results for the gravity-type equation

Sectors	Estimated coefficients for: *LYHD*	*LDIN*	*LERR*	*AR term*	Met.	T-d.	S.E.	Ad.R^2
01. Meat	1.76^{h} (3.23)	-0.10^{l}(-1.57)	-0.20 (-0.74)	0.48^{h}(4.41)	F.E.	-	0.88	0.87
03. Fish	0.51^{l}(1.35)	-0.004(-0.04)	-0.19 (-0.57)	-	R.E.	Yes	0.90	0.89
05. Veg&fruits	0.16 (0.44)	-0.27^{h}(-2.55)	-0.56 (-1.58)	-	R.E.	Yes	1.04	0.87
07. Coffee	-1.30^{l}(-1.61)	-0.07 (-0.64)	1.06^{h}(2.43)	0.27^{h}(5.39)	F.E.	-	1.07	0.91
08. Animal Feed	-1.10^{h}(-2.19)	-0.08^{h}(-2.13)	-0.11 (-0.42)	0.32^{h} (4.70)	F.E.	-	0.84	0.90
11. Beverages	1.94^{m}(1.78)	-0.004(-0.04)	-0.01 (-0.03)	0.47^{h}(8.44)	F.E.	-	1.04	0.77
12. Tobacco	-0.48^{l}(-1.51)	0.06 (0.98)	-0.33 (-1.08)	-	F.E.	-	1	0.88
22. Oil	-0.54 (-1.09)	-0.21^{l}(-1.57)	-0.53(-1.32)	-	R.E.	-	1.26	0.85
25. Paper	0.09 (0.23)	-0.17^{m}(-1.81)	1.34^{h}(2.55)	-	R.E.	Yes	0.92	0.79
28. Metals	-1.44^{l}(-1.51)	0.20 (1.07)	-0.16 (-0.21)	0.18^{l}(1.78)	F.E.	Yes	1.22	0.83
61. Leather	-0.63^{l}(-1.39)	-0.27^{h}(-2.64)	0.47 (1.30)	-	R.E.	Yes	1.01	0.86
67. Iron&steel	-1.69^{h}(-2.42)	0.02 (0.12)	1.32^{h}(2.99)	-	F.E.	Yes	1.11	0.85
68.Non ferr. M.	0.44 (0.64)	-0.06 (-0.45)	0.92^{l}(1.41)	-	R.E.	Yes	1.6	0.70
73. Metal M.	0.06 (0.07)	-0.32^{h}(-2.17)	1.05^{l}(1.37)	-	R.E.	Yes	1.32	0.75
74. Industr. M.	-1.32^{h}(-6.24)	0.02 (0.48)	-0.06 (-0.18)	-	F.E.	Yes	0.87	0.89
76. Telecom.	-4.25^{h}(-3.30)	0.05 (0.40)	0.57 (0.80)	0.26^{h}(3.7)	F.E.	Yes	1.63	0. 65
78. Road Veh.	-1.07^{m} (-1.7)	-0.22^{m}(-1.89)	0.39 (0.96)	-	F.E.	Yes	1.17	0.87
82. Furniture	2.85^{h}(2.57)	-0.16^{l}(-1.56)	0.34^{h}(6.71)	1.34^{h}(2.49)	F.E.	Yes	1.07	0.83
85. Footwear	2.69^{h}(2.58)	-0.53^{h}(-2.86)	0.06 (1.04)	2.15^{h}(3.44)	F.E.	Yes	1.38	0.80

Notes:
LYHD denotes the absolute value of per capita income differences. LDINF denotes distance between trading partners scaled by infrastructure. LERR denotes the bilateral real exchange rate. When we found autocorrelation an AR term was added as shown in column 4. Column 5 reports the method used for estimation according to the Hausman test results. Column 6 indicates whether time dummies were added as additional regressors. Standard Errors of the regressions and adjusted R^2 are reported in columns 7 and 8 respectively. All variables except dummies are expressed in natural logarithms. Estimation uses White's heteroskedasticity-consistent covariance matrix estimator. T-statistics are in parentheses.
[h] Significant at the 1% level. [m] Significant at the 5% level. [l] Significant at the 10% level.

Table 3. Hausman test results

Sectors	χ^2	p-value	Best Method
01. Meat	7.62	0.022	F.E.
03. Fish	5.85	0.053	R.E.
05. Veg&fruits	3.38	0.18	R.E.
07. Coffee	29.61	0.00	F.E.
08. Animal Feed	2.25	0.32	R.E.
11. Beverages	0.99	0.60	R.E.
12. Tobacco	15.81	0.00	F.E.
22. Oil	0.40	0.81	R.E.
25. Paper	1.24	0.53	R.E.
28. Metals	1.30	0.52	R.E.
61. Leather	5.49	0.06	R.E.
67. Iron&steel	9.42	0.00	F.E.
68.Non ferr. M.	2.44	0.29	R.E.
73. Metal M.	5.97	0.05	R.E.
74. Industr. M.	28.17	0.00	F.E.
76. Telecommu.	9.43	0.00	F.E.
78. Road Veh.	22.60	0.00	F.E.
82. Furniture	13.59	0.00	F.E.
85. Footwear	9.91	0.00	F.E.

Notes

The null hypothesis states for ortogonality between the fixed effects and the regressors. R.E. estimates are more efficient under the null, but inconsistent under the alternative hypothesis, whereas F.E. estimates are consistent under the alternative.

Table 4. Sectors ordered according to the importance of geographical distance

Sectors	LDIN est.	t-stat
Sectors with high and significant distance-effect		
85. Footwear	-0.53	-2.86
73. Metal M.	-0.32	-2.17
05. Veg&fruits	-0.27	-2.55
61. Leather	-0.27	-2.64
78. Road Veh.	-0.22	-1.89
22. Oil	-0.21	-1.57
25. Paper	-0.17	-1.81
82. Furniture	-0.16	-1.56
01. Meat	-0.10	-1.57
08. Animal Feed)	-0.08	-2.13
Sectors with low and non-significant distance-effect		
07. Coffee	-0.07	-0.64
68.Non ferr. M.	-0.06	-0.45
03. Fish	-0.004	-0.04
11. Beverages	-0.004	-0.04
28. Metals	0.20	1.07
12. Tobacco	0.06	0.98
76. Telecommu.	0.05	0.40
67. Iron&steel	0.02	0.12
74. Industr. M.	0.02	0.48

Note:
LDIN est. denotes the estimated coefficient for distance between trading patterns scaled by infrastructure.

Table 5. Sectors ordered according to the importance and sign of economic distance

Sectors	LYHD est.	t-stat
Sector with dominant Linder effect		
76. Telecommu.	-4.25	-3.30
67. Iron&steel	-1.69	-2.42
28. Metals	-1.44	-1.51
74. Industr. M.	-1.32	-6.24
07. Coffee	-1.30	-1.61
08. Animal Feed	-1.10	-2.19
78. Road Veh.	-1.07	-1.70
61. Leather	-0.63	-1.39
22. Oil	-0.54	-1.09
12. Tobacco	-0.48	-1.51
Sector with dominant H-O effect		
82. Furniture	2.85	2.57
85. Footwear	2.69	2.58
11. Beverages	1.94	1.78
01. Meat	1.76	3.23
03. Fish	0.51	1.35
68.Non ferr. M.	0.44	0.64
05. Veg&fruits	0.16	0.44
25. Paper	0.09	0.23
73. Metal M.	0.06	0.07

Note:
LYHD est. denotes the estimated coefficient for the absolute value of per capita income differences.

Table 6. Average effect and rate of growth of time dummies

Sectors	Time-effects	
	Average Effect	Average rate of growth
Industrial Machinery	0.30	0.13
Metal Machinery	0.28	0.29
Iron and Steel	0.27	0.15
Meat	0.22	0.12
Road Vehicles	0.20	0.07
Beverages	0.19	0.15
Telecommunications	0.18	0.54
Veg&fruits	0.11	-0.13
Paper	0.10	-2.77
Metals	0.09	0.13
Fish	0.04	-0.32
Furniture	0.04	0.27
Tobacco	0.02	-1.88
Oil	0.02	-0.14
Leather	0.00	-2.02
Footwear	-0.02	-3.06
Coffee	-0.05	0.50
Animal Feed	-0.07	0.06
Non Ferrous Metals	-0.07	-2.19

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Appendix 1. Data Sources

CEPAL, Statistical Year Book for Latin America and the Caribbean. Various years. United Nation Publication:

- -Bilateral trade Mercosur + Chile
- -Infrastructure Mercosur + Chile

OEA, America en Ciphers 1965, 1970:

- -Bilateral trade Mercosur+Chile

WILKE, James, Statistical Abstract of Latin America, Vol. XVII University of California Los Angeles (1976):

- -Bilateral trade Mercosur+Chile

BID, Intra-ALALC exports (grouped according to Standard International Trade Classification) Various years (1965-1969):

- -Bilateral trade Mercosur+Chile

OCDE, International Trade by Commodities Statistics ITCS. CD ROM 1960-1996:

- -Bilateral trade for EU countries

World Bank, World Development Indicators CD ROM 2000:

- -GDP
- -GDP deflator.
- -Total exports and imports
- -Exchange rates against dollar
- -Population
- -Infrastructure for EU countries

World Bank, World Data 1995 CD ROM:

- -Germany data before 1990

World Bank, Railways Database, http://www.worldbank.org/html/fpd/transport/rail/rdb.htm:

- -Railways data

FAO, Faostat Agriculture Data, http://apps.fao.org/page/collections:

- -Population (forecast)

John Haveman's web site and http://www.indo.com/distance:

- -Distance, expressed in kilometres, is the distance between capital cities.

Estimated data:

- -Bilateral real exchange rate (base 1995)
- -Exports deflator (base 1995)
- -Exports in real terms (base 1995)
- -Trade weight
- -Germany data prior 1990
- -European Union totals