

**NEW DIRECTIONS OF TRADE FOR THE AGRI-FOOD INDUSTRY: A
DISAGGREGATED APPROACH FOR DIFFERENT INCOME COUNTRIES, 1963-2000**

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Abstract: The objective of the present study is to explain the fundamental changes experienced by agricultural trade in the second half of the XX century. The first of these was a progressive concentration of this trade among developed countries, while the second was a significant boom in agricultural trade among developing countries, since the final decade of the last century. Our gravity model underlines that, the agricultural products exported by the Southern countries to any destination had a demand elasticity which was negative and statistically significant. Furthermore, this model has also permitted verification that Regional Trade Agreements have significantly encouraged agricultural trade among developed countries. In contrast, the developing countries were faced with highly protected markets and a relative initial failure in their attempts to liberalize their regional markets. The boom from the final decade of the XX century in South-South agricultural trade can be explained, by the stimulus provided by the new RTAs among developing countries,

Key words: Agri-food trade, gravity equation, regional trade agreements, agri-food industry

JEL codes: F14, N50, N70, Q17

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INTRODUCTION

From the mid-XIX century until the First World War the international economy witnessed a significant increase in market integration; this period is often referred to as the first wave of globalization. Industrialization, which took place principally in Europe, and an increase in incomes, accompanied by the reduction of transport costs, market liberalization and a stable economic setting provided by the gold standard were the principal motors of this process. The expansion of trade was one of the key elements in this first wave of globalization, together with the boom in capital movements and in transoceanic migrations.

Agricultural products and food played a central role in the growth of exchanges, which from 1870 onwards accounted for approximately 50% of total trade. Trade was inter-industrial, within which exchanges of manufactures for primary products between countries with very different patterns of specialization were predominant. The increased specialization of the most developed European countries in manufactured products generated an intense demand for raw materials and foodstuffs; such needs were met both by various lesser-developed European countries and the rest of the world. Most other Continental countries were integrated into international trade, principally as exporters of primary products and importers of manufactures (Aparicio et al., 2009).

After 1914, the globalization process was interrupted as a result of the outbreak of the First World War, which was followed by a far-reaching collapse, due to the depression of the 1930s and the Second World War (O'Rourke and Williamson, 1999).

In the second half of the XX century, the integration of the world economy accelerated, once more especially in the Western countries, with the establishment of a new economic order which encouraged a stable environment of generalized growth. Although at first this process did no more than recover past levels of integration, since approximately the 1960s the integration process

accelerated at an unprecedented rhythm, often called the second wave of globalization, in which trade once more played a key role (Findlay and O'Rourke, 2007). The pattern of international trade came to be intra-industrial, predominantly between advanced economies with similar factor endowment (Krugman, 1995). In addition, there was a profound change in the composition of international trade, characterized by an increase in the share of manufactured products and a sharp decline in that of agricultural and food products. In 1951 the latter accounted for 43% of the value of total world trade. In the year 2000 this figure was only 6.7%. Part of this declining importance is explained by the relative fall in their prices, but nevertheless the decrease in volume was also substantial (Serrano and Pinilla, 2011a and 2012).

This new process of market integration was far removed from the pattern of complementarity developed throughout the first globalization. Both total trade and trade in agricultural products and food have become progressively concentrated on the exchange of goods among developed countries. Nations which traditionally were more dependent upon the export of agricultural products and food saw their traditional market shares fall, while the more developed countries increased their exchanges. Thus, the regions most dependent on the export of agricultural products (Africa and South America) saw their share of world agricultural trade fall. Moreover, some of these countries not only saw their exports fall in relative terms, but also experienced a sharp deterioration in the ratio of agricultural exports to imports. Thus Africa and Asia became net importers of agricultural products where they had once been net exporters. By contrast, the high income nations, and in particular Europe, increased their share of world agricultural trade.

Table 1 reflects this decline in the share of developing countries, of approximately 10 percentage points from the 1960s until the end of the century. The counterpart has been the increasing weight of the developed countries, especially those of the European Union, in world agricultural markets. Thus, Europe represented 30.7% of world exports in the 1950s and its share

by the end of the century grew to 46.9%. Such diverse performances were not unaffected by either the economic policies followed in diverse countries nor by the obstacles placed in the way of international agricultural trade. The governments of the more developed countries supported agriculture more than any other sector, while many developing economies discriminated against it¹. On this last point, the case of South America is especially notable, since many of its countries opted in the early stages of the period to develop policies based on the substitutive industrialization of imports, which greatly penalized their agro-exporting sectors.

Table 1. Percentage of participation of the developed and developing countries in the international trade of agricultural and food products

	1961-63	1977-79	1998-00
Developed countries	57.87	64.97	68.94
Europe	30.67	39.82	46.94
Canada and USA	19.42	19.94	16.77
Oceania (developed)	7.29	4.90	4.86
Developing countries	41.87	34.71	30.90
Asia under development	15.60	12.46	15.29
Latin America and the Caribbean	14.79	14.95	12.09
Africa	11.49	7.30	3.52

Source: Authors' elaboration, using UN-COMTRADE (2003)

Table 2 shows, for the two final decades of the XX century, the directions of agricultural trade and offers a view of how the share of agricultural trade among the countries of the North has consolidated and even deepened. Approximately 80 percent of agricultural exports from the developed countries are destined to other developed countries. Within this group the boom in intra-EU trade has been very important, especially in the initial decades of the process of European integration. The same has occurred, from the 1990s on, with the surge of trade in the North

¹ In many countries of the developing world the exports sector was penalized, through diverse economic policy measures (Anderson, 2010).

American region, coinciding with the increasing importance of the North American Free Trade Treaty.

It is also important to underline here that the composition of international agricultural trade asymmetrically affected the exchanges among the diverse economic regions. The less developed countries exported basic products and products with a low level of processing, while the high-income countries largely monopolized the market in highly processed products, precisely those which have shown throughout this period greater potential for growth.

The developing countries have depended on exports to their traditional markets, that is to say Old Europe and rich North America. However, this position has progressively changed. The agricultural exports of developing countries to countries of similar income have significantly increased. They already represented 31 percent of total agricultural and food exports by 1990, a figure which increased to 38 percent at the end of the last century. This new trade pattern, with an increasing importance on the direction of South-South flows, is common to all the developing regions, and this is possibly related to the growth of the so-called emerging economies, increasing market liberalization and the success of some trade agreements among developing countries from the 1990s on².

Our hypothesis is that all these substantial changes in agricultural trade flows may be explained by the successful liberalization of regional exchanges through various types of Regional Trade Agreements, in a context of strong agricultural protectionism, and due to the diverse specializations in the trade in agricultural goods among developed and developing countries.

² This boom in South-South trade is even more important in manufactured products (Hanson, 2012)

Table 2. Destination of agricultural and food exports, by region (percentage)

Origin/Destination		North	EU-15	Canada and USA	South	Asia and the Pacific	Latin America and the Caribbean	Near East and North Africa	Sub-Saharan Africa
North (Developed countries)	1980	74	53	9	26	8	7	9	3
	1985	76	53	14	24	7	5	9	3
	1990	81	60	11	19	7	4	6	2
	1995	80	55	11	20	8	5	5	2
	2000	81	50	14	19	8	5	5	1
EU-15	1980	82	76	4	18	2	3	10	4
	1985	84	76	8	16	2	2	9	3
	1990	88	82	5	12	2	2	6	2
	1995	89	79	4	11	2	2	5	2
	2000	89	73	6	11	3	2	5	2
Canada and USA	1980	65	29	14	35	13	14	6	2
	1985	67	22	22	33	11	12	7	3
	1990	70	22	24	30	12	10	6	1
	1995	67	18	25	33	15	11	6	1
	2000	67	13	32	33	12	14	6	1
South (Developing countries)	1980	67	35	14	33	18	5	7	2
	1985	69	35	17	31	13	5	11	2
	1990	69	33	19	31	14	6	8	2
	1995	63	28	17	37	19	8	8	3
	2000	62	25	19	38	18	8	8	3
Asia and the Pacific	1980	61	24	12	39	27	2	9	2
	1985	62	21	14	38	24	1	10	2
	1990	63	21	12	37	26	2	8	2
	1995	57	16	12	43	32	1	7	2
	2000	57	15	14	43	32	1	7	2
Latin America and the Caribbean	1980	75	44	23	25	2	18	4	1
	1985	75	43	25	25	4	11	9	2
	1990	75	39	31	25	4	14	6	1
	1995	67	33	27	33	8	19	5	2
	2000	68	28	30	32	7	18	5	1
Near East and North Africa	1980	72	65	1	28	2	0	23	4
	1985	61	44	7	39	2	0	35	1
	1990	68	51	6	32	3	1	27	1
	1995	64	43	5	36	4	1	30	1
	2000	63	42	5	37	4	1	30	2
Sub-Saharan Africa	1980	85	71	9	15	3	0	3	8
	1985	86	71	14	14	4	0	2	8
	1990	75	67	5	25	5	0	2	18
	1995	71	59	5	29	8	1	5	14
	2000	61	46	5	39	11	1	8	19

Source: Authors' elaboration, using UN-COMTRADE (2003)

With regard to the impact of Regional Trade Agreements (RTAs), the European Union³ in particular was especially successful in liberalizing the exchange of agricultural products and food among its members. Agricultural trade among them (taking the EU-15 as reference), there was a spectacular increase, from 17.1% of world agricultural exports in 1959-66 to 26.8% in 1994-2000 (Serrano and Pinilla, 2011a)⁴. In other regions of the world, such as Latin America, the effect of these agreements upon agricultural trade was much lesser (Serrano and Pinilla, 2008). Only in the 1990s, following the Uruguay Round of GATT, did a certain liberalization of the markets in agricultural products and a reduction of protectionism take place. From that point on, and also as a consequence of the dynamism of the Asian countries and of the stimulation of RTAs among developing countries, a new pattern emerged in the exchanges of agricultural products, defined by the boom in trade among the economies of the South.

Secondly, the pattern of specialization in trade in agricultural products was diverse, at least until the 1990s, among developed and developing countries. The former have strengthened their specialization in high-value products and transformed agricultural products, while the latter continue to concentrate their exports on bulk and plantation products. This has damaged the dynamism of agricultural trade of the latter countries, since the lower income elasticity of these products has produced growth of their exports.

Given this context, the principal objective of the present study is to explain the changes in the directions of agricultural trade flows during the second half of the XX century. To do this we shall attempt to verify whether the two hypotheses proposed earlier are correct and therefore explain these changes. To compare and explain the evolution of different directions of trade, the

³ Hereafter we shall use the term European Union (EU) for all those institutions which preceded it.

⁴ See also Dell'Aquila *et al.*, (1999) or Diao *et al.*, (1999), who demonstrate the extraordinary upsurge in intra-regional trade in various geographical areas.

present article estimates the gravity equation for the bilateral volume of agricultural trade, analyzed separately in four categories of trade flows: trade between high-income countries (N-N), trade flows which originate in high-income countries and are destined to low-income countries (N-S); trade flows whose origin is in developing countries and are exported to the developed world (S-N); and trade flows between low-income economies (S-S). Concretely, using the UN-COMTRADE (2003) database we have constructed a data panel for bilateral trade among 40 countries with a significant presence in international markets for the period 1963-2000.

The empirical success of this equation in explaining trade patterns has engendered numerous subsequent articles, although very few of these have employed such a long-term perspective, and nor have they concentrated on the agricultural products and food trade and compared it to trade in different directions.

Finally, it should be emphasized that the study shows how a correct estimation of the gravity equation must include fixed effects by country; these serve as an approximation of “multilateral resistance”, following the suggestions made by Anderson and van Wincoop (2003). In addition, the standard errors must be corrected using a Prais-Winsten estimation, as otherwise the models are subject to problems of specification.

The following conclusions can be extracted from the present study. Firstly, income demand elasticity for imports has a negative sign for agricultural products from the Southern countries; this demonstrates that such products behaved like inferior goods, and that for this reason these countries suffered a brake on the growth of their exports. Secondly, while other types of trade, such as manufactures, enjoyed greater multilateral liberalization of their markets, strong market intervention caused them to base their growth on the proliferation and success of RTAs in the North. As a consequence, agricultural trade concentrated progressively on developed economies.

The latest liberalization of GATT and GSTP gave rise to new increases, this time in South-South agricultural trade.

MATERIALS AND METHODS

As described earlier, the process of the integration of agricultural markets during the second half of the XX century was especially important among high-income countries and then, in the 1990s, so were the latest increases in South-South trade flows. We would therefore like to study here the determinants of agricultural trade, employing a disaggregated approach to trade flows for different subsamples of countries. According to Feenstra, Markusen, and Rose (2001) and Hummels and Levinsohn (1995), it is possible that the results do not depend upon product type but instead on individual country characteristics.

To analyze the factors determining the changes in the direction of agricultural trade flows during a good part of the second half of the XX century, the present article estimates the gravity equation for the bilateral volume of agricultural trade, analyzed separately in four categories of regional trade flows. We use the data for bilateral trade flows published by the United Nations Statistics Division in the UN-COMTRADE database (2003). These data were taken from the figures for bilateral exports (FOB - free on board). The sample includes trade between 40 countries, whose trade flows are representative of international trade flows in agri-food⁵. With regard to the representativeness of the sample employed, in the 38 years covered, this moved in an interval of 66-76% of international trade in agricultural products. It largely followed the trend of the complete series of world agricultural trade (Serrano and Pinilla, 2010). As Table 3 shows, the representativeness of the sample exceeds 95% in the processed foods groups, those of high value

5 **South:** Africa (Algeria, Ivory Coast, Egypt, Morocco, Nigeria and Sudan); Asia (China, India, Indonesia, Israel, Malaysia and Saudi Arabia); Latin America (Argentina, Brazil, Chile, Colombia, Ecuador, Nicaragua and Peru)

North: Europe (Belgium-Luxembourg, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain and the United Kingdom); Japan; North America (Canada, Mexico and the United States); Oceania (Australia and New Zealand).

and other processed agricultural products, while basic and plantation products represent only approximately 50%, due to the lower presence of low-income countries specialized in this type of products.

Table 3. Representativeness of the sample of 40 countries over total trade in agricultural products, by product groups. 1963-2000
(Regional classification on the basis of per capita income - percentages)

Basic products and plantation products

Period	North-North	North-South	South-North	South-South	Outside the sample	Total
1963-66	26.91	4.09	13.80	1.69	53.51	100
1967-73	28.36	3.06	12.68	1.40	54.50	100
1974-80	29.61	4.99	9.67	1.38	54.35	100
1981-87	30.00	7.48	8.33	1.27	52.92	100
1988-94	34.23	5.90	8.50	1.57	49.81	100
95-2000	30.62	6.83	8.06	2.59	51.90	100

Processed and high value and other processed products

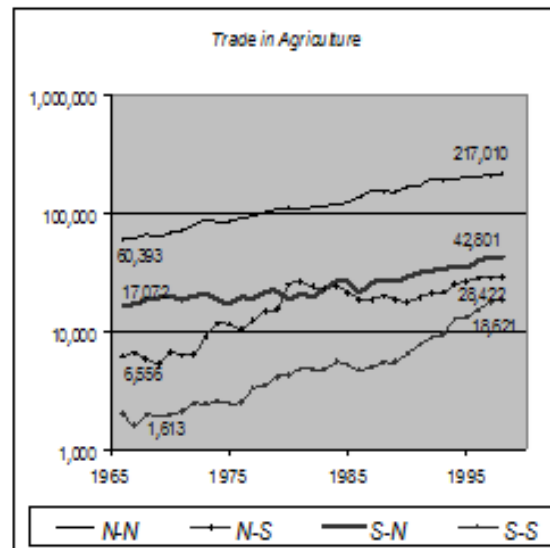
Period	North-North	North-South	South-North	South-South	Outside the sample	Total
1963-66	70.75	6.97	12.99	1.04	8.25	100
1967-73	72.88	6.56	11.13	1.12	8.31	100
1974-80	74.46	10.25	8.86	1.66	4.77	100
1981-87	73.01	11.28	9.28	2.30	4.13	100
1988-94	76.11	7.33	8.88	2.59	5.08	100
95-2000	72.74	7.97	9.55	4.78	4.96	100

Source: Authors' elaboration, using FAOSTAT (2004) and UN-COMTRADE (2003)

We constructed export flows by volume for agricultural and food products, following the system of the Standard International Trade Classification (SITC, Revision 2) (in 1985 \$US) for the period 1963-2000, in year t (X_{ij}). Trade in agricultural products and food is that included in the SITC groups 00-04⁶

⁶ SITC groups: 00.Live animals, 22.Oil-seeds and oleaginous fruits, 26.Textile fibres, 06.Sugar, 07.Coffee, tea, cocoa, 01.Meat and meat preparations, 02.Dairy products and birds' eggs, 04.Cereals, 05.Vegetables and fruit, 08.Feeding stuff for animals, 09.Miscellaneous edible products and preparations, 11.Beverages, 12.Tobacco and tobacco manufactures, 41.Animal oils and fats, 42.Fixed vegetable fats and oils, 43.Animal or vegetable fats and oils, processed.

Figure 1. Evolution of trade flows for agricultural products: groups of flows by economic region (Logarithmic scale. Millions of 1985 \$US)



Source: Authors' compilation. using UN-COMTRADE (2003)

The database therefore consists of four balanced data panels comprising trade flows among 40 countries of origin, 39 countries of destination and 38 years⁷. Following the World Bank's income classification trade flows is classified into four categories of trade flows, the first of which is among high-income countries (N-N). As Figure 1 shows, their bilateral trade flows achieved strong growth in agricultural exchanges. The second is trade flows which originate in high-income countries and are destined to low-income countries (N-S). The third is trade flows whose origins

⁷ In order to obtain a balanced panel trade flows with a value of 0 are replaced by a figure for minimum trade (\$100), following previous research such as Raballand (2003) or Schumacher and Siliverstovs (2006), who use a similar specification to our approach to the gravity equation. The most common alternative to the foregoing consists of eliminating those trade flows with a value of 0. Frankel (1997) performs a comparative analysis of the two methods and finds negligible differences between the two alternatives. The present study opted for the first method, since it permits us to use more sophisticated econometric methods, which correct the recurrent problems of estimation in previous research. Nevertheless, due to the drastic lack of data, exports from China, Ivory Coast, Nigeria, Sudan, Saudi Arabia and Uruguay to the remaining countries were eliminated. Note that exports from the remaining countries to these countries remain in the sample. Thus, the sample comprises the trade flows among 40 countries of origin x 39 countries of destination x 38 years – (6 x 39 x 38 trade flows were eliminated due to a lack of data) = 50,388 observations.

are in developing countries and are exported to the developed world (S-N), their trade in primary products was based on previous stages and grew very slowly in the study period. The final category is trade flows between low-income economies (S-S), whose growth of exchanges accelerated, especially in the final fifteen years of the last century.

We now propose the specification of the gravity equation we shall use. The empirical approach is based on the work of Feenstra et al. (1998), Bergstrand (1985, 1989) and Anderson and van Wincoop (2003), in which a detailed derivation of the theoretical groundwork may be found. Applying logarithms, the functional form of the equation is:

$$\begin{aligned} \ln X_{ij} = & \beta_1 + \beta_2 \ln(Y_i) + \beta_3 \ln(Y_j) + \beta_4 \ln(Y_{pcp_i}) + \beta_5 \ln(Y_{pcp_j}) + \\ & + \beta_6 \ln Dist_{ij} + \beta_7 \ln Excvol_{ij} + \beta_8 \ln Rem_{ij} + \beta_9 Border_{ij} + \\ & + \beta_{10} Lang_{ij} + \beta_{11} RTA_{ij} + \beta_{12} GATT_{ij} + \delta_{ij} + \varepsilon_t \end{aligned}$$

where X_{ij} represents the volume of trade between two countries; Y_i, Y_j : is the real GDP of both the exporting country and the importing country, in year t, in 1985 US dollars (World Development Indicators (WDI) database CD-ROM, 2004); Y_{pcp_i}, Y_{pcp_j} : is the per capita GDP of both the exporting and importing countries, in year t, in 1985 US dollars (WDI CD-ROM, 2004); $Dist_{ij}$: is the distance between the capitals of the countries of origin and destination (CEPII's Data-Base, 2011) ; $Excvol_{ij}$: is an indicator of exchange rate volatility in year t⁸; $Border_{ij}$ is a dummy variable which takes the value of 1 if the countries have a common border and 0 otherwise; $Lang_{ij}$:w is a dummy variable which takes the value of 1 if the countries share a common language and 0 otherwise; Rem_{ij} : is the relative distance weighted by income levels, following the methodology and data of Rose (2000); RTA_{ij} : is a dummy variable which takes the value of 1 if the two countries belonged to the following regional trade agreements (EU, NAFTA, CER, APEC,

8 Estimation of the standard deviation of the first difference of the annual natural logarithm of the nominal bilateral exchange rate, for both countries in the 10 years preceding the period t (data for exchange rates taken from WDI CD-ROM, 2004)

MERCOSUR, ANDEAN, ASEAN, GSTP and 0 otherwise; $GATT_{ij}$ is a dummy variable aimed at capturing the impact of the various rounds of GATT. Concretely, $GATT_{63-94}$, is a dummy variable, used if the two countries belonged to that body prior to the Uruguay Round (1994). Additionally, $GATT_{94-00}$ is a dummy variable, employed if the two countries were members of GATT following the implementation of the agreements reached in the Uruguay Round of GATT (1994). The objective of this separation is to analyze, especially, the effects of the latter which, as mentioned earlier, was the first round in which the liberalization of trade in agricultural products and food was negotiated.

Lastly, in line with the recent work by Anderson and van Wincoop (2003), the equation includes “multilateral (price) resistance terms”, which are proxied by the dummy variables. This article, which has been highly influential in recent studies, demonstrates that the omission of price indices leads to an erroneous specification of the empirical model, which may bias the results. We use country-pair fixed effects (δ_{ijt}) to account for the multilateral price terms (rather than a custom nonlinear least squares program), following the alternative proposed by Feenstra (2004). These variables reflect the effect of all the singularities of the exporting and importing nations that might affect trade between two countries and are not captured by the remaining variables specified in the empirical model. Finally, the model includes the error term (ε_t) which is assumed to be log-normally distributed.

With regard to the estimation technique, our aim is to overcome the limitations of previous research which has only taken into account the variations among the units of observation (cross-section analysis). The present study also examines the time variations within the observation units. The use of panel data increases the efficiency of the estimators and significantly reduces the potential problems caused by the omission of variables (Hiaso, 1986). From this perspective, three

types of data panel estimation are proposed: the first is the estimation of ordinary least squares (OLS) with the grouped panel; the second and third take into account the time variation, by the inclusion in the model of random effects and fixed effects, respectively.

In order to determine which of the three estimators is most efficient, the LM Breusch-Pagan test for random effects was employed; this permitted us to choose between OLS estimation of the grouped panel and estimation with random effects. Following the application of the Breusch-Pagan test, it was concluded that random effects are significant, and it is therefore preferable to use such an estimation rather than the grouped panel estimation. Similarly, to demonstrate that the inclusion of fixed effects was a more appropriate method than the other two we employed initially, various tests were performed. Firstly, the F-test (Greene, 2000) of the significance of fixed effects indicated that their estimations were better than when the OLS estimation of the grouped panel was employed. Secondly, the Hausman test demonstrated that the estimators of random effects and of fixed effects differ significantly, and that the fixed effects model provides a better explanation of the sources of variation and is therefore more appropriate than the random effects model.

It is important to underline here that, despite having modelled temporal and spatial heterogeneity, according to a Wald test (Greene, 2000) our model poses problems of heteroskedascity and, according to the Woolridge test (Wooldridge, 2001), problems of autocorrelation also exist. Lastly, the Breusch-Pagan test, used to identify problems of contemporaneous correlation in the residuals of the fixed effects model, likewise confirms the need to correct this problem. The abovementioned problems of contemporaneous correlation, heteroskedascity and autocorrelation can be solved jointly and were resolved by the estimation of panel-corrected standard errors (PCSEs)⁹. On the positive side, once the problems of estimator

⁹ Beck and Katz (1995) demonstrate that the standard errors of PCSE are more precise than those of FGLS (estimation of Feasible Generalized Least Squares, the potential alternative to solving the abovementioned problems).

specification were corrected, the models continued to function well. All the principal variables present the expected sign and are statistically significant.

On this point, and in addition to these technical reasons, there are also theoretical motives for preferring the fixed effects estimation (Feenstra 2004, 161-163). As stated earlier, Anderson and van Wincoop (2003) derived a gravity equation specification by using a model that includes the presence of “multilateral (price) resistant terms”, which was approximated using fixed effects by pairs of countries¹⁰. Furthermore, Baier and Bergstrand (2007) conclude that, for the analysis of trade agreements, the fixed effects approximation is best.

RESULTS AND DISCUSSION

Table 4 shows the estimation of the equation with PCSE and fixed effects for the four subsamples of trade flows.

Firstly, the growth in exchanges accelerates in line with market size. For any export destination, whether North or South, the coefficients of the variable Y_j , are high and statistically significant; this occurs especially in flows whose origins were in developing countries. With regard to the variable Y_i , we generally find a negative sign, which underlines that the growth of the domestic markets tends to brake exports of agricultural products and food. This is clear, especially when exports proceed from developing countries and are destined to the South (see the coefficient in the fourth column: S-S -5.207), where market growth via population expansion was notable in the period.

¹⁰ Following Feenstra (2004), the use of alternative methods produces similar results.

Table 4. Results of gravity equation for international trade in agricultural products and food, manufactures and total trade: groups of flows by economic region.

Agricultural Trade PCSE-FE				
	N-N	N-S	S-N	S-S
$\ln Y_i$	-1.333***	1.339*	-1.322	-5.207***
$\ln Y_j$	1.657***	1.280***	3.478***	3.198***
$\ln Y_{pcp_i}$	1.802***	-0.801	2.482**	7.474***
$\ln Y_{pcp_j}$	-0.356	0.481	-2.687***	-1.621***
$\ln Excvol_{ij}$	-0.021**	0.023	0.019	0.016
$\ln Rem_i$	-0.005	-0.000	0.002	-2.068***
<i>EU</i>	0.465***			
<i>EFTA</i>	0.270***			
<i>APEC</i>	0.105	-0.513**	0.058	1.076**
<i>NAFTA</i>	0.186*	0.472**	-0.207	
<i>CER</i>	0.036			
<i>MERCOSUR</i>				-0.920***
<i>ANDEAN</i>				-0.055
<i>ASEAN</i>				-0.108
<i>GSTP</i>				0.504***
$Gatt_{62-94}$	0.094	0.177	-0.004	-0.327*
$Gatt_{94-00}$	0.094	0.257	0.359**	0.624***
<i>Constant</i>	2.530	-64.80***	-37.64***	21.40
<i>No.observ.</i>	14.440	15.200	10.640	10.108
<i>Adjusted R²</i>	0.864	0.451	0.517	0.463

Note: Prais-Winsten estimation with PCSE and fixed effects. N-N: North-North trade, between high-income countries; N-S: North-South trade, exports from high-income countries to low-income countries; S-N: North-South trade, exports from low-income countries to high-income countries; S-S: South-South trade, between low-income countries.

All variables are in logarithms, except binary variables (such as common border, language and different RTAs).

***, ** and * denote statistical significance at the 1%, 5% and 10% level respectively.

Secondly, the slower growth of the exports of products originating in the South may be explained by the low income elasticity with regard to the demand for exports toward their traditional markets. As shown in Columns 3 and 4 of Table 4, the coefficient of the per capita income of the developed countries (Y_{pcp_j}), is negative and statistically significant (-2.687) in exports destined for the North, and also negative and statistically significant (-1.621) when their destination was countries of the South. Thus, the southern countries were exporting basic products which, as we know, have a negative elasticity in the more advanced economies.

Thirdly, in the trade flows among high-income countries, here characterized as North-North, the coefficients of the variables EU, EFTA and NAFTA, display positive signs and statistical

significance, demonstrating that the RTAs in the richest parts of the world created trade, and in some cases, such as in Europe, did so from very early dates within the study period. Consequently, this result should be borne in mind in order to understand the intensification of North-North trade.

From the point of view of the exporters of the South, everything seems to indicate that their exchanges have faced strongly protected markets during a large part of the period, at least until the 1990s. On this point, the coefficient of the GATT variable is extremely noteworthy; it only displays positive and statistically significant effects for flows proceeding from the South following the Uruguay Round (see the coefficients of the variable *Gatt₉₄₋₀₀*, in Columns 3 and 4 of Table 4). The coefficient also shows a greater effect in S-S flows. This result permits explanation of the boom which began in the 1990s in agricultural trade among developing economies. On this point, it is very interesting to check also how the GSTP and APEC variables display a positive and significant result in the liberalization of markets among developing countries. These effects are not found for previous RTAs such as Mercosur, el Pacto Andino (Andean) o Asean.

CONCLUSIONS

The objective of the present study has been to explain the fundamental changes experienced by agricultural trade in the second half of the XX century. The first of these was a progressive concentration of this trade among developed countries, while the second was a significant boom in agricultural trade among developing countries, since the final decade of the last century.

Our starting hypothesis was that these changes could be explained by regional specialization in the distinct types of countries in different agricultural products for export and also due to the different effects regarding agricultural trade in the established RTAs.

To explain the concentration of trade among developed countries, our gravity model has underlined that, in effect, the agricultural products exported by the Southern countries to any destination had a demand elasticity which was negative and statistically significant. Furthermore, this model has also permitted verification that RTAs such as the EU, EFTA or NAFTA have significantly encouraged agricultural trade among developed countries. In contrast, the developing countries were faced with highly protected markets and a relative initial failure in their attempts to liberalize their regional markets.

The boom from the final decade of the XX century in South-South agricultural trade can be explained, according to our model, by the stimulus provided by the new RTAs among developing countries, with much more significant results in their stimulation of the growth of agricultural exchanges among developing countries. Moreover, we have demonstrated that the multilateral liberalization of agricultural trade since the Uruguay Round of GATT in 1994 especially encouraged trade flows among the countries of the South. It is obvious that the demand for agricultural products and food from some emerging countries, such as China, has also stimulated South-South trade. This is clearly shown by the results from our model, which underline the strong stimulus to trade among developing countries, as the market size of the importers increases.

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