TRADE CREATION AND TRADE DIVERSION IN MERCOSUR AND NAFTA

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RESUMO

A integração comercial entre países vem ocorrendo através de negociações multilaterais e acordos regionais. As teorias de comércio internacional dizem que as primeiras provocam aumento de bem-estar. Entretanto, não há consenso sobre os efeitos dos segundos. O papel deste trabalho é justamente avaliar os impactos de dois acordos comerciais, o Mercosul e o Nafta, sobre dois critérios de bem-estar, a criação e o desvio de comércio. Isso é feito através da estimação de equações gravitacionais para dados em painel, com a inclusão de variáveis *dummy* para captar a relação intra e extra-bloco, conforme metodologia apresentada por Endoh (1999). Os resultados apontaram que não ocorreu criação de comércio em ambos os acordos. O Nafta foi seguido por desvio de comércio e o Mercosul apresentou dificuldades na mensuração do mesmo.

Palavras chave: Integração Econômica, Modelo Gravitacional, Mercosul, Nafta.

ABSTRACT

The commercial integration between countries has been taking place through multilateral negotiations and regional agreements. Economic theories of international trade say that the first one improves welfare. However, there is no consensus about the second one. The aim of this article is just to evaluate the effects of two agreements, Mercosur and Nafta, on two concepts of welfare, trade creation and trade diversion. This is done through the estimation of gravity equations by panel data methods, with dummy variables to detect intra-bloc and extra-bloc relations, according to the methodology of Endoh (1999). The results suggested that trade creation has not occurred in both agreements. Nafta was followed by trade diversion and Mercosur presented difficulties in measuring this component.

Keywords: Economic Integration, Gravity Models, Mercosur, Nafta.

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Trade creation and trade diversion in Mercosur and Nafta

1. Introduction

Since 1950, commercial integration between countries has been taking place mainly by two ways. The first one refers to the multilateral system, which involves organizations like Gatt and WTO. According to the theories of international trade, this way always comes with improvements in welfare and efficiency. The second one refers to regional agreements about which, otherwise, economic theory does not say if they are good or bad. Thus, empirical works can help us to know if the effects of these agreements are positive or not.

The empirical literature of international integration has been using extensively two criteria of welfare and efficiency, the Vinerian concepts of trade creation and trade diversion. The first occurs when countries which sign an agreement can import cheaper goods produced by members of the same bloc. It causes an increase in welfare. The second one happens mainly when imports from countries outside the bloc area are reduced after the agreement takes place. More competitive suppliers are then substituted for suppliers less competitive which are located in member countries. This phenomenon is related with a loss in welfare and efficiency.

The evaluation of these criteria, formerly made by income elasticities and market-shares, is now made through gravity models, which regress bilateral flows on GDP, population, exchange rates, distance and other variables. Dummy variables are usually included in this regression to capture the effects on intra-bloc relations, like trade creation, and on extra-bloc relations, like trade diversion.

The objective of this article is just to evaluate these criteria in a more accurate framework, analyzing two blocs: the Mercosur and the Nafta. We estimated gravity models in a panel data environment by several estimators. Trade creation and trade diversion were detected by the methodology of Endoh (1999), which uses three kinds of dummy variables: a first one to detect intra-bloc exports, a second one to capture extra-bloc imports and a third one to analyze extra-bloc exports. We then performed tests to select the more reliable estimators, analyze the estimatives and take the conclusions. The results suggested that there was no trade creation in both agreements. Nafta was followed by trade diversion and Mercosur had inconclusive results on this criterion.

2. Trade creation and trade diversion

In analyzing the welfare effects produced by trading blocs, the concepts of trade creation and trade diversion were first used by Viner (1950). In his book, he establishes a dichotomy by pointing trade creation as something that enhances welfare and trade diversion as something that reduces welfare. A short and abstract explanation of both concepts is presented below[3].

[3] More complete and graphical explanations can be seen in Nevin (1990) Yarbrough and Yarbrough (2000) and Molle (1990).

Suppose that two countries, C1 and C2, form a trade bloc. The removal of tariffs will become many products of C2 cheaper at C1 and vice versa. If C2 produces a product P with lower costs than C1, it will be sold with more competitive prices in the market of C1. The imports of P from C2 will rise and trade-creation will occur. The consumers of P will pay less for it. In the market as a whole, consumer's surplus will rise and welfare will be improved. Thus, trade-creation is related with an increase in welfare.

Imagine now that exists a country C3 with production costs of P even lower than C2. Suppose also that the tariff of C1 for products of C3 is not higher to hinder the P of C3 from being sold cheaper than the others. Surely, the product of C3 dominates the market of P in C1. If C1 and C2 form a bloc and the tariff reduction makes the P from C2 cheaper than the one from C3, consumers of C1 will buy the product that is not produced with the lower cost. Hence, trade of P is diverted from C3 to C2. This new allocation is not efficient and represents a loss in welfare.

From Viner henceforth, many empirical studies tried to measure both concepts with the purpose to evaluate the effects of trade agreements. Formerly, it was done through the analysis of market-shares and income-elasticities[4]. Lately, it was done through gravitational models, as we present in the next section. Gravity models have the advantage that they can be estimated by recent econometric tools. Former ways, otherwise, were made through difficult calculations that had an interpretation of results not always directly.

3. The gravity model

The econometric analysis of this article was based on a regularity in which bilateral trade is related positively with the incomes of the countries involved and negatively with the distance between them. This regularity is usually represented by an equation whose multiplicative format resembles the Newton's law of universal gravitation. Hence, econometric models of this kind are usually called gravity models and can be represented, in logarithms, as:

$$\ln X_{ij} = \alpha + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln D_{ij} \qquad (1)$$

where X_{ij} is the flow of goods from country i to country j; Y_i is the income of country i; Y_j is the income of country j; and D_{ij} is the distance between i and j.

The first attempt to provide theoretical foundations for gravity models was made by Linnemann (1966). He worked with a three countries – three goods Walrasian model that was criticized because of *ad-hoc* hypothesis made to get the reduced forms. Three years later, Savage and Stern (1970) formalized the model in a probabilistic manner. They treated the relation between importers and exporters in a random way and their model was considered a pure mathematical construction, with little economical foundation. Anderson (1979) and Bergstrand (1985) derived the model using assumptions that goods are differentiated by their country of origin. Anderson (1979) obtained the gravity model in two environments: a pure expenditure system where each country specializes in the production of a single tradable good and a system with a

[4] Examples of these works are Balassa (1974) and Truman (1969).

tradable-nontradable goods split. The second one was developed to overcome the unit-elasticity implication of the first one. Bergstrand (1985) worked with a general equilibrium model that assumes a single production factor in each of the N countries. Helpman (1984) and Bergstrand (1989) also provided foundations for the gravity equation in environments with monopolistic competition. The latter extended his previous work to a two factors – two industries – many firms and many countries model to obtain the imports' demands.

The first applications of the gravity model on international trade were made by Tinbergen (1962) and Pöyhönen (1963). Ten years later, Aitken (1973) evaluated the effects of the European Economic Community (EEC) and the European Free Trade Agreement (EFTA) on the bilateral trade of the countries involved. The estimates revealed that gross trade creation increased in both blocs but, between the two, there was a predominant trade diverting effect. Pelzman (1977) studied the Council of Mutual Economic Assistance (CMEA), which contained socialist countries. He concluded that the agreement presented trade creation between the countries involved and trade diversion from countries outside the bloc. Brada and Méndez (1985) worked with Latin American trade agreements[5] and found that the CACM had more effective policies than the LAFTA and the Andean Pact. Bayoumi and Einchengreen (1995) evaluated the EEC and the EFTA in a more sophisticated way than the formers. They used dummy variables to evaluate effects intra and extra-blocs and showed some concern with the idiosyncratic characteristics of the trade relations. They solved this problem with a first differences estimator and found a trade creating effect on EFTA and a growing trade in the EEC due to a mixture of trade-creation with trade-diversion. Endoh (1999) evaluated both concepts applied to the EEC, the LAFTA and the CMEA. He used three kinds of dummy variables to represent imports extra-bloc, imports intra-bloc and exports extra-bloc. The first set was assigned to detect diversion of imports, the second one was to detect trade creation and the third one was to detect diversion of exports. The estimates pointed a positive creation and a negative diversion in EEC and CMEA. LAFTA was followed by a negative sign in both criteria. Krueger (1999) also made an analogous work, but applied to the North-American Free Trade Agreement (NAFTA). Inconclusive results were found and she attributed them to macroeconomic distortions present in the period that the agreement was signed.

Apart from Bayoumi and Einchengreen (1995), there was little concern in the studies above to control for heterogeneity in the trade relations. Most of them tried to detect the intrinsic characteristics by variables of distance, adjacency and language. The problem in this approach is that the relation between two countries involves much more factors than those referred above and many of them are not always observable. This issue is treated in Cheng and Wall (2002) and they recommend the use of the fixed effects instead of Ordinary Least Squares (OLS) in gravity equations.

Therefore, in order to avoid this missing variable problem in our analysis of trade creation and diversion effects in the trade blocs of Nafta and Mercosur, we estimated the gravity equation by the use of panel data methods. The trade-creating and trade-diverting effects were detected by a methodology similar to the one used by Endoh (1999). The model (gravity equation) was estimated by several methods and tests were

[5] The Latin American Free Trade Association (LAFTA), the Central American Common Market (CACM) and the Andean Pact.

performed to choose the less problematic ones to reach reliable the conclusions on welfare effects produced by those two trading blocs.

The general model estimated here had the form:

$$\begin{aligned}\ln X_{ijt} &= \alpha + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln E_{it} + \beta_4 \ln E_{jt} + \beta_5 \ln N_{it} + \\ &\beta_6 \ln N_{jt} + \beta_7 \ln WD_{ij} + \beta_8 Contig_{ij} + \beta_9 Lang_{ij} + \beta_{10} Colony_{ij} + \\ &\beta_{11} Bloc1 + \beta_{12} Bloc2 + \beta_{13} Bloc3 + \beta_{20} \ln WX_t + \beta_{21} t + \mu_{ij} + e_{ijt}\end{aligned} \qquad (2)$$

where X_{ijt} is the bilateral flow from country i to country j; Y_{it} and Y_{jt} are real GDP's of countries i and j, respectively[6]; E_{it} and E_{jt} are real exchange rates of i and j; N_{it} and N_{jt} are populations; WD_{ij} is the distance between the principal cities, weighted by the proportion of the national population living in these cities[7]; $Contig_{ij}$ is a dummy variable for neighbor countries; $Lang_{ij}$ is a dummy variable for countries which have the same official language; $Colony_{ij}$ is a dummy variable for countries that had any colonial relationship; *Bloc*1 are dummy variables for countries which are in the same trade trade bloc (intra-bloc relation); *Bloc*2 are dummy variables reflecting exports from a country outside the bloc to a county inside the bloc (extra-bloc imports); *Bloc*3 are dummy variables representing exports from a country inside the bloc to a country outside the bloc (extra-bloc exports); WX_{ij} is the sum of exports from 57 countries (a proxy for world exports); t is a time trend; μ_{ij} is the unobserved effect of the pair ij of countries; e_{ijt} is the error; and α is the constant.

4. The data

The databank covers the period from 1980 to 2002. The observations of bilateral flows (exports) were taken from the Direction of Trade Statistics of IMF (2004). GDP's, exchange rates, PPP converters and populations were obtained from the World Development Indicators of World Bank (2004). Distances and dummy variables of adjacency, language and colonial ties were taken from the website of CEPII (2005)[8]. The American CPI, which was used to deflate the exports[9], was taken from the International Financial Statistics of IMF (2004). The bank includes 57 countries of origin[10] and 134 countries of destination[11], which sum 174,363 observations (=133x57x23).

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[6] In dollars converted by PPP.
[7] More details about this transformation can be found on Head and Mayer (2002).
[8] File dist_cepii.xls at the website http://www.cepii.fr/anglaisgraph/bdd/distances.htm (Visited on 02/27/2005).
[9] The year base is 1995.
[10] Argentina, Australia, Austria, Bangladesh, Belgium and Luxembourg, Bolivia, Brazil, Canada, Chile, China, Costa Rica, Denmark, Ecuador, Egypt, El Salvador, Finland, France, Germany, Greece, Guatemala, Honduras, Hong Kong, India, Indonesia, Ireland, Israel, Italy, Japan, South Korea, Kuwait, Malaysia, Mexico, Netherlands, New Zealand, Nicaragua, Norway, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Portugal, Saudi Arabia, Singapore, Spain, Sweden, Switzerland, Thailand, Trinidad and Tobago, Tunisia, Turkey, United Kingdom, Uruguay, USA, Venezuela.
[11] USA, United Kingdom, Austria, Belgium and Luxembourg, Denmark, France, Germany, Italy, Netherlands, Norway, Sweden, Switzerland, Canada, Japan, Finland, Greece, Iceland, Ireland, Malta, Portugal, Spain, Turkey, Australia, New Zealand, South Africa, Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela, Antigua and Barbuda, Bahamas, Barbados, Bermuda, Dominica, Grenada, Guyana, Belize, Jamaica, Suriname, Trinidad and Tobago, Bahrain,

5. Econometric results

The empirical analysis presented in this article involves the estimation of gravity equations by several methods in panel data approach and they are presented in tables 1 to 3. Table 1 shows results for the POLS, random effects and fixed effects. Table 2 has estimatives for first differences, random effects and fixed effects with AR(1) disturbances. Table 3 presents results for the tobit, the robust tobit and the random effects tobit. Since the results among methods were conflicting, tests were performed to select the more reliable estimators. This procedure enabled us to analyze the coefficients and reach some conclusions on the welfare effects of the two trading blocs.

The first estimator used was the Pooled Least Squares (POLS) with robust standard errors. In a panel data environment, this estimator is criticized because it ignores unobserved characteristics of bilateral flows[12]. Even with the inclusion of flow-specific variables of adjacency, language, colonial ties and distance, there may be still unobserved effects operating.

The second approach was estimating the gravity equation by random effects. This approach, as in the case of POLS, also omits the idiosyncratic effect. Hence, this effect is carried over to the error and cause bias, due to both to the omitted variable and inefficiency, and due to correlation between errors that contain the same specific effect. However, random effects estimator tries to correct these problems by two ways. Bias is solved through the hypothesis that the composite error, which includes the specific effect, is not correlated with the regressors. Inefficiency is solved through the estimation by Generalized Least Squares (GLS), weighted by a covariance matrix that considers the largest variance of the composite error and the residual auto-correlation caused the specific effect. In addition, geographical variables were included to reduce a possible variable-omission problem.

The third estimator used was the fixed effects. It consists in subtracting its temporal mean from each variable. The great advantage with this method is that it does not treat the idiosyncratic characteristics as omitted variables, which means that it does not put restrictions over the correlation between error and regressors. However, the disadvantage is that they do not have the GLS structure that guarantee efficiency. Thus, the choice between random and fixed effects involves a trade-off between consistence and efficiency. A Hausman test was made to solve this dilemma and the fixed effects was chosen.

The estimatives of these three methods appear with a conflicting aspect. For example, coefficients for the Merc1 variables have positive and significant signs in OLS. It

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Cyprus, Iran, Israel, Jordan, Kuwait, Oman, Saudi Arabia, Syria, United Arab Emirates, Egypt, Bangladesh, Sri Lanka, Hong Kong, India, Indonesia, South Korea, Macau, Malaysia, Nepal, Pakistan, Philippines, Singapore, Thailand, Vietnam, Algeria, Angola, Botswana, Burundi, Cameroon, Cape Verde, Central African Republic, Congo, Congo Dem. Republic, Benin, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea Bissau, Guinea, Ivory Coast, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Niger, Nigeria, Zimbabwe, Rwanda, Sao Tome, Seychelles, Senegal, Sierra Leone, Sudan, Togo, Tunisia, Uganda, Burkina Faso, Zambia, Fiji, Kiribati, New Caledonia, Vanuatu, Papua New Guinea, Tonga, Albania, Bulgaria, China, Hungary, Mongolia, Romania.

[12] See Cheng and Wall (2000) for more details.

suggests that there was an increase in exports involving countries of Mercosur after the agreement was signed, in other words, trade-creation. Otherwise, the same coefficients of random and fixed effects appear non-significant, that is, they suggest that trade-creation is null. Hence, tests must be performed to choose models that carried us to valid conclusions.

Table 1 - Estimation output

	ols (robust)			re			fe		
lnX_{ijt}	Coef.	S.E.	P>|t|	Coef.	S.E.	P>|z|	Coef.	S.E.	P>|t|
lnY_i	3.798	0.053	0.000	3.132	0.040	0.000	2.445	0.065	0.000
lnY_j	2.116	0.046	0.000	1.776	0.031	0.000	0.966	0.051	0.000
lnE_i	-0.069	0.052	0.179	0.169	0.022	0.000	0.111	0.022	0.000
lnE_j	-0.770	0.073	0.000	-0.302	0.024	0.000	-0.227	0.025	0.000
lnN_i	-1.704	0.055	0.000	-0.931	0.043	0.000	4.820	0.129	0.000
lnN_j	-0.710	0.050	0.000	-0.359	0.036	0.000	0.602	0.114	0.000
Contig	-0.837	0.356	0.019	-1.209	0.328	0.000			
Lang	1.982	0.121	0.000	1.804	0.123	0.000			
Colony	0.252	0.201	0.210	0.818	0.292	0.005			
$lnWD_{ij}$	-1.864	0.065	0.000	-2.186	0.061	0.000			
Merc1_91	1.202	0.568	0.034	0.001	0.590	0.999	-0.278	0.590	0.637
Merc1_94	1.521	0.642	0.018	0.054	0.590	0.927	-0.203	0.590	0.731
Merc1_97	1.350	0.656	0.040	-0.116	0.590	0.844	-0.345	0.590	0.558
Merc1_00	1.611	0.652	0.013	-0.140	0.590	0.812	-0.491	0.591	0.406
Merc2_91	-0.438	0.250	0.080	0.368	0.140	0.009	0.349	0.140	0.013
Merc2_94	0.426	0.233	0.068	0.939	0.140	0.000	0.897	0.140	0.000
Merc2_97	0.287	0.212	0.175	0.811	0.141	0.000	0.788	0.141	0.000
Merc2_00	0.307	0.200	0.124	0.679	0.141	0.000	0.586	0.142	0.000
Merc3_91	-0.203	0.180	0.261	0.032	0.095	0.737	-0.087	0.094	0.356
Merc3_94	-0.902	0.175	0.000	-0.758	0.095	0.000	-0.825	0.095	0.000
Merc3_97	-1.290	0.207	0.000	-1.137	0.095	0.000	-1.148	0.095	0.000
Merc3_00	0.048	0.164	0.771	0.055	0.097	0.572	-0.003	0.098	0.979
Nafta1_94	-4.377	0.920	0.000	-0.450	0.804	0.576	-0.328	0.800	0.682
Nafta1_97	-4.696	0.916	0.000	-0.689	0.804	0.392	-0.488	0.800	0.542
Nafta1_00	-4.909	0.954	0.000	-0.797	0.804	0.322	-0.536	0.801	0.503
Nafta2_94	-0.573	0.208	0.006	-0.409	0.156	0.008	-0.490	0.155	0.002
Nafta2_97	-0.633	0.193	0.001	-0.416	0.156	0.008	-0.452	0.155	0.004
Nafta2_00	-0.894	0.211	0.000	-0.606	0.156	0.000	-0.593	0.156	0.000
Nafta3_94	-3.785	0.215	0.000	-0.839	0.104	0.000	-0.708	0.104	0.000
Nafta3_97	-4.161	0.222	0.000	-1.169	0.105	0.000	-0.966	0.104	0.000
Nafta3_00	-4.499	0.221	0.000	-1.500	0.106	0.000	-1.235	0.106	0.000
$lnXM_t$	0.687	0.116	0.000	1.085	0.083	0.000	1.204	0.083	0.000
t	0.007	0.006	0.214	-0.011	0.004	0.003	-0.077	0.005	0.000
cons	-99.243	3.617	0.000	-101.287	2.546	0.000	-196.795	3.817	0.000

Breusch-Pagan LM test	
Test: Var(u) = 0	
chi2(1)	4.9E+05
Prob > chi2	0.000

Hausman specification test	
Test: coef FE = coef RE	
chi2(30)	3017.14
Prob > chi2	0.000

Table 2 - Estimation output

	fd			re ar(1)			fe ar(1)		
lnX_{ijt}	Coef.	S.E.	P>|t|	Coef.	S.E.	P>|z|	Coef.	S.E.	P>|t|
lnY_i	0.128	0.190	0.499	3.288	0.044	0.000	0.627	0.099	0.000
lnY_j	0.898	0.140	0.000	1.989	0.034	0.000	0.323	0.071	0.000
lnE_i	-0.031	0.010	0.002	0.024	0.019	0.196	-0.026	0.019	0.166
lnE_j	0.008	0.028	0.787	-0.176	0.023	0.000	-0.085	0.024	0.000
lnN_i	3.877	0.379	0.000	-1.180	0.046	0.000	2.683	0.175	0.000
lnN_j	0.390	0.439	0.375	-0.575	0.039	0.000	-1.552	0.153	0.000
Contig				-1.067	0.329	0.001			
Lang				1.820	0.123	0.000			
Colony				0.745	0.292	0.011			
$lnWD_{ij}$				-2.101	0.061	0.000			
Merc1_91	-0.019	0.103	0.855	0.111	0.679	0.871	-0.203	0.698	0.771
Merc1_94	-0.014	0.098	0.890	0.160	0.726	0.826	-0.112	0.757	0.883
Merc1_97	-0.065	0.141	0.646	0.018	0.736	0.980	-0.475	0.770	0.538
Merc1_00	-0.127	0.144	0.378	0.054	0.750	0.942	-0.977	0.784	0.213
Merc2_91	0.364	0.181	0.045	0.349	0.162	0.031	0.443	0.166	0.008
Merc2_94	0.811	0.271	0.003	0.806	0.173	0.000	1.026	0.179	0.000
Merc2_97	0.908	0.358	0.011	0.727	0.175	0.000	0.785	0.183	0.000
Merc2_00	0.956	0.422	0.023	0.609	0.179	0.001	0.376	0.187	0.045
Merc3_91	-0.528	0.165	0.001	-0.204	0.108	0.060	-0.387	0.112	0.001
Merc3_94	-0.484	0.240	0.044	-0.359	0.117	0.002	-0.436	0.122	0.000
Merc3_97	-1.831	0.360	0.000	-1.025	0.119	0.000	-1.226	0.125	0.000
Merc3_00	-2.089	0.384	0.000	-0.153	0.123	0.213	-0.713	0.130	0.000
Nafta1_94	-0.099	0.039	0.011	-0.541	0.936	0.563	-0.280	0.941	0.766
Nafta1_97	-0.144	0.064	0.025	-0.859	0.993	0.387	-0.658	1.007	0.513
Nafta1_00	-0.121	0.056	0.032	-0.991	1.021	0.331	-0.914	1.036	0.377
Nafta2_94	-0.179	0.099	0.072	-0.387	0.181	0.032	-0.280	0.182	0.124
Nafta2_97	0.079	0.153	0.604	-0.366	0.192	0.057	-0.374	0.195	0.055
Nafta2_00	0.043	0.163	0.794	-0.554	0.198	0.005	-0.676	0.202	0.001
Nafta3_94	-0.216	0.064	0.001	-0.830	0.121	0.000	-0.589	0.122	0.000
Nafta3_97	-0.273	0.103	0.008	-1.258	0.129	0.000	-1.054	0.132	0.000
Nafta3_00	-0.395	0.095	0.000	-1.610	0.134	0.000	-1.495	0.137	0.000
$lnXM_t$	0.834	0.108	0.000	0.789	0.094	0.000	-1.107	0.100	0.000
t				-0.002	0.004	0.582	0.161	0.003	0.000
cons	0.019	0.011	0.082	-95.250	2.840	0.000	-1.256	0.451	0.005

rho_ar	0.415126
sigma_u	3.386032
sigma_e	2.818357
rho_fov	0.590736
Bhargava DW	1.091707
Baltagi-Wu LBI	1.210265

rho_ar	0.414779
sigma_u	7.747013
sigma_e	2.759516
rho_fov	0.887405
Bhargava DW	1.092638
Baltagi-Wu LBI	1.211324

Table 3 - Estimation output

	tobit			tobit (robust)			re tobit		
lnX_{ijt}	Coef.	S.E.	P>|t|	Coef.	S.E.	P>|z|	Coef.	S.E.	P>|z|
lnY_i	4.508	0.025	0.000	4.508	0.073	0.000	2.611	0.066	0.000
lnY_j	2.455	0.017	0.000	2.455	0.059	0.000	1.013	0.052	0.000
lnE_i	-0.030	0.035	0.393	-0.030	0.065	0.642	-0.022	0.022	0.325
lnE_j	-0.854	0.032	0.000	-0.854	0.091	0.000	-0.353	0.025	0.000
lnN_i	-2.029	0.025	0.000	-2.029	0.069	0.000	4.771	0.131	0.000
lnN_j	-0.832	0.019	0.000	-0.832	0.064	0.000	0.684	0.115	0.000
Contig	-1.303	0.116	0.000	-1.303	0.435	0.003	-1.971	0.153	0.000
Lang	2.529	0.044	0.000	2.529	0.150	0.000	1.780	0.070	0.000
Colony	-0.140	0.101	0.167	-0.140	0.250	0.575	-0.042	0.156	0.786
$lnWD_{ij}$	-2.102	0.022	0.000	-2.102	0.080	0.000	-2.363	0.042	0.000
Merc1_91	1.451	0.962	0.132	1.451	0.701	0.038	-0.300	0.581	0.606
Merc1_94	1.668	0.962	0.083	1.668	0.781	0.033	0.079	0.581	0.892
Merc1_97	1.423	0.962	0.139	1.423	0.800	0.075	-0.203	0.581	0.727
Merc1_00	1.738	0.962	0.071	1.738	0.794	0.029	-0.437	0.582	0.452
Merc2_91	-0.337	0.232	0.146	-0.337	0.300	0.260	0.361	0.141	0.011
Merc2_94	0.574	0.231	0.013	0.574	0.274	0.037	1.150	0.141	0.000
Merc2_97	0.388	0.231	0.092	0.388	0.251	0.121	0.907	0.142	0.000
Merc2_00	0.442	0.231	0.056	0.442	0.238	0.064	0.575	0.143	0.000
Merc3_91	-0.193	0.159	0.225	-0.193	0.238	0.418	-0.208	0.095	0.029
Merc3_94	-1.074	0.158	0.000	-1.074	0.232	0.000	-0.714	0.095	0.000
Merc3_97	-1.484	0.158	0.000	-1.484	0.268	0.000	-1.201	0.096	0.000
Merc3_00	0.097	0.159	0.544	0.097	0.216	0.654	-0.147	0.099	0.136
Nafta1_94	-5.984	1.357	0.000	-5.984	1.167	0.000	-0.204	0.832	0.806
Nafta1_97	-6.402	1.357	0.000	-6.402	1.163	0.000	-0.529	0.832	0.525
Nafta1_00	-6.692	1.357	0.000	-6.692	1.201	0.000	-0.790	0.832	0.342
Nafta2_94	-0.982	0.264	0.000	-0.982	0.253	0.000	-0.183	0.154	0.234
Nafta2_97	-1.112	0.264	0.000	-1.112	0.240	0.000	-0.287	0.154	0.063
Nafta2_00	-1.483	0.265	0.000	-1.483	0.260	0.000	-0.611	0.155	0.000
Nafta3_94	-4.713	0.179	0.000	-4.713	0.265	0.000	-0.662	0.105	0.000
Nafta3_97	-5.174	0.179	0.000	-5.174	0.273	0.000	-1.086	0.106	0.000
Nafta3_00	-5.581	0.182	0.000	-5.581	0.273	0.000	-1.558	0.107	0.000
$lnXM_t$	0.868	0.156	0.000	0.868	0.148	0.000	-1.598	0.030	0.000
t	0.010	0.007	0.147	0.010	0.007	0.170	0.028	0.004	0.000
cons	-122.187	4.471	0.000	-122.187	4.712	0.000			0.000
M $ln(Y_i)$							-0.552	0.091	0.000
M $ln(Y_j)$							0.371	0.063	0.000
M $ln(E_i)$							-2.689	0.121	0.000
M $ln(E_j)$							-1.517	0.083	0.000
M $ln(N_i)$							-5.018	0.147	0.000
M $ln(N_j)$							-0.744	0.123	

CM normality test	37909
P-Value	0

Finally, the fourth method used was the first differences estimator. It removes the specific time-constant effect by time-differencing each variable. There are two problems with this method. First, it deals with growths and therefore the effects on levels are lost. Second, if the variables are weakly dependent, the FD estimator is inconsistent and its

inconsistence is not reduced as T grows infinitely[13]. Thus, since their results diverge from other methods, it can be disregarded.

Baltagi and Li (1991) created a method for panel data models with correlated residuals. What they suggest is first to perform a Prais-Winsten transformation in the variables. This procedure assumes that the residual correlation coefficient is known. All this is put in a transformation matrix which is used as a weight of a GLS. The model is then estimated with the modified variables and independent residuals to get consistent parameters. The estimates by this method are shown in Table 2. There is also a test for the residual correlation, the Locally Best Invariant, suggested by Baltagi and Li (1999). According to this test, we can reject that the correlation coefficient is zero. Thus, the methods with the transformed residuals explain the relation in a better way than the formers.

The dependent variable has a characteristic that can represent a serious estimation problem: it is always nonnegative. In this case, it is necessary an estimator that consider the excess of probability mass in the null flows, a tobit one. It assumes a normal distribution and performs a maximum likelihood estimation. Table 3 shows the results. Columns 1 to 6 present estimatives to the simple tobit and the robust one. A normality CM test was performed and the null hypothesis was rejected and therefore both methods (simple and robust tobit) can be disregarded.

The third set of columns in Table 3 presents estimatives of panel data tobit. The estimated form is based on a random effects method proposed by Wooldridge (2002)[14], which permits correlation of the specific effects with the regressors. This method consists in including temporal means of the regressors into the equation. Below the table is presented a likelihood ratio test for the variance of the specific effect. The null hypothesis of zero variance is rejected, which means that the idiosyncratic component is important for the regression and therefore the random effects is a more trustful tobit model.

In sum, three models were chosen: the fixed-effects with AR(1) errors, the random effects with AR(1) errors and the random effects tobit. Table 4 presents the correspondent dummy coefficients converted by exponentiation, which represent the percent variation of exports in the beginning of each agreement. A significant and positive result in a variable Bloc1 reflects an increase in commercial flows of countries that became members of the same trade union. It is an indicator of trade creation. The coefficients of Bloc2 variables evaluate the change in imports from countries outside the bloc to member countries after the agreement took place. In other words, it evaluates diversion of imports. The Bloc3 coefficients reveal the impact of the arrangement on exports from inside the bloc to non-member countries after the bloc formation, that is, a diversion of exports.

[13] See Wooldridge (2002) p. 302.
[14] Wooldridge (2002) p. 530-531.

Table 4 - Impacts on exports – selected models

	re ar(1)	fe ar(1)	re tobit
Merc1_91	0.117	-0.184	-0.259
Merc1_94	0.173	-0.106	0.082
Merc1_97	0.019	-0.378	-0.184
Merc1_00	0.056	-0.623	-0.354
Merc2_91	0.417**	0.557**	0.435**
Merc2_94	1.240**	1.789**	2.159**
Merc2_97	1.070**	1.192**	1.477**
Merc2_00	0.839**	0.456**	0.778**
Merc3_91	-0.184*	-0.321**	-0.188**
Merc3_94	-0.301**	-0.354**	-0.510**
Merc3_97	-0.641**	-0.707**	-0.699**
Merc3_00	-0.141	-0.510**	-0.137
Nafta1_94	-0.418	-0.244	-0.184
Nafta1_97	-0.576	-0.482	-0.411
Nafta1_00	-0.629	-0.599	-0.546
Nafta2_94	-0.321**	-0.244	-0.167
Nafta2_97	-0.306*	-0.312*	-0.250*
Nafta2_00	-0.425**	-0.491**	-0.457**
Nafta3_94	-0.564**	-0.445**	-0.484**
Nafta3_97	-0.716**	-0.651**	-0.662**
Nafta3_00	-0.800**	-0.776**	-0.789**

** and * mean significance at 5 and 10%, respectively

The estimatives presented show a common pattern over the models. The non-significant coefficients for Merc1 and Nafta1 variables means that trade creation was null in both agreements. Other variables had significant coefficients. The Merc2 set revealed a curious result. The coefficients appeared with a positive sign, which indicate that imports from outside the Mercosur rose after the agreement was signed. Possibly, it is due to the contemporary openness experienced by the member countries and their macro-economical guidance, based on appreciated currency, to combat inflation. The third set of coefficients (Merc3), had the expected negative sign, which means that some exports from the bloc changed their destiny from outside to inside the bloc. Altogether, these results make the welfare evaluation of Mercosur inconclusive.

In relation to the Nafta trading bloc, many results were similar to the ones obtained for the Mercosur bloc. First, in relation to trade-creation effects, the coefficients on the Nafta1 dummy variables were statistically equal to zero, meaning absence of trade creation effects. This result is similar to the one obtained for the Mercosur trading bloc. Second, in respect to the set of dummies variables Nafta2, the coefficients estimates showed to be negative and significant. This means that the Nafta trading bloc presents diversion effects on imports. The third set of dummy variables (Nafta3), as occurred in the case of the Mercosur trading bloc, also showed significant coefficients but they were negative. This means that the Nafta trading bloc presents diversion effects on exports. In sum, the North-American bloc showed no trade creation effects but was followed by two types of trade-diversion effects. Their impact on welfare was therefore negative.

6. Conclusions

The results showed that no trade creation occurred in both agreements. About this statement, some considerations must be made. According to Krueger (1999), a good evaluation needs a scenario completely "without-Nafta" before the agreement. A problem with this point lies on the fact that some economies had increased their openness before enjoying trade unions, like Mexico did. Although this fact can mitigate some trade-creating effect, the establishment of a trade union would be without reason if it could not improve trade. Taking this goal into consideration, our estimatives suggested that the agreement had a null effect.

Mercosur presented some curious results about trade-diversion. Imports from non-members increased after the agreement was signed. Possibly, it was related to the commercial openness adopted at the same time the bloc was formed. If some trade-diversion occurred, it was probably hid by the effects of the openness. Altogether, there was an improvement in welfare, but we can not attribute this improvement to the bloc formation. Thus, the impact of Mercosur in import-diversion is inconclusive, despite of its positive sign. On the other side, Nafta revealed a coherent pattern of trade diversion.

In both agreements, the exports to non-member countries decreased. It means that the international trade of the countries involved became more regionalized. This phenomenon is a special kind of trade diversion that does not necessarily means changing a more efficient supplier for a less competitive one. Thus, its effects on welfare are immeasurable.

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