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EFFECTS OF REGIONAL TRADE AGREEMENTS USING A STATIC AND DYNAMIC GRAVITY EQUATION

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Abstract

This paper evaluates the static effects of preferential agreements between several economic blocs and areas using a dynamic gravity equation. The main aim is to investigate whether regionalism has fostered intra or/and extra blocs international trade, taking into account the existence of heterogeneity over time and across countries and testing whether a dynamic model is preferred to the traditional static specification of the gravity model. This paper argues that the gravity model should be best estimated using Blundell and Bond's (1998) system-GMM estimator. This procedure remedies some econometric problems such as regressor endogeneity, measurement error and weak instruments, and controls for time-invariant country-specific effects such as distance or common language.

JEL classification: F14;

Key words: Gravity equation integration international trade regionalism

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EFFECTS OF REGIONAL TRADE AGREEMENTS USING A STATIC AND DYNAMIC GRAVITY EQUATION

1. Motivation

The objective of this paper is to evaluate the static effects of preferential trade agreements between several economic blocs and areas: The European Union (EU-15), North American Free Trade Agreement (NAFTA), Central American Common Market (CACM), Caribbean Community (CARICOM) and Cuba, Magreb region (MAGREB: Algeria, Morocco, Tunisia and Libya), Mashrek region (MASHREK: Egypt, Israel, Jordan, Lebanon and Syria) and other Mediterranean countries (Turkey, Cyprus and Malta) in a static and dynamic panel data framework. The period under study is from 1980 to 1999, when the second wave of regionalism flourished and before the EU changed to a monetary union[1] . With this aim, we estimate a gravity model to measure and compare the impact of preferential agreements on trade and also, to infer the relevance of other determinants of bilateral trade flows such us geographic proximity, income levels, population and cultural similarities.

This research can be viewed as an extension of Soloaga and Winters (2001) who introduced the Vinerian specification of integration effects with three different sets of dummy variables representing trade creation, export diversion and import diversion effects. Our main addition is to estimate these three integration effects in a dynamic panel-data framework. The justification of the use of a dynamic model is based on the accepted evidence showing that export series tend to be highly persistent. Chen and Tsai (2005) and Carrère (2006) can also be viewed as extensions of Soloaga and Winters (2001), however they both estimate static panel data models.

The analysis is first undertaken for each year of our sample and for segmented sub-periods with a static-panel model, in order to capture the temporal evolution of the impacts on trade of the different variables considered. In a second step, a dynamic model for two different sub-periods is estimated using the first-differences estimator and the Blundell and Bond's (1998) system-GMM estimator. The system-GMM estimator is the preferred technique since this procedure remedies some econometric problems such as regressor endogeneity, measurement error and weak instruments, and controls for time-invariant country-specific effects such as distance or common language. To our knowledge, this paper is one of the first[2] to offer some evidence of what should be the correct dynamic specification of the gravity model of trade in the framework of the system-GMM procedure.

The paper is organised as follows: Section 2 presents the specification of the gravity model. Section 3 focuses on the empirical application, using the gravity model to assess normal levels of trade. Section 4 presents the results from the yearly and static panel estimations. Section 5 focuses on the sensitivity analysis and shows the results for the dynamic panel estimations. Finally, Section 6 concludes.

2. The gravity equation of trade

2.1 Model specification

Tinbergen (1962) and Pöyhönen (1963) were the first authors to apply the gravity equation to analyse international trade flows. Since then, the gravity model has been successfully applied to flows of varying types such as migration, foreign direct investment and more specifically to international trade flows. According to this model, exports from country i to country j are explained by their economic sizes (GDP or GNP), their populations, direct geographical distances and a set of dummies incorporating some type of institutional characteristics common to specific flows.

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[1] Therefore, we do not consider the effect of a common currency on trade.

[2] De Benedictis et al (2005) evaluated the effects of regional arrangement in the enlarged EU in a similar framework.

Although the theoretical support for the gravity model was originally very poor, since the second half of the 1970s several theoretical developments have filled this gap. Anderson (1979) made the first formal attempt to derive the gravity equation from a model that assumed product differentiation. Bergstrand (1985, 1989) also explored the theoretical determination of bilateral trade in a series of papers, in which gravity equations were associated with simple monopolistic competition models. Helpman (1987) used a differentiated product framework with increasing returns to scale to justify the gravity model. More recently, Deardorff (1995) has proven that the gravity equation characterises many models and can be justified from standard trade theories. Finally, Anderson and Wincoop (2003) derived an operational gravity model based on the manipulation of the CES expenditure system that can be easily estimated and helps to solve the so-called border puzzle. According to these authors, multilateral trade resistance factors should be added in the empirical estimation to correctly estimate the theoretical gravity model. A simple and intuitive way to do it is to proxy these terms with country dummy variables or with fixed effects in a panel data framework.

There are a huge number of empirical applications in the literature on international trade which have contributed to the improvement of the performance of the gravity equation. Some of them are related to our work. Firstly, Mátyás (1997) and Harris and Mátyás (1998), Chen and Wall (1999), Breuss and Egger (1999) and Egger (2000, 2004) improved the econometric specification of the gravity equation. Secondly, Berstrand (1985), Helpman (1987), Wei, (1996), Soloaga and Winters (2001), Limao and Venables (2001) and Bougheas *et al*, (1999) among others, contributed to the refinement of the explanatory variables considered in the analysis and to the addition of new variables.

A number of recent papers are particularly linked to our investigation: Carrère (2006) who assessed regional trade agreements in a static panel framework and used a Vinerian specification of the integration effects. Chen and Tsai (2005) who estimated the staged effects of FTAs formation in a static panel data framework and considered the EU, NAFTA, LAFTA and MERCOSUR. Soloaga and Winters (2001) who analysed the effects of regionalism in the 90s by considering nine FTAs; Piani and Kume (2000), who studied bilateral trade flows between 44 countries involved in a number of agreements: NAFTA, ANDINO, MERCOSUR, EU, ASEAN and ANZCER; and Blavy (2001) who investigated trade in the Mashrek, its determinants and potential.

According to the generalised gravity model of trade, the volume of exports between pairs of countries, X_{ij}, is a function of their incomes (GDPs), their populations, their geographical distance and a set of dummies,

$$X_{ij} = \beta_0 \; Y_i^{\beta_1} Y_j^{\beta_2} POP_i^{\beta_3} POP_j^{\beta_4} DIST_{ij}^{\beta_5} F_{ij}^{\beta_6} \; u_{ij} \qquad (1)$$

where Y_i (Y_j) indicates the GDPs of the exporter (importer), POP_i (POP_j) are exporter (importer) populations, $DIST_{ij}$ measures the distance between the two countries' capitals (or economic centres) and F_{ij} represents any other factors aiding or preventing trade between pairs of countries. u_{ij} is the error term.

We add to the basic specification two variables that are commonly considered in the recent literature: the land area of countries *i* and *j* and a variable named 'remoteness' indicating the average distance from the exporting country to importer partners.

For estimation purposes, model (1) in log-linear form is expressed as,

$$\ln X_{ijt} = \alpha_{ij} + \phi_t + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln POP_{it} + \beta_4 \ln POP_{jt} + \beta_5 \ln A_i + \beta_6 \ln A_j + \\ + \beta_7 \ln DIST_{ij} + \beta_8 \ln REM_i + \beta_9 lang_{ij} + \beta_{10} adj_{ij} + \beta_{11} isl_{ij} + \sum_k \gamma_k D_{ki} D_{kj} + \\ + \sum_k \delta_k D_{ki} + \sum_k \rho_k D_{kj} + u_{ijt}$$

(2)

where:

ln denotes variables in natural logs.

X_{ijt} are the exports from country i to country j in period t at current US$.

Y_{it}, Y_{jt} indicate the GDP of countries i and j respectively, in period t at current PPP US$.

POP_{it}, POP_{jt} denote the population of countries i and j respectively, in period t in thousand inhabitants.

A_i, A_j denote the total area of countries i and j respectively in squared km.

$DIST_{ij}$ is the great circle distance between countries i and j.

REM_i is the average distance of country *i* to exporter partners, weighted by exporters' GDP share in world GDP.

α_{ij} are the specific effects associated to each bilateral trade flow. They are a control for all the omitted variables that are specific for each trade flow and that are time invariant.

ϕ_t are specific time effects that control for omitted variables that are common for all trade flows but vary over time. A high level of income in the exporting country indicates a high level of production, which increases the availability of goods for export. Therefore we expect β_1 to be positive. The coefficient of Y_j, β_2, is also expected to be positive since a high level of income in the importing country suggests higher imports. The coefficient estimate for population of the exporters, β_3, may be negatively or positively signed (Oguledo and Macphee, 1994), depending on whether the country exports less when it is big (absorption effect) or whether a big country exports more than a small country (economies of scale). The coefficient of the importer population, β_4, also has an ambiguous sign, for similar reasons. Another factor that may influence the coefficient estimates for population is the composition effect that influences supply and demand. Each country produces and exports a different mix of commodities (supply) and the mix of goods demanded is also different for each country. The distance coefficient is expected to be negative since it is a proxy of all possible trade costs. The coefficients of the areas of countries i and j are expected to be negative (bigger countries are better endowed and therefore trade less) and the coefficient for remoteness is expected to be positive. The model includes dummy variables for trading partners sharing a common language ($lang_{ij}$), sharing a common border (adj_{ij}) and for islands (isl_{ij}) as well as trading blocs' dummy variables, defined as D_{km} which evaluate the effects of preferential trading agreements (PTAs).

2.2 Trade creating and trade diverting effects

Since the evaluation of the effects of PTAs on trade is central to this research, some further explanations are needed. A similar approach to the most recent developments in this area (Soloaga and Winters; 2001 and Carrère (2005)) is adopted. Viner's trade creation and trade diversion are specified by including three dummy variables per FTA. The first one has been traditionally considered in the gravity model literature (it proxies for intra-bloc trade), the second (members' imports from non-members) and third (members' exports to non-members) were initially specified as a single dummy to capture extra-bloc trade (Bayoumi and Eichengreen, 1997; Frankel, 1997, and Frankel and Wei, 1998). Soloaga and Winters (2001) and Chen and Tsai (2005) also specified three set of dummies separately. However, these authors' dummies are different to ours since they separate intra-bloc trade (b_k), total members' imports (m_k) and total members' exports (n_k). Their specification is,

$$\ln M_{ij} = EV_{ij} + \sum_k b_k P_{ki} P_{kj} + \sum_k m_k P_{ki} + \sum_k n_k P_{kj} \qquad (3)$$

were M_{ij} are imports of country i from country j. EV_{ij} are the rest of explanatory variables. P_{km} is a dummy that takes the value 1 if m is a member of bloc k and 0 otherwise. Our specification of the Viner's trade creation and trade diversion is given by,

$$\ln X_{ij} = EV_{ij} + \sum_k \gamma_k D_k + \sum_k \delta_k D_{ki} + \sum_k \rho_k D_{kj} \quad (4)$$

where X_{ij} are exports from country i to country j, EV_{ij} is defined as in equation 3 above. D_k is a dummy that takes the value 1 if both countries, i and j, belong to the same economic bloc, 0 otherwise. D_{ki} is a dummy that takes the value 1 if i is a member of bloc k and j belongs to the rest of the world, 0 otherwise. D_{kj} is a dummy that takes the value 1 if j is a member of bloc k and i belongs to the rest of the world, 0 otherwise. γ_k measures the extent to which trade is higher than normal levels if both countries, i and j are members of the bloc, δ_k measures the extent to which members' exports are higher than normal levels to non-member countries and ρ_k measures the extent to which members' imports are higher than normal levels from non-member countries. δ_k and ρ_k could be interpreted as a measure for trade diversion effects; however we think that they combine trade diversion and openness effects. The relationships between the coefficients of the first and second specifications are:

$b_k=\gamma_k$; $m_k= \gamma_k+\rho_k$ and $n_k= \gamma_k +\delta_k$.

We believe that our specification directly identifies export and import diversion and openness effects, depurated from the increase in trade due to the RTA membership and is therefore preferred. Table 1 identifies the possible outcomes following an RTA. For example, an increase in intra-bloc exports ($\gamma_k>0$) along with a higher propensity to imports ($\rho_k>0$) indicates pure trade creation in terms of imports, whereas a decrease in intra-bloc exports ($\gamma_k<0$) along with a higher propensity to imports ($\rho_k>0$) indicates an extra-bloc import expansion (imports from the rests of the world increase).

3. Empirical application

We estimated bilateral exports of 47 countries[3] over the period 1980-1999. Our data-set is an unbalanced panel with a maximum of 43,240 observations (47x46x20). Equation (2) was estimated for different years and sub-periods by applying several methodologies. In the year-by-year estimations Ordinary Least Squares (OLS) were used. Although the appropriate estimation method should be a Tobit model, only 10% of the exports are recorded as zero, this refinement only change slightly the estimation results relative to the OLS method[4]. In the estimations for segmented sub-periods we used the between estimator (averaging the data over every 4-5 years) for the static panel and the first-differenced GMM and system GMM for the dynamic panel. For estimations with different groups of countries we used the within estimator (two ways fixed effects) and the generalised least squares with random effect for the whole sample period. A Hausman test is used to decide between both estimation techniques.

The between estimator exploits the between dimension of the data (differences between individuals). It is determined as the OLS estimator in a regression of individual averages of the dependent variable, *y,* on individual averages of the explanatory variables, *x,* and a constant. This estimator is used in order to evaluate the importance of differences between trading partners in our model and to test for the equality of the estimated coefficients for different sub periods. The within estimator is obtained from a transformed model. This is a regression model in deviations from individual means and does not include the individual effects. The transformation that produces observations in deviation from individual means is called the within transformation. This transformation exploits variation within individuals (trading partners) over time.

In all the estimations heteroskedastic consistent standard errors were computed since the null hypothesis of homoscedasticity was rejected when testing for heteroscedasticity.

[3] Countries are listed in the Appendix.
[4] Results are available upon request.

For the yearly and segmented sub-periods estimations (Tables 2, 3 and 4) the White test statistic was used, by computing N times the R^2 of an auxiliary regression of $\hat{\varepsilon}_i^2$ on a constant and all first moments, second moments and cross products of the original regressors. The resulting test statistic NR^2 has an asymptotic Chi-squared distribution with P degrees of freedom under the null hypothesis of homoscedasticity, where P is the number of regressors in the auxiliary regression.

In a panel data context (Table 5) we test for heteroscedasticity in ε_{ij} using a variant of the Breusch-Pagan test. This test uses the fixed effects residuals $\hat{\varepsilon}_{it}$. The auxiliary regression of the test regresses the squared within residuals $\hat{\varepsilon}_{it}^2$ upon a constant and the J variables z_{it} that we think may affect heteroskedasticity. Under the null hypothesis, the test statistic, computed as N(T-1) times the R^2 of the auxiliary regression, will have an asymptotic Chi-squared distribution, with J degrees of freedom.

4. Results for the Static model

4.1 Basic results

Tables (2) to (5) show the results for the yearly estimations and for the static panel estimations. Table 2 presents the estimated coefficients for the entire sample (47 countries) in five different years. The exporter income elasticity remains fairly constant, increasing slightly (from 1 in 1980 to 1.21 in 1999) in the period analysed. However, the importer income elasticity considerably decreases in magnitude (from 1.65 in 1980 to 0.34 in 1999). The declining magnitude of the coefficients of the importer country indicates an increasing inelasticity of bilateral trade with respect to the income of the importing country. The population coefficients of the exporting country are negative signed and remain rather constant, declining slightly in the 90s. The negative sign indicates that more populated countries export less since a higher proportion of their production is directed to the internal market. The population coefficients of the importing country are also negative signed but only until 1994. From 1995 to 1999 they are positive and significant in all years. The positive sign indicates that country size is directly related to trade. Larger countries have a greater capacity to absorb imports than do their smaller counterparts. This result points to an uneven distribution of costs and benefits of integration in favour of the bigger countries that will industrialise more rapidly.

The coefficient of area for the exporter is negative and significant in the 90s, showing that larger countries are endowed with more resources and thus would be more self-sufficient. However, the importer area coefficient is positive and significant until 1990 and then it changes sign but is not significant.

The coefficient of the distance variable has the expected negative sign and is highly significant in every year. The magnitude of the estimated coefficient remains fairly constant within the range (-1.04,-1.23). The remoteness variable, added to control for “overall trade resistance” is not significant in any of the years. The language dummy has the expected positive sign and is significant in all years. The magnitude of the coefficient increases yearly in the 1985-1995 time period. This may indicate that language and culture differences are increasing in importance as a factor creating trade resistance. Two countries sharing a common language trade 301% [(exp(1.39)-1]*100 more in 1999 (according to our results), than countries speaking a different language. The adjacency and island dummies are in general not significant at 5% level and the magnitudes of the estimated coefficients are always very small. Surprisingly, sharing a border does not influence trade. The explanation of the lack of significance may be the fact that the distance and integration dummy variables are already accounting for proximity between trading countries.

4.2 Trade creation and trade diversion effects

The dummy variables for membership in a trade preference scheme show mixed results. For the EU, the coefficients of the three sets of dummies are positive for all years and almost all are statistically significant, apart from the EUX (exports to non-EU members) coefficient in several years. Contrary to Soloaga and Winters (2001) the intra-bloc coefficient (EU) increases yearly in magnitude and we find no evidence of trade diversion since EUX and EUM (imports from non-members) present positive coefficients. These results would indicate the consolidation and effectiveness of this group as an integration scheme. According to Table 1, the results from the OLS yearly regressions indicate a pure trade creation effect.

For NAFTA the intra-bloc dummies (NAFTA) are positive signed and highly significant only from 1995 onwards. For exports to non-members (NAFTAX) the coefficient is almost always non significant and for imports from non-members (NAFTAM) is negative and non-significant in the eighties and positive and significant in the nineties, pointing towards an increase in the degree of openness. Once again we find no evidence of trade diversion.

Coefficients for the dummy variables for the CARICOM intra–bloc dummy are all positive and significant. The CARICM (imports from non-CARICOM countries) coefficient is always negative and significant from 1995 onwards showing evidence of an import diversion effect, whereas CARICX (exports to non-CARICOM countries) shows a negative and non-significant coefficient. In the 90s, the import diversion effect outweighs the intra-bloc positive effect, indicating therefore a pure import diversion effect.

CACM, which appeared strong in the 1960s and began to disintegrate in the 1970s, present positive coefficients for the intra-bloc dummy in all years, but they are declining yearly and lose significance in the second half of the 1990s. Similar to the CARICOM, imports from non-members (CACMM) present always negative coefficients that are only significant from 1995 onwards showing evidence of an import diversion effect, whereas CACMX (exports to non-members) shows a negative and non-significant coefficient.

Finally, coefficients for the dummy variables for MAGREB and MASHREK are insignificant in the early years and significant and negative signed in many years, showing the ineffectiveness of these two groups. We find evidence of import diversion effects in the second half of the nineties and intra-bloc trade is below normal levels of trade according to the gravity model. According to Table 1 trade contraction and trade diversion effects, for both imports and exports dominate in these regions.

In order to check for the robustness of the yearly results, in Table 3 we replace the remoteness variable with exporter and importer dummies (α_i, α_j) to proxy for multilateral resistance terms. According to Anderson and Wincoop (2001), this is the "correct specification" of the gravity model. The results concerning integration dummies change significantly, especially for developing countries. The coefficients are in general larger than in Table 2. The trade creation effect of the EU and NAFTA countries is magnified and the coefficients are positive and significant (with only one exception, the EU coefficient is negative and insignificant in 1981). EUX (EU exports to non-members) shows now a negative coefficient that is only significant in the 80s and early 90s, indicating export diversion effects and hence a decrease in welfare for non-members. EUM (EU imports from non-members) shows a positive coefficient as in Table 2, but much higher in magnitude, indicating import expansion effects.

With respect to CACM and CARICOM, the trade creation effect mainly disappears in most years (only positive and significant in 1999 for CARICOM) and trade diversion is found for CACM exports and imports and for CARICOM imports. CARICOM exports to non-members (CARICX) show a positive coefficient (in Table 2 the sign was negative) indicating positive welfare effects for non-members.

The Magreb and Mashrek regions present now positive intra-trade effects starting in the second half of the 90s and also positive effects for exports to third countries in the 90s. We find these results questionable. The inclusion of exporter and importer dummies together with the Vinerian integration effects may be problematic since the two sets of variables are correlated. A way to solve this problem is the use of panel data and the inclusion in the regressions of dyadic fixed effects (α_{ij}).

4.3 Stability over time

Table 4 shows estimation results for segmented sub-periods. We used the between estimator averaging the data over every 4-5 years. We only show the results for the regressions that include the remoteness variable as a proxy for multilateral resistance, since the inclusion of X and M dummies does not improve the fit of the results and creates problems concerning the interpretation of the trade creation and trade diversion effects. The results in terms of signs and magnitude of the estimated coefficients remain fairly similar to those obtained in the yearly estimations (Table 2). They are smaller in magnitude for the between estimator, which is to be expected since they are generally interpreted as long run parameters.

Similar regressions were run adding dyadic trading-pair effects (fixed/random) to control for multilateral trade resistance. In this way we control for unobserved heterogeneity and endogeneity problems are reduced. The Hausman tests always rejected the null hypothesis of ortogonality between the individual effects and the regressors indicating that only the FE estimates are consistent. However the within variation in these short time spans produces a very poor goodness of fit, hence the between estimator is preferred.

4.4 Different effects for developed and developing countries

Table (5) presents the results obtained when the sample is divided into developed exporters and developing exporters: EU and NAFTA (column 1) and Latin American and Mediterranean Countries (column 2). The estimated coefficients present, in most cases, the expected signs and magnitudes. Income elasticities (exporter and importer) are positively signed and the coefficient and t-value for the exporter is greater than that for the importer. This indicates that the income elasticity of mutual trade is more elastic with respect to the exporting country's income than it is to the importing country's income and highlights the importance of a country's production capacity in fostering exports, especially for developed countries.

The estimated coefficients for the exporter population variable are negatively signed which shows an absorption effect, the greater the size of the exporter, the lower the exports. The estimated coefficients corresponding to the importer population is positive signed and higher in magnitude and significance level for EU-NAFTA countries. The positive sign points towards the growing importance of the role played by scale economies and market-size effects in international trade models specially for developed countries (the magnitude of the estimated coefficient is five times higher than the one for developing countries). The area coefficient is negative and significant for developing countries; however it is positive and significant only for the importer country for developed countries. This result may indicate that natural resources and land extension is more important for developing than for developed countries.

Concerning geographic distance, the estimated coefficient presents a negative sign with elasticities of 1.84 for EU and NAFTA exports and 1.03 for LA and Mediterranean exports. The remoteness variable is only positive and significant for developing countries, indicating that only developing trading partners' trade more when they are far from the rest of the world, but this is not the case for developed countries. The dummy variable *common language (lang),* which takes the value one when the countries share the language presents a positive sign and is almost always significant which indicates the great importance of cultural similarities in international trade. However, the magnitude of the coefficients of this dummy is half in magnitude for developed countries. On the other hand, sharing a border does not seem to be relevant for developing countries since the coefficient is insignificant and for developed countries the coefficient is negative and significant.

Interpretation of the integration dummies indicates that intra-EU trade is 87% higher than expected from the gravity equation results {= [exp(0.63)-1]*100}. Intra-NAFTA trade is 186% higher than expected from normal levels of trade {= [exp(1.05)-1]*100}. Concerning trade diversion and openness effects, in this estimation we find a positive coefficient for members' imports from non-members, but a negative and significant coefficient for members' exports to non-members. With respect to developing countries, the CARICOM region shows a positive and significant intra-bloc trade effect (CARIC) that is more than compensated with negative extra-bloc import and export effects (CARICM, CARICX); hence resulting in trade diversion. The CACM dummy (intra bloc trade) is also positive but non significant and the import and export diversion effects dominate. The Magreb and Mashrek dummies show all negative intra and extra trade effects, confirming the prevalence of trade contraction and trade diversion effects in these regions.

5. Analysis in a dynamic framework

There is one more concern that deserves investigation. We have considered until now a static model ruling out the possibility that current exports depend on past exports volumes. This possibility is quite plausible since several authors have shown that exports are subject to hysteresis and therefore in time series analysis the export series tend to be highly persistent. In order to obtain consistent estimates in dynamic panels, instrumental variable procedures have to be used. The first differences-GMM estimator suggested by Arellano and Bond (1991) has commonly been used in the literature of dynamic panel data estimations. However, when data are highly persistent, as in the case of bilateral exports flows, Blundell and Bond (1998) argued that this procedure can be improved by using the system GMM estimation, which supplements the equations in first differences with equations in levels, for the former the instruments used are the lagged levels and for the latter the instruments are the lagged differences.

With these points in mind, we estimate a dynamic gravity model for two sub-samples. Results are presented in Tables 6 and 7. Table 6 shows the results for the period 1981-89 and Table 7 for the period 1990-99. For comparative purposes both tables present three set of estimations. The first three columns present the pooled OLS with time effects estimates, columns 3 to 6 present the within two ways fixed effects estimates and columns seven to nine show the system GMM with time effects estimates. The coefficient on the lagged exports (adjustment coefficient) is always statistically significant at 1% level, confirming our thought that the gravity model of trade should be estimated in a dynamic form.

The main difference with respect to the static panel concerning the estimated coefficients is that most of them are lower in magnitude. Moreover, the coefficient on the adjacency dummy is now positive and significant whereas the coefficient on the language variable is non-significant, these results change with respect to the static panel estimations[5]. The GMM system estimator provides better results in terms of standard errors, meaning that the fitted values are more precise and therefore, misspecification is reduced considerably.

Especial attention should be paid to the integration effects that are significantly lower when using the system GMM estimation. With respect to the EU (for both periods) and NAFTA (in the 90s only) the results confirm the existence of a pure trade creation effect. The total effect in the 90s for the EU (EU+EUM+EUX) is 0.15 which translates into 16.18%{= [exp(0.15)-1]*100}and for NAFTA (NAFTA+NAFTAM+NAFTAX) is 0.31 which translates into 36.34% above what is predicted by the dynamic gravity model. For developing countries we find a clear dominance of export and import diversion effects that compensate trade creation in most cases (apart from CARIC trade in the 80s). The Magreb and Mashrek dummies indicate trade destruction and significant import diversion effects that are statistically significant in the 90s only.

Our average results are comparable to Carrère (2006). She evaluates the total trade effects for 7 RTAs over the period 1962-1996, and also their evolution over time. We obtain similar results concerning trade diversion effects in CACM and positive intra-bloc effects in EU and NAFTA in the 80s and 90s. However, contrary to Carrère (2006) we do not find evidence of trade diversion effects in the 90s for the EU and NAFTA. The reason could be that Asian countries are not considered in our sample and that trade diversion occurred with them or that in the period 1997-99 the EUM dummy is positive and significant and therefore the average effect is positive. The first explanation seems more plausible. These conflicting results deserve further investigation.

A final matter of concern is the treatment of the presence of heterogeneity in the mix of countries considered in a dynamic context. The integration effects could differ for single countries. We also leave this subject for further research, since the main aim of this paper is to show what the average effects are for all the members of each regional group.

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[5] Income, population, area and remoteness coefficients are not shown in order to save space.

6. Conclusions

The aim of this research was to investigate the static effects of regional integration agreements in the last two decades in a static and dynamic framework.

Our results indicate that the variables traditionally included in the gravity equation are statistically significant and highlight the role played by intra and extra-bloc effects. The estimated coefficients present, in most cases, the expected signs and magnitudes. Income elasticities (exporter and importer) are positively signed and are close to unity according to the theory. The estimated coefficient for the exporter population variable is negatively signed which shows an absorption effect, the greater the size of the exporter, the lower the exports. However, the estimated coefficient corresponding to the importer population is only negatively signed until 1990. From 1991 onwards, the sign is positive which points towards the growing importance of the role played by scale economies and market-size effects in international trade models. Concerning geographic distance, its coefficient presents a negative sign with elasticities around 1.5.

Interpretation of the integration dummies according to the system GMM estimation results indicates that intra-EU trade is 6.2% higher than expected from the gravity equation and intra-NAFTA trade is 22.14% higher than expected from normal levels of trade. However, intra-CARICOM, intra-CACM, intra-MAGREB and intra-MASHREK trade are lower than expected according to the gravity model.

We show evidence indicating that the new wave of regionalism in the 1990s has had positive effects on intra-bloc trade in the short term mainly for developed countries (EU and NAFTA), whereas for developing countries the results show some evidence of import diversion effects for CACM and CARICOM, MAGREB and MASHREK. In these blocs there is less scope to increase trade since the country members have a very similar production structure.

TABLE 1. Interpreting static integration effects

Coefficient	Extra-Bloc:	*Imports (ρ_k)*		*Exports (δ_k)*	
Intra-Bloc:	Sign	+	-	+	-
γ_k	+	Pure TC (M)	TC+MD ($\gamma_k>\rho_k$) MD ($\gamma_k<\rho_k$)	Pure TC (X)	TC+XD($\gamma_k>\rho_k$), XD($\gamma_k<\rho_k$)
γ_k	-	ME	MD+MC	XE	XD+XC

Note: TC denotes trade creation in terms of imports (M) or in terms of exports (X), MD and XD denote import and export diversion respectively, ME and XE denote extra-bloc import and extra-bloc export expansion respectively and MC and XC denote intra-bloc import and intra-bloc export contraction respectively.

TABLE 2. Results from yearly estimations with remoteness

Variables	1981		1985		1990		1995		1999	
Dependent var: LOG(X)	Coef	t-Stat	Coef	t-Stat	Coef	t-Stat	Coef	t-Stat	Coef	t-Stat
C	-16.85	-1.17	-36.63	-3.35	-38.82	-3.26	-13.44	-1.14	-16.58	-1.11
LOG(YI)	1.00	2.48	1.57	5.08	1.56	4.63	1.09	3.32	1.21	3.00
LOG(YJ)	1.65	12.35	1.57	13.53	1.83	17.04	0.53	7.13	0.34	6.85
LOG(PI)	-0.72	-5.52	-0.80	-6.42	-0.71	-6.73	-0.55	-5.34	-0.43	-3.89
LOG(PJ)	-0.98	-6.82	-0.81	-6.50	-1.09	-9.44	0.33	4.64	0.45	6.84
LOG(AREAI)	0.03	0.65	-0.04	-0.78	-0.09	-2.04	-0.04	-1.08	-0.12	-2.72
LOG(AREAJ)	0.20	4.08	0.14	3.13	0.10	2.18	-0.06	-1.72	-0.02	-0.37
LOG(D)	-1.10	-11.61	-1.04	-13.26	-1.07	-15.72	-1.12	-16.27	-1.23	-13.66
LOG(REM)	-0.38	-1.09	0.09	0.34	0.05	0.16	-0.29	-1.00	-0.12	-0.33
EU	0.44	2.48	0.55	3.72	0.59	3.87	1.81	9.15	1.78	7.68
EUX	0.77	3.81	0.68	3.80	0.27	1.54	0.35	1.93	0.15	0.72
EUM	0.94	6.04	0.84	5.71	0.60	4.45	1.84	11.07	1.88	11.13
NAFTA	0.26	0.51	0.27	0.57	0.22	0.44	2.33	4.67	2.63	4.74
NAFTAM	-0.12	-0.52	-0.29	-1.35	-0.22	-1.01	1.26	5.28	1.29	5.06
NAFTAX	0.06	0.19	-0.07	-0.21	-0.12	-0.44	-0.26	-1.00	0.11	0.37
CACM	1.16	2.76	0.85	2.25	1.23	3.83	0.55	1.27	0.12	0.33
CACMM	-0.05	-0.23	0.27	1.15	0.26	1.16	-0.44	-2.14	-0.92	-4.36
CACMX	0.20	0.82	0.02	0.11	-0.32	-1.76	-0.23	-1.20	-0.06	-0.30
CARIC	1.71	5.93	1.60	5.18	1.31	4.43	0.90	3.25	0.98	3.45
CARICM	-0.31	-1.40	-0.19	-0.95	-0.18	-1.02	-1.04	-5.99	-1.47	-8.37
CARICX	-0.35	-2.04	-0.20	-1.27	-0.17	-1.22	0.00	0.02	-0.07	-0.46
MAGREB	-0.53	-0.73	-0.94	-0.94	0.31	0.73	-0.14	-0.41	-1.55	-3.19
MAGM	-0.43	-1.45	-0.54	-1.95	-0.19	-0.67	-0.86	-3.94	-1.36	-5.42
MAGX	0.34	1.36	0.34	1.48	0.29	1.31	-0.01	-0.07	-0.39	-1.62
MASHREK	-1.63	-1.62	-0.91	-2.73	0.25	0.63	-1.05	-2.96	-2.77	-8.45
MASHM	-1.39	-3.66	-1.45	-4.28	-0.37	-1.37	-1.64	-7.67	-1.87	-8.35
MASHX	1.00	3.98	0.84	3.73	0.63	2.97	0.45	2.30	-0.25	-1.20
ISL	-0.26	-1.34	-0.50	-2.70	-0.21	-1.46	-0.15	-1.20	0.05	0.33
LANG	1.19	6.48	1.21	6.69	1.38	8.72	1.39	9.86	1.39	10.27
ADJ	0.04	0.13	0.07	0.31	0.21	0.96	-0.27	-1.29	-0.31	-1.63
Adjusted R^2	0. 71		0.73		0.77		0.79		0.79	
Nobs	1205		1302		1461		1593		1440	
S.E.	1.76		1.66		1.64		1.57		1.60	
Akaike	4.80		4.75		5.32		5.93		5.45	
NR2	97.93*		78.25*		71.74*		84.58*		83.12*	

Note: Estimation uses White's heteroskedasticity-consistent covariance matrix estimator. EU, NAFTA, CACM, CARIC, MAGREB, MASHREK denote intra-bloc trade effects, EUM, NAFTAM, CACMM, CARICM, MAGREBM, MASHREKM denote import diversion effects and EUX, NAFTAX, CACMX, CARICX, MAGREBX, MASHREKX denote export diversion effects.

TABLE 3. Results from the yearly estimations with trade resistance dummies

Variables:	Years									
Dependent var:	1981		1985		1990		1995		1999	
LOG(X)	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio
LOG(D)	-1.12	-11.86	-1.11	-12.27	-1.13	-13.51	-1.12	-13.97	-1.26	-15.24
ISL	-2.20	-2.06	-0.02	-0.03	-0.29	-0.46	0.49	0.83	1.02	1.34
LANG	0.79	4.14	0.80	4.35	0.93	5.48	1.12	7.40	0.98	6.69
ADJ	0.06	0.17	0.20	0.75	0.04	0.14	-0.04	-0.18	-0.20	-0.74
UE	-0.65	-1.20	0.98	1.90	0.88	2.03	2.93	5.79	2.71	5.46
UEX	-2.49	-4.58	-1.02	-1.94	-1.84	-4.08	-0.42	-0.82	-0.57	-1.13
UEM	2.74	18.06	2.68	18.60	2.78	17.75	3.51	21.60	3.47	20.37
NAFTA	4.72	4.14	4.58	4.89	-		7.84	7.13	-	
NAFTAX	0.89	1.03	0.84	1.28	-4.09	-5.17	2.47	3.09	-5.45	-7.22
NAFTAM	3.10	13.51	2.82	13.00	3.10	13.76	3.98	18.36	4.15	19.3
CACM	-1.60	-2.67	-1.53	-4.33	-0.71	-2.39	0.45	0.70	0.06	0.1
CACMM	-1.27	-6.53	-1.24	-6.04	-1.32	-6.45	-0.43	-2.24	-0.67	-3.41
CACMX	-1.12	-1.74	-0.42	-1.04	-0.22	-0.65	-0.24	-0.36	-0.62	-1.07
CARIC	-0.04	-0.10	0.17	0.42	-0.11	-0.28	0.41	1.22	0.73	2.29
CARICX	1.18	3.05	1.85	5.23	1.29	3.25	1.02	2.80	1.17	3.5
CARICM	-2.70	-14.53	-2.69	-15.50	-2.60	-15.07	-2.02	-12.54	-1.86	-11.2
MAGREB	-		-6.05	-5.36	-		1.92	1.87	3.82	4.83
MAGX	3.09	2.88	-4.71	-8.55	0.32	0.52	1.36	1.59	3.47	3.52
MAGM	-0.74	-2.74	-0.80	-3.41	-0.62	-2.56	0.03	0.13	-0.24	-1.05
MASHREK	-2.41	-2.44	-2.34	-3.34	0.20	0.19	0.65	0.78	2.65	2.56
MASHX	0.24	0.29	0.50	0.84	2.29	2.36	1.73	2.22	3.99	4.05
MASHM	-2.58	-9.35	-2.53	-9.97	-2.09	-8.39	-1.17	-5.59	-1.13	-5.37
X-M dummies	nr		nr		nr		nr		nr	
Adjusted R^2	0.75		0.67		0.69		0.75		0.74	
Nobs	1205		1302		1461		1593		1440	
NR2	87.45*		96.32*		68.59*		93.16*		98.09*	
Akaike	6.9		6.8		7.04		6.8		7.2	

Notes: Estimation uses White's heteroskedasticity-consistent covariance matrix estimator. Variables that are country specific (incomes, populations and areas) are excluded from the regressions. EU, NAFTA, CACM, CARIC, MAGREB, MASHREK denote trade creation effects, EUM, NAFTAM, CACMM, CARICM, MAGREBM, MASHREKM denote import diversion effects and EUX, NAFTAX, CACMX, CARICX, MAGREBX, MASHREKX denote export diversion effects. Nr denotes no reported (47X and 47M dummies). * denotes significance at 1% level.

Table 4. Estimation results for segmented sub-periods with remoteness

Variables	1981-1985		1986-89		1990-95		1996-1999	
Dependent var:LOG(X)	Coef	t-Stat	Coef	t-Stat	Coef	t-Stat	Coef	t-Stat
C	-32.59	-5.94	-45.45	-6.81	-23.35	-4.74	-15.54	-2.19
LOG(YI)	1.48	9.57	1.73	9.42	1.37	9.90	1.12	5.80
LOG(YJ)	1.58	29.26	1.68	32.91	0.89	16.44	0.45	14.18
LOG(PI)	-0.77	-13.54	-0.74	-13.44	-0.69	-15.83	-0.45	-8.31
LOG(PJ)	-0.85	-14.77	-0.92	-16.26	-0.07	-1.33	0.44	13.28
LOG(AI)	-0.05	-2.48	-0.04	-1.70	-0.06	-3.47	-0.08	-4.34
LOG(AJ)	0.16	7.92	0.13	5.89	0.02	0.90	-0.08	-3.92
LOG(D)	-1.09	-29.47	-1.01	-27.58	-1.16	-39.62	-1.22	-29.29
LOG(RM)	0.00	0.00	0.24	1.43	-0.10	-0.86	-0.18	-1.07
EU	0.51	7.21	0.71	8.85	1.05	15.10	1.75	15.56
EUX	0.66	7.95	0.54	6.08	0.30	4.22	0.19	1.86
EUM	0.91	13.82	0.60	8.45	1.14	18.69	1.79	22.08
NAFTA	0.37	1.74	0.01	0.02	1.31	6.50	2.59	9.84
NAFTAM	-0.09	-0.89	-0.40	-3.64	0.32	3.36	1.37	11.70
NAFTAX	0.08	0.58	-0.23	-1.60	-0.07	-0.67	-0.01	-0.05
CACM	1.10	6.40	1.02	5.91	0.34	2.11	0.42	2.46
CACMM	0.17	1.62	0.08	0.71	-0.69	-7.23	-0.52	-5.09
CACMX	0.06	0.60	-0.10	-1.04	-0.18	-2.20	-0.13	-1.36
CARIC	1.67	12.54	1.53	10.57	0.74	6.04	0.75	5.56
CARICM	-0.18	-1.91	-0.27	-2.88	-1.02	-12.22	-1.13	-13.53
CARICX	-0.28	-3.85	-0.18	-2.45	-0.04	-0.66	-0.02	-0.26
MAGREB	-1.04	-2.67	-0.08	-0.24	-0.21	-1.61	-1.19	-4.94
MAGM	-0.40	-3.10	-0.45	-3.34	-1.09	-10.50	-1.06	-9.26
MAGX	0.48	4.43	0.24	2.14	0.15	1.53	-0.33	-2.90
MASHEK	-1.49	-3.84	-0.17	-0.43	-1.17	-7.55	-1.99	-11.38
MASHM	-1.31	-8.56	-0.82	-5.72	-1.70	-15.78	-1.79	-17.28
MASHX	0.91	8.39	0.59	5.11	0.57	7.00	0.02	0.20
ISL	-0.46	-5.49	-0.19	-2.63	-0.22	-3.94	-0.10	-1.45
LANG	1.20	14.65	1.31	15.95	1.27	21.18	1.38	20.29
ADJ	0.01	0.14	0.02	0.20	-0.17	-2.02	-0.34	-3.42
Adjusted R^2		0.73		0.76		0.78		0.79
Nobs		7158		6814		7880		6290
S.E.		1.67		0.62		1.62		1.57
Akaike		3.87		3.81		3.81		3.76
NR2		89.91*		85.58*		75.84*		96.21*

Notes: Estimation uses White's heteroskedasticity-consistent covariance matrix estimator. EU, NAFTA, CACM, CARIC, MAGREB, MASHREK denote trade creation effects, EUM, NAFTAM, CACMM, CARICM, MAGREBM, MASHREKM denote import diversion effects and EUX, NAFTAX, CACMX, CARICX, MAGREBX, MASHREKX denote export diversion effects. * denotes significance at 1% level.

TABLE 5. Estimation results for developed and developing exporters

1981-99 Variables	EU and NAFTA (Random Effects)		Developing countries (Two ways fixed effects)	
Dependent var:LOG(X)	Coef	t-Stat	Coef	t-Stat
C	3.08	0.52	-33.23	-10.45
LOG(YI)	0.87	9.25	1.21	13.55
LOG(YJ)	0.10	3.97	0.99	22.25
LOG(PI)	-0.39	-3.05	-0.42	-11.01
LOG(PJ)	0.55	9.02	0.09	1.88
LOG(AI)	0.02	0.24	-0.05	-3.16
LOG(AJ)	0.18	3.21	-0.10	-7.99
LOG(D)	-1.84	-26.42	-1.03	-43.36
LOG(RM)	-0.52	-2.94	0.22	2.77
EU	0.63	19.28	-	-
EUX	-0.39	-4.68	-	-
EUM	0.79	9.06	-	-
NAFTA	1.05	2.65	-	-
NAFTAM	1.40	5.83	-	-
NAFTAX	-0.49	-1.71	-	-
CACM	-	-	0.13	1.10
CACMM	-	-	-0.91	-11.45
CACMX	-	-	-0.24	-4.94
CARIC	-	-	0.61	7.69
CARICM	-	-	-1.06	-13.51
CARICX	-	-	-0.29	-7.07
MAGREB	-	-	-0.93	-6.02
MAGM	-	-	-1.83	-17.02
MAGX	-	-	0.41	6.80
MASHEK	-	-	-1.58	-11.20
MASHM	-	-	-1.88	-17.44
MASHX	-	-	0.62	11.69
ISL	-0.07	-0.42	-0.07	-1.20
LANG	0.50	2.59	1.23	28.76
ADJ	-0.65	-4.53	0.07	0.85
Adj. R^2	0.79		0.65	
S.E.	0.93		1.77	
N(T-1)*R2(Auxiliar Regresion)	75.92*		63.12*	
Nobs	8691		15221	

Note: Estimation uses White's heteroskedasticity-consistent covariance matrix estimator. EU, NAFTA, CACM, CARIC, MAGREB, MASHREK denote trade creation effects, EUM, NAFTAM, CACMM, CARICM, MAGREBM, MASHREKM denote import diversion effects and EUX, NAFTAX, CACMX, CARICX, MAGREBX, MASHREKX denote export diversion effects. * denotes significance at 1% level.

TABLE 6. Estimation results for dynamic panel 1981-89

1981-1989 Variables	Pooled OLS with time effects (1)			Within two ways fixed effects (2)			System GMM with time effects (3)		
Dependent var:LOG(X)	SR-Coef	t-Stat	LR-Coef	SR-Coef	t-Stat	LR-Coef	SR-Coef	t-Stat	LR-Coef
Adjustment coefficient	0.79	77.71		0.25	10.98		0.91	103.69	
EU	0.15	4.93	0.71	0.13	4.62	0.17	0.07	3.16	0.78
EUM	0.13	4.82	0.62	0.13	4.66	0.17	0.04	1.71	0.44
EUX	0.08	2.30	0.38	0.07	1.89	0.09	0.02	0.58	0.22
NAFTA	-0.02	-0.17	-0.10	-0.04	-0.46	-0.05	-0.06	-1.10	-0.67
NAFTAM	-0.09	-1.92	-0.43	-0.09	-1.91	-0.12	-0.08	-2.66	-0.89
NAFTAX	-0.07	-1.14	-0.33	-0.10	-1.76	-0.13	-0.07	-1.61	-0.78
CACM	0.16	2.49	0.76	0.13	2.11	0.17	0.01	0.24	0.11
CACMM	-0.02	-0.33	-0.10	-0.02	-0.54	-0.03	-0.00	-0.12	0.00
CACMX	-0.03	-0.92	-0.14	-0.05	-1.26	-0.07	-0.07	-2.27	-0.78
CARIC	0.32	5.39	1.52	0.29	5.07	0.39	0.10	2.17	1.11
CARICM	-0.06	-1.42	-0.29	-0.06	-1.67	-0.08	-0.02	-0.66	-0.22
CARICX	-0.05	-1.81	-0.24	-0.06	-2.18	-0.08	-0.03	-1.56	-0.33
MAGREB	0.08	1.04	0.38	0.04	0.55	0.05	0.04	0.54	0.44
MAGM	-0.10	-1.80	-0.48	-0.11	-2.06	-0.15	-0.03	-0.76	-0.33
MAGX	0.07	1.41	0.33	0.04	0.86	0.05	-0.02	-0.52	-0.22
MASHREK	0.02	0.24	0.10	0.01	0.13	0.01	0.07	0.68	0.78
MASHM	-0.19	-3.44	-0.90	-0.20	-3.71	-0.27	-0.01	-0.19	-0.11
MASHX	0.13	2.60	0.62	0.13	2.78	0.17	-0.02	-0.44	-0.22
ISL	-0.02	-0.73	-0.10	-0.03	-1.01	-0.04	-0.03	-1.20	-0.33
ADJ	0.27	7.86	1.29	0.27	7.86	0.36	0.11	4.20	1.22
LANG	0.01	0.38	0.05	0.01	0.32	0.01	-0.00	-0.03	0.00
Adjusted R^2	0.91			0.93			0.91		
S.E.	0.94			0.81			0.90		
Obs	10689			10718			9064		
Akaike	2.72			2.54			-		
J-stat.	-			-			0.01		

Note: Estimation uses White's heteroskedasticity-consistent covariance matrix estimator. Only integration effects are shown. EU, NAFTA, CACM, CARIC, MAGREB, MASHREK denote trade creation effects, EUM, NAFTAM, CACMM, CARICM, MAGREBM, MASHREKM denote import diversion effects and EUX, NAFTAX, CACMX, CARICX, MAGREBX, MASHREKX denote export diversion effects.

TABLE 7. Estimation results for dynamic panel 1990-99

1990-1999 Variables	Pooled OLS with time effects (1)			Within two ways fixed effects (2)			System GMM with time effects (3)		
Dependent var:LOG(X)	SR-Coef	t-Stat	LR-Coef	SR-Coef	t-Stat	LR-Coef	SR-Coef	t-Stat	LR-Coef
Adjustment coefficient	0.83	201.11		0.28	14.07		0.95	171.64	
EU	0.17	5.12	1.00	0.18	6.51	0.25	0.06	3.44	1.20
EUM	0.17	7.28	1.00	0.18	7.03	0.25	0.04	1.96	0.80
EUX	0.02	0.90	0.12	0.02	0.65	0.03	0.05	2.30	1.00
NAFTA	0.34	3.00	2.00	0.35	3.66	0.49	0.20	4.64	4.00
NAFTAM	0.06	1.76	0.35	0.07	1.99	0.10	0.03	1.11	0.60
NAFTAX	0.03	0.90	0.18	0.03	0.64	0.04	0.08	2.71	1.60
CACM	0.05	0.79	0.29	0.04	0.75	0.06	0.03	0.90	0.60
CACMM	-0.11	-3.80	-0.65	-0.12	-3.26	-0.17	-0.04	-1.34	-0.80
CACMX	0.01	0.31	0.06	0.01	0.24	0.01	0.02	0.74	0.40
CARIC	0.11	2.97	0.65	0.11	2.30	0.15	0.02	0.64	0.40
CARICM	-0.20	-8.22	-1.18	-0.21	-6.82	-0.29	-0.08	-3.81	-1.60
CARICX	-0.04	-1.79	-0.24	-0.04	-1.67	-0.06	-0.02	-1.46	-0.40
MAGREB	-0.26	-2.37	-1.53	-0.28	-3.89	-0.39	-0.15	-2.60	-3.00
MAGM	-0.22	-6.09	-1.29	-0.24	-5.02	-0.33	-0.09	-3.00	-1.80
MAGX	-0.05	-1.29	-0.29	-0.06	-1.43	-0.08	-0.04	-1.60	-0.80
MASHREK	-0.32	-3.66	-1.88	-0.34	-5.70	-0.47	-0.17	-3.88	-3.40
MASHM	-0.32	-9.45	-1.88	-0.34	-8.24	-0.47	-0.10	-3.48	-2.00
MASHX	0.08	2.25	0.47	0.08	2.39	0.11	-0.01	-0.22	-0.20
ISL	-0.02	-0.84	-0.12	-0.02	-1.09	-0.03	0.02	1.27	0.40
ADJ	0.21	9.54	1.24	0.22	9.09	0.31	0.06	3.62	1.20
LANG	-0.04	-0.91	-0.24	-0.04	-1.29	-0.06	-0.02	-1.30	-0.40
Adjusted R^2	0.94			0.95			0.93		
S.E.	0.83			0.71			0.82		
Nobs	14827			14865			14276		
Akaike	2.48			2.25			-		
J-stat.	-			-			0.02		

Note: Estimation uses White's heteroskedasticity-consistent covariance matrix estimator. Only integration effects are shown. EU, NAFTA, CACM, CARIC, MAGREB, MASHREK denote trade creation effects, EUM, NAFTAM, CACMM, CARICM, MAGREBM, MASHREKM denote import diversion effects and EUX, NAFTAX, CACMX, CARICX, MAGREBX, MASHREKX denote export diversion effects.

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Appendix

Trade data (in current thousand US$) were obtained from Statistics Canada (2001), incomes at purchasing power parity prices (in thousand $) and populations are from the World Development Indicators CD (2001) and distance in kilometres between capitals are from http://www.indo.com/distance.

List of regional blocs and countries: EU (France, Germany, Belgium, Luxembourg, Italy, Netherlands, UK, Denmark, Greece, Ireland, Spain, Portugal, Austria, Finland, Sweden); NAFTA (USA, Canada, Mexico); CACM (Costa Rica, Guatemala, Nicaragua, El Salvador, Honduras, Nicaragua as associated country), CARICOM (Barbados, Bahamas, Belize, Dominican Rep., Guyana, Haiti, Jamaica, St Kitts Nev., Suriname, Trinidad Tobago) and Cuba; Magreb (Algeria, Morocco, Tunisia, Lybia); Mashrek (Egypt, Israel, Jordan, Lebanon, Syria); other Mediterranean (Turkey, Cyprus and Malta).