Trade Effects of the Central American Free Trade Agreement

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Abstract

Proponents of DR-CAFTA argue the RTA will free the U.S. agricultural sector of these disadvantages by leveling the field through the removal of these tariffs and in many cases, create preferences for U.S. exporters over third country suppliers, including those in Canada, Europe, and South America, helping to restore lost U.S. market share and expand overall U.S. exports. In this paper, we develop gravity models to estimate and predict the potential bilateral trade flows between U.S. and CAFTA countries using panel data. In the course of the study, it was expected that if DR-CAFTA were to have an effect, all countries under the agreement should be trade creators. All the six CAFTA countries but one (Costa Rica) are trade creators. The amount trade created ranges from as low as 1% for Guatemala to as high as 13% for Nicaragua, and Costa Rica only diverse 1% of the potential bilateral trade.

The study has also revealed the importance and positive effects of differences between resource endowment, relative size of the economies, and exchange rates on trade flows. Distance, though less significant is seen as a factor that can potentially raise trade costs. Given these results, there is no doubt that implementing the DR-CAFTA will lead to an expansion of trade between the United States and the DR-CAFTA countries. As it stands, there appear to be advantages for U.S. producers from the Agreement, given the already low duties on agricultural imports from these countries to the U.S. and the relatively high duties placed on U.S. agricultural exports.

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1. BACKGROUND

The DR- CAFTA was negotiated as a regional trade agreement (RTA) between US, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras and Nicaragua. DR CAFTA is a comprehensive and reciprocal trade agreement, which distinguishes it from the unilateral preferential agreement between the U.S. and these countries as part of the Caribbean Basin Initiative (CBI). It defines detailed rules that would govern market access of goods, service trade, government procurement, intellectual property, investment, labor and environment.

With U.S. exports of more than $16 billion in 2004, Central America and the Dominican Republic make up the second largest market for U.S. exports in Latin America. The region is a larger export destination than Brazil and larger than India, Indonesia, and Russia combined. From 2000 to 2004, export shipments to DR-CAFTA destinations grew by almost 16 percent, compared with less than 5 percent for overall U.S. exports (Rosson 2004).

With respect to agriculture, the general objective of the Agreement is the eventual removal of all barriers to trade (tariff and non-tariff) on all commodities, save a few, which are considered sensitive. The RTA is modeled after the North American Free Trade Agreement (NAFTA) in that it considers not only trade-specific issues such as tariff reduction, but also liberalization in other areas such as intellectual property, investment, and services.

Like NAFTA, the RTA is comprised of a set of mini agreements between the U.S. and each of the partners (i.e., each of the six DR-CAFTA countries negotiated separate schedules of commitments providing access for U.S. products). In return, the U.S. has agreed to provide the same tariff treatment to all the partner countries while making country-specific commitments on tariff-rate quotas (TRQ).

In general, tariffs will be eliminated on all products (exceptions: sugar in the United States, fresh potatoes and fresh onions entering Costa Rica, and white corn for all CAFTA countries except Costa Rica) over a phase-out period, with some taking effect immediately and others scheduled for phase-out after five, ten, twelve, fifteen, seventeen, or twenty years. For most of the commodities, the reductions will occur in equal installments over the course of the agreed upon phase-out period. For others, TRQs will be established or, in some cases, expanded with zero duty for specified import quantities or greater quantities above the quota.

Proponents of DR-CAFTA argue the RTA will free the U.S. agricultural sector of these disadvantages by leveling the field through the removal of these tariffs and in many cases, create preferences for U.S. exporters over third country suppliers, including those in Canada, Europe, and South America, helping to restore lost U.S. market share and expand overall U.S. exports. For example, Koo, Kennedy, and Skripnitchenko (2006) found that RTAs had, overall, a positive and significant influence on increasing trade volumes among member countries and that RTAs could have a positive trade diversion effect (in this case for NAFTA). In this paper, we develop gravity models to estimate and predict the potential bilateral trade flows between U.S. and CAFTA countries using panel data.

2. GRAVITY MODEL FOR BILATERAL TRADE POTENTIALS

Originally inspired by Newton's gravity equation in physics, the gravity model has become common knowledge in regional science for describing and analyzing spatial flows, and was pioneered in the analysis of international trade by Tinbergen (1962), Poyhonen (1963) and Linneman (1966). The model works well empirically, yielding sensible parameter estimates and explaining a large part of the variation in bilateral trade. However, it has long been disputed for a lack of theoretical foundation. In conjunction with the expanding theoretical literature on the gravity model, a number of recent contributions have addressed issues concerning the correct specification and interpretation of the gravity equation in empirical estimation. These deal with, for example, the specification of panel gravity equations, the estimation of cross-section gravity equations, and the correct interpretation of the distance effect on patterns of bilateral trade Mátyás, (1998). Overall, these developments have improved our understanding of the gravity equation as a tool to model and analyze bilateral trade patterns.

Over the years several authors have used various additional variables that enhance or resist trade (e.g. population, distance, per capita income, producer or consumer subsidies, and other variables), in order to enrich the analysis of trade between pair–countries. It has also included dummy variables in order to capture contiguity effects, cultural and historical similarities, distance, common language, regional integration, and patents right, to name a few.

The gravity model has been used as far back as the early 1960s in order to explain bilateral trade flows. In its basic form, the model assumes that the volume of trade between any two partners is an increasing function of their national incomes and a decreasing function of the distance between them that increases transportation and other transaction costs.

The gravity model provides a strong empirical approach in explaining bilateral trade patterns. For example, Koo and Karemera (1991) revised the conventional gravity model into a commodity-specific gravity model to determine factors affecting trade flows of wheat. The authors also used panel data instead of only cross-sectional data in estimating the model. The results from the analysis revealed that all the independent variables, including production capacities, income, input and export unit values, price of wheat, inflation and exchange rates in respective countries and trade policies relative to wheat trade play an important role in determining trade flows of wheat. The gravity model has also been used to estimate trade flows for countries within a trading block and others outside the trading block. This helps to determine whether a trade agreement has resulted in trade creation or trade diversion.

Martinez and Nowak-Lehmann (2003) applied the gravity trade model to assess Mercosur – European Union trade and trade potential following the agreements between both trade blocks. In this model, the authors included a number of variables such as infrastructure, income differences and exchange rates to the standard gravity equation and found them to be important determinants of international trade flows.

More recently, the application of gravity models has enjoyed a big revival. However, this has not so much been driven by its more rigorous theoretical foundation (Anderson, 1979; Bergstrand, 1985, 1989, and 1990; Helpman and Krugman, 1985; and Helpman, 1987; and so on) but the opportunity to project bilateral trade relations (Hamilton and Winters, 1992; Baldwin, 1994). According to the traditional concept of the gravity equation, bilateral trade can be explained by GDP and GDP per capita figures and both trade impediment (distance) and preference factors (common border, common language, etc.). The economic framework in most cases was cross-section analysis (Wang and Winters, 1991; Hamilton and Winters, 1992; Brulhart and Kelly, 1999; and Nilsson, 2000; and so on). Only a few authors made use of (random effects) panel econometric methods (Baldwin, 1994; Gros and Gonciarz, 1996; Mátyás, 1997; and Egger, 2000). Mátyás, (1997 and 1998) provides insights in the question of proper econometric specification without dealing with the issue of trading potentials.

3. THE ECONOMETRIC SPECIFICATION

According to the endowment-based new trade model with Dixit and Stiglitz (1977) preferences, bilateral trade is an increasing sum of factor income G, relative size S, and the difference in relative factor endowments R. Additionally, bilateral trade is affected by more traditional measures of transportation cost which is represented by distance D_{ij} and lastly, the real bilateral exchange rate $E_{ijt.}$ Accordingly, bilateral trade can be estimated by

(1) $$Y_{it} = \beta_0 + \beta_1 G_{ijt} + \beta_2 S_{ijt} + \beta_3 R_{ijt} + \beta_4 D_{ij} + \beta_5 E_{ijt} + \varepsilon_{ijt}$$

where all variables are in real figures and expressed in logs, and the error term can be written as

(2) $$\varepsilon_{ijt} = u_{ij} + v_{ijt}$$

with u_{ij} as the (fixed or random) unobserved bilateral effect and v_{ijt} as the remaining error.

Using the Helpman (1987) model, the Heckscher-Ohlin bilateral trade determinants can be formulated in the following way:

(3) $$G_{ijt} = \log\left(GDP_{it} + GDP_{jt}\right)$$

(4) $$S_{ijt} = \frac{GDP_{jt}}{GDP_{it}}$$

and

(5) $$R_{ijt} = \left|\log\left(\frac{GDP_{it}}{N_{it}}\right) - \log\left(\frac{GDP_{jt}}{N_{jt}}\right)\right|$$

where N denotes a country's population and GDP per capita is commonly used as a proxy for a country's capital-labor ratio.

For the panel econometric projection of potential bilateral trade, researchers have concentrated on random effects model (REM), which requires that $\mu \sim (0, \sigma_{\mu}^{2})$, $v_{ijt} \sim (0, \sigma_{v}^{2})$, and the u_{ij} are independent of the v_{ijt}. Moreover, the X_{ijt} (i.e. the explanatory variables) have to be independent of the u_{ij} and v_{ijt} for all cross-sections (*ij*) and time periods (*t*). Whereas the fixed effects model (FEM) is always consistent in the absence of endogeneity or errors in variables, the REM is only consistent if the above-mentioned othogonality conditions are fulfilled. Then, the REM has the advantage of more efficiency as compared to the FEM. If these conditions do not hold, only the FEM is consistent since it wipes out all the time-invariant effects (u_{ij}). The decision between FEM and REM can be based on the Hausman (1978) test.

4. DATA AND ESTIMATION PROCEDURE

The gravity model is applied using panel data for the period 1990 to 2004 for 6 CAFTA countries and the U.S. In this analysis, several variations across individual country are analyzed in the one-way FEM, the one-way REM, and two-way FEM, to see whether individual country's effects are as fixed or randomly distributed across cross-sectional units. The dependent variable, real value of trade flows (US agricultural exports and imports to and from each CAFTA country) was regressed on factor income G_{ijt}, relative S_{ijt}, the difference in relative factor endowments R_{ijt}., distance D_{ij} and the real bilateral exchange rate E_{ijt}.. Since the individual country's effects were included, there was a need to decide whether these effects should be treated as fixed or random. The Hausman test was conducted to examine the model that was most efficient.

The dollar values of U.S. agricultural exports and imports to and from each CAFTA country were obtained from the Foreign Agricultural Trade of the United States (FATUS) database at website of the USDA'S Economic Research Service (ERS) (http: // www.ers.usda.gov). Real GDP data for each country were obtained from the

Euromonitor International Database (2006). These figures are converted to U.S. dollars to maintain a common unit of measure. Populations, measured in thousands of inhabitants were obtained from the Euromonitor International Database (2006). The distances, measured in meters were obtained using GDA Vincenty Calculation Results (inverse) from Australian Geodetic Datum. (http://www.ga.gov.au/bin/gda_vincenty.cgi). Figures of real exchange rate of each CAFTA country currency to the U.S. dollar were obtained from Euromonitor International Database (2006).

Data on trade flows and exchange rates were obtained from the Foreign Agricultural Trade of the United States (FATUS) database on the USDA's Economic Research Service (ERS) website. The exchange rate data are measured as the foreign currency per U.S. dollar, which means that an increase indicates appreciation of the U.S. dollar, and a decrease means depreciation of the U.S. dollar. An appreciation of an importing country's currency against the U.S. dollar implies an increase in imports from the US. Data on real GDP in dollars for each country were obtained from the International Monetary Fund's World Economic outlook Database.

The summary statistics of the variables used in the analysis are presented in Table 1. The mean value of bilateral tarde flows for all countries for the period under study is $540 million and with maximum and minimum of $1.18 billion and $307 million. The mean of the sum of real bilateral trade factor income is around $1 billion and mean per capita factor income is about $3,800. Also, the mean distance between the capital of any CAFTA nation and Washington, DC is about 2,960 km.or 1,850 miles. The mean real exchange rate to the dollar is 49 units with lowest currency exchanged at 437 and highest, 2.8, to the dollar.

5. RESULTS AND PROJECTIONS

Table 2 presents the estimation results for the three different panel estimators. According to the test statistics we cannot ignore the cycle and cross-sectional effects as the F-test for time and cross-sectional effects are significant. The F-tests for the one-way and two-way fixed effects models are all significant at (p = 0.0001). Thus, the probabilities that are no effects and cyclic effects in the two models, respectively, are 0. However, the Hausman test statistic reveals that the random-one effects model (REM1) seems most appropriate. The Hausman statistics ***m***, which is the test for correlation between the error and the regressors has a value of 9.06 with 3 degrees of freedom and (p > m = 0.028). This indicates the absence of autocorrelation.

Besides the real sum of bilateral factor income, all the parameter estimates are significant with expected signs. The estimates of resource endowment differences and real exchange rate, all are significant at (p = 0.0001), relative GDP at (p = 0.0292), and distance is at (p = 0.1386).

The results reveal that the impact of differences in resources endowment, relative factor income, and real exchange rates is positive. The positive sign of the exchange rate variable supports the theory that an appreciation of the U.S. dollar (depreciation of CAFTA currency) has a positive effect on imports form CAFA countries (negative effects of on US exports) to CAFTA countries. A 1% percent appreciation of the dollar, increases imports from CAFTA (reduces exports to U.S.) by 0.34%.

A 1% increase in the resources endowment differences will increase trade flow volume by 1.5%. This result is consistent with the fundamentals of trade theory. That is, trade is more pronounced among countries with different resource endowments. The size of a CAFTA economy relative to that the U.S. also positively affects trade flows. A 1% increase in the relative size of the economy will increase bilateral trade flows by 1.04%.

The distance variable had an expected sign (-) but only significant at 10%. For every 1% increase in distance between U.S. capita and any the capital of any CAFTA country, there will be a corresponding decrease of trade flows between the two countries by about 1.3%.

In the course of the study, it was expected that if DR-CAFTA were to have an effect, all countries under the agreement should be trade creators. Based on the results of the FEM1, the bilateral trade potential of the 6 CAFTA countries was calculated using the exponent of minus one times the bilateral residual. All the countries, with the exception of Costa Rica, are trade creators. The largest trade creator is Nicaragua with 13%, followed by Honduras with 5%, and 4% for El Salvador. Dominica Republic and Guatemala are 3% and 1%, and of course, Costa Rica will diver 1% of the bilateral trade potential

6. CONCLUSION

The study has revealed that CAFTA could have a positive effect on trade flows. All the six CAFTA countries but one (Costa Rica) will be trade creators. The potential trade created ranges as low as 1% for Guatemala to a high of 13% for Nicaragua. We have also seen the important and positive effects of differences between resource endowment, relative size of the economies, and exchange rates on trade flows. Distance, though less significant is seen as a factor that can potentially raise trade costs.

Given these results, there is no doubt that implementing the DR-CAFTA will lead to an expansion of trade between the United States and the DR-CAFTA countries. As it stands, there appear to be advantages for U.S. producers from the Agreement, given the already low duties on agricultural imports from these countries to the U.S. and the relatively high duties placed on U.S. agricultural exports. However, as with any trade agreement, there will be "winners" and "losers". In the absence of a crystal ball, there are potential benefits for U.S. producers from the Agreement. The conclusions reached are made based on two premises. The first premise is the observation that U.S. producers still maintain a trade surplus for some of the selected commodities, notwithstanding the relatively high tariff faced by U.S. producers/exporters. The second premise is that removing trade restrictions would enable more U.S. producers to penetrate more DR-CAFTA markets. It should be noted that trade flows and patterns can and do change over time and that countries currently importing a particular commodity can, with the requisite level of investment and technological support, become net exporters in the near future.

However, there is much to be gained by the U.S. if it can have made agreement with the rest of Latin countries. According to free trade experts, when two countries sign for a free trade agreement, the third country which is not part of the agreement is likely to face higher tariffs. Therefore, DR-CAFTA is not the best option for the U.S. but the Free Trade Area of the Americas (FTAA) will be the one.

There are about thirty different regional trade agreements of different types in the

Western Hemisphere.   These agreements can put non-participating countries at a competitive disadvantage. For example, the MERCOSUR trade agreement includes Argentina, Brazil, Paraguay, and Uruguay; because of this agreement, U.S. exporters face tariff differentials in the MERCOSUR market that favor member suppliers.

Negotiations to create the largest single market in the world, the Free Trade Area of the Americas (FTAA), are in progress. While the United States has free trade agreements with Canada, Mexico and DR-CAFTA countries, the goal of the FTAA is to progressively eliminate trade and investment barriers within the Western Hemisphere. Negotiations for the FTAA involve 34 nations from the Western Hemisphere. Such an agreement could have significant effects on U.S. agriculture; it could create an opportunity to increase U.S. exports of agricultural commodities and products. It could also increase U.S. imports of agricultural commodities produced in other Western Hemisphere countries.

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Table 1. Descriptive Analysis of the Variables

Variables	**Mean**	**Standard Deviation**	**Minimum**	**Maximum**	**Skewness**
TFLOW	540754.20	313325.934	30714.00	1181453.00	0.378
Gijt	1013.69	96.854	865.94	1176.64	0.066
Rijt	3.87	0.885	2.42	5.63	0.143
Sijt	0.0012	0.001	0.0004	0.0023	-0.090
Dij	2962.30	289.003	2580.00	3363.00	0.230
Eijt	49.46	97.044	2.81	437.91	2.555

Table 2. Regression Results of the Three Panel Gravity models

	Fixed Effects		Random Effects
Variable	**FixOne**	**Fixtwo**	**Ranone**
Dominican Republic	0.687	1.947***	
El Salvador	1.376***	1.551***	
Guatemala	0.499**	0.875***	
Honduras	1.593**	1.6074**	
Nicaragua	0.789***	0.889***	
Intercept	15.812	-3775.36	25.892***
G_{ijt}	1.185**	536.33	0.309
R_{ijt}	-0.555	1.415	1.519**
S_{ijt}	-0.052	0.153	1.044***
D_{ij}	-1.541	-0.718	-1.359
E_{ijt}	0.304***	0.146	0.341***
Year 1		163.46	
Year 2		151.21	
Year 3		143.17	
Year 4		131.97	
Year 5		117.66	
Year 6		107.27	
Year 7		94.55	
Year 8		80.60	
Year 9		68.46	
Year 10		54.86	
Year 11		41.50	
Year 12		34.24	
Year 13		26.09	
Year 14		14.93	
R^2	0.946	0.957	0.664
F Test	11.05***	3.84***	
Hausman Test			9.06**

Standard errors are in parentheses
*** Indicates significance at 1% confidence level
** Indicates significance at 5% confidence level