A Gravity Model for the Exports of Nicaragua*

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Abstract

This paper constructs a gravity model for the exports of Nicaragua to assess the benefits of the trade policies implemented in the country. Using panel data techniques on the exports for the period of 1960-2011 and among 30 trade partners, estimates suggest that relative economic size of the exporting and importing country are significant in explaining the growth of exports of Nicaragua. Additionally, Free Trade Agreements have played a key role in the consistent growth of the exports of Nicaragua and there is strong evidence of untapped trade potential among many commercial partners.

Key Words: Gravity Model, International Trade, Nicaragua.
Código JEL: C23, F13, F14.

*Trabajo ganador del 2do. lugar del Premio de Economía, Finanzas y Desarrollo "Vicente Vita Rodríguez", Edición 2013. Durante la elaboración de este documento los autores eran estudiantes de maestría de la London School of Economics and Political Science. Para comentarios comunicarse con los autores a: robertolanuza@me.com o bone_claudia@hotmail.com. El contenido de este documento es de exclusiva responsabilidad de su(s) autor(es) y no representa la posición oficial del Banco Central de Nicaragua.

1. Introduction

Nicaragua's economic growth is closely related to the performance of its trade sector. The most recent Trade Policy Review of the country by the World Trade Organization (WTO), emphasizes that the average growth of 4% attained between 2006-2011 was principally driven by exports, ultimately causing significant improvement in social indicators such as decreasing poverty rates (WTO, 2012b).

Trade policies have been principally implemented in the form of trade agreements, beginning with the formation of the General Treaty on Central American Economic Integration in 1960 (OAS, 2013). Known as the Treaty of Managua, it laid down the framework for the regional economic integration system and establishment of the Central American Common Market (CACM).

This regional agreement included among its members Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua and was considered the most successful regional integration strategy in Latin America at the time as it produced a substantial increase in intraregional trade (Baier and Bergstrand, 2009). Political and economic circumstances such as war and intensification of government debt in the region caused the withdrawal of certain members and the agreement as a whole was not reestablished until the early 1990 (OAS, 2013).

During this time, a shift in government regime in Nicaragua prompted for the adoption of liberalization policies, characterized by the execution of an international insertion strategy through unilaterally opening to trade by means of reduction in duties on imports, initiation of multilateral and bilateral rounds of negotiations on trade agreements (López and Muñoz, 2008) and the approval of tax incentives legislation such as the Export Promotion Decree of 1991, oriented primarily for companies operating under Export Processing Zones (EPZ) regimen (MIFIC, 2005).

The Nicaraguan government in turn also subscribed two Enhanced

Structural Adjustment Facility programs (ESAF) with the International Monetary Fund (IMF) in accordance with a macro prudential stability plan (IMF, 1999). The ESAF's objectives in aspects of trade policy continued in the line of reduction of tariff and non-tariff barriers as well as to avoid any severe protectionist position towards national industries.

The Poverty Reduction and Growth Facility program (PRGF) also concurred with the IMF, maintained the guideline provided by the ESAF on commercial liberalization and set the groundwork for the signing of CAFTA (Central American Free Trade Agreement) with the United States in 2006 (Avendaño, 2010). Since then, exports have increased at a compound annual nominal growth rate of 15% (9.4 in real terms), reaching the sum of US$ 2,200 millions (excluding EPZ) in 2011 (BCN, 2011).

In view of the above, this paper aims to analyze the factors that determine Nicaragua's exports through the construction of a gravity model of trade. Set in analogy to Newton's Law of Gravity, the model explains that *the flow of trade between countries is directly proportional to their relative economic sizes (GDP) and inversely proportional to distances as a proxy for trade cost* (Tinbergen, 1962).

Vast theoretical framework has been provided in order for the gravity model to be considered one of the most useful tools to evaluate trade policies. However, there are still considerations on the estimation procedure that must be followed in order to obtain consistent results. This paper applies different techniques in order to compare which performs better, which is a common practice in empirical research utilizing the gravity model.

The main results acknowledge the importance of economic growth in both exporting and importing countries in order to boost the rise of exports. Trade cost is the main obstacle that the country faces in order to improve the performance of exports. FTAs and CAFTA in

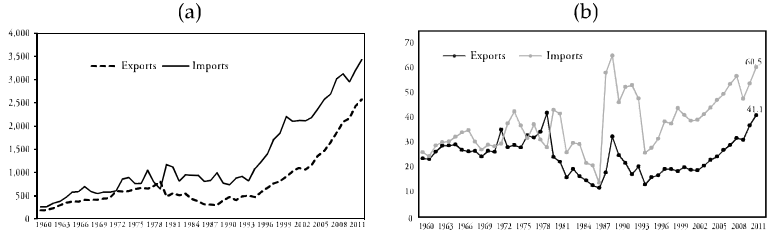
particular, have been meaningful to explain the increment in exports. Finally, there is a vast unexploited trade potential that the country can explore in order to diversify exports allocations.

The rest of this paper is organized as follows. Section 2 briefly describes the development of the trade sector and the rise in the conformation of trade agreements in Nicaragua. Section 3 reviews the literature behind the construction of a gravity model of trade and the different estimation procedures. Section 4 explains the model specifications for Nicaragua and section 5 contains the concluding remarks.

2. Nicaragua's Export Development

Trade policy in Nicaragua has followed a liberalization strategy since the early 1990's through the conformation of trade agreements and gradual reductions in tariffs on commerce (López, 2013). Since then, exports have increased at a compound annual real growth rate of 9%. In terms of GDP, total exports represented 41% in 2011, almost twice in comparison with the data of the decade of 1960 (Figure 1).

Figure 1: Nicaragua's Exports and Imports, 1960-2011
(US$ Millions 2000=100, % of GDP)



Source: World Bank, World Development Indicators.

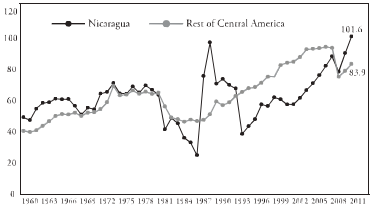
The traditional measure of trade openness (Exports + Imports/GDP) also positions Nicaragua above the average of the rest of the countries of the Central American region (Figure 2a). Between 1996-2011, the country approved 7 FTAs, for which 5 of those included mutual ar-

rangements with regional partners (Table A.1, Appendix). There are still ongoing negotiations for three additional FTAs, which includes Canada, Venezuela and the European Union. Before this period, the only trade agreement was the CACM.

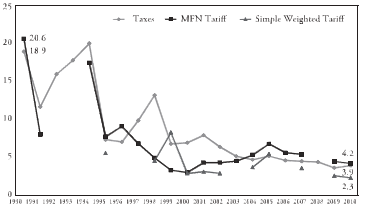
Tariffs data shows that the rate of the Most Favored Nation (MFN[1]) applied to trade has been constantly decreasing since 1990 when it reached 20.6% to 4.2% in 2011. Taxes on trade have also diminished in proportion of total revenues from 19% to 4% for the same period (Figure 2b).

Figure 2: Openness and Tariff Indicators
(% of GDP, %)

(a) Central America Openness



(b) Taxes and Tariffs on International Trade in Nicaragua



Note: Taxes expressed as a percentage of total revenues.
Source: World Bank, World Development Indicators.

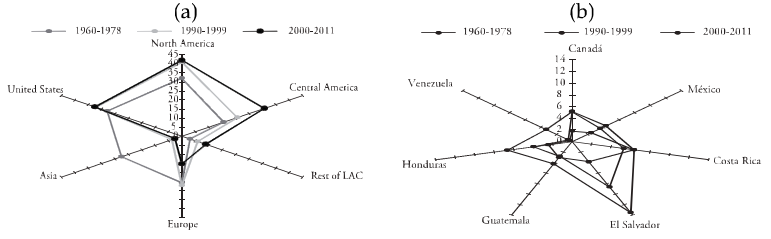
There has also been a strong tendency to concentrate the destination of trade of Nicaragua when in 2011, 82% of the exports were allocated in the American continent (North, Central and South America) and only 12% and 5% were destined to Europe and Asia respectively (Figure A.1, Appendix). In 1960, the allocation of exports by geographical destination was more diversified, where the American Continent accounted for 54% percent of total exports and Europe received 30% and Asia 14%.

By region, North America is the main trade partner of the country and

[1] *"Simple mean most favored nation tariff rate is the unweighted average of most favored nation rates for all products subject to tariffs calculated for all traded goods"* (World Bank, 2012)

accounts for 41% of total exports for the period of 1990-2011 followed by Central America with 25%. The United States alone represents on average 32% of the total exports share of Nicaragua for the same period (Figure 3).

Figure 3: Geographical Orientation of Nicaragua's Export
(Average Share of Total Exports, %)



Source: Central Bank of Nicaragua.

Finally, there is also a strong change in the type of exports being traded by Nicaragua. In 1960, 78% of total exports came from agricultural and livestock products while manufacturing goods only represented 8%. Following the liberalization strategy of 1990, the entry into operation of Export Processing Zones have given way to a robust increase in the share of manufacturing goods and have also pointed out the importance of valued added products. In 2011, manufacturing goods represented 48% of total exports and livestock and agricultural products signified 31% (Figure A.2, Appendix).

Trade policy has become substantial to the development strategy being carried by different governments of Nicaragua since the 1990s. López and Muñoz (2008) consider that most countries in Latin America have followed a similar trade policy pattern; strong liberalization policies, use of the comparative advantage in the production of primary goods and having the United States as the main market where to allocate exports. These countries also share in common, little evidence of the use of gravity model to assess the benefits of such policies.

This paper is therefore motivated by the lack of a proper model to analyze if there has been significant gain in the increase of trade following the policies implemented by the Nicaraguan government and if there are substantial opportunities of unexploited trade potential.

3. Literature Review on the Gravity Model

3.1. The Theoretical Model

First Nobel Laureate in Economics Jan Tinbergen introduced the gravity model in his work of 1962 "Shaping the World Economy", as a method to provide a consistent explanation for the flow of trade among nations. Established as an analogy to Newton's law of gravity, Tinbergen's model explains that countries trade in proportion to their relative sizes (measured in GDP) and proximity (measured as geographic distance).

The original model in its multiplicative form was denoted in the following way:

$$E_{ij} = a_0 Y_i^{a_1} Y_j^{a_2} D_{ij}^{a_3} \tag{1}$$

The exports of country i to country j is implied by E_{ij}, Y_i and Y_j indicate the respective GDP for each country while D_{ij} is the distance between them. Provided this specification, Tinbergen suggested that the flow of exports one country is capable of supplying will depend on its economic size and the market magnitude of the importing country. Distance is used to specify the cost involved in transporting the goods.

The model was estimated in log linear form through ordinary least squares:

$$\log E_{ij} = a_0 + a_1 \log Y_i + a_2 \log Y_j + a_3 \log D_{ij} \tag{2}$$

The expected sign of a_1 and a_2 are to be positive as GDP can be interpreted as income while a_3 is intended to be negative, as an increase in distance rises transport cost. However, important

characteristic of the exporting country such as the dominance of agricultural goods in the exports share can allow for a_2 to be negative due to Engel's Law (Reinert et al., 2010).

Tinbergen also introduced new explanatory variables to its benchmark model to account for "political" and "semi-economic" dynamics in the pattern of trade flows between countries (Tinbergen, 1962). These include the use of dummy variables to account for the existence of trade agreements, if countries share a border and an index to measure the degree of concentration of the type of exports.

Even when the gravity model performed satisfactorily in explaining the behavior of exports, it was criticized for the lack of a theoretical framework and was perceived in the academic world as a mere econometric instrument (WTO, 2012a). The first attempt to provide an analytical basis to the gravity equation was done by Anderson (1979). In his gravity model, goods are differentiated by origins (Armington assumption), consumers have preferences over differentiated products and trade costs are modeled as iceberg costs. Subsequently Bergstrand (1985, 1989) built a gravity equation for the factorial model derived from Krugman's (1980) monopolistic competition trade model.

Most recent contributions include Deardorff (1998) that structured his gravity model appreciation on traditional factor endowments principles of the Hecksher-Ohlin trade theory. Eaton and Kortum (2002) developed a structural bilateral trade equation based on the Ricardian Trade Model. Anderson and van Wincoop (2003) constructed a new gravity model, "Gravity with Gravitas", which incorporated relative trade costs to solve the McCallum (1995) border puzzle problem. Finally, Helpman, Melitz and Rubinstein (2008) and Chaney (2008) developed different gravity models centered on firm heterogeneity.

The many contributions of these researchers have made the gravity model a solid tool for understanding the dynamics behind trade

flows in the world. Most importantly, when the proper variables are included to the baseline equation, the gravity model highlights policy implications on trade (Reinert et al., 2010)).

This paper utilizes the "Gravity with Gravitas" model of Anderson and van Wincoop (2003), which is the most commonly used specification in empirical work. It is a demand function holding the same assumptions as Anderson (1979) in which consumer's preferences are identical and homothetic and takes the form of a Constant Elasticity of Substitution (CES) utility function. The main difference is the added importance on relative trade costs, established by the "resistance" of the importing and exporting country to trade one from the other (WTO, 2012a).

A simple proof of the model is as follows (Gómez and Milgram, 2010):

$$U_j = \left(\sum_i \beta_i^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}, \quad \sigma > 1, \beta_i > 0 \ \ \forall i, \tag{3}$$

where c_{ij} indicates the consumption of country j from country i and σ is the elasticity of substitution.

The representative consumer constraint is:

$$y_j = \sum_i x_{ij} = \sum_i p_{ij} c_{ij}, \tag{4}$$

where y_j is the current income of country j, p_{ij} is the Cost Inclusive of Freight (CIF) import price in country j for goods produced in country i and x_{ij} is the current value of exports from i to j. Trade costs take the form of iceberg costs that is assumed by the exporter and are expressed in one unit of good of i to j and symbolized by t_{ij}, where $t_{ij} - 1 > 0$. Given p_i (Exporters Free on Board Price, FOB), $p_{ij} = p_i t_{ij}$.

The representative consumer's problem in country j is to maximize

(3) subject to (4). The Lagrangian is written as:

$$\mathcal{L} = \left(\sum_i \beta_i^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} + \lambda \left(y_j - \sum_i p_{ij} c_{ij} \right) \tag{5}$$

Taking first order conditions of (5) with respect to two individual varieties c_{ij}, c_{kj} and equating the multipliers yields:

$$\frac{\beta_i^{\frac{1-\sigma}{\sigma}}}{p_{ij} c_{ij}^{\frac{1}{\sigma}}} = \frac{\beta_k^{\frac{1-\sigma}{\sigma}}}{p_{kj} c_{kj}^{\frac{1}{\sigma}}} \Rightarrow c_{ij} = \left(\frac{\beta_i}{\beta_k} \right)^{1-\sigma} \left(\frac{p_{kj}}{p_{ij}} \right)^{\sigma} c_{kj} \tag{6}$$

Using (6) and substituting into (4) results in:

$$y_j = \sum_i p_{ij} c_{ij} \sum_i p_{ij} \left(\frac{\beta_i}{\beta_k} \right)^{1-\sigma} \left(\frac{p_{kj}}{p_{pij}} \right)^{\sigma} c_{kj} \tag{7}$$

Isolating c_{kj} from (7) and introducing this relationship in (5), the following expression is obtained:

$$c_{ij} = \frac{\beta_i^{1-\sigma} p_{ij}^{-\sigma}}{\sum_i (\beta_i p_{ij})^{1-\sigma}} y_j$$

To acquire the Marshallian demand we multiply (8) by p_{ij} to find x_{ij}:

$$x_{ij} = \frac{\beta_i^{1-\sigma} p_{ij}^{-\sigma}}{\sum_i (\beta_i p_{ij})^{1-\sigma}} y_j \tag{8}$$

By assumption the CIF price equals to p_{ij}=$p_i t_{ij}$ and by substituting this into (8) it leads to:

$$x_{ij} = \left(\frac{\beta_i t_{ij} p_i}{P_j} \right)^{1-\sigma} y_j, \tag{9}$$

where P_j is a price index representing country j resistance to import, which is defined as:

$$P_j = \left[\sum_i \left(\beta_i t_{ij} p_i \right)^{1-\sigma} \right]^{\frac{1}{1-\sigma}} \tag{10}$$

This last term is in fact the most important contribution of Anderson and van Wincoop (2003). The price index is composed of the bilateral trade cost t_{ij} and resistance terms for i and j.

Imposing market clearing conditions results in:

$$y_i = \sum_i x_{ij} = \sum_j \left(\frac{\beta_i t_{ij} p_i}{P_j} \right)^{1-\sigma} y_j = (\beta_i p_i)^{1-\sigma} \sum_i \left(\frac{t_{ij}}{P_j} \right)^{1-\sigma} y_j$$

Isolating $(\beta_i p_i)^{1-\sigma}$ and substituting into (9) yields:

$$x_{ij} = \frac{y_i y_j}{y^w} \left(\frac{t_{ij}}{P_j \Pi_i} \right)^{1-\sigma}, \tag{11}$$

where $\Pi_i \equiv \left(\sum_j \left(\frac{t_{ij}}{P_j} \right)^{1-\sigma} \theta_j \right)^{\frac{1}{1-\sigma}}$ and $\theta_j \equiv \frac{y_j}{y^w}$ is the share of the world income. Inserting the relationship of $(\beta_i p_i)^{(1-\sigma)}$ into (10) and assuming costs to be identical ($t_{ij} = t_{ji}$), will result in $\Pi_i = P_i$ and therefore:

$$x_{ij} = \frac{y_i y_j}{y^w} \left(\frac{t_{ij}}{P_j P_i} \right)^{1-\sigma},$$

which is the Anderson and van Wincoop (2003) model specification. This expression follows the same logic as Tinbergen (1962); the value of exports from i to j (x_{ij}) depends on the GDP of the countries (y_i and y_j) and the trade cost is measured relative to price indexes. Trade

costs t_{ij} are estimated using distance (D_{ij}) and dummy variables (δ_{ij}) as the original model: $t_{ij} = e^{\alpha\delta_{ij}D_{ij}^{a_1}}$.

3.2. Augmenting the Gravity Model

The gravity equation is effective in measuring the effects of policy variables on bilateral trade. Augmenting the gravity model with the proper variables is crucial in order to obtain better estimates and reduce the impact of omitted variable bias.

As expressed before, the relative size of a country is measured by nominal GDP. Augmenting for other relative size variables is associated with the inclusion of GDP per capita and population for both importing and exporting countries to control for labor intensity in exports. Coefficients of population for j can be negative in case of the import substitution effect controlling over the market size effect (Reinert et al., 2010).

Distance, a proxy for transport costs is usually augmented with dummy variables such as landlocked, island and contiguity of countries. To capture information and search costs, variables such as common language, colonial link and cultural similitudes are also included (WTO, 2012a). Tariff costs are incorporated in the form of a dummy variable for trade agreements due to the lack of information on bilateral tariffs. The inclusion of trade integration treaties is perhaps the most useful concept about the gravity model as there is vast literature regarding the impact of Economic Integration Agreements (EIA), Free Trade Agreements (FTA), Preferential Trade Agreements (PTA) and customs union on trade.

A compilation of other variables used in gravity models is done by Bergstrand and Egger (2011) and includes: the use of GDP deflators to account for price indexes, infrastructure and its impact on fixed costs, exchange rate variation, currency unions, political circumstances that may affect commercial patterns and immigration.

Finally, Frankel and Romer (1999) used the gravity equation to build instrumental variables in order to measure the effects of trade on growth using the area of a country to account for proximity, which controls for the influences that geographic characteristics may have on trade.

3.3. Estimation Methods

Given its multiplicative specification, the gravity equation is usually estimated in log linear form resulting in the case of the Anderson and van Wincoop (2003):

$$\begin{aligned} \ln T_{ij} = \alpha + \ln y_i + \ln y_j + (1-\sigma)\delta_{ij} + (1-\sigma)a_i \ln D_{ij} \\ - (1-\sigma)\ln P_i - (1-\sigma)\ln P_j + \varepsilon_{ij}, \end{aligned} \tag{12}$$

where T_{ij} now denotes exports from i to j.

The "Gravity with Gravitas" model was built by solving the McCallum (1995) border puzzle problem for which Anderson and van Wincoop (2003) claimed the model lacked proper variables to control for resistance of trade and therefore the border effects were overestimated. These variables, referred to as Multilateral Resistance Terms (MRT) and denoted by P_i and P_j, are not observable and there are several methods proposed to account for them.

Anderson and van Wincoop (2003) proposed a non-linear estimation technique to estimate MRT by means of price effects of barriers. An easier approach is to proxy for them by using "remoteness" terms, which are weighted average of distance between trading partners. The most common being: $Remoteness = \sum_j \frac{D_{ij}}{\frac{y_j}{y^w}}$. Anderson and van Wincoop (2003) criticized this approach, as the only resistance term being captured is distance.

The most accepted methods to estimate remoteness in gravity model is through the use of importer and exporter fixed effects (Anderson and van Wincoop, 2004). Not including MRT in the equation can lead

to the "Gold Medal Mistake" in which estimations are biased because of an omitted variable problem (Baldwin and Taglioni, 2006).

Another important aspect in the estimation of a gravity model is the existence of zeros in trade. A simple solution is to use $\ln(1 + T_{ij})$ as the dependent variable in an OLS regression. An alternative method is to use a Tobit estimator with $\ln(1 + T_{ij})$ as the dependent variable where α is a constant and it is alleged that the existence of zeros is due to unrecorded data. The ability of the Tobit estimator to explain missing data has been doubted as it treats unobserved data below reasonable levels for certain countries (WTO, 2012a).

A new estimation technique proposed by Silva and Tenreyro (2006) is through the use of a Pseudo Poisson Maximum Likelihood (PPML) estimator. These authors claim that due to the variance of trade, heteroskedasticity is present and that log linearized models result in biased estimates of the true elasticities. This conclusion is supported in the Jensen's Inequality ($\ln(E[\varepsilon_{ij}]) \leq E[\ln(\varepsilon_{ij})]$) when given a gravity model such as: $\ln T_{ij} = \ln \alpha + \ln y_i + \ln y_j + a_1 \ln D_{ij} + \ln \varepsilon_{ij}$, its expected value will equal to $E[\ln T_{ij}] = E[\ln \alpha] + a_1 E[\ln y_i] + a_2 E[\ln y_j] + a_3 E[\ln D_{ij}] + E[\ln \varepsilon_{ij}]$, modifying the conditional distribution of T_{ij}.

Finally, panel data arrangements are preferred to cross-sections since it diminishes the bias that arises from the heterogeneity across countries (WTO, 2012a). It also addresses the issue of policy trade variables being endogenous (Baier and Bergstrand, 2007).

4. Empirics: Model Specification for Nicaragua

To assess the factors that determine Nicaragua's exports, different sets of gravity equation are constructed using the Anderson and van Wincoop (2003) "Gravity with Gravitas" model as the basic framework. Several estimation methods are presented to compare which performs better using panel data techniques. To control for MRT, the equations are estimated using fixed effects and remoteness

indexes. Remoteness is estimated using the following specification: $\frac{1}{\sum_i \frac{y_i}{D_{ij}}}$ (Head, 2003). Time dummies are included to capture specific factors varying over time.

The analysis includes 30 countries (Table A.2, Appendix) that import goods from Nicaragua during the time sample of 1960-2011. These countries account for nearly 100% of the destinations of the exports of Nicaragua for the sample period. Table A.3 in Appendix includes detailed description of the variables used in the regression.

4.1. Baseline Model

In order to measure the impact of different policy variables on the exports of Nicaragua, a baseline model is constructed in the following multiplicative form:

$$T_{ij} = \alpha D_{ij}^{a_1} e^{a_2 C_{ij}} e^{a_3 CL_{ij}} e^{a_4 CT_{ij}} e^{a_5 SC_{ij}} y_i^{a_6} y_j^{a_7} Rem_i^{a_8} Rem_j^{a_9} \tag{13}$$

The model is estimated after its log lineal representation:

$$\begin{aligned} \ln T_{ijt} = \alpha + a_1 \ln D_{ij} + a_2 C_{ij} + a_3 CL_{ij} + a_4 CT_{ij} + a_5 SC_{ij} \\ + a_6 \ln y_{it} + a_7 \ln y_{jt} + a_8 \ln Rem_{it} + a_9 \ln Rem_{jt} + \varepsilon_{ij}, \end{aligned}$$

where the following are dummy variables: C_{ij} is contiguity, CL_{ij} common language, CT_{ij} colonial tie and SC_{ij} is to specify if both commercial partners belonged once to the same country. Remoteness terms are included as Rem_i and Rem_j while the rest of the variables maintain the same notation as expressed before. The estimation methods include the use of OLS, OLS with $\ln(1 + T_{ijt})$ as dependent variable, Tobit estimation with $\ln(\alpha + T_{ijt})$ as dependent variable and the PPML using level of exports, T_{ij} as the dependent variable. The results are presented in Table A.4.

The basic regression with no fixed effects or MRT indexes presents most coefficients significant at the 1% level and with the exception of common language and contiguity they bear the expected signs. A possible explanation for this unexpected negative sign can be that

these variables are likely collinear with SC_{ij} and CT_{ij} as Nicaragua shares border with Costa Rica and Honduras, countries with the same official language and that once belonged to the Federal Republic of Central America.

Distance coefficient ranges from -1.59 and -1.10 while GDP coefficients yield estimates between 0.47 and 0.65 for the importing country and 0.31 and 0.47 for the exporting country. Typical gravity models produce distance coefficients between -0.7 and -1.5 while importing GDP coefficient is unitary (WTO, 2012a). As pointed out by Silva and Tenreyro (2006), PPML estimates are also smaller compared to OLS. Their own work also points out that GDP coefficients are actually close to 0.7.

The interpretation of the estimated coefficients is done directly as elasticity due to its log specification: An increase in 10% in distance reduces exports between 11% to 59% while an increase of 1% in the GDP of the importing country increases exports between 0.49% and 0.65% and amid 0.21% and 0.47% in the case of the exporting country GDP.

Dummy variable coefficients such as colonial tie and same country when transformed to elasticity, result that in the presence of these two characteristics, trade is more than doubled among trade partners according to estimates provided by the PPML method $(e^{1.39} - 1, e^{1.27} - 1)$. One last important fact is that the PPML is also the method that better explains the variation of the level of exports with a coefficient of determination (R^2) of 0.82 vis a vis 0.53 and 0.59 of OLS.

When the gravity equation is estimated using fixed effects to account for MRT terms, a change in the magnitudes of the coefficients is produced but signs remain the same. This discrepancy can bring forward an omitted variable bias problem. The distance coefficient increase is higher with fixed effects compared to the use of remoteness indexes, reaching up to 3.2 with the PPML. GDP

coefficient for the importing country decreases to a range between 0.18 and 0.53 and turns out not statistically significant while the exporting country GDP coefficient is significant at the 1% level using OLS techniques and introducing fixed effects, but the estimates range between 0.56 and 0.82.

Controlling for MRT using remoteness indexes yield lower distance coefficients statistically significant at the 1% level while the rest of coefficients remain within the same relative range compared with basic regression results, with the exception of the GDP of the exporting country that increases to a unitary value. The PPML method produces in all three cases a better explanation for the variation of the natural logarithm of exports. Fixed effects also register a higher R^2 when using OLS methods compared to the basic regression.

4.2. Impact of Trade Agreements on Exports

Equation (13) is augmented to measure the impact of trade agreements on the exports of Nicaragua. The model to be estimated is now:

$$\begin{aligned}\ln T_{ijt} = {} & \alpha + a_1 \ln D_{ij} + a_2 C_{ij} + a_3 CL_{ij} + a_4 CT_{ij} + a_5 SC_{ij} \\ & + a_6 LC_{ij} + a_7 I_{ij} + a_8 FTA_{ij} + a_9 PTA_{ij} + a_{10} CU_{ij} \\ & + a_{11} \ln y_{it} + a_{12} \ln y_{jt} + a_{13} \ln Rem_{it} + a_{14} \ln Rem_{jt} + \varepsilon_{ij},\end{aligned} \tag{14}$$

where LC_{ij} symbolizes landlocked countries, I_{ij} stands for islands and FTA_{ij}, PTA_{ij}, CU_{ij} denotes free trade and preferential trade agreements and customs unions, respectively.

Results of this regression are presented in Table A.5 of Appendix. The new coefficient estimates are highly significant at the 1% significance level for most cases. Landlocked results with a negative sign as expected since it is associated with higher transport cost. Island on the other hand is positive for most cases.

FTA is the only variable significant at the 1% significance level in all three cases estimated. The estimated coefficients range from 0.39 to

0.86 for the basic regression, 0.41 to 0.77 for the fixed effects and 0.28 to 0.76 using remoteness indexes. As before, the PPML yield lower estimates compared to OLS.

Using the upper band of the results mentioned above as reference, they are in line with the predictions of impact of FTA on trade established by Baier and Bergstrand (2006). Using panel data to control for endogeneity of trade policy variables they obtained estimates between 0.61 and 0.76, which account for doubling the exports of members of an FTA.

The average result by regression shows that FTA account for 73% increase $(e^{0.55} - 1)$ in exports of Nicaragua when MRT are not controlled for, 71% $(e^{0.54} - 1)$ if the regression is estimated using fixed effects and 57% $(e^{0.45} - 1)$ if remoteness indexes are introduced. The PPML estimates yield a 44% increase on average in trade among FTA members.

PTA and CU yield significant results at the 1% level with different methods resulting on an average range of 107% $(e^{0.73} - 1)$ and 137% $(e^{0.86} - 1)$ increase in members trade respectively, which mainly accounts for interregional trade due to the existence of the CACM.

Importers and exporters GDP elasticity remains similar to the baseline equation results while the same increase in magnitude of the distance coefficient is observed when comparing between fixed effects and remoteness indexes.

A final exercise is conducted estimating equation (14) only with the variable CAFTA to account for trade agreements:

$$\begin{aligned} \ln T_{ijt} = {} & \alpha + a_1 \ln D_{ij} + a_2 C_{ij} + a_3 CL_{ij} + a_4 CT_{ij} + a_5 SC_{ij} \\ & + a_6 LC_{ij} + a_7 I_{ij} + a_8 CAFTA_{ij} + a_9 \ln y_{it} + a_{10} \ln y_{jt} \\ & + a_{11} \ln Rem_{it} + a_{12} \ln Rem_{jt} + \varepsilon_{ij} \end{aligned} \tag{15}$$

Regression results are provided in Table A.6 of Appendix. CAFTA is

considered one of the most important trade agreements subscribed by Nicaragua in the last decade. According to the regression, it has increased exports on average by 69% $(e^{0.53} - 1)$ in the basic regression, 67% $(e^{0.51} - 1)$ using fixed effects and 53% $(e^{0.42} - 1)$ with remoteness indexes. The PPML results yield increments in trade between 38% $(e^{0.32} - 1)$, 33% $(e^{0.29} - 1)$ and 28% $(e^{0.25} - 1)$ for the same respective regression specification as mentioned before.

4.3. CAFTA: Trade Creation or Trade Diversion

The gravity equation provides ex-post feedback of trade policy analyses if the intended purpose is for the estimates to provide information relative to the creation or diversion of trade after the conformation of an FTA (WTO, 2012a). The logic follows that after the creation of a trade agreement, if country j imports more from country i and country k imports less from i where only i and j belong to the same trade agreement, then trade diversion is likely. If the imports of both countries from i increase, then trade creation is a possible result.

To measure the analysis stated above, two dummy variables are introduced:

1. One country in CAFTA (OCCAFTA) indicates that only one member belonged to CAFTA at time t while the other did not.

2. Both countries in CAFTA (BCCAFTA) indicates that both members belonged to CAFTA at time t.

The model specification is as follows:

$$\begin{aligned} \ln T_{ijt} = {} & \alpha + a_1 \ln D_{ij} + a_2 C_{ij} + a_3 CL_{ij} + a_4 CT_{ij} + a_5 SC_{ij} \\ & + a_6 LC_{ij} + a_7 I_{ij} + a_8 OCCAFTA_{ij} + a_9 BCCAFTA_{ij} \\ & + a_{10} \ln y_{it} + a_{11} \ln y_{jt} + a_{12} \ln Rem_{it} + a_{13} \ln Rem_{jt} + \varepsilon_{ij} \end{aligned} \tag{16}$$

Trade creation is indicative when both a_8 and a_9 are positive and significant while if a_8 is negative and a_9 positive, then trade diversion is likely (WTO, 2012a).

According to the results (Table A.7, Appendix), both coefficient estimates are positive and significant at the 1% and 5% level according to the PPML estimation. This outcome is a suggestion of trade creation after CAFTA. This result coincides with the work of Yeboah et al. (2007) where it is conducted a gravity model regression for the Central American countries after the signing of CAFTA.

The authors concluded that CAFTA will result in trade creation of 13% for Nicaragua. The estimations provided by the regression specified above yield higher trade creation for Nicaragua in the order of 74% ($e^{0.56} - 1$) for the basic regresion, 70% ($e^{0.53} - 1$) for the fixed effects and 57% ($e^{0.45} - 1$) when using remoteness indexes. Even the PPML estimates which provide lower coefficients than OLS ranging from 0.30-0.39 conclude that trade creation has been in the range of increments between 35%-48%.

4.4. Impact of Prices on Exports

The last regression uses the framework provided by Bergstrand (1985) where price indexes are proxied using GDP deflators and exchange rates $XRate_{it}$ and $XRate_{jt}$. The equation to be estimated is as follows:

$$\begin{aligned}\ln T_{ijt} =& \alpha + a_1 \ln D_{ij} + a_2 C_{ij} + a_3 CL_{ij} + a_4 CT_{ij} + a_5 SC_{ij} + a_6 LC_{ij} \\ &+ a_7 I_{ij} + a_9 PTA_{ij} + a_{10} CU_{ij} + a_{11} \ln GDP\_Deflator_{it} \\ &+ a_{12} \ln GDP\_Deflator_{jt} + a_{13} \ln XRate_{it} + a_{14} \ln y_{it} \\ &+ a_{15} \ln y_{jt} + a_{16} \ln Rem_{it} + a_{17} \ln Rem_{jt} + \varepsilon_{ij}\end{aligned} \tag{17}$$

Bergstrand (1985) also specified a proper explanation concerning the expected sign of the variables: *"A rise in j's income, an appreciation of j's currency, adjacency and the presence of preferential trading arrangements should increase the trade flow from i to j... If the elasticity of substitution among importable exceed unity, i's income and GDP deflator will have a positive and negative coefficients, respectively"* (p. 479).

The results of the regression are presented in Table A.8 of Appendix. GDP coefficients for both exporter and importer are positive and sig-

nificant at the 1%, 5% and 10% level in dependence of the estimation procedure while the values ranges from 0.43 to 0.73 for the importer and 0.35 to 1.6 for the exporter.

The variables of interest, exchange rates and GDP deflators also reflect the expected sign. Exporters $XRate$ is positive, implying that a devaluation of its currency provides an increment in exports flow. On average, a 1 percent devaluation of Nicaragua's Cordoba increases exports between 0.39% and 0.47%, depending on the estimation procedure.

This follows the logic of Nicaragua's exchange rate policy of a crawling peg, where the Central Bank devaluates the currency annually, which supports the competitiveness of the trading sector. The exporters GDP deflator is negative which according to Bergstrand (1985) signifies that the elasticity of substitution is less than 1. A one percent increase in the general level of prices on all domestically produced goods, reduces exports between 0.40% and 0.55%.

4.5. Export Potential

A final use of the gravity equation is to characterize the export capacity of a country given the potential of unexploited markets of its trading partners. Is this sense, the within sample predictions of the gravity estimations are used to measure the existence or not of prospective markets where exports can be allocated (Pasteels, 2006).

The relative residuals (ε) are estimated through the formula:

$$\varepsilon = \left(\frac{\hat{T_{ij}} - T_{ij}}{T_{ij} + \hat{T}_{ij}} \right) \times 100$$

Following Pasteels (2006) guideline for interpreting ε:

- If $\varepsilon \approx 0$, then predicted trade is close to current trade.
- If $\varepsilon > 30\%$, there is existence of untapped trade potential.

- If $\varepsilon < -30\%$, then strong current trade is present.

The results imply (Table A.9, Appendix) strong evidence of untapped trade potential with Argentina, Norway, Switzerland and the United Kingdom, whose import share of Nicaragua represented conjointly 2% in 2011. The PPML results are suggestive of additional unexploited trade potential with Colombia, Costa Rica, Ecuador, Japan and Germany, which accounted for 7% of the exports share of Nicaragua to these countries for the same year. There is also evidence of strong trade with Venezuela (13% of exports share of Nicaragua in 2011), in the sense that current flows are above the ones predicted by the model. For the rest of the countries, the current flows are similar to the predicted trade.

5. Concluding Remarks

The trade policy of Nicaragua in the early 90s was characterized by strong liberalization of its export sector. This has given way to the rise of Free Trade Agreements that have significantly increased the growth of exports. Even when trade policy has become a significant element of the development strategy of the country, no empirical studies have been done to assess the benefits of such actions.

This paper aimed to construct a gravity model for the exports to measure the impact of trade policies and have found strong evidence of significant increase in exports growth resulting from the accordance of an FTA, as well as other important outcomes such as the promotion of trade creation. Additionally, there is strong evidence of the presence of unexploited trade potential with a large number of trade partners that account for a small share of the total exports of Nicaragua.

The baseline model established that an increase of 1% in the GDP of the importing country increases the exports coming from Nicaragua between 0.49% and 0.65%. Similarly an increase in 1% of the GDP of the exporting country is translated into an increment of 0.21% to

0.47% in the total exports.

Colonial linkage plays an important part in explaining trade patterns of Nicaragua but contrary to a priori expectations, sharing borders and the same language resulted in a negative effect for exports. While most coefficients remained within accordance of an average range, the distance coefficient presented strong fluctuation in dependence of the estimation procedure. This suggests that export costs are to a certain extent, a limitation to trade in Nicaragua.

The conformations of FTAs have shown to be significant in explaining the development of exports of the country. In the presence of an FTA, exports have increased up to 73%. The agreement of CAFTA is also substantial, as exports have increased up to 69%. However, lower bound estimates through the PPML estimation considers that the increase has been 44% and 33% on average respectively. CAFTA is also responsible for trade creation in the order of 74% and of 35% to 48% if the PPML results are considered.

With respect to prices, a 1% devaluation of the Nicaraguan Cordoba induces an increase in exports between 0.39% and 0.47% while an increase in the GDP deflator, reduces exports between 0.40% and 0.55%.

Finally, there is strong evidence of untapped trade potential with Argentina, Norway, Switzerland and the United Kingdom as well as suggestive indications of additional unexploited trade potential with Colombia, Costa Rica, Ecuador, Japan and Germany. On the other hand, current trade with Venezuela is above the prediction of the model, so a conformation of an FTA could be beneficial.

This paper can be enriched even further as there are still many interesting aspect of the trade policy of Nicaragua that can be analyzed, one of them being the implementation of Frankel and Romer (1999) methodology to measure the effects of trade on growth. The gravity

model of Nicaragua can also be augmented with variables such as employment and GDP per capita to measure the labor intensities in the exports.

Additionally it would be motivating to run a gravity model by goods to characterize if the exports of Nicaragua follow a traditional trade model theory. Finally, Nicaragua has a relative small number of trade partners; a Tobit model can be constructed to characterize the main aspect of trade partnerships the country currently holds and consider the expansion of trade in new identifiable markets.

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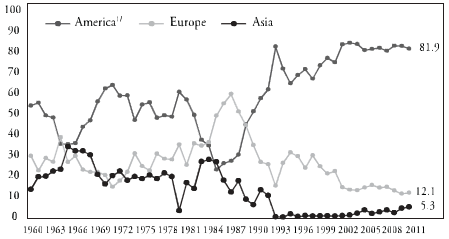
Appendix

Figure A.1: Geographical Orientation on Nicaragua's Exports, 1960-2011

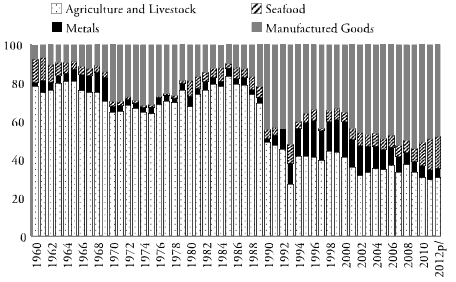
(Share of Total Exports, %)



1/: Refers to North, Central and South America.
Source: Central Bank of Nicaragua.

Figure A.2: Exports of Nicaragua by Product

(Share of Total Exports, %)



p/: Preliminary.
Source: Central Bank of Nicaragua.

Table A.1: Trade Agreements of Nicaragua

Customs Union	Date of Subscription
MCCA (Central America Common Market)	13/12/1960
Free Trade Agreements	
Chile - Central America	22/02/2011
Mexico - Central America	22/11/2011
Mexico	18/12/1997
Panama - Central America	06/05/2012
DR-CAFTA: Dominican Republic - Central America -United States	05/08/2004
Dominican Republic - Central America	16/04/1998
Taiwan (Republic of China)	16/06/1996
Partial Agreements	
Colombia	02/05/1984
Venezuela	15/08/1986
Under Negotiations	
European Union - Central America[1/]	29/06/2012
Canada	
ALBA (Bolivarian Alliance for the Americas)	23/02/2007

1/: Includes Panama.
Notes: Central America: Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua. ALBA: Antigua and Barbuda, Bolivia, Cuba, Dominica, Ecuador, Nicaragua, Saint Vincent and the Grenadines and Venezuela.
Source: OEA (Organization of American States) System of Information of International Trade. MIFIC: Ministry of Development, Industry and Trade of Nicaragua.

Table A.2: List of Countries used in the Estimations

Argentina	Costa Rica	Finland	Italy	Panama	Switzerland
Belgium	Cuba	France	Japan	Puerto Rico	Taiwan
Canada	Dominican Republic	Germany	Mexico	Russia	United Kingdom
Chile	Ecuador	Guatemala	Netherlands	Spain	United States
Colombia	El Salvador	Honduras	Norway	Sweden	Venezuela

Table A.3: Data Descriptions and Sources

Variable	Description	Source
Exports	Natural logarithm of Nicaragua's exports	BCN
Log of Distance	Natural logarithm of the distance between capitals	CEPII
Contiguity	1 if countries share a common border	CEPII
Common Language	1 if countries share the official common language	CEPII
Colonial Tie	1 if countries share a colonial past	CEPII
Same Country	1 if countries were the same in the past	CEPII
Landlocked Country	1 if importer's country is landlocked	CEPII
Island	1 if importer's country is an island	CEPII
Free Trade Agreement	1 if countries hold a free trade agreement	Frankel/OAS/MIFIC
Preferential Trade Agreement	1 if countries hold a preferential trade agreement	Frankel/OAS/MIFIC
Customs Union	1 if countries hold a customs union agreement	Frankel/OAS/MIFIC
CAFTA	1 if importer's belong to CAFTA	OAS/MIFIC
One in CAFTA	1 if one country belongs to CAFTA	OAS/MIFIC
Both in CAFTA	1 if both countries belong to CAFTA	OAS/MIFIC
Importer's GDP Deflator	Natural logarithm if importer's GDP deflator	World Bank
Exporter's GDP Deflator	Natural logarithm of exporter's GDP deflator	World Bank
Importer's Nominal Exchange Rate	Natural logarithm of importer's nominal exchange rate	Penn World Tables
Exporter's Nominal Exchange Rate	Natural logarithm of exporter's nominal exchange rate	Penn World Tables
Importer's Tariff	Natural logarithm of the importer's weighted mean tariff rate applied to all products	World Bank
Exporter's Tariff	Natural logarithm of the exporter's weighted mean tariff rate applied to all products	World Bank
Log of Importer's GDP	Natural logarithm of importer's total GDP	World Bank
Log of Exporter's GDP	Natural logarithm of exporter's total GDP	World Bank
Importer's Remoteness	Natural logarithm of importer's remoteness	Author's Calculations
Exporter's Remoteness	Natural logarithm of exporter's remoteness	Author's Calculations

Source: BCN: Central Bank of Nicaragua, Cuadros de Anuario Estadístico 2012. CEPII: French Research Center in International Economics, Database of Geographical Distance and Gravity Models. Jeffrey A. Frankel, Database on Trade Agreements. MIFIC: Ministry of Development, Industry and Trade of Nicaragua. OAS: Organization of American States, System of Information of International Trade. Penn World Table Version 7.1. World Bank, World Development Indicators (2012).

Table A.4: Baseline Model

Estimator	OLS	OLS	Tobit	PPML	PPML	OLS	OLS	Tobit	PPML	PPML	OLS	OLS	Tobit	PPML	PPML
Dependant Variable	ln(Tij)	ln(1+Tij)	ln(α+Tij)	T_{ij}	$T_{ij>0}$	ln(Tij)	ln(1+Tij)	ln(α+Tij)	Tij	$T_{ij>0}$	ln(Tij)	ln(1+Tij)	ln(α+Tij)	Tij	$T_{ij>0}$
Log of Distance	-1.589***	-0.966***	-1.197***	-1.110***	-1.106***	-2.852***	-0.962***	-1.636***	-3.240***	-2.954***	-1.856***	-1.148***	-1.377***	-1.422***	-1.418***
	(0.121)	(0.057)	(0.066)	(0.085)	(0.084)	(0.387)	(0.181)	(0.202)	(0.382)	(0.379)	(0.128)	(0.062)	(0.069)	(0.089)	(0.088)
Contiguity	-0.365**	-0.171	-0.255**	-0.415***	-0.415***	-1.979***	-0.777***	-1.152***	-1.873***	-1.634***	-0.441***	-0.204**	-0.293***	-0.495***	-0.494***
	(0.144)	(0.109)	(0.102)	(0.114)	(0.116)	(0.258)	(0.166)	(0.214)	(0.202)	(0.206)	(0.142)	(0.096)	(0.091)	(0.105)	(0.108)
Common Language	-2.326***	-1.207***	-1.692***	-1.036***	-0.923***	-5.226***	-1.342***	-3.374***	-4.573***	-4.122***	-2.248***	-1.055***	-1.560***	-1.181***	-1.054***
	(0.280)	(0.099)	(0.126)	(0.250)	(0.250)	(0.584)	(0.209)	(0.554)	(0.995)	(1.016)	(0.279)	(0.097)	(0.126)	(0.220)	(0.220)
Colonial Tie	2.622***	1.465***	1.931***	1.271***	1.138***	5.973***	2.195***	3.136***	6.401***	5.686***	2.632***	1.396***	1.860***	1.477***	1.365***
	(0.335)	(0.141)	(0.171)	(0.263)	(0.263)	(0.528)	(0.153)	(0.253)	(0.450)	(0.473)	(0.345)	(0.142)	(0.176)	(0.233)	(0.235)
Same Country	1.304***	1.131***	1.097***	1.390***	1.261***	0.111	0.803***	-0.0804	-0.337	-0.222	1.074***	1.157***	1.063***	1.141***	1.053***
	(0.205)	(0.123)	(0.133)	(0.206)	(0.199)	(0.337)	(0.233)	(0.422)	(0.365)	(0.362)	(0.213)	(0.117)	(0.131)	(0.187)	(0.179)
Log of Importer's GDP	0.652***	0.486***	0.514***	0.647***	0.649***	0.389*	0.175*	0.207	0.509**	0.525**	0.673***	0.571***	0.575***	0.650***	0.665***
	(0.042)	(0.025)	(0.027)	(0.030)	(0.029)	(0.220)	(0.106)	(0.127)	(0.214)	(0.215)	(0.045)	(0.031)	(0.033)	(0.030)	(0.029)
Log of Exporter's GDP	0.473***	0.210**	1.519	1.289	0.313*	0.824***	0.560***	2.320	1.600	0.442	0.773***	0.446***	3.628	4.989	1.044***
	(0.179)	(0.088)	(2.717)	(2.339)	(0.189)	(0.291)	(0.146)	(2.731)	(2.138)	(0.269)	(0.205)	(0.100)	(6.092)	(4.477)	(0.267)
Importer's Remoteness											-0.203	0.897***	0.560***	-1.553***	-0.813*
											(0.410)	(0.160)	(0.204)	(0.434)	(0.431)
Exporter's Remoteness											0.211***	0.126***	0.138***	0.369***	0.357***
											(0.039)	(0.019)	(0.020)	(0.043)	(0.042)
Constant	4.161**	3.356***	-6.858	9.912***	11.36***	15.85***	3.939**	-5.340	27.57***	26.95***	3.067	1.325	-25.36	7.059	12.60***
	(1.922)	(0.826)	(24.72)	(3.479)	(0.821)	(3.370)	(1.548)	(24.80)	(4.048)	(2.420)	(2.074)	(0.876)	(54.93)	(6.425)	(0.710)
Observations	1,229	1,443	1,443	1,443	1,229	1,229	1,443	1,443	1,443	1,229	1,202	1,415	1,415	1,415	1,202
R-squared	0.526	0.588		0.818	0.821	0.724	0.730		0.847	0.856	0.537	0.598		0.841	0.847
Time Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No

Notes: Robust standard errors in parentheses. $^{***}p < 0.001$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table A.5: Effects of Trade Agreements

Estimator	OLS	OLS	Tobit	PPML	PPML	OLS	OLS	Tobit	PPML	PPML	OLS	OLS	Tobit	PPML	PPML
Dependant Variable	$\ln(T_{ij})$	$\ln(1+T_{ij})$	$\ln(\alpha+T_{ij})$	T_{ij}	$T_{ij}>0$	$\ln(T_{ij})$	$\ln(1+T_{ij})$	$\ln(\alpha+T_{ij})$	T_{ij}	$T_{ij}>0$	$\ln(T_{ij})$	$\ln(1+T_{ij})$	$\ln(\alpha+T_{ij})$	T_{ij}	$T_{ij}>0$
Log of Distance	-1.528***	-0.874***	-1.130***	-1.083***	-1.071***	-2.097***	-0.790***	-1.571***	-5.995***	-2.199***	-1.777***	-1.040***	-1.291***	-1.387***	-1.377***
	(0.126)	(0.061)	(0.071)	(0.090)	(0.090)	(0.208)	(0.119)	(0.204)	(0.578)	(0.183)	(0.135)	(0.067)	(0.076)	(0.098)	(0.097)
Contiguity	-0.328**	-0.114	-0.211**	0.417***	0.415***	1.519***	-0.725***	-1.168***	4.072***	-1.057***	0.403***	0.146	-0.246***	0.491***	0.488***
	(0.144)	(0.108)	(0.104)	(0.112)	(0.114)	(0.310)	(0.161)	(0.215)	(0.412)	(0.236)	(0.140)	(0.096)	(0.094)	(0.104)	(0.107)
Common Language	-2.646***	-1.245***	-1.757***	-1.190***	-1.074***	-6.051***	-3.405***	-3.600***	-2.951***	-4.426***	-2.586***	-1.102***	-1.635***	-1.285***	-1.156***
	(0.279)	(0.098)	(0.127)	(0.295)	(0.295)	(0.913)	(0.418)	(0.553)	(0.971)	(0.888)	(0.280)	(0.096)	(0.127)	(0.255)	(0.255)
Colonial Tie	3.064***	1.546***	2.066***	1.437***	1.289***	5.782***	2.197***	3.153***	7.412***	5.390***	3.069***	1.478***	1.996***	1.570***	1.446***
	(0.343)	(0.141)	(0.172)	(0.314)	(0.315)	(0.544)	(0.174)	(0.253)	(0.514)	(0.465)	(0.353)	(0.140)	(0.174)	(0.273)	(0.275)
Same Country	1.293***	1.165***	1.151***	1.230***	1.080***	1.097*	0.763*	-0.37	-7.265***	1.210***	1.081***	1.218***	1.146***	1.025***	0.923***
	(0.230)	(0.136)	(0.149)	(0.186)	(0.180)	(0.560)	(0.423)	(0.428)	(0.982)	(0.407)	(0.248)	(0.135)	(0.153)	(0.190)	(0.184)
Landlocked Country	-0.736***	-0.372***	-0.204	-1.124***	-1.135***	-1.455	-2.178***	-1.033*	5.192***	0.0301	-0.815***	-0.415***	-0.263**	-1.088***	-1.163***
	(0.280)	(0.131)	(0.144)	(0.233)	(0.232)	(0.902)	(0.440)	(0.621)	(1.315)	(0.887)	(0.290)	(0.122)	(0.133)	(0.219)	(0.224)
Island	1.066***	0.446***	0.541***	0.167	0.134	1.452***	-0.0967	-0.813**	6.871***	1.777***	1.007***	0.424***	0.511***	0.0819	0.057
	(0.142)	(0.079)	(0.090)	(0.124)	(0.122)	(0.396)	(0.233)	(0.401)	(0.873)	(0.335)	(0.14)	(0.078)	(0.088)	(0.116)	(0.115)
Free Trade Agreement	0.860***	0.609***	0.520***	0.368**	0.390***	0.771***	0.599***	0.507***	0.391***	0.416***	0.758***	0.514***	0.432***	0.261**	0.281**
	(0.142)	(0.098)	(0.097)	(0.147)	(0.142)	(0.149)	(0.097)	(0.096)	(0.107)	(0.103)	(0.137)	(0.092)	(0.092)	(0.133)	(0.128)
Preferential Trade Agreement	1.352***	0.813***	0.856***	0.271	0.152	0.425*	0.123	-0.00524	-0.178	-0.117	1.069***	0.763***	0.759***	0.135	0.0467
	(0.194)	(0.131)	(0.143)	(0.226)	(0.216)	(0.231)	(0.166)	(0.169)	(0.344)	(0.336)	(0.212)	(0.137)	(0.152)	(0.216)	(0.207)
Customs Union	0.669***	-0.0926	-0.0434	-0.283	-0.312	0.709***	-0.0698	-0.00414	-0.32	-0.317	1.006***	0.182	0.216	0.677***	0.584**
	(0.258)	(0.150)	(0.166)	(0.253)	(0.256)	(0.197)	(0.112)	(0.124)	(0.244)	(0.249)	(0.269)	(0.149)	(0.165)	(0.235)	(0.230)
Log of Importer's GDP	0.606***	0.474***	0.504***	0.606***	0.603***	0.243	0.0973	0.132	0.493**	0.500**	0.628***	0.559***	0.565***	0.622***	0.633***
	(0.044)	(0.026)	(0.028)	(0.036)	(0.035)	(0.219)	(0.106)	(0.127)	(0.215)	(0.216)	(0.047)	(0.032)	(0.035)	(0.038)	(0.036)
Log of Exporter's GDP	0.465***	0.183**	1.624	1.333	0.3	0.924***	0.602***	2.354	1.59	0.405	0.724***	0.391***	3.637	5.052	0.990***
	(0.171)	(0.086)	(2.694)	(2.328)	(0.188)	(0.286)	(0.143)	(2.722)	(2.133)	(0.265)	(0.205)	(0.102)	(5.950)	(4.379)	(0.281)
Importer's Remoteness											-0.0503	0.911***	0.619***	-1.384***	-0.595
											(0.387)	(0.155)	(0.198)	(0.448)	(0.432)
Exporter's Remoteness											0.182***	0.108***	0.117***	0.350***	0.340***
											(0.036)	(0.018)	(0.020)	(0.049)	(0.047)
Constant	4.120**	2.783***	-8.432	-7.274	2.113	11.02***	5.027***	-5.091	32.23*	12.07***	3.265	0.918	-26.17	-38.67	-2.227
	(1.884)	(0.826)	(24.520)	(21.050)	(1.877)	(2.437)	(1.346)	(24.710)	(19.060)	(2.395)	(2.099)	(0.896)	(53.630)	(39.630)	(2.416)
Observations	1229	1443	1443	1443	1229	1229	1443	1443	1443	1229	1202	1415	1415	1415	1202
R-squared	0.571	0.612		0.812	0.814	0.73	0.737		0.843	0.849	0.577	0.619		0.838	0.843
Time Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No

Notes: Robust standard errors in parentheses. $^{***}p < 0.001$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table A.6: Effects of CAFTA on Trade

Estimator	OLS	OLS	Tobit	PPML	PPML	OLS	OLS	Tobit	PPML	PPML	OLS	OLS	Tobit	PPML	PPML
Dependant Variable	$\ln(T_{ij})$	$\ln(1+T_{ij})$	$\ln(\alpha+T_{ij})$	T_{ij}	$T_{ij}>0$	$\ln(T_{ij})$	$\ln(1+T_{ij})$	$\ln(\alpha+T_{ij})$	T_{ij}	$T_{ij}>0$	$\ln(T_{ij})$	$\ln(1+T_{ij})$	$\ln(\alpha+T_{ij})$	T_{ij}	$T_{ij}>0$
Log of Distance	-1.662***	-0.931***	-1.196***	-1.090***	-1.064***	-2.149***	-0.796***	-1.617***	-6.007***	-2.230***	-1.896***	-1.100***	-1.356***	-1.382***	-1.360***
	(0.122)	(0.058)	(0.067)	(0.090)	(0.092)	(0.210)	(0.121)	(0.203)	(0.572)	(0.186)	(0.129)	(0.063)	(0.071)	(0.095)	(0.095)
Contiguity	-0.406***	-0.141	-0.245**	-0.398***	-0.387***	-1.427***	-0.718***	-1.145***	-4.059***	-1.053***	-0.473***	-0.174*	-0.279***	-0.467***	-0.457***
	(0.144)	(0.106)	(0.101)	(0.115)	(0.118)	(0.312)	(0.165)	(0.211)	(0.414)	(0.237)	(0.142)	(0.095)	(0.092)	(0.106)	(0.109)
Common Language	-2.763***	-1.279***	-1.812***	-1.068***	-0.917***	-5.561***	-3.130***	-3.317***	-2.888***	-4.360***	-2.680***	-1.137***	-1.687***	-1.180***	-1.022***
	(0.276)	(0.096)	(0.124)	(0.268)	(0.270)	(0.921)	(0.419)	(0.550)	(0.958)	(0.888)	(0.275)	(0.094)	(0.124)	(0.225)	(0.226)
Colonial Tie	3.188***	1.580***	2.121***	1.320***	1.139***	5.707***	2.143***	3.120***	7.383***	5.388***	3.168***	1.509***	2.044***	1.471***	1.320***
	(0.340)	(0.138)	(0.169)	(0.286)	(0.289)	(0.543)	(0.171)	(0.248)	(0.516)	(0.468)	(0.350)	(0.139)	(0.173)	(0.246)	(0.249)
Same Country	1.374***	1.194***	1.151***	1.280***	1.138***	1.711***	1.152***	-0.150	-7.084***	1.399***	1.192***	1.243***	1.146***	1.089***	0.997***
	(0.202)	(0.125)	(0.134)	(0.181)	(0.174)	(0.546)	(0.421)	(0.422)	(0.988)	(0.396)	(0.212)	(0.121)	(0.134)	(0.175)	(0.169)
Landlocked Country	-0.709**	-0.361***	-0.192	-1.112***	-1.128***	-0.941	-1.917***	-0.726	5.246***	0.123	-0.799***	-0.413***	-0.260**	-1.092***	-1.169***
	(0.276)	(0.127)	(0.142)	(0.230)	(0.227)	(0.905)	(0.439)	(0.617)	(1.294)	(0.888)	(0.287)	(0.118)	(0.130)	(0.217)	(0.221)
Island	1.049***	0.421***	0.519***	0.147	0.109	1.655***	0.011	-0.622	6.871***	1.804***	0.991***	0.401***	0.491***	0.067	0.037
	(0.143)	(0.080)	(0.091)	(0.122)	(0.120)	(0.400)	(0.236)	(0.398)	(0.856)	(0.336)	(0.140)	(0.077)	(0.088)	(0.114)	(0.113)
CAFTA	0.559***	0.808***	0.627***	0.293**	0.350**	0.518***	0.775***	0.682***	0.288**	0.288**	0.427**	0.676***	0.509***	0.232*	0.269**
	(0.168)	(0.135)	(0.125)	(0.144)	(0.141)	(0.173)	(0.132)	(0.126)	(0.140)	(0.136)	(0.178)	(0.138)	(0.130)	(0.133)	(0.130)
Log of Importer's GDP	0.596***	0.469***	0.496***	0.619***	0.618***	0.384*	0.166	0.199	0.518**	0.532**	0.618***	0.550***	0.555***	0.632***	0.645***
	(0.043)	(0.026)	(0.028)	(0.033)	(0.031)	(0.220)	(0.106)	(0.126)	(0.214)	(0.215)	(0.045)	(0.032)	(0.034)	(0.034)	(0.032)
Log of Exporter's GDP	0.506***	0.185**	1.634	1.322	0.286	0.797***	0.523***	2.278	1.569	0.384	0.773***	0.405***	3.659	5.020	0.971***
	(0.175)	(0.087)	(2.720)	(2.348)	(0.189)	(0.290)	(0.144)	(2.731)	(2.152)	(0.267)	(0.209)	(0.102)	(5.964)	(4.427)	(0.273)
Importer's Remoteness											-0.151	0.858***	0.558***	-1.326***	-0.557
											(0.382)	(0.152)	(0.194)	(0.435)	(0.422)
Exporter's Remoteness											0.191***	0.116***	0.124***	0.350***	0.340***
											(0.035)	(0.017)	(0.019)	(0.045)	(0.043)
Constant	5.141***	3.330***	-7.837	-7.291	1.945	10.29***	4.592***	-5.193	32.16*	12.05***	4.077**	1.415	-25.670	-38.600	-2.404
	(1.879)	(0.811)	(24.750)	(21.230)	(1.863)	(2.479)	(1.353)	(24.780)	(19.250)	(2.386)	(2.083)	(0.884)	(53.770)	(40.040)	(2.327)
Observations	1229	1443	1443	1443	1229	1229	1443	1443	1443	1229	1202	1415	1415	1415	1202
R-squared	0.561	0.607		0.816	0.819	0.725	0.734		0.847	0.855	0.569	0.614		0.841	0.847
Time Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No

Notes: Robust standard errors in parentheses. $^{***}p < 0.001$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table A.7: CAFTA: Trade Diversion or Trade Creation

Estimator	OLS	OLS	Tobit	PPML	PPML	OLS	OLS	Tobit	PPML	PPML	OLS	OLS	Tobit	PPML	PPML
Dependant Variable	$\ln(T_{ij})$	$\ln(1+T_{ij})$	$\ln(\alpha+T_{ij})$	T_{ij}	$T_{ij}>0$	$\ln(T_{ij})$	$\ln(1+T_{ij})$	$\ln(\alpha+T_{ij})$	T_{ij}	$T_{ij}>0$	$\ln(T_{ij})$	$\ln(1+T_{ij})$	$\ln(\alpha+T_{ij})$	T_{ij}	$T_{ij}>0$
Log of Distance	-1.661***	-0.932***	-1.196***	-1.090***	-1.063***	-2.146***	-0.794***	-1.612***	-6.006***	-2.223***	-1.893***	-1.098***	-1.355***	-1.381***	-1.358***
	(0.122)	(0.058)	(0.067)	(0.090)	(0.092)	(0.210)	(0.121)	(0.203)	(0.574)	(0.187)	(0.129)	(0.063)	(0.071)	(0.095)	(0.095)
Contiguity	-0.430***	-0.164	-0.265***	-0.427***	-0.421***	-1.431***	-0.720***	-1.147***	-4.064***	-1.055***	-0.491***	-0.192**	-0.294***	-0.483***	-0.478***
	(0.145)	(0.106)	(0.102)	(0.117)	(0.120)	(0.312)	(0.165)	(0.211)	(0.414)	(0.238)	(0.144)	(0.095)	(0.092)	(0.108)	(0.111)
Common Language	-2.765***	-1.282***	-1.814***	-1.076***	-0.925***	-5.580***	-3.153***	-3.339***	-2.902***	-4.376***	-2.682***	-1.140***	-1.689***	-1.186***	-1.028***
	(0.276)	(0.096)	(0.124)	(0.271)	(0.273)	(0.922)	(0.420)	(0.550)	(0.962)	(0.888)	(0.275)	(0.094)	(0.124)	(0.228)	(0.228)
Colonial Tie	3.189***	1.582***	2.122***	1.329***	1.147***	5.709***	2.148***	3.122***	7.391***	5.390***	3.169***	1.511***	2.045***	1.476***	1.325***
	(0.340)	(0.139)	(0.170)	(0.289)	(0.291)	(0.542)	(0.171)	(0.248)	(0.515)	(0.466)	(0.350)	(0.139)	(0.173)	(0.248)	(0.251)
Same Country	1.370***	1.191***	1.148***	1.261***	1.115***	1.698***	1.135***	-0.157	-7.102***	1.385***	1.190***	1.241***	1.144***	1.077***	0.980***
	(0.202)	(0.125)	(0.134)	(0.179)	(0.173)	(0.546)	(0.421)	(0.422)	(0.986)	(0.397)	(0.212)	(0.121)	(0.134)	(0.175)	(0.168)
Landlocked Country	-0.709**	-0.361***	-0.192	-1.114***	-1.131***	-0.963	-1.939***	-0.752	5.233***	0.100	-0.798***	-0.412***	-0.259**	-1.091***	-1.167***
	(0.275)	(0.126)	(0.141)	(0.228)	(0.224)	(0.906)	(0.439)	(0.617)	(1.299)	(0.889)	(0.286)	(0.118)	(0.130)	(0.216)	(0.219)
Island	1.044***	0.417***	0.516***	0.148	0.109	1.646***	0.003	-0.636	6.871***	1.796***	0.988***	0.398***	0.489***	0.068	0.038
	(0.143)	(0.080)	(0.091)	(0.121)	(0.120)	(0.400)	(0.236)	(0.399)	(0.859)	(0.337)	(0.140)	(0.077)	(0.088)	(0.114)	(0.113)
One Country in CAFTA	0.865***	0.815***	0.724***	0.378***	0.458***	0.444	0.607***	0.538***	0.262*	0.301**	0.635**	0.633***	0.549***	0.188	0.261**
	(0.240)	(0.136)	(0.147)	(0.132)	(0.128)	(0.312)	(0.153)	(0.199)	(0.144)	(0.140)	(0.266)	(0.156)	(0.173)	(0.132)	(0.128)
Both Countries in CAFTA	0.589***	0.836***	0.651***	0.327**	0.389***	0.536**	0.797***	0.702***	0.312**	0.316**	0.454**	0.702***	0.532***	0.255*	0.301**
	(0.172)	(0.137)	(0.127)	(0.152)	(0.148)	(0.176)	(0.133)	(0.127)	(0.148)	(0.143)	(0.184)	(0.141)	(0.133)	(0.145)	(0.140)
Log of Importer's GDP	0.596***	0.468***	0.496***	0.615***	0.613***	0.378*	0.160	0.193	0.513**	0.525**	0.617***	0.549***	0.554***	0.629***	0.641***
	(0.043)	(0.026)	(0.028)	(0.033)	(0.032)	(0.220)	(0.106)	(0.126)	(0.215)	(0.216)	(0.045)	(0.032)	(0.034)	(0.035)	(0.033)
Log of Exporter's GDP	0.504***	0.183**	1.632	1.326	0.285	0.803***	0.529***	2.283	1.572	0.387	0.769***	0.401***	3.660	5.028	0.961***
	(0.175)	(0.087)	(2.720)	(2.339)	(0.189)	(0.290)	(0.144)	(2.732)	(2.146)	(0.267)	(0.209)	(0.102)	(5.966)	(4.409)	(0.273)
Importer's Remoteness											-0.157	0.853***	0.554***	-1.344***	-0.579
											(0.382)	(0.152)	(0.194)	(0.437)	(0.424)
Exporter's Remoteness											0.190***	0.114***	0.123***	0.348***	0.337***
											(0.035)	(0.017)	(0.019)	(0.045)	(0.044)
Constant	5.154***	3.348***	-7.816	-7.284	2.010	10.31***	4.627***	-5.182	32.20*	12.07***	4.105**	1.447	25.680	-38.650	-2.287
	(1.878)	(0.811)	(24.750)	(21.150)	(1.866)	(2.478)	(1.353)	(24.790)	(19.200)	(2.383)	(2.085)	(0.884)	(53.780)	(39.880)	(2.337)
Observations	1229	1443	1443	1443	1229.	1229	1443	1443	1443	1229	1202	1415	1415	1415	1202
R-squared	0.561	0.607		0.817	0.820	0.725	0.734		0.848	0.856	0.569	0.615		0.842	0.847
Time Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No

Notes: Robust standard errors in parentheses. $^{***}p < 0.001$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table A.8: Price Effects on Trade

Estimator	OLS	OLS	Tobit	PPML	PPML	OLS	OLS	Tobit	PPML	PPML	OLS	OLS	Tobit	PPML	PPML
Dependant Variable	$\ln(T_{ij})$	$\ln(1+T_{ij})$	$\ln(\alpha+T_{ij})$	T_{ij}	$T_{ij}>0$	$\ln(T_{ij})$	$\ln(1+T_{ij})$	$\ln(\alpha+T_{ij})$	T_{ij}	$T_{ij}>0$	$\ln(T_{ij})$	$\ln(1+T_{ij})$	$\ln(\alpha+T_{ij})$	T_{ij}	$T_{ij}>0$
Log of Distance	-1.202***	-0.689***	-0.880***	-0.883***	-0.904***	-4.921***	-1.791***	-2.527***	-5.224***	-2.388***	-1.482***	-0.884***	-1.057***	-1.225***	-1.244***
	(0.155)	(0.072)	(0.080)	(0.094)	(0.091)	(0.755)	(0.417)	(0.440)	(0.616)	(0.685)	(0.164)	(0.078)	(0.086)	(0.103)	(0.101)
Contiguity	0.198	0.135	0.126	-0.118	-0.105	-3.826***	-2.526**	-1.933***	-3.793***	-1.492**	0.132	0.0914	0.0812	-0.164	-0.148
	(0.182)	(0.118)	(0.116)	(0.150)	(0.150)	(0.700)	(1.016)	(0.387)	(0.512)	(0.643)	(0.177)	(0.106)	(0.107)	(0.137)	(0.138)
Common Language	-1.558***	-0.745***	-1.011***	-0.732***	-0.646**	-0.694	-1.718**	-0.97	-3.969***	-4.946***	-1.529***	-0.631***	-0.931***	-0.738***	-0.636**
	(0.370)	(0.144)	(0.165)	(0.277)	(0.270)	(1.462)	(0.808)	(1.003)	(1.202)	(1.330)	(0.369)	(0.143)	(0.165)	(0.266)	(0.259)
Colonial Tie	1.997***	1.032***	1.323***	1.068***	0.961***		2.267***	2.786***	7.122***		2.017***	0.989***	1.283***	1.091***	1.001***
	(0.427)	(0.177)	(0.202)	(0.288)	(0.282)		(0.212)	(0.259)	(0.612)		(0.433)	(0.177)	(0.205)	(0.272)	(0.267)
Same Country	1.655***	1.371***	1.418***	1.535***	1.351***	-5.851***	-0.706	-2.771***	-6.515***	0.0342	1.350***	1.382***	1.364***	1.183***	1.068***
	(0.254)	(0.146)	(0.157)	(0.186)	(0.181)	(1.865)	(0.757)	(1.025)	(1.237)	(1.782)	(0.263)	(0.143)	(0.160)	(0.195)	(0.188)
Landlocked Country	-0.782**	-0.512***	-0.369**	-1.070***	-1.045***	5.412***	0.0928	1.788	3.300**	-0.319	-0.658**	-0.404***	-0.280*	-0.971***	-0.951***
	(0.332)	(0.149)	(0.158)	(0.219)	(0.217)	(1.822)	(1.012)	(1.227)	(1.490)	(1.639)	(0.331)	(0.149)	(0.158)	(0.218)	(0.216)
Island	0.765***	0.335***	0.339***	0.0877	0.0823	-1.004	-0.890**	1.319	4.981***	1.054	0.694***	0.310***	0.313***	0.0202	0.0204
	(0.151)	(0.082)	(0.092)	(0.109)	(0.107)	(0.722)	(0.384)	(0.884)	(1.311)	(0.685)	(0.145)	(0.079)	(0.089)	(0.102)	(0.099)
Free Trade Agreement	0.767***	0.591***	0.474***	0.368***	0.384***	0.614***	0.556***	0.416***	0.315***	0.351***	0.659***	0.499***	0.397***	0.196*	0.208*
	(0.147)	(0.100)	(0.098)	(0.112)	(0.107)	(0.156)	(0.100)	(0.099)	(0.095)	(0.091)	(0.139)	(0.092)	(0.092)	(0.115)	(0.108)
Preferential Trade Agreement	1.497***	0.909***	0.980***	0.482***	0.343*	0.21	0.0134	-0.113	-0.258	-0.192	1.121***	0.824***	0.847***	0.16	0.07
	(0.199)	(0.136)	(0.145)	(0.186)	(0.179)	(0.242)	(0.174)	(0.182)	(0.343)	(0.341)	(0.213)	(0.141)	(0.153)	(0.192)	(0.184)
Customs Union	0.623**	-0.141	-0.0891	-0.0419	-0.0329	0.704***	-0.0468	-0.00728	-0.194	-0.191	0.970***	0.139	0.155	0.805***	0.759***
	(0.265)	(0.156)	(0.173)	(0.297)	(0.300)	(0.212)	(0.117)	(0.134)	(0.269)	(0.272)	(0.278)	(0.156)	(0.174)	(0.279)	(0.276)
Importer's GDP Deflator	0.251***	0.0859***	0.144***	0.373***	0.373***	-1.485***	-0.529***	-0.742***	0.122	0.0573	0.254***	0.0869***	0.141***	0.363***	0.366***
	(0.038)	(0.015)	(0.022)	(0.066)	(0.065)	(0.368)	(0.203)	(0.271)	(0.369)	(0.375)	(0.038)	(0.015)	(0.021)	(0.064)	(0.064)
Exporter's GDP Deflator	-0.550***	-0.426***	-2.361	-6.4	-0.445***	-0.436***	-0.377***	-3.921	-8.005	-0.381***	-0.588***	-0.465***	-2.23	-6.329	-0.547***
	(0.177)	(0.114)	(14.380)	(10.350)	(0.134)	(0.128)	(0.094)	(15.310)	(9.907)	(0.116)	(0.175)	(0.115)	(14.030)	(9.584)	(0.140)
Importer's Nominal Exchange Rate	-0.078***	-0.039***	-0.045***	-0.066**	-0.071***	1.505***	0.518***	0.758***	0.12	0.158	-0.094***	-0.045***	-0.051***	-0.090***	-0.095***
	(0.024)	(0.011)	(0.014)	(0.027)	(0.028)	(0.364)	(0.200)	(0.265)	(0.342)	(0.348)	(0.024)	(0.011)	(0.014)	(0.024)	(0.025)
Exporter's Nominal Exchange Rate	0.492***	0.419***	3.492	7.462	0.390***	0.414***	0.396***	4.403	8.926	0.357***	0.515***	0.439***	3.456	7.465	0.449***
	(0.172)	(0.111)	(14.570)	(10.740)	(0.128)	(0.121)	(0.094)	(15.380)	(10.190)	(0.110)	(0.170)	(0.113)	(14.240)	(10.050)	(0.132)
Log of Importer's GDP	0.724***	0.519***	0.577***	0.661***	0.660***	1.261***	0.431**	0.670***	0.227	0.306	0.729***	0.602***	0.627***	0.681***	0.696***
	(0.047)	(0.028)	(0.030)	(0.038)	(0.037)	(0.309)	(0.168)	(0.219)	(0.273)	(0.271)	(0.049)	(0.034)	(0.036)	(0.042)	(0.039)
Log of Exporter's GDP	0.746**	0.353**	2.847	5.217	0.597*	1.062***	0.664**	4.922	6.936	0.912**	1.205***	0.752***	2.676	5.142	1.654***
	(0.343)	(0.167)	(10.300)	(7.263)	(0.358)	(0.338)	(0.164)	(11.040)	(6.950)	(0.356)	(0.372)	(0.182)	(10.040)	(6.678)	(0.440)
Importer's Remoteness											-0.245	0.912***	0.534**	-0.875**	-0.164
											(0.392	(0.164	(0.211	(0.395	(0.373)
Exporter's Remoteness											0.201***	0.116***	0.117***	0.347***	0.343***
											(0.039)	(0.021)	(0.023)	(0.049)	(0.048)
Constant	-3.338	-0.796	-22.57	-38.14	-3.859	23.65***	10.13***	-20.03	-6.471	12.64**	-5.152	-3.841**	-20.8	-35.26	-10.81***
	(3.204)	(1.490)	(65.310)	(46.700)	(3.203)	(5.453)	(2.873)	(70.030)	(44.480)	(5.413)	(3.373)	(1.597)	(63.680)	(43.160)	(3.702)
Observations	1193	1405	1405	1405	1193	1193	1405	1405	1405	1193	1193	1405	1405	1405	1193
R-squared	0.583	0.61		0.82	0.829	0.731	0.735		0.848	0.857	0.596	0.626		0.843	0.854
Time Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No

Notes: Robust standard errors in parentheses. $^{***}p < 0.001$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table A.9: Potential Exports of Nicaragua

Estimator	OLS	OLS	Tobit	PPML	PPML	OLS	OLS	Tobit	PPML	PPML	OLS	OLS	Tobit	PPML	PPML
Dependant Variable	$\ln(T_{ij})$	$\ln(1+T_{ij})$	$\ln(\alpha+T_{ij})$	T_{ij}	$T_{ij}>0$	$\ln(T_{ij})$	$\ln(1+T_{ij})$	$\ln(\alpha+T_{ij})$	T_{ij}	$T_{ij}>0$	$\ln(T_{ij})$	$\ln(1+T_{ij})$	$\ln(\alpha+T_{ij})$	T_{ij}	$T_{ij}>0$
Argentina		U	U	U	U	S	U	U	U	U		U	U	U	U
Belgium	P	P	P	P	P	P	P	P	U	U	P	P	P	P	P
Canada	P	P	P	S	S	P	P	P	S	S	P	P	P	S	S
Chile		P	P	P	P	S	P	P	P	P		P	P	P	P
Colombia	P	P	P	U	U	P	P	P	P	P	P	P	P	U	U
Costa Rica	P	P	P	U	U	P	P	P	U	P	P	P	P	U	U
Dominican Republic	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Ecuador	P	P	P	U	U		P	P	S	S	P	P	P	U	U
El Salvador	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Finland	S	P	P	S	S	S	P	P	S	S	S	P	P	S	S
France	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Germany	P	P	P	U	U	P	P	P	U	U	P	P	P	U	U
Guatemala	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Honduras	P	P	P	P	P	P	P	P	P	P	P	P	P	U	U
Italy	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Japan	P	P	P	U	U	P	P	P	U	U	P	P	P	U	U
Mexico	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Netherlands	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Norway		U	U	U	U		U	U	P	P		U	U	U	U
Panama	P	P	P	P	P	P	P	P	U	U	P	P	P	P	P
Puerto Rico	P	P	P	S	P	P	P	P	P	P	P	P	P	S	P
Russia	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Spain	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Sweden	P	P	P	P	P	S	P	P	S	S	P	P	P	P	P
Switzerland		U	U	U	U		U	U	U	U		U	U	U	U
United Kingdom	U	U	U	U	U	P	P	P	U	U	U	U	U	U	U
United States	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Venezuela	S	S	S	S	S	S	S	S	S	S	S	P	P	S	S
Time Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No

Notes: P: predicted trade is closed to current trade. U: untapped trade potential. S: strong current trade (above predicted).