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A Determination of the Trade Creation and Diversion Effects of Regional Trade Agreements in the Western Hemisphere

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Abstract

With the recent proliferation of Regional Trade Agreements (RTAs) the tendency world-wide has been seemingly toward trade liberalization. This thesis is primarily concerned with the impacts RTAs have had in the Western Hemisphere regarding agricultural trade flows. Utilizing the framework of the Gravity Model, agricultural trade flows for 24 Western Hemisphere Nations were examined. In the course of the study it was expected that if RTAs were to have an effect it would be a positive Trade Creation Effect and a negative Trade Diversion Effect with positive effects for GDP of importer/exporter and population size of importer/exporter and a negative effect for that of distance. Of the five agreements examined (NAFTA, AC, MERCO, LAIA, and CACM), NAFTA and LAIA were the only positive (but non-significant) as to Trade Creation effects while AC, MERCO, and CACM were all negative (but non-significant). It was also interesting to note that of the agreements, NAFTA, had both a positive and significant ($p=0.023$) diversionary effect with the remaining agreements all being negative (as expected) and significant regarding trade diversion. It was also concluded that GDP (importer) and distance also had the expected signs (+,– respectively) with distance also being significant ($p=0.0001$). It was concluded that RTAs had a more pronounced effect on inter-industry trade versus intra-industry trade and that with the passage of more time, further analysis may substantiate the claim of a positive RTA effect on agricultural bilateral trade flows.

Introduction

The concept of regionalism is not a new one. Regionalism is defined, in the context of this study as the preference of nations to trade with nations with which a common geographical region is shared. One of the obvious reasons for regionalism is that it overcomes distance as a hindrance to trade. In the literature, distance is commonly referred to as a 'friction to trade', subsequently, distance is viewed (from both intuitive and econometric viewpoints) as having a negative impact on trade flows, and as a result insinuating that from both expectation and economic theory a negative sign should be the expected sign for the distance coefficient in any econometric equation (Pöyhönen,1963, Linneman, 1966, Tinbergen, 1962). Srivastava and Green assert that of all the determinants of trade intensity between nations, distance is the *single most important determinant.* (Srivastava and Green, 1986).

There are also other underlying reasons for the rise of regionalism world-wide. It has been proposed that regionalism has been embraced due to frustration with the delay in GATT negotiations and that the United States has shifted its tendencies from that of multilateralism to that of ardent regionalism. (Baldwin, 1997) The GATT received notice of 124 regional trading agreements from 1948 to 1994, and after the WTO had been instituted in 1995, the GATT/WTO received notification of an additional 130 agreements covering both goods and services (WTO, 2006). Some of these agreements are no longer in force having been amended by subsequent agreements, etc. but as of 2002 there were 162 agreements in force with the number projected to rise to 300 by 2007 (WTO, 2006). Proponents of RTAs argue that RTAs allow countries to gradually work toward global free trade while providing a window of respite for domestic industries that need time to adjust to the specter of global competition. Critics argue that the proliferation of RTAs

has spawned issues in trade that will in the end hinder multilateral trade negotiations (ex. complex trade preferences, fear of dumping accusations and the attendant retaliatory action, etc) (GTN, 2006). The existence and creation of RTAs will be the subject of debate for some years to come. In this paper we examine to see the role, if any, RTAs play in trade creation and diversion in the Western Hemisphere.

The Gravity Model

Newton postulated the "Law of Universal Gravitation" in 1687 describing the attraction between two forces as the result of the product of the mass of the two bodies divided by the squared distance between the two bodies multiplied by a gravitational constant (read frictional force). (Head, 2003) The Gravity Model has been used since the early 1960's to describe bilateral trade flows between nations. Pöyhönen (1963) and Tinbergen (1962) were among the first to utilize the Gravity Model in their respective studies regarding trade. Linneman (1966) employed the Gravity Model in his exhaustive study on world trade flows. In Linneman's model, more variables that tended toward a more theoretical justification of the Gravity Model rather than the more intuitive arguments of Pöyhönen and Tinbergen were added (Deardorff, 1995). Linneman's version of the Gravity Model was said to be grounded in that of a Walrasian General Equilibrium System. In 1974, Leamer employed both the Gravity Model and a Heckscher-Ohlin model in order to lend credence as to the motivation for the explanatory variables in his regression analysis of trade flows, Leamer however refrained from combining both the Gravity Model and the Heckscher-Ohlin model together theoretically (Leamer, 1974). Attempts to justify the Gravity Model theoretically would be addressed by several parties. In 1979, Anderson proffered his theoretical justification for the Gravity Model, where he proposed that by modeling preferences over traded goods only, by assuming Cobb-Douglas preferences (and in an appendix CES preferences) and by

making what is commonly known today as the Armington Association of the national differentiation to the origins of goods, the Gravity Model could be derived. Bergstrand would follow Anderson in 1985, where Bergstrand posited that, like Anderson, by assuming CES preferences and accepting the Armingston Assumption for traded goods, a reduced form equation for the estimation of the flow of goods between nations could be obtained. The generalized Gravity Model equation is of the form:

$$lnX_{ij} = lnA_j + lnY_i + lnY_j + lnN_i + lnN_j + lnD_{ij} + U$$

where lnX_{ij} is the log dollar amount of the flow of goods from country *i* to country *j*, $lnY_{i(j)}$ is the log of country *i(j)*'s income (normally GDP), $ln\ N_{i(j)}$ is the population of country *i(j)*, lnD_{ij} is the log of distance between *i(j)*, and *U* is a randomly distributed log normal error term. Also, there can be other explanatory variables in the Gravity Model that capture positive benefits from mutual RTA membership (Trade Creation), potential negative benefits from one party a member of a RTA and the other party not a member (Trade Diversion) and any colonial or linguistic ties any two countries might share in common.

Employment of the Gravity Model as to RTA Analysis

Not only has the gravity equation been used in examining bilateral trade between generalized groups of nations, it has also been utilized in examining the trade creation and trade diversion effects in particular regions and within particular trading blocs. Carrillo and Li utilized the Gravity Model in an attempt to determine what influence the Andean Community and MERCOSUR preferential trading agreements had had on trading patterns from 1980-1997, focusing primarily on intra-regional, intra-industrial trade. Carrillo and Li found that the AC and MERCOSUR had had an effect on intra-regional and intra-industrial trade but when compared with other crucial variables their impact was somewhat diminished. The impacts of the regional trading agreements were

limited relatively to particular product classes rather than to all the products considered. Koo, Kennedy, and Skipnitchenko utilized the Gravity Model in analyzing the effects that Regional Trading Agreements (RTAs) have had on *agricultural* trade.

The RTAs that were examined were: the ASEAN Free Trade Agreement (AFTA), Andean Community (CAN), the EU, and NAFTA. Koo, Kennedy, and Skipnitchenko 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). This positive effect being derived from the low substitutability between traded goods. According to the authors, another reason for the positive trade creation effect could be that since there was a positive trade creation effect in the case of NAFTA, overall demand increased, offsetting any trade diversion effects. Koo, Kennedy, and Skipnitchenko concluded that RTAs increase welfare for RTA members and, to a lesser extent, non-RTA members as well.

Data Employed

Standard Industrial Trade Classification Revision 3 agricultural commodity data for classes 0 (food and live animals), 1 (beverages and tobacco), and 4 (animal, vegetable oils, fats, and wax) was obtained from the United Nations' COMTRADE database and was used in this analysis. After examining the data available from the United Nations, it was determined that 2001 was the year that would have the requisite export information for all twenty-four countries included in this study. Those twenty- four countries being: Argentina, Belize, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, the United States, Uruguay, and Venezuela. Gross domestic product (2001) and population (2001) information were from the International Monetary Fund's International Financial Statistics Database and

Browser 2006, the physical distance between capital cities was calculated using Environmental Systems Research Institute's geographic information systems software package, ArcView3.x.[1] The information on language commonality, etc. was obtained from the Central Intelligence Agency World Factbook (2005). Statistics regarding concentration for farm equipment (tractors) to hectares of arable/permanent land were derived from FAOSTAT.

The Variables

Total bilateral trade flow in *agricultural* commodities for country pairs, *i* and *j*, in log form is the dependent variable for this study. Table 1 contains the variables that were considered in the gravity model. The independent variables are income for *i* and *j*, population for *i* and *j*, distance between *i* and *j* and dummy variables for *NAFTA, AC, MERCOSUR, LAIA,* and *CACM*, and dummy variables for possible trade diversion for *NAFTA, AC, MERCOSUR, LAIA*, and *CACM*, also there is a variable, *RATIO*, that takes into account the ratio of tractors per hectare of arable/permanent land for exporting country *i* to tractors per hectare of arable/permanent land for importing country *j.* Table 2 shows the sources from whence the data was obtained.

Results

In this paper it was our express purpose to develop a gravity model that would determine the bilateral trade flows of agricultural commodities in the Western Hemisphere and account for the trade creation and possible trade diversion effects of RTAs included in the model. In this section, we will examine the results of the gravity model that were obtained and analyze the results to see if trade creation and trade diversion effects were captured in the parameters of our specific model. In estimating the

[1] Sincere thanks to Huizhen Niu for her calculation of *i* to *j* distances used in this study.

model, Ordinary Least Squares Regression was employed using *SAS,* version 9.0 for Windows (English).

The reasons that nations trade have been attributed to their incomes and populations. Nations normally trade less when the transaction costs outweigh the cost savings that would be incurred in engaging in trade. We saw earlier the impact that increased distance had on transaction costs. The further the distance, the higher the transaction costs to engage in trade, thus lessening trade activity between a particular pair of nations. With the advent of RTAs, the issue of transactions costs was met head on, that nations, with a reduction in certain 'frictions to trade' (e.g., lowering of tariff barriers between *i* and *j*) would trade more with each other (i.e. *trade creation*) than where 'frictions to trade' were more prevalent (the presence of tariff barriers etc.) i.e. *trade diversion.*

The estimated *OLS* gravity model equation that was obtained is of the form:

$$\begin{aligned} logX_{ij}\,(\text{bilateral trade flow}) = & -25.16 - 0.24 * log(Yi) + 0.19 * log(Y_j) \\ & - 2.47 * log(d_{ij}) + 2.67 * log(Pop_i) + .94 * log(Pop_j) + 0.72 * lang \\ & + 0.44 * NAFTA - 2.57 * AC - 1.16 * MERCO + 1.42 * LAIA \\ & - 0.30 * CACM + 2.09 * NAFTAD - 2.00 * ACD \\ & - 1.86 * MERCOD - 2.10 * LAIAD \\ & - 2.14 * CACMD + .61 * log(RATIO) \end{aligned}$$

Table 1. Variables Utilized in the Gravity Model

Variable	Description	Expected Sign
$LogX_{ij}$	Log of bilateral trade flow from *i* to *j*	
a_1	Intercept term	(+/–)
$LogY_i$	Log of GDP for *i*	(+)
$LogY_j$	Log of GDP for *j*	(+)
$LogN_i$	Log of population for *i*	(+)
$LogN_j$	Log of population for *j*	(+)
$Logd_{ij}$	Log of distance from *i* to *j*	(–)
Lang	Dummy variable for language commonality	(+)
NAFTA	Dummy variable for mutual *NAFTA* membership between *i* and *j,* employed for trade creation	(+)
AC	Dummy variable for mutual *AC* membership between *i* and *j,* employed for trade creation	(+)
MERCO	Dummy variable for mutual *MERCOSUR* membership between *i* and *j*, employed for trade creation	(+)
LAIA	Dummy variable for mutual *LAIA* membership between *i* and *j,* employed for trade creation	(+)
CACM	Dummy variable for mutual *CACM* membership between *i* and *j*, employed for trade creation	(+)
NAFTAD	Dummy variable where either *i* or *j* is a member of *NAFTA* but not both, employed for trade diversion	(+/–)
ACD	Dummy variable where either *i* or *j* is a member of ACD but not both, employed for trade diversion	(+/–)
MERCOD	Dummy variable where either *i* or *j* is a member of *MERCOSUR* but not both, employed for trade diversion	(+/–)
LAIAD	Dummy variable where either *i* or *j* is a member of *LAIA* but not both, employed for trade diversion	(+/–)
CACMD	Dummy variable where either *i* or *j* is a member of *CACM* but not both, employed for trade diversion	(+/–)
LogRATIO	Log of quotient resulting from the ratio of tractors to hectares of arable/permanent land for exporter *i* being divided by ratio of tractors to hectares of arable/permanent land for importer, *j*	(+)

Table 2. Variable Sources

VARIABLE	SOURCE
Bilateral Trade Flow (2001)	United Nations' COMTRADE Database (2005)
GDP (2001)	International Monetary Fund's International Financial Statistics Database and Browser (2006)
Population (2001)	International Monetary Fund's International Financial Statistics Database and Browser (2006)
Language Information	Central Intelligence Agency's World FactBook (2005)
RTA Membership	World Trade Organization Web Site
Tractor/Land Ratio	FAOSTAT

Table 3 gives a summary of statistical information for the parameters included in the model, discussion of the parameter values will then follow. Specificity tests showed the model to be correctly specified and the residuals of the model were largely normal. Tests for heteroscedasticity (Breusch-Pagan and White's LM tests both highly significant) were positive, indicating the presence of heteroscedasticity, so remedial measures were taken to obtain robust results for our model. This was accomplished in *SAS* utilizing the 'PROC MODEL' command, and within 'PROC MODEL' the equation was fitted to the dependent variable (the log of bilateral trade flows) utilizing the 'HCCME' procedure(where HCCME=1). The results that were obtained from this procedure are the results that are reported within the confines of this paper.

The model coefficients had the expected signs for the most part with the exceptions of $LGDP_i$, the trade creating dummy variables *AC, MERCO, CACM* and the trade diverting dummy, *NAFTAD*. The log of country *i*'s GDP was negative and non-significant (p=0.24717). This is not as unusual as might be expected. In the Gravity Model, when *total* trade flows are examined, it is normally accepted that the standard sign for country *i*'s GDP is to be positive. In this case the sign is negative. This *apparent* contradiction is just that, *apparent*. In agricultural trade, when an exporter's income rises at home, that

Table 3. Empirical Results for the Gravity Model Equation

Variable	Estimate	S.E.	t-value	p-value
Intercept	–25.16	5.45	-4.61	<0.0001
lgdpi	–0.25	0.19	–1.32	0.1878
lgdpj	0.20	0.17	1.15	0.2527
lpopi	2.67	0.28	9.53	<0.0001
lpopj	.94	0.26	3.66	0.0003
ldistance	–2.47	0.48	–5.13	<0.0001
NAFTA	0.44	2.69	0.16	0.8707
AC	–2.57	1.87	–1.37	0.1704
MERCO	–1.16	2.08	–0.56	0.5778
LAIA	1.43	1.36	1.05	0.2946
CACM	–0.30	1.83	–0.16	0.8704
LANG	0.72	0.58	1.24	0.2161
NAFTAD	2.09	0.90	2.32	0.0207
ACD	–2.00	0.76	–2.64	0.0086
MERCOD	–1.86	0.84	–2.22	0.0268
LAIAD	–2.10	0.81	–2.58	0.0100
CACMD	–2.14	0.74	–2.88	0.0042
lratio	.60	.19	3.19	.0015
R^2			0.5366	
Adj. R^2			0.5218	
SSE			17110.2	
MSE			32.05	

usually drives up domestic demand for agricultural products in the domestic market, with increased income/demand, come lessened exports of that particular commodity from country *i* to *j*, hence our negative sign on $LGDP_i$. The log of country *j*'s GDP had the expected sign (+) but was not significant (p-value 0.1990), the logs for both country *i* and *j*'s populations had the expected sign (+) and were both highly significant (p-value 0.0001 and 0.0003 respectively). The variable, lratio, indicating the relationship between

the quotient of tractor/arable land ratios between i and j was also significant (p-value 0.0015) and had the expected sign (+).

Because of the significance of the parameter coefficients for the populations of both country *i* and *j*, it can be projected that with a 1% increase in country *i*'s population, there would be a 2.67% increase in *agricultural* bilateral trade flows between *i* and *j* (because of the log-log nature of the model, the parameter coefficient value is the elasticity-for the continuous variables of gdp and population), with a 1% increase in country *j*'s population, there would be a .94% increase in *agricultural* bilateral trade flows between *i* and *j*.

The log of distance had the expected sign (–) and was highly significant (p-value <0.0001) and with a 1% increase in distance between *i* and *j* there would be a corresponding 2.47% decrease in *agricultural* bilateral trade flows between *i* and *j*. The trade creating dummies, *NAFTA and LAIA* were not significant but both had the expected sign (+) while the trade creating dummy variables *AC*, *MERCO*, and *CACM* had negative signs (–) and were all insignificant, the language commonality dummy variable, *lang,* had the expected sign (+) but was insignificant (p-value 0.2161), and the trade diverting dummies, *ACD, MERCOD, LAIAD,* and *CACMD,* all had the expected sign (–) and were all highly significant (p-value <0.01 for all). The trade diversion effects from *ACD, MERCOD, LAIAD,* and *CACMD* are quite marked, resulting in trade diversion effects of 0.86%, 0.84%, 0.88% and 0.88% (respectively) decrease in bilateral trade between members/nonmembers of these particular RTAs. The elasticity for dummy variables is obtained from the expression e^b-1, where *e* is the exponential function raised to the coefficient parameter value, *b*, in our case *b*= –2 (for *ACD)*, subtracted from 1. For trade diversion effects the trade diverting dummy, *NAFTAD,* did not have the expected sign (–) rather it was positive (+) and was significant at the 5% level (p-value 0.0207). Using our

relation from above, e^b-1, we can say that NAFTA has contributed a 7.10% increase in bilateral trade flow between NAFTA member/nonmember trading pairs. Also, the log of the quotient of tractor/land ratios between *i* and *j* was significant (p=0.0015) and had the expected sign (+). We conclude that for every 1% increase in country *i*'s tractor/arable land ratio over country *j*'s tractor/arable land ratio, one could expect a .61% increase in the flow of agricultural products from *i* to *j*.

It is interesting to note that of the trade creating dummies, *AC, MERCO,* and *CACM* are negative in sign and not significant to the model. In this model the examination was of agricultural commodity trade between countries. As the nations of the *Andean Community, MERCOSUR* and *CACM* are fairly self-reliant in agricultural production, it is not surprising to see the negative, non-significance of these results. In a model where both agricultural and *non*-agricultural production information were included, a negative, non significant result would have been viewed with some concern. Many RTAs are formed to help in the area of intra-industry trade. In this study, we are examining primarily *inter*-industry trade in agricultural commodities.

With *NAFTA* and *LAIA* we are encouraged to see the expected sign (+) but we notice that they are not significant in their explicative capability as to the variability in the log of bilateral trade flows from country *i* to *j*. This could be that when RTAs are formed, there are usually time constraints to when/how barriers are reduced in certain areas. It has been noted that agriculture remains an area that is very sensitive to quick changes (as to government interaction between the producers, reductions in domestic levels of production etc.). Many agreements, among them *NAFTA* and *LAIA,* have specific time tables for the elimination of certain restrictions to trade. *NAFTA* had a 10-15 year goal of reducing/eliminating all external tariff barriers between trading members. As this research was conducted in 2006, and with *NAFTA* having been formed in 1994,

the time limit has not yet been reached for total tariff elimination. In the case of *NAFTA*, the United States was already the largest *foreign* trading partner for both Canada and Mexico, so *NAFTA*'s effect was really in the easing of commodity movements with additional benefits to be observed (in the future) with the sun-setting of existing tariff protection schemes. With the trade diverting dummies, most had the expected signs and were significant with the exception of the trade diverting dummy, *NAFTAD*. *NAFTAD* was positive and significant at the 5% level. Normally with trade diverting dummies we would expect a negative effect and with *NAFTA* we do not obtain that result. It could be explained that, with *NAFTA*, the ease of shipment of agricultural commodities had induced some benefits, not markedly observed in this model, that have had a positive effect on *NAFTA* members' trade with non-*NAFTA* members. It is possible that in some instances, when an agreement has boosted incomes in member countries, the positive income effect trickles over to non-member trade. This is where a member nation that, because of increases in income, increases trade with non-member nations for the purchasing of commodities that are not obtained from within the framework of their RTA. This trickle down effect could then lead to *positive* trade diversion effects and is offered here as an explanation as to the positive sign of the trade diversion dummy coefficient for *NAFTA*. It is also interesting to note that the relation that our tractor/arable land relation had in describing the variance of the log of agricultural trade flows. With the log of the quotient of tractor/land ratios between *i* and *j* being both positive and significant, it is surmised that the greater concentration of farm machinery to hectare of land in the exporting country *i* versus the importing country *j*, exports of agricultural products would be expected to increase as well. Farm machinery tends to enhance efficiencies of production, with this additional efficiency comes inherent price advantages for the exporter relative to that of the importer. If a foreign producer

produces an agricultural crop cheaper than their domestic counterpart, it is only natural for the foreign producer to fill the gap of production (that was handled formerly domestically) as domestic producers seek to enhance their own relative advantages in analyzing potentially more profitable markets in which domestic comparative advantages would better be employed. Hence, advantage mechanization.

Summary

In this study, it was initially proposed that Regional Trade Agreements (RTAs) would have a positive effect on bilateral trade flows. That is, if two nations were members of the same RTA, a noticeable *increase* of trade should be observed between the trading pair. In this regard we see that of the five RTAs analyzed (*NAFTA, AC, MERCOSUR, LAIA, and CACM*), none of them were significant in their explanatory capacity as to significant increases in *agricultural* bilateral trade flows. This fact is not as disturbing as one would initially suspect, keeping in mind that agriculture is a highly protected commodity class and that the lifting of economic barriers to allow the free flow of goods in the field of agricultural commodities has not yet been fully realized. It is also important to note that of the RTAs included that were not significant, *NAFTA* and *LAIA* had the expected sign (+). With the advent of lowered tariff restrictions, trade flows will be less inhibited through reductions in tariff levels. Once this occurs, a more significant explanatory contribution (from these RTA dummy variables) as to the flow of *agricultural* bilateral trade between those member states may be observed. Not only have the trade creating effects of RTAs been examined, it was also the purpose of this study to examine the possible negative effects RTA membership could have in diverting trade from traditional nation trading pairs. The traditional pair of trading nations would then be replaced by non-trading pairs of trading nations who were mutual members of the same RTA. Of the five agreements (*NAFTA, AC, MERCOSUR, LAIA*, and *CACM*), all,

with the exception of *NAFTA*, had the expected negative sign and all, except *NAFTA*, were highly significant, with p <0.0001. *NAFTAD* was significant at the 5% level, although positive (+) in sign. These results tend to indicate that. when nations do join a RTA, trade *is* diverted from traditional trading pairs to pairs of countries enjoying mutual membership in the same RTA. This reallocation of resources from traditional trading sources to new nations was defined earlier as *trade diversion.* With the trade diverting dummy for NAFTA *(NAFTAD)* it is interesting to note the positive nature of the trade diversion dummy. Stemming from this positive sign on *NAFTAD*, it can be deduced that membership in a RTA is not automatically negative when it comes to possible trade diversion effects. Some nations, while enjoying the mutual membership effects in a RTA, could experience enhanced income effects from increased mutual RTA trade which would in turn lead to an increase in trade with non-RTA members in a nation's bid to obtain items that are demanded by its population but not readily available from within the framework of RTA member states. We conclude then that not all diversion effects are *negative* in nature.

As to the variables that were considered key to the foundation of the Gravity Model, (GDP, population, and distance), it is interesting to note that in the case of GDP, the log of GDP for the exporting country, *i*, was negative but insignificant while the log of GDP for the importing country, *j*, was positive but also insignificant. As has been offered earlier, in the generalized Gravity Model, where all trade flows are observed (inter- and intra-industry trade) the generally expected result would be a positive relation between the logs of both country *i* and *j*'s GDP to bilateral trade flows. In this particular case, we are examining the result of the logs of country *i* and *j*'s GDP to *agricultural* bilateral trade flows. Given how the market reacts in the exporter's market with a rise in

income (the demand for agricultural commodities goes up, exports go down) it is not surprising to see an inverse relationship with respect to income.

Another determinant of *agricultural* bilateral trade flows is the population of the respective trading pair. In our model we saw both significance in the population for the exporting country (*i*) and the importing country (*j*). Populations are determinants of demand. The greater the population, according to economic theory, the greater will the demand be for goods and services. Since the focus of this paper was on the flow of agricultural commodities across trading partners, population's level of explanatory significance in the model is not surprising.

With distance we noticed the significant ($p<0.0001$) relationship between the variation in the log of distance with the log of bilateral trade flows. This is in agreement with the tenants of the Gravity Model and is also in agreement with economic theory. The farther country *i* and country *j* are from each other, the higher the transaction costs. In turn, the higher the transaction costs, the greater friction to trade will be between *i* and *j*, and thus, more economical alternatives to trade would be investigated by *i* and/or *j*. This investigation of more efficient, less costly trading structures would then lead to a lessened bilateral trade flow between the original trading nation pair, *i* and *j*.

Finally, it was noticed that language did play a role in the flow of bilateral trade. The language commonality variable, *lang*, was positive (+) but insignificant, indicating that language commonality between a trading pair in the Western Hemisphere does not play as important a role in trade between countries as it would with more diverse trading pairs/blocs. This result should not diminish the fact that sharing a common language allows countries to better understand their target market through having common cultural norms and not having to bridge a 'psychic gap' of any great magnitude. Learning a different language to conduct bilateral trade would present to a potential barrier to trade.

Conclusions

We have seen that RTAs could have a positive effect (yet insignificant) on bilateral trade flows, and that with some of the other RTAs (e.g. *NAFTA*, etc.) sufficient time will have to be allowed to pass before noticeable results could be obtained. We have also seen that not all trade diversion effects are negative in nature, (e.g. *NAFTA*) but can, with increased income, have a positive effect on a RTA member's trade with non-RTA members. We saw the importance of population and, to a lesser degree, income as to explaining the variability in *agricultural* bilateral trade flows and these observations are in agreement with the literature. Language was also observed as occupying an important place (yet insignificant) in its' descriptive capability as to the variability in *agricultural* bilateral trade flows and this too, is in agreement with the attendant literature (as regards the sign of the parameter coefficient). Mechanization also is not to be underestimated in its ability to explain why some countries tend to export products to other similarly resource-endowed countries. With all of the above in mind, it is held that this paper has accomplished what was stipulated from the beginning: to develop a gravity model framework that would describe the relationship between the flows of agricultural commodity trade in the Western Hemisphere and population, income, distance, language commonality, degree of mechanization, and RTA membership.

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