

# The role of intra- and extra-regional agreements in trade flows: the case of the Andean Community of Nations

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## Abstract

The Andean Community of Nations (CAN), created in 1969, is a regional trade agreement designed to promote development in member countries via integration. Member countries have also signed extra-regional agreements. Fifty years after the creation of CAN, it is crucial to determine whether intra- and extra-regional agreements have played a fundamental role in member countries' trade flows, or whether other factors have significantly influenced these trade flows. This study estimates the augmented gravity model for the period 2000-2017. It found evidence that intra- and extra-regional agreements have not played a major role in CAN trade flows.

**Keywords:** Andean Community of Nations; trade agreements; trade flows; economic integration; panel data; gravity equation.

## 1. INTRODUCTION

The Andean Community of Nations (CAN) was the first regional integration agreement in South America. Signed in 1969 in the Cartagena Agreement, it seeks to achieve a comprehensive, balanced and autonomous development of its member countries by means of Andean integration, moving towards South American and Latin American integration. Currently, it consists of the following countries: Bolivia, Colombia, Ecuador and Peru.<sup>1</sup> A few years ago they decided to start a restructuring process of the CAN, where one of its main strategic guidelines was a deeper intra- and extra-regional trade integration.

It is therefore important to ask whether intra- and extra-regional agreements play a significant role in trade flows in CAN countries, or whether there are other factors that significantly influence said trade flows.

This research, based on the theoretical model of augmented gravity and an error-corrected panel data methodology, analyzes the role that intra- and extra-regional agreements have in trade flows<sup>2</sup> of CAN member countries and their 20 primary trade partners in the period of 2000-2017.<sup>3</sup>

Evidence was obtained that intra- and extra-regional agreements do not play an important role in CAN trade flows. Of greater import are geographical distance or transportation costs, the size of countries' economies, and the trade openness of the Andean countries.

This work is structured as follows: in the next section a brief assessment of the CAN is carried out, followed by a review of literature on theoretical research and empirical studies. The following section presents stylized facts on the CAN's intra- and extra-regional trade flows. The next two sections present the theoretical and econometric models respectively. Then come the variables studied and the data sources used. In the penultimate section, econometric results are presented and, finally, we draw up some conclusions and policy implications.

## 2. ANDEAN COMMUNITY OF NATIONS

On 26 May 1969, the Cartagena Agreement was signed. This is the Constitutional Treaty where the objectives of Andean integration were set, defining the institutional system and the mechanisms and policies to be developed by the Community organizations. As such, the Andean process of integration began, known then as the Andean Pact and now the CAN.<sup>4</sup>

Originally this regional integration agreement consisted of Bolivia, Chile, Colombia, Ecuador and Peru. In 1976, Chile withdrew as a member only to become an observer country in 2004, and in 2006 an associate member. In the same year, Venezuela acceded to the Agreement and then withdrew in 2006 due to Peru's and Colombia's signing agreements with the United States. The CAN currently consists of four member-countries: Bolivia, Colombia, Ecuador and Peru.

According to the Cartagena Agreement, the objectives of the CAN are:

To promote balanced and harmonious development of member countries under conditions of equity, by means of economic and social integration and cooperation; accelerate its growth and generate employment; facilitate their participation in the regional integration process, with their sights set on the gradual formation of a common Latin American market, thereby reducing external vulnerability and improving the position of member countries in the economic world stage [ ... ] in order to seek persistent improvement in the standard of living of the subregion's inhabitants (Comunidad Andina de Naciones [CAN] , 2003a, p. 1).

According to the General Secretariat of the Andean Community of Nations (Secretaría General de la CAN [SGCAN], 2019a) and the Lima Declaration, the goals in their internal agenda met over the CAN's 50 years of operation are several. The organization represents a market of 110 million Andean inhabitants with a nominal per capita income of \$6,500 USD. Likewise, this income is an indicator of the improvement in living standards, having registered a significant growth, growing 17-fold from 1969 to the present (SGCAN, 2019b).

In terms of trade, the CAN represents a Free Trade Area worth \$8.902 billion USD of intra-community exports and has greater dynamism in regards to trade with third countries, as well as the development of a value-added market for medium- and high-tech manufactures. In this field, an achievement that stands out is that of greater diversification in intra-Andean exports in comparison to exports directed outside the Andean bloc.<sup>5</sup>

For the Latin American and Caribbean Economic System (Sistema Económico Latinoamericano y del Caribe [SELA] 2014), statistics show that while intra-community exports have grown significantly since opening the market in the 1990s, there are no public procurement commitments so an important segment of the community market remains subject to national laws in this regard. Moreover, although the CAN is important for countries' manufactures exports,<sup>6</sup> it is a marginal market for total Andean exports. The problem in achieving a deeper integration is largely due to differences in the developmental models and priorities regarding foreign integration had by Andean countries.

According to SELA (2014), Andean regulations have bestowed upon their members greater bargaining power due to their multilateral nature, in spite of the CAN not following a discipline of joint negotiations with third countries, except for the negotiations of the Free Trade Area of the Americas (FTAA). This is evident in the joint negotiations with the Southern Common Market (MERCOSUR), the failed FTAA process, the Free Trade Agreements (FTAs) negotiated by Colombia and Peru, and in the General Agreement on Tariffs and Trade/World Trade Organization (GATT/WTO) multilateral trading system.

The former European Union's (EU) cooperation program for Andean countries essentially respected the Community, giving greater import to this subregional grouping above that of individual Andean countries. This strategic importance was critical in creating both the EU's Andean Generalized System of Preferences (GSP) and the United State's Andean Trade Preference Act (ATPA). On the other hand, the negotiations carried out by Colombia and Peru and, subsequently, Ecuador with the EU, are based on the 2003 Political Dialogue and Cooperation Agreement which includes the possibility of negotiating a free trade area.

According to Fairlie (2013), some countries in the Andean region have promoted a process of liberalization and unilateral openness in recent years, which merged their participation in North-South agreements and FTAs with their primary trade partners, and an express policy of seeking to become closer with Asia-Pacific. These countries' trade policies have followed the idea of a "new regionalism". A term coined by the Inter-American Development Bank (IDB), which contrasts it with the "old regionalism" of protectionism and regional import substitution.

"New regionalism" has three pillars which make up a feedback loop: unilateral openness, adapting to WTO regulations, and regional (primarily North-South) trade agreements. In the opinion of other international organizations such as the United Nations Conference on Trade and Development (UNCTAD), FTAs create potential benefits but at real costs. Its assessment is that such agreements do not contribute to the growth of developing countries, and further questions some of the extreme liberalization processes of some markets. This is how FTAs reduce National States' labor margins in the use of instruments and policies that they can use for their development.

Along these lines, Sanahuja (2019) points out that once the conditions that made this postliberal regionalist shift possible ceased to be, the region returned to a more vulnerable secular condition. In particular the end commodities' economic cycle provided material resources upon which more assertive foreign policies were based, and the regional leadership drove the post-liberal cycle. Likewise, according to Bouzas (2017), in spite of the proposal of regional integration as an appropriate response to adverse and favorable international contexts, the lack of political will has not let this objective progress.

The predisposition to building regional mega-processes, new protectionisms, as well as accelerated technological advances, put several countries in the region in a position of inequality. Several studies indicate that the trade relations of Latin American countries with their main trading partners (China, the United States, the EU, among others) are asymmetrical, undiversified, based on primary products with little value added and technological content, and reproduce North-South patterns. Likewise, the Andean countries' current trade relationship with China has influenced the disintegration process in Latin America, particularly in the Andean region (Umaña, 2016). According to Regueiro (2008), signing FTAs and FTAs have been the pillars of the United States' hegemonic power by promoting a regulatory framework above the National (Latin American) States, even against their interests. As such, said agreements imply an asymmetric surrender of sovereignty, amending their national laws to coincide with that regulatory standard.

González-Vigil (2009), considers the primary goal of the external agenda to have been negotiations between CAN countries and the United States, the EU and MERCOSUR. On the other hand, the main limitations have been the inability to form a customs union between all CAN members and to enter into community trade negotiations with third countries.

Within the bilateral external agenda, one can see evidence found by the SGCAN in 2006 where they evaluated the impact had by new trade agreements signed by the Andean countries, individually or in groups of two or three with third countries: Mexico, Chile and MERCOSUR, in intra-community trade. The results of this study show that these trade agreements have led to a restructuring of intra-community trade, resulting in changes in focus which have manifested themselves in intra-community trade growth, which are not necessarily the same sectors and products traded prior to these agreements coming into effect. While some products have shown a shift in suppliers from Andean exporters to a third country, other products were exported in greater quantities by Andean members, with these numbering twice those which saw a change in suppliers.

On the other hand, according to Prado (2017), agreements signed by Andean countries with third countries weakened the CAN's trade integration framework. For example, the creation of a customs union which necessitates the adoption of a common trade policy. According to the author, the common external tariff was degraded by the negotiation of bilateral free trade agreements by Peru and Colombia with the United States.

In 2015, Bolivia signed the Protocol of Accession to MERCOSUR and its gradual adoption of the regulations within four years after the signing of the protocol. However, it still finds itself in the process of accession.

With regards to the regional external agenda, the study carried out by the Economic Commission for Latin America and the Caribbean (Comisión Económica para América Latina y el Caribe [CEPAL/ECLAC] 2005) conducts a quantitative assessment of the MERCOSUR-CAN free trade agreement. Using a computerized overall balance model of the world economy with 14 countries and 24 productive sectors, they found that the regional free trade agreement would have a positive effect on the aggregate well-being of each individual country. However, at the sectoral level there would be winners as well as losers. Estimates show statistically significant reductions in both poverty and inequality, albeit at values of little import.

Neira (2014) considers economic integration policies between MERCOSUR and CAN to still not be sufficient to generate the promised impact and development. As such, broader and more egalitarian trade policies are needed to generate intra-regional economic development in both trade partners and to truly incentivize production, employment and at the same time lead to effective policies to combat poverty and social inequality.

In a recent analysis on trade between the CAN and the EU, Pérez (2019) shows that the EU is the second largest destination market for CAN exports. Exports to the European market accounted for 14% of the total in the period of 2005-2014. However, the Andean market accounts for only 0.6% of the EU's total trade. The CAN's trade structure has not changed. The raw materials (agricultural and mineral) continue to have a considerable proportion of exports just like imports from the EU and are basically industrial goods with a high technological content (machinery and equipment). According to this author, trade between a central and peripheral country tends to consolidate a structure of unequal exchange.

In 2012, with Decision 773, it was decided to instill the CAN with stronger and renewed dynamism. With this goal in mind they agreed to take on the task of reviewing and restructuring the Andean Integration System (AIS), with the goal of adapting the CAN to the challenges of the current international context. Thus, in September 2013, with Decision 792 they agreed to implement the "Implementation of the Restructuring of the Andean Integration System (AIS)", which has as its new vision: "A process that, from a pragmatic approach to prioritizing areas of action, achieves effective results that benefit member countries, contributes decisively to the process of their integration and allows for a successful relationship with other regional and global economic spaces" (CAN, 2019, p. 1).

According to the Lima Declaration, the internal agenda has as its vision for the future: achieving the free mobility of people; the Andean digital agenda (digital transformation, connectivity, innovation, communication and information technologies, and computerizing procedures); interconnecting the energy frameworks of Andean countries and other countries in the region; strengthening the CAN's free trade area, facilitating trade, strengthening trade complementarity and joint trade promotion actions; strengthening SMBs and MSMBs; implementing programs to improve the public education and health services provided to the population. These aims are in accordance with the provisions of the Cartagena Agreement and the prioritization given them in the CAN's restructuring process.

The future external agenda includes the evaluation of international standards in order to access third-country markets, strengthening its geographical expansion into other regions, and as becoming the unifying hub for the rest of South America.

### 3. REVIEWING THE LITERATURE

Various authors have conducted theoretical studies of which factors impact trade flows between countries. Using Isaac Newton's law of gravity (1687), Tinbergen (1962) postulates that trade between countries is directly related to volume and inversely related to distance. Later on, Anderson (1979) provides theoretical support to the equation and, years later, Anderson and Van Wincoop (2003) propose a theoretical model of augmented gravity as they find a specification problem in Anderson's model (1979) as multilateral resistance was omitted.

Among the main empirical studies that use the augmented gravity model to analyze trade flows processes of Latin American regional integration processes, one that is worth pointing out is that conducted by Gauto (2012), which finds that the MERCOSUR process of regional integration has positively impacted Paraguayan imports in sectors such as tobacco and oils. Later on, Alleyne and Lorde (2014) find that the Caribbean Community (CARICOM) integration process has not had a significant effect on intra-bloc trade, and that extra-regional agreements signed with their main (non-member) partners have had a negative impact on trade in CARICOM countries. A more recent study, conducted by Ovando *et al.* (2017), finds that in the Pacific Alliance the Linder Effect is not present among Pacific Alliance member countries.<sup>7</sup>

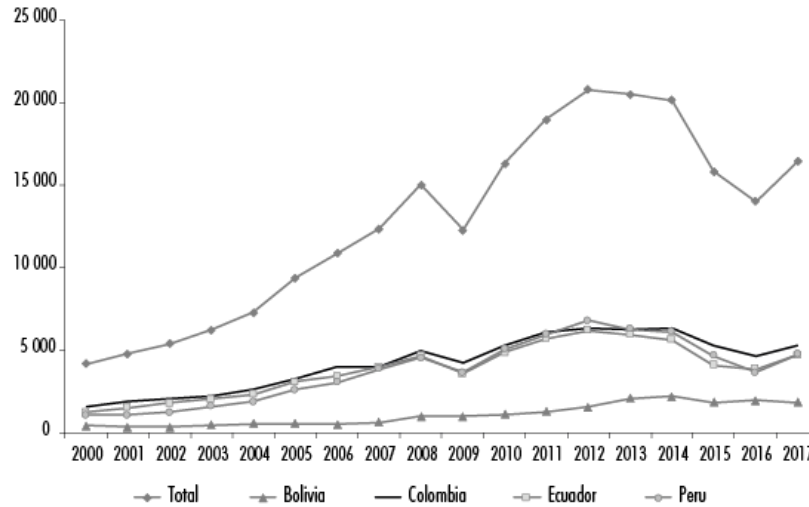
A study using the augmented gravity model for the CAN was conducted by Acosta *et al.* (2006), in which they sought to determine the importance of distance, the CAN trade agreement and a fictitious border variable in CAN imports with its main Latin American trading partners.<sup>8</sup> These authors find that distance is significant and negative for the entire period studied (1985-1995). However, the CAN trade agreement was not significant for the years of 1985-1989, and was significant and positive for the years 1990-1995. For its part, the border variable was significant and positive for all the years covered by the study.

This research is based on the study by Alleyne and Lorde (2014) in order to analyze the role had by intra- and extra-regional agreements in CAN member countries' trade flows with their main trading partners.

#### 4. STYLIZED FACTS

Figure 1 shows trade flow<sup>2</sup> of the CAN and its members for the period of 2000-2017. During this period, intra-bloc trade in the CAN had an average of \$230.750 billion USD. Meanwhile, Colombia, Ecuador and Peru have had a similar trade flow. Bolivia is the country with the lowest intra-bloc trade, accounting for only 8% of the total.

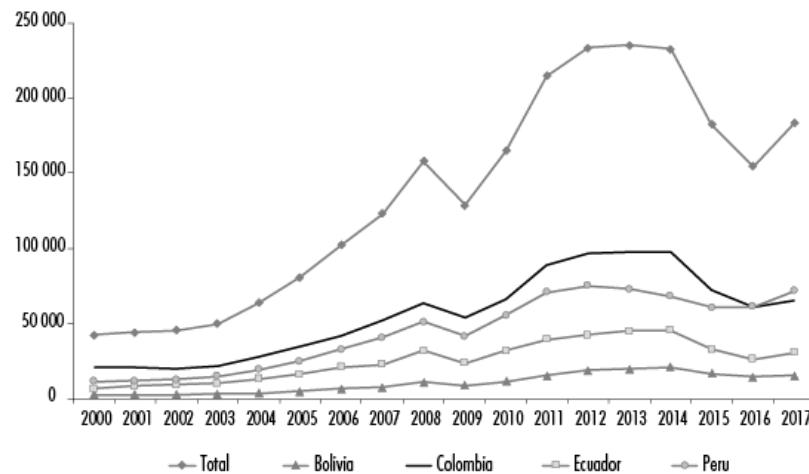
Figure 1. CAN intra-bloc trade flow, 2000-2017 (Millions of Dollars)



Source: World Integrated Trade Solution(WITS). Created by the Author.

Figure 2 shows THE CAN's trade with its 20 primary trading partners. It is important to mention that these countries currently account for 85% of all CAN trade. As one can see, the total trade for that period was an of average \$ 2.5 trillion USD. Again, Bolivia is the country with the lowest level of trade at only 8% of the total. The country that traded the most outside the bloc was Colombia with 41%, followed by Peru and Ecuador.

Figure 2. CAN extra-bloc\* trade flow, 2000-2017 (Millions of Dollars)



Note: \* For trade with its 20 primary trading partners, representing 85% of their total trade.  
Source: World Integrated Trade Solution(WITS). Created by the author

#### 5. THEORETICAL MODEL

Based on Tinbergen's (1962) gravity equation model:

$$Y_{ij} = g \frac{Y_i Y_j}{D_{ij}}$$

Where  $g$  is the gravitational constant, trade flow between countries  $i$  and  $j$  is represented by  $Y_{ij}$ , distance between the two by  $D_{ij}$  and the GDP of each country by  $Y_i$  and  $Y_j$ .

Anderson and Van Wincoop's (2001) modification of the equation has a theoretical foundation and, following Deardorff (1998), assume each country specializes in a single product and that the supply of each product is fixed. Likewise, homothetic preferences are assumed. Each country maximizes its usefulness (i.e. increases the level of well-being of its society as much as possible) by means of the following equation:

$$\left( \sum_i \beta_i^\sigma c_{ij}^{-\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$$

Subject to the following budgetary constraint:

$$\sum_i p_{ij} c_{ij} = y_j$$

Where  $\sigma$  represents the elasticity of substitution among goods,  $\beta$  is a positive distribution parameter,  $y_j$  is the nominal income of the inhabitants of country  $j$ ,  $p_{ij}$  is the price of goods consumed by country  $j$  produced in country  $i$ ,  $c_{ij}$  is consumption by country  $j$  of goods multiplied by the goods of country  $i$  and  $p_i$  is the price of the good produced in country  $i$  without considering transportation costs.

Country  $i$ 's demand for country  $j$ 's goods is:

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

And the multilateral resistance to trade is:

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

Which depends positively on other countries' trade barriers. Overall market equilibrium is:

$$y_i = \sum_j x_{ij} = \sum_i (\beta_i t_{ij} p_i / P_j)^{1-\sigma} y_j, \forall i$$

Assuming symmetry in trade barriers<sup>10</sup> and isolating demand for exports, the gravity equation can be expressed as follows:

$$X_{ij} = \frac{Y_i Y_j}{Y^w} \left( \frac{t_{ij}}{P_i P_j} \right)^{1-\sigma}$$

Applying logarithms:

$$\ln X_{ij} = k + \ln y_i + \ln y_j + (1 - \sigma) \rho \ln d_{ij} + (1 - \sigma) \ln b F_{ij}$$

Where multilateral resistances to trade are  $d$  and  $F$ .

## 6. MODEL SPECIFICATIONS

Following the theoretical model of augmented gravity equation proposed by Anderson and Van Wincoop (2003) and Alleyne and Lorde's (2014) methodology of panel data with standard error correction, we analyze the role of intra- and extra-regional trade agreements on trade flow (exports plus imports) between CAN members and their 20 primary trading partners.

The sample covers a total of 4 origin countries and 20 destination countries which were the primary trading partners of CAN members for the period of 2000-2017. This period of time was chosen due to the signing of the main trade agreements between CAN members and their main trading partners happening during that period.

The model specifications include as a dependent variable total trade between two countries, measured by the sum of exports and imports from country  $i$ , –in this case CAN members– and partner country  $j$  –in this case its primary trading partners– in period  $t$  ( $F_{ijt}$ ). On the other hand, we have as explicative variables: the size of economies measured by multiplying the GDP of countries  $i$  and  $j$  in time  $t$  ( $PBI_{it} * PBI_{jt}$ )<sup>11</sup>; the product of country  $i$ 's population and country  $j$  in time  $t$  ( $pop_{it} * pop_{jt}$ ); the absolute value of the difference between per-capita GDP of country  $i$  and country  $j$  in time  $t$  ( $PBIpcD_{ijt}$ ); for each country  $i$  and  $j$ , all their total trade's share of their GDP in time  $t$  ( $TRG_{it}$  and  $TRG_{jt}$ ); the exchange rate of country  $i$ 's monetary unit in terms of that country  $j$ ; variables that do not change over time such as the geographical distance between countries  $DIST_{ij}$ , shared language ( $Lenguaje_{ij}$ ) and the variables of interest which are the countries that form part of the intraregional trade agreement ( $ACR_{ij}$ ) and the countries that have an extra-regional trade agreement ( $ACP_{ij}$ ). With these last two variables, we will assess the impact of intra- and extra-regional agreements on the trade flows of CAN countries with their primary trading partners.

The equation to be estimated expressed in its log-linear form is as follows:<sup>12</sup>

$$\begin{aligned} \ln F_{tij} = & \alpha + \beta_1 \ln(PBI_{ti} * PBI_{tj}) + \beta_2 \ln(pop_{ti} * pop_{tj}) \\ & + \beta_3 \ln DIST_{ij} + \beta_4 \ln PBIpcD_{tij} \\ & + \beta_5 \ln TRG_{ti} + \beta_6 \ln TRG_{tj} + \beta_7 Lenguaje_{ij} \\ & + \beta_8 TC_{ij} + \beta_{10} ACR_{ij} + \beta_{11} ACP_{ij} + \mu_{tij} \end{aligned}$$

Where it is a white noise process which has a normal distribution with mean of 0 and unit variance.

## 7. DATA AND VARIABLES

The model will be based on 4 countries of origin ( $i = 4$ ), which are the four member-countries of the CAN and 20 destination countries ( $j = 20$ ) which are the primary trading partners of the CAN member countries. These countries are listed in Table 1. The study covers the period of 2000-2017 ( $t \times 18$ ). As such, the model has 1,368 observations as the 4 CAN countries are also included in the list of the 20 primary trading partners.

**Table 1. Countries studied**

Countries	
Andean Community of Nations	Bolivia, Colombia, Ecuador and Peru.
Non-CAN countries	Argentina, Brazil, Canada, Chile, China, France, Germany, India, Japan, Mexico, Panama, South Korea, Spain, Switzerland, the United Kingdom, and the United States.

Source: Created by the author.

The endogenous variable of trade flow in millions of dollars between countries is obtained as the sum of exports from  $i$  to  $j$  plus imports by  $i$  from  $j$ . This data has been obtained from trade statistics from the World Integrated Trade Solution (WITS) database.

The explicative variable of interest, Regional Trade Agreement (RTA), was obtained from the data on trade agreements of the Ministry of Foreign Trade and Tourism. This variable represents a dummy variable which takes on the value of 1 if country  $i$  and country  $j$  belong to the CAN, and 0 if not, for the entire sample period of 2000-2017. The other variable of interest, preferential trade agreements (PTA), was obtained from the data source of the Foreign Trade Information System. This variable represents a dummy variable that takes on the value of 1 if country  $i$  and country  $j$  have a preferential trade agreement outside the CAN, starting with the year said agreement was signed onwards, and 0 if otherwise.

In the case of control variables, the GDP variable is constructed by multiplying the GDP of origin and destination countries in millions of dollars at constant prices for 2010, using the World Bank's World Development Indicators database. The population variable is constructed by multiplying the population in millions of people in the origin and destination country, using the World Bank's World Development Indicators database. The difference variable of per capita GDP is built by obtaining the difference between GDP per capita in millions of dollars at constant prices in 2010 in country  $i$  and country  $j$  in absolute values, based on data from the World Bank's World Development Indicators. The trade-to-GDP ratio (TGR) variable is built by dividing the country's total trade by its GDP multiplied by 100. This data has been obtained from trade statistics from the WITS database and the World Bank's World Development Indicators database. Variables that do not change over time, such as distance between origin and destination country, as well as a shared language, have been obtained from the database provided by Centre d'Etudes Prospectives et d'Informations Internationales (CEPII).

The distance variable is measured as the distance between the capitals of the countries in kilometers.<sup>13</sup> The common language variable is measured by a dummy variable that takes on a value of 1 if country  $i$  and country  $j$  have the same official or primary language, and 0 if not. The bilateral exchange rate variable is obtained from the United Nations Conference on Trade and Development Statistical (UNCTAD STAT).

Table 2 presents the descriptive statistics of the variables used in the estimation. As one can see, the trade flow between CAN countries and their primary trade partners was on average \$1.722 billion USD. It also shows that the average GDP of CAN member countries is \$125.587 billion USD, while the average GDP of its trade partners is \$2 trillion USD. This means that the 20 primary trade partners' economies are on average about 18 times larger than those of CAN countries. It also demonstrates that the average population of CAN's primary trading partners is approximately eight times the average population of CAN countries. Likewise, the difference between the average per capita GDP of trading partners and the average per capita GDP of CAN countries is approximately \$20 thousand USD for the sample period. We would like to point out, however, that trade partners' trade openness is, on average, greater than that of CAN member countries; 42% of the total sample share the same official language.

**Table 2. Descriptive statistics of the variables used in the estimate  
(Average for the years 2000-2017)**

<i>Variable</i>		<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>	<i>Observations</i>
Trade flow	overall	1721.559	3484.842	4.450701	36356.36	N = 1368
(X+M)	between		3009.656	27.3757	21637.93	n = 76
	within		1788.502	-10536.7	16439.98	T = 18
Exporter GDP	overall	125587.4	103988.1	13481.15	372319.3	N = 1368
(millions)	between		97925.01	19289.71	277512.6	n = 76
	within		36653.43	40589.38	220394.2	T = 18
Importer GDP	overall	2365597	3456503	13481.15	17300000	N = 1368
(millions)	between		3409399	19289.71	14900000	n = 76
	within		684078.5	-992084.2	6907635	T = 18
Exporter per capita GDP	overall	0.0043649	0.0017359	0.0015976	0.007626	N = 1368
(millions)	between		0.001545	0.0019422	0.0062005	n = 76
	within		0.0008099	0.0028513	0.0059446	T = 18
Importer per capita GDP	overall	0.0240123	0.0205926	0.0008266	0.077452	N = 1368
(millions)	between		0.0206322	0.0012926	0.0730551	n = 76
	within		0.0019137	0.0182819	0.0293295	T = 18
Exporter population	overall	24.54952	13.8814	8.339512	49.06562	N = 1368
(millions)	between		13.85125	9.685466	44.9969	n = 76
	within		1.795061	19.95658	28.61824	T = 18
Importer population	overall	197.2083	374.2165	3.030347	1386.395	N = 1368
(millions)	between		375.8986	3.554899	1326.576	n = 76
	within		22.25879	48.49237	334.6216	T = 18
Exporter TGR	overall	38.91896	20.07235	12.25414	96.31931	N = 1368
(Xi/GDP)	between		11.48479	23.24641	54.74934	n = 76
	within		16.5118	6.495355	80.48892	T = 18
Importer TGR	overall	40.19243	20.43257	2.46199	111.1688	N = 1368
(Xi/GDP)	between		15.44369	13.88924	69.43957	n = 76
	within		13.48882	-4.509533	103.969	T = 18
Per Capital GDP difference	overall	0.0204119	0.01986	0.000037	0.074961	N = 1368
(millions)	between		0.0199327	0.0005023	0.0711128	n = 76
	within		0.0014306	0.0150224	0.0251804	T = 18
Distance	overall	7568.129	5257.58	662.6532	17709.48	N = 1368
	between		5290.579	662.6532	17709.48	n = 76
	within		0	7568.129	7568.129	T = 18
Shared language	overall	0.4210526	0.4939085	0	1	N = 1368
	between		0.4970086	0	1	n = 76
	within		0	0.4210526	0.4210526	T = 18
Exchange rate	overall	80.70937	312.8963	.0002078	3054.122	N = 1368
	between		310.9804	.0002078	2302.543	n = 76
	within		48.96904	-424.9379	832.2878	T = 18

CAN RTA	overall	0.1578947	0.3647756	0	1	N = 1368
	between		0.3670652	0	1	n = 76
	within		0	0.1578947	0.1578947	T = 18
PTA	overall	0.4868421	0.5000096	0	1	N = 1368
	between		0.503148	0	1	n = 76
	within		0	0.4868421	0.4868421	T = 18

Source: WITS, World Bank and CEPII. Created by the author.

## 8. ECONOMETRIC RESULTS

Table 3 shows the estimation results for the augmented gravity model using panel data methodology with standard error correction. It should be noted that this estimation method is used thanks to the database's build, the individual effect is not fixed and, as Petersen (2009) noted, both fixed and random effects models produce biased standard errors in these cases.

**Table 3. OLS Regression Results with Standard Error Correction (2000-2017)**

	(1)	(2)
GDP	0.989 *** [0.030]	1.004*** [0.028]
Population	-0.196 *** [0.032]	-0.186*** [0.032]
Distance	-1.060 *** [0.023]	-1.107*** [0.026]
Per capita GDP difference	-0.277*** [0.020]	-0.265*** [0.021]
Exporter's TGR	0.414 *** [0.063]	0.382*** [0.066]
Importer's TGR	0.361*** [0.035]	0.374*** [0.035]
Shared language	0.209*** [0.025]	0.294*** [0.024]
Exchange rate	0.051*** [0.004]	0.053*** [0.004]
CAN-RTA	0.057 [0.058]	-0.097 [0.079]
PTA		-0.186*** [0.035]
<i>Time dummies</i>	Yes	Yes
N	1 368	1 368
R <sup>2</sup>	0.723	0.724

Notes: Standard errors in brackets. \*, \*\*, \*\*\* signal that variables are significant at 10, 5 and 1% significance levels, respectively.

Source: created by the author.

In the model's estimation, continuous variables are found in logarithms (GDP, population, distance, difference between per capita GDP, exporter's TGR, importer's TGR and exchange rate), and all other variables are binary (shared language, RTA, and PTA). Table 3 presents two models, the first one does not include the variable representing the CAN's extra-regional agreements and the second one does.



Both models highlight that the distance between countries and the size of their economies (GDP) are on average the most important factors affecting the CAN's intra- and extra-regional trade flows. It also reveals that Linder's effect is present. In 1961, Linder proposed that countries with similar per capita GDP levels are more likely to trade amongst themselves. The results show that the greater the difference in per capita GDP, the lower the trade flows.

On the other hand, it is clear that trade openness has had a positive and significant influence on trade flows. Nevertheless, the impact of Andean countries' trade openness on trade flows has been more than double that of their trading partners. Furthermore, we see that the variable of shared language is highly significant and positive. This reflects that two countries sharing a common language lead to greater bilateral trade relations. The exchange rate variable is significant and positive, albeit quite small.

Regarding the first variable of interest, the CAN RTA variable is not significant in both models. This means that for the sample period, the CAN countries' intraregional agreements on average did not have a significant impact on trade flows between CAN members. These results are in line with what Acosta *et al.* (2006) found for the period of 1985-1989.

With regard to the second variable of interest, in model (2), having an extra-regional trade link is revealed to be significant; however, on average it has a negative value, albeit small, of the trade flow between CAN members and their primary trading partners. Similar results were obtained by Alleyne and Lorde (2014) for CARICOM countries. Nevertheless, a reduction of extra-regional trade flows approximately twice as large was found.

This reveals that, in general, geographical distance, size of the economy of Andean countries and their trade partners, as well as the Andean countries' trade openness are more important for the trade flows between the CAN and their primary trade partners.

## 9. CONCLUSIONS AND POLICY RECOMMENDATIONS

This study assessed the role that intra- and extra-regional agreements play in the CAN's trade flows with its main trading partners in the period of 2000-2017.

The results show that, overall, the CAN's intra-regional trade agreements have not had a significant influence on trade flows for the period studied, and that the extra-regional agreements have a small and negative effect.

More important than intra- and extra-regional agreements is geographical distance, the size of the economies of Andean countries and their trading partners, and Andean countries' trade openness. As neighbors, the CAN members have similar GDPs (i.e. exhibit less asymmetry than when compared to developed countries), and being more open to world trade should have a more prominent role in the regional exchange agreement.

Evidence of the relevance of geographical distance for trade flows implies a need for greater investment in infrastructure that would allow for greater intra-regional interconnection and with other countries in the region. Likewise, the importance of the economies' size as another important determinant of their trade flows is made evident.

However, one limitation of the model is the omission of development variables as an explicative variable of trade flows, especially when taking into account that the export basket of Andean countries is highly concentrated in their comparative advantages (mainly raw materials), it being an empirical regularity that the driving force for a country's development is not found to be related to comparative advantage. On the contrary, it is closely related to greater productive diversification (Imbs and Wacziarg, 2003).

Likewise, the evidence acquired from this study uses as a dependent variable trade flows at an aggregate level, exports plus imports, such that there is still a need for subsequent studies to verify whether these results hold true when between exports and imports are separated, as well as to analyze with official microdata and product-input matrices the disaggregation according to the structure and complexity of their productive apparatus, their competitiveness and integration in international markets, as has been carried out by CEPAL (2017) in order to study productive integration in the CAN based on the value chains between Colombia and Ecuador.

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<sup>1</sup> Observer members are: Chile, Argentina, Brazil, Paraguay and Uruguay.

<sup>2</sup> Exports plus imports.

<sup>3</sup> It does not include Venezuela which withdrew in 2006.

<sup>4</sup> Somos Comunidad Andina. ¿Qué es la Comunidad Andina? (*We are the Andean Community. What is the Andean community?*) <http://www.comunidadandina.org/Seccion.aspx?id=189&tipo=QU&title=somos-comunidad-andina>

<sup>5</sup> 90% represent 588 NANDINA subheadings.

<sup>6</sup> Particularly for Bolivia, Colombia and Ecuador.

<sup>7</sup> Linder (1965) proposed that countries with similar per capita GDP levels trade more amongst themselves.

<sup>8</sup> They analyze Bolivia, Colombia, Ecuador, Peru and Venezuela.

<sup>9</sup> Trade flow is the sum of imports and exports.

<sup>10</sup>  $t_{ij} = t_{ji}$

<sup>11</sup> Translator's note: variable names in the equations (e.g.  $GDP$ ,  $Lenguage_{t_{ij}}$ ,  $ADP_{ij}$ ,  $ACR_{ij}$ , etc.) are derived from the original Spanish.

<sup>12</sup> Unlike Alleyne and Lore's gravity equation model (2014), the per capita GDP multiplication variable is not included due to there being a high level of autocorrelation.

<sup>13</sup> This variable was built based on the great circle formula in which one uses the longitudes and latitudes between origin and destination countries' capitals.