Abstract. In this paper we analyzed the current involvement of China in Latin American and the Caribbean countries during the last 15 years while using the data from 22 countries in the region plus China. Following are the areas that we found significantly related with the trade between the regions. Firstly, the complexity of the imported and exported goods; Secondly, How Intra-regional agreements affected trade with China and, the US immersion in the LAC Region. The analysis of the Impact of trade are involving factors that have more to do with spatiality and geography. We not only surveyed the recent literature, but also made our own analysis in order to examine under which conditions China can influence LAC Trade. Finally an effect of the LAC exports and Imports to USA on LAC trade was set in order to have a better understanding of the actual situation in the region.

Introduction

China’s rapid economic growth has been one of the most significant developments in the global economy in the last three decades [1]. Nowadays, Chinese presence in world markets and its competitiveness are creating a major impact in developing and developed countries [2]. The impact that Chinese economic growth has into Latin American and Caribbean countries (LAC) has to be evaluated not only through the investment onto those economies, but also through their established relations ties and multilateral trade.

The involvement of China in Latin American countries is evident, specifically through its investment in different projects, primary for “resource seeking” motives. For example, Chinese companies have financed different hydropower plants in Ecuador and, this country has compromised large amounts of its crude oil to PetroChina. Similarly, China agreed to carry out aerospace training, and undertook Venezuela’s energy infrastructure, and oil exploration; in exchange of fixed minimums of oil supply [3]. Simultaneously, each party is becoming the other’s most promising investment market. China is one of the most important consumer of Latin America’s natural resources, agricultural products and livestock, which are major exports from Chile, Colombia, Venezuela, Peru, Brazil, Mexico and Argentina [4] [5]. In terms of economic structures and development stages, Latin America and China have a great level of mutual complementarity, where Latin American and Caribbean countries are China’s important energy and resources supplier, while China provides industrial products such as electromechanical equipment, electrical appliances and, light industry products.

In this paper, we use Gravity Model with the objective to analyze China’s impact on Latin America and the Caribbean trade and, future implications on the pattern of trade for the regions. The rest of this paper is structured as follows: Section 2 explains the recent trends of Latin America and Caribbean trade relationship with China; Section 3 explains the stylized facts and policies of the LAC region and China; Section 4 presents the empirical model estimation, variables, and data used for the Gravity model, regression OLS method and results; Finally Section 5 draws the main conclusion, policy implications, and future research.
Recent trends in Trade Relationship between China and Latin America

In recent years, the combined effects of falling prices from manufactured products and increasing prices of primary commodities boosted the trade from most Latin American economies and China [6]. Countries like Argentina, Brazil, Chile, Peru, and Venezuela exhibit a constant trade improvement since 2002. On the other hand, Mexico and Colombia are the only large economies in the region that statistically did not enhance in a steady trade with China; however, this may be explained because both economies have maintained free trade agreements with the United States, where most of their exports are directed to the North American country. During the examined period, Chile and Peru also benefited from the high prices of metals and ores; while in the same way as Venezuela, Ecuador, and Argentina enjoyed the high prices of oil, fuels, and agricultural products, Brazil has benefited only to some extent by the oil prices too. Whether a country performs as a loser or as a winner it exceptionally depends on how it complements or compete with China, in terms of the nature and quantity of its imports and exports [7].

Trade Performance between China and LAC

The figure 1 shows total exports from the LAC region to China during 2004 to 2018, where it can be seen the increased during the year of 2004 to 2012 with a slowdown during the US crisis which affect the trade globally. After 2012 the exports of the LAC region did maintained without any growth partly due to the falling demand for commodities in China and the recession of Euro zone. On the other hand the Imports in the region have being increasing over time, as it showed in the previous graph, simultaneously with the exports to China. Therefore, the Trade balance has been favorable for China for the volume and amount of exports to Latin America until 2018. Meanwhile, for the last three years an increase on exports and imports have been notorious, making a high impact on the trade relationship between LAC and China. The total trade between China and LAC region rise significantly in recent years. Among the 33 countries in Latin America and the Caribbean with the highest and lowest export dependencies with China as listed in Table 1.

Table 1. Latin America and the Caribbean biggest and smallest exporters to China up to 2018.

| Biggest LAC exporters to China | Smallest LAC exporters to China |
|-------------------------------|--------------------------------|
| Brazil $ 47,488,448,664       | Panama $ 36,987,518            |
| Chile $ 25,286,938,068        | Paraguay $ 25,958,446          |
| Peru $ 11,626,233,312         | Jamaica $ 18,615,639          |
| Mexico $ 7,194,348,315        | Nicaragua $ 17,768,044        |
| Argentina $ 4,210,929,514     | Suriname $ 13,716,776         |
| Colombia $ 4,056,050,165      | Barbados $ 1,445,128          |
| Uruguay $ 1,481,337,988       | Belize $ 1,084,145            |
| Guatemala $ 60,914,261        | Antigua and Barbuda $ 51,040  |

Source: Author’s calculation based on WTO data.
In the same manner, the list of the country’s biggest and smallest imports dependency from the Chinese market is registered in the table 2.

Table 2. Latin America and the Caribbean biggest and smallest importers from China up to 2018.

| Biggest LAC Importers from China | Smallest LAC importers from China |
|----------------------------------|----------------------------------|
| Mexico                           | Guatemala                        |
| $83,504,746,875                  | $1,969,970,103                   |
| Brazil                           | Nicaragua                        |
| $27,321,483,887                  | $1,172,353,488                   |
| Chile                            | Jamaica                          |
| $17,504,355,849                  | $364,573,574                     |
| Ecuador                          | Guyana                           |
| $15,767,928,739                  | $219,932,528                     |
| Argentina                        | Belize                           |
| $12,072,489,741                  | $114,979,686                     |
| Colombia                         | Suriname                         |
| $10,544,728,129                  | $103,428,110                     |
| Peru                             | Barbados                         |
| $8,861,240,013                   | $94,429,891                      |
| Costa Rica                       | Antigua and Barbuda              |
| $2,142,616,943                   | $26,997,353                      |

Source: Author’s calculation based on WTO data.

LAC trade had become more balanced with China displacing Japan, as a key partner in terms of imports and exports of goods during the past 10 years. Even though, in recent years the Republic of Korea, China, Japan, and ASEAN have played a large part in the LAC trade [8]. Within the countries of Latin America and the Caribbean, the importance of China’s market varies considerably according to the needs and development; China has become a vital export market for Chile, Peru, Brazil, Colombia, Costa Rica and Argentina (see table 1-2), meanwhile Some Caribbean countries, Ecuador, Uruguay and the countries of Central America have not considerably exploited Chinese market, with the exception of Costa Rica.

Figure 2, illustrates Latin America and the Caribbean’s exports by commodity grouping, the composition of LAC’s exports to China is roughly consistent with the theory mentioned before, that almost 60% of the exports of the region are based on the natural resources (Crude materials, inedible, except fuel). We found a small portion of manufactured goods that have improved during the last decade and miscellaneous manufactured articles with the fewer amounts of exports. China has become a leading importer and consumer of commodities like minerals and metal especially in the cases of cooper, iron ore and nickel that are of significant attention to Latin America and the Caribbean.

Source: Author’s calculation based on WTO data.

Figure 2. Latin America and the Caribbean commodity composition of Exports to China 2018.
Meanwhile in the following figure 3, LAC imports from China, show that machinery and transport equipment count for more than 50% of the total value of imports, so far we can observe the percentage of almost 60% of manufacturing goods (Machinery and Transport equipment) imported for 33 developing countries during a period of 2004 to 2018 which share a valuable amount compared with the total imports in the region [1].

**Stylized Facts**

Among the first countries in LAC to recognize Beijing were Cuba, Chile, Peru, Jamaica, Trinidad and Tobago, Venezuela, Brazil, Ecuador, and Colombia. These 9 countries recognized China before the 80s. We contemplate that the earlier recognition of Beijing helped to improve trade with China. As a result of the China’s accession to the World Trade Organization (WTO), after the 1990s China incremented the number of agreements with other countries in the world and enhanced its trade with the US [9]. We surely mention that the earliest recognition of a marketplace determined a positive impact on bilateral trade. Although, China was early recognized by more complementary markets, as a positive result, China had signed Free trade Agreements with some Latin American countries such as Chile in 2006, Peru in the end of 2009 and Costa Rica in 2010. We made an assumption, that the signature of a free trade agreement did not influence Chinese’s import levels since countries without free trade agreements like Brazil or Mexico showed the highest exports to China without having FTA. China and the Caribbean have hosted several meetings of the China-Caribbean Economic and Commercial Cooperation Forum, with a hope of facilitating trade and economic cooperation for mutual development. To mention that 18 Latin American countries and China participated in the East Asia-Latin American Cooperation Forum and that China, Mexico, Chile and Peru are members of APEC (Asian-Pacific Economic Cooperation) gives great expectations to build better and strong ties between the regions [10] [11].

**Regional Agreements and the United States**

Latin America is characterized by its intraregional trade of agricultural products and it’s recently openness to the world market. Although, distance greatly impact the trade within the region due to the lack or poor infrastructure. Authors such as Jilberto A [12] made an explanatory differentiation between International and Domestic policies, describing that the first one includes all the border barriers, and the second one assume everything in relation to financial institutions, taxes, environmental protection and so on. Latin American economies level of integration is analyzed by henry P.B [13] pointing out the latent impact of financial integration and trade between economies. As a result the author found in contrast with other research that trade relations do not increase
integration substantially and that the US impact on Latin Economies had been low [14]. Meanwhile Regional integration still under develop, but the cross country trade differ within the region. A better understanding of regional integration as a part of Globalization is required for LAC nations. Finally Chinas’ fast development impact is moving towards the region, debilitating the US hegemony and the Intraregional trade [15].

Data and Methodology

For this study, Regression Method is being used in order to estimate the effects of trade flows between Latin America and China. The Gravity Model equation relates to trade between 33 Latin American and the Caribbean countries and China, this model is considering variables from China and 33 Latin American countries ((Argentina, Antigua and Barbuda, The Bahamas, Belize, Bolivia, Brazil, Barbados, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, Grenada, Guatemala, Guyana, Honduras, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, Mexico, Nicaragua, Panama, Peru, Paraguay, El Salvador, Suriname, Trinidad and Tobago, Uruguay, St. Vincent and the Grenadines, Venezuela) thus the data used for the regression will be calculated under the view from the effects on Sino-Latin American and Caribbean trade from 2004 to 2018.

Data

The trade data used for this study is collected from Comtrade, the development indicators collected from World Bank, World Trade Organization, ECLAC, and National Bureau Statistics of China presented the trade of all commodities of China with Latin America and the Caribbean. In a Gravity equation an error term is non-homoscedastic as well as zero trade flows are unlikely to happen.

Model

The economist Timbergen [16] was the first one using Gravity Model to explain trade flows. The model has been a practical success accurately predicting trade flows between countries. In this study, gravity model will be used to analyze the pattern of trade of China with Latin America and the Caribean. It has been used to test hypotheses purely engrained in economic theories of trade. One of the theories predicts that trade will be based on comparative factor abundances. The gravity model successfully explains the bilateral trade flows (often using GDP measurements) and distance between two parts [17]. The traditional approach for the Gravity equation for trade between two countries (i and j) takes the form of:

\[
T_{ij} = G \frac{M_i^{\beta_1} M_j^{\beta_2}}{D_{ij}^{\beta_3}} \eta_{ij} \tag{1}
\]

\[
\ln(T_{ij}) = \beta_0 + \beta_1 \ln(M_i) + \beta_2 \ln(M_j) - \beta_3 \ln(D_{ij}) + \varepsilon_{ij} \tag{2}
\]

Where \( T_{ij} \) represents size of trading goods from country \( i \) to country \( j \), \( M_i \) and \( M_j \) denote the value of the GDPs for countries \( i \) and \( j \), \( D_{ij} \) symbolizes the distance between two countries or regions which is multiply by the actual oil price, and \( \eta \) represents an error term with expectation equal to 1[18]. Base on this model, the international trade equation is established using cross-country data:

\[
\ln(\text{imports}_{it}) = \alpha_0 + \alpha_1 \ln(\text{gdp}_{ij}) + \alpha_2 \ln(\text{chinese gdp}_{ij}) + \alpha_3 \ln(\text{distance oil price}_{ij}) + \ln(\text{FDI}_i) + \ln(\text{Imports from USA}_i) + \ln(\text{labor force}_i) + \ln(\text{unemployment}_i) + \varepsilon_{ij} \tag{3}
\]

Where \( \ln(\text{imports}) \) is the value of the total imports of 33 Latin American countries to China, \( \ln(\text{gdp}) \) is the gross domestic product at purchasing power parity (PPP) in Latin America, \( \ln(\text{chinese gdp}) \) is the gross domestic product at purchasing power parity (PPP) of China, \( \ln(\text{distance}) \) correspond to the direct distance between China and 33 countries in LAC, adding the oil price, \( \ln(\text{FDI}) \) which is the total Chinas’ foreign direct investment in the region, \( \ln(\text{Exports to USA}) \) and \( \ln(\text{Imports from USA}) \) by
Latin America and the Caribbean; lnlabor is the workforce estimated, lnunemployment, modeled ILO estimate for Countries in LAC.

\[
\ln \text{exports}_{ij} = \alpha_0 + \alpha_1 \ln \text{gdpp}_{ij} + \alpha_2 \ln \text{chinesegdp}_{ij} + \alpha_3 \ln \text{distanceoilprice}_{ij} + \ln \text{FDI}_i + \ln \text{exports to USA}_i + \ln \text{laborforce}_i + \ln \text{unemployment}_i \quad \varepsilon_{ij}
\] (4)

For the exports, the equation is the value of the total exports to China from 33 Latin American and the Caribbean countries and the independent variables are the same used for imports regression.

**Results**

LAC GDP affected positively the trade with the Asian Country confirming the region import more machinery and transportation equipment for mining exploitations and manufactured goods, meanwhile keep on exporting it. Distance is a determinant that remained us, how competitive in production and logistic the countries in LAC should be in order to dismiss any remoteness. LAC exports to USA affect negatively the trade of the region with China. USA has been LAC first trade partner for more than 30 years, its distance, influence and diplomatic ties with LAC are very strong. Although after the Chinese involvement in the region the USA-LAC trade had been decreasing over time, reducing the region dependency on the North American Country.

**Concluding Remarks**

In this paper we estimated an augmented Trade between Latin America and the Caribbean with China using gravity equation based on a theoretical framework and statistics of exports and imports. This paper takes a deep look of the understanding of the vital linkage of the region with China. The Globalization, China’s exposure to the world and, its increased levels of trade and investment open an opportunity to LAC for a development and better long-term economic stability. Previous work recognized that trade with China might be good for LAC in terms of exporting natural resources (Jilberto, 2012) but there will be more positive results if LAC will focus on diversifying sales to China by implementing knowledge and value-added into their exports, exploiting comparative advantages as agricultural sector, creating intraregional integration, stimulating business with the Chinese counterparts through technological ties and promoting investment in China. Specialization in sectors that offers better results to LAC economy need great efforts but the results will be highly beneficial.

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**References**

[1] Kuwayama, M. and V. Rosales, China and Latin America and the Caribbean: building a strategic economic and trade relationship. 2012: ECLAC.

[2] Kotschwar, B., China's economic influence in Latin America. Asian Economic Policy Review, 2014. 9(2): pp. 202-222.

[3] Devlin, R., A. Estevadeordal, and A. Rodriguez-Clare, The Emergence of china: Opportunities and challenges for latin america and the caribbean. 2006: IDB.

[4] Jenkins, R. and E.D. Peters, China and Latin America. Economics relations in the twenty century. Studies. German Development Institute. Bonn/Cidade do México, 2009.
[5] Limao, N. and A.J. Venables, Infrastructure, geographical disadvantage, transport costs, and trade. The World Bank Economic Review, 2001. 15(3): pp. 451-479.

[6] Rodriguez, J., J. Blazquez, and J. Santiso, Angel or Devil: China's Trade Impact on Latin American Emerging Markets. Cepal Review, 2006(90): pp. 15-41.

[7] Gallagher, K.P. and R. Porzecanski, China matters: China's economic impact in Latin America. Latin American Research Review, 2008: pp. 185-200.

[8] Li, H., China's growing interest in Latin America and its implications. Journal of Strategic Studies, 2007. 30(4-5): pp. 833-862.

[9] Rose, A.K., Do we really know that the WTO increases trade? 2002, National bureau of economic research.

[10] Green, S., China’s quest for market economy status. China Brief, 2004. 4(16): pp. 1-8.

[11] Panitchpakdi, S. and M. Clifford, China and the WTO: Changing China, changing world trade. 2002: Wiley.

[12] Jilberto, A.E.F., Latin America facing China: South-south relations beyond the Washington consensus. Vol. 98. 2012: Berghahn Books.

[13] Henry, P.B., Capital-account liberalization, the cost of capital, and economic growth. American Economic Review, 2003. 93(2): pp. 91-96.

[14] Miles, W., The impact of the US on Latin American business cycles: A new approach. Economic Systems, 2017. 41(2): pp. 320-331.

[15] Mora, F.O., The people's Republic of China and Latin America: From indifference to engagement. Asian Affairs: An American Review, 1997. 24(1): pp. 35-58.

[16] Tinbergen, J. and H. Bos, Mathematical models of economic growth. 1962.

[17] Yu, M., Trade, democracy, and the gravity equation. Journal of Development Economics, 2010. 91(2): pp. 289-300.

[18] Silva, J.S. and S. Tenreyro, The log of gravity. The Review of Economics and statistics, 2006. 88(4): pp. 641-658.