Europe and Latin America: Analysis of the Effect of Trade Agreements on Exports

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Abstract **– One of the leading commercial drivers applied in developing countries, especially in economies with conservative policies, is free trade agreements or tariff preferences with strategic economic zones worldwide. The countries of Latin America and the Caribbean are no exception. The United States is the region's leading trading partner; however, several countries have signed trade agreements with the European area in recent years. In this paper, we ask ourselves to what extent these agreements are beneficial. In addition, we evaluate the impact on exports with other world regions. Mainly, we analyze the effect of commercial firms in the European zone on the level of exports of the other partners, especially with the United States. The results consistently suggest that signing trade agreements with the European zone generates an export displacement effect. In other words, although the gross level of exports to the European zone increases, the level of exports to other regions of the world, especially to the United States, grows faster than other countries that do not even have agreements with the Europeans. Generally, exports do not have a statistically significant effect on signing trade agreements with the European zone.**

Keywords **– Trade agreements, exports, Latin America-Europe, Latin America-United States.**

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1. Introduction

The behavior of foreign trade between Latin America and the countries of the European Union has intensified in the last 21 years. Both markets are representative of international business. World exports reached more than 28.5 trillion dollars in 2021; in 2001, it was more than 6 billion. Latin America alone represents 5.4% of world exports [1].

Furthermore, if we review the market only between LAC and the EU, the figures are more compelling. Thus, exports to the EU went from 62 billion to 172.9 billion, which means an increase of 5.15%. The leading suppliers in Latin America are ten countries that account for 95% of sales to those markets. Brazil, Mexico, Chile, Argentina, Peru, Colombia, Ecuador, Costa Rica, Venezuela, and Honduras are on the list [1], [2].

The Europeans increased their sales to Latin American countries by going from 54.5 billion to 150.6 billion dollars in the same period, which implied an increase of 50%. Only ten countries acquired 92% of the products in 2016, when 2006 stood at 84%. The countries that imported the most were Mexico, Brazil, Argentina, Chile, Colombia, Peru, Ecuador, Panama, Cuba, and the Dominican Republic [3].

On that list are countries with agreements with the EU and others that are in process or do not have any commercial relationship. Despite this, trade flowed for some with greater intensity and others with moderate speed. However, the behaviors were different between exports and imports. Latin American sales grew at single digits while purchases of European goods were at double digits. The main questions arising are: who benefited? Who got hurt? These questions are formulated by applying trade agreements or treaties [4]. Of the 22 countries that exported the most to the old continent, 18 countries were selected, including Ecuador, its main competitors, and representative countries that do not have agreements with the EU [5].

2. Materials and Methods

We used a panel data model with fixed effects to estimate the effect of signing trade agreements between Latin American and Caribbean countries as the objective of this article. In this section, we detail the data and the estimation methods we apply to assess the effect of signing trade agreements with the European zone on total exports and the main trading partners. In addition, we specify several models that allow testing the consistency of the results [6], [7].

This work builds a panel with information from various data sources. The dependent variable corresponds to the total annual exports of 95% of Latin America and the Caribbean countries. The information is available from 2001 to 2021 (21 periods for each country). Likewise, the data is transformed into logarithms to measure the effects on elasticity [8], [9].

The panel is built with information from 22 Latin American and Caribbean countries. For each country, the information on the variables for 2001–2021 is presented. We apply a fixed effects model to determine the effect of signing the trade agreements of Latin America and the Caribbean countries with the European zone [10], [11]. The basic model is presented as follows:

$$E_{it} = \beta_0 + \beta_1 t_i + \beta_2 A_t + \beta_3 (t_i * A_t) + u_i \qquad (1)$$

Where:

E_{it} Total exports of country i, in year t.

t_i Dummy variable that captures the fixed effect of the moment in which the trade agreement with the European zone is signed.

A_t The variable captures the fixed effect of the countries that sign trade agreements with the European zone.

u_i This is a typical error not included in the export growth model.

The interaction between the year of signing the trade agreement with the European zone (t) and the signing country (A) reflects the desired effect. β_3 is the parameter of interest of the study [12], [13]. However, to determine the consistency of the effect, we test the model for several specifications with some additional controls:

$$E_{it} = \alpha_0 + \alpha_1 t_1 + \alpha_2 A_t + \alpha_3 (t_1 * A_t) + \alpha_{3+i}(P) + \alpha_{3+i+t} T + u_i \qquad (2)$$

In equation (2), we include two controls, P and T, which represent the fixed effects of each country (P) and each year (T). In this case, we evaluate the consistency of the estimator that measures the effect of signing trade agreements with the European zone [14], [15].

Note that, in the first two specifications, we analyze the effect of trade agreements on the gross value of each country's exports. However, estimating the effect with the nominal value of exports can cause stationarity problems. In addition, we are exposing the model to omitted variable bias, for example, the previous period's GDP and the European zone's tariff level for Latin American countries [16], [17]. In the last two models, we add these controls and measure the effect of trade agreements on the natural logarithm of each country's exports:

$$\ln(E_{it}) = \alpha_0 + \alpha_1 t_1 + \alpha_2 A_t + \alpha_3 (t_1 * A_t) + \alpha_{3+i}(P) + \alpha_{3+i+t} T + u_i \qquad (3)$$

Before estimating the effect, we transform the time series by applying the natural logarithm of each country's exports. Adjusting the values and estimating parameters closer to the natural effect of signing trade agreements are possible [18], [19]. Finally, in the last specification, we include two variables relevantly related to each country's export level: the natural logarithm of the GDP of the previous period and the average level of tariffs that the European area establishes for Latin American countries [20], [21].

Although the signing of trade agreements with the European zone may increase the nominal value of exports with European countries, this does not necessarily mean that total exports will maintain a significant increase [22], [23]. In this paper, we also evaluate the effect of commercial firms in Europe and exports to other trading partners, specifically to the United States and the rest of the world ($E_{itE}, E_{itEEUU}, E_{itRM}$).

3. Results

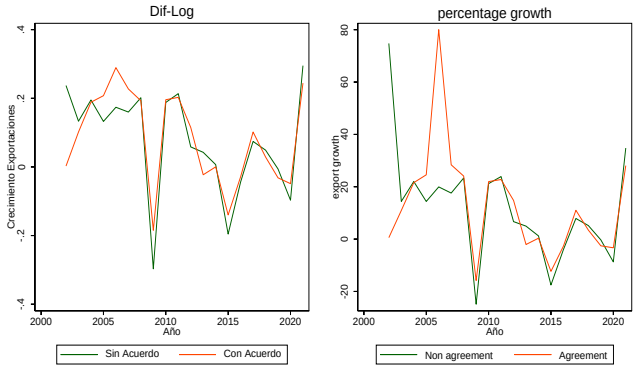

Figure 1. Comparison of the evolution of the average total growth of exports

As the first element of analysis, Figure 1 compares the evolution of the average total growth of exports of the countries that are part of the sample, separating the group that, each year, has an agreement signed with the European Union.

On the left side, the measure taken as the difference of the natural logarithm of exports is shown, while on the right side, the average of the percentage growth rate is shown. In general terms, it is observed that countries with trade agreements have higher levels of growth in their exports. However, such marked differences are not observed; only the difference between 2005 and 2007 is highlighted.

On the other hand, in Figure 2, an individual analysis is presented for six countries: Chile and Peru. Colombia, Costa Rica, El Salvador, and Ecuador. In this case, the evolution of the growth of total exports for each is presented, measured as the difference of the natural logarithm of said exports. Additionally, in each case, the figure includes a vertical line that shows the period in which the agreement with the European Union was signed and implemented.

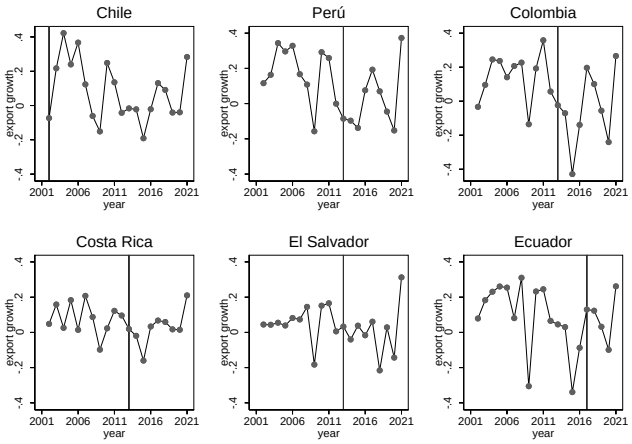

Figure 2. Growth of exports for Chile and Peru. Colombia, Costa Rica El Salvador and Ecuador

In the case of Chile, the data shows only information after the signing of the agreement, where initially, a decreasing trend of this rate is observed. However, since 2015, this trend has increased. For the rest of the five countries, the dynamics of the growth rate of exports are different among them, with this recovery occurring approximately in this same period only in Peru, Colombia, and Costa Rica.

In contrast, Ecuador and El Salvador have different trends. In this sense, it is essential to highlight that the change in the trend in the growth of exports for these countries does not seem to be adjusted to the periods in which the agreement is signed and seems to respond to an external element that, according to the data, generally affected the countries of the region. Colombia, Peru, Costa Rica, and El Salvador started the agreement simultaneously.

Ecuador only signed it in 2017, and it was launched in 2018. In other words, at a general level (growth averages between groups of countries) and individually priori, the data do not support a significant effect in the growth of total exports for the countries that sign this type of agreement.

In 2021, world exports stood at 22 billion 138,761 million dollars, of which the European Union (EU) market represented 31.3%, China with 15%, the United States with 8%, and Latin America with 5.4%.

Estimates of the effects of the agreement on exports

The behavior of the region's exports to the European Union (EU) market marks a difference on average between countries with trade agreements and those without (Figure 3). The difference in the analysis period is almost 8 billion dollars on average.

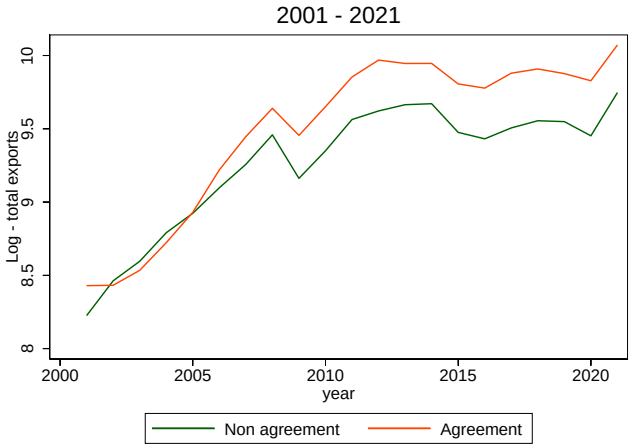

Figure 3. Effects of the agreement on total exports

It implies that signing the agreement helped increase total exports from the region to those who maintained alliances with the Europeans. However, to measure the impact, four models were made to evaluate the effect (Table 1). The first uses variables of economic growth, trend, agreements, and iteration of a trend with the agreement, where the results indicate that the signing of an agreement significantly influences exports, but its coefficient of determination or R^2 is only 28%. This model has no controls, so it is necessary to carry it out to confirm if the agreement variable remains significant and if its explanatory power increases.

The second model incorporates control variables such as the time that allows its R^2 to increase to 94%, and the agreement variable is significant at 1%, where it explains that by maintaining an agreement, the impact is a 61% growth in the logarithm of total exports of the countries analyzed. It also reveals that it is not sustainable over time because those benefits slowly decrease as the years go by. The variable that drives the growth of exports is the logarithm of economic GDP, which implies that each country's economy also influences its sales.

The third model no longer uses time as a control but proceeds to estimate the fixed effects of the spatial units (countries). The objective is to determine the expected valuation of exports in the countries over time through the study period.

With this adjustment, the coefficient of determination improves to 97%, but the significance level is 10% for the variable agreement. The remaining variables remain significant at 1%, and only the constant is no longer significant, even at 10%.

Table 1. Panel data regression model (Logarithm Total Exports)

Regressor Variables	Model 1	Model 2	Model 3	Model 4
T	0.1218**	0.0262**	0.0385***	0.0570***
	(0.0236)	(0.0118)	(0.0086)	(0.0124)
P	-0.3230*	0.1305**	-0.7301**	-0.1024***
	(0.1747)	(0.0554)	(0.3173)	(0.3734)
Agreement	3.8919***	0.6104***	0.1747*	0.095
	(0.1849)	(0.0925)	(0.0983)	(0.0963)
pt	-0.1779***	-0.0192***	-0.0009	0.0049
	(0.0272)	(0.0073)	(0.0057)	(0.0053)
tariff	0.0538	0.0649***	0.0575***	0.066***
	(0.0430)	(0.0236)	(0.0102)	(0.0183)
t2014	-0.8793***	-0.3311*	-0.3482***	-0.5591***
	(0.3028)	(0.1843)	(0.0555)	(0.1273)
lngdp		0.93939***	0.6925***	0.5929***
		(0.015)	(0.0789)	(0.0937)
constant	7.9676***	-1.7051***	1.4453	2.4721**
	(0.4854)	(0.2593)	(0.9358)	(1.1282)
Time effect	NO	SI	NO	NO
Country effect	NO	NO	SI	NO
Effect of time and countries	NO	NO	NO	SI
R-sq	28%	94%	97%	28%
Prob>chi2	0.00	0.00	0.00	0.00
Observations (country)	378	378	378	378

Note: Results of the Commercial Agreement Panel 2001-2021.

The fourth model included both time and country controls. The agreement variable and the iteration between trend and agreement (pt) are no longer significant, and the level of explanation of the model dropped to 28%. The rest were losing power to measure the effect of the variables even though model 3 reached a representation of the model of 97%, but its significance level was 10%. In addition, the variable that interacts with the agreement with the trend was insignificant.

In short, model 2 is the one that can best analyze the effects of the agreement with the EU on the total exports of the countries that have this alliance.

The effects of the agreement with the EU

Although total exports are growing, it is necessary to determine if the cause comes from maintaining agreements with the European market. For this, we replicated the models again, but now, the logarithm of exports to the EU was chosen as the dependent variable.

The first visualization of Figure 4 shows that there is no significant effect on exports to that market by the trading firm.

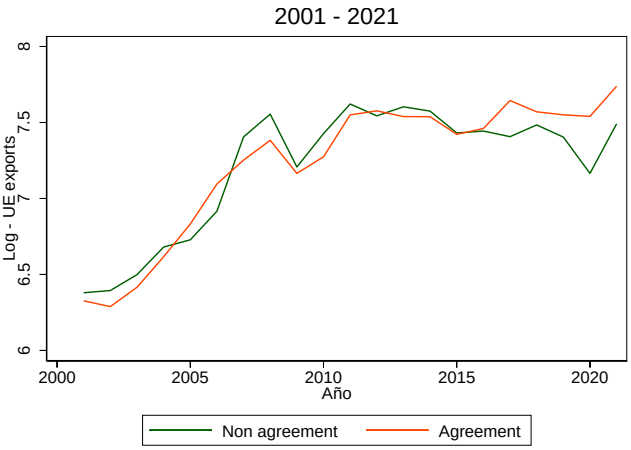

Figure 4. Effects of the agreement on Union European exports

There are periods when those who sell the most do not have a relationship or trade agreements, such as Argentina, Brazil, Bolivia, Jamaica, Paraguay, the Dominican Republic, and Uruguay. In the last five years of the analysis, one can see the superiority of the countries that maintain an agreement with the Europeans, such as Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, and Peru.

Of the 1,195 trillion dollars that Latin American countries exported, only 9.2% went to the EU; in 2014, the percentage was 11%. In both periods, the countries that sell the most are Brazil (which does not have an agreement) and Mexico (with an agreement), and only in 2021 did they place 35% and 15% of their sales in the European market.

That is why it is essential to analyze, through various models, whether or not the agreement maintained by certain Latin American countries impacts the destination of exports to that traditional market.

The results of the four models applied to exports to the EU, only the first one generates significant results but without controls (Table 2). There, it is revealed that the agreement has increased sales by 340 percent more than those without agreements, but since the agreement was signed, it has decreased by 15% annually. The meaning is that the treaty is not sustainable over time. To this, it is added that the variables used in the model only explain 18% of the impact on exports directed to the EU.

The rest of the models are not consistent or significant, so it is understood that the agreement has not generated increases in the region's exports to that market, mainly when controls are applied.

If the record of exports from certain countries to the European market is analyzed when the negotiation is finalized, the effects are not immediate. Instead, it takes time to start growing later, but they slow down. For example, Colombia, signed in 2013 and 2014, already sold 9,440 million. However, in 2016, it dropped to 4,993 million, according to statistics from the International Trade Center (ITC). This story is repeated in Ecuador, which 2018 entered into operation with the agreement with exports valued at 3,298 million, while in the following year, it dropped to 3,100 million. In 2021, Ecuador already bordered its sales to 4,057 million, the highest in its commercial history. In other words, between 2018 and 2021, sales only grew 23%.

Table 2. Panel data regression model (Logarithm European Union Exports)

Regressor Variables	Model 1	Model 2	Model 3	Model 4
T	0.1031**	-0.0067	0.006	-0.0065
	(0.0277)	(0.0180)	(0.01)	(0.0122)
P	-0.4669**	0.026	-0.5482	0.2076
	(0.2102)	(0.0782)	(0.4177)	(0.1643)
Agreement	3.4090***	-0.155	-0.084	-0.132
	(0.2958)	(0.3433)	(0.1856)	(0.1854)
pt	-0.1551***	0.0171	0.0143	0.0176
	(0.0269)	(0.0204)	(0.0106)	(0.0106)
tariff	0.0623	0.0855**	0.0575***	0.121
	(0.0493)	(0.0378)	(0.0118)	(0.1035)
t2014	-0.7729***	-0.1146	-0.2531***	0
	(0.3414)	(0.2969)	(0.0715)	0
lngdp		1.0204***	0.8856***	0.8586***
		(0.0170)	(0.1070)	(0.1283)
constant	6.0294***	-4.4757***	-2.5114**	-2.4824
	(0.3301)	(0.3105)	(1.2783)	(1.5632)
Time effect	NO	SI	NO	NO
Country effect	NO	NO	SI	NO
Effect of time and countries	NO	NO	NO	SI
R-sq	18%	87%	97%	97%
Prob>chi2	0.00	0.00	0.00	0.00
Observations (country)	378	378	378	378

Note: Results of the Commercial Agreement Panel 2001-2021.

If the sales behavior of those countries that do not have agreements is reviewed, it can be summarized that several of them have doubled their sales, such as the case of Brazil, which went from 15,557 million dollars in 2001 to 39,636 million in 2021. In The same case, Argentina and Bolivia, between 2001 and 2021, increased their sales to the EU by 126% and 692%, respectively, according to ITC.

The effects of the agreement with the United States

Most Latin American countries have the United States as their leading trading partner, although some have not signed Free Trade Agreements that facilitate the reduction of tariffs in that market. With those countries that have agreements with the European Union, it turns out that they are the most indirect beneficiaries of the growth of exports to the US market.

In Figure 5, there is a very marked gap in favor of the countries that have agreements with the Europeans. In other words, even though the countries that have alliances with the Europeans do not have significant growth in their sales in that market, on the other hand, with the US, there is well-marked and sustainable growth.

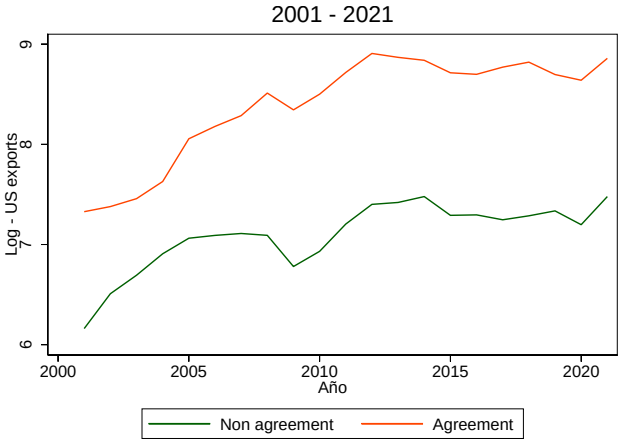

Figure 5. Effects of the agreement on Union European exports

In measuring the impact of these agreements with the EU in the US market, the models are replicated again but now setting exports to the United States as the dependent variable.

The four models are significant in the agreement variable, which explains that maintaining a trade agreement with the Europeans indirectly causes sales to the US market to grow. What stands out is that models 1 and 2 have an r2 of 31 and 81%, respectively. In addition, in model 1, the tariff variable is not significant; in model 2, the variables T, pt, tariff, and t2014 do not contribute to the model (Table 3).

Meanwhile, models 3 and 4 register a coefficient of determination of 95% and 96%, where the first has a significance level of 1% and the other of 5%, remembering that the last model only has 2 of the seven significant variables.

Undoubtedly, the best model would be the third, where it allows explaining that the countries that have trade agreements with the EU, their exports to the US market grow by 48.5% more compared to those that do not have alliances with Europe, but as it happens over time those incentives are slowly reduced.

Although some countries, such as Brazil and Argentina, do not have agreements with the United States or the European Union, their sales are constantly growing. So, some countries maintain agreements with the EU but do not like the US, and their exports do not increase at the same speed. Case of Ecuador, which had tariff preferences (Atpdea) with the US market, could sell its main products with zero tariffs, reaching a maximum level of 11,971 million dollars in 2013. In that year, the government of former President Rafael Correa decided to renounce the tariff preferences granted by the US, which implied that products such as tuna, wood, leather, and metal mechanics, among others, pay tariffs of up to 35%. In 2021, sales to that market reached 8,645 million.

Table 3. Panel data regression model (Logarithm United States Exports)

Regressor Variables	Model 1	Model 2	Model 3	Model 4
T	0.1090**	0.0229	0.0738***	0.0590***
	(0.0264)	(0.0231)	(0.0133)	(0.0157)
P	0.7428***	1.2015***	-1.2009**	-0.0676
	(0.2022)	(0.1163)	(0.4744)	(0.1576)
Agreement	4.0594***	0.7239**	0.4853***	0.3307**
	(0.5424)	(0.3000)	(0.1438)	(0.1402)
pt	-0.1883***	-0.0268	-0.0179**	-0.0057
	(0.0376)	(0.0212)	(0.0082)	(0.0079)
tariff	0.0353	0.055	0.0656***	0.195
	(0.0509)	(0.0480)	(0.0144)	(0.1213)
t2014	-0.7912**	-0.3672	-0.3812***	0
	(0.3366)	(0.4330)	(0.0942)	0
lngdp		0.9492***	0.088	-0.214
		(0.0296)	(0.1181)	(0.1374)
constant	6.0045***	-3.9090***	6.1674***	9.2477***
	(0.3357)	(0.4360)	(1.3806)	(1.6327)
Time effect	NO	SI	NO	NO
Country effect	NO	NO	SI	NO
Effect of time and countries	NO	NO	NO	SI
R-sq	31%	81%	95%	96%
Prob>chi2	0.00	0.00	0.00	0.00
Observations (country)	378	378	378	378

Note: Results of the Commercial Agreement Panel 2001-2021.

In the last 22 years, among the countries that import the most products globally, the United States remains in the first place, making most Latin America and even the EU sell their products. Empirical implication shows that it is a great partner for the entire region, with or without an agreement since it is close to the entire region. For this reason, maintaining an agreement with the EU does not guarantee that other markets will be left.

Instead, it can be detected that this indirectly affected the United States to strengthen its business with the region.

4. Conclusion

The results show that the exporting countries that maintain agreements with the EU present slight expected valuations, thus confirming that trade agreements do not have guaranteed growth rates in sales per se. In this way, and according to the elasticities related to the GDP tariffs, it is highlighted that the export increase will depend on other qualitative or quantitative variables, including the fact that these agreements must be reviewed annually to improve them and facilitate other aspects that are not only tariff rates but also logistics, transportation, and time issues, which are the most substantial costs faced by foreign trade operators.

In this way, trading partners can be further encouraged to increase their exports, which, in many cases, are displaced by countries that do not have an agreement. For example, Brazil, without maintaining any trade agreement with the European market, has the highest sales, although it has fallen. They are caused, like all others, by external shocks and not necessarily by the tariff preferences that the Europeans have with their partners.

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