Cointegration's Relationship and Causality between Exportations and Economic Growth from Southern America's Countries and the United States

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Abstratct: The objective of this study is to comprehend the dynamic of the relationships in the long term between the economic growth, represented by Gross Domestic Product (GDP) and the exportations from the Southern America's countries and the United States. Therefore, note that both move together in a period of 51 years, just as well the existence of the causality relationship between them. For this examination, it was used Amplified Dickey Fuller's methodology and the cointegration test of Johansen (1991) to compare the relationship between the exportations and economic growth and, the causality model proposed by Granger (1969). The results allow inferring, through Johansen's test, eigenvalue's statistic and the trace of vector's existence of cointegration in the United States, Brazil, Colombia, Ecuador and Uruguay. The causality unidirectional was confirmed in Bolivia, Brazil, Chile, Ecuador and Uruguay, confirming the hypotheses GLE (export-led-growth). The main study's contribution allows inferring that the maintenance of causality relationship, contribute to an economic development, thereby, politics incentive domestic production can be progressives, because the exportations showed up the causer of economic growth. In this respect, the political conduct could highlight the importance of competitiveness from countries in the support to domestic to productivity, fiscal incentives and infrastructure, the realization of commercial deals, aiming the exporter growth. For countries which the causality wasn't identified, contributes for the clarification for other peculiarities, inherent to the individuals contexts that might contribute to economic growth.

Word keys: Gross Domestic Product. Export-led-growth. Development countries. Long-term relationship. Johansen's cointegration. Granger's causality.

1 Introduction

To achieve the economic growth, the countries pass by a complex process because there are many variables and, among these variables, there are the exportations. In the literature, there are many empirical contributions that broach economic growth and the exportations, but there are also studies that differ among each other. When investigating the interdependence relation among economic growth, exportations and foreign direct investment, [1] they concluded that the exportations act like an "effect mechanism" that promotes the economic growth affecting the foreign direct investment. In the Chilean context, [2] verified that the exportations' performance configure itself as a determinant variable to explain the economic growth in the long term and highlighted policy role and rate regime as relevant to its growth. The authors [3], [4] e [5] investigated the existence of methodologic problems in some researches carried out by other authors, what conducted to doubts in its validity.

And, in spite of exists many studies about this issue [6], [7], [1], [2] there is a lack of empiric studies that analysed specifically the case of America Latina's countries, turning the issue relevant mainly by the moment of the trade opening happened in the 1980 decade, with the Southern Common Market (MERCOSUR).

Some studies present a positive relation among the exportations and the economic [6] others, in contrast concluded the inverse, not always the exportations impact in a positive way in the economic growth [7]. This controversial arouse the interest of researchers about the issue, who were able to corroborate and verify models already existing with analyse of exportations' diversification

and its composition, and, the impact of these variables in the economic growth.

In this respect, this study is justified by applying the hypothesis GLE (export-led-growth) in comparison among different contexts that incorporate the Southern America's countries and, in an additional mode, the context of the United States, in other words, it sought to verify more information about how the hypotheses GLE happens among countries that are found in economic development stage and an already developed country. For this purpose, its central point is in the hypotheses that a strong exporter performance conducts to the increase in the growing of the Gross Domestic Product (GDP) [8]. The economic growth would be substantiated in the productivity gains, mainly by the access to more competitive markets and by the facility of scale's economies with the exportations to countries with restricted domestic markets.

The motivation of this study lies in the investigation of the causality relationship between the economic growth represented by GDP and the exportations, relevant fact in the face of the economics events, furthermore, estimating these effects could assist in the formulation of countries' economic policies. This study brings an empiric contribution when comparing the Southern America's countries: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Peru, Uruguay and the United States. The selection of the chosen countries lies in the fact of data availability by the World Bank website and, also, for presenting a comparative among developing countries' economies with a developed country, comprising a time series of economic growth and exportations in the period from 1962 to 2013.

Based on the above considerations, it is intended to answer to following research question: **What is the cointegration's relationship and causality between exportations and economic growth?** The study has as objective verify the behaviour relationship between the exportations and the economic growth (GDP) and the direction of causality of the impact of exports on economic growth. In these terms, it's intended to determinate if the economic performance can be affected by exportations, once that the definition of this relationship become a relevant way to orient a formulation of policies that aim the increase of GDP.

This study is structured in such a way that, after the introduction, it's presented the empiric theoretical framework exposing the relationship between the economic growth and the exportations. In result, the methodological procedures used in the study, followed by the data analysis and, finally, the conclusions.

2 Empirical theoretical background

2.1 The exportations as conductors of economic growth

One of the main sources of economic growth of a country is its exportations, in this way, it becomes visible, on account of, this element, integrates the GDP of a country [8]. Countries which its policies are directed to the exportations, have a better performance when compared with the countries which don't adopt them [8]. Thus, the exportations may contribute to the economic growth by transference of technologies, inducing innovations and increasing the efficiency by means of economies' scale exploration and productivity gains [9].

In relation to the scale economies' exploration, the authors [3] point out that these present themselves as favourable to addition of a policy directed to encourage the exportations, having as base the existence of increments in returns, which results in an access to international markets. The fast growing of exportation and the manufactures production can foster the economic growth [10], the product expansion tends to expand the production, for motives of scale gains and enable the exportations' sector expansion becoming it more competitive [11].

Among the several metrics to evaluate the economic development is the GDP *per capita*, represented by the relationship between the gross domestic product and the population size [12]. According to the author, if the growing rate of the GDP is higher than the growing rate of population, this indicator tends to raise. According to the incoming, this indicator, in evaluate the total product in relation to the total population, it doesn't consider the dispersion in relation the average [12]. To [13], the well-being people and the life's level are best measured by the *per capita's* household income.

When it comes to talk about economic increase, it may have several differentiated rates among countries. Some methods are proposed by researchers [14], [15], [16], [17], [18] aiming minimize this issue, however, it may conduct to different and divergent conclusions. [14] presents a classification, considering some methods: i) an individual study of countries, its social sources, its technologies, going back to the growing process, being tough generalize the results; ii) based in inputs and in the productivity as factors that contribute to the growth; iii) inclusion of explicative variables

associated to the technological progress, among others.

Based in the technological progress and its determinants, these are related with endogenous growth model, attested by authors like [15], [16], [17], [18] and others based in development's research, from authors like [19], [20]. Others authors, in complement, affirm that countries converge to a state's constant of long-term conditioned into accumulation of factors and its production [21].

Another classification among the growth's sources presented are more extensive and they are linked to factors as population, trade, financial development among others, consequently, the deepest sources may associate with religion, government efficacy, among others [14]. The long term growth is stimulated by the interaction among these factors [22]. Another growth source, considered wider, it would be the growth headed by exportations, having in sight that the effects depend on the characteristics of the countries, such as the industrialization [8].

Results more efficient are presented because they turn back their strategies of growth out, comparing them with the others that are guided in the process of importation's replacement [23]. In this regard, [21] makes a point that in the endogenous growth literature, the emphasis is in the scale's growing returns and in the production of new technologies, an important contributions in terms of incorporation of new technologies and increasing returns. In the endogenous growth model, it's found the work of [15], [19], [24].

In turn, the weak performance of an economy may be associated to its colonization's history [25], issues related to its geography [26], to the interaction level that own in the international markets [23], or still, factors related with the human funds [15], [27], among other factors. Nevertheless, these factors don't contemplate others which are related to the external restrictions on the economic growth.

2.2 Relationship between economic growth and exportations

The literature presents different theories oriented to the influence of increasing in the exportations in the economy. It postulates the Theory of Comparative Advantage, from David Ricardo (Ricardian Theory) that the nations must develop their relations with the foreign in a way to increase their output [28], [29], [30]. This Theory enhance that countries must specialize in the assets whose production occurs in a more efficient way, and trade its other assets with the other countries in the world. In that direction, he orients the specialization in assets that the country has a comparative advantage. A bigger economic growth can be caused by trade opening (e.g. MERCOSUR) and in making actions directed to their exportation, technical improvements and increase in the private investment may be generated [31].

Some theoretical lines emphasized the impact of increasing of the exportations in the economic growth. Authors like [32] list three: i) the increasing of exportations causes increase in the gross domestic product, because the first are economy's components; ii) the increasing of exportations may cause their specialization of products that will be exported, generating an increase in the productivity and allocation of resources in the sectors related to the foreign market and, consequently, propel the economy; iii) the increasing in the exportations assist in the reduction of foreign restrictions that may come to happen and that are related with the growth, it also facilitates the importation of raw material and technologies, allowing attending the domestic demand and propelling the economic growth.

In turn, the theoretical line of GLE presents a relation which the exportations conduct to the economic growth. Because of this, the efficiency in the domestic production of a country originates advantages comparatives that make the access to the foreign markets easier, in this context, it is generated gains that conduct the exportations and guide their economic growth (GLE). Giles and Williams (1999) present studies and authors who suggest that the technological gains and the accumulations of funds are induced by economic growth.

A relationship bi-causal between the economic growth and the exportations is pointed by [33] in defending that the increase in the exportations could be expanded by scale economy gains, due the production increase [32]. The increasing of the exportations and the economic growth may be generated by different process, and can, this way, not present causality relations between its components.

One of the first authors to use time series to verify the relation between the industrial development and the exportation increase was [34]. He used eight developing countries as sample, he sought to determinate the causality relationship existent between the two variables, identifying that the exportations growth and the industrial development would have in the most of the countries a bi-causal relation. [35], in using the causality methodology of [36] applied two different methodologies to verify the theory of GLE in Canada and concluded that

there was a balance in the long term to the analysed variables, and a causality relation of Granger unidirectional indicating that changes in the exportations precede changes in the economies' products.

There are four arguments mentioned by [37] that presented in favour of the exportation's expansion as being a mechanism that propels the economic growth: i) based in the Keynesian model of short term, the exportations are the main source of borders to the economic activity of a country; ii) the increase of productive efficiency is based in the relation with the international market, add the competition from exporters, expanding the business activity and consequently the company's profit, these last when they are inefficient reduce their chances of surviving; iii) the sectors' expansion aimed to the exportation benefit the scale's economies, and; iv) diffusion of technical knowledge that aim to others sectors. Furthermore, the exportations also may contribute to the economic development of a country in the best resource allocation, generating jobs, productive efficiencies and increasing fund [38], [39].

Some studies analysed empirically this relation in different contexts. The relationship between the exportations' growth and the GDP growth in India was object of study of [40]. Using monthly data from 1992 to 2011, the authors verified that this relationship is positive and it has increased in the last few years. This way, the authors concluded that the analysed causal relation is bidirectional in time's scales higher [40].

[41] performed a study of meta-analysis comparing the publications that analysed the relationship between exportation and economic growth in 68 countries and concluded that the results are more significant in China, revealing that strategies of exportation adopted contribute for its development. Using as exportation measures the total exportation, of petroleum and other types of exportations, [42] didn't find evidences of unidirectional causality between the exportations and the economic growth in the Nigeria context, the authors defend the necessity of directing policies to reinforce the economic growth based in the importation of industrialized substitutes.

In the context of Asian Tigers (Hong Kong, South Korea, Singapore and Taiwan), [43] identified that the exportations, the GDP and the exchange rate are cointegrated. However, the tests revealed bilateral causality between the exportations and the GDP of Hong Kong e Singapore and, unilateral causality between the GDP and the exportations of South Korea and Taiwan. With these results [43] enhance that the economic growth improved by exportations is unstable, having the need of revaluation of growing strategies that depend on the developed countries' exportations. Therefore, the policies of diversification of markets could be adopted.

In an investigation performed in Morocco and Tunisia, between 1962 and 2013 [44] verified in Tunisia a causal relation unidirectional between the importations and the exportations and between the exportations and the economic growth, in this case, the economic growth is influenced by its exportations. In Morocco, by the other hand, evidences displayed the economic growth coming from importations, also, the unidirectional growing of exportations conducted to the economic growth. The author enhance that the results might be linked to the stable economic development in reason of commercial policies reforms with views to the modernization of economy and world economic integration.

Challenging the common view used that the exportations conduct to the increase of GDP, [45] investigated its impact, in short and long term, in 45 countries in state of developing. In this way, in short term the exportations presented positive influence in the GDP, just as well its inverse relationship also influences. Consequently, in the long term the impact created by the exportations in the GDP indicated negative value. The authors identified that specific elements among countries (e.g. level of exportation of primary products, country's legislation and capacity of absorption of foreign knowledge) conduct to the differences in the impact of exportations and in the countries' growth. Furthermore, [45] enhance that the exportations' effect over the GDP can divert significantly over time among the countries.

Based in the analysed in literature, the relationship between the exportations and the economic growth are different among countries, some studies put in evidence countries more competitive, in other hand presented points to improve, however the investigations propose measures for improvements and contour the eventual deficiencies in the policies strategies.

To keep competitive in the world market, the countries need to adopt strategies aiming improvements in its domestic production, in this way, it's necessary incentive in the quality of its products, the increasing of production of fiscal incentives, infrastructure and other peculiarities that have the objective of increasing the competitor potential, decreasing the inefficiency [7]. With the pass of the years the countries specialize themselves

in sectors directed to exportation, increase their productivity and distribute in a more homogeneous way the resources among the sectors that there really are and the other that aren't directed to exportation [46]. The growing of exportation owns a tendency to affect in a direct form the total productivity of factors using spillovers in the rest of the economy [47]. These effects spillovers created by exportations can motivate a domestic allocation more efficient of resources. [48].

3 Methodological Aspects

The study has the objective of verifying the behaviour relationship in the long term between the exportations and the economic growth (GDP) and the direction of causality in this relationship. Verifying the causality between the exportations and the economic growth becomes essential to orient the formulation of policies that aim the increase of the gross domestic product. Given the need of correct some problems with atypical value's data, it was used the logarithmic transformation (log x) and, in these terms, reduced some asymmetries.

To achieve this objective it was used the GLE model to compare developing countries and with the economic in growing of a developed country, so, it opposed the Southern America's countries, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Peru e Uruguay, against the United States.

The information referring to GDP *per capita* and the exportations' data were accounted in an annual data base which that comprised the information related to a period of 51 years from 1962 to 2013, and, the 9 countries with available data in the World Bank website (data.worldbank.org/indicator).

To know the nature of the analysed series, it was used the Amplified Dickey-Fuller's test (ADF), according to equation 1 in level proposed by [49].

$$\boldsymbol{Y_t = pY_{t-1} + e_i} \quad (1)$$

Where, p is a real number, and it must observe the behaviour of parameter p. And if, $|p|=1$ the model is considered *random walk,* it says that it owns unitary root. But if $|p|>1$, the time series would be not stationary and, the series' variance grows exponentially as t increase. If $|p|<1$, the time series converge to the stationarity. From the equation 1, previously described, it can demonstrate the Dickey Fuller's test (DF) indicated to detect unitary root, but it is necessary a new parameterization when uses first differences, according to equation 2 and, in complement, in equation 3 is presented the ADF test.

$$\Delta Y_t = \gamma T_{t-1} + \varepsilon_t \quad (2)$$

$$\Delta Y_t = \delta + bt + \lambda Y_{t=1} + \sum_{s=1}^{p} \Delta Y_{t-s} + \varepsilon_t \quad (3)$$

Where, ΔY_t is the first the difference of the time series Y_t, and the parameter denoted by y is equal to p-1. In this way, in equation 2, is tested the hypothesis that p=1, such as equivalent to test the hypothesis, in equation 3, that y=0. The lagged value ΔY_{t-S} are included to eliminate self-correlation ε_t serial (if there is). The number's choice of the discrepancy had as base the criterions of benchmark of Akaike, Schwarz and Hannan-Quinn.

When the time series were characterized for being not stationarity, the cointegration becomes a statistical technic suitable [36]. After identify the hypothesis of not stationarity, it can be verified if it has a relation of equilibrium in long term, for that, it was used the methodology proposed by [50] and [51], according the equation 4:

$$\boldsymbol{\Delta Z_t = a_0 + \sum_{i=1}^{k-1} a_i \Delta Z_{t-1} + \pi Z_{t-k} + B' Z_t + u_t} \quad (4)$$

The study verifies the existence of causality relation between the exportations and the economic growth according presented by [52], it can be defined by variable X (exportations) causing the variable Y (economic growth), if the current and past values of variable X conduct to predict Y. The causality model proposed by [52] is esteemed in the equations 5 and 6.

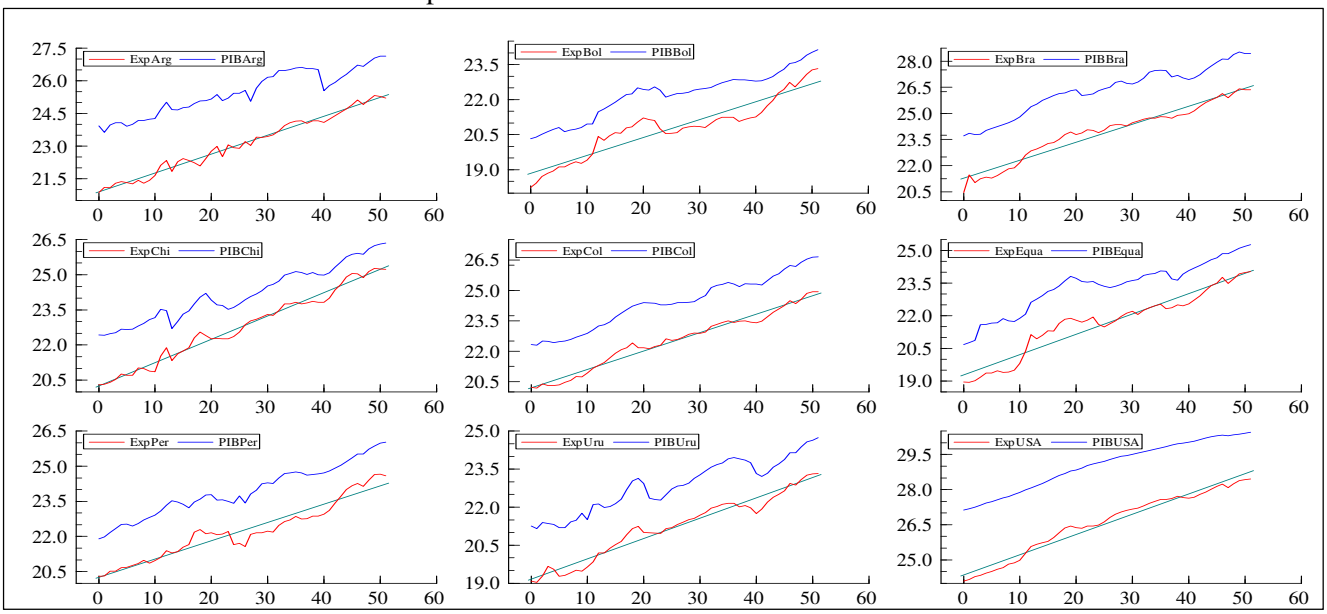
$$\boldsymbol{X_t + b_0 Y_t = \sum_{j-1}^{m} a_j X_{t-j} + \sum_{j-1}^{m} b_j Y_{t-j} + \varepsilon'_t} \quad (5)$$

$$\boldsymbol{Y_t + c_0 X_t = \sum_{j-1}^{m} c_j X_{t-j} + \sum_{j-1}^{m} d_j Y_{t-j} + \varepsilon'_t} \quad (6)$$

Where, a_j, b_j, c_j e d_j are parameters, and ε'_t e ε''_t are the mistakes. If it rejects the null hypothesis ($b_j = 0$) it can infer that the variable X causes Y, but if it is rejected the null hypothesis that $d_j = 0$, so it can infer that Y causes X. It's possible reject the null

hypothesis in the two cases, but this study proposes to analyse the hypothesis that *X* causes *Y*, that way, it will be tested the exposed in equation 3. To the analysis it was used the Eviews software version 5.

Picture 1 – Time series GDP and Exportations



Source: Study's data

The results of plotting in Picture 1 suggest a behaviour pattern among the variables, once these present linear tendency and if they presented as not stationary. Once for time series the variables need to be stationary, in other words, they don't own tendency with the pass of the years it becomes necessary to carry out the amplified Dickey-Fuller's test (ADF) to transform them in stationary.

The ADF test is indicated to verify the stationarity of the studied series. In Table 1 there are exposed the results of this test and the verifying of the unitary roots in the time series, to the GDP variables and countries' exportations.

Table 1 – ADF test for the variables GDP and exportations in level

Country	Variable	Constant	Tendency	ADF	Critical Value 5%	Classification
Argentina	Exportations	Yes	No	-0,4059	-2,9211	Not stationary
	GDP	Yes	No	-0,7215	-2,9199	Not stationary
Bolivia	Exportations	Yes	No	-0,5514	-2,9199	Not stationary
	GDP	Yes	No	-0,3005	-2,9199	Not stationary
Brazil	Exportations	Yes	No	-1,8736	-2,9199	Not stationary
	GDP	Yes	No	-1,0825	-2,9211	Not stationary
Chile	Exportations	Yes	No	-0,5094	-2,9199	Not stationary
	GDP	Yes	No	-0,0476	-2,9199	Not stationary
Colombia	Exportations	Yes	No	-0,0422	-2,9199	Not stationary
	GDP	Yes	No	-0,3730	-2,9211	Not stationary
Ecuador	Exportations	Yes	No	-0,8888	-2,9199	Not stationary
	GDP	Yes	No	-1,7538	-2,9211	Not stationary
Peru	Exportations	Yes	No	0,0958	-2,9199	Not stationary
	GDP	Yes	No	-0,3801	-2,9199	Not stationary
Uruguay	Exportations	Yes	No	-0,4045	-2,9199	Not stationary
	GDP	Yes	No	-0,7352	-2,9211	Not stationary
USA	Exportations	Yes	Yes	-1,6034	-3,5023	Not stationary
	GDP	Yes	Yes	1,4350	-3,5004	Not stationary

Source: Own elaboration based in calculations made with assist of Eviews software version 5

The proper use of the cointegration's model of Johansen requires the not stationarity. The first test made was the ADF to verify the model's stationarity of each country, from time series.

According to presented in Table 1, it's possible to verify the existence of unitary roots in the level of 5%. The variables were analysed considering only with constant, except the GDP USA (GDP United States) and ExpUSA (United States Exportations) that were analysed with constant and tendency.

When they were analysed in first difference, the variables were displayed stationary, being integrated in order I(1), this way, proceeded the analysis with the variables in level, because they fell the precondition to the cointegration test of Johansen, that one which requires not stationarity and valuates the balance relationship in the long term among the variables. Before the cointegration test is necessary to identify the number of discrepancies to be used, these are presented in table 2.

Table 2 – Test results of discrepancy's selection

Country	Discrepancy	Log likelihood	LR	Akaike	Schwarz	Hannan-Quinn
Argentina	0	-58,0300	NA	2,5012	2,5792	2,5307
	1	176,4309	439,6142	-7,1012	-6,8673	-7,0128
	2	252,4399	136,1829	-10,1016	-9,7118	-9,9543
	3	327,7232	128,6088	-13,0718	-12,526	-12,8655
	4	884,8517	**905,3338***	**-36,1188***	**-35,4171***	**-35,8536***
Bolivia	0	-62,3251	NA	2,6802	2,7581	2,7096
	1	74,1089	**255,8140***	**-2,8378***	**-2,6039***	**-2,7494***
	2	75,4691	2,4369	-2,7278	-2,3380	-2,5805
	3	77,3603	3,2308	-2,6400	-2,0942	-2,4337
	4	80,6335	5,3190	-2,6097	-1,9080	-2,3445
Brazil	0	-72,1928	NA	3,0913	3,1693	3,1208
	1	67,0523	261,0848	-2,5438	**-2,3099***	-2,4554
	2	73,2134	**11,0386***	**-2,6338***	-2,2440	**-2,4865***
	3	76,4583	5,5434	-2,6024	-2,0566	-2,3961
	4	77,6119	1,8745	-2,4838	-1,7821	-2,2186
Chile	0	-70,3050	NA	3,0127	3,0906	3,0421
	1	47,5383	220,9562	-1,7307	-1,4968	-1,6423
	2	54,8897	13,1713	-1,8704	-1,4805	-1,7230
	3	63,1425	**14,0984***	**-2,0476***	**-1,5018***	**-1,8413***
	4	64,4498	2,1243	-1,9354	-1,2337	-1,6702
Colombia	0	-49,2667	NA	2,1361	2,2140	2,1655
	1	91,6946	**264,3026***	-3,5706	**-3,3367***	**-3,4822***
	2	95,7843	7,3273	**-3,5743***	-3,1845	-3,4270
	3	97,3565	2,6858	-3,4731	-2,9274	-3,2669
	4	99,3238	**3,1968**	**-3,3884**	**-2,6867**	**-3,1233**
Ecuador	0	-52,3846	NA	2,2660	2,3439	2,2954
	1	63,3681	**217,0366***	**-2,3903***	**-2,1564***	**-2,3019***
	2	66,9344	6,3895	-2,3722	-1,9824	-2,2249
	3	67,5395	1,0336	-2,2308	-1,6850	-2,0245
	4	67,8370	0,4835	-2,0765	-1,3748	-1,8113
Peru	0	-71,7046	NA	3,0710	3,1489	3,1004
	1	53,1522	234,1065	-1,9646	**-1,7307***	**-1,8762***
	2	56,5100	6,0160	-1,9379	-1,5480	-1,7905
	3	63,0654	**11,1989***	-2,0443	-1,4986	-1,8381
	4	67,9963	8,0125	**-2,0831***	-1,3814	-1,8180
Uruguay	0	-66,3274	NA	2,8469	2,9249	2,8764
	1	53,0044	223,7473	-1,9585	**-1,7246***	-1,8701
	2	59,2659	**11,2186***	-2,0527	-1,6629	**-1,9054***
	3	63,9234	7,9564	**-2,0801***	-1,5343	-1,8738
	4	64,4637	0,8780	-1,9359	-1,2342	-1,6708
USA	0	-30,2166	NA	1,3423	1,4203	1,3718
	1	182,2071	398,2946	-7,3419	-7,1080	-7,2535
	2	192,9568	**19,2598***	**-7,6231***	**-7,2333***	**-7,4758***
	3	194,0852	1,9278	-7,5035	-6,9577	-7,2973
	4	195,6903	2,6082	-7,4037	-6,7020	-7,1385

Source: VAR model, (*) indicate the minimum values of criterions Akaike, Schwarz and Hannan-Quinn.
Source: Own elaboration based in calculations made with assist of Eviews software version 5

The Table 2 presents the discrepancies for the models for the each country by the criterions Akaike, Schwarz e Hannan-Quinn. After the discrepancies' identification suitable by the VAR model, it's made its analysis and interpretation in a way that the great number of discrepancies to be used to each country is: i) Argentina with 4 discrepancies, according all the analysed criterions; ii) Bolivia with 2 discrepancies also by all the criterions; iii) Brazil with 2 discrepancies by Schwarz's criterion; iv) Chile with 3 discrepancies for all the criterions; v) Colombia with 1 discrepancy by Schwarz and Hannan-Quinn's criterion; vi) Ecuador with 1 discrepancy by all the criterions; vii) Peru with 2 discrepancies by Schwarz and Hannan-Quinn's criterion; viii) Uruguay with 1 discrepancy by Schwarz's criterion, and; ix) USA with 2 discrepancies according all the criterions.

The cointegration's test of Johansen, presented in Table 3, can confirm or reject the hypotheses that there is a relationship of long term between the GDP and exportations from countries of Southern America and the United States. The time series are relationships of long term only verified in series that may be cointegrated. It means that they move together to the same direction with the pass of the time and that will exist a point where they meet each other.

Table 3 – Values for the trace test and the maximum eigenvalue to the many regressions of cointegration by Johansen's model

Country	Order	Eigenvalue	Trace test	Critical value 5%	Probability	Maximum eigenvalue test	Critical value 5%	Probability
Argentina	0	0,1528	7,8250	15,4947	0,4843	7,7978	14,2646	0,3996
	1	0,0005	0,0272	3,8414	0,8689	0,0272	3,8414	0,8689
Bolivia	0	0,1537	8,3248	15,4947	0,4313	8,1821	14,2646	0,3605
	1	0,0029	0,1426	3,8414	0,7056	0,1426	3,8414	0,7056
Brazil	0	0,2713	18,0780	15,4947	0,0200**	15,5106	14,2646	0,0316**
	1	0,0510	2,5673	3,8414	0,1091	2,5673	3,8414	0,1091
Chile	0	0,2002	11,4423	15,4947	0,1857	10,7235	14,2646	0,1686
	1	0,0148	0,7187	3,8414	0,3965	0,7187	3,8414	0,3965
Colombia	0	0,2817	16,2438	15,4947	0,0385**	16,2137	14,2646	0,0243**
	1	0,0006	0,0301	3,8414	0,8622	0,0301	3,8414	0,8622
Ecuador	0	0,4909	34,2250	15,4947	0,0000***	33,0865	14,264	0,0000***
	1	0,0229	1,1385	3,8414	0,2860	1,1385	3,8440	0,2860
Peru	0	0,1334	7,4225	15,4947	0,5290	7,0192	14,2646	0,4869
	1	0,0081	0,4033	3,8414	0,5254	0,4033	3,8414	0,5254
Uruguay	0	0,2752	15,9648	15,4947	0,0425**	15,7726	14,2646	0,0287**
	1	0,0039	0,1921	3,8414	0,6611	0,1921	3,8414	0,6611
USA	0	0,2865	21,6106	15,4947	0,0053*	16,2055	14,2646	0,0244**
	1	0,1064	5,4050	3,8414	0,0201**	5,4050	3,8414	0,0201**

Source: Own elaboration based in calculations made with assist of Eviews software version 5
NOTE: (*/**/***) represent a value p lower than (10%, 5%, 1%).

By means of Johansen's test, visualized in Table 3, it can infer that there is the presence of at least one cointegration vector in countries Brazil, Colombia, Ecuador, Uruguay and, in the United States, two cointegration's vectors. It can be concluded that in these countries these variables, present a balance relationship in long term.

Other study that also identified cointegration was made by [43], considering the exportations, the GDP and the exchange rate in the Asian Tigers context. The authors enhance that the economic growth feasible by exportations is unstable, and it needs the revaluation of growing strategies that depend on the exportations of developed countries. In this study, the causality test results of Engle and Granger may be visualized in Table 4.

Table 4 – Causality test results of Engle and Granger

Country	Causality	Statistic F	Probability
Argentina	GDP -> Exportations	0,4610	0,7638
	Exportations -> GDP	1,1553	0,3452
Bolivia	GDP -> Exportations	1,8413	0,1703
	Exportations -> GDP	7,5998	0,0014
Brazil	GDP -> Exportations	0,3291	0,7212
	Exportations -> GDP	4,8902	0,0119
Chile	GDP -> Exportations	2,6245	0,0629
	Exportations -> GDP	4,9786	0,0048
Colombia	GDP -> Exportations	0,0568	0,9447
	Exportations -> GDP	4,3497	0,0187
Ecuador	GDP -> Exportations	0,1010	0,9040
	Exportations -> GDP	12,4763	0,0000
Peru	GDP -> Exportations	2,5007	0,0933
	Exportations -> GDP	0,8948	0,4158
Uruguay	GDP -> Exportations	1,8484	0,1692
	Exportations -> GDP	7,7255	0,0013
USA	GDP -> Exportations	1,2509	0,3034
	Exportations -> GDP	0,9452	0,4274

Source: Own elaboration based in calculations made with assist of Eviews software version 5

According to Table 4, it can infer that the GLE hypotheses was confirmed, in level 1%, in Bolivia, Brazil, Chile, Colombia, Ecuador and Uruguay. The GLE hypotheses consists in the relationship that exportations conduct to economic growth. These results confirm that the exportations increase leads to the economic growth, corroborating with authors as [32] that enumerated that as a theoretical line.

These countries present unilateral causality between the exportations and the GDP, allowing to infer that the exportations cause the economic growth, here represented by GDP and Granger's sense. These results divert from the others found by [33] and [40] that pointed a bi-causal relationship between these variables. The study corroborates with the GLE hypothesis and diverts from the results found by the referred authors, whose found bi-causal relation, indicating that in the Southern America countries the behaviour of this variables is divergent from the same in the others countries, as in the India.

Analysing the Chile, [53] identified a tendency to the increase of exportations' specialization linked in volatility part of the growth of exportations and GDP. The period analysed by the authors, 1991-2010, supplied evidences in how the external factors, such as high commodities prices and low exchange rate of North American dollar decrease the exportations not mineral. Similar the study of [53], this study brings that its main contribution is in presenting the economic growth behaviour and the exportations in a region with big concentration of developing countries and with similar characteristics, colonization time and exported products (commodities). And, by analysing the United States with distinct characteristics from these countries.

The results found suggest that in 6 Latin American countries, represented by Bolivia, Brazil, Chile, Colombia, Ecuador e Uruguay, the exportations infer in the maintenance of causality relations and contribute for the economic growth, this way, more incentive policies aiming the production the domestic production growth and the competitivity of these countries could be developed because conduct to the countries' economic growth.

In contrast, other countries like Argentina, Peru and United States didn't present a causality relationship between the variables analysed, exportations and GDP. This result indicates that coalitions or alterations in exportations don't affect directly the GDP, furthermore it suggests that this can increase without interference or assist of exportations. The result of causality non-relationship showed similar in two countries of Latin American that are found in development stage, and with the developed country, the United States. In that way, it was verified that in these countries the GDP and the economic growth don't interfere not

even suffer interference from each other. Thus, it can have peculiarities, inherent to each context, that contribute to the economic growth. To these countries which this relationship was confirmed, actions can be developed to promote other aspects, among them, the improvement of aspects directed to the domestic market.

5 Final considerations and recommendations

In this study it was broached the cointegration and the causality between the GDP and the exportations from Southern America countries and the United States in a period of 51 years, from 1962 to 2013. It was applied the GLE hypothesis with its central point directed to the indication that a strong exporter performance conducts to the increase in the growth of gross domestic product (GDP), according to [33], [54] and [32]. To the cointegration, the Johansen's model pointed cointegration among some countries of Southern America and with the United States, so there is a balance relationship in the long term among the countries that presented cointegration's vector: Brazil, Colombia, Ecuador, Uruguay and United States.

To the causality investigation proposed by Granger, it was verified the presence of unilateral causalities between the exportations and the GDP in countries Bolivia, Brazil, Chile, Colombia, Ecuador and United States. These results confirm the GLE hypothesis, which the strong exporter performance conducts to the GDP's increase.

A peculiar result can be verified in the countries Argentina, Peru and United States, that didn't present causality relation among the investigated variables, inferring that, coalitions or alterations in the exportations don't affect directly the GDP, furthermore, it suggests that this can increase without interference or assist of exportations. In South Africa the increase of human resources and investment in technologies were taken as indicators of propelling for exportations and economic growth [55].

Similar results were localized in the Southern Africa by [55], in verifying in the period of 100 years (1911 and 2011) which the exportations didn't present predictive power over the economic growth and, that its inverse relationship also didn't indicate Granger's linear causality. The result showed up distinct when the causality test used was the premise of not linearity of [56], indicating bi-directional causality between the exportations and the economic growth with characteristics not linear.

In this context, [57] included the importations variable to the study over relationship between exportations and the economic growth, considering Granger's causality test in India. The authors verified the presence of bi-directional causality among exportations, importations and economic production, inferring that the relationship of these variables have its characteristics of complementarity, because together contributed to the India's development. As example of the study of [57] it is pointed out that the inclusion the importations variable can present indicatives that it can come to contribute to the causal relationship in other contexts.

To countries, which the causality wasn't identified, this study contributes to the clarification that there are other peculiarities, inherent to the individual context that contribute to the economic growth.

This study limits itself by analyse the Southern American countries and the United States, and it isn't possible generalize its results for other countries. In addition, it suggests itself to analyse in a separate way the characteristics for each country to verify other variables that may infer in the causality relation between economic growth and the exportations.

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