# Integration Index
# for Latin America and the Caribbean

## Intra-Regional Relations

# C   O   N   T   E   N   T   S

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*This study has been prepared in compliance with Activity I.2.2 of the Work Programme of SELA for 2016 entitled "Integration Index for Latin America and the Caribbean".*

*The document consists of an Executive Summary, an Introduction, four chapters and the Conclusions. Chapter I presents a brief review of the forms that integration can take on, conceptually and in its different stages or phases, a description of the subregional integration mechanisms which are the subjects of this study, and an excerpt of some existing indicators within and outside the region. Chapter II contains a description of what the Integration Index of Latin America and the Caribbean is, as created by SELA, its structure and the way in which the variables that form it have been categorized. Chapter III is dedicated to explaining the estimation methodology of the index, and its data processing. Chapter IV presents the main results produced by the study. And lastly, the document presents the Conclusions.*

**EXECUTIVE SUMMARY**

This document deals with the Integration Index for Latin America and the Caribbean (IINTALC) by taking into consideration a broad series of economic, social, environmental and cultural indicators. It estimates the weightings of the index by means of the main components technique and the results are presented for the different integration mechanisms of the region during 2005, 2010 and 2014. Starting from there, a cluster analysis is made, seeking common patterns that could explain or influence the integration processes. In this way, the methodology allows for identifying those countries that show greater similarities when considering a broad range of dimensions and indicators. It is important to point out that these classifications are not expected to qualify the countries in terms of their general performance, but in terms of the homogeneity shown in regard to their peers following the proposed criteria and inside the integration agreement.

An initial analysis of the IINTALC suggests that within the countries of the Pacific Alliance, Chile and Colombia are the ones that converge faster than their partners towards the goals of the mechanism. In the case of the member countries of the Common Market of the South (MERCOSUR), the 2014 results indicate that Uruguay is the country that has the IINTALC greatest mark, followed by Argentina and Brazil, leaving Venezuela and Paraguay at the rear. Regarding the Andean Community (CAN), the results obtained in the IINTALC suggest that Peru has the leading mark although it shows a small difference with respect to Colombia, and these last two countries show a high level of convergence when compared with Bolivia and Ecuador. As regards the Central American Integration System (SICA), the group formed by Nicaragua, Honduras, Guatemala y El Salvador displays less heterogeneity (especially the first two countries); the second group that consists of the Dominican Republic, Panama, Costa Rica and Belize, is more heterogeneous, and the last one stands out as the country with less similarities than the other members in 2014. Regarding CARICOM, Saint Vincent and the Grenadines are the countries that seem to converge with the fastest speed than their partners towards the goals of the mechanism.

**INTRODUCTION**

Economic integration is a process that encompasses measures aimed at reducing the several economic, social and even cultural barriers between countries. This phenomenon had a significant boom mainly from the 1980s, time in which a considerable increase is recorded in several trade agreements between developed and developing countries. This situation has fostered the interest in measuring and following up the integration processes, understood as a multidimensional phenomenon, in which other aspects in addition to the economic one, have equal relevance and must be considered as part of the process and its measurement.

The integration mechanisms allow that the countries progressively broaden their field of action in search for lower costs, greater performance and new markets, which promotes the insertion into international markets and fosters the creation of common spaces that facilitate the free mobility of the production factors. This document proposes the formulation of an index that evaluates the progress of the different integration mechanisms in Latin America and the Caribbean. Specifically, the tool presented here, is a weighted indicator used to measure the degree of integration in: the Common Market of the South (MERCOSUR), the Central American Integration System (SICA), the Pacific Alliance (AP), the Caribbean Community (CARICOM) and the Andean Community (CAN).

Due to the multidimensional nature of integration, the IINTALC proposes to quantify the degree of proximity between the countries of a certain mechanism through economic, social, demographic, political and environmental variables, in order to demonstrate the degree of convergence. In this sense, the index offers an extended outlook of the current situation of each country in regard to their pairs by identifying the more relevant strengths and weaknesses, which would contribute with the design of assertive public policies. On the other hand, the IINTALC allows for estimating the future impact of said policies from the current evaluation, with which it becomes a long range instrument for development, integration and growth.

Because it is an added indicator, econometric techniques are used for the calculation of the weightings of each variable considered in the analysis, specifically the Multivariate Analysis of main components is used, as well as various options for data processing aimed at minimizing the errors brought by information gathering and data handling from the primary source that somehow might generate distortions in the indicator.

The document was written and thought to give a summarized and simple vision to the reader of the way to formulate the index and its main conclusions, so it accounts for how the results are obtained and opens a way towards possible new incorporations and poses the next steps to follow for future updating. The document is divided into: Chapter I, which presents a brief review of the forms that integration can take on, conceptually and in its different stages or phases, a description of the sub regional integration mechanisms, subjects of this study, and an excerpt of some existing indicators within and outside the region. Chapter II, which contains a description of what the Integration Index of Latin America and the Caribbean is, as created by SELA, its structure and the way in which the variables that formed it have been categorized. Chapter III is dedicated to explaining the estimation methodology of the index, and its data processing. Chapter IV presents the main results obtained from the study. And lastly, the document presents the Conclusions.

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**CHAPTER I. Integration as a process and as a situation**

The integration of several countries is a complex process that carries not only economic, but also political, legal and social consequences.

According to Balassa (1961), the word "integration" in its everyday use refers to the union of parts within a whole. However, the term "economic integration" does not have a precise and universally accepted meaning, because the reasoning about the elements that set out a true economic integration varies very much. Therefore, economic integration should be understood as a process that includes the different forms of international cooperation and social integration, whereas for others, the pure existence of trade relations between two countries is a synonym of integration.

The definition of economic integration of Balassa (1961) is understood as a process and as a situation. As a process, when considering the dynamism in decision-making aimed at the abolition of any sign of discrimination between economic units pertaining to different countries; and as a situation, when evaluating at any given time the absence of a form of discrimination between national economies. In this way, it is implied that a greater fluidity of the institutional, entrepreneurial and state relations between one or more countries is the natural counterpart of all integration process (Urrutia, 2011); whose success additionally depends on the political, economic and social will of the countries.

Perhaps a more standard definition corresponds to those that interpret economic integration as a process through which a group of countries eliminate certain economic barriers between them, where the different types of economic borders that separate markets, as well as the commitments made by the participating countries, lead to different forms or phases of integration (Maesso, 2011). In any case, integration is considered as a useful mechanism facing new conditions of international competitiveness. It is conceived as an instrument for the promotion of international trade and to confront the challenges of economic and financial globalization. Integration has been adapted to the dominant economic logic, whose pillars are external opening and insertion into global markets (Briceño, 2011). This document will assess the forms of economic integration, according to the adopted schemes between more than two countries or between groups, and will review the degrees reached, in accordance with each goal or aim originally proposed in their creation.

**1.    Stages of integration**

Thus, according to the goals of each integration mechanism, integration between two or more countries can be described in accordance with the following phases or stages:

▪    **Free Trade Area**

This phase refers to the free circulation of merchandise between the countries that form it. This mobility is carried out through the elimination of tariff and non-tariff barriers in trade, for exports and imports of the products coming from economies belonging to the free trade area. It should be noted that each one of the member countries maintains its own tariff policy for the countries that are not part of the free trade area.

▪       **Customs Union**

In this phase of economic integration, the member countries continue with the adoption of a common external tariff, which translates into the establishment of common external barriers vis-à-vis the rest of the world. This phenomenon brings along the need for coordination of trade policy of the Member States of the Customs Union.

▪       **Common Market**

When the customs union eliminate barriers, not only for the movements of merchandise but also production factors, it becomes a common market characterized by the free circulation of merchandise, services, capital and people. Therefore, in this stage of the process of integration there should not be any type of restriction or barrier at the entry or exit of the production factors in any of the States that form the common market.

▪       **Economic Union**

Once that the countries allow the free mobility of the production factors between them, that is that they form a common market, the next step in the process of integration is the coordination and harmonization of the policies of the member countries aiming at favouring regional development and reducing internal asymmetries.

▪       **Economic Integration**

This is the last phase of the process of integration; it supposes compliance with each one of the previous phases joined with the existence of a unique supranational authority that coordinates each one of the Member States.

It should be noted that the decision of a country to join an integrating process resides in the comparative advantages that this country gains, obtaining a higher level of well-being, speeding up the processes of negotiation between the countries, improving the processes of industrialization and direct foreign investment among others. Although these are the economic reasons of integration, there are other consequences in the processes of integration, which can have a social, political or simply strategic nature.

**2.      Subregional Integration Mechanisms**

In Latin America and the Caribbean there are five integration mechanisms that according to their constitutive treaties have as a goal to move forward through the various phases of integration, although with different emphasis as regards the priorities or features that such process should assume.

Pacific Alliance (PA): This mechanism is formed by four (4) countries, namely Chile, Colombia, Mexico and Peru. It is the most recent subregional integration project in Latin America. This initiative has as a background the free trade agreements of the member countries and its goal is to deepen integration in this trade block by means of an opening-up vision of their economies through the liberalization of the flows of trade, goods and investments. Therefore, the search for an area of deep integration implies to create an area of free circulation of goods, services, capital, and people, and improve the insertion into global markets.

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Caribbean Community (CARICOM): In accordance with the Chaguaramas Treaty, the member countries of CARICOM agreed on the promotion of a "functional integration" that implied policy harmonization in key sectors such as transport, communications, health, education, agriculture among other aspects related with the creation of a common market. This integration mechanism is the one that gathers the largest number of countries, 15 in total: Antigua and Barbuda, Belize, Bahamas, Barbados, Dominica, Grenada, Guyana, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Montserrat and Trinidad and Tobago.

Andean Community (CAN): The principles of the Cartagena Agreement include the mandate for the creation of a customs union and a common capital and labour market. For this purpose, the member countries of this mechanism have as a common goal the harmonization of economic and social policies, channelling internal and external resources of the subregion to promote investment financing, attaining the free circulation of the human factor, the development of programmes of cooperation in science and technology and the acknowledgement of the higher education degrees. On the other hand, the decision on the liberalization of financial services will be discussed in 2017. CAN is formed by Bolivia, Ecuador, Colombia and Peru; these last two are members at the same time of the Pacific Alliance.

Common Market of the South (MERCOSUR): This integration mechanism is formed by five (5) countries, namely Argentina, Brazil, Paraguay, Uruguay and Venezuela. The Asunción Treaty of 1991 envisages the following objective: "the free circulation of goods, services and production factors between countries". Nevertheless, the protocols have not entered into force. Even so, efforts have been made towards the harmonization of social, labour and migratory policies aimed at allowing for the free mobility of jobs, residency, right to work and equal treatment. In addition, the common external tariff is in force between the member countries of MERCOSUR with the exception of Venezuela.

Central American Integration System (SICA): The Central American Common Market (CACM) was established with the signing of the General Treaty of Central American Economic Integration (TGIECA). In this market, the aim is to enhance a free trade zone among the signatory countries, which is intended to adopt a common tariff. As regards the efforts to facilitate trade in goods, impressive progress has been made with the adoption of the common external tariff, whereas for the free circulation of the workforce and taking advantage of human resources for development programmes have been promoted for cooperation in science and technology, as well as programmes for the acknowledgement of higher education degrees. The countries that make up this mechanism are: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama and the Dominican Republic.

## 3.    Background

Although progress has been made the different regional integration mechanisms, it is important to have tools that would allow for clearly quantifying the current status of the integration processes. Therefore, there are several proposals that look for adding different types of indicators statistically, in spite of using different methodologies, study period and number of countries (Maesso, 2011). Within this context, we have identified the Migrant Integration Policy Index (MIPEX), the European Union Economic Integration Index and the KOF Globalization Index.

The Migrant Integration Policy Index (MIPEX) consists of 167 policy indicators through which there are estimated the level of integration of the immigrants and their opportunities for participation in society. This tool has three editions, the first one was presented in 2004, and its main goal was to

close the gap of information on policies of migration, inclusion and civil citizenship for 15 countries in Europe.

The second edition of the MIPEX was made in 2007 in which, through six dimensions, there are assessed the policies of immigrants for their access to full citizenship, access to labour market, long-term residency, political participation, and discrimination. In addition, this edition of the indicator had the participation of 25 organizations, like universities, research institutes, foundations and nongovernmental organizations. In 2011, the third edition of the MIPEX emerged; it includes 31 countries and manages to assess 148 integration policies classified in 7 dimensions: mobility of the labour market, family reunion, education, political participation, long-term residency, access to nationality and anti-discrimination.

Later on, the last measurement of the MIPEX, made in 2014, has an additional dimension linked to health. In this way, the indicator is made up by 8 dimensions and 167 policy indicators that allow for a multidimensional vision of the opportunities of the immigrants in the countries assessed, facilitating the process of policy assessment and identification of best practices in this area.

On their part, the countries of the European Union (EU) have an indicator that assesses the economic relations of the member countries: the European Union Economic Integration Index, developed by König and Ohr (2012). It should be noted that the main objective of the European Union is to foster the economic links and promote the social and territorial development of their member countries. However, there exists a meaningful heterogeneity in the economic structures and performance of the countries, and because of this a composed indicator was developed to measure the degree of economic integration of the member countries of the EU, additionally, the tool analyses the existing time lag in the process of integration.

The EU index consists of 25 indicators, grouped in four (4) dimensions: First, the EU single market, which assesses intra-regional trade, movement of capital and workforce. Second, EU homogeneity, which deals with the level of convergence of the countries through indicators like per capita GDP, labour costs, long-term interest rates, public debt, consumption tax and capital tax. Third, the EU symmetry dimension, which gathers figures from the main macroeconomic variables, such as GDP growth rate, inflation and unemployment. Fourth, a dimension called EU agreements, which assesses the EU rule of law and the institutional participation.

Finally, a third index that quantifies, to a certain extent, integration processes is the KOF Globalization Index, which makes an assessment of the proximity between regions, countries and individuals localized in different continents. This index consists of three dimensions: economic globalization, political globalization and social globalization. The first one, just like the EU integration index, assesses trade in goods, services and capital, highlighting the existence of trade barriers and restrictions to foreign capital. The political dimension analyses the degree of cooperation between countries and the participation in international organizations and treaties, as well as the democratization and the respect from governments for the dissemination of ideas. The social dimension includes indicators linked with the freedom of information, quality of life of inhabitants and cultural proximity. The data is available for 207 countries and covers the period 1970-2013.

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**CHAPTER II.    Integration Index for Latin America and the Caribbean (IINTALC)**

The Integration Index of Latin America and the Caribbean (IINTALC) is a multidimensional indicator to assess the progress made by each country in its respective regional integration mechanism. The tool has five dimensions: economic, political, social, cultural and environmental, in this way aspects linked with the economic performance are addressed such as intra mechanism trade, trade opening, but also there are assessed aspects related with the institutional dynamics, environmental sustainability, poverty, access to basic services and life conditions.

The IINTALC thus becomes a pioneering tool for the region, which quantifies the progress of the integration processes according to their constitutive goals, facilitating in this way the identification of opportunities and time lags in the dynamics of the countries, aimed at the optimization of decision-making processes to promote the full integration of the nations.

**1.      Structure of the IINTALC**

        Chart 1 shows the five global dimensions with which the Index was organized during its formulation.

**CHART 1**
**Structure of the IINTALC**
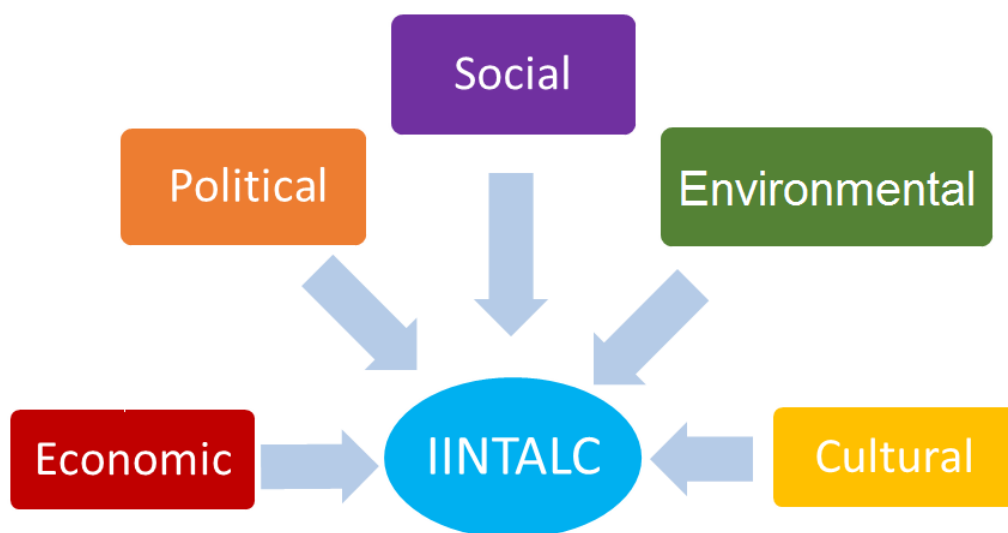


*Source: Prepared by the authors.*

**Economic Dimension:** Just as other indicators that quantify the degree of connection and homogeneity between countries, the IINTALC quantifies the degree of convergence of the members of an integration mechanism. Thus, variables such as intra mechanism trade, trade opening, trade concentration (Herfindahl Index), and economic complexity will allow for inferring the degree of trade complementarity of the countries. In addition, the analysis of the evolution of the main macroeconomic variables like inflation, public debt, public expenditure, allows knowing how the macroeconomic environment influences the processes of convergence at the inside of the integration mechanism.

**Political Dimension:** Along with the economic variables, it is necessary to assess the institutional quality of the countries. It should be noted that homogeneous and sound policies facilitate, to a certain extent, the decision-making processes and speed up the implementation of policies that would favour and put energy into the economic and social relations between countries. The political dimension is constituted by indicators that measure the control of corruption, government effectiveness, political stability, regulatory quality, rule of law and accountability.

The inherent complexity of regional integration is increased due to the problems presented by the international economic political situation. On the other hand, there are differences in regard to the role that each country defines for the integration policy, because this depends on the conceptions, goals and modes of carrying out the integration processes. Within this framework, the political and economic dimensions are mutually influenced. Trade policy should not only result compatible with the demands of the economic theory and praxis, but it will have to adapt itself to different political criteria.

**Social Dimension:** One of the common and essential goals of the integration mechanisms in Latin America is to promote the free circulation of people between countries. But this should be done considering several aspects related with health, education and income. Therefore, the IINTALC considers the assessment of variables such as: life expectancy at birth, public expenditure in health and education, poverty, destitution, unemployment, per capita GDP, and neonatal mortality, among others.

**Environmental Dimension:** It is acknowledged the need for addressing the economic development from a sustainable standpoint. So the environmental dimension is positioned in the same "value" plane as the economic and social topics. This aimed at considering the design and implementation of public policies and, in particular, sectorial policies that would promote the development of "green" economies. Therefore, it is necessary a greater and more effective inter institutional collaboration, the intensification of job networks and the strengthening of synergies between the member countries of the integration mechanisms. The indicators addressed in this dimension are: intensity in fertilizer use, emissions of carbon dioxide, GDP energy intensity and consumption of ozone-depleting substances.

**Cultural Dimension:** Although each one of the Latin American and Caribbean countries has its own cultural taxonomy, there are points of coincidence. The consideration of these aspects can facilitate the insertion of the human factor and the creation of new markets, promoting in this way the integration process of the nations. Therefore, the cultural dimension includes indicators linked with the access to information technology, the dynamics of the tourism sector and trade in intra-mechanism cultural goods.

## 2.     Categorization of information

To calculate the Integration Index for the mechanisms of Latin America and the Caribbean, it was necessary to use a large number of variables and indicators. First of all, it was decided to categorize the data in five dimensions: economic, social, political, cultural and environmental. Each one of these dimensions, considered for all the countries, consists of a set of variables and indicators that encompasses the period 1990-2014.

Table I presents a brief description of the indicators that are grouped in each one of the dimensions used.

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**Table 1**
**Description of the indicators[1]**

| Dimension | Indicator | Description |
|---|---|---|
| Policy | Control of Corruption | Index on the perception in which public power is exerted for private benefit. |
| | Government Effectiveness | Index on the perception of the quality of public services, administration, degree of independence from political pressure, quality of policy formulation and application, and the credibility of the government's commitment to those policies. |
| | Political Stability | Index on the perception of the probability of political instability and/or violence. |
| | Regulatory Quality | Index on the perception of the government capacity to formulate and apply correct policies and regulations that would allow and promote the development of the private sector. |
| | Rule of Law | Index on the perception in which the agents trust when complying with the rules of society, the quality of execution of contracts, property rights, the police and the courts. |
| | Accountability | Index on the perception in which citizens can participate in the governmental elections, as well as the freedom of expression, freedom of association and free mass media. |
| Environmental | Intensity in fertilizer use | Percentage of tons per 1,000 hectares of cultivatable land. |
| | CO2 Emissions | Tons of CO2 |
| | GDP energy intensity | Total energy consumption in thousands of oil equivalent barrels per GDP $ million (constant prices in 2010). |
| | Consumption of ozone-depleting substances | Tons of ozone-depleting potential (ODP). |
| Cultural | Internet Users | Rate per 100 inhabitants. |
| | Mobile Phone Users | Rate per 100 inhabitants. |
| | Computer Users | Rate per 100 inhabitants. |
| | Tourism | International tourism received as a percentage of total exports. |
| | Exports of intra mechanism cultural goods | Exports of cultural goods of each country as a percentage of the total exports of these goods made by each mechanism. |
| | Imports of intra mechanism cultural goods | Imports of cultural goods of each country as a percentage of total imports of these goods made by each mechanism. |
| Social | Life expectancy at birth | Years. |
| | Public expenditure in health | Public expenditure in health as a GDP percentage. |
| | Neonatal mortality | Neonatal mortality rate per 1000 per live births. |
| | Public expenditure in education | Public expenditure in education as a percentage of Gross Domestic Product. |
| | Poverty | |
| | Destitution | |
| | Improving water services | Improved water supply as a percentage of population with access to safe water. |
| | Teenage fertility | Live births per 1000 women 15 to 19 years of age. |
| | Unemployment | Unemployment rate. |
| | Employment in agriculture | Workers employed in the agricultural sector as a percentage of total employment. |
| | Employment in industry | Workers employed in the industrial sector as a percentage of total employment. |
| | Employment in services | Workers employed in the service sector as a percentage of total employment. |
| | GDP per capita | GDP per capita at current prices |
| Economic | Intra mechanism exports | Exports of intra mechanism goods and services of each country as a percentage of total exports. |
| | Intra mechanism imports | Imports of intra mechanism goods and services of each country as a percentage of total imports. |
| | Trade opening | Exports plus imports as a share of the Gross Domestic Product. |
| | Net terms of trade | Index of net terms of trade (2000 = 100). |
| | HH concentration index | Market concentration index of Herfindahl and Hirschman. |
| | Cross-border trade | Time and costs associated with the process of merchandise exports and imports. |
| | Total public debt | Total public debt as a share of the Gross Domestic Product. |
| | Inflation | Annual variation of the consumer price index. |
| | Gross capital formation | Gross capital formation as a percentage of the Gross Domestic Product. |
| | Economic Complexity Index | Index that classifies exports according to their level of complexity and diversity. |
| | Total Public Expenditure | Total public expenditure as a share of the Gross Domestic Product. |

*Source: Prepared by the authors.*

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[1] For more details about the sources consulted, see Annex 1.

The study considered a total of 5 dimensions and 40 indicators. The statistical information used comes from international organizations with a wide experience in data processing and gathering: the World Bank, the Inter-American Development Bank, the International Monetary Fund, and the Economic Commission for Latin America and the Caribbean (ECLAC). Although these sources have the indicators required by the index, there were certain limitations due to the fact that some variables are not available for all the countries of the study and/or the time range considered. The opportunity of choosing the indicators that adjust with greater precision to the research work is rather low, working with little information and a reduced range of indicators becomes a major limitation to do the job.

## CHAPTER III. MEASURING THE IINTALC

### 1.     Dealing with missing data

There is a wide range of literature on the treatment of samples when the variables are not completely visible, Kohn and Ansley (1986) explain how to estimate, foresee and interpolate missing data from uni-variable models. Anderson and Moore (1979), and De Jong (1989) use algorithms of *smoothing* for the process of interpolation values that are obtained by filtering.

In the statistics data base considered in this document, there are series with missing information for certain years, and it was therefore decided, for maximum use of the missing information, to proceed with interpolating the years with information gaps. It was by the use of the econometric technique, known as status space, using an interpolation algorithm known as fixed interval *smoothing*, that completion of all the information for the data base was accomplished.

This document pays special attention to the use of these algorithms to interpolate missing data inside the sample, in the cases where it is reduced, and can therefore be calculated based on the information provided by the rest of the data, in such cases, the predictor in finite sample is defined by a projection originated inside the set of variables observed.

In a structural equation system where we assume that the variables observed it is not the ☒ components of the vector ☒ but only the ☒ components of the vector ☒ so that:

$$\boxed{\times}$$

Where ☒ represents that proportion observed.

The objective is to calculate that proportion of information that is not observed and obtain a model from the data that is observed.

Some possibilities that arise are:

1.  When ☒ the ☒ observations are absent for the period of time ☒
2.  When ☒ the latter ☒ components of the vector ☒ are not observable.
3.  When ☒ is given by the expression:

 where  is a vector line of  ones.

Means that the sum of the first  components of the vector  and the remaining  components are observed.

The resolution of this system is carried out by the methodology of State Space with methods of numeric optimization and with the use of the verisimilitude function. For a technical briefing, see Annex 17.

## 2. Methodology

### a. Standardization

The first step towards the construction of the index is to standardize the information in such a way so as to work them in bloc, and avoid the different measuring units in which the data is originally received. One of the forms of normalization, commonly known as series standardization, which allows data structuring in a precise manner in order to represent the relations between the observations inside a given variable, thus transforming the data to a common level. In this case, it is assumed that the data is distributed as a normal with a zero media and variance equals to the unit ($DX \sim N(\mu; \sigma)$).[2]

This standardization process, obtained by all the indicators in each integration mechanism, was carried out by the following transformation:

$$Z_{i,t} = \frac{X_{i,t} - \mu_{J,T}}{\sigma_{J,T}}$$

Where X represents the values of each indicator of the country in the year t, $\mu$ and $\sigma$ are the media and standard deviation, respectively, from the series for each indicator corresponding to the member countries of each integration mechanism J in the period T, spanning the sample 1990-2014.

### b. Ponderation

IINTALC being an aggregate index, it is necessary to take into consideration that, in the analysis, different types of variables are included, with differences in their importance within the sector to which they belong and also the notable differences between the countries of the region. Thus the procedure for aggregation should be carefully considered and agreed upon, especially with regard to the ponderations of each variable in its corresponding dimension. Sometimes the selection of these ponderations occurs by incorporating the judgment of the researcher who somehow has experience in this type of analysis; however, the use of this approach itself runs the risk of falling into subjectivities and therefore in simplifications that result in contradictions from the point of view of the theory and/or inappropriate results on the underlying empirical behaviour of the data, thus diverting the understanding of what really happened.

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[2] It is worth mentioning that various forms of standardization of the series were tested and reasonable results were not obtained for the index.

In order to add, in an optimum way, the variables comprising IINTALC, these were statistically pondered according to their relevance in each dimension, so that the ponderations collect both their own characteristics of the data as well as the underlying theoretical framework. The end result is that the ponderations reflect the relative importance for integration of the indicators and dimensions into each mechanism (OECD and JRC, 2008).

The statistical method used to obtain the ponderations was Multivariate Analysis using the Principal Component Analysis technique (PCA). This technique was initially developed by Karl Pearson in the late XIX century and was later strengthened by the statistician Harold Hotelling in 1933; indicating that, to study the relationships that occur between $p$ correlated variables (containing common information) the original set of variables can be transformed into another set of new variables not correlated with each other (thereby lowering or eliminating repetition or redundancy of information) called principal components set.

### c.      Main Components

From $n$ observations of $p$ variables, the objective of the analysis of main components is to verify if it is possible to adequately represent this information with a lower number of variables, built as lineal combinations from the originals. This is the mathematic technique that does not require the assumption of multivariate normality of the data, although, if the latter is carried out, a more profound interpretation can be given to said components. Its utility is double: 1) It allows for optimum representation in a small space, observations of a general space with $p$-dimensions. In this sense, the analysis of main components is the first step to identifying the possible latent or unobserved variables that generate the data; and 2) It allows for transformation of the original variables, which are generally correlated, into new non-correlated variables, facilitating interpretation of the data.

In academic literature, the analysis of main components is used in different ways in the development of composed indicators. Some studies such as Lockwood (2001), Gwartney and Lawson (2001) and Dreher (2006) use PCA to obtain the weights of the first component, independently of the general aptness of the data set, from the size of their own values and from the weight of the factors of the remaining components (König y Ohr, 2012).

In contrary, this study uses the PCA in like manner as that carried out by König and Ohr (2012), Noorbakhsh (1998) and Nicoletti et al. (000), where information provided by the data is considered both before and after applying PCA. In this approach, the correlation structure of the data set is considered in order to assess the suitability of the indicators used in the PCA. The components obtained are analysed in order to derive the optimum size of the components retained and; finally, the rotation of the weights of the factors were analysed in order to assign adequate ponderations to each one of the indicators. In the same way as König and Ohr (2012), the oblique rotation used enables the correlations among the factors to take into account the nature of the variables in a more realistic manner.

### d.    Statistical tests

The following table shows the results by Coefficient Alpha mechanism, initially developed by Cronback (1951), to estimate the reliability of the measuring instruments through internal consistency analysis of the compound punctuations; the Bartlett sphericity test which is used to test whether $k$ samples come from populations with the same variance, to the same variances through the samples called homoscedasticity or homogeneity of variances; and the adequacy sample from Kaiser-Mayer-Olkin (KMO). All these tests support global aptness from the data set for each integration mechanism.

**TABLE 2**
**Statistical test of data aptness**

| INTEGRATION MECANISMS | KAISER-MAYER-OLKIN'S (KMO) | COEFFICIENT ALPHA (CRONBACH, 1951) | ESPHERICITY TEST BY BARTLETT | |
|---|---|---|---|---|
| | | | CHI2 | P-VALUE |
| AP | 0.8011 | 0.9341 | 9038.388 | 0.000 |
| MERCOSUR | 0.7594 | 0.8944 | 10505.108 | 0.000 |
| SICA | 0.7519 | 0.9248 | 12896.787 | 0.000 |
| CAN | 0.7327 | 0.8898 | 8010.307 | 0.000 |
| CARICOM | 0.6292 | 0.7878 | 6065.601 | 0.000 |

*Source: Prepared by the authors.*

*Notes: a KMO index greater than 0.7 is indicative of high inter-correlation; therefore, the PCA is justified, if the KMO is between 0.5 and 0.6 there is an average inter-correlation. In the Bartlett H0 Sphericity test: the variables are not inter-correlated. Cronbach's Alpha is not a statistic to use, given that it is not accompanied by any p-value that allows rejection of the hypothesis of reliability on the scale. However, the more it approaches its maximum value (1), the greater the reliability of the scale.*

In order to determine the appropriate number of components for the construction of IINTALC, the *"screen-test"* graphical test proposed by Cattell (1966) was used, supported by the accumulated variance percentage explained by these components for each mechanism. Both tests can be seen in Annexes 2 to 11. The test suggests consideration of three (3) components for the construction of IINTALC in AP and MERCOSUR, with 68.1% and 62.6% of accumulative variance respectively; two (2) components SICA (44.9% accumulative variance) and CAN (49.8% accumulated variance) and; four (4) components in CARICOM with 53.4% accumulative variance. Also, the test indicates that from the number of components mentioned above for each mechanism the components may present random correlation condition; therefore, they should not be considered.[3]

According to Noorbakhsh (1998) and Nicoletti et al. (2000), the components extracted in each mechanism were rotated for the purpose of revealing a simple structure in the weights of the factors. This can be seen in annexes 12 to 13, where those factors with greater weight are highlighted; these, in turn, are squared and are multiplied by the ratio of the explained variance corresponding to its component in order to find the ponderations of the indicators.

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[3] Kaiser-Guttman´s criteria reveals that results exceeding 6 components are impractical and statistically less efficient.

In this study, the orthogonal rotation is used. Therefore, each component explains an independent dimension (non-correlated) of the total variance. However, IINTALC does not present dimensions that are considered independently one from the other. The dimensions obtained in this study have an effect on the performance of the others. Finally, IINTALC and its dimensions indicate the speed rate of convergence of each country in relation to the other members of the integration mechanism.

## CHAPTER IV. RESULTS

This chapter presents the general results of INTALC and its dimensions for each integration mechanism during 2005, 2010 and 2014. These years provide a time range so as to observe the possible existence of significant changes in the evolution of the index. Additionally, and for the purpose of complementing the results, a *cluster* analysis was carried out with the same set of indicators.

In principle, the most homogeneous countries are more likely to implement similar integration methods based on common preferences (König and Ohr, 2012). Therefore, identification of the groups of homogenous countries can increase the possibility of their committal, in a flexible manner, to the integration process of the agreement to which they belong. To identify the group of homogenous countries, in each mechanism, an analysis of the hierarchical *cluster* was carried out (through Ward grouping) using the same set of indicators that was used to calculate the IINTALC.

The cluster analysis allows for identifying those countries that are most closely interlinked. To this end, squared Euclidian distances were used to group the Member States. The results of this analysis are provided in the dendrograms for the years 2010 and 2014.

▪ **Pacific Alliance (PA)**

Table 3 shows the results of IINTALC for the member countries of the Pacific Alliance. Chile is in the lead with a rating of 71.86 followed by Colombia (64.95), Peru and Mexico with 60.37 and 57.77 points, respectively. The results of IINTALC for 2005 and 2010 reflect that Chile has been the country that has recorded the highest ratings of the indicator. However, Colombia and Peru showed the most notable progress recording variations of 20.5% and 18.0% respectively during the period considered.

The methodology of the main components used for the calculation of the ponderations of the indicators used in building IINTALC showed that the social and economic dimensions are the most relevant for the Pacific Alliance, representing 29% and 28%, respectively, (See Annex 12).

The results by country show a heterogeneous panorama, Chile being the country that obtained the highest ratings in the social and political dimension, thus favouring its performance in the final indicator, whereas Colombia exhibited the best ratings in three dimensions: economic, environmental and cultural positioning itself in second place within the group of countries. Meanwhile, Mexico obtained the lowest values of the mechanism, specifically in the dimensions: environmental and economic.

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**TABLE 3**
**Results from IINTALC in the PA**

| COUNTRY | YEARS | DIMENSIONS | | | | | IINTALC | ABSOLUTE VAR. | RELATIVE VAR. |
| | | POLITICAL | ENVIRONMENTAL | CULTURAL | SOCIAL | ECONOMIC | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **2005** | 55.86 | 49.65 | 50.80 | 54.75 | 51.22 | 62.28 | | |
| **CHILE** | **2010** | 55.75 | 50.57 | 52.12 | 56.92 | 52.13 | 67.49 | 5.21 | 8.4% |
| | **2014** | 55.68 | 51.99 | 53.11 | 58.81 | 52.27 | 71.86 | 4.37 | 6.5% |
| | **2005** | 47.32 | 52.11 | 48.78 | 49.60 | 52.38 | 50.19 | | |
| **COLOMBIA** | **2010** | 48.09 | 53.58 | 52.33 | 52.49 | 54.00 | 60.50 | 10.31 | 20.5% |
| | **2014** | 48.65 | 53.04 | 54.42 | 54.52 | 54.32 | 64.95 | 4.45 | 7.4% |
| | **2005** | 49.16 | 47.59 | 52.78 | 52.31 | 48.03 | 49.87 | | |
| **MEXICO** | **2010** | 48.81 | 48.37 | 52.76 | 54.37 | 49.71 | 54.01 | 4.14 | 8.3% |
| | **2014** | 48.66 | 49.02 | 53.62 | 55.60 | 50.87 | 57.77 | 3.76 | 7.0% |
| | **2005** | 47.58 | 52.22 | 48.66 | 47.42 | 51.09 | 46.98 | | |
| **PERU** | **2010** | 48.69 | 52.29 | 51.93 | 51.17 | 51.34 | 55.42 | 8.44 | 18.0% |
| | **2014** | 48.75 | 52.65 | 53.11 | 53.43 | 52.43 | 60.37 | 4.95 | 8.9% |

*Source: Prepared by the authors.*
*Note: Both the absolute and relative variations refer to the change between the years selected for the general index (IINTALC).*

The results of IINTALC for the countries of the Pacific Alliance prove the level of convergence of the mechanism. In this regard, Chile and Columbia are the countries that are converging faster towards the objectives of the mechanism with regard to their partners. In the case of the Pacific Alliance, these objectives are aimed at a profound integration that contemplates the creation of an area of free circulation of goods, services, capital, individuals and to facilitate the insertion of the countries into world markets.

**CHART 2**
**Dendrograms for PA, 2010-2014**
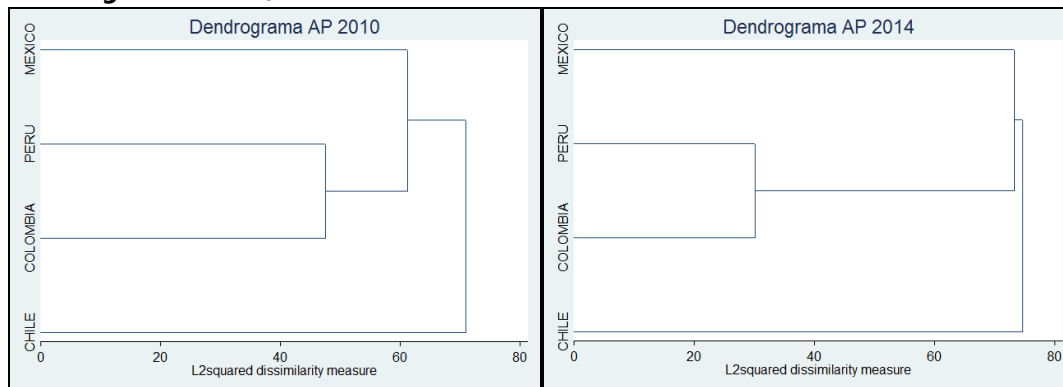


*Source: Prepared by the author.*

Chart 2 shows how the existing heterogeneity among the countries of the bloc, identifying a homogeneous group comprising Columbia and Peru which, by 2014, reduced their structural gap, facilitating their integration. While Mexico and Chile are the countries showing greater differences with regard to the other members accruing in 2014. However, Mexico and Chile are tending to reduce the heterogeneity between them.

▪ **Common Market of the South (MERCOSUR)**

In the case of the member countries of MERCOSUR, the results from 2014 show that Uruguay is the country with the highest value of IINTALC, followed by Argentina, Brazil, Venezuela and Paraguay. The evolution of the indicator for 2005 and 2010 indicates that Venezuela, despite having the lowest rating of the bloc in 2005 and 2010, is the country undergoing the greatest

variations on the indicator. It is noteworthy that it was in 2012 when Venezuela became a full member of the mechanism.

The dimensions with greatest relevance for MERCOSUR, according to the methodology used in building IINTALC, are economic and social with ponderations of 28% and 25% respectively. (See annex 13). The political dimension has a weight of 18%, in which 16% is cultural and 12% is environmental. This ponderative structure enabled Uruguay to obtain the highest final rating, registering favourable ratings in the political, environmental, social and economic dimensions while, with regard to the cultural dimension, it ranks in fourth position.

Meanwhile, Argentina is the country showing the highest rating in the economic dimension in 2014, followed by Uruguay and Brazil. In the social area, the rating is led by Venezuela, Uruguay and Argentina. In the case of Brazil, the results are heterogeneous. Even though the country obtained favourable results in the cultural and political dimensions, the ratings registered in the social and environmental sectors are among the lowest.

**TABLE 4**
**Results from IINTALC in MERCOSUR**

| COUNTRY | YEARS | DIMENSIONS | | | | | IINTALC | ABSOLUTE VAR. | RELATIVE VAR. |
|---|---|---|---|---|---|---|---|---|---|
| | | POLITICAL | ENVIRONMENTAL | CULTURAL | SOCIAL | ECONOMIC | | | |
| ARGENTINA | 2005 | 49.64 | 50.54 | 50.74 | 52.01 | 50.25 | 53.19 | | |
| | 2010 | 49.34 | 50.85 | 52.80 | 54.61 | 51.58 | 59.19 | 6.00 | 11.3% |
| | 2014 | 48.65 | 50.69 | 53.17 | 54.94 | 52.90 | 60.35 | 1.16 | 2.0% |
| BRAZIL | 2005 | 50.72 | 48.32 | 50.45 | 49.24 | 50.98 | 49.72 | | |
| | 2010 | 51.80 | 47.32 | 53.19 | 53.01 | 51.23 | 56.56 | 6.85 | 13.8% |
| | 2014 | 50.88 | 46.10 | 55.06 | 54.32 | 51.77 | 58.13 | 1.56 | 2.8% |
| PARAGUAY | 2005 | 46.20 | 50.09 | 48.22 | 46.83 | 52.84 | 44.18 | | |
| | 2010 | 47.54 | 50.20 | 50.56 | 49.40 | 51.76 | 49.47 | 5.29 | 12.0% |
| | 2014 | 48.07 | 49.83 | 51.98 | 52.57 | 51.11 | 53.56 | 4.09 | 8.3% |
| URUGUAY | 2005 | 54.84 | 52.94 | 49.45 | 54.29 | 51.69 | 63.20 | | |
| | 2010 | 55.74 | 52.41 | 51.96 | 55.45 | 53.19 | 68.75 | 5.55 | 8.8% |
| | 2014 | 55.95 | 52.41 | 52.94 | 57.33 | 52.61 | 71.23 | 2.48 | 3.6% |
| VENEZUELA | 2005 | 45.15 | 48.16 | 51.48 | 48.01 | 45.79 | 38.59 | | |
| | 2010 | 43.53 | 47.65 | 52.54 | 55.05 | 45.92 | 44.69 | 6.10 | 15.8% |
| | 2014 | 42.96 | 48.48 | 54.25 | 61.31 | 49.06 | 56.05 | 11.36 | 25.4% |

Source: Prepared by the authors.
Note: Both the absolute and relative variations refer to the change between the years selected for the general index (IINTALC).

Overall, the results obtained by the member countries of MERCOSUR show that the integration process of the group is led by Uruguay and Argentina, being the countries that are converging faster towards the objectives of the mechanism with regard to their partners. It is noteworthy that free circulation of factors among member countries is a principle of the Common Market of the South.

On the other hand, the analysis of *cluster* enables identification of important structural similarities between Argentina and Brazil as shown in the strong trade link between them. While the heterogeneity with the rest of the member countries prevails both in 2010 and 2014, highlighting the case of Venezuela which shows the greatest structural differences with its partners.

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**CHART 3**
**Dendrograms for MERCOSUR 2010-2014**
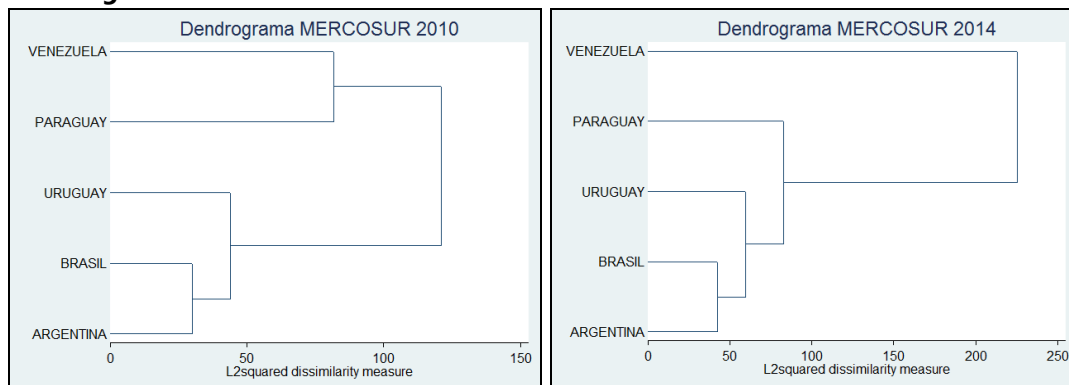


*Source: Prepared by the authors.*

▪ **Andean Community (CAN)**

The integration Index in the countries of the Andean Community is led by Peru, obtaining a rating of 69.81 in 2014. However, the ratings of the CAN countries show the greatest similarities in contrast to the results from the other integration mechanisms. In like manner, in 2014, the developments of the indicator were similar in countries such as Ecuador, Bolivia and Columbia, while Peru experienced a variation of 6.0%.

The main components technique showed as a result that the dimensions of greater relevance in CAN are Social with a ponderation of 37%, Economy with a participation of 25%, followed by Cultural (15%), Environmental (12%) and Political (11%). In the social area, the country with the highest rating was Peru which had significant impact in its lead in the final rating of IINTALC. Meanwhile, outstanding in the economic dimension, are the results obtained from Ecuador and Bolivia that rank in first and second places, respectively.

In the case of the cultural dimension, the ratings are led by Colombia, followed by Ecuador and Peru. In the environmental aspect, the results are homogeneous; the differences in the ratings are relatively small. Finally, in the political dimension, Peru and Colombia are the countries registering the best ratings.

**TABLE 5**
**Results from IINTALC in CAN**

| COUNTRY | YEARS | DIMENSIONS | | | | | IINTALC | ABSOLUTE VAR. | RELATIVE VAR. |
|---------|-------|-----------|---------------|----------|--------|----------|---------|---------------|---------------|
| | | POLITICAL | ENVIRONMENTAL | CULTURAL | SOCIAL | ECONOMIC | | | |
| BOLIVIA | 2005 | 49.43 | 51.45 | 48.03 | 46.71 | 50.21 | 45.83 | | |
| | 2010 | 50.30 | 51.26 | 49.88 | 52.23 | 52.06 | 55.74 | 9.90 | 21.6% |
| | 2014 | 50.19 | 51.57 | 51.50 | 55.27 | 54.22 | 62.76 | 7.02 | 12.6% |
| COLOMBIA | 2005 | 49.48 | 48.45 | 51.64 | 53.05 | 48.93 | 51.55 | | |
| | 2010 | 50.75 | 48.56 | 54.62 | 56.29 | 50.71 | 60.93 | 9.38 | 18.2% |
| | 2014 | 51.49 | 49.48 | 56.28 | 59.44 | 52.14 | 68.82 | 7.89 | 13.0% |
| ECUADOR | 2005 | 48.48 | 49.93 | 49.49 | 50.69 | 50.76 | 49.34 | | |
| | 2010 | 48.70 | 49.39 | 53.85 | 54.78 | 53.78 | 60.50 | 11.16 | 22.6% |
| | 2014 | 49.74 | 49.34 | 55.98 | 58.22 | 54.49 | 67.78 | 7.28 | 12.0% |
| PERU | 2005 | 50.85 | 50.76 | 49.81 | 52.10 | 51.44 | 54.96 | | |
| | 2010 | 51.92 | 50.06 | 53.21 | 57.38 | 53.31 | 65.89 | 10.93 | 19.9% |
| | 2014 | 52.33 | 50.73 | 54.65 | 59.83 | 52.26 | 69.81 | 3.92 | 6.0% |

*Source: Prepared by the authors.*
*Note: Both the absolute and relative variations refer to the change between the years selected for the general index (IINTALC).*

The results obtained in IINTALC for the Andean Community show that, although Peru holds the highest rating, the little difference between the ratings of this country and Columbia confirm that the convergence process of both countries towards the objectives of the mechanism is accelerated in contrast with Bolivia and Ecuador.

The *cluster* analysis of the Andean Community confirms the results of IINTALC, given that they identify two groups of countries; the first comprising Columbia and Peru who have notable homogeneous structures, which facilitates the integration process of these economies; the second group is comprised by Bolivia and Ecuador, countries that, although they are similar, do so to a lesser extent than the first group.

**CHART 4**
**Dendrograms for the Andean Community 2010-2014**
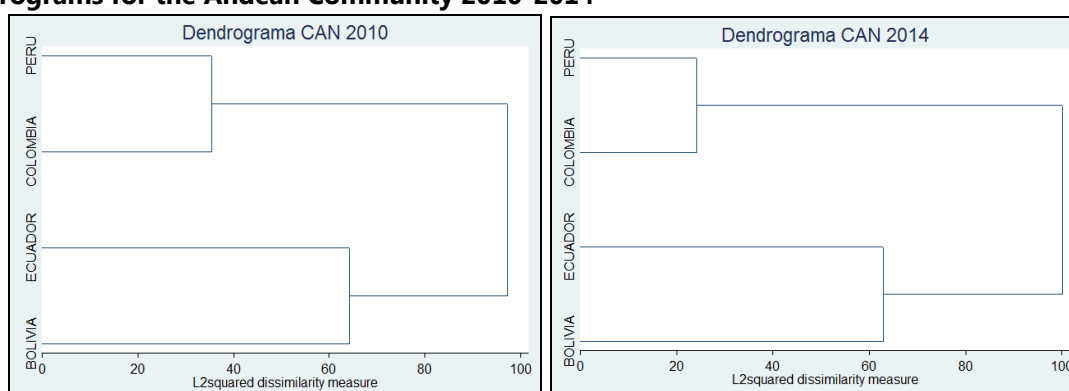


*Source: Prepared by the author.*

▪   **Central American Integration System (SICA)**

Table 6 shows the results from IINTALC for the member countries of the Central American Integration System, where Costa Rica is seen leading with a rating of 71.59, followed by Belize and Panama with 70.18 and 69.40 points respectively. The results from IINTALC for 2005 and 2010 show that Costa Rica has been the country registering the best ratings of the indicator. However, El Salvador and Panama showed the most significant progress, with variations of 11.8% and 10.7% respectively during those years.

The main components methodology used for the calculation of the ponderations of the indicators used in building IINTALC showed that the social and economic dimensions were the most relevant for SICA, representing 38% and 25% respectively (See Annex 14).

Within this group of countries, Belize obtained the best results in the social and economic dimensions, ranking in second place within the group of countries. However, the highest rating in IINTALC came from Costa Rica who showed the best results in the political and cultural dimensions which represented 16% and 13% of the total ponderations respectively. It should be noted that the differences of the ratings between these two countries are insignificant, thus indicating the reduced heterogeneity between these countries.

Meanwhile, the Dominican Republic and Guatemala obtained the lowest ratings of the mechanism, specifically in the dimensions: environmental, social and economic which was a determinant in the final result.

**TABLE 6**
**Results from IINTALC in SICA**

| COUNTRY | YEARS | DIMENSIONS | | | | | IINTALC | ABSOLUTE VAR. | RELATIVE VAR. |
|---|---|---|---|---|---|---|---|---|---|
| | | POLITICAL | ENVIRONMENTAL | CULTURAL | SOCIAL | ECONOMIC | | | |
| BELIZE | 2005 | 52.15 | 51.75 | 52.72 | 52.00 | 53.71 | 62.33 | | |
| | 2010 | 50.91 | 51.79 | 53.10 | 57.49 | 53.68 | 66.97 | 4.64 | 0.07 |
| | 2014 | 49.65 | 51.56 | 53.98 | 60.10 | 54.88 | 70.18 | 3.21 | 4.8% |
| COSTA RICA | 2005 | 55.79 | 49.36 | 53.13 | 58.72 | 49.77 | 66.78 | | |
| | 2010 | 56.38 | 49.79 | 53.30 | 60.65 | 49.93 | 70.05 | 3.27 | 4.9% |
| | 2014 | 56.69 | 49.68 | 54.74 | 59.56 | 50.92 | 71.59 | 1.54 | 2.2% |
| EL SALVADOR | 2005 | 50.13 | 50.12 | 49.93 | 51.03 | 49.51 | 50.72 | | |
| | 2010 | 50.98 | 50.20 | 50.65 | 53.60 | 51.25 | 56.69 | 5.98 | 11.8% |
| | 2014 | 51.10 | 49.96 | 52.77 | 55.47 | 50.83 | 60.12 | 3.43 | 6.1% |
| GUATEMALA | 2005 | 46.54 | 48.29 | 48.70 | 48.47 | 48.31 | 40.32 | | |
| | 2010 | 47.15 | 48.92 | 49.44 | 49.95 | 48.76 | 44.22 | 3.91 | 9.7% |
| | 2014 | 47.14 | 48.96 | 49.85 | 50.57 | 48.01 | 44.53 | 0.31 | 0.7% |
| HONDURAS | 2005 | 47.06 | 49.46 | 48.64 | 48.32 | 51.74 | 45.22 | | |
| | 2010 | 47.16 | 49.96 | 49.55 | 51.56 | 50.44 | 48.67 | 3.45 | 7.6% |
| | 2014 | 46.81 | 50.03 | 49.64 | 53.08 | 52.08 | 51.64 | 2.97 | 6.1% |
| NICARAGUA | 2005 | 47.92 | 51.00 | 48.74 | 47.67 | 51.13 | 46.45 | | |
| | 2010 | 46.84 | 51.00 | 48.81 | 50.64 | 49.93 | 47.23 | 0.78 | 1.7% |
| | 2014 | 47.77 | 50.81 | 49.41 | 52.81 | 50.36 | 51.16 | 3.93 | 8.3% |
| PANAMÁ | 2005 | 51.94 | 50.42 | 50.02 | 54.33 | 54.51 | 61.21 | | |
| | 2010 | 52.58 | 50.06 | 52.32 | 57.46 | 55.38 | 67.79 | 6.58 | 10.7% |
| | 2014 | 53.00 | 49.37 | 52.94 | 59.97 | 54.13 | 69.40 | 1.61 | 2.4% |
| DOMINICAN REPÚBLIC | 2005 | 0.00 | 48.54 | 47.58 | 52.92 | 46.61 | 45.17 | | |
| | 2010 | 48.76 | 47.18 | 52.50 | 47.45 | 47.55 | 43.44 | -1.73 | -3.8% |
| | 2014 | 50.32 | 46.91 | 53.29 | 48.46 | 48.18 | 47.16 | 3.72 | 8.6% |

*Source: Prepared by the authors.*
*Note: Both the absolute and relative variations refer to the change between the years selected for the general index (IINTALC).*

The results from IINTALC for the countries of SICA show the level of convergence of the mechanism. In this sense, Costa Rica and Belize are the countries that are converging faster towards the objectives of the mechanism with regard to their partners. In the case of SICA, these objectives are aimed towards the creation of a free trade zone among the signatory countries, proposing the adoption of a common tariff.

**CHART 5**
**Dendrograms for SICA 2010-2014**
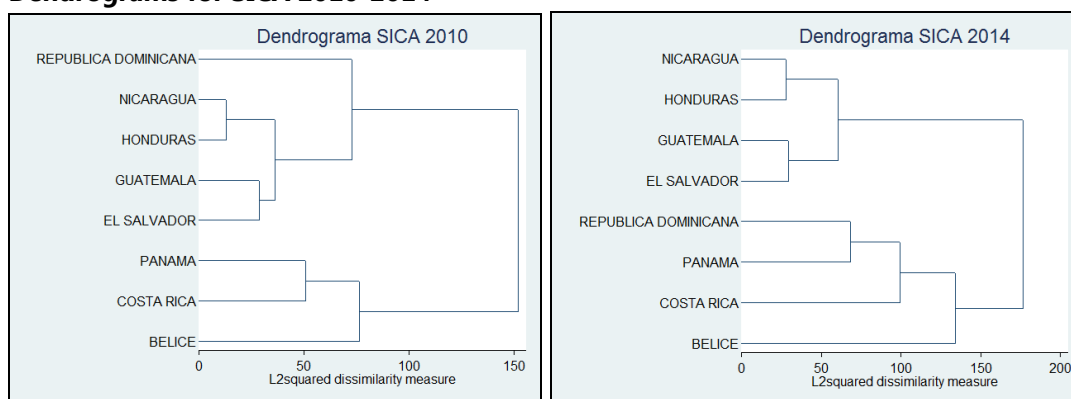


*Source: Prepared by the authors.*

Chart 5 shows the heterogeneity among the countries of the bloc, identifying two homogeneous groups for 2014. The first comprised by Nicaragua, Honduras, Guatemala and El Salvador and the second comprised by the Dominican Republic, Panama, Costa Rica and Belize. It can be seen that the first group was the one showing less heterogeneity for that year, highlighting the closeness between Nicaragua and Honduras, while Belize was the country with less similarities with regard to the other members in 2014.

▪ **Caribbean Community (CARICOM)**[4]

The results from IINTALC for the Caribbean Community are provided in Table 7. Barbados is the leading country with a rating of 69.97, followed by Saint Vincent & the Grenadines and Dominica with 62.25 and 59.08 points, respectively. The results from IINTALC for 2005 and 2010 show that Barbados has been the country registering the highest ratings of the indicator. However, Surinam and Jamaica showed the most significant progress showing variations of 12.7% and 8.7% respectively during those years. For the period 2010 and 2014, Suriname again being the country with the highest progress, followed by Trinidad & Tobago.

The main components methodology used for the calculation of the ponderations of the indicators used in building IINTALC showed that the economic and political dimensions were the most relevant for the Caribbean Community, representing 33% and 22% respectively (See Annex 16).

Barbados and Saint Vincent and the Grenadines are the countries that are converging faster towards the objectives of the mechanism with regard to their partners. In this sense, the results obtained in IINTALC for the countries of the Caribbean Community show the level of convergence of the mechanism. In the case of CARICOM, these objectives are aimed towards a "functional integration" that implied harmonization of policies in key sectors.

**TABLE 7**
**Results from IINTALC in CARICOM**

| COUNTRY | YEARS | POLITICAL | ENVIRONMENTAL | CULTURAL | SOCIAL | ECONOMIC | IINTALC | ABSOLUTE VAR. | RELATIVE VAR. |
|---|---|---|---|---|---|---|---|---|---|
| ANTIGUA AND BARBUDA | 2005 | 51.28 | 51.06 | 51.02 | 51.03 | 50.18 | 54.58 | | |
| | 2010 | 52.64 | 51.06 | 53.97 | 51.78 | 45.14 | 54.59 | 0.00 | 0.0% |
| | 2014 | 49.65 | 51.06 | 53.33 | 52.02 | 48.57 | 54.63 | 0.04 | 0.1% |
| BELIZE | 2005 | 46.67 | 50.95 | 49.13 | 48.21 | 47.38 | 42.35 | | |
| | 2010 | 45.47 | 51.01 | 50.37 | 49.26 | 47.31 | 43.42 | 1.07 | 2.5% |
| | 2014 | 44.07 | 51.02 | 50.48 | 49.26 | 49.02 | 43.85 | 0.43 | 1.0% |
| BAHAMAS | 2005 | 55.74 | 50.57 | 50.78 | 51.60 | 44.40 | 53.10 | | |
| | 2010 | 53.89 | 50.56 | 52.10 | 52.36 | 45.17 | 54.08 | 0.99 | 1.9% |
| | 2014 | 53.02 | 51.12 | 52.97 | 52.64 | 45.29 | 55.04 | 0.96 | 1.8% |
| BARBADOS | 2005 | 56.32 | 50.75 | 52.19 | 50.62 | 53.75 | 63.63 | | |
| | 2010 | 55.46 | 50.82 | 54.24 | 51.34 | 53.36 | 65.22 | 1.58 | 2.5% |
| | 2014 | 55.07 | 50.79 | 54.80 | 52.09 | 57.22 | 69.97 | 4.76 | 7.3% |
| DOMINICA | 2005 | 52.50 | 51.12 | 50.92 | 49.54 | 52.40 | 56.48 | | |
| | 2010 | 52.65 | 51.14 | 52.79 | 50.33 | 52.80 | 59.71 | 3.23 | 5.7% |
| | 2014 | 51.76 | 51.15 | 53.13 | 50.73 | 52.30 | 59.08 | -0.63 | -1.1% |
| GRENADA | 2005 | 49.66 | 51.12 | 49.49 | 48.71 | 57.20 | 56.18 | | |
| | 2010 | 49.63 | 51.10 | 51.17 | 48.94 | 55.68 | 56.53 | 0.34 | 0.6% |
| | 2014 | 49.17 | 51.12 | 51.53 | 48.97 | 54.92 | 55.71 | -0.82 | -1.4% |
| GUYANA | 2005 | 41.30 | 50.51 | 49.05 | 51.71 | 54.62 | 47.18 | | |
| | 2010 | 42.55 | 50.77 | 50.51 | 52.08 | 52.20 | 48.11 | 0.93 | 2.0% |
| | 2014 | 42.80 | 50.74 | 50.86 | 51.19 | 51.36 | 46.96 | -1.15 | -2.4% |
| JAMAICA | 2005 | 45.24 | 48.82 | 50.06 | 49.01 | 50.86 | 43.98 | | |
| | 2010 | 45.31 | 49.42 | 52.08 | 49.83 | 51.06 | 47.71 | 3.72 | 8.5% |
| | 2014 | 46.36 | 49.16 | 52.18 | 49.54 | 49.83 | 47.07 | -0.63 | -1.3% |
| ST. KITTS AND NEVIS | 2005 | 55.42 | 51.10 | 51.26 | 44.09 | 55.26 | 57.13 | | |
| | 2010 | 53.65 | 51.11 | 53.64 | 44.59 | 55.31 | 58.29 | 1.16 | 2.0% |
| | 2014 | 49.69 | 51.11 | 53.06 | 44.58 | 51.26 | 49.69 | -8.60 | -14.7% |
| ST. LUCIA | 2005 | 55.21 | 51.07 | 50.14 | 49.37 | 51.57 | 57.36 | | |
| | 2010 | 53.84 | 51.08 | 51.96 | 50.71 | 51.12 | 58.72 | 1.36 | 2.4% |
| | 2014 | 51.30 | 51.07 | 53.16 | 50.27 | 51.18 | 56.98 | -1.74 | -3.0% |
| ST. VINCENT AND THE GRENADINES | 2005 | 54.84 | 51.10 | 49.31 | 49.68 | 53.66 | 58.59 | | |
| | 2010 | 53.38 | 51.12 | 51.90 | 50.63 | 52.35 | 59.37 | 0.78 | 1.3% |
| | 2014 | 51.89 | 51.12 | 52.37 | 51.07 | 55.80 | 62.25 | 2.88 | 4.9% |
| SURINAME | 2005 | 44.97 | 50.55 | 48.85 | 50.79 | 48.15 | 43.30 | | |
| | 2010 | 44.61 | 50.64 | 51.35 | 50.64 | 51.57 | 48.81 | 5.51 | 12.7% |
| | 2014 | 44.94 | 51.06 | 52.92 | 50.83 | 53.61 | 53.37 | 4.56 | 9.3% |
| TRINIDAD AND TOBAGO | 2005 | 47.62 | 44.16 | 55.58 | 53.17 | 47.35 | 47.88 | | |
| | 2010 | 46.87 | 39.57 | 56.85 | 54.63 | 47.07 | 44.99 | -2.89 | -6.0% |
| | 2014 | 46.74 | 41.10 | 57.95 | 54.97 | 48.17 | 48.92 | 3.93 | 8.7% |

*Source: Prepared by the authors.*

[4] In the case of CARICOM, Haiti and Monserrat are excluded given the limited statistical information available for these countries.

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*Note: Both the absolute and relative variations refer to the change between the years selected for the general index (ⅡNTALC).*

It is important to note that the results obtained for the Caribbean Community lack sturdiness given the limited statistical information available for these countries. As a result, it was imperative to eliminate certain key and important indicators[5] of the work methodology, implying possible alterations in the results.

**CHART 6**
**Dendrograms for CARICOM 2010-2014**
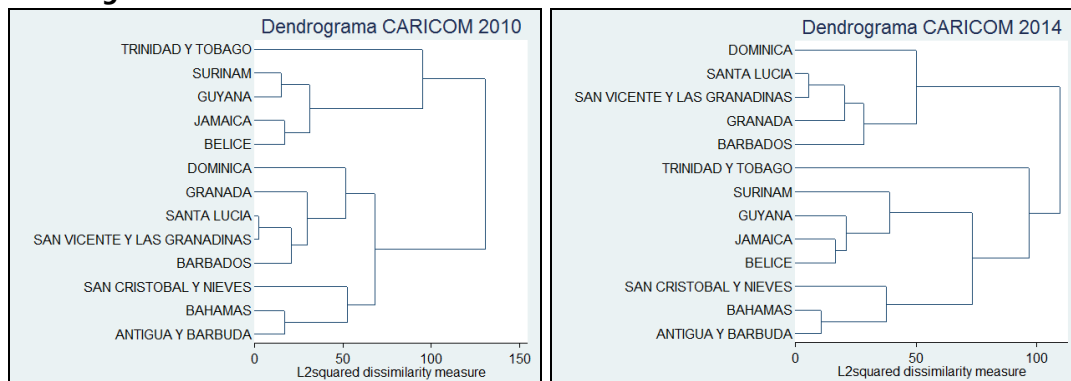


*Source: Prepared by the authors.*

Chart 6 reveals the heterogeneity among the countries of the bloc for the years 2010 and 2014, identifying three groups of countries with low heterogeneity. For the year 2010, the first group of similar countries is comprised by Suriname, Guyana, Jamaica and Belize, the second comprising Dominica, Grenada, Saint Lucia, Saint Vincent & the Grenadines and Barbados, and the last group of homogenous countries comprising Saint Kitts & Nevis, the Bahamas and Antigua & Barbuda. For the year 2014, generally, a greater heterogeneity is observed among the countries, bringing about changes in those groups. Saint Lucia and Saint Vincent & the Grenadines in 2010 were two very homogeneous countries and for 2014, despite them being similar, their structural gap increased. The same happened with Trinidad & Tobago and Dominica, who, in 2014, showed greater heterogeneity.

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[5] For the purpose of calculating the index in CARICOM, the following indicators were eliminated due to insufficient statistical information available: energy intensity in GDP, computer users, poverty, homelessness, ECI, agricultural workers, service employees, industry employees, and educational expenses, use of fertilizers, adolescent fertility, border trade, tourism and unemployment.

**CONCLUSIONS**

The Integration Index of Latin America and the Caribbean measures the degree of convergence of the countries conforming the integration mechanisms, by means of a quantitative and multidimensional indicator. In this regard, the study shows that members of each mechanism all have different levels of integration and different pace towards convergence, within their groups.

It should be noted, that this study represents a first step to measuring the level of integration of Latin American and Caribbean countries. In this regard, for subsequent editions it is expected to include new components and indicators, as well as the contrast with other methods of calculation in order to raise the level of trust in the indicator. This investigation offers a solid theoretic and statistic basis that will serve to support the discussions regarding the status and advancement of the integration processes in the region.

In the case of the Pacific Alliance, Chile and Colombia are the countries with the fastest pace of convergence. The performance achieved by Chile in the political and social dimension is outstanding; while Colombia reached its highest values in the economic, environmental and cultural dimensions. Mexico registered a significant gap with respect to the rest of the mechanism, while Colombia and Peru are the countries with the largest structural proximity, which will enable achievement of the constitutive objectives of their mechanism.

Meanwhile, in MERCOSUR, Uruguay registered the best performance in the dimensions considered by the index, except with respect to the cultural indicators, which favours their convergence toward the objectives of the mechanism. The remaining countries of the bloc, exhibited a heterogeneous behaviour in all the dimensions. In the case of Venezuela, despite having the highest increases in its scores, this has not allowed it to improve its position in the total result of the IINTALC. Brazil and Argentina are the countries with the most structural similarities. In the case of the remaining countries of the mechanism, for 2014, they showed significant heterogeneous nature, highlighting the case of Venezuela.

The Andean Community is the mechanism with the least dispersion in the results of the index, led by Peru, followed by Colombia, Ecuador and Bolivia. In the case of Peru, its performance in the social and political dimensions was outstanding. With regard to Colombia, this was only seen in the cultural dimension, Ecuador in the economy and Bolivia in the environment. The analysis of Cluster has allowed us to identify two homogenous groups, on the one hand Colombia and Peru, and on the other, Ecuador and Bolivia, although the latter at a lesser extent.

The Central American Integration System is characterized for having two groups of countries: the first comprising Costa Rica, Belize and Panama with an average value of 70,39 and the second integrated by Guatemala, Honduras, Nicaragua and the Dominican Republic, which average 48,62. Meanwhile, El Salvador obtained a qualification of 60.12 points. However, the *cluster* analysis showed that Honduras, Nicaragua, Guatemala and El Salvador showed the highest structural homogeneity.

Finally, despite the fact that the results obtained for the Caribbean Community lack robustness, given the little statistical information available, the *cluster* analysis showed three groups of countries with structural similarities: the first comprising Saint Lucia, Saint Vincent and Grenadines, Grenada and Barbados; the second consisting of Jamaica, Belize, Guyana and Suriname, and the third group conforming Saint Kitts and Nieves, the Bahamas and Antigua and Barbuda.

*A   N   N   E   X   E   S*

**METHODOLOGIES AND RESULTS**

## ANNEX 1
## Description and sources of the indicators used in the IINTALC

| Dimension | Indicators | Description | Sources |
|---|---|---|---|
| Political | Control of Corruption | Index on the perception in which the Government works for private benefit. | Worldwide Governance Indicators (WGI) |
| | Government Effectiveness | Index on the perception of the quality of public services, the administration, the level of Independence from political pressure, the quality of formulation and application of policies, and the credibility of the commitment of the Government to these policies. | Worldwide Governance Indicators (WGI) |
| | Political Stability | Index on the perception of the probability of political instability and/or violence | Worldwide Governance Indicators (WGI) |
| | Regulatory Quality | Index on the capability of the Government to formulate and apply correct policies and regulations that allow and promote development of the private sector. | Worldwide Governance Indicators (WGI) |
| | Estado de la Ley | Index on the perception on which the agents trust in the compliance of the rules of society, the quality of execution of contracts, property rights, law enforcement and the courts. | Worldwide Governance Indicators (WGI) |
| | Accountability | Index on the perception that citizens can participate in governmental election, as well as freedom of expression, freedom of association and freedom of the press | Worldwide Governance Indicators (WGI) |
| Environmental | Intensity in the use of fertilizers | Percentage of tonnes per 1.000 hectares of agricultural land. | ECLAC |
| | CO2 Emissions | Tonnes of CO2 | ECLAC |
| | Intensity of Energy on GDP | Total consumption of energy in thousands of barrels, equivalent to petroleum per millions of dollars of GDP (consistent prices from 2010). | ECLAC |
| | Use of substances that may deplete the ozone layer | Tonnes of potential depletion of the ozone (PAO). | ECLAC |
| Cultural | Internet Users | Rate on every 100 inhabitants. | World Bank |
| | Cell phone Users | Rate on every 100 inhabitants | World Bank |
| | Computer Users | Rate on every 100 inhabitants | World Bank |
| | Tourism | International tourism received as a percentage on the total exports. | WITS-COMTRADE-BM |
| | Exports of intra-mechanism cultural goods | Export of Cultural Goods of each country as a percentage of the total export of these goods for each mechanism. | COMTRADE |
| | Imports of intra-mechanism cultural goods | Import of Cultural Goods of each country as a percentage of the total import of these goods for each mechanism... | COMTRADE |
| Social | Life expectancy at birth | Years. | World Bank |
| | Public spending on health | Public expenditure on health as a percentage of the Gross Domestic Product. | World Bank |
| | Infant mortality | Infant mortality for every 1000 live birth. | World Bank |
| | Public spending on education | Public spending on education as a percentage of the Gross Domestic Product. | World Bank |
| | Poverty | Incidence rate of Poverty of $ 2 per day as a percentage Gross Domestic Product | World Bank |
| | Extreme Poverty | Incidence rate on poverty of $ 1.5 per day as a percentage of GDP | World Bank |
| | Improvement in the supply of water | Improvement in the supply of water as a percentage of the population with access to water. | World Bank |
| | Fertility in adolescents | Live births per 1000 women between 15 and 19 years. | World Bank |
| | Unemployment | Unemployment rate. | World Bank |
| | Employment in Agriculture | Employment in the Agricultural Sector as a percentage of the Total Employment. | World Bank |
| | Employment in Industry | Employment in the Industry Sector as a percentage of the Total Employment. | World Bank |
| | Employment in Services | Employees in the service sector as percentage of the Total Employment. | World Bank |
| | Per capita GDP | GDP per capita at current prices | International Monetary Fund |
| Economic | Intra-mechanism Exports | Export of intra-mechanism goods and services of each country as a percentage of the total export | International Monetary Fund |
| | Intra-mechanism Imports | Import of intra-mechanism goods and services of each country as a percentage of the total import. | International Monetary Fund |
| | Trade Opening | Export plus import as a proportion of the Gross Domestic Product. | International Monetary Fund |
| | Net conditions for interchange | Index of net conditions of interchange (2000 = 100) | WITS-COMTRADE-BM |
| | Index of concentration of HH | Index on the concentration of the market of Herfindahl and Hirschman. | IDB-Number for the Development |
| | Trans border trade | Time and cost associated with the process of import and export of merchandise. | Doing Business - Banco Mundial |
| | Total public debt | Total Public Debt in proportion to the Gross Domestic Product. | International Monetary Fund |

| Inflation | Annual variation of the consumer price index | International Monetary Fund |
| Gross Formation of Gross Capital | Gross formation of capital as a percentage of the Gross Domestic Product. | World Bank |
| Index of economic complexity | Index that classifies exports according to their level of complexity and diversity. | Hausmann and Hidalgo (2012). |
| Total public spending | Total Public Spending in proportion to the Gross Domestic Product. | International Monetary Fund |

*Source: Prepared by the authors.*

## ANNEX 2
## Graphic test to select the number of components in the PA



Screen plot of eigenvalues after pca
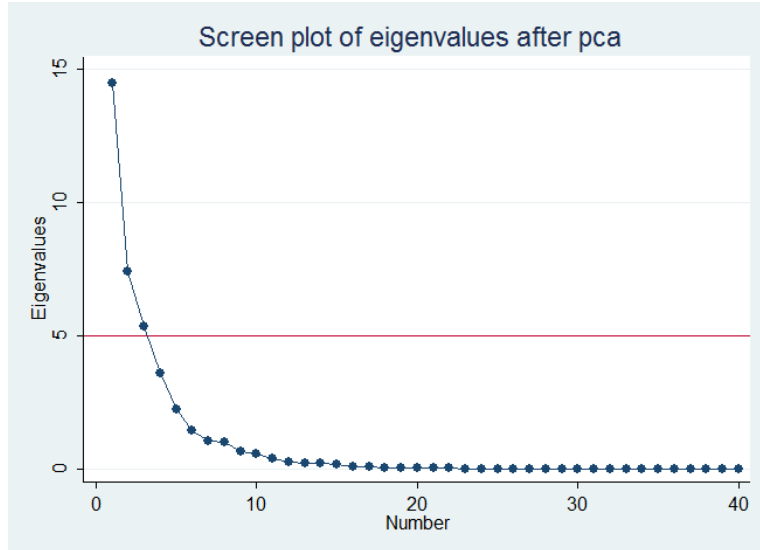
*Source: Prepared by the authors.*

## ANNEX 3
## Eigenvalues and variance of the main components of the PA

| Components | Eigenvalue | Difference | Explained Variance (%) | Accumulated Variance (%) |
| --- | --- | --- | --- | --- |
| Comp1 | 14.477 | 7.07214 | 36.2 | 36.2 |
| Comp2 | 7.40482 | 2.04148 | 18.5 | 54.7 |
| Comp3 | 5.36334 | 1.76766 | 13.4 | 68.1 |
| Comp4 | 3.59568 | 1.33686 | 9.0 | 77.1 |
| Comp5 | 2.25883 | 0.804628 | 5.7 | 82.8 |
| Comp6 | 1.4542 | 0.36545 | 3.6 | 86.4 |
| Comp7 | 1.08875 | 0.084781 | 2.7 | 89.1 |
| Comp8 | 1.00397 | 0.308393 | 2.5 | 91.6 |
| Comp9 | 0.695574 | 0.116363 | 1.7 | 93.4 |
| Comp10 | 0.579212 | 0.148946 | 1.5 | 94.8 |
| . | . | . | . | . |
| . | . | . | . | . |
| . | . | . | . | . |
| Comp40 | 0.00061734 | - | 0.0 | 100.0 |

*Source: Prepared by the authors.*

**ANNEX 4**

**Graphic test to select the number of components in MERCOSUR**



*Source: Prepared by the authors.*

**ANNEX 5**

**Eigenvalues and variance of the main components of MERCOSUR**

| Components | Eigenvalue | Difference | Explained Variance (%) | Accumulated Variance (%) |
|---|---|---|---|---|
| Comp1 | 11.0212 | 2.7779 | 27.6 | 27.6 |
| Comp2 | 8.24333 | 2.47537 | 20.6 | 48.2 |
| Comp3 | 5.76796 | 1.70927 | 14.4 | 62.6 |
| Comp4 | 4.0587 | 1.75361 | 10.2 | 72.7 |
| Comp5 | 2.30508 | 0.616227 | 5.8 | 78.5 |
| Comp6 | 1.68886 | 0.336743 | 4.2 | 82.7 |
| Comp7 | 1.35211 | 0.322987 | 3.4 | 86.1 |
| Comp8 | 1.02913 | 0.219819 | 2.6 | 88.7 |
| Comp9 | 0.809309 | 0.0232435 | 2.0 | 90.7 |
| Comp10 | 0.786066 | 0.209181 | 2.0 | 92.7 |
| . | . | . | . | . |
| . | . | . | . | . |
| . | . | . | . | . |
| Comp40 | 0.00099089 | - | 0.0 | 100.0 |

*Source: Prepared by the authors.*

**ANNEX 6**
**Graphic test to select the number of components in SICA**
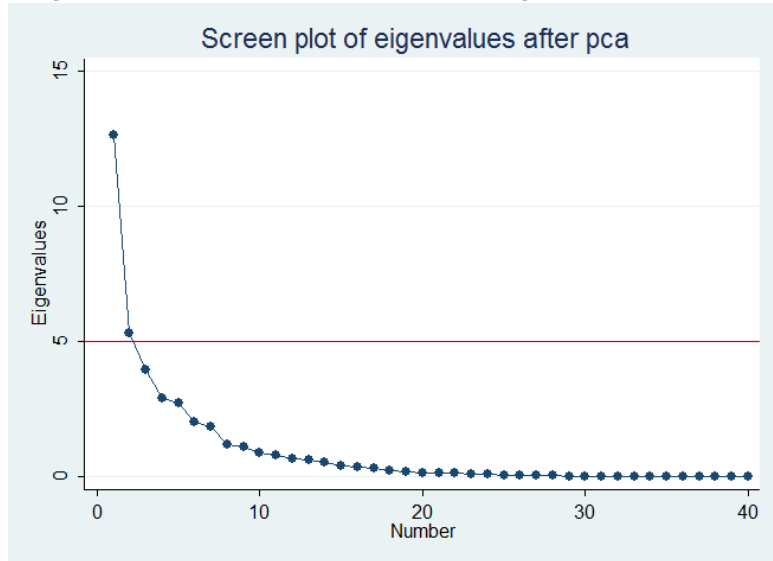


Source: Prepared by the authors.

**ANNEX 7**
**Eigenvalues and variance of the main components of SICA**

| Components | Eigenvalue | Difference | Explained Variance (%) | Accumulated Variance (%) |
|---|---|---|---|---|
| Comp1 | 12.6395 | 7.34075 | 31.6 | 31.6 |
| Comp2 | 5.2988 | 1.34571 | 13.3 | 44.9 |
| Comp3 | 3.95309 | 1.03306 | 9.9 | 54.7 |
| Comp4 | 2.92003 | 0.167786 | 7.3 | 62.0 |
| Comp5 | 2.75225 | 0.738545 | 6.9 | 68.9 |
| Comp6 | 2.0137 | 0.155926 | 5.0 | 73.9 |
| Comp7 | 1.85778 | 0.674865 | 4.6 | 78.6 |
| Comp8 | 1.18291 | 0.0649873 | 3.0 | 81.6 |
| Comp9 | 1.11792 | 0.21613 | 2.8 | 84.3 |
| Comp10 | 0.901793 | 0.113059 | 2.3 | 86.6 |
| . | . | . | . | . |
| . | . | . | . | . |
| . | . | . | . | . |
| Comp40 | 0.00595981 | - | 0.0 | 100.0 |

Source: Prepared by the authors.

**ANNEX 8**
**Graphic test to select the number of components in the Andean Community**
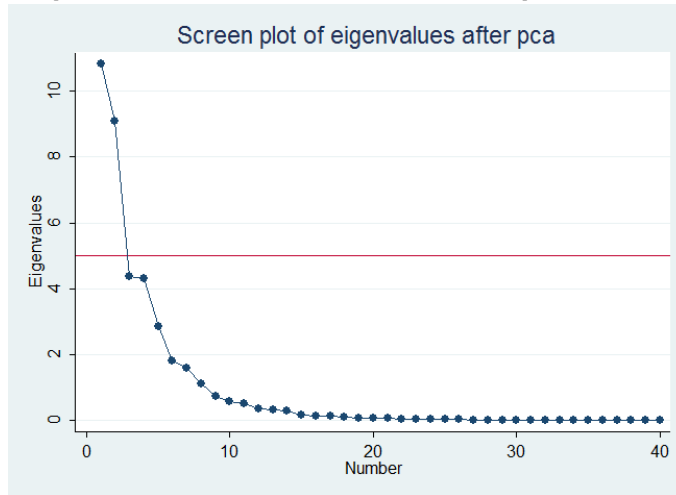


*Source: Prepared by the authors.*

**ANNEX 9**
**Eigenvalues and variance of the main components of the Andean Community**

| Components | Eigenvalue | Difference | Explained Variance (%) | Accumulated Variance (%) |
|---|---|---|---|---|
| Comp1 | 10.8303 | 1.75294 | 27.1 | 27.1 |
| Comp2 | 9.07741 | 4.68977 | 22.7 | 49.8 |
| Comp3 | 4.38764 | 0.0698395 | 11.0 | 60.7 |
| Comp4 | 4.3178 | 1.46573 | 10.8 | 71.5 |
| Comp5 | 2.85206 | 1.04941 | 7.1 | 78.7 |
| Comp6 | 1.80266 | 0.215276 | 4.5 | 83.2 |
| Comp7 | 1.58738 | 0.453851 | 4.0 | 87.1 |
| Comp8 | 1.13353 | 0.381418 | 2.8 | 90.0 |
| Comp9 | 0.75211 | 0.170061 | 1.9 | 91.9 |
| Comp10 | 0.582049 | 0.0790671 | 1.5 | 93.3 |
| . | . | . | . | . |
| . | . | . | . | . |
| . | . | . | . | . |
| Comp40 | 0.00040794 | - | 0.0 | 100.0 |

*Source: Prepared by the authors.*

**ANNEX 10**
**Graphic test to select the number of components in CARICOM**
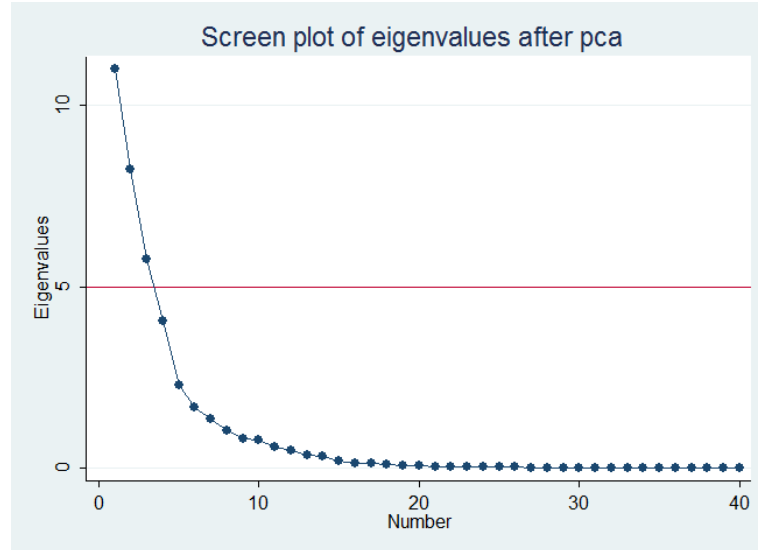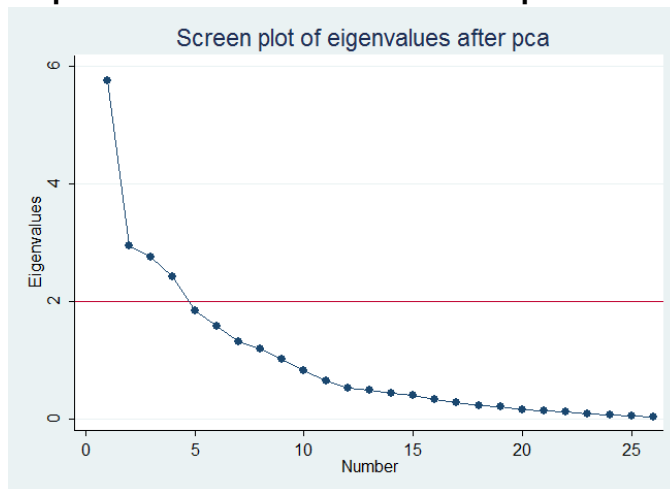


*Source: Prepared by the authors.*

**ANNEX 11**
**Eigenvalues and variance of the main components of CARICOM**

| Components | Eigenvalue | Difference | Explained Variance (%) | Accumulated Variance (%) |
|---|---|---|---|---|
| Comp1 | 5.75476 | 2.80588 | 22.1 | 22.1 |
| Comp2 | 2.94888 | 0.188038 | 11.3 | 33.5 |
| Comp3 | 2.76084 | 0.340648 | 10.6 | 44.1 |
| Comp4 | 2.42019 | 0.576814 | 9.3 | 53.4 |
| Comp5 | 1.84338 | 0.26931 | 7.1 | 60.5 |
| Comp6 | 1.57407 | 0.247169 | 6.1 | 66.6 |
| Comp7 | 1.3269 | 0.135646 | 5.1 | 71.7 |
| Comp8 | 1.19125 | 0.168076 | 4.6 | 76.2 |
| Comp9 | 1.02318 | 0.194287 | 3.9 | 80.2 |
| Comp10 | 0.828891 | 0.176255 | 3.2 | 83.4 |
| . | . | . | . | . |
| . | . | . | . | . |
| . | . | . | . | . |
| Comp26 | 0.044329 | - | 0.2 | 100 |

*Source: Prepared by the authors.*

**ANNEX 12**

**Rotating factors and ponderations in the PA**

| Dimensions | Indicators | Promax Rotation * | | | Weights of indicators** | | | Total weight on Index (%) | | Weight on the dimensions (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Comp1 | Comp2 | Comp3 | Comp1 | Comp2 | Comp3 | Value | Accumulated | Value | Accumulated |
| Political | Control of Corruption | 0.195 | 0.038 | -0.244 | 1.3 | 0.0 | 1.9 | 2.5 | | 17 | |
| | Government Effectiveness | 0.209 | -0.048 | -0.193 | 1.6 | 0.1 | 1.2 | 2.1 | | 14 | |
| | Political Stability | 0.194 | -0.058 | -0.222 | 1.3 | 0.1 | 1.6 | 2.1 | 15 | 14 | 15 |
| | Regulatory Quality | 0.171 | -0.001 | -0.281 | 1.0 | 0.0 | 2.5 | 3.3 | | 22 | |
| | State of Law | 0.223 | 0.026 | -0.182 | 1.8 | 0.0 | 1.0 | 2.3 | | 16 | |
| | Accountability | 0.231 | -0.059 | -0.136 | 1.9 | 0.1 | 0.6 | 2.5 | | 17 | |
| Environmental | Intensity in the use of Fertilizers | -0.232 | -0.053 | 0.020 | 1.9 | 0.1 | 0.0 | 2.5 | | 17 | |
| | $CO_2$ Emissions | 0.003 | 0.333 | -0.134 | 0.0 | 3.5 | 0.6 | 4.6 | 15 | 31 | 15 |
| | Energy Intensity in the GDP | 0.100 | 0.080 | 0.339 | 0.4 | 0.2 | 3.6 | 4.8 | | 32 | |
| | Use of substances that could deplete ozone layer | 0.109 | 0.278 | 0.055 | 0.4 | 2.4 | 0.1 | 3.2 | | 21 | |
| Cultural | Internet Users | 0.194 | 0.050 | 0.234 | 1.3 | 0.1 | 1.7 | 2.3 | | 29 | |
| | Cell phone users | 0.186 | 0.052 | 0.257 | 1.2 | 0.1 | 2.1 | 2.8 | | 35 | 59 |
| | Computer Users | 0.185 | 0.036 | 0.258 | 1.2 | 0.0 | 2.1 | 2.8 | 13 | 36 | |
| | Tourism | -0.109 | -0.027 | 0.024 | 0.4 | 0.0 | 0.0 | 0.6 | | 10 | |
| | Exports of intra-mechanism cultural goods | -0.028 | -0.126 | 0.163 | 0.0 | 0.5 | 0.8 | 1.1 | | 20 | 41 |
| | Imports of intra-mechanism cultural goods | 0.029 | -0.300 | 0.022 | 0.0 | 2.8 | 0.0 | 3.8 | | 69 | |
| Social | Life expectancy at birth | 0.242 | -0.097 | 0.041 | 2.1 | 0.3 | 0.1 | 2.8 | | 14 | |
| | Public spending on health | -0.005 | 0.111 | 0.265 | 0.0 | 0.4 | 2.2 | 2.9 | | 14 | |
| | Infant mortality | 0.229 | -0.073 | 0.061 | 1.9 | 0.2 | 0.1 | 2.5 | | 12 | |
| | Public spending on education | 0.097 | -0.136 | 0.272 | 0.3 | 0.6 | 2.3 | 3.1 | | 15 | 69 |
| | Poverty | 0.239 | -0.039 | 0.013 | 2.0 | 0.0 | 0.0 | 2.7 | | 13 | |
| | Extreme Poverty | 0.221 | -0.079 | -0.013 | 1.7 | 0.2 | 0.0 | 2.3 | | 11 | |
| | Improvement in the supply of water | 0.202 | -0.088 | 0.060 | 1.5 | 0.2 | 0.1 | 1.9 | 29 | 9 | |
| | Fertility in adolescents | 0.210 | 0.153 | 0.014 | 1.6 | 0.7 | 0.0 | 2.1 | | 10 | |
| | Unemployment rate | 0.031 | -0.181 | -0.059 | 0.0 | 1.0 | 0.1 | 1.4 | | 15 | |
| | Employment in agriculture | 0.051 | -0.214 | 0.046 | 0.1 | 1.4 | 0.1 | 1.9 | | 22 | |
| | Employment in industry | 0.086 | -0.041 | -0.186 | 0.3 | 0.1 | 1.1 | 1.4 | | 16 | 31 |
| | Employment in services | -0.081 | 0.218 | 0.083 | 0.2 | 1.5 | 0.2 | 2.0 | | 22 | |
| | Per capita GDP | 0.216 | -0.125 | 0.133 | 1.7 | 0.5 | 0.6 | 2.2 | | 25 | |
| Economic | Intra-mechanism exports | 0.022 | 0.340 | 0.000 | 0.0 | 3.7 | 0.0 | 4.8 | | 47 | |
| | Intra-mechanism imports | 0.065 | 0.266 | 0.133 | 0.1 | 2.2 | 0.6 | 3.0 | | 29 | 37 |
| | Trade Openness | 0.231 | -0.068 | -0.037 | 1.9 | 0.1 | 0.0 | 2.5 | | 24 | |
| | Net Terms for Exchanges | 0.109 | 0.149 | 0.123 | 0.4 | 0.7 | 0.5 | 0.9 | | 14 | |
| | HHI Concentration Index | 0.073 | 0.324 | -0.092 | 0.2 | 3.3 | 0.3 | 4.4 | | 69 | 23 |
| | Cross-border Trade | 0.149 | -0.074 | 0.005 | 0.8 | 0.2 | 0.0 | 1.1 | 28 | 17 | |
| | Total Public Debt | -0.186 | -0.126 | 0.093 | 1.2 | 0.5 | 0.3 | 1.6 | | 15 | |
| | Inflation | 0.131 | 0.030 | 0.156 | 0.6 | 0.0 | 0.8 | 1.0 | | 9 | |
| | Gross Formation of Fixed Capital | 0.161 | 0.015 | 0.057 | 0.9 | 0.0 | 0.1 | 1.2 | | 11 | 40 |
| | Economic Complexity Index | -0.032 | -0.330 | 0.110 | 0.0 | 3.4 | 0.4 | 4.5 | | 41 | |
| | Total Public Spending | -0.021 | 0.025 | 0.251 | 0.0 | 0.0 | 2.0 | 2.6 | | 24 | |
| **Explained Variance** | | | | | 5.490 | 4.867 | 5.066 | | | | |
| **Ratio of total variance (%)** | | | | | 35.597 | 31.554 | 32.849 | | | | |

Source: Prepared by the authors.

Notes: (*) Method of rotation: (oblique) Promax rotation with Kaiser-normalization. (**) Table of rotated factors, multiplied by the ratio of explained variance of the corresponding component.

**ANNEX 13**

**Rotating factors and ponderations in MERCOSUR**

| Dimensions | Indicators | Promax Rotation * | | | Weights of indicators** | | | Total weight on Index (%) | | Weight on the dimensions (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Comp1 | Comp2 | Comp3 | Comp1 | Comp2 | Comp3 | Value | Accumulated | Value | Accumulated |
| Political | Control of Corruption | 0.263 | -0.060 | -0.005 | 2.3 | 0.1 | 0.0 | 3.1 | | 17 | |
| | Government Effectiveness | 0.283 | -0.071 | -0.059 | 2.7 | 0.2 | 0.1 | 3.6 | | 19 | |
| | Political Stability | 0.266 | -0.081 | 0.007 | 2.3 | 0.2 | 0.0 | 3.1 | 18 | 17 | 18 |
| | Regulatory Quality | 0.191 | -0.213 | -0.104 | 1.2 | 1.6 | 0.4 | 2.1 | | 11 | |
| | State of Law | 0.263 | -0.132 | -0.006 | 2.3 | 0.6 | 0.0 | 3.0 | | 17 | |
| | Accountability | 0.275 | -0.073 | 0.032 | 2.5 | 0.2 | 0.0 | 3.4 | | 18 | |
| Environmental | Intensity in the use of Fertilizers | 0.005 | -0.211 | 0.072 | 0.0 | 1.5 | 0.2 | 2.0 | | 17 | |
| | CO$_2$ Emissions | 0.002 | -0.170 | 0.280 | 0.0 | 1.0 | 2.7 | 3.6 | 12 | 30 | 12 |
| | Energy Intensity in the GDP | 0.259 | 0.029 | -0.154 | 2.2 | 0.0 | 0.8 | 3.0 | | 24 | |
| | Use of substances that could deplete ozone layer | -0.002 | 0.113 | 0.279 | 0.0 | 0.4 | 2.7 | 3.6 | | 29 | |
| Cultural | Internet Users | 0.094 | 0.281 | 0.125 | 0.3 | 2.7 | 0.5 | 3.6 | | 38 | |
| | Cell phone users | 0.067 | 0.262 | 0.156 | 0.1 | 2.4 | 0.8 | 3.2 | | 33 | 59 |
| | Computer Users | 0.079 | 0.244 | 0.086 | 0.2 | 2.0 | 0.3 | 2.7 | 16 | 29 | |
| | Tourism | 0.239 | -0.081 | 0.070 | 1.9 | 0.2 | 0.2 | 2.5 | | 38 | |
| | Exports of intra-mechanism cultural goods | 0.114 | 0.033 | -0.192 | 0.4 | 0.0 | 1.3 | 1.7 | | 25 | 41 |
| | Imports of intra-mechanism cultural goods | -0.099 | 0.149 | -0.232 | 0.3 | 0.8 | 1.8 | 2.5 | | 37 | |
| Social | Life expectancy at birth | 0.181 | 0.197 | 0.165 | 1.1 | 1.3 | 0.9 | 1.8 | | 10 | |
| | Public spending on health | 0.212 | -0.031 | 0.027 | 1.5 | 0.0 | 0.0 | 2.0 | | 12 | |
| | Infant mortality | 0.172 | 0.217 | 0.110 | 1.0 | 1.6 | 0.4 | 2.1 | | 13 | |
| | Public spending on education | -0.086 | 0.273 | -0.001 | 0.2 | 2.6 | 0.0 | 3.4 | | 20 | 68 |
| | Poverty | 0.052 | 0.199 | 0.144 | 0.1 | 1.4 | 0.7 | 1.8 | | 11 | |
| | Extreme Poverty | 0.019 | 0.208 | 0.130 | 0.0 | 1.5 | 0.6 | 2.0 | | 12 | |
| | Improvement in the supply of water | 0.195 | 0.162 | -0.096 | 1.3 | 0.9 | 0.3 | 1.7 | 25 | 10 | |
| | Fertility in adolescents | 0.225 | 0.065 | 0.182 | 1.7 | 0.1 | 1.1 | 2.2 | | 13 | |
| | Unemployment rate | -0.032 | -0.023 | 0.130 | 0.0 | 0.0 | 0.6 | 0.8 | | 10 | |
| | Employment in agriculture | -0.156 | -0.086 | 0.060 | 0.8 | 0.3 | 0.1 | 1.1 | | 14 | |
| | Employment in industry | 0.131 | -0.041 | -0.144 | 0.6 | 0.1 | 0.7 | 0.9 | | 12 | 32 |
| | Employment in services | 0.154 | 0.135 | -0.017 | 0.8 | 0.6 | 0.0 | 1.0 | | 13 | |
| | Per capita GDP | 0.111 | 0.297 | -0.030 | 0.4 | 3.0 | 0.0 | 4.1 | | 51 | |
| Economic | Intra-mechanism exports | 0.004 | -0.182 | 0.312 | 0.0 | 1.1 | 3.3 | 4.5 | | 31 | |
| | Intra-mechanism imports | 0.071 | -0.149 | 0.344 | 0.2 | 0.8 | 4.1 | 5.4 | | 38 | 50 |
| | Trade Openness | -0.169 | -0.043 | 0.310 | 0.9 | 0.1 | 3.3 | 4.4 | | 31 | |
| | Net Terms for Exchanges | -0.028 | 0.267 | 0.086 | 0.0 | 2.4 | 0.3 | 3.3 | | 51 | |
| | HHI Concentration Index | 0.178 | -0.043 | 0.105 | 1.1 | 0.1 | 0.4 | 1.4 | | 22 | 22 |
| | Cross-border Trade | 0.198 | -0.038 | 0.096 | 1.3 | 0.1 | 0.3 | 1.7 | 28 | 27 | |
| | Total Public Debt | -0.068 | 0.110 | -0.040 | 0.2 | 0.4 | 0.1 | 0.6 | | 7 | |
| | Inflation | 0.013 | 0.085 | 0.164 | 0.0 | 0.2 | 0.9 | 1.2 | | 16 | |
| | Gross Formation of Fixed Capital | -0.071 | 0.158 | -0.140 | 0.2 | 0.9 | 0.7 | 1.1 | | 15 | 27 |
| | Economic Complexity Index | 0.178 | -0.063 | -0.254 | 1.1 | 0.1 | 2.2 | 2.9 | | 38 | |
| | Total Public Spending | 0.026 | 0.149 | -0.206 | 0.0 | 0.8 | 1.5 | 2.0 | | 25 | |
| **Explained Variance** | | | | | 5.229 | 5.423 | 5.151 | | | | |
| **Ratio of total variance (%)** | | | | | 33.089 | 34.315 | 32.595 | | | | |

*Source: Prepared by the authors.*

*Notes: (\*) Method of rotation: (oblique) Promax rotation with Kaiser-normalization. (\*\*) Table of rotated factors, multiplied by the ratio of explained variance of the corresponding component.*

**ANNEX 14**

**Rotating factors and ponderations in SICA**

| Dimensions | Indicators | Promax Rotation * | | Weights of indicators** | | Total weight on Index (%) | | Weight on the dimensions (%) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Comp1 | Comp2 | Comp3 | Comp1 | Value | Accumulated | Value | Accumulated |
| Political | Control of Corruption | 0.168 | -0.097 | 1.5 | 0.5 | 1.7 | | 11 | |
| | Government Effectiveness | 0.217 | -0.037 | 2.5 | 0.1 | 2.9 | | 18 | |
| | Political Stability | 0.221 | -0.045 | 2.6 | 0.1 | 3.0 | 16 | 19 | 16 |
| | Regulatory Quality | 0.211 | 0.016 | 2.3 | 0.0 | 2.7 | | 17 | |
| | State of Law | 0.214 | 0.046 | 2.4 | 0.1 | 2.8 | | 17 | |
| | Accountability | 0.220 | -0.043 | 2.5 | 0.1 | 3.0 | | 18 | |
| Environmental | Intensity in the use of Fertilizers | -0.117 | 0.075 | 0.7 | 0.3 | 0.8 | | 10 | |
| | $CO_2$ Emissions | -0.004 | 0.291 | 0.0 | 4.0 | 4.8 | 8 | 58 | 8 |
| | Energy Intensity in the GDP | 0.081 | -0.006 | 0.3 | 0.0 | 0.4 | | 5 | |
| | Use of substances that could deplete ozone layer | 0.024 | 0.196 | 0.0 | 1.8 | 2.2 | | 26 | |
| Cultural | Internet Users | 0.190 | 0.020 | 1.9 | 0.0 | 2.2 | | 39 | |
| | Cell phone users | 0.121 | 0.078 | 0.8 | 0.3 | 0.9 | | 16 | 44 |
| | Computer Users | 0.206 | 0.039 | 2.2 | 0.1 | 2.6 | 13 | 46 | |
| | Tourism | 0.103 | -0.319 | 0.6 | 4.8 | 5.7 | | 78 | |
| | Exports of intra-mechanism cultural goods | 0.104 | 0.156 | 0.6 | 1.2 | 1.4 | | 19 | 56 |
| | Imports of intra-mechanism cultural goods | 0.025 | 0.070 | 0.0 | 0.2 | 0.3 | | 4 | |
| Social | Life expectancy at birth | 0.223 | 0.099 | 2.6 | 0.5 | 3.1 | | 13 | |
| | Public spending on health | 0.143 | 0.273 | 1.1 | 3.6 | 4.2 | | 18 | |
| | Infant mortality | 0.198 | 0.218 | 2.0 | 2.3 | 2.7 | | 11 | |
| | Public spending on education | 0.109 | 0.207 | 0.6 | 2.0 | 2.4 | | 10 | 63 |
| | Poverty | 0.193 | -0.102 | 1.9 | 0.5 | 2.3 | | 10 | |
| | Extreme Poverty | 0.205 | -0.180 | 2.2 | 1.5 | 2.6 | | 11 | |
| | Improvement in the supply of water | 0.235 | -0.026 | 2.9 | 0.0 | 3.4 | 38 | 15 | |
| | Fertility in adolescents | 0.214 | 0.075 | 2.4 | 0.3 | 2.8 | | 12 | |
| | Unemployment rate | -0.081 | 0.205 | 0.3 | 2.0 | 2.4 | | 17 | |
| | Employment in agriculture | -0.196 | 0.189 | 2.0 | 1.7 | 2.4 | | 17 | |
| | Employment in industry | 0.008 | -0.233 | 0.0 | 2.6 | 3.1 | | 22 | 37 |
| | Employment in services | 0.224 | -0.073 | 2.6 | 0.3 | 3.1 | | 22 | |
| | Per capita GDP | 0.224 | -0.024 | 2.6 | 0.0 | 3.1 | | 22 | |
| Economic | Intra-mechanism exports | -0.092 | 0.122 | 0.4 | 0.7 | 0.8 | | 13 | |
| | Intra-mechanism imports | -0.149 | 0.213 | 1.2 | 2.2 | 2.6 | | 41 | 25 |
| | Trade Openness | 0.124 | 0.225 | 0.8 | 2.4 | 2.9 | | 46 | |
| | Net Terms for Exchanges | -0.104 | -0.061 | 0.6 | 0.2 | 0.7 | | 11 | |
| | HHI Concentration Index | 0.130 | 0.266 | 0.9 | 3.4 | 4.0 | | 64 | 25 |
| | Cross-border Trade | 0.157 | -0.016 | 1.3 | 0.0 | 1.5 | 25 | 25 | |
| | Total Public Debt | -0.052 | 0.254 | 0.1 | 3.1 | 3.6 | | 29 | |
| | Inflation | 0.044 | -0.034 | 0.1 | 0.1 | 0.1 | | 1 | |
| | Gross Formation of Fixed Capital | 0.052 | 0.175 | 0.1 | 1.5 | 1.7 | | 14 | 50 |
| | Economic Complexity Index | 0.219 | 0.043 | 2.5 | 0.1 | 3.0 | | 24 | |
| | Total Public Spending | -0.001 | 0.266 | 0.0 | 3.4 | 4.0 | | 32 | |
| **Explained Variance** | | | | 5.606 | 5.110 | | | | |
| **Ratio of total variance (%)** | | | | 52.317 | 47.683 | | | | |

Source: *Prepared by the authors.*

Notes: *(\*) Method of rotation: (oblique) Promax rotation with Kaiser-normalization. (\*\*) Table of rotated factors, multiplied by the ratio of explained variance of the corresponding component.*

**ANNEX 15**

**Rotating factors and ponderations in the Andean Community**

| Dimensions | Indicators | Promax Rotation * | | Weights of indicators** | | Total weight on Index (%) | | Weight on the dimensions (%) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Comp1 | Comp2 | Comp1 | Comp2 | Adjusted Value | Adjusted Accumulated | Value | Accumulated |
| Political | Control of Corruption | 0.145 | -0.050 | 1.0 | 0.1 | 1.2 | | 11 | |
| | Government Effectiveness | 0.075 | -0.124 | 0.3 | 0.8 | 0.9 | | 8 | |
| | Political Stability | -0.060 | 0.210 | 0.2 | 2.2 | 2.6 | 11 | 24 | 11 |
| | Regulatory Quality | -0.021 | -0.181 | 0.0 | 1.6 | 1.9 | | 18 | |
| | State of Law | -0.114 | -0.026 | 0.6 | 0.0 | 0.7 | | 7 | |
| | Accountability | 0.026 | 0.238 | 0.0 | 2.9 | 3.3 | | 31 | |
| Environmental | Intensity in the use of Fertilizers | -0.207 | -0.023 | 2.1 | 0.0 | 2.5 | | 20 | |
| | $CO_2$ Emissions | -0.231 | 0.193 | 2.6 | 1.9 | 3.1 | 12 | 25 | 12 |
| | Energy Intensity in the GDP | 0.168 | -0.175 | 1.4 | 1.6 | 1.8 | | 15 | |
| | Use of substances that could deplete ozone layer | -0.007 | 0.284 | 0.0 | 4.1 | 4.7 | | 39 | |
| Cultural | Internet Users | 0.248 | 0.132 | 3.0 | 0.9 | 3.5 | | 35 | |
| | Cell phone users | 0.247 | 0.152 | 3.0 | 1.2 | 3.5 | | 35 | 66 |
| | Computer Users | 0.226 | 0.114 | 2.5 | 0.7 | 2.9 | 15 | 29 | |
| | Tourism | -0.032 | 0.065 | 0.1 | 0.2 | 0.2 | | 5 | |
| | Exports of intra-mechanism cultural goods | 0.135 | -0.259 | 0.9 | 3.4 | 3.9 | | 78 | 34 |
| | Imports of intra-mechanism cultural goods | 0.123 | -0.074 | 0.8 | 0.3 | 0.9 | | 17 | |
| Social | Life expectancy at birth | 0.249 | -0.016 | 3.1 | 0.0 | 3.5 | | 16 | |
| | Public spending on health | 0.134 | -0.098 | 0.9 | 0.5 | 1.0 | | 5 | |
| | Infant mortality | -0.274 | 0.047 | 3.7 | 0.1 | 4.3 | | 20 | |
| | Public Infant mortality spending on education | 0.004 | 0.185 | 0.0 | 1.7 | 2.0 | | 9 | 59 |
| | Poverty | 0.215 | 0.052 | 2.3 | 0.1 | 2.6 | | 12 | |
| | Extreme Poverty | 0.205 | 0.023 | 2.1 | 0.0 | 2.4 | | 11 | |
| | Improvement in the supply of water | 0.240 | -0.061 | 2.8 | 0.2 | 3.3 | 37 | 15 | |
| | Fertility in adolescents | 0.217 | 0.016 | 2.3 | 0.0 | 2.7 | | 12 | |
| | Unemployment rate | -0.053 | 0.248 | 0.1 | 3.1 | 3.6 | | 24 | |
| | Employment in agriculture | 0.031 | 0.223 | 0.0 | 2.5 | 2.9 | | 19 | |
| | Employment in industry | -0.099 | -0.184 | 0.5 | 1.7 | 2.0 | | 13 | 41 |
| | Employment in services | 0.015 | -0.180 | 0.0 | 1.6 | 1.9 | | 13 | |
| | Per capita GDP | 0.286 | 0.019 | 4.1 | 0.0 | 4.7 | | 31 | |
| Economic | Intra-mechanism exports | -0.114 | 0.151 | 0.6 | 1.2 | 1.3 | | 16 | |
| | Intra-mechanism imports | 0.014 | 0.205 | 0.0 | 2.1 | 2.5 | | 29 | 34 |
| | Trade Openness | 0.032 | 0.286 | 0.1 | 4.1 | 4.8 | | 56 | |
| | Net Terms for Exchanges | 0.188 | 0.186 | 1.7 | 1.8 | 2.0 | | 37 | |
| | HHI Concentration Index | 0.043 | 0.116 | 0.1 | 0.7 | 0.8 | | 14 | 22 |
| | Cross-border Trade | 0.100 | 0.215 | 0.5 | 2.3 | 2.7 | 25 | 49 | |
| | Total Public Debt | -0.222 | 0.009 | 2.4 | 0.0 | 2.8 | | 25 | |
| | Inflation | 0.026 | 0.038 | 0.0 | 0.1 | 0.1 | | 1 | |
| | Gross Formation of Fixed Capital | 0.230 | 0.050 | 2.6 | 0.1 | 3.0 | | 27 | 45 |
| | Economic Complexity Index | 0.114 | -0.252 | 0.6 | 3.2 | 3.7 | | 33 | |
| | Total Public Spending | 0.055 | 0.169 | 0.1 | 1.4 | 1.7 | | 15 | |
| **Explained Variance** | | | | 5.224 | 5.329 | | | | |
| **Ratio of total variance (%)** | | | | 49.504 | 50.496 | | | | |

*Source: Prepared by the authors.*

*Notes: (\*) Method of rotation: (oblique) Promax rotation with Kaiser-normalization. (\*\*) Table of rotated factors, multiplied by the ratio of explained variance of the corresponding component.*

## ANNEX 16
## Rotating factors and ponderations in CARICOM

| Dimensions | Indicators | Promax Rotation * | | | | Weights of indicators** | | | | Total weight on Index (%) | | Weight on the dimensions (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Comp1 | Comp2 | Comp3 | Comp4 | Comp1 | Comp2 | Comp3 | Comp4 | Adjusted Value | Adjusted Accumulated | Value | Accumulated |
| Political | Control of Corruption | 0.304 | -0.038 | -0.113 | 0.176 | 2.4 | 0.0 | 0.3 | 0.7 | 3.5 | | 16 | |
| | Government Effectiveness | 0.285 | 0.081 | -0.067 | 0.212 | 2.1 | 0.2 | 0.1 | 1.1 | 3.0 | | 14 | |
| | Political Stability | 0.314 | -0.108 | -0.011 | 0.051 | 2.5 | 0.3 | 0.0 | 0.1 | 3.7 | 22 | 17 | 22 |
| | Regulatory Quality | 0.303 | -0.019 | -0.263 | 0.104 | 2.3 | 0.0 | 1.6 | 0.3 | 3.4 | | 16 | |
| | State of Law | 0.316 | -0.148 | -0.151 | -0.013 | 2.6 | 0.5 | 0.5 | 0.0 | 3.7 | | 17 | |
| | Accountability | 0.338 | -0.047 | -0.069 | -0.048 | 2.9 | 0.1 | 0.1 | 0.1 | 4.3 | | 20 | |
| Environmental | $CO_2$ Emissions | -0.092 | 0.474 | -0.191 | 0.065 | 0.2 | 5.3 | 0.9 | 0.1 | 7.8 | 10 | 75 | 10 |
| | Use of substances that could deplete ozone layer | 0.204 | -0.131 | 0.273 | -0.062 | 1.1 | 0.4 | 1.8 | 0.1 | 2.6 | | 25 | |
| Cultural | Internet Users | 0.176 | 0.341 | 0.328 | -0.040 | 0.8 | 2.8 | 2.6 | 0.0 | 4.0 | | 50 | 60 |
| | Cell phone users | 0.148 | 0.343 | 0.326 | -0.087 | 0.6 | 2.8 | 2.5 | 0.2 | 4.1 | 14 | 50 | |
| | Exports of intra-mechanism cultural goods | -0.008 | 0.392 | -0.219 | 0.180 | 0.0 | 3.6 | 1.1 | 0.8 | 5.3 | | 96 | 40 |
| | Imports of intra-mechanism cultural goods | -0.062 | 0.053 | -0.077 | -0.040 | 0.1 | 0.1 | 0.1 | 0.0 | 0.2 | | 4 | |
| Social | Life expectancy at birth | -0.004 | 0.002 | -0.053 | 0.423 | 0.0 | 0.0 | 0.1 | 4.2 | 6.2 | | 40 | |
| | Public spending on health | -0.126 | -0.097 | 0.231 | 0.331 | 0.4 | 0.2 | 1.3 | 2.6 | 3.8 | | 25 | 74 |
| | Infant mortality | -0.349 | 0.009 | -0.030 | 0.074 | 3.1 | 0.0 | 0.0 | 0.1 | 4.6 | 21 | 29 | |
| | Improvement in the supply of water | -0.012 | 0.101 | -0.061 | -0.162 | 0.0 | 0.2 | 0.1 | 0.6 | 0.9 | | 6 | |
| | Per capita GDP | 0.179 | -0.066 | -0.066 | -0.142 | 0.8 | 3.8 | 0.1 | 0.5 | 5.5 | | 100 | 26 |
| Economic | Intra-mechanism exports | 0.172 | -0.048 | 0.167 | 0.346 | 0.8 | 0.1 | 0.7 | 2.8 | 4.2 | | 37 | |
| | Intra-mechanism imports | 0.069 | -0.169 | 0.395 | 0.091 | 0.1 | 0.7 | 3.7 | 0.2 | 5.4 | | 48 | 34 |
| | Trade Openness | -0.216 | -0.050 | 0.071 | 0.192 | 1.2 | 0.1 | 0.1 | 0.9 | 1.7 | | 15 | |
| | Net Terms for Exchanges | -0.088 | 0.178 | 0.009 | 0.230 | 0.2 | 0.7 | 0.0 | 1.3 | 1.8 | | 35 | 16 |
| | HHI Concentration Index | -0.002 | -0.097 | 0.045 | 0.313 | 0.0 | 0.2 | 0.0 | 2.3 | 3.4 | 33 | 65 | |
| | Total Public Debt | -0.010 | 0.065 | 0.343 | -0.134 | 0.0 | 0.1 | 2.8 | 0.4 | 4.1 | | 24 | |
| | Inflation | 0.236 | -0.002 | 0.035 | -0.063 | 1.4 | 0.0 | 0.0 | 0.1 | 2.1 | | 12 | 50 |
| | Gross Formation of Fixed Capital | 0.004 | -0.147 | 0.005 | -0.419 | 0.0 | 0.5 | 0.0 | 4.2 | 6.1 | | 36 | |
| | Total Public Spending | 0.019 | 0.211 | 0.363 | 0.053 | 0.0 | 1.1 | 3.1 | 0.1 | 4.6 | | 27 | |
| Explained Variance | | | | | | 4.035 | 3.749 | 3.961 | 4.052 | | | | |
| Ratio of total variance (%) | | | | | | 25.544 | 23.730 | 25.076 | 25.650 | | | | |

Source: Prepared by the authors.

Notes: (*) Method of rotation: (oblique) Promax rotation with Kaiser-normalization. (**) Table of rotated factors, multiplied by the ratio of explained variance of the corresponding component.

**ANNEX 17**

Models formulated within the space of statuses.

　　　　The technique of the models written in the form of space within statuses seeks, by means of linear systems, to extract the dynamics entailed in the relations between unobserved variables, commonly known as status, in function of observed variables called measured or observed variables.

　　　　What is really observed and what can be concluded from the observation is written, as a matrix, based on two equations, in the following manner:

　　　　Through this system, it is possible to infer the properties of the status variable $x$, based on the information provided by the observed vector of variables $z_t$, and the structure of the relation existing between the statuses over several periods of time; in this case, it is assumed that the status variable continues an order 1 Markovian process.

　　　　It is possible to further expand the system with the purpose of incorporating $u_t$ exogenous variables, and add the information provided by the noise component, both that of the status and that of the $v_t$ and $w_t$ observation, which constitutes a representation for the dynamic trend of the status variable, as shown as follows (Terceiro, 1990):

$$\hspace{4cm} \tag{1}$$

$$\hspace{4cm} \tag{2}$$

　　　　In summary, the equation (1) is the equation of the statuses and describes the evolution of the vector of status ▢ of dimension ▢, whilst the equation (2) generates the vector of measurement ▢ of dimension ▢ ▢ is a vector of exogenous variables, ▢ and ▢ are processes of white noise, such that:

　　　　Where ▢ and ▢ are matrixes with coefficient relation, which for the purpose of this paper are considered fixed or invariants in time.

Smoothing algorithm of fixed interval

　　　　In this paper, smoothing is considered to include the missing information in the model, on the basis of the information available, ▢ to ▢ ; this is ▢ and referring to the conditional moments of first and second order of the vector of status, such as:

**42**
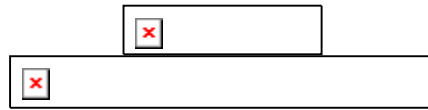




A status variable is incorporated and all the missing information will be incorporated.

Smoothing not only uses the information contained in the moment $\boxed{\times}$ but also the information before and after the moment $\boxed{\times}$ This means that a delay occurs in obtaining the information in comparison with the filtering, but this delay is compensated with the capacity of using all the information available in the sample before and after. This makes smoothing a very attractive method when inserting missing information within the sample.

It is possible, and following De Jong (1989), to insert $\boxed{\times}$, $\boxed{\times}$ y $\boxed{\times}$ within the space $\boxed{\times}$ by using an smoothing algorithm of fixed interval. This algorithm consists of a step forward given by a standard Kalman filter and a backward recursion, which takes the following form:
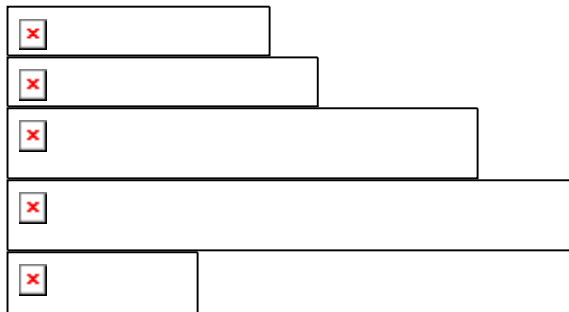










where $\boxed{\times}$ and $\boxed{\times}$ were calculated at a step ahead, $\boxed{\times}$ is the sequence of the innovations of the Kalman filter, which corresponds to (2)-(3); $\boxed{\times}$ is the matrix of the co-variance of $\boxed{\times}$ and $\boxed{\times}$ is the earning of the Kalman filter. Model (2)-(3) can be stationary, non-stationary or partially stationary, depending on the auto values of $\boxed{\times}$

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