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"Impacts of Social Spending, Economic Freedom and Institutional Factors on Poverty in Latin American Countries. Impact analysis of Free School Policy in Colombia"

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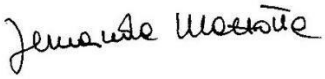

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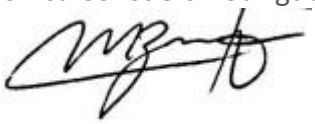

Academic Year 2022/2023

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Dedicado a todos los ángeles que me ayudaron en este camino

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Introduction

The end of poverty by 2030 is the first goal of Sustainable Development, however in Latin America a significant part of people is still in poverty and therefore this work revolves around the theme of poverty in Latin America and is inspired by all families in the region who live with the indispensable minimum of 6.85 dollars a day or less. This paper studies the relationship between poverty and other variables of interest and control by government authorities such as public social spending, economic freedom, economic growth, and well-being, in the period between 1997 and 2020 for 15 Latin American countries and ends in deepening on educational policy in Colombia.

The work adopts the conventional definition and measurement of poverty, from the perspective of income, since it has the advantage that it allows international comparison, so the indicator used is the poverty line proposed by the World Bank in September 2022, as the percentage of population living with less than 2.15, 3.65 and 6.85 per day at constant international prices in 2017. At present, the multidimensional measurement of poverty is not the same for all Latin American countries and although the World Bank also proposes an indicator in this regard, there are no data for the countries of interest.

Most of the data is taken from the World Bank and ELAC which are reliable sources of information and allow comparison between different countries. At the level of Latin America, it takes a sample of 15 countries: Mexico in North America; Costa Rica, Dominican Republic, El Salvador, Honduras, and Panama of Central America; and Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, and Uruguay in South America, the selection of these is given by the availability of information.

The work is divided into three sub-documents. The first chapter explores the relationship between public social spending and poverty reduction in Latin America for the period between 1997 and 2020, public social spending is distributed between spending on education, health spending, housing spending and social security spending. It shows how these indicators have performed in Latin America for the period and the selected countries, which are grouped into three economic blocs: MERCOSUR (Common Market of the South), CAN (Andean Community of Nations) and SICA (Central American Integration System). In the behavior of poverty, it can be identified that it has decreased significantly and there has been a process of convergence and in the same way it is noted that public social spending as a percentage of GDP increases. By having the information of a group of 15 countries for 24 years, we have a data panel, when facing the problem of endogeneity since poverty and public social spending present a causal relationship in two directions, a dynamic panel model system GMM (Generalized Method of Moments) is estimated, however we face a second challenge that is related to a small sample size that is solved to through the estimation or prediction of the explanatory endogenous variables using the Kitchen-Sink methodology to then estimate the OLS fixed effects dynamic panel model and the system GMM. The result shows us that public social spending does indeed influence poverty reduction, and it is of particular interest that public social spending on health improves extreme poverty, that is, it decreases the population that lives on less than 2.15 dollars a day, while public social spending on education has an effect on those who live on less than 6.85 dollars a day. We also find that there is a beneficial effect of economic growth.

The second chapter explores the correlations between poverty, economic freedom, and happiness, as well as some economic and institutional aspects in Latin America through a coresponse analysis. In this case it is no longer a question of finding the effect of causality but only of correlation, so a correspondence analysis is used to find the association between 15 Latin American countries and variables of interest. The

analysis is carried out in two periods namely: 2007-2009 and 2017-2019 which allows a comparative static analysis. As a result, we found that there is a direct correlation between poverty and happiness as well as an inverse correlation between economic freedom and poverty, so that countries with lower economic freedom show higher poverty rates, and on the other hand, paradoxically, these countries with higher poverty rates also show higher levels of happiness. This analysis also shows us an interesting way to group countries into clusters according to their similarities in terms of poverty, economic freedom, economic performance, institutional performance, and happiness.

Being that Colombia one of the countries with the highest poverty incidence indicator and given that in the first chapter we find that spending on education has an impact on poverty reduction, the third chapter presents the policies around basic education developed in Colombia. The policy of free education in formal education is highlighted and the estimation of a dif and dif model , considering a continuous staggered made using information from 24 departments, which shows that the free policy has a positive effect on the increase in official gross enrollment primary and total, and has a collateral effect on the employment rate and labour force participate rate by sex, since the fact that more children attend school gives the possibility to more people of integrating into the labor market.

I Public Social Spending and Poverty Reduction in Latin America 1997 – 2020

Abstract

This document aims to analyze the relationship between public social spending and poverty reduction from the traditional perspective of income for 15 Latin America countries between 1997 and 2020. To get this aim, the estimation of a standard dynamic panel model of fixed effects OLS Fe as well as a dynamic panel model system GMM are estimated using the kitchen sink approach for three levels of poverty, using as explained variable the poverty headcount rate of the population that lives with less than 2.15, 3.65 and 6.85 dollars per day at 2017 international prices. The findings suggest that in Latin American countries public social spending on education has been relevant to the reduction of the poverty rate at 6.85 level, while health spending shows a short-term effect on to reduce extreme poverty and spending on housing and social security have a long-term beneficial effect also on extreme poverty (2.15 level). Finally, the results also reveal that Latin America is characterized by a persistent poverty phenomenon.

Keywords: Government Expenditures and Welfare Programs, Government Policy. Measurement and analysis of poverty

JEL classification: H53, I32, I38

Spesa pubblica sociale e riduzione della povertà in America Latina 1997 - 2020

Riepilogo

Il documento mira ad analizzare la relazione tra spesa sociale pubblica e riduzione della povertà dalla prospettiva tradizionale del reddito per 15 paesi dell'America Latina tra il 1997 e il 2020. Per raggiungere questo obiettivo, se fa la stima di un modello standard di panel dinamico di effetti fissi OLSFe e di modello di panel dinamico system GMM per tre livelli di povertà, utilizzando come variabile spiegata il tasso di povertà della popolazione che vive con meno di 2,15, 3,65 e 6,85 dollari al giorno ai prezzi internazionali del 2017. I risultati suggeriscono che nei paesi dell'America Latina la spesa sociale pubblica per l'istruzione è stata rilevante per la riduzione del tasso di povertà al livello di 6,85 dollari, mentre la spesa sanitaria mostra un effetto a breve termine sulla riduzione della povertà estrema e la spesa per l'alloggio e la sicurezza sociale ha un effetto benefico a lungo termine sulla povertà estrema (livello 2,15). Infine, i risultati rivelano anche che l'America Latina è caratterizzata da un fenomeno di povertà persistente.

Parole chiave*: Spesa pubblica e programmi di welfare, Politica governativa. Misurazione e analisi della povertà*

Classificazione JEL: H53, I32, I38

I.1 Introduction

To end of poverty in all its forms is the first objective of sustainable development goals, and public social spending is one of the tools that societies use to achieve this objective. Therefore, the analysis between these two variables becomes important and useful to measure the impact that social spending has been able to generate in reducing poverty Latin American.

At the end of the 20th century, Latin American countries suffered an important crisis because of the change in the economic paradigm: they adopted the neoliberal model of economic opening that brought with it an economic and social crisis as part of the adjustment which leads to these countries ending the 20th century with high levels of poverty. According to the data of world development indicators of World Bank (2023), for 1999 in Latin America and Caribbean around 272 million people lived with less of 6.8 dollars per day (2017 PPP) was estimated to be 52.8% of the population, 20 years later, in 2019 this figure stood at 28% which corresponds to 181 million of people. The poverty headcount ratio at level 3.65 dollars per day for 1999 was 27.8%, corresponding to 143 million people, while for 2019 it was 10.1% involving 65 million people. Finally, for 1999 around 76 million of people were in a situation of extreme poverty, that is 14.7% of the population lived with less of 2.15 dollars per day (2017 PPP); for 2019 this figure decreased significantly to 4.3% which corresponds to 28 million people. (World Bank, 2023). Therefore, the social policy took on an important role in these countries hence public social spending was expanded, under the scheme of targeting spending, assistance, and demand subsidies.

In this region the public social spending has been focused on the poor and vulnerable population and has materialized through spending on social security, education, health, and housing, through the implementation of programs to combat poverty, conditional transfers, and subsidies, which have consumed a part of the public budget resources of each country and therefore it is important to make a retrospective review of their impact on the poverty level.

In the last decade, the Latin American countries presented an improvement in their socioeconomic indicators, showing important advances in poverty reduction and a recovery in economic growth, which make it a dynamic region in its macroeconomic reality over time. In this sense, this document is important because it estimates the effect of public social spending on education, health, and others on poverty. In addition, a dynamic analysis is also presented to observe the persistent effect of poverty.

The following countries are taken for the analysis[1]: Mexico in North America; Costa Rica, Dominican Republic, El Salvador, Honduras, and Panama of Central America; and Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, and Uruguay in South America. The poverty data are taken from the World Bank and the public social spending data were taken from ECLAC - Economic Commission for Latin America and the Caribbean or CEPAL for the acronym in Spanish.

The purpose of this document is to estimate the effect of public social spending on poverty reduction in the 15 countries of Latin America described above, using as an explained variable the poverty headcount rate as a percentage of the population living with less than 2.15, 3.65 and 6.85 dollars per day as constant PPP values for 2017 and as an explanatory variable, public social spending as a percentage of GDP between the periods 1997 to 2020, under the hypothesis that greater public social spending will reduce poverty. As

[1] Belize, Guatemala, Nicaragua, and Venezuela are not considered due to lack of data.

control variables for the estimation, the following were used; GDP per capita PPP, inflation, and net international bilateral aid as a percentage of GDP, both at 2017 prices.

The first part of this document presents the introduction, the second part addresses the issue of poverty, and presents the way in which public social spending has behaved in the target countries; the third part of this chapter relates social programs from the perspective of conditional and unconditional cash transfers and transfers in kind; fourth is an overview of literature; fifth talk about the data set; sixth explains the methodology and seventh presents the results of the estimation of a standard dynamic panel model of fixed effects OLS Fe as well as a dynamic panel model system GMM that estimate the effect of public social spending on poverty reduction in the 15 countries of Latin America, to end with the conclusions.

I.2 Definition and behavior of main variables

I.2.1 Poverty: Definition

Regarding poverty, ECLAC defined it as "a situational syndrome in which underconsumption, malnutrition, precarious housing conditions, low educational levels, poor sanitary conditions, an unstable insertion in the system are associated productive, attitudes of discouragement and anomie, little participation in the mechanisms of social integration, and perhaps the ascription to a particular scale of values, differentiated to some extent from that of the rest of society "(Altimir, 1979). There are many aspects engage in this definition of poverty: food, housing, education, health, access to the labor market and participation in society and other aspects of a subjective and symbolic nature also define different areas of intervention in social policy and, therefore, public spending.

There are different approaches from which the concept and measurement of poverty can be approached, in general terms two types are identified.: objective and subjective; the objective refers to that which is observable and measurable, while the subjective depends on the perception of individuals and whether they identify themselves as poor or not. From the objective perspective there are also two approaches, that of absolute poverty and that of relative poverty.

Relative poverty, Townsend (1979) defines poverty as a form of relative deprivation, that is, as the insufficiency or scarcity (not as absence) in diets, services, norms, and activities common in society. In the same way is defined by Sen (1983) like "the deprivation of capability to function in society, and the lack of resources to acquire those capabilities". Sen also defined it as "a situation of deprivation in comparison with the general standard of living of the society in which one lives." (Sen et al, 1999). Thus, relative poverty depends on the socio-economic environment of the population under study and therefore changes from one country to another, so that an individual who may be considered poor in a country may not be poor in another country. The relative approach allows monitoring the evolution of poverty within countries in a way that addresses their situation, but does not allow comparisons between countries, which is why this approach is not used in this document.

Absolute poverty is a situation of deprivation where people do not have enough resources to meet the minimum requirements necessary for survival or satisfied the basic needs that include food, potable water, clothing, shelter, and medical (Sen, 1999). In the same vein, Ravallion (2003) defines as poor those of people who cannot satisfy certain predetermined needs of consumption and broad access to public

goods (health services, education, housing). This measure is independent of the standard of living or the degree of development of the society under study. Absolute poverty is defined without reference to social context or norms, but in terms of simple physical subsistence needs (Spicker, Alvarez, & Gordon, 2007). Ravallion and Chen (2009) point out that absolute poverty lines that attempt to have the same real value across time and space are often used to assess poverty in underdeveloped nations, while most high-income nations choose relative lines as measures of poverty. On the other hand, the measure of absolute poverty can be applied equally in all countries, and has been widely used in comparative studies, since it allows international comparisons.

George (1988) proposes an absolute version of poverty where “poverty consists of the inability to satisfy a series of basic needs and a set of other needs”. The United Nations has defined poverty as "the condition characterized by severe deprivation of basic human needs, including food, clean water, sanitation facilities, health, housing, education and information. poverty depends not only on monetary income but also access to services” (UN, 1995, 57). For the Interamerican Development Bank, from the monetary or material point of view, “poverty is a measure that compares the income or consumption of people with a predefined threshold such as “minimum” or “basic”, below which considers that individuals or families are poor.” (Duryea, Robles, & Sáenz, 2017).

World Bank also adopted an absolute perspective in 1990, defining poverty as “the inability to achieve a minimum standard of living”. To have a measure of absolute poverty comparable between the different regions and countries, this institution proposed the method of the poverty line, which is a threshold of daily income: this value corresponds to the average of the lines of national poverty policies adopted by the countries with the lowest levels of per capita income in the world (World Bank, 1990, p. 26). The poverty line proposed by World Bank, is a method to measure poverty based on the cost of satisfying basic needs defined as consumption or income, although this method focuses the measurement on material deficiencies, and is controversial because it is an arbitrarily constructed measure, its advantage is that it allows international comparison.

In 2017, World Bank adopted three additional parameters to the international poverty line of USD2.15, which are national poverty lines: USD3.65 and USD6.85 per day, social poverty line and multidimensional poverty. The additional poverty lines (USD3.65 and USD6.85) are measures of absolute poverty typical of standards among lower-middle-income and upper-middle-income countries, respectively, just as the value of the international poverty line (USD2.15) is derived from the typical poverty line for some of the world's poorest countries, and are designed to complement, not replace, the international poverty line (USD2.15). (World Bank, 2018, p 11). The social poverty line, which is adjusted on the typical level of consumption or income in each country, is introduced as a measure of relative poverty and shows the increase in the basic needs that a person must see satisfied to lead a decent life as a country becomes richer. And the multidimensional poverty parameter incorporates deprivations into three well-being indicators (monetary poverty, access to education, and basic infrastructure), allowing a better understanding of the complex nature of poverty.

It is important to mention that in this document we adopt the three absolute poverty lines: USD2.15, USD3.65 and USD6.85 for all countries in the sample, regardless of the income group to which they belong, thanks to the fact that as the World Bank (2023) says that lines USD3.65 and USD6.85, are "two complementary global poverty lines, which can be used as a reference point for countries around the world". Although they are created to better meet the income levels of the countries, these are absolute complementary and non-exclusive measures and thanks to this they are used in this document to

distinguish three degrees of intensity in poverty and thus have the possibility of observing in a differentiated manner the effect that public social spending has on each level of poverty.

The theoretical literature has developed a framework to define and measure poverty as a multidimensional phenomenon. Such approaches have as a theoretical-conceptual foundation the capabilities approach initially developed by Amartya Sen, who conceives poverty as "… the deprivation of basic capabilities and not only as a low income" (Sen, 2000, p. 114). Then under this conception, the Oxford Initiative on Poverty and Human Development OPHI and UNDP have approached poverty as a multidimensional problem and as a form of social deprivation beyond material deprivation. For their part, authors such as Banerjee and Duflo pose the problem of poverty from more concrete areas that can be addressed and solved and focuses on "understanding the economic lives of the poor and taking advantage of what the lives and decisions of the poor say regarding how to fight against global poverty" (Banerjee & Duflo, 2011, p. 13).

Thus, in the analysis of poverty, more and more non-material aspects such as people's well-being and their vulnerability, insecurity, social exclusion, gender, among others, are included, and some countries have adopted new indicators to measure it, however, it is calculated or measured differently within each country, which makes international comparisons difficult. World Bank (2021) also adopts the measure of multidimensional poverty including shortages in education, health, and housing, although this is also an interesting measure to consider, for the countries in reference and for the period 1997 – 2020 no statistical information is yet available on the indicators of the social poverty line and multidimensional poverty.

Although the absolute approach based on monetary income does not directly consider the multidimensional problem and presents limitations since it does not take into account accumulated resources, indirect family transfers and subsidies, the particular conditions of the families, the situation itself according to the country and local culture, among others, the analysis of this document is limited to the (absolute) income-based approach, with the aim of making international comparisons between the countries of Latin America, and the indicator of the poverty count rate is taken as a percentage of the population living on less than 2.15, 3.65 and 6.85 dollars per day, 2017 PPP values.

I.2.2 Behavior of poverty in Latin American countries

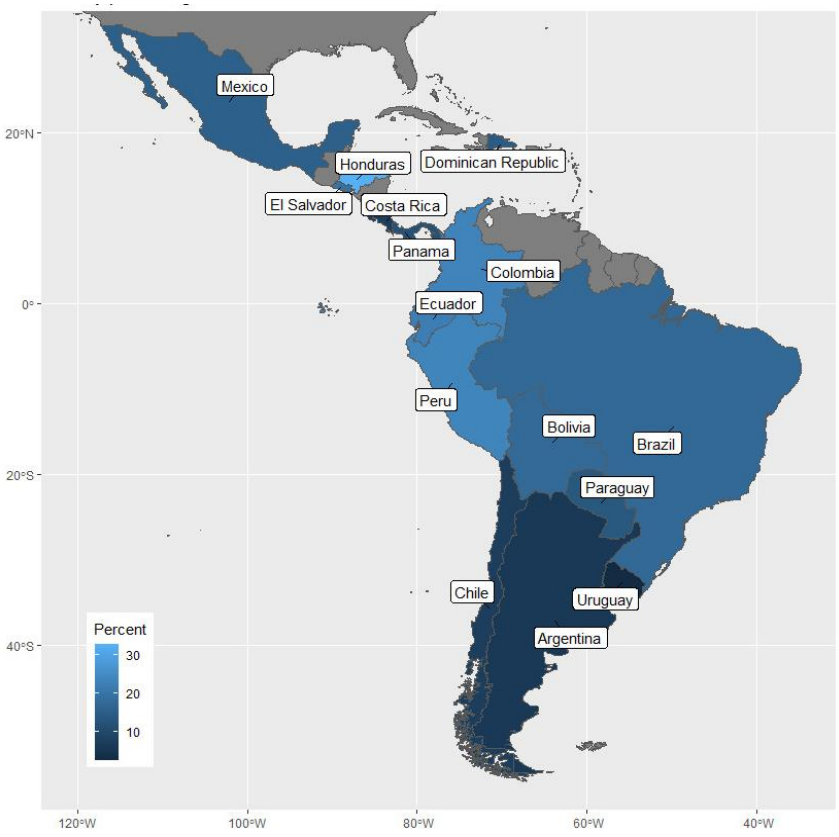
Poverty turns out to be an economic problem since it does not allow the population that suffers from it to develop their potential and live their lives fully, because the living conditions of this group of people are not adequate. For this reason, it is important to observe the evolution of the dimension of this problem at the Latin American level.

By the end of the eighties most of the countries of Latin America joined the proposals presented in the Washington census (1988) and were inserted into a new economic paradigm called Neoliberalism that advocated greater economic openness and a reduction in the participation of the state in the economy. This emerged as an opportunity to change the previous paradigm called the Import Substitution Model, which had been too paternalistic, leaving countries with a weak productive structure dependent on supply-side subsidies and tariff and para-tariff protections, as well as high inflationary levels and public debt caused in part by excessive public spending.

Thus, countries made several structural changes following 10 variables: 1) fiscal discipline, 2) cuts in public spending; 3) increase in the tax base; (4) liberalization of interest rates; (5) free floating of the exchange

rate; (6) liberalization of international trade; (7) liberalization of foreign direct investment; (8) privatization of public enterprises; 9) deregulation, and 10) guarantees of legal certainty for industrial property rights. Berumen (2009). These changes were implemented in an accelerated way and with the paradigm shift, the Latin American countries soon entered in crisis, in words of Stiglitz (2002, p 81) "The Washington consensus policies (Fiscal austerity, privatization and market liberalization) were designed to respond to Latin American problems such as the fiscal deficit and inflation. The problem was that many of these policies became ends in themselves, rather than means for equitable and sustainable growth. Thus, the policies were taken too far too fast, and the results have been very different from those sought". Examples of which are Mexico with the crisis of the tequila effect in 1994, in Colombia it occurred in 1998 and in Argentina in 2002, among others. The crisis was characterized by negative growth rates, rising unemployment rates and higher poverty. The results of the Washington Consensus policies were not satisfactory. In many countries that embraced its dogmas, development has been slow and where there has been growth, its fruits have not been equally distributed. In Latin America, after a brief period of growth in the early 1990s, stagnation and recession followed. Stiglitz (2002, p 117).

According to the World Bank´s World Development Indicators at the end of the 20th century to 1999, for the 15 countries taking in account in this document (that correspond to 86% of the population of the total Latin America and Caribbean) the people who lived with less than 6.85 dollars per day (2017 PPP) arrived to 48.8% of the population corresponding to 212,2 million people and 58.6 million of people were in a situation of extreme poverty, which is around 13.2% of the population who lived with less of 2.15 dollars per day (2017 PPP). In the next map is possible to see the average of poverty in Latin America.



Map 1 *Poverty in Latin America Average 1997-2020 - Percentage of the population living on less than 3.65 dollars a day constant 2017 PPP values - Source: Own elaboration with data from the World Bank.*

With this magnitude, this persistent phenomenon required the attention of the authorities, from where anti-poverty actions were developed. On the one hand, demand subsidies were provided focused on the population classified as poor and vulnerable, and, on the other hand, the possibility of access to primary and secondary education was strengthened, as well as the development of an infrastructure with greater coverage around housing in terms of the development of networks of public services and subsidies for social housing. Thus, at the end of the second decade of the twentieth century, poverty levels had indeed been reduced, however additional efforts must still be made since by the year 2020, poverty levels were 3.5% (19.3 million of people) for poverty level 2.15, 8.9% (50.2 million of people) for level 3.65 and 25% (147 million of people) for poverty level of 6.85.

To see the trajectory of poverty in Latin America, it is convenient to group the countries using León´s (2008, p. 34) suggestions implying that countries can be grouped according to their economic integration, the extent that it highlights the differences in the level of development and magnitude of poverty within the "Latin American space". In this case, for the South American countries there are two groups: the first is the Andean countries: Colombia, Ecuador, Peru, and Bolivia, the second is the Southern Cone countries: Argentina, Chile, Paraguay, Uruguay and added Brazil. For the North and Central America, a third group can be considered integrated by Mexico, Costa Rica, Dominican Republic, El Salvador, Honduras, and Panama.

These subregions are also supported by the fact that these countries have advanced in a different economic integration process: the Andean countries belong to the CAN – Andean Community of Nations – and the countries of the Southern Cone and Brazil belong to MERCOSUR – Southern Common Market – . MERCOSUR is a subregional economic integration agreement created in 1991 with the aim of creating a free trade area and promoting the economic, social, and cultural integration of the member countries, that is currently a customs union. For its part, the CAN is a subregional organization whose main objective is the harmonious and balanced development of its members, as well as their economic integration into a common market. It was initially created as the Andean Group in 1969 and in 1996 it was restructured and renamed as the Andean Community of Nations.

In Central America the integration is consolidated across the SICA – Central American Integration System – created in 1991 and made up of Belize, Costa Rica, Dominican Republic El Salvador, Guatemala, Honduras, Nicaragua, and Panama[2]. It is preceded by the Organization of Central American States created in 1951 and by the Central American Common Market created in 1960, (Combescot, 2014, p. 21). As Mexico borders this subregion to the north and since it has also developed a free trade agreement with the group, it is considered within the group for graphic and statistical purposes.

These subregions define relatively homogeneous spaces from the point of view of their resource endowment, the characteristics of the economies, and the particularities of the historical makeup of the countries that are part of them and therefore it is not a surprise that poverty levels are also similar within the subregion and dissimilar within regions. (León et al. 2008, p. 34).

In Latin America, poverty reduction from the USD 3.65 and USD 6.85 per day lines has been slower than from the extreme poverty line USD 2.15, suggesting that millions of people in those countries had only narrowly escaped extreme poverty. Those who have just escaped extreme poverty can easily slip back into it and are therefore especially vulnerable to the impoverishing effects of the socio-economic risks they face.

[2] Belize, Guatemala, Nicaragua, are not considered in the sample due to lack of data.

The behavior of the three poverty indicators is presented graphically below, noting that for the countries in question, except for Uruguay, the three levels of poverty were at high and increasing levels until the year 2000. As mentioned, this was due to the consequences of the implementation of neoliberal policies in Latin America in the last two decades of the 20th century, especially in relation to the opening of the economy and the privatization of public companies that resulted in the closure of many companies that were not sufficiently competitive with the subsequent increase in unemployment and poverty.

In the case of the Andean countries the situation was more difficult because, as can be seen in the figure 1.1, more than half of the population was below the poverty line, living on less than 6.85 dollars per day (PPP at constant 2017 prices). Because of the generalized economic crisis throughout the region due to the change of economic paradigm, each of the countries began the implementation of new political reforms in the social field, first through the recognition of the basic rights to education, health, and housing, and second to allow access to these public goods to the population in a condition of vulnerability. In this sense, political reforms to the constitution became necessary in Colombia (1991), Ecuador (2008) and Bolivia (2008).

The following is an overview of how the poverty indicator has been behaving: "Population living on less than 6.85 dollars per day as % of the population, 2017 PPP values (World Bank). For the Andean countries, the situation of poverty in Ecuador stands out, where for 2002, 75.9% of the population was considered poor and around 28.4% was in extreme poverty; in the figure 1.1 it is possible to observe that although Ecuador was the poorest country in the Andean zone at the beginning of the 21st century, it has shown a notable reduction in poverty in the last two decades, falling to levels below those of Colombia and Peru since 2005. As of 2008, Colombia has been presented as the poorest country in the CAN, because although the level of poverty has decreased, it has done so more slowly than its neighbors, with the aggravating factor that COVID returned this country to the poverty levels of 2010, around 44%.

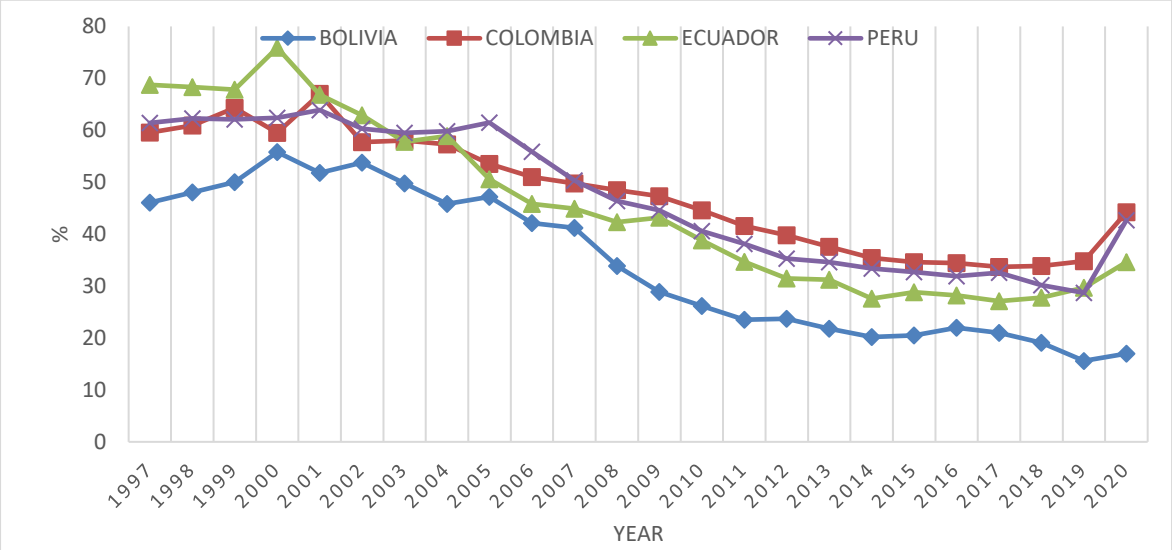


Figure 1.1 *Poverty in CAN - Percentage of the population living on less than 6.85 dollars a day constant 2017 PPP values - Source: Own elaboration with data from the World Bank.*

In the case of MERCOSUR, the insertion into the Neoliberal model occurred at a slightly earlier stage, so the crisis and adjustment policies began a little earlier, so the average poverty rate at the beginning of the

21st century was around 30%, while for the CAN it was around 60%. According to the Figure 1.2 it is possible to see that Brazil and Paraguay are the countries with the highest levels of poverty for the entire period of analysis. Argentina stands out for 2002, a year of great political and economic instability.

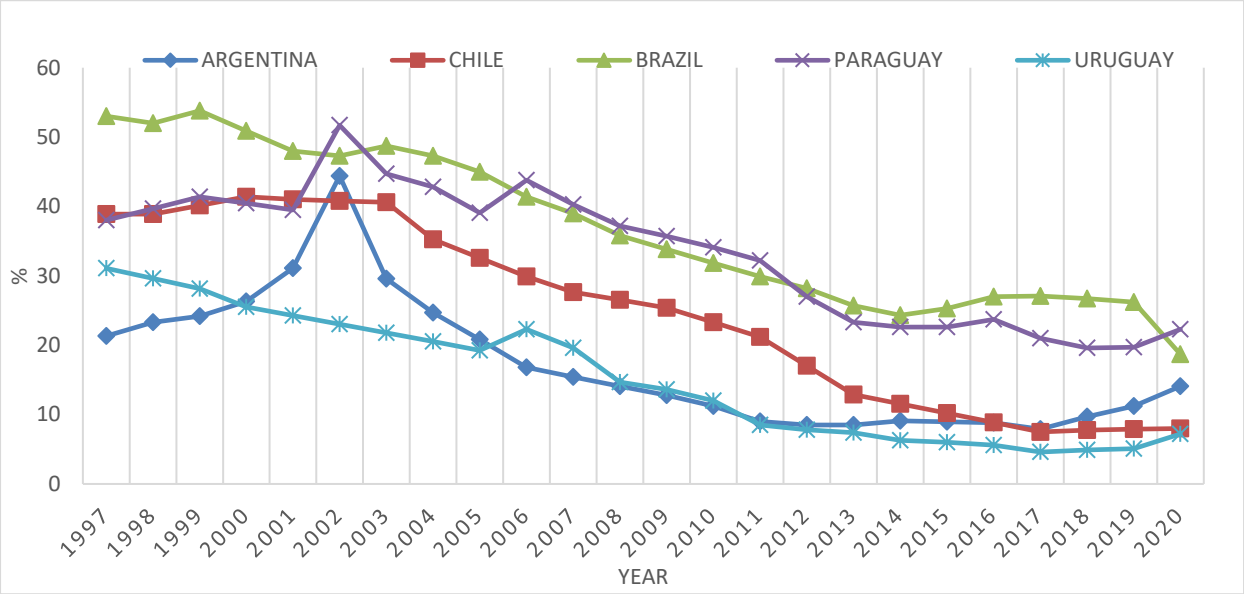


Figure 1.2 *Poverty in MERCOSUR - Percentage of the population living on less than 6.85 dollars a day constant 2017 PPP values - Source: Own elaboration with data from the World Bank.*

Figure 1.3 highlights Honduras, which begins the period with 65.6% poverty and ends it with 49.5%. It is the only country in the sample that does not converge to the poverty levels of the rest of SICA, which by 2020 was between 12 and 32%, and it is also the only country in the sample where half of the population is still in poverty. On the other hand, Costa Rica and Panama are the countries that have behaved best by reducing poverty levels from 39% to 20% and 39% to 12% respectively- this has happened in the first place because they have a small population size and second because the insertion of these countries to financial services and tourism has allowed the entire population to benefit from economic growth. Mexico, for its part, reduces poverty significantly, from 55.2% in 1997 to 32.5% in 2020. In this country a set of social programs were implemented in relation to the expansion of coverage in education, health, and social security, as well as programs to help microenterprises, contributing to the improvement of the living conditions of the population.

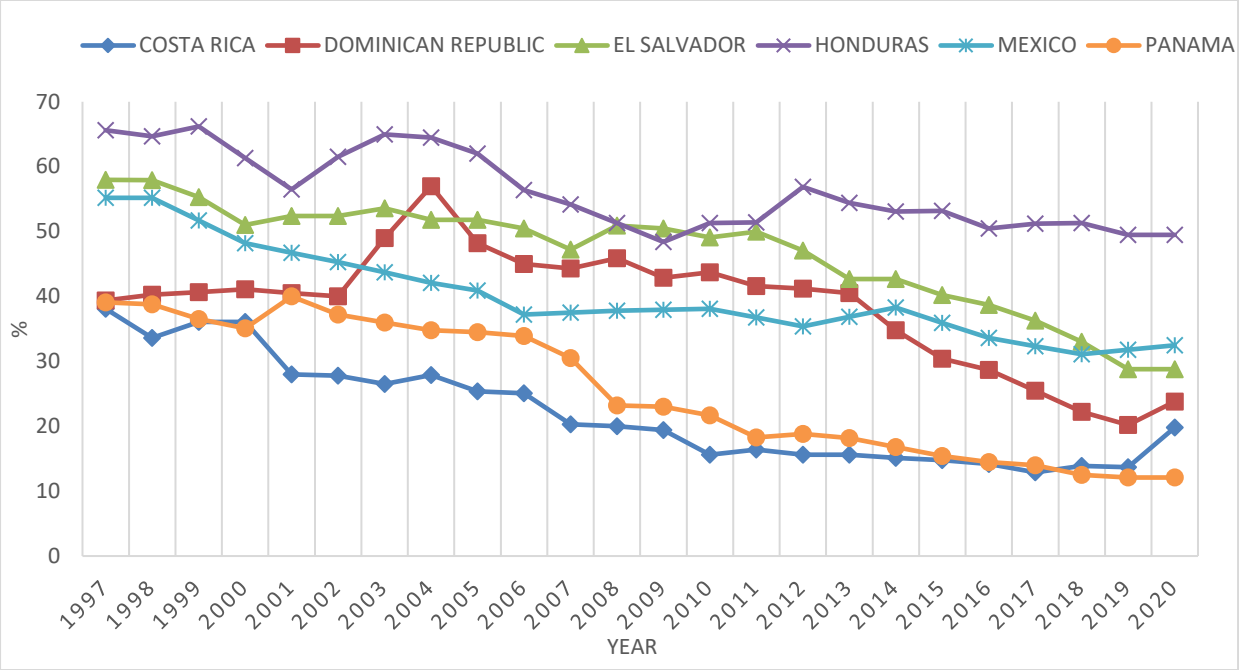


Figure 1.3 *Poverty in SICA and Mexico - Percentage of the population living on less than 6.85 dollars a day constant 2017 PPP values - Source: Own elaboration with data from the World Bank.*

The Figure 2.1 shows how the poverty indicator "Population living on less than 3.65 dollars per day as % of the population, 2017 PPP values (World Bank) has behaved. All the countries of Latin America implemented aid and policies for access to education and health, job creation, and in general subsidies for demand focused on the poor and vulnerable population as a consequence of neo assistance implemented in the region. This made it possible to start the process of alleviating poverty.

For the Colombian case, in 2001 it reached the highest peak in poverty level: until this year the consequences of the crisis that the country went through in 1999 were felt, when the GDP fell to a level of -4.9%. In the case of Ecuador, it is observed that the efforts of social policy helped to significantly reduce the average poverty level from 50% in 2000 to 9.9% in 2019. This coincides with the fact that in this country there was a notable increase in public social spending thanks to the policies implemented in the government of President Correa that promoted improvements in education, health, housing, and infrastructure in the country Legarda (2015).

In the case of Bolivia, the period of President Evo Morales that started in 2006 and the new Political Constitution of the State approved in 2008, allowed the implementation of policies of access to education, housing, and health, which managed to reduce poverty levels, especially in the urban area of the country.

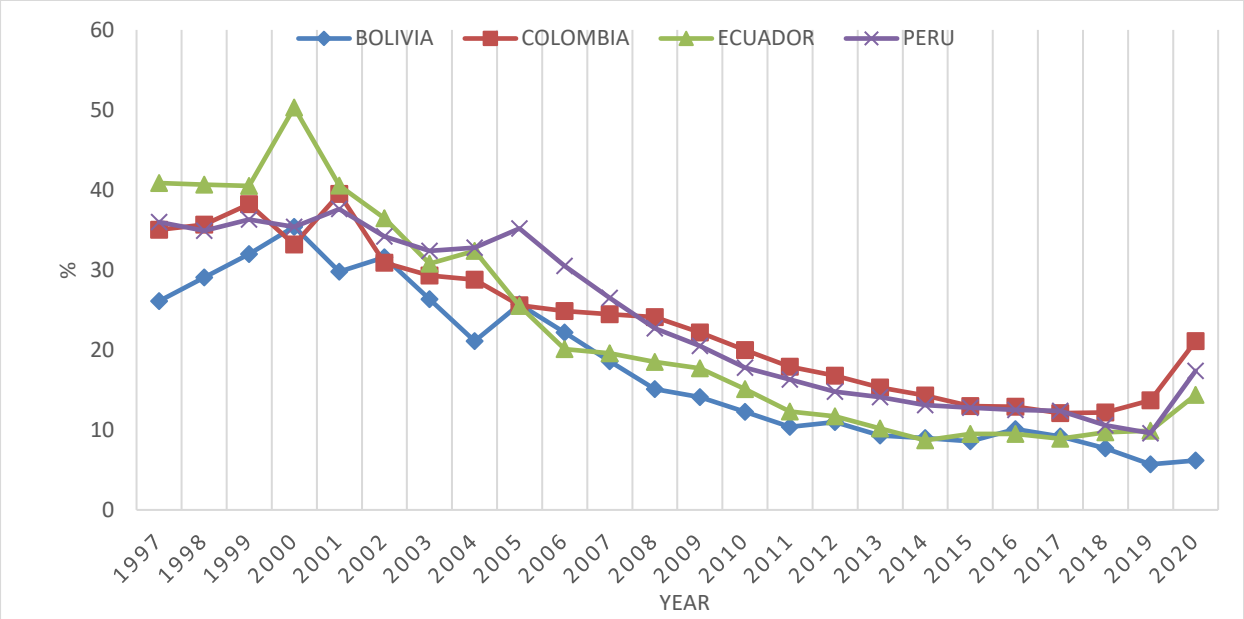


Figure 2.1 *Poverty in CAN - Percentage of the population living on less than $ 3.65 a day as constant 2017 PPP values. - Source: Own elaboration with data from the World Bank.*

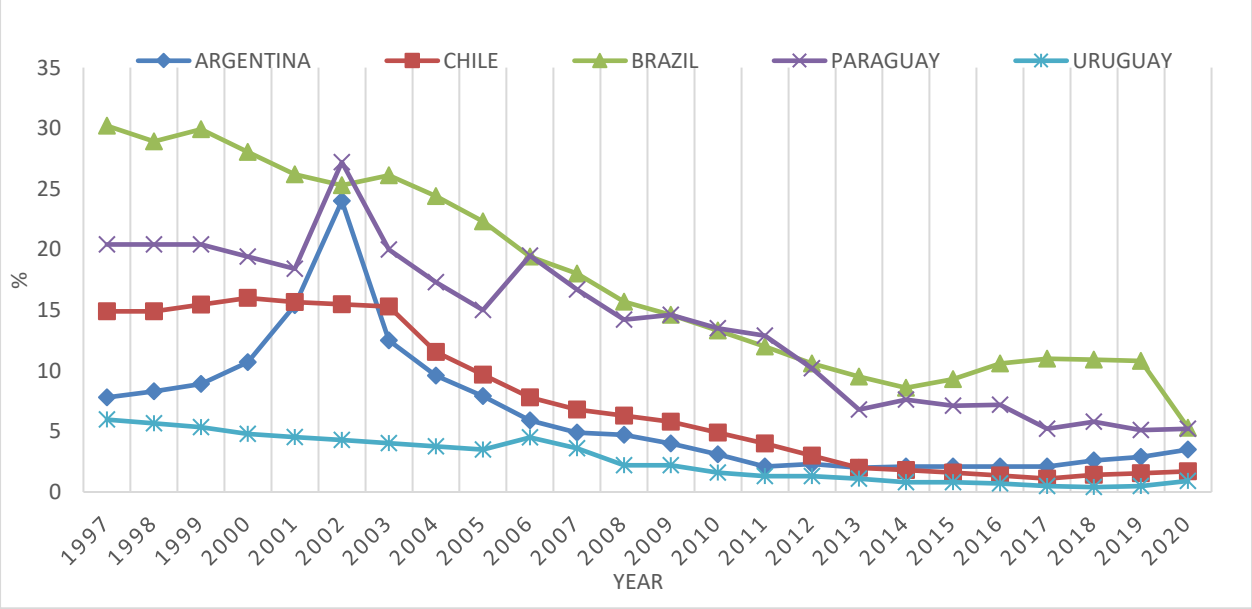


Figure 2.2 *Poverty in MERCOSUR - Percentage of the population living on less than $3.65 a day as constant 2017 PPP values. Source: Own elaboration with data from the World Bank.*

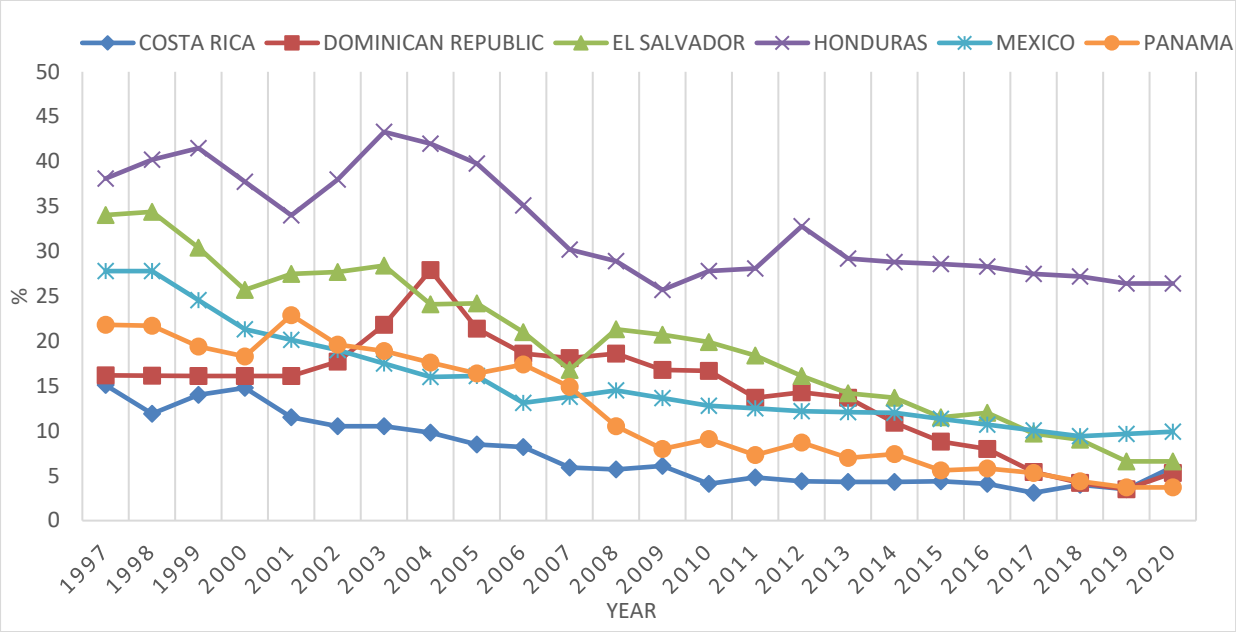


Figure 2.3 *Poverty in SICA and Mexico - Percentage of the population living on less than $3.65 a day as constant 2017 PPP values. Source: Own elaboration with data from the World Bank.*

In the figures 3.1 and 3.2 it is possible to observe that between 1997 - 2005 there were disparities in the average poverty rates and that Uruguay presented the lowest rate with 0.5% while in Ecuador that same rate amounted to 50% of the population, but during the following two decades it gave rise to a convergence process, especially in the Andean countries as a whole, and by 2019, Uruguay continued to be the country with the lowest average poverty rate, again with 0.5%, and Colombia the country with the highest rate in the region with a 12.7%. Thus, a convergence process for the poverty rate can be observed: from 2.1-50% range in 2000, to the 0.5-12.7% range in 2020.

Finally, the next graph shows the panorama of how the poverty indicator has been behaving “Population living on less than 2.15 dollars per day as % of the population, 2017 PPP values (World Bank).

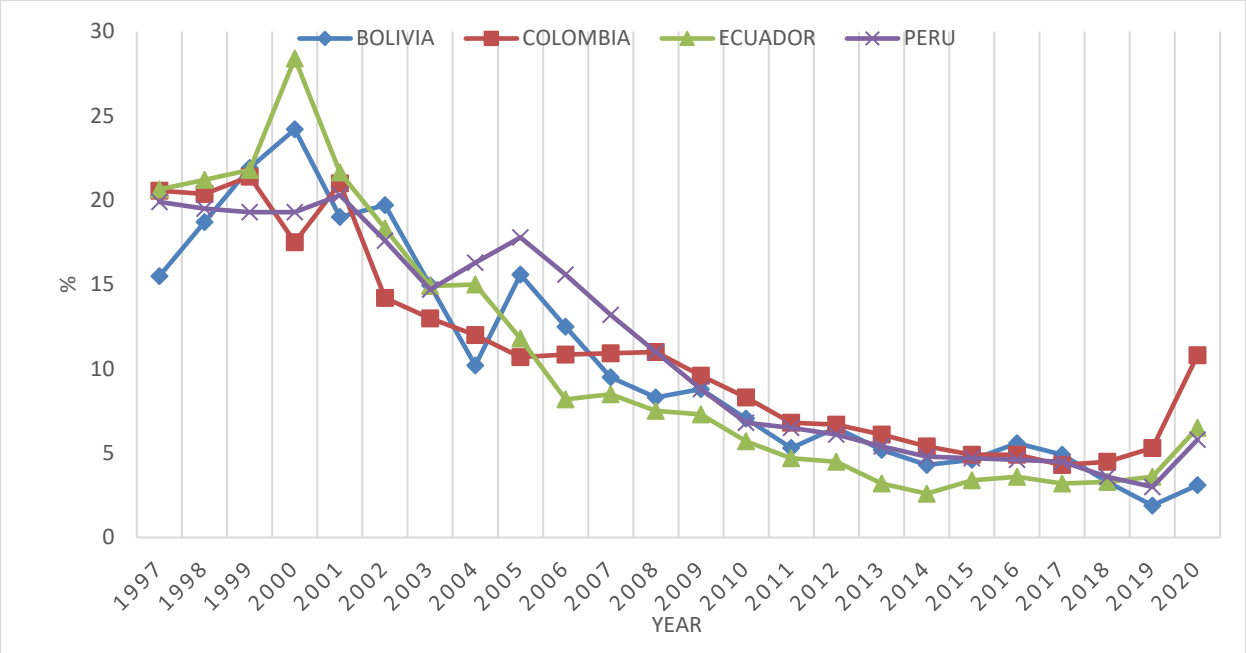


Figure 3.1 *Poverty in CAN - Percentage of the population living on less than 2.15 dollars a day as constant 2017 PPP values. - Source: Own elaboration with data from the World Bank.*

Following the figure 3.2, for MERCOSUR Brazil is the country with the highest level of extreme poverty and the fact stands out that since 2014 there has been a setback, since the levels of extreme poverty increased for this country until 2019, separating from the rest of the countries of the southern cone that converge to lower levels of external poverty of 1%. However, for 2020 the level of extreme poverty converged, reducing to 1.9%, in the last year due to the policies implemented because of the covid. These policies sheltered a significant part of the population in extreme poverty, and this allowed them to get out of this level.

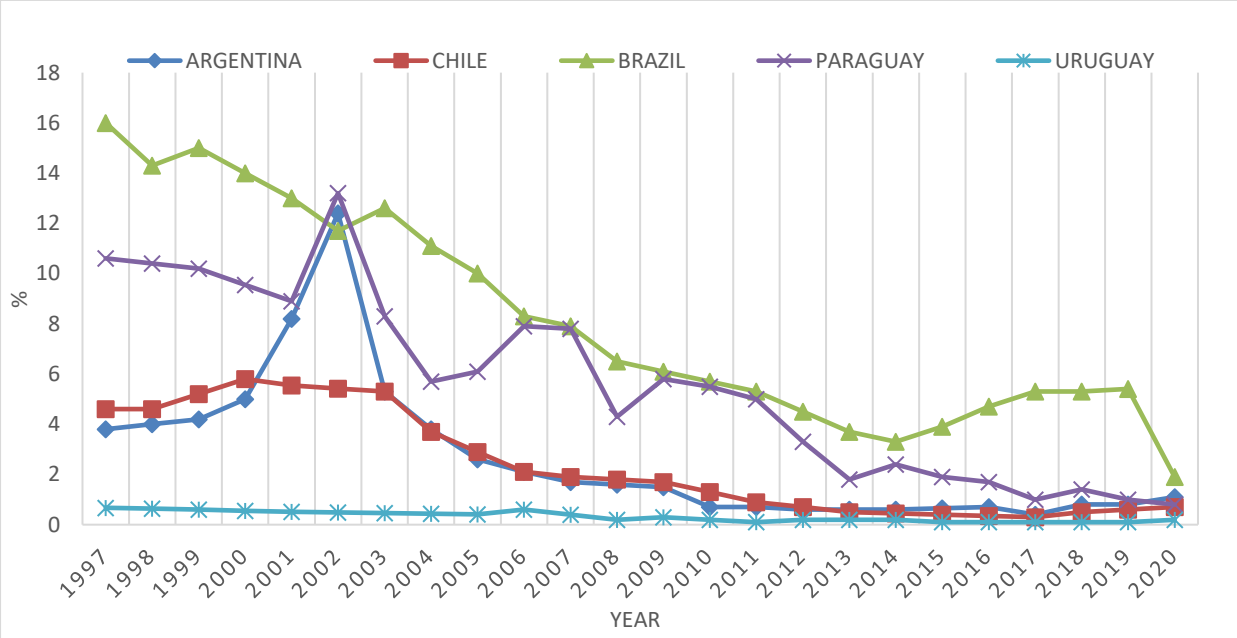


Figure 3.2 *Poverty in MERCOSUR - Percentage of the population living on less than 2.15 dollars a day as constant 2017 PPP values. - Source: Own elaboration with data from the World Bank.*

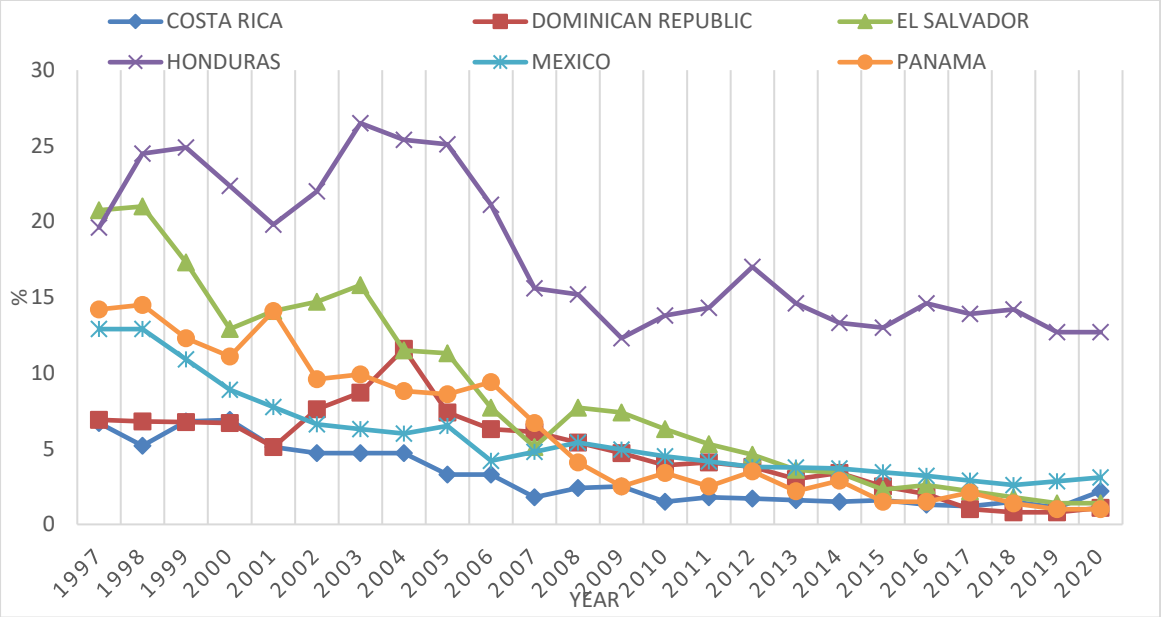


Figure 3.3 *Poverty in SICA and Mexico - Percentage of the population living on less than 2.15 dollars a day as constant 2017 PPP values. - Source: Own elaboration with data from the World Bank.*

The graph 3.3 highlights high extreme poverty rates related to Peru and Colombia, but there are also problems existing in other places such as Honduras, a country where an increase in the extreme poverty rate has recently been registered. In the 1997-2020 period there is a convergence towards the poverty rate: from the 0.7-16% range in 1997 to the 0.2-1.9% range in 2020 for Southern Cone, 3.1-10.8% for Andean countries, and 1-12.7% for Central America and Mexico.

I.2.3 Public Social Spending

This document takes the definition of the Organization for Economic Cooperation and Development OECD of public social spending, which it proposes in its Guide for the Social Expenditure Database and is understood as: “The facilitation by public and private institutions of benefits and financial contributions directed to households and individuals in order to provide support in circumstances that negatively affect their well-being, provided that the facilitation of benefits and financial contributions does not constitute a direct payment for a particular good or service or an individual contract or transfer.” (OECD, 2019). This definition of public social spending becomes relevant, since these benefits or contributions are directed towards poor households, since the lack of income significantly restricts their demand, which negatively affects their well-being. This public social spending is divided into several components, namely: housing and community services, health, education, and social protection.

Public social spending is seen as a powerful tool in the fight against poverty, since it allows mitigating the factors that increase poverty, such as unemployment and inflation among others, and potentiating those that can help reduce it such as those that were mentioned above: health, education, and social protection. According to the World Bank, public social spending is an important tool to reduce poverty in Latin America, because the use of public funds to invest in social programs is an effective way to reduce economic inequality in the region. (World Bank, 2019).

Next, the behavior of public social spending in the 15 countries can be observed in the three groupings made, CAN countries, MERCOSUR countries and SICA countries.

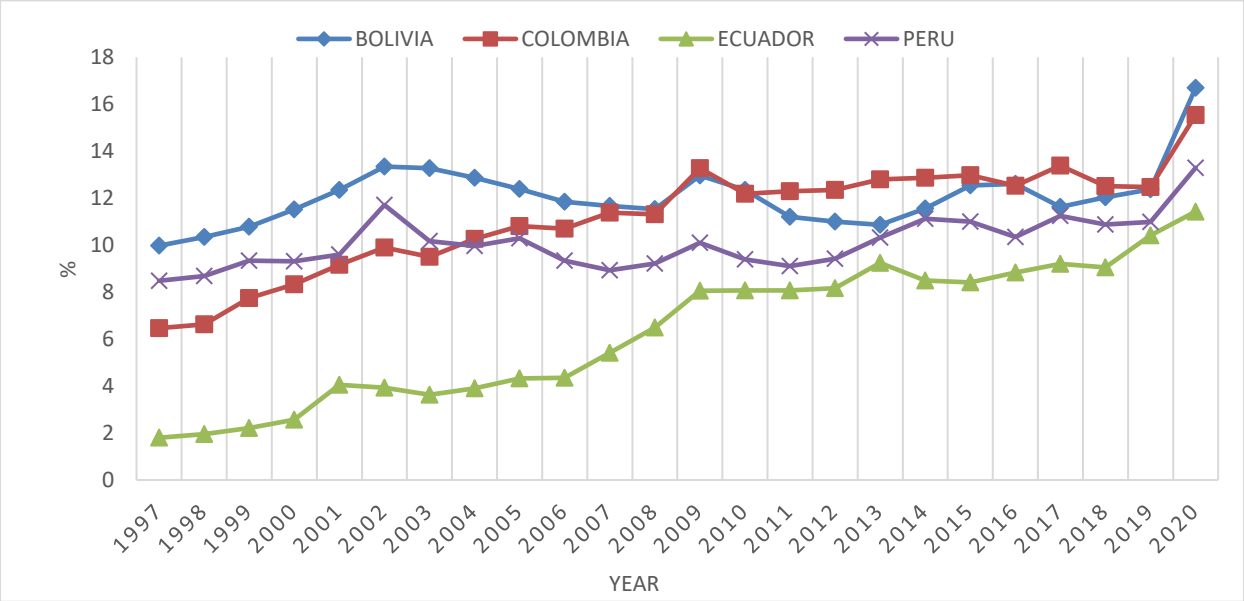


Figure 4.1 *Public social spending as a percentage of GDP in CAN. - Source: Own elaboration with data from ECLAC - Economic Commission for Latin America and the Caribbean*

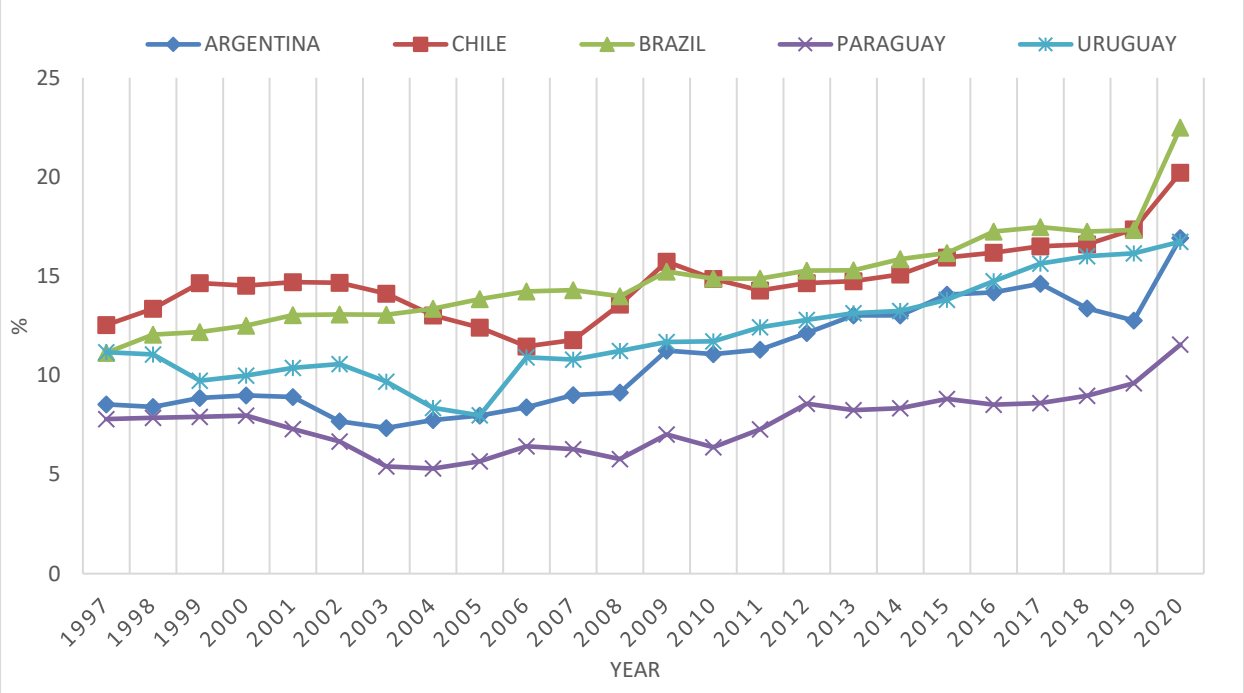


Figure 4.2 *Public social spending as a percentage of GDP in MERCOSUR. - Source: Own elaboration with data from ECLAC - Economic Commission for Latin America and the Caribbean*

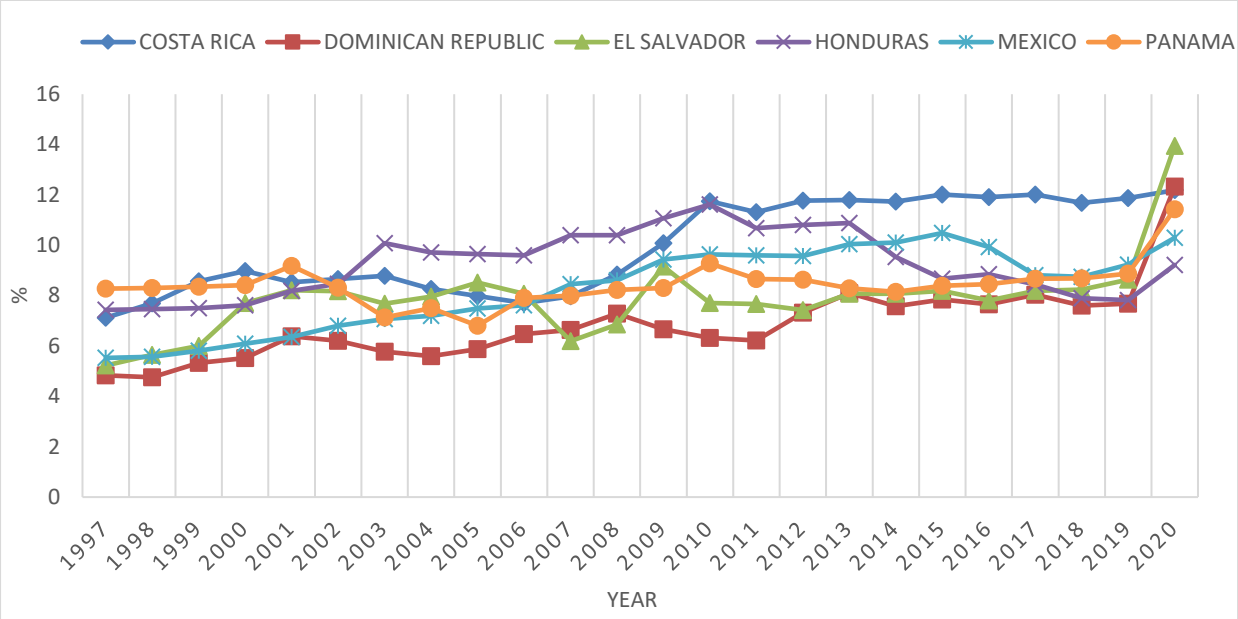


Figure 4.2 *Public social spending as a percentage of GDP in SICA and Mexico. - Source: Own elaboration with data from ECLAC - Economic Commission for Latin America and the Caribbean*

Regarding public social spending as a percentage of GDP, it is possible to observe that it is higher for countries such as Brazil, Chile, and Uruguay. For all countries, except Bolivia and Honduras, public social spending as a percentage of GDP increased in the period from 1997 to 2020.

Chile has increased its public social spending as a percentage of GDP by 12.5% in 1997 to 20.2% in 2020, increasing 8 percentage points in the last two decades. In Colombia, public social spending has oscillated around 11.1% of GDP, going from 6.5% in 1997 to 15.5% in 2020, so in the last 23 years it increased, absorbing an additional 9% of GDP. For the Colombian case, the implementation of the new political constitution of 1991, opened the possibility for the expansion of public social spending, and as Lasso says (2004, p.6) this increased, decentralized and directed social spending towards sectors such as health and education that have a redistributive effect in the long term and that have allowed the improvement of the living conditions of the population that were particularly affected by the economic crisis of the late twentieth century. This is how Colombia became the CAN country with the highest public social spending as a percentage of GDP since 2010, however it is still well below the average levels of the MERCOSUR countries.

For its part, Ecuador is the country with the greatest increase in public social spending, bridging the gap it had in relation to its neighbors in the CAN, going from 3.2% to 10.5% in the study period. Legarda (2015, 50) maintains that with the beginning of the mandate of President Rafael Correa in 2007 and the approval of a new political constitution in Ecuador in 2008, priority was given to the design and execution of social policy, seeking to increase the social and economic benefit of the population. This translated into a substantial increase in spending on education, health, and social inclusion, thus improving the coverage of social services.

In its efforts to meets the goals set for reducing school dropouts to 5 percent and achieving universal coverage in basic education, the National Government is implementing the Families in Action Program in addition to the above programs. This is classified as a direct support cash transfer programme, since it provides all poor and extremely poor families with children and adolescents with an economic incentive

conditional on school attendance and attendance at health checks for children under 18 years of age, which complements the income of beneficiary families for the formation of human capital, the generation of social mobility, access to secondary and higher education programmes, the contribution to overcoming poverty and extreme poverty and to the prevention of teenage pregnancy. (Department National of Planning, 2011).

I.3 Anti-poverty programs

I.3.1 Cash transfer programs

Cash transfer programs provide cash to previously identified and prioritized vulnerable families. These transfers can be conditional or unconditional and are focused on improving the living conditions of the target population.

Unconditional transfers deliver the money to the family only because of their poverty condition or because they meet certain criteria in the prioritization, but they don't condition the delivery of this benefit to the fulfilment of any subsequent condition, so the family can freely decide how to use it. The advantage of this type of policy is that in the short term it tends to improve the poor family's living conditions and, as the intervention is unconditional, it does not generate additional costs in supervising compliance with any condition. However, the disadvantage is that it is not possible to guarantee that the family uses the money properly to improve their living conditions or to accumulate human capital, so a positive outcome in terms of poverty reduction is not guaranteed in the long term.

On the other hand, conditional transfer programs consist of providing cash subsidies to families in situations of poverty or vulnerability prioritized to improve their income level, in the short term this kind of programs have the objective to reduce poverty by increasing the consumption and in the long term, by strengthening the human capabilities of children, adolescents, and young people, driven by conditionalities (Abramo et al, 2000, p. 55), with the commitment to comply with certain actions on their own benefit. Usually, the conditioning is related to the performance of actions in relation to nutrition, health, education, or housing. In relation to nutrition, the granting of the subsidy is conditioned on the acquisition of food through food vouchers; In terms of health, the family is required to attend medical check-ups, especially for children, the elderly or pregnant women, who attend vaccination campaigns and/or preventive health campaigns; in educational terms, it is conditioned on children attending school or young people attending tertiary education; and in terms of housing, the subsidy is directed to the fact that it can only be used to acquire a house or to pay the monthly rent of the place where you live.

Cash transfer policies have the advantage that they make it possible to alleviate poverty by allowing the poor population to have access to goods necessary for subsistence, giving them the opportunity to improve patterns of nutrition, access to health, education and living place. In addition, giving money instead of products gives the beneficiaries greater freedom with respect to their consumption. Another advantage is that conditional intervention encourages households to invest in human capital, thus breaking the cycle of poverty in the long term.

As a disadvantage, it is identified that the dependence of families in terms of the subsidy received is encouraged and that entrepreneurship and own actions are discouraged to get out of the situation of

poverty and additional costs are also generated to carry out an effective control of the use of the transferred resources and compliance with the conditioning.

In Latin America, part of public social spending has been invested in the implementation of social assistance programs aimed at poor families, which from the nineties were designed under the paradigm of targeting public social spending and demand subsidies. Thus, in the mid-1990s, conditional transfer programs emerged in the region with the objective of directly reducing poverty. The table 1 (Abramo et al, 2000, p55) shows the programs implemented in each country.

Table 1 Conditional transfer programs in Latin America (15 countries)

Country	Program (starting year)
Argentina	Universal Child Allowance (AUH) for social protection (2009)
	Porteña Citizenship (2005)
Bolivia	Juancito Pinto Voucher (Bono Juancito Pinto) (2006)
	Juana Azurduy Mother-Child Voucher (Bono Madre Niño-Niña "Juana Azurduy") (2009)
Brazil	"Bolsa Familia" Program (2003)
	"Bolsa Verde" Program (2011)
	Child Labor Eradication Program (PETI) (1996)
Chile	Chile Solidario (2002)
	Security and Opportunities Subsystem (Ingreso Ético Familiar) (2012)
Colombia	More Families in Action (Más Familias en Acción) (2000)
	"Red Unidos" Program (2007)
Costa Rica	Avancemos (2006)
Dominican Republic	Progressing with Solidarity (2012)
Ecuador	Human Development Voucher (Bono de Desarrollo Humano - BDH) (2003)
	Desnutrición Cero (2011)
El Salvador	Program to Support Communities in Solidarity in El Salvado (Programa de Apoyo a Comunidades Solidarias en El Salvador - PACSES) (2005)
Honduras	Better Life Voucher (Bono Vida Mejor) (2010)
México	Prospera, a social inclusion program (1997)
Panamá	Network of oportunities (Red de Oportunidades) (2006)
	Family food Vouchers (2005)
Paraguay	Tekoporâ (2005)
	Abrazo (2005)
Peru	National Program of Direct Support for the Poorest (Juntos) (2005)
Uruguay	Uruguay Social Card (2006)
	Family Allowances - Equity Plan (2008)

Source: Taken from "Programas sociales, superación de la pobreza e inclusión laboral". Abramo L, Cecchini S, & Morales B, 2019, Copyright © Naciones Unidas.

In Colombia, the program "Más Familias en Acción" was launched in 2000. In 2005 its evaluation was carried out demonstrating its positive impact, which allowed the program to be incorporated into the Social Protection System and, finally in 2007, it was significantly scaled up to become the main component of the strategy for overcoming low poverty. This program in 2020 reached 2.2 million beneficiary families with an annual budget of 1.9 billons of pesos. (General Budget of the Nation 2020).

The education incentive is given individually to three (3) children or adolescents in the family, between 4 and 18 years of age who are in the school system. The incentive is given every two months, except in the end-of-school holiday period, that is, five times a year, provided that the family fulfils two commitments: children and adolescents must attend at least 80 per cent of the scheduled classes and cannot lose more than two school years. If one of the participants is 18 or 19 years old, he must be studying at least 10th grade, and if he is 20 years old, 11th grade. (Conpes 3472 of 2007)

In the case of "Más Familias en Acción", transfers are conditional on school attendance and health checks for children under 18, so the program has contributed to the reduction of absence and dropout rates, especially at the level of basic secondary education in municipalities with high rates. It is also important to note that the program favours families in poverty, which allows them to access goods and services that can help them improve their nutrition patterns, access to education and health. However, it is not possible to have effective control of the way the family makes spending and therefore sometimes the objectives of the program are not achieved. in addition, other disadvantages of the program are, first, the dependence on the subsidy that is generated, the incentive to increase the birth rate, among others.

Social programs can be classified into two types according to the form of contribution, which can be through monetary transfer, or through transfer in kind. Both are aimed at reducing poverty and caring for the vulnerable population, but they differ in the way in which assistance is carried out.

I.3.1 Tax reduction.

Another important policy is the refund of taxes or the reduction of taxes for families in vulnerable conditions. The tax refund consists of returning to the family taxes that it pays regularly, either direct taxes such as income tax and/or indirect taxes such as value added tax (VAT) or consumption tax.

In Colombia, the VAT refund program has been presented, for less income families, it is about returning to the family through a bank account part of the VAT that they pay when they make purchases through their debit or credit card. This too it encourages families to join the financial system and at the same time gives them the ability to improve their purchasing power.

There is also the modality of refund or reduction of income taxes, this consists of reducing the taxable base of the person or reducing the tax rate for people with lower income. This has the advantage that it generates an incentive to enter the labour market, because the benefit is only obtained if you obtain some type of income.

I.3.2 In-kind transfer programs

This kind transfer programs, unlike cash transfer programs, relate to the delivery of goods or services to the prioritized population and focus on education, health, social security, and the infrastructure necessary for access to public services, allowing the population in conditions of poverty and vulnerability to access these primary services.

One of the advantages of the application of transfer programs in kind that stimulates the consumption of goods and services that are particularly important for the vulnerable population, the free access to food,

education, health, social security, and housing invites the families to integrate to the consumption of these. Another advantage for families is that by accessing these goods and services without payment, they free up part of their income for the purchase of other goods, which increases your purchasing power and allows them to expand their demand. Additionally, in-kind transfers increase the local supply of the goods or services delivered, in such a way that schools, hospitals, and housing are built, which also contributes to the growth of the economy.

These types of transfers can also induce less needy individuals to self-eliminate from programs, as a selection mechanism. For example, if there is a geographic location of the vulnerable population, this may favour the delivery of the good or service in that location, discouraging other population groups from moving. But, as a disadvantage, when there is no other self-selection mechanism, this induction can lead to a reduction in the quality of the good or service delivered so that those who do not need it will give up their consumption, thus, a disadvantage is that in many cases these goods and services are not of optimum quality.

Similarly, the in all Latin American countries has been implemented health programs to guarantee access to the general social security system in health for the most vulnerable population access health services free of charge. In addition, programs are being implemented to provide the least-favoured population with access to decent housing that improves their conditions of vulnerability.

I.4 Overview literature of poverty and public social spending

In terms of the literature in relation to poverty reduction, it is possible to identify that the predominant trend occurs in studies that analyze the relationship between economic growth and poverty reduction, thus Ravallion and Chen (2001) conclude that economic growth is the most important variable that is capable of influencing poverty reduction. However, there is also a complementary line where attention is also paid to the effect of public spending and public policies to alleviate poverty. A pioneer in this field was Chenery et al (1974) who criticizes the effect of economic growth that does not always reach the poorest, especially in conditions of inequality and postulates that public policies focused on pro-distribution in favor to the poorest members of society are also important. In this sense, this document is in this line, since its objective is to identify how public social spending has impacted the reduction of poverty in Latin America.

Some studies have been carried out on the impact of spending on poverty reduction for Latin America, such as Sánchez (2023), Duryea & Robles (2016), Korzeniewicz (2000), Lloyd-Sherlock (2000), Lustig (2017), Leon (2008), Ocampo (1998) among others. Others have studied this relationship on a country level like Legarda (2015) for Ecuador, and Araujo, Alves & Besaria (2013) for Brazil.

An important part of the empirical literature has been devoted to identifying the effects of programs on poverty reduction, to visualizing the relationships between poverty and other macroeconomic variables, and especially many find their relationship with economic growth. Studies such as that of Korzeniewicz (2000) show the relationship between poverty, inequality, and growth in Latin America. After Gasparini, Gutierrez, and Tornarolli (2005) get empirical evidence on how economic growth impacts on poverty reduction in Latin-American countries from 1989 to 2004. Some years after, Azevedo, Inchaust and Sanfelice (2013) extended the sample until 2010 and used a PVAR model over poverty reduction and found that the impact of growth is stronger that the impact of public policies.

The article "Persistent Poverty and Excess Inequality: Latin America, 1970-1995" by Londoño and Székely (2001) analyze the relationship between poverty and inequality in Latin America during the period from 1970 to 1995. The authors find that poverty in Latin America is persistent and that poor households tend to remain in that condition for extended periods of time. The authors suggest that specific policies are needed to address persistent poverty, such as income transfer policies and education and training programs to improve the employment prospects of poor households and reduce their economic vulnerability.

Lloyd-Sherlock P (2000) finding that the public spending in Latin America is failed in the goal of reach the poorest and most vulnerable groups in society because only a small share of public spending is allocated to programs with greatest potential for poverty reduction.

An interesting study to cite is that of Bahmani & Oyolola (2009), where three panel models, both fixed effects and random effects, are estimated to observe the impact of foreign aid on the poverty reduction, using a database of 46 developing countries (including some from Latin America) for the period between 1981 and 2001, finding that external aid effectively has an effect on poverty reduction, although not to the extent that economic growth and the reduction of inequality and that, on the other hand, public social spending has an adverse effect since an estimator with a positive sign was found.

Sanchez's work (2023) also stands out, where analyze the impact of economic growth and social public spending on poverty reduction through a panel of eight Latin America countries along the period of 2000 to 2019, using a Panel Vector Autoregressive (PVAR) model finding that the impact of economic growth is much stronger than that of public social spending. This recognizes some limitations for the econometric analysis such as the endogeneity of the variables and the size of the panel in terms of the number of countries and the temporal sample, so to avoid bias problems the sample is limited to only 8 countries sacrificing information from some important countries such as Chile and Brazil.

Empirical studies have also been carried out on social mobility in Latin America using education, inequality, region, ethnicity, and public social spending as study variables. At this level, the work of Lustig (2017) stands out, presenting an analysis of the impact of the tax system and social spending on income distribution and poverty in Latin America.

More specific studies are also carried out at the country level for the cases of Colombia, Brazil, Mexico, and Chile. Francisco Lasso (2004) conducted a study financed by the World Bank and the United Nations Development Program UNDP, entitled "Incidence of social public spending on income distribution and poverty reduction" and its purpose was to determine the impact of social public spending on income distribution and poverty reduction in Colombia. The study shows the evolution of public social spending as a percentage of GDP in comparison for the biennium 1990-1991, 1996-1997 and 2000-2001, as well as the evolution of the poor population due to insufficient income, of income distribution, and the access of households to the social services offered by the State in terms of education, health, and access to home public services, making a comparison between 1993, 1997 and 2003. In the end, it is found that the level of social spending achieved by Colombia in the 1990s was considerable, although it was still insufficient compared to the needs of the population.

Rodríguez (2012) did a study on the incidence of social public spending on the human development index for the city of Bogotá in Colombia, between the period 1995 to 2010 through a VEC model, showing that public spending in Bogotá has helped to improve this indicator, noting that it has served as a tool to improve the income, health, and education conditions of the population.

Araujo, Alves & Besarria (2013) carry out an empirical analysis of the impact of social spending on education and health on inequality and poverty indicators for the regions of Brazil in the period between 2004 and 2009 through a fixed effects panel model, finding that social spending does indeed influence poverty reduction, but this effect is less than that generated by economic growth.

Legarda (2015), made an analysis of public social spending in Ecuador for the period from 2000 to 2014 in the context of the political cycle, finding that public social spending has increased in an important dimension in Ecuador and although social spending has played an important role in reducing poverty by income, it has been important to the political cycle because it has also been used to increase the popularity of leaders seeking re-election.

Mckee, D., & Todd, P.E., (2011) did a study about the longer-term effects of human capital enrichment programs on poverty and inequality in Mexico and found that the program opportunities increase the average income, but do not decrease the monetary poverty.

Ramírez's (2017) article examines the link between social public expenditure and poverty reduction in Latin America. Using data from more than 15 countries in the region and an econometric methodology, the results suggest that social public expenditure is an effective tool for reducing poverty. These results suggest that to achieve poverty reduction goals, Latin American governments must significantly increase social public expenditure.

Other related works, carried out for other areas other than Latin America are listed in the following table.

Table 2 Literature Review

Authors	Title	Year	Purpose of the document	Country	Data	Methodology	Findings
Asadullah M.N.; Savoia A.; Sen K.	Will South Asia Achieve the Sustainable Development Goals by 2030? Learning from the MDGs Experience	2020	This paper contributes to the debate on the Sustainable Development Goals progress by evaluating the MDGs achievements in South Asia and the policy and institutional challenges deriving from such experience, outh Asian countries.	South Asia	aggregate indicators of poverty, health, education and gender parity outcomes	Cross-country regressions	Find that greater public spending on education and health is required to generate significant benefits in the region in terms of the "end of poverty" objective. A simulation exercise confirms that such a combination of interventions would deliver significant benefits in the region, particularly in areas that are

Authors	Title	Year	Purpose of the document	Country	Data	Methodology	Findings
							critical to progress on the goals of 'No Poverty', 'Quality Education', 'Gender Equality', and 'Inclusive Growth'.
Sasmal R.; Sasmal J.	Public expenditure, economic growth, and poverty alleviation	2016	The purpose of the paper is to examine the impact of public expenditure on economic growth and poverty alleviation in developing countries like India. If poverty and inequality are high, the government may resort to distributive policies at the cost of long-term growth. The distributive policies and poverty alleviation measures fail to achieve success due to lack of good governance, lack of proper targeting and problems in the implementation of such schemes. On the other hand, if the nature of public expenditure is such that it enhances per capita income, it will help reduce poverty.	India	public expenditure, economic growth, and poverty	Panel Fixed effects and Panel Random effects models	The results show that in states where ratio of public expenditure on the development of infrastructure such as road, irrigation, power, transport, and communication is higher, per capita income is also higher and incidence of poverty is lower indicating that economic growth is important for poverty alleviation and development of infrastructure is necessary for growth.
Agrawal P.	Economic growth and poverty reduction: Evidence from Kazakhstan	2007	This paper empirically examines the relation between economic growth and poverty alleviation in the case of Kazakhstan. However, expenditure on other social sectors like education and health has not increased	Kazakhstan	province-level data of growth and poverty	Descriptive Analysis	In the document is empirically shown that the increase in public spending in the social sectors contributed significantly to poverty alleviation. This suggests that

Authors	Title	Year	Purpose of the document	Country	Data	Methodology	Findings
			much and needs more support.				both rapid economic growth and increased government support for the social sectors are helpful in reducing poverty.
Castro-Leal F.; Dayton J.; Demery L.; Mehra K.	Public social spending in Africa: Do the poor benefit?	1999	The paper examines the effectiveness of public social spending on education and health care in several African countries. It concludes that this targeting problem cannot be solved simply by adjusting the subsidy program. The constraints that prevent the poor from taking advantage of these services must also be addressed if the public subsidies are to be effective.	Several African countries	Public social spending on education and health Poverty	Descriptive Analysis	The document finds that these programs in education and health do not favor the poor, but rather those who are economically better off, presenting a targeting problem.
Ariyo A.; Olaniyan O.	Structural Transformation and Inequality: Evidence from Nigeria	2014	This article highlights that the persistent high levels of poverty and inequality are being mainly propelled by the structure of the Nigerian economy and the inability of annual public expenditure, despite its large size, to guarantee improved access to functional facilities and social services.	Nigeria	Poverty, inequality and public expenditure	Descriptive Analysis	Public spending unable to curb poverty in Nigeria
Aderounmu, B., Azuh, D., Onanuga, O., Oluwatomisin, O., Ebenezer,	Poverty drivers and Nigeria's development: Implications for policy intervention	2021	This study examined the key principles influencing poverty rate in Nigeria and their implications for policy interventions	Nigeria	World Development Indicators (WDI): poverty Inflation, unemployment,	Autoregressive Distributed Lag (ARDL) model	They find that unemployment causes poverty while inflation, public resources devoted to

Authors	Title	Year	Purpose of the document	Country	Data	Methodology	Findings
B., & Azuh, A.			for the period of 1992–2016		public resources and economic growth		austerity programmes and economic growth reduces poverty in the short run in Nigeria.
Mussida & Sciulliz	The dynamics of poverty in Europe. What has changed after the great recession	2022	They analyze the determinants of poverty in Europe and their evolution over time by disentangling the role of genuine state dependence and heterogeneity. Their purpose is estimate genuine state dependence and uncover the role of observable and unobservable factors in determining the risk of poverty	European countries	Poverty rate by country, Characteristics of family members in terms of age, educational level, employment, gender and marital status.	Alternative dynamic probit models accounting for endogenous initial conditions and correlated random effects	The findings suggest that the degree of genuine state dependence is relevant in Europe. The results suggests that measures aimed at lifting individuals out of poverty, including cash transfers, have become even more important during the Europe 2020 decade, and that that the protective role of higher education has diminished over time, while the role of employment stability and of childcare provision during early childhood has become even more important

Source: Own elaboration

I.5 Data

Since the objective of this document is to analyze the relationship between public social spending and poverty, these are taken as the main variables. The poverty data were taken from the World Bank and the social public spending data were taken from ECLAC - Economic Commission for Latin America and the Caribbean or CEPAL for the acronym in Spanish. The sample is constructed with information for the period

between 1997 and 2020 from the following 15 countries[3]: Mexico, Costa Rica, Dominican Republic, El Salvador, Honduras, Panama, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, and Uruguay. In the table 1 it is possible to find statistical information about mean and standard deviation for a sample of 360 observations: 15 countries and 24 years.

Table 3 Descriptive Statistics (Obs. 360)

Variable	Name	Mean	Std. Dev.	Units of measurement	Type	Source
Poverty headcount ratio at $2.15 a day (2017 PPP)	POV215	7.212	6.333	% of population	Explained	World Bank
Poverty headcount ratio at $3.65 a day (2017 PPP)	POV365	15.787	10.669	% of population	Explained	World Bank
Poverty headcount ratio at $6.85 a day (2017 PPP)	POV685	35.48	15.84	% of population	Explained	World Bank
Public Social spending	PSE	10.019	3.153	% of GDP	Explanatory	ECLAC
Educational spending	GE	3.564	1.428	% of GDP	Explanatory	ECLAC
Health spending	GH	1.771	.888	% of GDP	Explanatory	ECLAC
Social protection spending	Gps	4.019	3.05	% of GDP	Explanatory	ECLAC
Home spending	GV	.432	.449	% of GDP	Explanatory	ECLAC
Public Social spending without educational and health spending	P_h	4.684	2.961	% of GDP	Explanatory	ECLAC
GDP per capita growth	GRW PC	1.7	3.775	Annual %	Control	World Bank
Net official development assistance and official aid received	AID 2020	.293	.502	% of GDP	Control	World Bank
Inflation, consumer prices	INF	7.04	9.184	Annual %	Control	World Bank
Tax revenue, General Government	TAX GG	15.443	4.407	% of GDP	Instrumental	ECLAC
Distrust in the political and state institutions by sex, Both sexes	Distrust Both sexes	63.554	13.571	%	Instrumental	ECLAC
GDP by activity: Agriculture, hunting, forestry and fishing	Agri perc	.072	.029	% of GDP	Instrumental	ECLAC
GDP by activity: Construction, Manufacturing, Mining and quarrying	Indu perc	.275	.056	% of GDP	Instrumental	ECLAC
GDP by activity: Public administration, defense, compulsory social security, education, health and social work, and other community, social and personal service activities	PA perc	.212	.059	% of GDP	Instrumental	ECLAC

[3] Belize, Guatemala, Nicaragua, and Venezuela are not considered due to lack of data.

Variable	Name	Mean	Std. Dev.	Units of measurement	Type	Source
GDP by activity: Electricity, gas and water supply; Financial intermediation, real estate, renting and business activities; and transport, storage and communications	Serv perc	.281	.059	% of GDP	Instrumental	ECLAC
GDP by activity: Wholesale and retail trade, repair of goods, and hotels and restaurants	Comm perc	.16	.038	% of GDP	Instrumental	ECLAC

Source: Own elaboration with data from the World Bank and ECLAC

Inflation, foreign aid, and growth of gross domestic product per capita were taken as control variables in the analysis. The foreign aid and the GDP per capita growth were taken as a reference from the work of Bahmani & Oyolola et al. (2009) which shows that they are important variables to consider in the study of poverty. On the other hand, the group of variables Tax revenue and GDP by activity are used as instrumental variables.

Inflation is defined as the sustained and generalized increase in the level of prices in the economy and is calculated as the annual percentage change in the consumer price index. The increase in prices is reflected in a reduction in the purchasing power of consumers if incomes are not able to increase at the same speed as prices, affecting more strongly the population with low-income levels or in a situation of poverty, since the highest percentage of their income is dedicated to the consumption of the basic food basket. This variable is used in the paper of Aderounmu et al. (2021), called "Poverty drivers and Nigeria's development: Implications for policy intervention" where shows that inflation has a significant effect on poverty reduction in Nigeria.

Foreign aid is also a component to be considered: from the work of Burnside and Dollar (2000) external aid has been considered as important in terms of the development. In poverty reduction, part of the resources is dedicated to social programs of attention to the poor population. Therefore, these aids should contribute to the alleviation of poverty at least in the short term. Sachs and McArthur (2001) are in favor of the foreign aid and state that it can help to eradicate poverty in developing countries, although others like William Easterly and Dambisa Moyo consider that this aid could be bad because it generates negative incentives in the long term. In empirical terms, Bahmani & Oyolola et al. (2009, 270) concentrated the analysis in the impact of foreign aid on poverty reduction and they find that indeed there is an impact in 49 aid-recipient developing countries, but it is less than the impact of decreasing inequality or increasing economic growth.

GDP per capita is a measure of the value of the production of final goods and services per person on a country, but also it can be thought like the average income of the population; in the same line GDP per capita growth is a dynamic measure about how this production, or this income by person increases across the time. GDP is important as a control variable because if it increases it is expected to be distributed among the entire population and allow some families to exceed the minimum income threshold necessary to get out of poverty. Ravallion & Chen (2001) point out that economic growth is the most important force in promoting poverty reduction, and as also reviewed by Sanchez (2023), based on Kuznets' (1955) hypothesis of inverted U-shaped economic development, it is argued that economic growth

has a trickle-down effect that has an impact on poverty reduction. This variable is also included in the analysis of Bahmani & Oyolola et al. (2009), as a result, they found that there is an important impact of the increase of growth on the poverty reduction for 49 developing countries. In the work of Korzeniewicz (2000) the variable is used like ratio of growth. Is also used in the work of Agrawal (2007), this paper addresses the relationship between economic growth and poverty reduction in Kazakhstan and shows that provinces with higher growth rates achieved faster decline in poverty and explains that this occurred largely due to growth, which led to increased employment and higher real wages and contributed significantly to poverty reduction. For the case of Latin America, Sanchez (2023) includes economic growth in his estimate and as a result shows that economic growth has the strongest influence, in both short and long run, on poverty reduction.

The distribution of GDP by economic activity is also used as instrumental variables and is organized into 5 groups in relation to agricultural, industrial, service, commercial and public sector activity.

Tax GG are the taxes received by the general government, and it is used as an instrumental variable related to public social spending and its components, in the sense that taxes are the main income of the State and the higher these taxes are, the higher public spending can be.

The instrumental variable called distrust in the political and state institutions by sex is an Index prepared by the Social Statistics Unit of ECLAC. It is defined as "Number of people with little or no trust in political and state institutions, as a percentage of the total population aged 18 and over." This indicator aggregates the responses to questions about the confidence in political parties, the legislative branch, and the judiciary, given that the responses for each of the institutions are made on a scale with the following values: 1) A lot, 2) Some, 3) Little and 4) None. It is considered that people who obtain averages equal to or greater than 3, have little or no trust in political and state institutions. This variable is used as an instrument of public social spending and its components, since it measures the extent that taxpayers have greater confidence in the government, thus socially validating public spending.

I.6 Methodology

As mentioned above, this chapter focuses on the effect that public social spending has on poverty mediated through indicators based on income level, since in this way the international comparisons that are the object of this work can be made.

To estimate the effect of social public spending on poverty, a database is collected that combines a time dimension from 1997 to 2020, and another cross-sectional dimension with information from 15 Latin American countries, using information from ECLAC for the variable public social spending and the World Bank for the percentage of the population living on less than 2.15, 3.65 and 6.85 dollars per day, constant 2017 PPP values. Thus, those who live with less than 2.15 dollars are considered as extremely poor, those who live on less than USD 3.65 a day are in average poverty and those who live on less than USD 6.85 a day are in moderate poverty.

When carrying out the analysis of poverty, it can be intuited that poverty and public social spending are strictly linked, since public social expenditure is conceived as an instrument of the state to alleviate poverty, but at the same time the size of this expenditure depends on the level of poverty suffered by the countries. Thus, the higher the level of poverty, the higher the level of public spending because there is a greater social pressure on the government. Hence, the estimated correlation between these two variables

could be biased by the dynamic interrelation and feedback effects between the two variables. Consequently, there is a problem of endogeneity of the public social spending with respect to the poverty condition.

Endogeneity can be treated through different routes, one way is to employ fixed-effect and random-effect estimators by incorporating instrumental variables (IV), which uses a proxy variable (Z) as an instrument of the endogenous variable (Cameron & Trivedi, 2009). It should be noted that to use this methodology it is required to have a proxy variable that meets the characteristic of being exogenous in the sense that it is not correlated with errors, but at the same time it must be relevant so it must be correlated with the explanatory X variables, so a disadvantage is that you cannot always count on a proxy variable with these criteria. Following this methodology, an IV panel model was estimated with the variables tax of general government (TAX_GG) and trust in the government (Distrust_Both_sexes) as instruments variables and using the variables inflation (INF), growth of GDP per capita (GRW_PC) and foreign aid (AID_2020) as control variables. However, when we perform the Sargan test for its validation, it indicated that the instrument was not valid. To see the results of the IV Fixed effect model and the tests see appendix 3.

On the other hand, there is also a persistent effect of poverty, this is a dynamic behavior that makes past poverty influence the present, this phenomenon is found in both developed and developing countries. Devicienti and Poggi (2011) and the more recent work by Fabbrizi and Mussida (2020), analyze the persistence of poverty in Italy, as well as Biewen (2009) in Germany and Ayllón (2013) in Spain, while Ayllón and Gábos (2017), Giarda and Moroni (2018), and Bosco and Poggi (2020) look at European countries more broadly. At the level of Latin America, Barba (2009) identifies that poverty in this region is persistent, in this way so does Galasso (2011) for the case of Chile and Machado (2007) in Brazil. However, this poverty dynamic cannot be estimated through the IV Fixed effect model.

Another option is to use the dynamic panel models that have been developed with the purpose of incorporating in the estimation the dynamic relationships that are generated within the model and to treat endogeneity problems. For this, GMM (Generalized Method of Moments) estimators are used as a generalization of IV estimators (Holtz-Eakin, Newey and Rosen, 1988; Arellano and Bond, 1991). In these models the instrumental variables are expressed as lags of the endogenous variable, which can be formulated as differences or levels. Even if heteroskedasticity is present, the GMM estimator is more efficient than the simple IV estimator, whereas if heteroskedasticity is not present, the GMM estimator is no worse asymptotically than the IV estimator.

There are two prominent types of Generalized Method of Moments (GMM) estimators. The difference GMM and System GMM. Roodman (2009) explains that following Hansen (1982), the Arellano-Bond estimation known as the Difference GMM (Diff-GMM) starts by transforming all the regressors, usually by differencing, and using the GMM. And the Arellano-Bover/Blundell-Bond estimator, which is known as the System GMM (sGMM), goes further that Arellano-Bond by making an additional assumption that the first difference of the instrumental variables is uncorrelated with the fixed effects. This allows for the introduction of more instruments and can drastically improve efficiency. It constructs a two-equation system, the original equation, and the transformed equation. In this document is used the approach System GMM. [4]

The advantage of GMM estimation is that, as already mentioned, it allows to treat endogeneity using time lags as an instrument, it also allows to alleviate the problem of omitted variables and allows to explore

[4] Implemented in Stata with the command xtabond2

the dynamics of the model, that is, how the delayed endogenous variable generates effects on itself. On the other hand, a disadvantage, except for the Diff-GMM model of Arellano and Bond that only uses differences, is the possibility that more instruments arise than necessary, producing the "overidentification of the model", product of the generation of instruments in differences and levels. So as Roodman (2009) notes between other situations[5] dynamic panel estimators are designed to "small *T*, large *N*" panels, meaning few time periods and many individuals.

As mentioned above, a dynamic panel model works well in the case of many observations N, however in this case the number of observations is small since we have the information of only 15 countries in Latin America, so following Destefanis & Rehman (2022), this problem can be solved by a kitchen sink estimation or the control function approach (Heckman & Hotz, 1989; Wooldridge, 2004). To estimate the relationship between public social spending and poverty reduction in 15 Latin American countries for the period between 1997 to 2020, a dynamic panel model is estimated, finding that the most appropriate is the system GMM model with dichotomous variables.

The dynamic panel model is represented by the next equation:

$$Y_{it} = \sum a_j Y_{it-j} + \sum b_j G_{it-j} + \sum c_j X_{it-j} + vi + \epsilon_{it} \quad \text{i=\{1, … ,N\}; j=\{0, 1\} t=\{1, … ,T\}} \quad (1)$$

Where:

Y_{it} is a 1 x k vector with the information of the explained endogenous variable, in this case the poverty to level determined 2.15, 3.65 or 6.85
$a_1 \ldots a_p$ are p parameters to be estimated,
G_{it} is the explanatory variable, in this case the public social spending (PSE) and each specific components of this spending: GE, GH and P_h that is PSE without GE and GH
X_{it} is a *1 x k* vector with the information of the exogenous control variables: AID_2000, GRW_PC and INF.
$b_1 \ldots b_p$ is the parameter associated with the explanatory variable.
C is a k x 1 vector of parameters to be estimated
*V*i are the panel level effects gives for the dummy variables for time and country.
Є are iid with variance σ_e^2

I.7 Results:

I.7.1 Results conventional dynamic panel.

In this part, six dynamic panel-data System GMM estimates were run, one for each level of poverty 2.15, 3.65 and 6.85 and for public social spending (PSE), and on the other hand one for each level of poverty

[5] Roodman (2009, 86) notes that the GMM models are designed to estimate with the next characteristics in addition: 1) "small T, large N" panels, meaning few time periods and many individuals 2) a linear functional relationship; 3) one left-hand-side variable that is dynamic, depending on its own past realizations; 4) independent variables that are not strictly exogenous, meaning they are correlated with past and possibly current realizations of the error; 5) fixed individual effects; and 6) heteroskedasticity and autocorrelation within individuals but not across them.

with the public social spending without education and health (P_h), education spending (GE) and health spending (GH). The STATA program is used to carry out the estimations.

Table 4 Dynamic panel-data System GMM estimate.

	System GMM PSE			System GMM Ph, GE, GH		
Regressors	POV215	POV365	POV685	POV215	POV365	POV685
POV215 (t-1)	**0.721*** **			**0.686*** **		
POV365 (t-1)		**0.787*** **			**0.770*** **	
POV685 (t-1)			**0.847*** **			**0.839*** **
PSEt	0.591	0.554	0.178			
PSE (t-1)	**-0.677***	**-0.671***	-0.266			
GEt				-0.169	-0.539	-0.592
GE (t-1)				-0.297	-0.286	-0.209
GHt				1.301	1.141	-0.554
GH (t-1)				0.003	0.572	2.087
P_ht				0.218	0.202	0.09
P_h (t-1)				-0.408	-0.296	-0.026
AID_2020t	1.498	1.572	0.981	1.028	0.701	0.115
AID_2020 (t-1)	-0.029	-0.492	-0.456	0.38	0.096	0.08
GRW_PCt	**-0.107***	**-0.225****	**-0.409*****	**-0.097***	**-0.214*****	**-0.406*****
INFt	0.031	0.035	0.014	0.056	0.048	0.011
Constant	1.49	2.801	3.84	2.903**	5.107**	7.535*
TIME	YES	YES	YES	YES	YES	YES
N	345	345	345	345	345	345
Arellano-Bond test for AR(2) in first differences: Pr > z =	0.653	0.217	0.387			
Sargan test of overid. Prob > chi2 =	0.902	0.908	0.605	0.264	0.367	0.381
Hansen test of overid. Prob > chi2 =	1	1	1			

* p<0.05, ** p<0.01, *** p<0.001

Source: Own elaboration with data from ECLAC and World Bank

For the group of estimates on the left where public social spending (PSE) is used as the main explanatory variable, the result suggests that for the three levels of poverty analyzed, there is a significantly direct dynamic effect of poverty in relation to itself, this result is the same in all the estimated models. This shows a persistent effect of long-term poverty.

On the other hand, for public social spending (PSE) the contemporary effect is not as expected, it is direct and insignificant; while for its first lag (PSEt-1), it is the long-term dynamic effect, the coefficient is negative as expected and has a significant poverty-reducing effect for poverty levels 3.65 and 2.15. In this case, as predicted by theory, public social spending is important to alleviate poverty, and its targeting makes it

possible to reach the population with the lowest income levels. It is worth noting that for these two levels of poverty, the effect of state intervention is greater than the effect that economic growth can generate.

For the group of estimates on the right, where public spending is divided in three: GE education, GH health and other P_h, again the lagged effect of poverty on itself is significant and direct. For the variables of public spending: education GE, health GH, and others P_h, is possible observe that the results are not significative. This may seem strange since the first lag of consolidated expenditure (PSEt-1) is significant for poverty levels 2.15 and 3.65, therefore it is necessary to make an alternative estimate against a possible bias problem due to the small sample.

For the two groups of estimates, there is a significant and inverse interaction expected between growth of GDP per capita and all poverty levels, in this way the effect is more important for those poor with the highest level of income. In this case, even though the result is in accordance with the theory that growth decreases poverty, when analyzing by poverty level, it is important to note that the effect of growth is smaller as the poverty level becomes extreme.

In all six estimates, for the international aid, the result is opposite to that found by Bahmani & Oyolola et al. (2009), so in this case, there is no strong relationship between foreign aid and poverty because the ratio is not significant either for the contemporaneous period or for the first lag. The result of the coefficient that corresponds to inflation is positive like expected, however it is not significant, and the value is very small.

As already mentioned above, these results must be confronted, because the dynamic panel models are designed for samples with large size N, however in this case N is 15, it may not be large enough and the estimates could be biased. An alternative is shown in the next section.

I.7.2 Results: Kitchen sink estimation

Taking in account that the SGMM require a large "N", and that in the sample "T" is greater than "N", we followed to Destefanis & Rehman (2022) by applying the Kitchen sink procedure to estimate our dynamic model which is described in the appendix 4.

Are estimated both a standard fixed effect OLS and a system GMM model using the kitchen sink approach (including the predicted of our core variable: the selected Public social spending). According to kitchen sink methodology, the values of the explanatory endogenous variables are estimated or predicted using as regressors the instrumental variables shown in Table 1, thus obtaining the values of yGE, yGH and yP_h which are used in the final estimate because viewing the test of specification (Ramsey Test) these were the better. The estimates and the test can be seen in the appendix 2.

The preferred estimate is the standard FE models (given the small "N" which make the number of group fewer than the instruments, is used also the option collapse that in a system GMM model is useful in treating the problem of instrument proliferation[6])

[6] The GMM estimation is very sensitive. Is important to be careful about the number of instruments and the number of groups. A rules of thumb is that number of instruments should not be larger than the number of groups in GMM. For better understanding, you could follow the Rodman (2009)

It is important to see the result for public social spending for the components on education (GE) and health (GH), so that it can be identified if in these cases the relationship between expenditure and poverty is strong since it is expected that with greater education and with guarantees in health more are provided more tools to the population so that they can get out of poverty in a sustainable way. So, we considered P_h that is given by public social spending excluding education spending and health spending.

Thus, in this part, six models were run, one for each level of poverty 2.15, 3.65 and 6.85 and for each public spending yGE, yGH and yP_h, the first three estimates were run like fixed effect OLS dynamic panel and the last three like a System GMM, all after applying the kitchen sink methodology.

Table 5 Dynamic panel-data System GMM Kitchen and OLS Fixed effect Kitchen

	OLS FE KITCHEN (preferred estimate)			SGMM KITCHEN		
Regressors	OLS_pred~ POV215	OLS_pred~ POV365	OLS_pred~ POV685	POV215	POV365	POV685
POV215 (t-1)	**0.671*** **			**0.673*** **		
POV365 (t-1)		**0.727*** **			**0.746*** **	
POV685 (t-1)			**0.808*** **			**0.830*** **
yGEt	-0.143	-0.836	**-1.595***	-0.209	-0.799	**-2.185****
yGE (t-1)	0.297	0.931	**1.715***	0.266	0.76	**2.086****
yGHt	**-1.678***	-1.259	0.074	-0.321	0.265	2.265
yGH (t-1)	**2.158****	1.892	0.107	0.713	0.176	-2.215
yP_ht	0.48	0.708	0.516	0.7	0.882	0.556
yP_h (t-1)	**-0.521***	-0.678	-0.254	**-0.738***	-0.828	-0.305
AID_2020t	0.57	-0.155	-0.521	**2.074*** **	**1.818*** **	**1.760***
AID_2020 (t-1)	0.158	0.165	0.073	-0.233	-0.512	-0.7
GRW_PCt	**-0.090***	**-0.202*** **	**-0.397*** **	-0.079	**-0.198***	**-0.404*** **
INFt	**0.063*** **	**0.092*** **	**0.083*** **	0.03	0.03	0.006
Constant	-1.783**	-2.697**	-1.774	0.4	4.633*	6.229
TIME dummies	YES	YES	YES	YES	YES	YES
COUNTRY dummies	YES	YES	YES	NO	NO	NO
R-squared	0.935	0.957	0.971			
N	315	315	315	315	315	315

* p<0.05, ** p<0.01, *** p<0.001

Source: Own elaboration with data from ECLAC and World Bank

It is possible to see that poverty follows a dynamic process, since the poverty levels of the previous period tend to directly affect the poverty levels in the current period, which shows that there is a persistence in poverty levels in Latin America. This result is consistent with those of Mussida & Sciulliz (2022) for Europe, who find that this continent is characterized by a growing scarring effect of poverty and that the degree of genuine state dependence is relevant.

In the estimation, the public spending on education, has the expected negative contemporary effect on level of poverty 6.85, this result agrees with Davila (2023) that public spending in this case on education is a powerful tool in the fight against poverty. However, for the same level of poverty, the result for the

first lag shows a direct and significant relationship, that is larger than the contemporary impact. This imply that in short-term, the spending on education has a relevance poverty-reducing effect but in long-term it could become counterproductive, thus suggesting that the spending on education loses the poverty reduction effect over time and for this reason each year this spending must be maintained to guarantee the desired effect. It is striking to see that spending on education has no impact on the population living on less than 3.65 and 2.15 dollars a day, this indicates that the poorest families can´t to access to education and can´t benefit of this type of spending.

On the other hand, in the results of the preferred estimate (OLS FE Kitchen) is possible to see that the health spending has an important effect contemporary on the reduction of extreme poverty (POV215) with a significant coefficient; however, like the case of the effect of education spending on POV685, the sign of the first lag is reversed and showing a direct relationship between health spending in the previous period (yGH_{t-1}) and the current extreme poverty level ($POV215_t$). Health spending has a static, short-term beneficial effect, but this fades over time, in fact in the long term, the dynamic effect is contrary to what is desired and the previous year's health spending loses its beneficial effect, which would tend to increase poverty. This also shows the degree of vulnerability of the poor population, which requires state assistance to realize their fundamental right to health.

The fact that the contemporary coefficient of spending on health and education has a poverty-reducing effect and then that the first lag in this expenditure reverses its effect, leads us to identify that the local and national government should pay attention to sustaining annual spending on health and education, giving continuity to the social programs developed in these two pillars. Also is important to make sustained social investments annually that can have a long-term effect, this is only achieved by thinking about long-term social projects and investments that are executed year after year, for example the educational field with the construction of schools and universities, high qualification of teachers, acquisition of technologies, and in the field of health with the construction of hospitals, acquisition of high-tech medical equipment to provide timely and quality care to the population.

This fact that the impact of social spending in education and health have a benefic short-term effect and the long-term the effect can be seen as perverse, may imply that incentives are being generated so that the population wants to stay in situation of poverty to access this type of public spending that is normally focused on people under this condition, for this reason, the government must also be vigilant in guaranteeing universal access to health and education in such a way that perverse incentives are not generated that attract the vulnerable population to the condition of poverty.

The Kitchen results show a positive contemporary effect of public social spending without education and health (yP_h) on all levels of poverty but the coefficients are not significative. On the other hand, for the first lag of yP_h there is a significant coefficient with an inverse relationship between the other social expenditures and poverty at level 2.15, showing a long-term beneficial effect of spending on housing and social security on extreme poverty, however this effect is no longer relevant for poverty levels 3.65 and 6.85 since the coefficient is not significant for these cases.

In the case of foreign aid, the paper of Bahmani & Oyolola et al. (2009) is followed, and bilateral aid as a percentage of GDP was taken as an independent variable, finding in this case a coefficient with a negative sign for the same period at poverty levels 6.85 and 3.65 and a positive sign for level 2.15 and for the first lag at all levels. Although for the preferred estimate (left) the coefficient is not significant, suggesting that there is no strong relationship between aid and poverty - this may be because aid as a percentage of GDP has not been very high, since greater prominence has been given to what the State itself can allocate to

the low-income population. On the contrary, for the estimation GMM system kitchen (right), the contemporary effect is significant, but with a positive sign, which could indicate a perverse incentive, as Berjeen (2009) warns "International aid is often associated with a perpetuation of poverty, due to the generation of incentives for inefficient behavior." Finally, it should be noted that the long-term effect is not significant in any of the estimated models, therefore the difference in the direction of impact between one group of estimates and the other is not relevant.

The result of the coefficient that corresponds to inflation has a positive sign as expected, significant for the preferred estimation, but it is not significant for the sGMM results where the effect is almost non-existent. In any case, the result confirms that the sustained and generalized increase in the level of prices affects mainly the poor and vulnerable population, causing their purchasing power to decrease, hence why a significant part of Latin American countries has adopted a monetary policy of inflation target, with a sense of social responsibility.

The growth of the GDP per capita is significant and presents the expected sign. Here the results are very similar to those obtained in the sGMM model without Kitchen approach. The values of the coefficients show that, in the case of Latin America, economic growth is less effective in alleviating poverty as poverty worsens, this also shows that the benefits of growth reach to a lesser extent the population with a deeper level of poverty, and on the other hand, it shows that the effect of growth on poverty is less than that achieved through public social spending. In the sGMM Kitchen model the effect of growth GDP on extreme poverty (POV 2.15) is not significant, this again suggests that the benefits of growth do not reach the population with a deeper level of poverty. This result differs from that found by Davila (2023) where the results showed a stronger and significative impact of economic growth.

I.8 Conclusions

The estimated models show that the percentage of the population living under the poverty line 2.15, 3.65 and 6.85 dollars per day at constant 2017 prices, is a measure that allows us to approach the issue of poverty, and although this is a measure that leaves aside some social and cultural dimensions of poverty, allows us to size the problem in quantitative terms to measure the possible scope that public social spending has on the population living in poverty and vulnerability.

For the countries of Latin America, moderate poverty is the highest and the countries with the highest level of poverty are Honduras, Colombia, and Brazil, while the one with the lowest level is Uruguay. However, it is noted that there has been a process of convergence and poverty levels have decreased significantly throughout Latin America in the last two decades, in the same way public spending has been increasing, with a notable acceleration in 2020 as a result of COVID.

In the case of Colombia and Honduras, public social spending must be more efficient, since they are countries in Latin American with the highest poverty rates in the three indicators used, this suggests that it is important to control the way in which the social public spending is executed.

Although over the last decade there have been improvements in poverty reduction, it is possible to conclude that public social spending has an important effect on this reduction, but it is still insufficient, given the high rates of poverty that still exist. In Latin America, almost a doubling of effort is required to reach the goal of ending poverty by 2030.

Education and health care are basic services essential in any effort to combat poverty and are often subsidized with public funds to help achieve that purpose. Social programs have evolved to become a tool that allows the use of public social spending in a complementary way, improving access to education, health, housing, basic services, and social protection. Although the situation in terms of coverage has improved, the great challenge now is to improve quality conditions.

Public social spending in education has had the greatest impact on the population that lives on less than 6.85 dollars a day, but the impact is not significative on who live on less than $ 3.65 and $ 2.15 dollars a day. This shows that an effort still needs to be made on targeting spending, so that it can reach the poorest. Policies must therefore be implemented to ensure that spending on education can be harnessed by the extreme poor.

Public social spending in health has an impact on the population that lives on less than $2.15 a day, but the impact is not relevant on those who live on less than $ 3.65 a day and less than 6.85 dollars a day. This shows that Policies are still required to allow this spending to reach all poor people, so that the right to health is a right for all. In this case, it is important to evaluate the possibility of expanding health spending, since by 2020, with the COVID emergency, the need for countries to expand their infrastructure and personnel in the health sector was seen.

Given that in the results we obtained that spending on health and education generates an important impact in the short term, it is worth enhancing these expenses by maintaining them every period, and focusing them on social investment, so that in the long run a benefic effect can be generated.

As the long-term effect of education and health expenditures is not as desired, because they tend to increase poverty, it is important to reassess spending targeting policies, as programs may be generating perverse long-term incentives, as those who are not poor have the incentive to be poor to access goods or services that only they can access. This suggests that expenditures in these areas should be universalized to guarantee these fundamental rights to the entire population, thus eliminating negative long-term incentives.

When identifying that short-term spending on education provides a beneficial effect on people who live with less of US6.85 per day, would be interesting to investigate which programs are developed in education and see if these have been maintained over time.

The effect of Inflation on poverty shows the expected positive sign, so that the higher the price level, the greater the poverty, as it directly affects purchasing power but is not strong because the coefficients are small. This leads us to identify that monetary policy also has a social responsibility and when poverty levels are high, priority should be given to the objective of maintaining the purchasing power of citizens, since inflation affects the poor and vulnerable population more strongly.

On the other hand, the effect of bilateral aid on poverty in the preferred estimation (OLS-Fe-Kitchen) is not significantly. However, the short-time coefficients found in the system GMM kitchen model, contrary to expectations, suggests that bilateral aid also encourages the increase in poverty in Latin America, given that this aid was used as a control variable, and this result is different in both estimates, the cause was not delved into, and this result may inspire future research.

The results also reveal that Latin America is characterized by a persistent effect of poverty, this means that there is a direct relationship between poverty in the previous period and that of the current period.

This inertia suggests that poverty follows a trend, and if poverty is managed to take a downward path, this force will push it into a sustained future reduction.

An important finding is that of economic growth, since it is observed that although it does have an effect on poverty reduction, this effect is weaker as the level of economic growth becomes more extreme, which shows that the conditions of inequality in Latin America mean that the benefits of economic growth are not distributed equitably and are not very effective in helping the poorest to escape from poverty, In this same sense, the result that public social spending in general and spending on health and education in particular, have a stronger effect than economic growth, is different from the classic findings that position economic growth as the most important variable in reducing poverty.

When performing the econometric tests, it was verified that there is endogeneity between poverty and public social spending, so the dynamic panel model was presented as a good alternative, however having a small number of observations or countries the Kitchen Sink method allowed to estimate the social public expenditure in order to obtain a robust dynamic panel estimate that gives us the possibility of obtaining estimators with reliable signs and significances.

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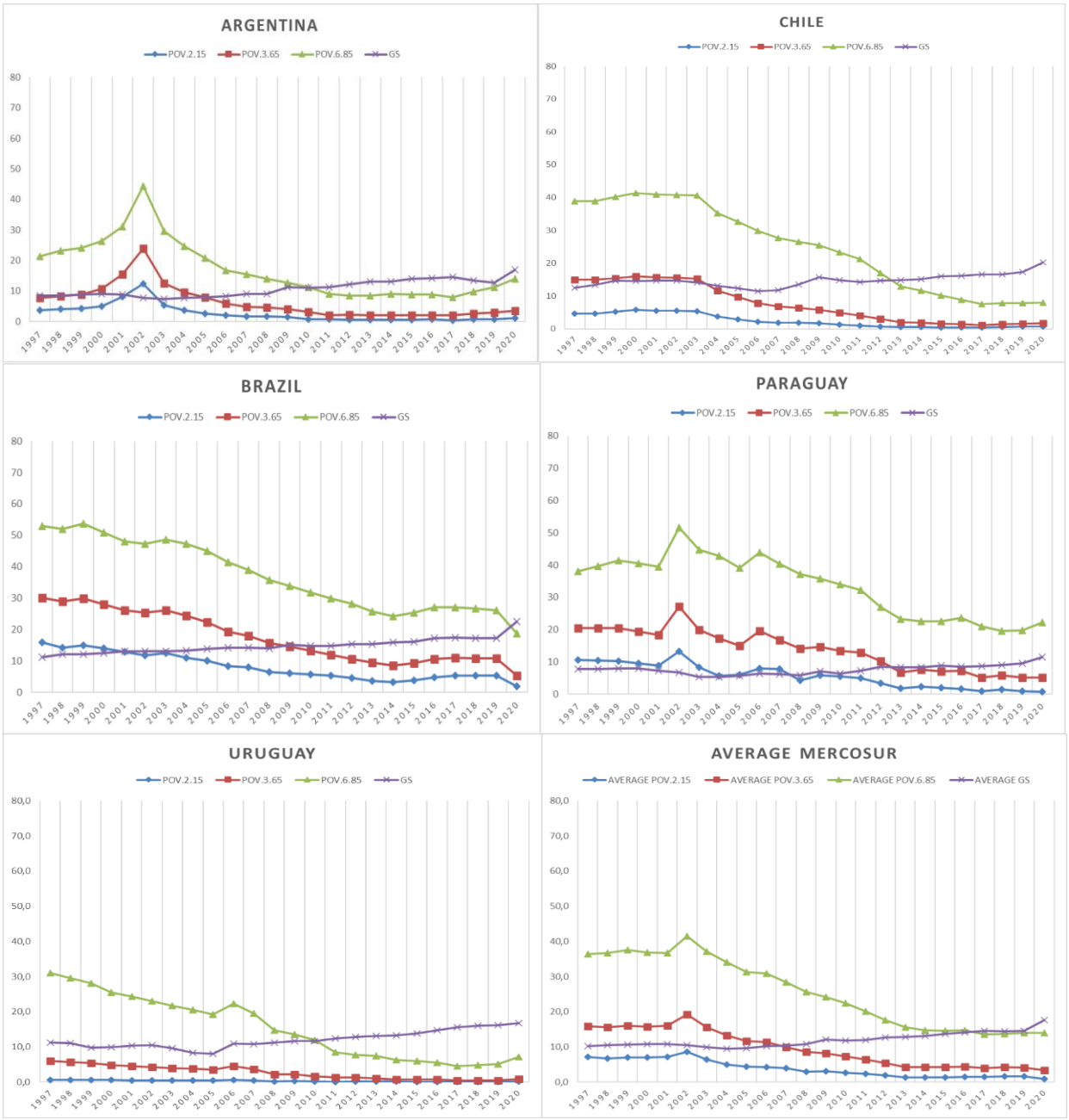
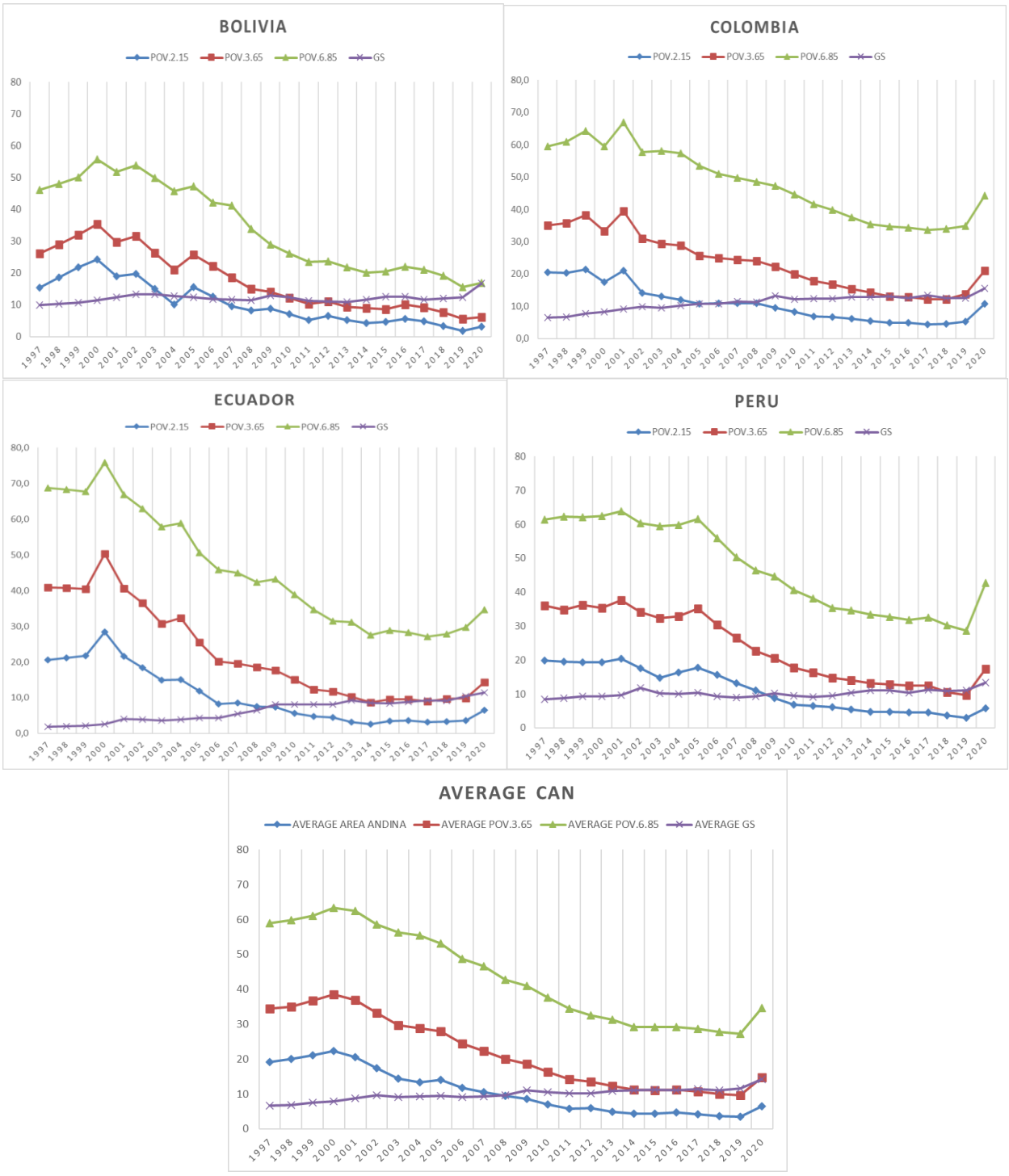
Appendix

I.9.1 Appendix 1.A Graphs poverty and public social spending MERCOSUR



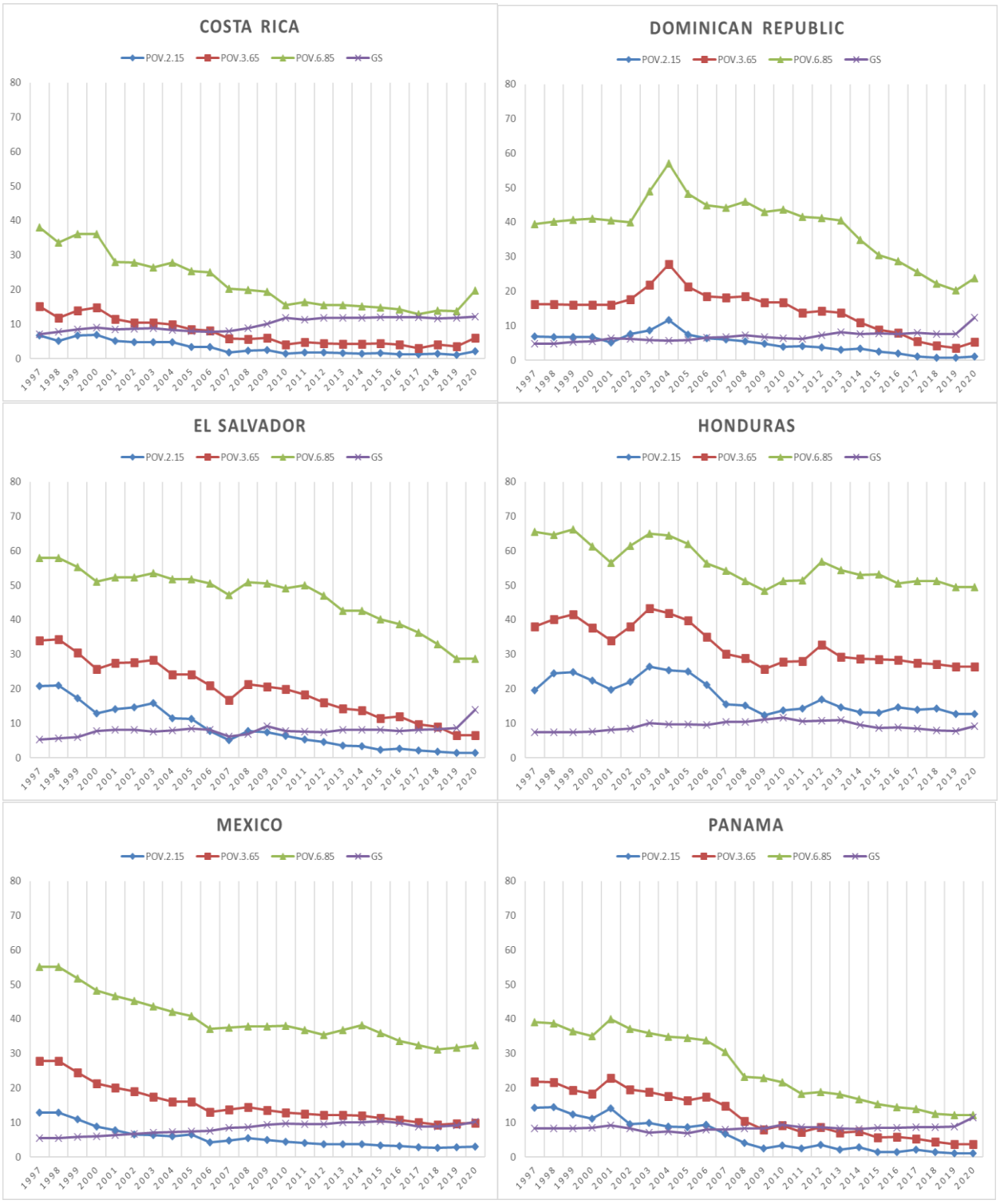
Source: Own elaboration whit world bank data.

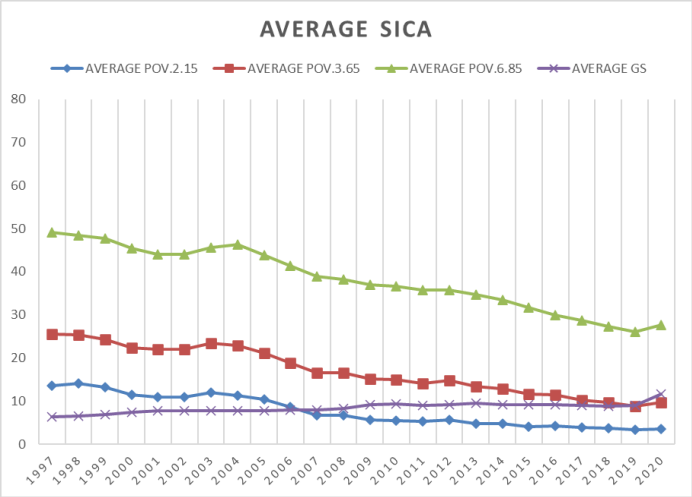
Appendix 1.B Graphs poverty and public social spending CAN



Source: Own elaboration whit world bank data.

Appendix 1.C Graphs poverty and public social spending SICA





Source: Own elaboration whit world bank data.

I.9.2 Appendix 2 LSDV model

To determine the degree of dependence of the poverty with respect to the public social expenditure of each country it is possible to use dummy variables to calculate the fixed effect of each country, following Bontempi and Golinelli (2020), LSDV model (Least Square Dummy Variables) accounts for the effect of country heterogeneity by allowing different intercepts, one for each country in the pooled data. Differences in intercepts capture the unique characteristics of the country. The term fixed effect is because although the intercept varies across countries, it is fixed over time. Below in the table 5 are the results of a LSDV, without correction for endogeneity:

Table 6 LSDV estimation

Dependent variable: POV Regressors	POV685	POV365	POV215
PSE	1.300***	0.566***	0.350***
GRW_PC	0.214	0.112	0.049
INF	0.346***	0.266***	0.150***
AID_2020	-1.184	1.276***	2.266***
COUNTRY==Bolivia	25.801***	14.603***	7.427***
COUNTRY==Brazil	23.028***	14.024***	6.688***
COUNTRY==Chile	11.724***	4.610***	1.280
COUNTRY==Colombia	38.727***	**21.647*** **	**10.319*** **
COUNTRY==Costa Rica	13.869***	6.141***	2.981
COUNTRY==Dominican R	34.090***	14.521***	5.519***
COUNTRY==Ecuador	**40.368*** **	**21.380*** **	**10.433** **
COUNTRY==El Salvador	**43.726*** **	20.462***	8.727***
COUNTRY==Honduras	**50.842*** **	**30.111*** **	**14.772*** **
COUNTRY==Mexico	34.730***	15.536***	6.509***
COUNTRY==Panama	21.095***	13.201***	7.398***

Dependent variable: POV Regressors	POV685	POV365	POV215
COUNTRY==Paraguay	28.952***	14.048***	6.291***
COUNTRY==Peru	**40.240*** **	**23.128*** **	**11.364*** **
COUNTRY==Uruguay	3.880*	-0.188	-0.727
YEAR	Yes	Yes	Yes
Adj R-squared	0.982	0.966	0.939
N	360	360	360

* p<0.05, ** p<0.01, *** p<0.001

Source: Own elaboration with data from the World Bank and ECLAC

It is worth mentioning that this result was ruled out by the fact that it does not consider the fact that there is a causal relationship between public social expenditure and poverty.

I.9.3 Appendix 3 Endogeneity tests and instrumental variables estimation

The under-identification test is an LM test to verify whether the equation is identified, i.e., whether the excluded instruments are significantly correlated with the endogenous regressors. The test is essentially the test of the rank of a matrix under the null hypothesis that the equation is under-identified. A rejection of the null indicates that the matrix is full column rank, i.e., the model is identified.

Weak identification arises when the excluded instruments are correlated with the endogenous regressors but only weakly. When errors are assumed to be i.i.d., the test for weak identification automatically reported by ivreg2 is an F version of the Cragg-Donald Wald statistic, (N-L)/L1*CDEV, where L is the number of instruments and L1 is the number of excluded instruments. Stock and Yogo (2005) have compiled critical values for the Cragg-Donald F statistic for several different estimators.

In the test of over-identifying restrictions, the joint null hypothesis is that the instruments are valid instruments, i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation. For the efficient GMM estimator, the test statistic is Hansen's J statistic. A rejection casts doubt on the validity of the instruments.

The instruments should be highly correlated with the variables to be instrumented to be ‘strong’ in Murray’s (2006) terminology. They should also be uncorrelated with the disturbances of the equation of interest (in our case Equation 6); that is, the instruments should be ‘valid’ in Murray’s (2006) terminology. Sometimes, economic theory helps identify strong and valid instruments. In general, however, economic interactions may be so complex and numerous that economic theory alone is not helpful to identify strong and valid instruments. Moreover, one can imagine a scenario where the chosen instruments are strong and valid, but it is often possible to find another scenario where the instruments are not (Durlauf, Johnson, & Temple, 2005). Therefore, econometric tests become the best means to judge whether the chosen instruments are strong and valid. Murray (2006) suggests using the Staiger & Stock (1997) “rule” to examine whether instruments are strong and the test of over identifying restrictions to judge their validity. Following Staiger and Stock, the instruments can be considered as good if the first-stage F-statistic of the regression of the variable to be instrumented on the instrument is above 10. The test of overidentifying restrictions is the Hansen’s J test.

Like the C statistics, the endogeneity test implemented on the STATA software with the command ivreg2 procedure (which we have used for 2SLS) is defined as the difference of two Sargan-Hansen statistics: one for the equation with the smaller set of instruments, where the suspect regressor(s) are treated as endogenous, and one for the equation with the larger set of instruments, where the suspect regressors are treated as exogenous. The null hypothesis is that the specified endogenous regressors can be treated as exogenous.

Below are the estimations for each level of poverty for the instrumental variables fixed effect model:

Table 7 Instrumental Variables Fixed Effect Estimations

Regressors	POV685	POV365	POV215
PSE	**-5.459*** **	**-4.141*** **	**-2.553*** **
GRW_PC	**-0.465***	**-0.295***	-0.183
INF	0.084	**0.120** **	**0.071***
AID_2020	**6.647** **	**6.945*** **	**5.822*** **
COUNTRY==Bolivia	18.241***	10.769***	5.460***
COUNTRY==Brazil	43.345***	29.862***	16.924***
COUNTRY==Chile	31.165***	19.851***	11.152***
COUNTRY==Colombia	33.339***	19.506***	9.446***
COUNTRY==Costa Rica	2.175	-0.471	-0.672
COUNTRY==Dominicana R	1.474	-6.759	-7.208*
COUNTRY==Ecuador	3.790	-2.706	-4.038
COUNTRY==El Salvador	11.916*	0.014	-3.411
COUNTRY==Honduras	22.213***	11.482*	3.646
COUNTRY==Mexico	10.469*	0.348	-2.385
COUNTRY==Panama	-1.851	-1.086	-0.944
COUNTRY==Paraguay	-0.61	-4.912	-4.952
COUNTRY==Peru	27.432***	15.858***	7.337***
COUNTRY==Uruguay	6.692**	3.277	1.828
Constant	74.172***	47.526***	28.167***
YEAR Dummies	YES	YES	YES
Centered R2	0.8135	0.7388	0.7169
N	360	360	360
Underidentification test (Anderson canon. corr. LM statistic):	22.706	22.706	22.119
Chi-sq(2) P-val	0.0000	0.0000	0.0000
Sargan statistic (overidentification test of all instruments):	2.11	8.637	10.839
Chi-sq(1) P-val	0.1464	**0.0033**	**0.001**
Endogeneity test of endogenous regressors.	41.218	47.497	34.57
Chi-sq(1) P-val	0.0000	0.0000	0.0000
Regressors tested:	PSE		
Included instruments:	GRW_PC INF AID_2020 tau2 tau3 tau4 tau5 tau6 tau7 tau8 tau9 tau10 tau11 tau12 tau13	GRW_PC INF AID_2020 tau2 tau3 tau4 tau5 tau6 tau7 tau8 tau9 tau10 tau11 tau12 tau13	GRW_PC INF AID_2020 tau2 tau3 tau4 tau5 tau6 tau7 tau8 tau9 tau10 tau11 tau12 tau13

Regressors	POV685	POV365	POV215
	tau14 tau15 tau16 tau17 tau18 tau19 tau20 tau21 tau22 tau23 tau24 mu2 mu3 mu4 mu5 mu6 mu7 mu8 mu9 mu10 mu11 mu12 mu13 mu14 mu15	tau14 tau15 tau16 tau17 tau18 tau19 tau20 tau21 tau22 tau23 tau24 mu2 mu3 mu4 mu5 mu6 mu7 mu8 mu9 mu10 mu11 mu12 mu13 mu14 mu15	tau14 tau15 tau16 tau17 tau18 tau19 tau20 tau21 tau22 tau23 tau24 mu2 mu3 mu4 mu5 mu6 mu7 mu8 mu9 mu10 mu11 mu12 mu13 mu14 mu15
Excluded instruments:	TAX_GG Distrust_Both_sexes	TAX_GG Distrust_Both_sexes	TAX_GG Distrust_Both_sexes

* p<0.05, ** p<0.01, *** p<0.001

Source: Own elaboration with data from the World Bank and ECLAC

The Sargan-Hansen test is a test of overidentifying restrictions. The joint null hypothesis is that the instruments are valid instruments, uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation. Under the null, the test statistic is distributed as chi-squared. A rejection casts doubt on the validity of the instruments (Hayashi, 2000, 227-8, 407, 417). As you can see in table 3, the probability indicates a rejection and therefore the instruments are not valid for the model POV3.65 and POV2.15.

I.9.4 Appendix 4 Control function approach, kitchen sink estimation description and results of the first stage of kitchen sink estimation

The following estimation are the first stage of the kitchen sink estimation or the control function approach (Heckman and Hotz, 1989; Wooldridge, 2004), assuming that PSs are randomly allocated, conditional *on observable covariates*, this hypothesis of unconfoundedness underlies the estimation of the average treatment effect of policies through a 'kitchen sink' regression that includes the treatment variable alongside with the variables determining the response variable and/or PSs allocation. This approach requires estimating an equation determining the allocations of Public social spending PSE. Firstly we aggregate in a single PSE (which include Gh GE, GPs, GV) but also we check each single public spending and different aggregation (as PSE and P_h) and we assume that policy funds can react only with delay to changes in the economic or political environment and we use as determinant of the PSE the taxation in general government and trust.

With this methodology, the values of the endogenous explanatory variables are estimated, finding the predicted values of total social public expenditure and PSE and its components, which in this case would be yGE, yGH, and yP_h which are then used as exogenous variables within the OLS-Fe and sGMM kitchen dynamic panel models.

According to Wooldridge (2004), this equation must have a correct functional form (tested through Ramsey RESET test, which is an F test and a rejection of it means that the Model has some omitted variables). If the hypothesis of homoscedastic disturbances (tested through the Breusch-Pagan/Cook-Weisberg test) is rejected, the 'kitchen sink' regression should include the fitted values from the equation determining the allocations of PSs.

We chose the selection of public spending which respect better the tests and is more significance on the poverty (PSE and yGE; and yP_h, yGH). Moreover, is usefull to consider in a separate way the yGE and yGH

```
Linear regression                               Number of obs     =        330
                                                F(10, 319)        =      60.50
                                                Prob > F          =     0.0000
                                                R-squared         =     0.6919
                                                Root MSE          =     .19343

------------------------------------------------------------------------------
                             |               Robust
                       nt_GH | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-----------------------------+------------------------------------------------
                    nt_GH_m1 |   .7420938   .1107931     6.70   0.000     .5241163    .9600712
                    nt_GH_m2 |   .1370334   .1123805     1.22   0.224    -.0840672    .3581339
             nt_AID_2020_m2 |   .0978276    .079912     1.22   0.222    -.0593936    .2550488
            nt_agri_perc_m1 |          0  (omitted)
            nt_indu_perc_m1 |  -.4944869   1.752912    -0.28   0.778    -3.943216    2.954242
              nt_PA_perc_m1 |  -.5621837   1.955234    -0.29   0.774    -4.408968      3.2846
            nt_serv_perc_m1 |  -1.476522   1.529113    -0.97   0.335    -4.484941    1.531898
            nt_comm_perc_m1 |  -.3802276    2.17179    -0.18   0.861    -4.653068    3.892613
               nt_TAX_GG_m1 |  -.0051918   .0087259    -0.59   0.552    -.0223594    .0119758
nt_Distrust_Both_sexes_m1 |  -.0022764   .0017875    -1.27   0.204    -.0057931    .0012403
nt_Distrust_Both_sexes_m2 |   .0026508   .0017889     1.48   0.139    -.0008688    .0061703
                     _cons |  -1.95e-09   .0106479    -0.00   1.000     -.020949     .020949
------------------------------------------------------------------------------

Akaike's information criterion and Bayesian information criterion
```

```
-----------------------------------------------------------------------------
       Model |          N   ll(null)  ll(model)      df        AIC        BIC
-------------+---------------------------------------------------------------
           . |        330  -114.7725   79.48326      11  -136.9665   -95.1765
-----------------------------------------------------------------------------
Note: BIC uses N = number of observations. See [R] BIC note.

Breusch Pagan/Cook Weisberg test for heteroskedasticity
Assumption: i.i.d. error terms
Variable: Fitted values of nt_GH

H0: Constant variance

F(1, 328) =   0.41
 Prob > F = 0.5224

White's test
H0: Homoskedasticity
Ha: Unrestricted heteroskedasticity

   chi2(65) = 129.32
Prob > chi2 = 0.0000

Cameron & Trivedi's decomposition of IM-test

---------------------------------------------------
              Source |       chi2     df         p
---------------------+-----------------------------
  Heteroskedasticity |     129.32     65    0.0000
            Skewness |      20.08     10    0.0285
            Kurtosis |       3.86      1    0.0493
---------------------+-----------------------------
               Total |     153.26     76    0.0000
---------------------------------------------------
Arellano-Bond test for AR(1): z =  -0.71  Pr > z = 0.4755

Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of nt_GH

H0: Model has no omitted variables

F(3, 314) =   3.16
 Prob > F = 0.0248

 ( 1)  y2 = 0
 ( 2)  y3 = 0

       F(  2,   317) =    0.48
            Prob > F =    0.6169

note: nt_agri_perc_m1 omitted because of collinearity.

Linear regression                               Number of obs     =        330
                                                F(10, 319)        =      53.86
                                                Prob > F          =     0.0000
                                                R-squared         =     0.6777
                                                Root MSE          =     .50422

------------------------------------------------------------------------------
                             |               Robust
                      nt_Gps | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-----------------------------+------------------------------------------------
                  nt_Gps_m1 |   .8552214   .0596475    14.34   0.000     .7378693    .9725736
                  nt_Gps_m2 |   .0048177   .0624069     0.08   0.939    -.1179635    .1275988
             nt_AID_2020_m2 |   .0018486   .1124369     0.02   0.987    -.2193629    .2230601
            nt_agri_perc_m1 |          0  (omitted)
            nt_indu_perc_m1 |  -9.731595   4.785574    -2.03   0.043    -19.14687   -.3163212
              nt_PA_perc_m1 |  -10.07763   6.307379    -1.60   0.111    -22.48695    2.331683
            nt_serv_perc_m1 |  -10.00742   4.592956    -2.18   0.030    -19.04373   -.9711028
            nt_comm_perc_m1 |  -7.531056   5.657822    -1.33   0.184    -18.66242    3.600304
               nt_TAX_GG_m1 |   .0225695   .0215775     1.05   0.296    -.0198828    .0650218
```

```
nt_Distrust_Both_sexes_m1 |  -.0136653   .0048914    -2.79   0.006    -.0232888   -.0040418
nt_Distrust_Both_sexes_m2 |   .0085934    .005281     1.63   0.105    -.0017966    .0189834
                    _cons |   4.10e-08   .0277564     0.00   1.000    -.0546087    .0546088
------------------------------------------------------------------------------------------

Akaike's information criterion and Bayesian information criterion

-------------------------------------------------------------------------------
       Model |          N   ll(null)  ll(model)      df        AIC         BIC
-------------+-----------------------------------------------------------------
           . |        330  -423.5237  -236.6908      11   495.3817   537.1717
-------------------------------------------------------------------------------
Note: BIC uses N = number of observations. See [R] BIC note.

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
Assumption: i.i.d. error terms
Variable: Fitted values of nt_Gps

H0: Constant variance

F(1, 328) =   2.60
 Prob > F = 0.1075

White's test
H0: Homoskedasticity
Ha: Unrestricted heteroskedasticity

   chi2(65) = 114.14
Prob > chi2 = 0.0002

Cameron & Trivedi's decomposition of IM-test

-------------------------------------------------
              Source |       chi2     df         p
---------------------+---------------------------
  Heteroskedasticity |     114.14     65    0.0002
            Skewness |      10.14     10    0.4279
            Kurtosis |       5.81      1    0.0159
---------------------+---------------------------
               Total |     130.10     76    0.0001
-------------------------------------------------
Arellano-Bond test for AR(1): z =  -1.49  Pr > z = 0.1362

Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of nt_Gps

H0: Model has no omitted variables

F(3, 313) =   0.95
 Prob > F = 0.4147

 ( 1)  y2 = 0
 ( 2)  y3 = 0
 ( 3)  y4 = 0

       F(  3,   316) =    0.65
            Prob > F =    0.5847
note: nt_agri_perc_m1 omitted because of collinearity.

Linear regression                               Number of obs     =        330
                                                F(10, 319)        =      12.25
                                                Prob > F          =     0.0000
                                                R-squared         =     0.4979
                                                Root MSE          =     .17967

------------------------------------------------------------------------------------------
                         |               Robust
                  nt_GV | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-------------------------+----------------------------------------------------------------
                nt_GV_m1 |    .644671   .1268341     5.08   0.000      .395134     .894208
                nt_GV_m2 |   .0028429   .1381422     0.02   0.984     -.268942    .2746277
```

```
           nt_AID_2020_m2 |  -.0391954   .0314231    -1.25   0.213    -.1010181    .0226273
          nt_agri_perc_m1 |          0  (omitted)
          nt_indu_perc_m1 |  -.4248199   2.634435    -0.16   0.872    -5.607881    4.758241
            nt_PA_perc_m1 |  -3.028545   3.048339    -0.99   0.321    -9.025933    2.968843
          nt_serv_perc_m1 |  -1.062272   2.517768    -0.42   0.673    -6.015801    3.891256
          nt_comm_perc_m1 |   .3692798   2.911989     0.13   0.899    -5.359851     6.09841
             nt_TAX_GG_m1 |   .0099769   .0072766     1.37   0.171    -.0043393    .0242931
nt_Distrust_Both_sexes_m1 |  -.0000473   .0015038    -0.03   0.975    -.0030059    .0029113
nt_Distrust_Both_sexes_m2 |  -.0004235     .00143    -0.30   0.767    -.0032369    .0023899
                    _cons |   1.79e-10   .0098907     0.00   1.000    -.0194593    .0194593
------------------------------------------------------------------------------------------

Akaike's information criterion and Bayesian information criterion

-----------------------------------------------------------------------------
       Model |          N   ll(null)  ll(model)      df        AIC        BIC
-------------+---------------------------------------------------------------
           . |        330  -9.850148   103.8252      11  -185.6505  -143.8605
-----------------------------------------------------------------------------
Note: BIC uses N = number of observations. See [R] BIC note.

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
Assumption: i.i.d. error terms
Variable: Fitted values of nt_GV

H0: Constant variance

F(1, 328) =  28.38
 Prob > F = 0.0000

White's test
H0: Homoskedasticity
Ha: Unrestricted heteroskedasticity

   chi2(65) = 198.42
Prob > chi2 = 0.0000

Cameron & Trivedi's decomposition of IM-test

---------------------------------------------------
              Source |       chi2     df         p
---------------------+-----------------------------
  Heteroskedasticity |     198.42     65    0.0000
            Skewness |      14.06     10    0.1704
            Kurtosis |       1.34      1    0.2476
---------------------+-----------------------------
               Total |     213.82     76    0.0000
---------------------------------------------------
Arellano-Bond test for AR(1): z =  -0.90  Pr > z = 0.3691

Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of nt_GV

H0: Model has no omitted variables

F(3, 313) =   9.55
 Prob > F = 0.0000

 ( 1)  y2 = 0
 ( 2)  y3 = 0
 ( 3)  y4 = 0

       F(  3,   316) =    8.97
            Prob > F =    0.0000
note: nt_agri_perc_m1 omitted because of collinearity.

Linear regression                               Number of obs     =        330
                                                F(10, 319)        =      71.86
                                                Prob > F          =     0.0000
                                                R-squared         =     0.7039
                                                Root MSE          =     .62976
```

```
------------------------------------------------------------------------------
             |               Robust
      nt_PSE | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
   nt_PSE_m1 |   .8976841    .058324    15.39   0.000     .7829359    1.012432
   nt_PSE_m2 |  -.0764056   .0575385    -1.33   0.185    -.1896086    .0367974
nt_AID_2020_m2 |   .3576432    .204007     1.75   0.081     -.043726    .7590124
nt_agri_perc_m1 |          0  (omitted)
nt_indu_perc_m1 |  -10.46201   5.727514    -1.83   0.069    -21.73049    .8064606
  nt_PA_perc_m1 |  -12.04981   8.226256    -1.46   0.144    -28.23437    4.134764
nt_serv_perc_m1 |   -13.3428   6.008215    -2.22   0.027    -25.16353   -1.522068
nt_comm_perc_m1 |  -8.514561   7.203116    -1.18   0.238    -22.68618    5.657054
   nt_TAX_GG_m1 |    .013949   .0253059     0.55   0.582    -.0358386    .0637366
nt_Distrust_Both_sexes_m1 |  -.0169301   .0066783    -2.54   0.012    -.0300692   -.0037911
nt_Distrust_Both_sexes_m2 |   .0165027   .0068898     2.40   0.017     .0029475    .0300578
             _cons |   5.83e-08   .0346672     0.00   1.000    -.0682052    .0682053
------------------------------------------------------------------------------

Akaike's information criterion and Bayesian information criterion

-----------------------------------------------------------------------------
       Model |          N   ll(null)  ll(model)      df        AIC        BIC
-------------+---------------------------------------------------------------
           . |        330  -510.8481  -310.0592      11   642.1183   683.9084
-----------------------------------------------------------------------------
Note: BIC uses N = number of observations. See [R] BIC note.

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
Assumption: i.i.d. error terms
Variable: Fitted values of nt_PSE

H0: Constant variance

F(1, 328) =   0.71
 Prob > F = 0.3993

White's test
H0: Homoskedasticity
Ha: Unrestricted heteroskedasticity

   chi2(65) =  72.59
Prob > chi2 = 0.2422

Cameron & Trivedi's decomposition of IM-test

---------------------------------------------------
              Source |       chi2     df         p
---------------------+-----------------------------
  Heteroskedasticity |      72.59     65    0.2422
            Skewness |      22.89     10    0.0112
            Kurtosis |       8.13      1    0.0043
---------------------+-----------------------------
               Total |     103.61     76    0.0194
---------------------------------------------------
Arellano-Bond test for AR(1): z =  -1.13  Pr > z = 0.2591

Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of nt_PSE

H0: Model has no omitted variables

F(3, 313) =   0.35
 Prob > F = 0.7880

 ( 1)  y2 = 0
 ( 2)  y3 = 0
 ( 3)  y4 = 0

       F(  3,   316) =    6.87
            Prob > F =    0.0002
```

```
note: nt_agri_perc_m1 omitted because of collinearity.

Linear regression                               Number of obs     =        330
                                                F(10, 319)        =      45.61
                                                Prob > F          =     0.0000
                                                R-squared         =     0.6299
                                                Root MSE          =     .55725

------------------------------------------------------------------------------------------
                         |               Robust
                   nt_PS | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-------------------------+----------------------------------------------------------------
                nt_PS_m1 |   .7654999   .0622808    12.29   0.000     .6429668     .888033
                nt_PS_m2 |   .0243877   .0612535     0.40   0.691    -.0961242    .1448995
          nt_AID_2020_m2 |   .1256707   .1500263     0.84   0.403    -.1694952    .4208367
         nt_agri_perc_m1 |          0  (omitted)
         nt_indu_perc_m1 |  -10.40115   4.899662    -2.12   0.035    -20.04089   -.7614183
           nt_PA_perc_m1 |  -11.76495   6.834729    -1.72   0.086    -25.21179    1.681893
         nt_serv_perc_m1 |  -12.14274   5.007756    -2.42   0.016    -21.99515   -2.290342
         nt_comm_perc_m1 |  -6.578587   6.141893    -1.07   0.285    -18.66232    5.505147
            nt_TAX_GG_m1 |   .0240195   .0229733     1.05   0.297    -.0211787    .0692178
nt_Distrust_Both_sexes_m1 |   -.016359   .0056026    -2.92   0.004    -.0273818   -.0053362
nt_Distrust_Both_sexes_m2 |   .0103066   .0060114     1.71   0.087    -.0015204    .0221335
                    _cons |   4.22e-08   .0306756     0.00   1.000    -.0603519     .060352
------------------------------------------------------------------------------------------

Akaike's information criterion and Bayesian information criterion

------------------------------------------------------------------------------
       Model |          N   ll(null)  ll(model)      df        AIC        BIC
-------------+----------------------------------------------------------------
           . |        330  -433.6773  -269.6909      11   561.3818   603.1719
------------------------------------------------------------------------------
Note: BIC uses N = number of observations. See [R] BIC note.

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
Assumption: i.i.d. error terms
Variable: Fitted values of nt_PS

H0: Constant variance

F(1, 328) =   2.78
 Prob > F = 0.0966

White's test
H0: Homoskedasticity
Ha: Unrestricted heteroskedasticity

   chi2(65) =  93.90
Prob > chi2 = 0.0110

Cameron & Trivedi's decomposition of IM-test

---------------------------------------------------
              Source |       chi2     df         p
---------------------+-----------------------------
  Heteroskedasticity |      93.90     65    0.0110
            Skewness |      13.19     10    0.2133
            Kurtosis |       5.91      1    0.0151
---------------------+-----------------------------
               Total |     113.00     76    0.0038
---------------------------------------------------
Arellano-Bond test for AR(1): z =  -0.81  Pr > z = 0.4154

Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of nt_PS

H0: Model has no omitted variables

F(3, 313) =   1.75
 Prob > F = 0.1558
```

```
 ( 1)  y2 = 0
 ( 2)  y3 = 0
 ( 3)  y4 = 0

       F(  3,   316) =    1.32
            Prob > F =    0.2668
note: nt_agri_perc_m1 omitted because of collinearity.

Linear regression                               Number of obs     =        330
                                                F(10, 319)        =     135.69
                                                Prob > F          =     0.0000
                                                R-squared         =     0.8150
                                                Root MSE          =     .23966

------------------------------------------------------------------------------
                             |               Robust
                      nt_GE | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-----------------------------+------------------------------------------------
                  nt_GE_m1 |   1.021419   .0669633    15.25   0.000     .8896732    1.153164
                  nt_GE_m2 |  -.1558031   .0729681    -2.14   0.034    -.2993627   -.0122435
             nt_AID_2020_m2 |   .2415542   .0859444     2.81   0.005     .0724646    .4106437
           nt_agri_perc_m1 |           0  (omitted)
           nt_indu_perc_m1 |  -1.158583   2.240618    -0.52   0.605    -5.566838    3.249672
             nt_PA_perc_m1 |  -2.034241   3.102702    -0.66   0.513    -8.138585    4.070103
           nt_serv_perc_m1 |    -2.2088   2.351273    -0.94   0.348    -6.834762    2.417161
           nt_comm_perc_m1 |    -2.6919   2.607513    -1.03   0.303    -7.821996    2.438195
              nt_TAX_GG_m1 |  -.0039354   .0097296    -0.40   0.686    -.0230777     .015207
nt_Distrust_Both_sexes_m1 |  -.0005144   .0025687    -0.20   0.841     -.005568    .0045393
nt_Distrust_Both_sexes_m2 |   .0040555   .0023976     1.69   0.092    -.0006616    .0087726
                    _cons |  -2.50e-09   .0131926    -0.00   1.000    -.0259555    .0259555
------------------------------------------------------------------------------

Akaike's information criterion and Bayesian information criterion

------------------------------------------------------------------------------
       Model |          N   ll(null)  ll(model)      df        AIC        BIC
-------------+----------------------------------------------------------------
           . |        330  -269.6594   8.766804      11   4.466392   46.25641
------------------------------------------------------------------------------
Note: BIC uses N = number of observations. See [R] BIC note.

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
Assumption: i.i.d. error terms
Variable: Fitted values of nt_GE

H0: Constant variance

F(1, 328) =   0.05
 Prob > F = 0.8157

White's test
H0: Homoskedasticity
Ha: Unrestricted heteroskedasticity

   chi2(65) =  81.95
Prob > chi2 = 0.0761

Cameron & Trivedi's decomposition of IM-test

---------------------------------------------------
              Source |       chi2     df         p
---------------------+-----------------------------
  Heteroskedasticity |      81.95     65    0.0761
            Skewness |      30.11     10    0.0008
            Kurtosis |      11.34      1    0.0008
---------------------+-----------------------------
               Total |     123.40     76    0.0005
---------------------------------------------------
Arellano-Bond test for AR(1): z =  -0.66  Pr > z = 0.5120
```

```
Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of nt_GE

H0: Model has no omitted variables

F(3, 313) =   1.30
 Prob > F = 0.2734

 ( 1)  y2 = 0
 ( 2)  y3 = 0
 ( 3)  y4 = 0

       F(  3,   316) =    1.91
            Prob > F =    0.1275
note: nt_agri_perc_m1 omitted because of collinearity.

Linear regression                               Number of obs     =        330
                                                F(10, 319)        =      32.77
                                                Prob > F          =     0.0000
                                                R-squared         =     0.5607
                                                Root MSE          =     .58474

------------------------------------------------------------------------------------------
                         |               Robust
                   nt_P_h | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-------------------------+----------------------------------------------------------------
               nt_P_h_m1 |   .6919323   .0600201    11.53   0.000     .5738471    .8100175
               nt_P_h_m2 |   .0737628   .0659392     1.12   0.264    -.0559678    .2034934
          nt_AID_2020_m2 |   .0164208   .1247197     0.13   0.895    -.2289562    .2617979
         nt_agri_perc_m1 |          0  (omitted)
         nt_indu_perc_m1 |  -8.837044   5.329724    -1.66   0.098    -19.32289    1.648806
           nt_PA_perc_m1 |   -18.6857   7.321042    -2.55   0.011    -33.08933   -4.282074
         nt_serv_perc_m1 |  -10.01596   5.175614    -1.94   0.054    -20.19861    .1666854
         nt_comm_perc_m1 |  -14.98263    6.54062    -2.29   0.023    -27.85083   -2.114428
            nt_TAX_GG_m1 |   .0667867   .0254971     2.62   0.009      .016623    .1169504
nt_Distrust_Both_sexes_m1 |  -.0141446    .005756    -2.46   0.015    -.0254691     -.00282
nt_Distrust_Both_sexes_m2 |   .0076154    .006038     1.26   0.208    -.0042639    .0194947
                    _cons |  -1.46e-09    .032189    -0.00   1.000    -.0633296    .0633296
------------------------------------------------------------------------------------------

Akaike's information criterion and Bayesian information criterion

------------------------------------------------------------------------------
       Model |          N   ll(null)  ll(model)      df        AIC        BIC
-------------+----------------------------------------------------------------
           . |        330  -421.3234  -285.5834      11   593.1667   634.9567
------------------------------------------------------------------------------
Note: BIC uses N = number of observations. See [R] BIC note.

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
Assumption: i.i.d. error terms
Variable: Fitted values of nt_P_h

H0: Constant variance

F(1, 328) =   5.06
 Prob > F = 0.0251

White's test
H0: Homoskedasticity
Ha: Unrestricted heteroskedasticity

   chi2(65) =  94.25
Prob > chi2 = 0.0103

Cameron & Trivedi's decomposition of IM-test

-------------------------------------------------
              Source |       chi2     df         p
---------------------+---------------------------
  Heteroskedasticity |      94.25     65    0.0103
```

```
            Skewness |      10.35     10    0.4102
            Kurtosis |       4.25      1    0.0393
---------------------+---------------------------
               Total |     108.85     76    0.0080
-------------------------------------------------
Arellano-Bond test for AR(1): z =   4.67  Pr > z = 0.0000
Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of nt_P_h

H0: Model has no omitted variables

F(3, 313) =   1.41
 Prob > F = 0.2407

 ( 1)  y2 = 0
 ( 2)  y3 = 0
 ( 3)  y4 = 0

       F(  3,   316) =    1.20
            Prob > F =    0.3088
```

II Poverty, happiness, and economic freedom: a correspondence analysis with a doubling technique on Latin American Countries.

Abstract

The paper aims to analyse the relationship among poverty, happiness, economic freedom, and other institutional aspect (democracy, trust, corruption, inflation, and growth) in 15 Latin American countries. The periods under consideration are two, the first is the time spam between 2007-2009 and the second is the period between 2017-2019. The method used to analyse these relationships is the correspondence analysis. The findings show that in the countries where the poverty index (absolute definition) is low, there are higher levels of positive institutional factors (low corruption, better legal system, democracy) and these conditions translate also into higher life satisfaction. Free economy alone, is not synonymous of richness but on the other hand economic freedom and poverty are linked to low suicide rate, instead not economic freedom and richness produce a high the suicide rate. The corruption index is positively linked with poverty and inflation as expected.

Keyword: General Economic Welfare. Basic Needs, Quality of Life, Happiness. Measurement and Analysis of Poverty

JEL Classifcation: D60 · I31 · I32

Povertà, felicità e libertà economica: un'analisi delle corrispondenze con la tecnica della duplicazione sui paesi dell'America Latina.

Riepilogo

Il documento si propone di analizzare la relazione tra povertà, felicità, libertà economica e altri aspetti istituzionali (democrazia, fiducia, corruzione, inflazione e crescita) in 15 paesi dell'America Latina. I periodi presi in considerazione sono due, il primo è il tempo tra il 2007-2009 e il secondo è il periodo tra il 2017-2019. Il metodo utilizzato per analizzare queste relazioni è l'analisi della corrispondenza. I risultati mostrano che nei paesi in cui l'indice di povertà (definizione assoluta) è basso, ci sono livelli più elevati di fattori istituzionali positivi (bassa corruzione, migliore sistema giuridico, democrazia) e queste condizioni si traducono anche in una maggiore soddisfazione di vita. La sola economia libera non è sinonimo di ricchezza, ma d'altra parte la libertà economica e la povertà sono legate al basso tasso di suicidi, invece non la libertà economica e la ricchezza producono un alto tasso di suicidi. L'indice di corruzione è positivamente collegato alla povertà e all'inflazione, come previsto.

Parole chiave: Economia del benessere. Bisogni primari, tenore di vita, tenore di vita, felicità. Medicina e analisi della malattia.

Classificazione JEL: D60 · I31 · I32

II.1 Introduction

The institutional framework of a society appears to have an active role in explaining its economic performance. In fact, several studies have considered economic freedom, democracy, and other institutional variables as potential determinants of economic welfare. Specifically, researchers attempt to identify the variables that determine economic growth and in which direction they determine it, also trying to find the causal relation between the economic growth (and/or wellbeing) and economic freedom (Justesen 2008; Vega-Gordillo and Alvarez-Arce 2003; Spruk and Kešeljević 2016) in the wide sense freedom of personal choice, voluntary exchange in markets, freedom of entry and competition, and protection of person and property.

Several authors found out that economic freedom, does make a positive contribution to well-being. Countries that have higher economic freedom tend to have higher rates of growth. At the same time the economic growth is the most powerful instrument for reducing poverty and improving the quality of life in developing countries. A successful strategy of poverty reduction should promote rapid and sustained economic growth, combining growth-promoting policies with policies that allow the poor to participate in the opportunities released and so contributing to that growth. Hence, if economic freedom positive contribute to economic growth should be also reduce poverty (Easton et al. 1997; de Haan et al. 1995; Scully 2002; Cole 2003; Berggren 1999). The main objective is to analyze the relationship between poverty, happiness, and economic freedom in 15 American Latin Countries during the two period 2007-2009 and 2017-2019, including also other institutional variables that the literature suggests as relevant as democracy, corruption, and inflation. For developing countries, the channel should be that democracy and economic freedom, although it is sometimes suggested that democracy in different way may hamper liberalization, we also explore this correlation and we hypotheses that they are mutually reinforcing as also found in other studies (de Haan and Sturm 2003),

Another interesting aspect is the link between economic freedom and happiness (subjective wellbeing). Researchers have found that economic freedom is positive linked to happiness (Knoll, Pitlik, and Rode 2013), but economic freedom can have both positive and negative effects on individual life satisfaction, and these effects are related to pecuniary and non-pecuniary aspects about the first, risk lovers would face extra gains from freer markets because economic freedom creates extra opportunities for gambling. On the contrary, risk-averse individuals prefer constant and secure income streams, even at the cost of a lower expected lifetime income. For the second, non-pecuniary effects may arise if people's ideological positions are considered. Depending on an individual's ideological position, s/he subjectively appreciates freedom regardless of being in a better economic position or not.

Another nonlinear link is between life satisfaction and poverty, the literature on income and subjective wellbeing suggests two possible hypotheses. The first is that income poverty is associated with lower subjective wellbeing even if above an income threshold the well-known Easterlin paradox holds: additional increases in income do not raise life satisfaction (Easterlin 1974). A second possible hypothesis is that poverty is not associated with lower satisfaction levels and as for the link freedom and subjective wellbeing, the income may not explain a great deal of subjective wellbeing because satisfaction may be driven by latent personality traits (see Diener et al. 1999) or more closely associated with other domains of life as health, war, violence personal adversity, loss etc) (Sulkers and Loos 2022) . As regard of the definition of happiness in this paper, we use two indicators: the life satisfaction index from the latin-barometer and the suicide rate. About these, the link between the life satisfaction and the suicide rate is also controversial and need of further studies, some authors (Koivumaa-Honkanen et al. 2001) on Finnish data, found a positive link specially because mediated by the health conditions, in the same time the suicide rate was found negative correlate with life satisfaction and happiness in Eastern Europe but a positive association was seen in Western Europe (r=0.47) (Bray and Gunnell, 2006)

The economic growth and poverty and their links with institutional aspects as economic and political freedom are important in Latin American Countries. Most of the countries in the region have established democratic institutions, however elections, that are the only way to access to public office, frequently involve high levels of clientelism, harassment of the opposition, and unfair advantages for incumbents. Moreover, although the separation of powers is central to the constitutional design in most countries, there is a generalized trend toward the concentration of power in the national executive through formal or informal mechanisms. Most importantly, the peculiarities of Latin American democracies have regarded as a problem the definition of democracy itself. Finally, the "Political Risk Latin America 2022" index of the Pontificia Universidad Católica de Chile Center for International Studies (CEIUC) yielded a clear conclusion: political risk is increasing this means that increase the risk of erosion of the quality of democracy; there is a resurgence of social protests and violence, many of them led by frustrated young people; an increase in illegal economies. All these reasons, make particularly interesting the focus of the analysis on the Latin American countries (henceforth LAC).

As regard to monetary poverty, we do not aim to enter the debate on the conceptualization of poverty, we just consider here the monetary definition of poverty, considering three absolute international poverty lines (i.e., $2.15; $3.65 and $6.85 per person per day)[7]. Also, we make use of the "shared propensity" as defined in Section 1.2 and finally two indicators of happiness (the life satisfaction index and the suicide rate).

Regarding to our core variables linked to the previous defined above, we consider the economic freedom in each of their components (size of government, legal system and property rights, sound money, freedom to trade internationally, no regulation explained in section 1.1), democracy, external balance, corruption, and trust of people. We include actively in the analysis also other variables which characterize the countries as: military expenditure, growth of GDP per capita, inflation, population growth.

From a methodological point of view, the paper does not aim to find the direction of causality between our core variables and poverty hence we consider a method which only synthetise the correlation between all the active variables, for this purpose we use the correspondence analysis approach (henceforth CA). This method (see Greenacre 1984; 2017) belongs to the set of techniques that are also called in French

[7] Poverty in the developing world is typically measured using absolute lines, as provided by the World Bank, which aim to have the same real value at different dates and places. By contrast, most developed countries use what Ravallion and Chen(2011). In particular, An awkward feature of relative poverty lines is that a policy which raises the living standards of all, but proportionally more those of the rich, will increase poverty, notwithstanding the fact that the absolute living standard of the poor has increased, more over using a absolute line, such a poverty measure automatically falls when all incomes grow at the same proportionate rate – inequality neutral growth – while any measure based on strongly relative lines will be unchanged with such a growth process. Hence the absolute poverty line, which is "fixed"; but fixed doesn't mean unchanged but only that is defined in a specific context and time, that is fully historically determined. Ravallion and Chen (2011)conclude that it's hard to accept the underlying assumption made by prevailing measures of relative poverty, in fact while it's accepted that people care about their relative position in society (at least above some level o living) it is hard to accept that they do not also care about the absolute levels of living (except very rich societies. World bank researcher have developed new poverty measure that take social effect on welfare seriously Technically, these are called weakly relative measures, meaning that the poverty line rises with average income but not as a constant proportion of that income, Each countries then has two poverty line, namely the absolute (i.e. $2.15 a day) line and a higher (or, at least, no lower) line intended to reflect higher costs of social inclusion in the country concerned. In the poorest of countries, the second line is also an absolute measure (Ravallion 2012).

"Analyse des Donnees" (Benzecri, Blasius, and Greenacre, 1973a). The main object of CA is to visualize the rows and columns of any data table with non-negative entries within an r-dimensional map. Although the method has usually been used to analyse categorical data, CA can also be applied to analyse metric, ordinal, or rank data (Greenacre 2017).

The data[8] are collected for two periods 2007-2009 and 2017-2019, for considering completely a period of 10 years. We deliberately avoid the 2020 given that the Covid period needs of a specific analysis given the condition, moreover the data are not complete. Hence, we consider the last decade before the Covid, moreover during these periods from 2010 to 2020 there was a decade of "deconstruction" in the region also called by many "the lost decade", it was marked by protests (as results of the already delicate political, economic, and social situation before the pandemic. 10 years, in fact, during the last two decades, a new wave of populist movements and leaders has developed as a result of ongoing economic dislocation and popular anger at the political class, threatening long-term political stability and economic growth (Ramírez Gomez 2022; Sabatini 2021), for 15 countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Honduras, Mexico Panama. Paraguay, Peru, and Uruguay[9].

II.2 Theoretical and empirical background: freedom, growth, poverty, and happiness

A significant body of research indicates that economic freedom enhances economic growth (see: Vega-Gordillo and Alvarez-Arce 2003 for an extended review). The foundations of economic freedom are protection of private property, personal choice, freedom of exchange and freedom to compete. The political orientation of the authorities can be relevant for freedom, but there are conflicting hypotheses on the effect of these orientations on freedom: liberal orientations can impose restrictions on the central activities in favor of individual freedom and hence protection of property right. Autocratic system can act to promote political freedom also against the opinion of citizen or lobbies, while democratic systems depend on the vote that could be in favour of no freedom and counteract liberal economic reforms expanding the bureaucratic procedure. Supporters of this view often refer to the experience of countries such as Chile, South Korea, and Taiwan, which only introduced democracy after economic reform was successfully implemented (see Edwards, 1991).

Anyway, De Haan and Sturm (2003) found that democratic institutions of any kind in developing countries significantly contribute to increases economic freedom. In general, democracy seems to be a good stimulus for the emergence of economic freedom, even if only specific freedoms such as trade restraints or governmental regulations are usually considered (Lundström 2005; Blasius and Graeff, 2009).

The democratic institutions can foster growth in a variety of ways, the quality of the institutions, as measured by indexes of bureaucratic quality, corruption, and the rule of law, is very important as bad quality such as more corruption can hamper the economic growth itself (Mauro 1995; Del Monte and Papagni 2001). Del Monte and Papagni (2001) pointed out that corruption may be relevant in underdeveloped countries where society lacks democratic control over government, a possibility also

[8] All data and their sources are described in Section 2 - Table 1.

[9] We do not include in our analysis Venezuela, Nicaragua and Cuba that are considered "not free" and authoritarian regimes and this condition translate also in few official statical information and a great number of missing data.

investigated by Paldam (2002). According to his results, democracy seems to decrease corruption, and lower corruption rates may provide higher growth, but the effect is slight and fragile.

Arguments why democracy may lead to more economic freedom are generally like the arguments as to why democracy may foster economic growth (see Przeworski and Limongi, 1993; De Haan and Siermann, 1996, for surveys). First, only governments with some legitimacy will be able to implement and afford policies with high short-term costs. Second, As North (1993) puts it, ‘‘well specified and enforced property rights, a necessary condition for economic growth, are only secure when political and civil rights are secure; otherwise, arbitrary confiscation is always a threat.’’ Third, democratization may limit rent seeking (de Haan and Sturm 2003)

In most countries, however, democracy, economic expansion has not been accompanied by rising incomes or popular welfare. In Ghana, Kenya, Nigeria, South Africa, and Tanzania, indicators of public well-being lag far behind strong overall economic performance. In fact, a crucial paradox—that of growth without prosperity—besets Africa’s new democracies. There is sound evidence that political liberalization enhances some of the institutional requisites for economic performance but there are few signs that these improvements foster significant reductions in poverty or inequality, even when local regimes and external donors appear concerned with achieving such change. Both the relationship between political and economic reform and the politics of poverty reduction remains to be deeply explored in developing countries (Lewis 2008)

There is a strong debate that aims to understand whether and which economic growth has benefited poor people in the developing world. On the one hand, Dollar, and Kray claim that "since average incomes of the poorest fifth of society rise proportionately with average incomes ... economic growth generally does benefit the poor as much as everyone else” (Kraay and Dollar 2001 p, 1,32). If this statement is true, economic growth should be both necessary and sufficient to reduce poverty in the developing world. However, on the other hand, some researchers argue that economic growth tends to increase income (and asset) inequality, and that these higher levels of inequality ensure that economic growth benefits the rich rather than the poor. Moreover, between economic growth and inequality there is also a mutual correlation: inequality is affected by economic growth, but we can also consider that the economic growth is affected by inequality. Barro (2000) concludes that inequality retards growth in poor countries but encourages growth in richer areas. His empirical study shows only a small overall relationship between inequality and growth. For this reason, the World Bank put a new institutional emphasis on tracking “shared prosperity”, in addition to monitoring absolute poverty. “Shared prosperity” is defined in terms of the growth rate of incomes in the bottom 40 percent of households within each country, and the World Bank has made a public commitment to supporting policies that foster “shared prosperity” in the developing world.

Other few studies highlight the link between freedom and happiness, usually considered as a proxy of subjective well-being. There are empirical evidence suggesting that economic, judicial, and political institutions contribute significantly to cross-country subjective well-being. Economically, many authors argue (Easterlin 1974, 1995, 2001; Caporale et al. 2009; Mentzakis and Moro 2009; Di Tella and MacCulloch 2006; Diener et al. 1995; Layard et al. 2012) that an increase in income yields a lower increase in happiness at higher income levels. Easterlin (1974) was one of the first to note that increase in GDP per capita in the USA since the 1950s had not been accompanied by an increase in happiness. Different are the explanation (own income relative to the others, comparison with own economic condition in the past, different notion at individual level of their subjective wellbeing)). For Caporale et al (2009) is an inequality problem or the relative utility hypothesis, in that the income of a reference group exerts a negative effect

on well-being hence an increasing income gap between the rich and poor reduces well-being due to social comparisons, alleviating income inequality moves higher up in the policy agenda. In contrast, if higher inequality raises the expectations of the poor that they are to enjoy higher incomes in the future (i.e., 'tunnel effect'), then increased income inequality during rapid growth at the early stages of reforms becomes socially and politically more acceptable (consequently it can find a positive relation between inequality and happiness).

Also, other studies have questioned the validity of Easterlin paradox founding no evidence of satiation point beyond which wealthier countries experience no further increases in subjective well-being (Stevenson and Wolfers 2008, 2013; Veenhoven and Vengust, 2013). On this line, Gropper et al. (2011) found a positive relationship between economic freedom and national happiness in a cross-section of more than 100 countries where the effect is particularly strong in less developed nations with lower degree of economic freedom. Other studies conclude that income can, after all, buy happiness, especially in Eastern European countries (e.g., Frijters et al., 2004).

Finally, in a comparative study on 46 countries, Veenhoven (2000) studied the relationship between freedom and happiness to disentangle which type of freedom affect happiness the most founding strong zero-order and partial correlation between freedom and happiness. However, apart from the limits of the analysis highlight by the author, private and political freedoms are significantly related to happiness in rich nations but not in poor ones whilst a reverse pattern has been found. Differently, for economic freedom which is positively related to happiness in poor nations but not in rich nations and the strongest in nations where the capability to choose is the lowest (Spruk and Kešeljević, 2016). Further, while personal and political freedom is related to happiness only when 'opportunity' and 'capability' coincide in rich countries, the relation between economic freedom and happiness is strongest in poor nations where capability to choose is lowest (Veenhoven, 2000).

Following the previous mentioned literature, we can pose our hypothesis:

H1: economic freedom enhancing the economic growth of a country, reduce the monetary poverty;

H2: economic freedom comes together to the political freedom or democracy;

H3: if H1 and H2 are verified, economic freedom, produces a positive effect on people happiness, hence economic freedom is a necessary but not sufficient condition for happiness.

As important variables that could be linked to the socio-political structure, poverty and the economic freedom of the countries could be the corruption. Corruption in the public sector -- the misuse of public office for private gain -- is often viewed as exacerbating conditions of poverty (low income, poor health and education status, vulnerability to shocks and other characteristics) in countries already struggling with the strains of economic growth and democratic transition. Alternatively, countries experiencing chronic poverty are seen as natural breeding grounds for systemic corruption due to social and income inequalities and perverse economic incentives. There is link between economic freedom and corruption: the behavior of the governments can increase corruption, for instance restrictions (such as tax increases) can decrease freedom and increase corruption, on the contrary if restriction is introduced to prevent corruption (such as capital controls) there will be less freedom and less corruption. The hypothesis is that increased corruption reduces economic investment, distorts markets, hinders competition, creates inefficiencies by increasing the costs of doing business, and increases income inequalities. By undermining these key economic factors, poverty is exacerbated. (Chetwynd, Chetwynd, and Spector, 2004) The" governance

model" asserts that corruption erodes the institutional capacity of good government to deliver quality public services, diverts public investment away from major public needs into capital projects (where bribes can be sought), lowers compliance with safety and health regulations, and increases budgetary pressures on government. Through these serious challenges to governance practices and outcomes, poverty is affected.

Hence, corruption can be correlated to economic freedom and democracy as well, and the relevance in high if we consider that Latin America is the third most corrupt region in the world (after Africa and the Middle East); it has the highest levels of crime and violence; and the rule of law remains a weak spot.

Another variable that can affect economic freedom is the inflation: it usually has negative correlation, as corruption also depends on cultural conditions in the country (Braun and Di Tella, 2004; Lal and Myint, 1998; Jorg Blasius and Graeff, 2008). Finally, also the military expenditure which in some cases can be seen as a way of preserving one's freedom (North, 1990), in other cases a free country with good political e social relations inside and with other countries does not need military expenditure (Weede, 2005).

The collapse of the population has a negative effect on freedom since it creates oversupply of unskilled workers: this is true for developing countries. In developed countries, however, the reduction in the natality rate is a problem because it reduces the supply of labor and increases dependence on other countries.

II.2.1 Definition of economic freedom

Two are considered the most comprehensive indexes of economic freedom today: the first is the Index of Economic Freedom by Heritage Foundation, the second is the Wall Street Journal and Economic Freedom of the World, by the Fraser Institute (Gwartney and Lawson, 2004). We consider this last, which encompass five components: government size in terms of potential intervention, safeguarding of property rights, access to sound money, free international trade and no regulation in labor, credit, or product market.

About the first components (Size of Government) we need to say that as government spending, taxation, and government-controlled enterprises increase, government decision-making is substituted for individual choice and economic freedom is reduced. Government size measures the size of government intervention in the market. Governments usually impose fiscal burdens on economic activity through taxation and borrowing. Governments that permit individuals and businesses to keep and manage a larger share of their income and wealth for their own benefit and use, maximize economic freedom. The index for this area is high for countries with low levels of government spending as a share of the total, a smaller government enterprise sector and lower marginal tax rates **(**HTTPS://WWW.FRASERINSTITUTE.ORG/ECONOMIC-FREEDOM/APPROACH***).*** Area 1 measure the degree to which a country relies on personal choice and markets rather than government budgets and political decision-making.

The second component of the freedom index is the legal system and property rights. Protection of persons and their rightfully acquired properties is the central element of both economic freedom and civil society that, indeed, it is also the most important function of a government. Property right refers to structures that allow to safeguard property rights and contracts by the rule of law.

Third, the sound money regards inflation that erodes the value of rightfully earned wages and savings. Sound money is thus essential to protect property rights. When inflation is not only high but also volatile, it becomes difficult for individuals to plan and thus use economic freedom effectively. Sound money is the degree to which individuals have access to cash, this component is designed to measure the ease with which other currencies can be used via domestic and foreign bank accounts. In order to earn a high rating in this area, a country must follow policies and adopt institutions that lead to low (and stable) rates of inflation and avoid regulations that limit the ability to use alternative currencies.

Component 4 is related to freedom to trade internationally, that is the freedom to exchange, in its broadest sense of buying, selling, making contracts, and so on. This is essential to economic freedom, which is reduced when freedom to exchange does not include businesses and individuals in other nations. International free trade among countries consists in avoiding restraints quotas o hidden administrative check. The components in this area are designed to measure a wide variety of restraints that affect international exchange, i.e., tariffs, quotas, hidden administrative restraints, controls on exchange rates and the movement of capital. A country gets a high rating in this area, if it has low tariffs, easy clearance and efficient administration of customs, a freely convertible currency, and few controls on the movement of physical and human capital.

Finally, the fifth component of index is related to the regulation. Governments may also impose regulations that limit the right to exchange, gain credit, hire or work for which you wish, or freely operate your business. This component is designed to identify the extent to which regulations and bureaucratic procedures restrain entry and reduce competition. A country gets a high score on these components if it allows markets to determine prices, if it refrains from regulatory activities that retard entry into business and if it increases the cost of producing products. Countries also must refrain from "playing favourites," that is, from using their power to extract financial payments and reward some businesses at the expense of others.

II.2.2 Definition of well-being measure (happiness and poverty)

Usually, happiness is considered as a proxy of subjective wellbeing, and it is measured in a subjective way. The term subjective may be interpreted as a matter of arbitrary taste and in subjective judgments people may usually be unable to produce an accurate and unbiased evaluation for experiences that extend over time (Schwarz and Strack, 1999; Veenhoven, 2001; Frey and Stutzer, 2002; Clark, 2003; Sunstein and Thaler, 2003). In order to reduce this bias, happiness measures need to represent actual experiences as directly as possible, that's the reason why we use the suicide rate as a proxy of happiness. In any case, the debate if the link between Suicide rate and happiness was negative or positive is still open and further analysis should be necessary. Some authors (Koivumaa-Honkanen et al., 2001) on Finnish data, found a positive link specially because mediated by the health conditions, in the same time the suicide rate was found negative correlate with life satisfaction and happiness in Eastern Europe but a positive association was seen in Western Europe (r=0.47) (Bray and Gunnell, 2006) .For this reason we include also a subjective measure of satisfaction provided by the Latin-Baròmeter, in the classic 4 value according a Likers scale: very satisfied (1), fairly satisfied (2), not very satisfied (3); not satisfied at all (4)[10]. We consider the percentage of the very satisfied.

[10] The question in the questionnaire is "In general, would you say you are satisfied with your life? Would you say you are".

As regard to monetary poverty, as we stated above, we do not aim to enter the debate on the conceptualization of poverty (i.e., monetary vs. non-monetary approach). There are many studies for Latin America deeply assess a 'combined' approach using multidimensional index that includes monetary poverty as one of its component indicators (Santos and Villatoro 2018). In this analysis we consider only the monetary definition of poverty considering three absolute international poverty lines (i.e., $2.15; $3.65 and $6.85 per person per day). Is used the poverty headcount ratio, i.e., the percentage of population below the three absolute lines considered. Also, we make use of the "shared propensity" indicator that is the growth rate of the income of the poorest 40% of population.

II.2.3 Definition of Corruption indicators

Corruption has been defined as "the use of public office for private gain"(Lambsdorff, 2007) or as the "sale by government officials of government property for personal gain" (Shleifer and Vishny, 1993). However, with recent developments, it is inadequate to define corruption only as the abuse of public office. The International Transparency Agency defines corruption as "the abuse of entrusted power for private gain" and evaluates both the public and private sector. As understood from these definitions, to speak about corruption, one needs to exercise their power, and some people need to benefit from the use of this power. Based on this definition, all crimes such as bribery, embezzlement, dishonesty, misconduct, and favouritism can be considered as corruption. In any case we decide to consider the famous index of Corruption Perceptions Index (CPI), published yearly by Transparency International (TI). This index aims to measure what people think about corruption, but also TI doesn't as an index of the true facts about the actual levels of corruption. The World Bank has constructed a similar index, which is part of its efforts to estimate the quality of governance. The World Bank's approach to estimating corruption is like the methodology TI applies to make their ranking; several of the sources are the same, and the two indices correlate well.

The CPI is an "index of indices"; it is composed from different sources that all provide a relevant ranking of countries, but doubt could be raised about their significance for developing countries and some other the problems are related to the construction of the indices (see Søreide 2006 for an extended analysis).

Some alternatives could be average number of procedures a firm has to go through to start up a business in different countries or firms' reported facilitation payments. Another relevant indicator of corruption is the functioning of antitrust institutions, or surveys that aim at gathering public expenditure tracking surveys (PETS). The PETS should be auspicial but didn't cover all the countries and, in any case, not all the countries of American Latin that we used (for our knowledge there are PETS for Brazil, Honduras, Guatemala, Paraguay and Peru) (for a survey see: Gurkan, Kaiser, and Voorbraak, 2009).

Hence, is included in the analysis not only CPI, but also another indicator of the public corruption or "legal corruption", and is choiced the Government Effectiveness estimate that captures perceptions of the "quality" of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e., ranging from approximately -2.5 to 2.5.

Instead, the corruption Perception Index (CPI) was taken by the Transparency International and aggregates data from a number of different sources that provide perceptions by business people and country experts of the level of corruption in the public sector. After standardize data sources to a scale of 0-100 where 0 equals the highest level of perceived corruption and 100 equals the lowest level of perceived corruption.

Finally, as indicator of the climate of corruption we consider the distrust of the people. In fact, growing empirical literature on political corruption shows trust (interpersonal and political) to be both cause and consequence of corruption (Morris and Klesner 2010; Xiao, Scott, and Gong 2022).

II.3 Data

We consider 15 countries of Latin America, and we collect 21 variables (the description and the source of the variables are in the tables 1)

All the variables can be grouped as follow:

1) Well-being measures, including three headcount ratios considering the respectively absolute poverty line as absolute headcount ratio (i.e., $2.15; $3.65 and $6.85 per person per day), shared propensity (growth rate of incomes in the bottom 40 percent of households), life satisfaction and suicide rate (as proxy of unhappiness) as described above.
2) Institutional aspect (economic freedom-and its five components as described below; democracy, corruption, government efficiency, military expenditure, trust of people)
3) Economic aspect (GDP growth per capita; inflation)
4) Social aspect (population growth)

In the following table we include all the variables used, and the details (source, period, label, and description). We consider two periods: the average value for the period 2007 and 2009, and the average of 2017-2019.

Table 1. Description of variables used in the analysis and their sources.

Name	*Label_low*	*Label_high*	*Source*	*Period*
Poverty index				
Poverty headcount ratio at $2.15 a day (2017 PPP) (% of population)	Povhea265_l	Povhea265_h	World bank	2007-2009; 2017-2019
Poverty headcount ratio at $3.65 a day (2017 PPP) (% of population)	povhea365_l	povhea356_h	World bank	2007-2009; 2017-2019
Poverty headcount ratio at $6.85 a day (2017 PPP) (% of population)	Povhea685_ll	Povhea685_h	World bank	2007-2009; 2017-2019
Shared propensity (growth rate of incomes in the bottom 40 percent of households)	shareprop_l	shareprop _h	World Bank	
Happiness				
Suicide mortality rate (per 100,000 population)	suicide_l	suicide_h	World Bank	2007-2009; 2017-2019
Life Satisfaction (Share of people very satisfied with their life)	verysat_l	verysat_h	Latinobarómetro	2007-2009 2017-2020

Name	*Label_low*	*Label_high*	*Source*	*Period*
Economic Freedom (Fraser Institute Index)	ef_l	ef_h	Free of the world	2008;2018
.1. Size of Government	govsiz_l	govsiz_h	Free of the world	2008;2018
2. Legal System & Property Rights	rights_l	rights_h	Free of the world	2008;2018
3. Sound Money	money_l	money_h	Free of the world	2008;2018
4. Freedom to Trade Internationally	trade_l	trade_h	Free of the world	2008;2018
5. Regulation	noregula_l	noregula_h	Free of the world	2008;2018
Negative structural Factors				
Corruption Perceptions Index	cpi_l	cpi_h	Transparency International	2008;2018
Government effectiveness: Estimate	geff_esti_l	geff_esti_h	World Bank	2007-2009; 2017-2019
Population with little or no trust in political and state institutions (% of the total population aged 18 and over)	Distrust_l	Distrust_h	ECLAC (Economic Commission for Latin America and the Caribbean)	2007-2009 2917-2019
Political Factors				
Democracy	democra_l	democra_h	Polity IV database	2008;2018
Military expenditure (% of GDP)	milex_l	milex_h	World bank	2007-2009; 2017-2019
Economics of Country				
External balance on goods and services (% of GDP)	balance_l	balance_h	World bank	2007-2009; 2017-2019
GDP growth (annual %)	gdpgrow_l	gdpgrow_h	World bank	2007-2009; 2017-2019
GDP deflator (base year varies by country)	infla_l	infla_h	World bank	2007-2009; 2017-2019
Population growth (annual %)	popgrow_l	popgrow_h	World bank	2007-2009; 2017-2019

Source: own elaboration

II.4 Methodology: Doubling Techniques

summarize all the variables discussed on the literature and linked to the economic freedom and different level of poverty, we used the Correspondence Analysis which enable to summarize the correlation between these variables in a complex picture with the advantage of without any assumption on the scaling of the data or interrelation between variables. As said by Benzecri (1973b) “the model should follow the data, not the inverse” (cf. J. Blasius and Greenacre, 2006 p.6).

To have the same matrix scales, we transform all the variables in a ranking of each variable (as liker scale) across the countries which goes from 0 to 14 (15 are the countries), this is a method to standardize the data. Second, to determine the direction of the variables we “doubled” each variable that in this way, have a positive and negative pole. Thus, each variable will have two endpoints, one representing the positive and the other the negative pole. To give a reading example: with respect to the extreme poverty index (threshold 2.15$) in descending order of the poverty (*pohea215_h*: from the highest to the lowest poor country), the country with the highest poverty index Honduras (14.37%) , receives the highest rank value

(14); the country with the second highest value, Colombia (10.51%) , receives the rank value 13.0; and Uruguay with the lowest poverty index among the 15 countries, receives the value 0.0. Starting with the lowest index (*pohea215_l*), and then ranking the values in descending order richest Uruguay receive rank 14, Colombia 1.0, and Honduras 0.0.

As shown, the sum of images and anti-images is constant (= 14), over all indicators we obtain: number of ranks x indicators = 14 x 21 = 294. The procedure of standardization and doubling is made to have the same measure and weight for all the variables considered that is the matrix of 21 actives variables bring to 42 columns for 15 countries in two periods. We have n=0,1, ….14 observations and each row sum at 294 (14X21=294). And each column sum at 105 ((14*(15))/2=105). For the period 2007-2009 and the same for the period 2017-2019. [11]

Table 2 Extract of the data used for the correspondence analysis.

Country name	povhea215_l_1	povhea215_h_1	povhea365_l_1	povhea365_h_1	povhea685_l_1	povhea685_h_1	Total
Argentina	13	1	13	1	14	0	294
Bolivia	3	11	7	7	9	5	294
Brazil	5	9	6	8	8	6	294
Chile	12	2	11	3	10	4	294
Colombia	2	12	1	13	2	12	294
Costa Rica	11	3	12	2	12	2	294
Dominican Republic	8	6	5	9	4	10	294
Ecuador	4	10	4	10	5	9	294
El Salvador	6	8	3	11	1	13	294
Honduras	0	14	0	14	0	14	294
Mexico	9	5	9	5	6	8	294
Panama	10	4	10	4	11	3	294
Paraguay	7	7	8	6	7	7	294
Peru	1	13	2	12	3	11	294
Uruguay	14	0	14	0	13	1	294
Sum	105	105	105	105	105	105	4410

Source: Own elaboration

II.5 Results

The doubling procedure constrains all indicators (images and anti-images) and all countries to the same weight, that is, the direction of the rankings of the indicators does not have any influence on the CA solution. Thus, differences in the amount of explained variance of the indicators in the model are based on differences between the countries. Furthermore, since images and anti-images of all variables are perfectly negatively associated, on all dimensions their locations are exactly opposite to each other; a trajectory connecting the two endpoints of a variable will pass through the centroid of the map (shown by the cross of axes). The visualization of the variables (images and anti-images) is given in Figure 1 for the first period, Figure 3 for the second period and Figure 5 for the dynamic analysis)

[11] All the computation are made with the package “CA” in R.

When interpreting CA maps based on this kind of data, it should be noted that: the distance to the centroid reflects the representation in the two-dimensional map. The farther away the endpoints are from the centroid, the stronger their contribution to the geometric orientation on the respective axis. The angle between the trajectories of two indicators reflects their correlation in the two-dimensional map.

The distances between the variables (in the full space, there are 21 dimensions in the given example) can be interpreted as similarities: the closer two variable endpoints are in the map, the more similar they are. The same holds for similarities between the countries (Figure 1): their similarities are measured by the chi-square distances between the respective rows (for guidelines on measuring the distances in a CA map, see Greenacre, 2017). (J. Blasius and Greenacre, 2006; Jorg Blasius and Graeff, 2008; Thiessen and Blasius 2002).

The dataset contains 15 rows and 42 columns, all the columns are considered active the 15 rows are the 15 countries which are plotted on the space characterized by the significative dimension.

Table 3 report the test chi squared and we refused the null hypothesis of independence.

	Chi squared	Pvalue
First period	1686.119	7.925976e-110
Second Period	1684.548	1.332532e-109
Dynamic analysis	3370.667	1.730175e-207

Source: Own elaboration

II.5.1 First period under consideration (2007-2009)

The inertia of the first and second dimensions shows if there are strong relationships between variables and suggests the number of dimensions that should be studied. The first two dimensions of analyses express 53.95% of the total dataset inertia; that means that 53.95% of the total variability is explained by the plane. This percentage is relatively high and thus the first plane well represents the data variability. This value is strongly greater than the reference value that equals 32.24%, the variability explained by this plane is thus highly significant (the reference value is the 0.95-quantile of the inertia percentages distribution obtained by simulating 6328 data tables of equivalent size based on a uniform distribution). Another rule for choosing the number of dimension to comment is to calculate 1/Q where Q is the number of variables considered (1/21= 0.048). We can describe the number of dimensions whose variance explained is higher than 5%. Consequently, the description will stand to these axis (First and Second Dimension. Figure 1).

Table 4 Principal Inertia and percentage of inertia

Eigenvalue	*Variance*	*% of Var.*	*Cumulative % of Var.*
Dim.1	0.122	31.822	31.822
Dim.2	0.085	22.133	53.955

Dim.3	0.045	11.795	65.75
Dim.4	0.041	10.641	76.39
Dim.5	0.026	6.874	83.264
Dim.6	0.019	4.816	88.08
Dim.7	0.015	3.928	92.007
Dim.8	0.011	2.897	94.904
Dim.9	0.009	2.395	97.299
Dim.10	0.005	1.28	98.579
Dim.11	0.003	0.765	99.344
Dim.12	0.001	0.332	99.676
Dim.13	0.001	0.193	99.87
Dim.14	0.001	0.13	100

Source: Own elaboration with data from the World Bank and ECLAC

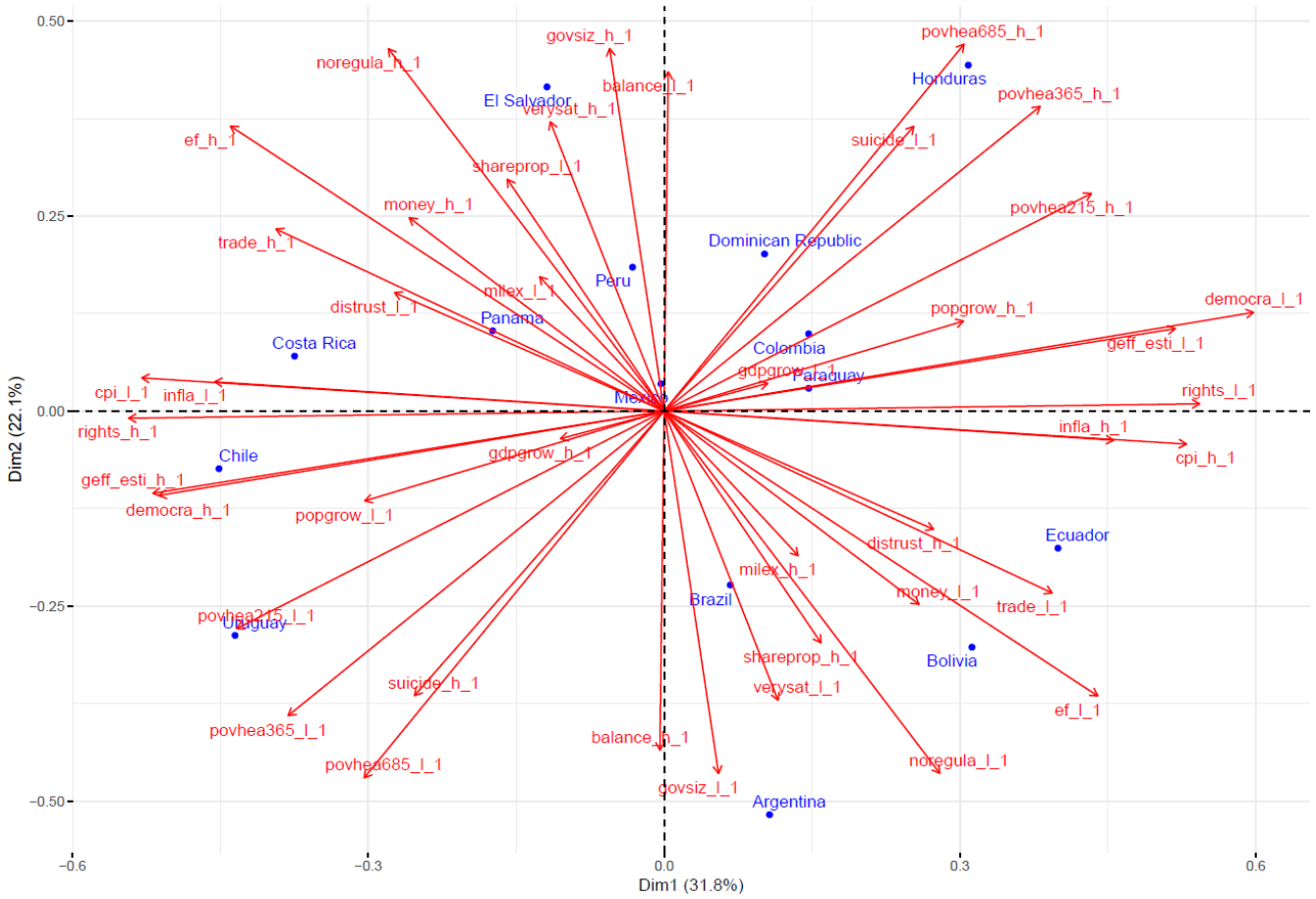


Figure 1 - Overlayed factor map (CA) *First Period (2007-2009).*
Note: The columns (variables) in red are considered as active, the rows (countries) are in blue.
Source: Own elaboration

Looking at Figure 1 is possible to examine the factors that characterized the first two dimensions and where the countries under consideration are placed in the graph.

The **dimension 1** (horizontal axes) opposes countries such as *Ecuador (and Honduras and Bolivia)* (to the right of the graph, characterized by a strongly positive coordinate on the axis) to countries such as *Chile, Uruguay,* and *Costa Rica* (to the left of the graph, characterized by a strongly negative coordinate on the axis).

The first dimension is characterized by high positive frequencies for factors such as less economic freedom, low democracy, high poverty, high inflation, low government efficiency and high corruption index on the right-hand side and on the opposite side we have high negative frequencies with high economic freedom, high democracy, low poverty, low inflation, high government efficiency and low corruption.

In fact, the group in which *Ecuador, Honduras and Bolivia* stands (characterized by a positive coordinate on the axis) is sharing low democracy; low rights; high corruption perceptions index; low government effectiveness, low economic freedom; high inflation; low freedom to trade Internationally; *high extrem poverty.* (Factors are listed from the most common).

According to the graphical distance to the centroid and the contribution/coordinates (Table A1 in Appendix) we can subdivided the variables into two parts. The first is characterized by low democracy, low safeguard of property right and high poverty thus nondemocratic institution are positively associated to poor conditions. The second consists of factors such as low access to international trade, high inflation rate and high value of corruption thus these characteristics suggest low development of trade.

The group in which *Chile, Uruguay,* and *Costa Rica* stand (characterized by a negative coordinate on the axis) reflect high frequency for the factors as: high freedom to trade Internationally; high economic freedom; low poverty 2.15; low inflation; high democracy; high corruption perceptions index; high rights (again factors are listed from the most common).

According to the graphical distance to the center (coordinates) and the contribution (Table A1 in Appendix) apart the distinction between most free, democratic and rich as (Uruguay, Costa Rica and Chile) and on the opposite with a defective democracy (Ecuador and Bolivia) or moderate autocracy (Honduras) we can subdivide the variables in two part: in the first prevails high democracy, high safeguard of property right and low poverty (mainly where Chile and Uruguay are positioned), in the second prevail high property right, high international trade, low inflation rate and low value of corruption (factors mainly related to Costa Rica), these characteristics suggest high development of trade.

If we consider the angle and the distance between the variables, is possible to highlight that on the one hand, economic freedom in terms of high safeguard of property rights is associated with low poverty and democracy. On the other hand, economic freedom is also associated with low inflation as well as with good access international trade and low corruption.

The **dimension 2** (vertical axis) opposes countries such as *El Salvador and Peru* (to the top of the graph, characterized by a strongly positive coordinate on the axis) to countries such as *Argentina, Bolivia, and Brazil* (to the bottom of the graph, characterized by a strongly negative coordinate on the axis).

The group in which *Peru* and *El Salvador* stand (characterized by a positive coordinate on the axis) is sharing high frequency for the factors as: high poverty 6.85; high deregulation; high size of government; hogh Poverty 3.65; low external balance on goods and service; high economic freedom; low suicide rate, high Life Satisfaction; high Poverty 2.15 (factors are listed from the most common).

As before, according the centroid's distance and the contribution (Table A1 in Appendix) El Salvador and Peru are linked to low external balance of good and service (negative balance of import-export) are poor but happy (as the suicide rate is low and satisfaction is high), there is low influence of the Government in the markets (financial, labour, and goods), no regulation, but low share propensity (low growth rate of income of poor) (here are positioned the Peru and El Salvador).

The group in which *Argentina, Brazil and Bolivia* stand (characterized by a negative coordinate on the axis) presents high frequency for the factors as: low poverty 6.85; low deregulation; low size of Government; low poverty 3.65; high external balance on goods and service; low economic freedom; high suicide rate; low poverty 2.15 (factors are listed from the most common).

Again, seeing the distance and the angle between the variables and is possible to realize that Argentina, Bolivia, and Brazil are linked to high exports are positively associated to less poor conditions, unhappiness condition, high control of Government in the markets, higher regulation and higher share propensity (income increase of the 40% bottom of distribution).

Figure 2 synthesize the factor map that cluster all the countries according to their characteristics. In Appendix A are presented tables with coordinate and contributions of each variable summarized in the Figure 1 and 2.

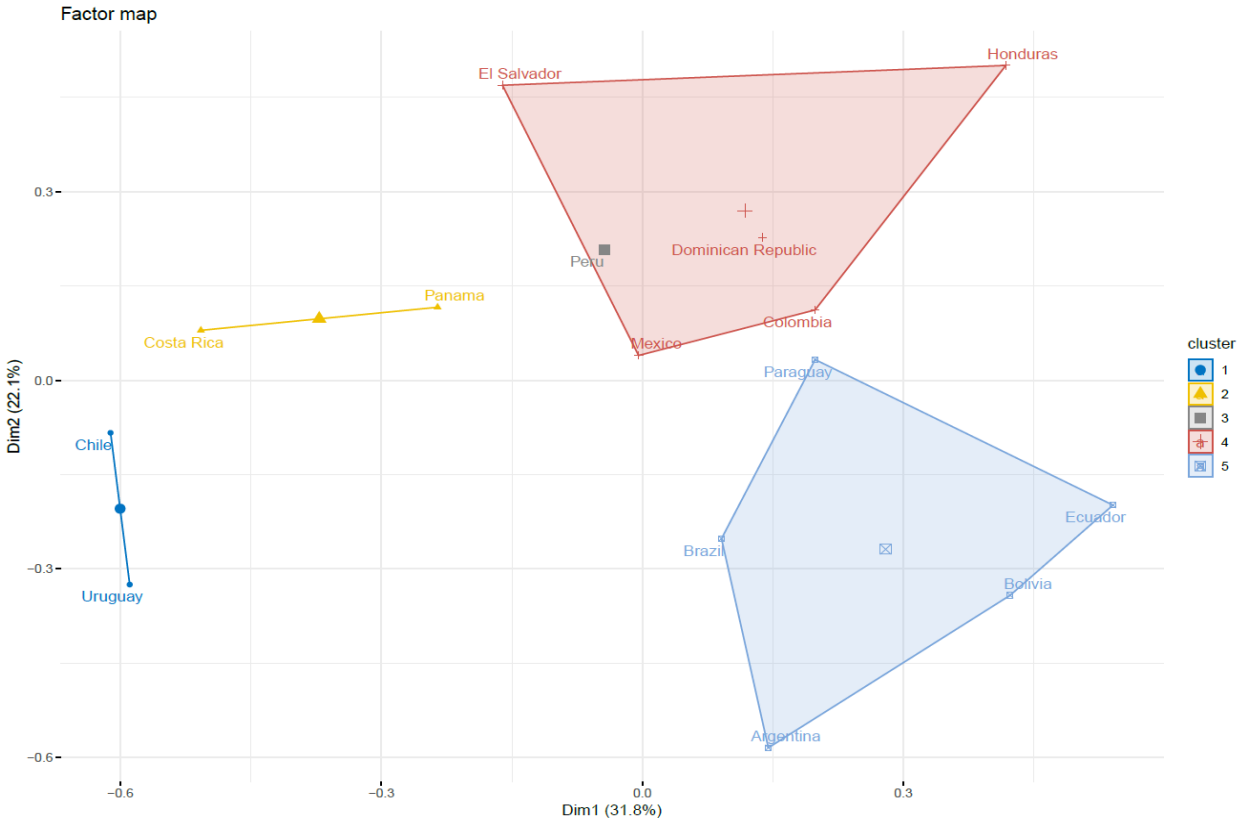


Figure 2 Factor map, first period 2007-2009
Source: own elaboration

According to the results of the cluster analysis we identify 5 clusters (results in table A2 in Appendix), below representative countries of each cluster are reporter and a description of the variables that characterize each cluster. For individual we reported the distance of everyone (in this case countries) and the cluster center. In the Appendix table A2, we reported the variables description clusters (with p. value and we consider a significance of at least 1%).

Cluster 1 includes Chile, Uruguay. They are characterized by low value of corruption, high government efficiency, low inflation, high democracy, low poverty, higher economic freedom, high trust in the political and institution (richer countries, more democratic, low corruption, and the citizen trust in the political and state but high suicide rate and low satisfaction).

Cluster 2 includes Panama, Costa Rica. They are characterized by low military expensive, high life satisfaction, high efficiency of the government, high democracy, high safeguard of property right, high population growth and low poverty (3.65$ threshold)

Cluster 3 includes Peru, and it is characterized by low people trust and high poverty (2.15$ threshold), but GDP growth, high control of money, high share propensity (growth rate of incomes in the bottom 40 percent of households) and low suicide rate.

Cluster 4 includes Dominican Republic, Mexico, Honduras, El Salvador, and Colombia that are characterized by high poverty (6.85$, 3.65$ and 2.15$ threshold) and low share propensity, low export, low democracy, but high trust and high life satisfaction, low governments regulation of the markets.

Finally, Cluster 5 includes Brazil, Ecuador, Bolivia, Argentina, and Paraguay. They are characterized by low economic freedom and political freedom, low trust of people, low satisfaction, lower government efficiency, high export but low freedom to trade internationally, low sound money, high inflation, and corruption.

II.5.2 Second period under consideration (2017 -2019)

Considering the analysis on the second period (2017-2019) The first two dimensions express 59.13% of the total dataset inertia; that means that 57.67% of the total variability is explained by the plane. This value is strongly greater than the reference value that equals 32.21%, the variability explained by this plane is thus highly significant (the reference value is the 0.95-quantile of the inertia percentages distribution obtained by simulating 6144 data tables of equivalent size based on a uniform distribution). Consequently, the description will stand to these axis (First and Second Dimension – Figure 3).

Table 6 Principal Inertia and percentage of inertia

	Variance	% of var.	Cumulative % of var.
Dim.1	0.133	34.649	34.649
Dim.2	0.088	23.018	57.667
Dim.3	0.047	12.315	69.982
Dim.4	0.028	7.401	77.384
Dim.5	0.021	5.37	82.754
Dim.6	0.019	5.061	87.815

Dim.7	0.013	3.455	91.27
Dim.8	0.011	2.903	94.173
Dim.9	0.007	1.86	96.032
Dim.10	0.006	1.544	97.577
Dim.11	0.004	0.986	98.563
Dim.12	0.003	0.728	99.291
Dim.13	0.002	0.508	99.799
Dim.14	0.001	0.182	100

Source: Own elaboration with data from the World Bank and ECLAC

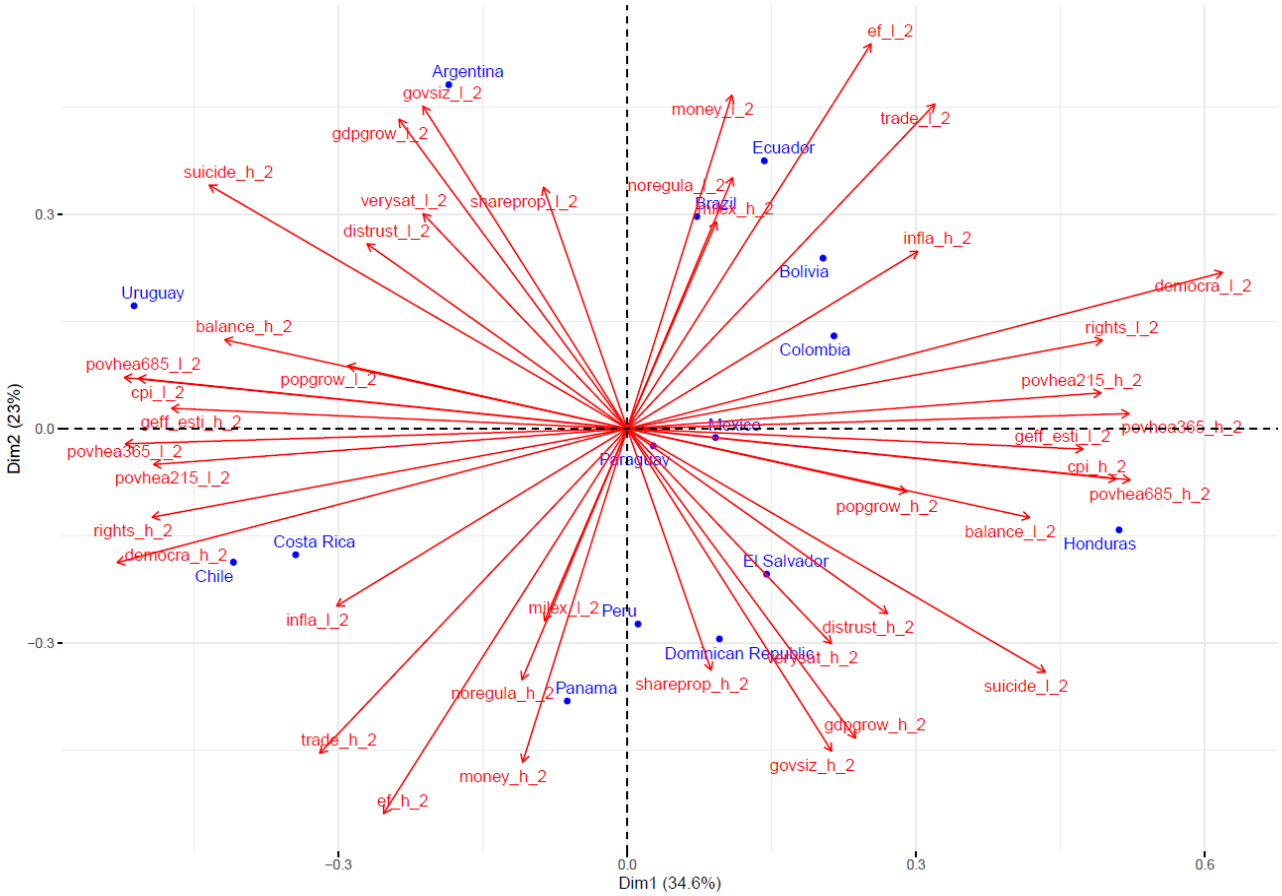


Figure 3 - Overlayed factor map (CA) *Second Period (2017-2019).*
Note: The columns(variables) in red are considered as active. The rows (countries) are in blue:
Source: Own elaboration

Figure 3 synthesize the factor map that cluster all the countries according to their characteristics. In Appendix A are presented tables with coordinate and contributions of each variable summarized in the Figure 3 and 4.

We do not find much variation between the two periods under consideration, in fact the figure 3 is quite the same of Figure 2. (Notice that for technical reason the second dimension is inverted, but the variables and the countries are positioned the same as before).

The **dimension 1** (horizontal axes) opposes countries such as *Honduras* (to the right of the graph, characterized by a strongly positive coordinate on the axis) to factors such as *Chile, Uruguay,* and *Costa Rica* (to the left of the graph, characterized by a strongly negative coordinate on the axis). The group in which *Honduras* stands (characterized by a positive coordinate on the axis) is sharing high contribution (Table A3 in Appendix) for the factors as low *democracy; high poverty levels; high corruption index; low rights; low balance of goods and services and low government effectiveness* (factors are listed from the most common).

According to the distance and the angle between the variables, we can group the variables in two parts. The first consists of low democracy and low property right. The second includes high corruption, high poverty and low export (where is positioned *Honduras*). And we can say that low democracy and low property right are in these second period more connected to poor condition and suggest worst condition (in terms of poverty and democracy) of the *Honduras* respect an economic improving of Ecuador which now is less linked to the poverties index. In countries such as *Honduras*, the problems of democracy reflect the weakness of the state. However, interference by various governments with the independence of the judiciary and attacks on civil society (including by cutting financial resources) pose a danger for democracy in the region. Latin America and the Caribbean was the world's most violent region in 2020, with Jamaica, Venezuela, and Honduras in the lead regarding homicide rates (46.5, 45.6 and 37.6 per 100 000 inhabitants, respectively).

The group in which *Chile, Uruguay,* and *Costa Rica* stand (characterized by a negative coordinate on the horizontal axis) is sharing high frequency for the factors as high democracy; low poverty 3.65, low poverty 6.852; low poverty 2.15; low Corruption perceptions index; high Government effectiveness; high rights; high external balance on goods and services (factors are listed from the most common).

We can subdivide in two part these variables: high democracy and high property right, low inflation, but higher free in the commercial trade (where are positioned *Chile and Costa Rica*). The other variables are low poor, higher export, and lower corruption, we can say that these characteristics suggest high development of trade (*Uruguay*).

The **dimension 2** (vertical axis) opposes countries such as *Argentina and Ecuador* (and also Brazil, Bolivia and Colombia (characterized by a positive coordinate on the axis) that are sharing high contributions (Table A3 in Appendix) for the factors low economic freedom; low sound money; low size of government; low freedom to trade internationally; low GDP growth; low Regulation; low shared propensity (factors are sorted from the most common).

According to the angle and the distance with the dimension we can subdivide in two part these variables: high level of Government spending and high presence of public firm, low GDP growth, low share propensity, (*Argentina*). The others are lower of global economic freedom (*Ecuador, Brazil, Bolivia, and Colombia*).

On the opposite, *Panama, Peru, Dominican Republic and El Salvador* (to the bottom of the graph, characterized by a strongly negative coordinate on the axis) are characterized by high contribution for the factors as high economic freedom; high size of government; high sound money; high GDP growth; high freedom to trade internationally; low suicide rate; high shared propensity; high deregulation; high Population with little or no trust in political and state institutions (factors are sorted from the most common)

Again, we can then group *El Salvador and Dominican Republic* characterized by high distrust, low control of government and high GDP growth with high share propensity. The second group include factors such as low regulation, low military expensive, high economic and money free (here are positioned the *Panama, Peru*).

Looking to the cluster analysis[12] presented in Figure 4 we can distinguish, as before, 5 different cluster (Table A4 in Appendix). Below, representative countries of each cluster are reporter and a description of the variables that characterize each cluster. For individual we reported the distance of everyone (in this case countries) and the cluster center. In the Appendix table A4, we reported the variables description clusters (with p. value and we consider a significance of at least 1%).

Cluster 1 includes Uruguay, Chile and Costa Rica characterized by low corruption perception index, high efficiency of government, high democracy, high safeguard of property right; low poverty, high export, high trust of people, but there is also a high suicide rate.

Cluster 2 includes Peru and Panama characterized by high international trade and high economic freedom, and low suicide rate.

Cluster 3 includes Ecuador, Brazil, Bolivia, and Argentina characterized by high regulation, high inflation and low economic freedom, low control of money and inflation, high influence of Government.

Cluster: 4 includes El Salvador, Paraguay, and Dominican Republic: low influence of Government, safeguard of property right low; low efficiency of government and a high growth of poor income (high share propensity)

Cluster: 5 includes: Mexico, Colombia and Honduras characterized by low democracy, high military expensive, few policies to control the rate of inflation, high poverty, low export, low economic freedom but low suicide rate and high life satisfaction.

[12] For each cluster, the top closest individuals to the cluster center are shown. The distance between each individual and the cluster center is provided.

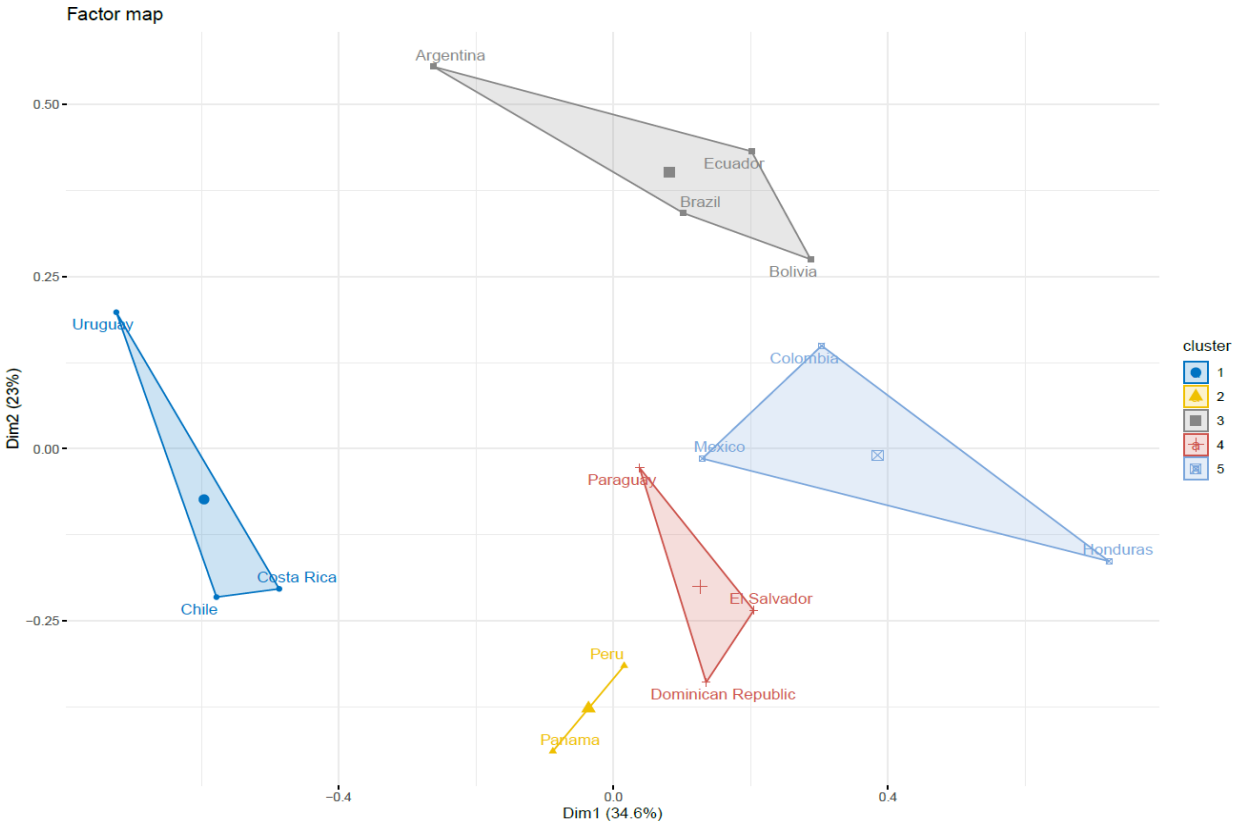


Figure 4 Factor map Second Period (2017 – 2019)
Source: Own elaboration with data

II.5.3 Dynamic analysis

Looking at the dynamic analysis, comparing the position of the countries in the first and in the second period, that can be seen in the figure 5, is possible realize that there are two stable groups of countries: stable good countries composed by Chile, Costa Rica and Panama which are characterized by the economic freedom, democracy, and low poor conditions. And the second is the stable medium countries composed by Perú, Bolivia and Colombia, with defective or flawed democracy and partly free, closer to poverty. Stability is desirable for successful countries, but it turns out to be a stagnation for developing countries that need to improve their conditions.

The most active nations are the Dominican Republic and Ecuador, which develop and move toward economies with greater economic freedom, and Uruguay and El Salvador, which deteriorate (Uruguay toward less favourable conditions in terms of slowdown in economic growth and deterioration in happiness indicators and El Salvador, which for the second period is in a situation of increased poverty and corruption, as well as deterioration of economic indicators. The dynamics between Argentina, Brazil, Honduras, and Mexico are less pronounced; Mexico exhibits a later state that cannot be classified as better or worse; it is simply different. Argentina sees an improvement in its situation, while Brazil and Honduras see a deterioration.

Going to hour hypothesis:

H1: economic freedom enhancing the economic growth of a country, reduce the monetary poverty is not verified, because are the positive institutional factors (low corruption, legal system, and property right and democracy) that produce a reduction of poverty.

H2: economic freedom comes together to the political freedom or democracy; Is not completely verified because do not come always together in all the countries.

H3: if H1 and H2 are verified, economic freedom, produces a positive effect on people happiness, hence economic freedom is a necessary but not sufficient condition for happiness. Our evidence, confirm that freedom and democracy produce high satisfaction but if the poverty is high (given lower democracy), we see a lower suicide rate. It seems that the suicide rate is linked to better economic conditions but less free countries.

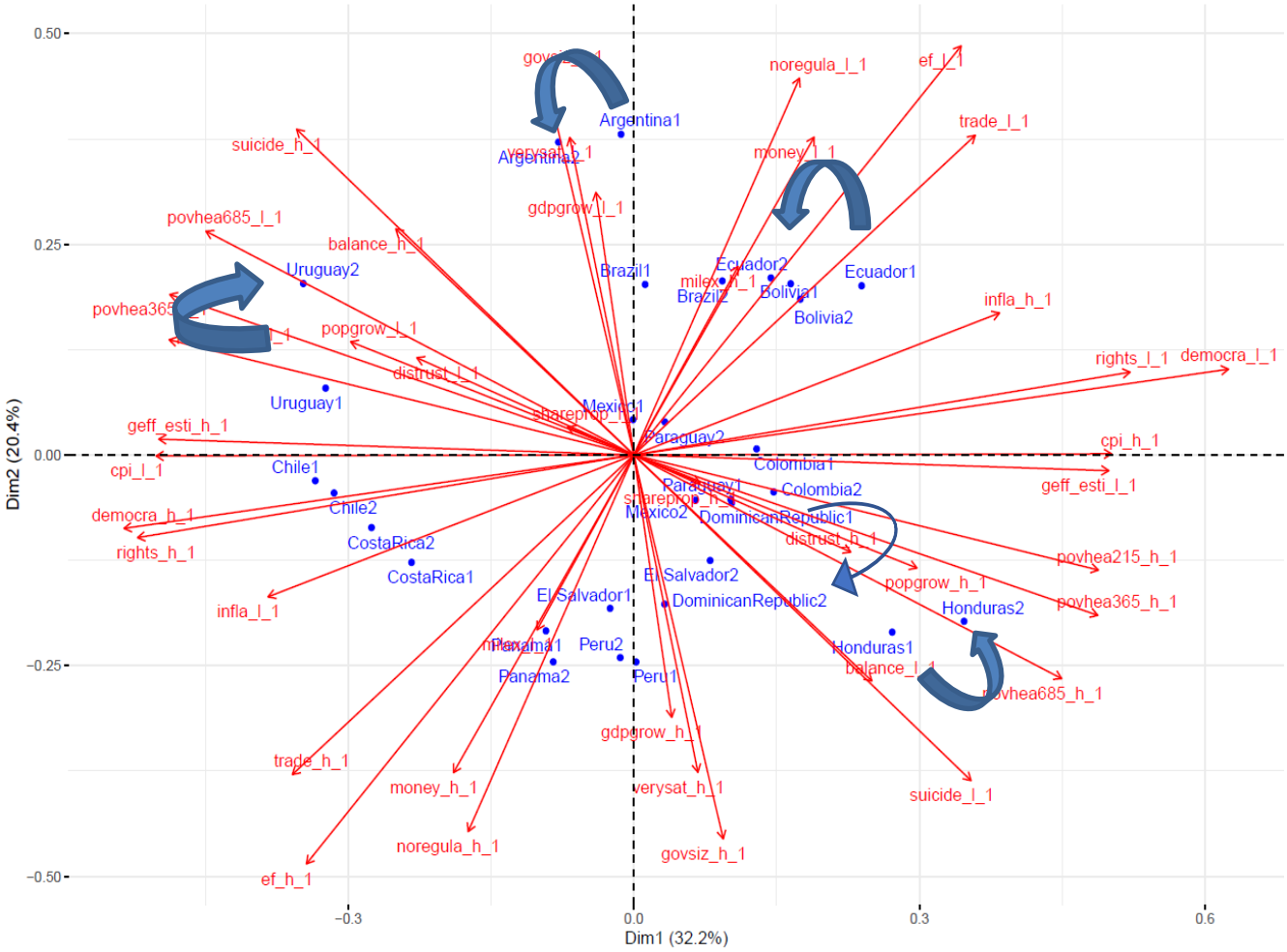


Figure 5 - Overlayed factor map (CA) First and *Second Period.*
Source: Own elaboration

As mentioned, Figure 5 the map factor shows country dynamics given a decade. This dynamic can show whether the country is in a better or worse condition after a decade has passed. Considering this Cartesian plane, it is possible to identify that downward movements in the vertical axes mean improvements in economic indicators such as “Economic growth”, in economic freedom such as freedom to “Freedom to

Trade Internationally", "Sound Money", and the "Size of Government"; and happiness indicators such as "Suicide Mortality Rate" and the "Life Satisfaction" indicator. It should be noted that if the movement is upward, it means that the situation is getting worse.

On the other hand, movements to the left on the horizontal axes mean improvements in poverty indicators, in the two structural factors indicators which are the "Corruption Perceptions Index", "Government Effectiveness" and "no trust in political and state institutions", in the economic freedom indicators such as "Legal System & Property Rights" and "Regulation", in the economic factors of "Inflation" "External Balance on Goods and Services (% of GDP)" and "Population Growth" and finally in the political factors which are "Democracy" and "Military Expenditure". Therefore, improvements are given by downward and/or leftward movements.

Thus, Chile and Costa Rica are the best placed countries because they are those that are lower and to the left. This implies that they have high economic freedom indicators, low poverty indicators, with happiness indicators in the middle of the spectrum. It should be noted that if the movement is toward right, it means that the situation is getting worse.

Table 7 Dynamics

Country name	Movement on horizontal axis	Movement on vertical axis	Result
Argentina	Left	Down	Improves
Bolivia	Right	Down	Undetermined
Brazil	Right	=	Worse
Chile	Right	Down	Undetermined
Colombia	Right	Down	Undetermined
Costa Rica	Left	Up	Undetermined
Dominican Republic	Left	Down	Improves
Ecuador	Left	=	Improves
El Salvador	Right	Up	Worse
Honduras	Right	Up	Worse
Mexico	Right	Down	Undetermined
Panama	=	Down	Improves
Paraguay	Left	Up	Worse
Peru	Left	=	Improves
Uruguay	Left	Up	Worse

Source: Own elaboration

The following are the cases of Brazil, Paraguay, El Salvador, Honduras and Uruguay, all of which have worsened in the last decade.

Brazil moved towards a situation of high corruption, high inflation, low property rights and democracy, high regulation, and low economic freedom. The corruption scandal of the Odebrecht group in Brazil and political elections with questionable results from the point of view of democracy, due to vote buying and electoral fraud were well known.

Paraguay, for its part, worsens, although in the decade it improves poverty indicators, indicators such as inflation, economic freedom variables worsen with greater restrictions on international trade, greater regulation, and less economic freedom.

El Salvador worsens because its poverty indicators increase, the external balance of goods and services worsens, and corruption increases; however, even with these pessimistic conditions, the suicide rate decreases.

Honduras is getting worse because it is moving to the right and upwards, this means that it has moved towards a higher level of poverty, there is less government efficiency and in the same sense more corruption, it is also facing less economic growth and a lower level of life satisfaction.

The change in Uruguay is the most evident, although this country moves to improve in poverty indicators, as well as in institutional factors such as Government effectiveness and consequently in a decrease of the population that does not trust in political and state institutions, it moves up in the map of factors, so after making the balance the country is worse, which increases the suicide rate, in the same way the level of life satisfaction decreases and the economic growth slows down. It is important to mention that Uruguay's suicide rate is the highest in Latin America and represents a public health problem, even more so because it is a small country with a small population.

The following are the cases of Argentina, Ecuador, Dominican República, Panamá y Perú, all of which have improved in the last decade.

II.6 Conclusion

This document presents a correspondence analysis that allows us to relate the level of poverty with the levels of happiness and economic freedom of 15 countries in Latin America. We find that countries with low levels of poverty have higher levels of economic and political freedom, as well as a good behavior economic. However, having more freedom doesn't necessarily translate into being happier. In fact, they show low happiness levels finding that the suicide rate is high, and the life satisfactions is low in countries with better economic performance, while poorer countries with less economic freedom show a higher level of happiness. This allows us to identify an inverse relationship between economic freedom, poverty, and happiness.

It is concluded that there is a heterogeneity within Latin America, thanks to the correspondence analysis we were able to group in an interesting way the countries according to their economic and institutional characteristics in 5 clusters. The cluster of countries with better economic performance is composed of Chile, Costa Rica, and Uruguay, are the richer countries characterized by a relatively smaller population than the other countries, stand out the low levels of poverty, high levels of economic growth accompanied by economic freedom, with high level of the citizen trust in the political and institutions, show more democratic with low levels of regulation and of corruption and this is paradoxically contrasted with high suicide rates and less life satisfaction, which reflect a level of happiness lower than those of countries with a higher level of poverty like El Salvador and Honduras where the situation is opposed.

Of the countries that are part of this study, Uruguay stands out, which is a country characterized by economic freedom, good economic results, and low levels of poverty, but with high suicide rates, well above the world average, and in contrast Honduras also stands out being the poorest in the region but with lower suicide rates.

Two time periods 2007-2009 and 2017-2019 are considered, in order to perform a dynamic analysis, where the situation of the countries is compared as well as the relationship between the variables of interest,

and it is identified that the countries whit more dynamic are Dominican Republic and Ecuador that improve and go towards freer economy and on the other hand Uruguay and El Salvador that worsen (Uruguay towards less satisfied conditions and El Salvador toward a situation with less economic growth). Argentina, Brazil, Honduras, and Mexico also show a less strong dynamic, Argentina improves its conditions, while Brazil and Honduras worsen, while Mexico presents a later situation that cannot be categorized as better or worse, it is just different.

Another important conclusion is that the corruption index is positively linked to poverty, In the same sense, the second indicator called Government Effectiveness shows an inverse relationship, so that in the factor map, the vector of high Government Effectiveness was always located in the same direction as low poverty levels., indicating that the fight against corruption is an important component in the fight against poverty. Countries where institutions are not strong, with little trust in the state, are those with greater corruption and higher levels of poverty.

It would be interesting if the clusters identified in this document for the second period materialized in regional integration blocks, since the existing economic integration blocks such as MERCOSUR, CAN, SICA, CARICOM, as well as the Pacific Alliance, have been consolidated only by the advantage given to them by the geographical neighborhood and have concentrated on the promotion of trade and international cooperation, but integrations have not been explored in relation to similarities in the variables analyzed here, that is, economic and political freedom, poverty and happiness, and other aspects in terms of other economic and institutional features. This would give the blocs the possibility to develop and implement common development policies that allow them to take into account their particular performances, their economic advantages and disadvantages, as well as their institutional shortcomings. Thus, the agendas of these blocs would not concentrate only on international trade and synergies would surely be created that would enhance the improvement of the conditions of their members.

II.7 References

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II.8 Appendix A

II.8.1 Table A1 Coordinates and Contributions 2007-2009

i) coordinates

Countries	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5
Argentina	0.144749051	-0.58470372	-0.19108643	0.03775191	-0.14265861
Bolivia	0.422721791	-0.34207708	0.17684271	-0.11771491	0.14213160
Brazil	0.090906203	-0.25198656	0.03678963	0.16453918	-0.03082229
Chile	-0.611266432	-0.08354953	0.18334965	0.08238651	-0.25475398
Colombia	0.198454270	0.11184072	0.15475166	0.34914624	0.36012069
Costa Rica	-0.507462438	0.07945503	-0.27018279	-0.10252165	0.14375917
Dominican Republic	0.137902779	0.22743885	-0.26191302	-0.01192690	-0.06330463
Ecuador	0.540872908	-0.19865341	0.06523743	0.03944463	-0.13082843
El Salvador	-0.160844126	0.46942881	0.03174911	0.31812071	-0.19927795
Honduras	0.417744134	0.50095975	-0.01676629	-0.01952435	0.03184498
Mexico	-0.004357703	0.03950829	-0.32736125	0.12200909	0.02284670
Panama	-0.235398469	0.11617319	-0.08192679	-0.39675727	0.17020189
Paraguay	0.198565765	0.03290567	-0.12598554	-0.29317817	-0.13603794
Peru	-0.043335302	0.20829094	0.51332499	-0.25251212	-0.07037799
Uruguay	-0.589252431	-0.32503094	0.11317692	0.08073709	0.15715678

ii) contributions

Countries	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5
Argentina	1.142214499	26.79549701	5.3704240	0.23235546	5.1359716
Bolivia	9.741492324	9.17145135	4.5996333	2.25911340	5.0980953
Brazil	0.450508780	4.97673918	0.1990672	4.41381049	0.2397488
Chile	20.369356732	0.54711441	4.9443483	1.10659141	16.3782910
Colombia	2.147025075	0.98037003	3.5222446	19.87420601	32.7282500
Costa Rica	14.038607256	0.49480371	10.7365377	1.71358731	5.2155215
Dominican Republic	1.036721861	4.05433291	10.0893466	0.02319155	1.0113410
Ecuador	15.948016555	3.09301584	0.6259542	0.25365928	4.3194742
El Salvador	1.410349121	17.27148145	0.1482559	16.49905012	10.0217862
Honduras	9.513425933	19.66961111	0.0413450	0.06214816	0.2559226
Mexico	0.001035217	0.12233944	15.7617125	2.42694225	0.1317267
Panama	3.020810543	1.05779596	0.9871900	25.66402827	7.3106394
Paraguay	2.149438217	0.08486556	2.3344805	14.01323163	4.6703207
Peru	0.102376405	3.40040684	38.7555309	10.39535883	1.2499722
Uruguay	18.928621482	8.28017519	1.8839294	1.06272583	6.2329389

iii) coordinates

Variables	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5
povhea215_l_1	-0.433306979	-0.279046101	-0.287430783	-0.02605997	-0.086602995
povhea365_l_1	-0.381257063	-0.390678877	-0.233137661	-0.13460207	-0.018782058
povhea685_l_1	-0.304145906	-0.470498657	-0.148255227	-0.18120769	0.041925492

povhea685_h_1	0.304145906	0.470498657	0.148255227	0.18120769	-0.041925492
povhea365_h_1	0.381257063	0.390678877	0.233137661	0.13460207	0.018782058
povhea215_h_1	0.433306979	0.279046101	0.287430783	0.02605997	0.086602995
suicide_l_1	0.253138663	0.365047079	-0.009382414	-0.16573951	0.140371663
suicide_h_1	-0.253138663	-0.365047079	0.009382414	0.16573951	-0.140371663
shareprop_l_1	-0.159004974	0.297258448	-0.386125559	0.14398005	-0.275031773
shareprop_h_1	0.159004974	-0.297258448	0.386125559	-0.14398005	0.275031773
ef_l_1	0.439712669	-0.365356576	-0.155631031	0.11208245	0.101906501
trade_h_1	-0.393513240	0.233358390	0.204390691	-0.24457510	-0.114053959
rights_h_1	-0.543019394	-0.009231808	0.075876888	0.07862640	0.020922804
democra_h_1	-0.512300009	-0.108407122	-0.003817327	-0.26655738	-0.023909969
cpi_l_1	-0.529639272	0.042484033	0.142364181	0.23088218	0.097181167
infla_l_1	-0.455720364	0.037473838	-0.017981039	0.10664609	0.081154096
money_h_1	-0.258458386	0.247903814	0.320615414	-0.10145477	-0.030743461
noregula_h_1	-0.279541954	0.464595230	0.136362117	0.03603981	-0.078544806
popgrow_l_1	-0.303508331	-0.115265138	0.196147897	0.26566177	-0.154204329
govsiz_h_1	-0.055231153	0.464889974	-0.137163511	-0.19163400	-0.242059722
milex_l_1	-0.126244787	0.172256320	-0.437281554	-0.30363818	-0.007611812
balance_h_1	-0.004228314	-0.434838369	0.224631309	-0.11640546	-0.184625954
gdpgrow_h_1	-0.105111014	-0.035525181	0.208519159	-0.41122073	0.303783142
distrust_l_1	-0.273299362	0.151771246	-0.157684308	0.34724861	0.162237321
distrust_h_1	0.273299362	-0.151771246	0.157684308	-0.34724861	-0.162237321
gdpgrow_l_1	0.105111014	0.035525181	-0.208519159	0.41122073	-0.303783142
balance_l_1	0.004228314	0.434838369	-0.224631309	0.11640546	0.184625954
milex_h_1	0.135955925	-0.185506806	0.470918597	0.32699496	0.008197336
govsiz_l_1	0.055231153	-0.464889974	0.137163511	0.19163400	0.242059722
popgrow_h_1	0.303508331	0.115265138	-0.196147897	-0.26566177	0.154204329
noregula_l_1	0.279541954	-0.464595230	-0.136362117	-0.03603981	0.078544806
money_l_1	0.258458386	-0.247903814	-0.320615414	0.10145477	0.030743461
infla_h_1	0.455720364	-0.037473838	0.017981039	-0.10664609	-0.081154096
cpi_h_1	0.529639272	-0.042484033	-0.142364181	-0.23088218	-0.097181167
rights_l_1	0.543019394	0.009231808	-0.075876888	-0.07862640	-0.020922804
trade_l_1	0.393513240	-0.233358390	-0.204390691	0.24457510	0.114053959
ef_h_1	-0.439712669	0.365356576	0.155631031	-0.11208245	-0.101906501
democra_l_1	0.597683344	0.126474975	0.004453548	0.31098361	0.027894963
verysat_l_1	0.115440929	-0.370954257	0.224249508	-0.01134842	-0.368551174
verysat_h_1	-0.115440929	0.370954257	-0.224249508	0.01134842	0.368551174

iv) contributions

Variables	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5
povhea215_l_1	3.6742695767	2.190813736	4.3619316706	0.039745362	0.679447470
povhea365_l_1	2.8445622696	4.294310057	2.8697044526	1.060332196	0.031957767
povhea685_l_1	1.8102710164	6.228311333	1.1604657600	1.921727201	0.159237881
povhea685_h_1	1.8102710164	6.228311333	1.1604657600	1.921727201	0.159237881
povhea365_h_1	2.8445622696	4.294310057	2.8697044526	1.060332196	0.031957767

povhea215_h_1	3.6742695767	2.190813736	4.3619316706	0.039745362	0.679447470
suicide_l_1	1.2539973370	3.749309509	0.0046477360	1.607646519	1.785044107
suicide_h_1	1.2539973370	3.749309509	0.0046477360	1.607646519	1.785044107
shareprop_l_1	0.4947673938	2.486119209	7.8717157238	1.213229949	6.852606548
shareprop_h_1	0.4947673938	2.486119209	7.8717157238	1.213229949	6.852606548
ef_l_1	3.7837079343	3.755669731	1.2788060772	0.735213936	0.940792495
trade_h_1	3.0303887616	1.532146800	2.2056394633	3.500764961	1.178448989
rights_h_1	5.7704586187	0.002397878	0.3039704218	0.361805601	0.039657911
democra_h_1	5.1360397555	0.330650486	0.0007693626	4.158339172	0.051790257
cpi_l_1	5.4895912534	0.050781439	1.0700738935	3.119746544	0.855567500
infla_l_1	4.0642135593	0.039510260	0.0170703283	0.665623036	0.596638057
money_h_1	1.3072567898	1.729099375	5.4272658592	0.602397913	0.085624015
noregula_h_1	1.5292329310	6.072996491	0.9817474324	0.076015723	0.558888278
popgrow_l_1	1.8026893048	0.373808767	2.0313259384	4.130442604	2.154185975
govsiz_h_1	0.0596963631	6.080704499	0.9933207003	2.149233429	5.308051428
milex_l_1	0.3118936684	0.834841184	10.0956577098	5.395742562	0.005248874
balance_h_1	0.0003498759	5.319970866	2.6641144471	0.793021832	3.087987720
gdpgrow_h_1	0.2162101632	0.035507994	2.2956423598	9.896655770	8.360214100
distrust_l_1	1.4616954129	0.648085843	1.3127718468	7.056990126	2.384468531
distrust_h_1	1.4616954129	0.648085843	1.3127718468	7.056990126	2.384468531
gdpgrow_l_1	0.2162101632	0.035507994	2.2956423598	9.896655770	8.360214100
balance_l_1	0.0003498759	5.319970866	2.6641144471	0.793021832	3.087987720
milex_h_1	0.3358854890	0.899059737	10.8722467644	5.810799682	0.005652634
govsiz_l_1	0.0596963631	6.080704499	0.9933207003	2.149233429	5.308051428
popgrow_h_1	1.8026893048	0.373808767	2.0313259384	4.130442604	2.154185975
noregula_l_1	1.5292329310	6.072996491	0.9817474324	0.076015723	0.558888278
money_l_1	1.3072567898	1.729099375	5.4272658592	0.602397913	0.085624015
infla_h_1	4.0642135593	0.039510260	0.0170703283	0.665623036	0.596638057
cpi_h_1	5.4895912534	0.050781439	1.0700738935	3.119746544	0.855567500
rights_l_1	5.7704586187	0.002397878	0.3039704218	0.361805601	0.039657911
trade_l_1	3.0303887616	1.532146800	2.2056394633	3.500764961	1.178448989
ef_h_1	3.7837079343	3.755669731	1.2788060772	0.735213936	0.940792495
democra_l_1	5.9920463814	0.385758900	0.0008975897	4.851395701	0.060421967
verysat_l_1	0.2607950088	3.871633660	2.6550658672	0.007537188	12.305114516
verysat_h_1	0.2607950088	3.871633660	2.6550658672	0.007537188	12.305114516

Source: Own elaboration

II.8.2 Table A2 Description of each cluster by variables (2007-2009)

CLUSTER `1`

	Intern %	glob %	Intern freq	Glob freq	p.value	v.test
geff_esti_h_1	4.6153846	2.393162	27	105.0	0.000852366990	3.335204
cpi_l_1	4.6153846	2.393162	27	105.0	0.000852366990	3.335204
suicide_h_1	4.6153846	2.393162	27	105.0	0.000852366990	3.335204
infla_l_1	4.4444444	2.393162	26	105.0	0.002007904905	3.089061
democra_h_1	4.4444444	2.393162	26	105.0	0.002007904905	3.089061
rights_h_1	4.4444444	2.393162	26	105.0	0.002007904905	3.089061
povhea215_l_1	4.4444444	2.393162	26	105.0	0.002007904905	3.089061
povhea365_l_1	4.2735043	2.393162	25	105.0	0.004504640599	2.840475
trade_h_1	4.1025641	2.393162	24	105.0	0.009617231790	2.589296
ef_h_1	3.9316239	2.393162	23	105.0	0.019524680009	2.335359
popgrow_l_1	3.9316239	2.393162	23	105.0	0.019524680009	2.335359
povhea685_l_1	3.9316239	2.393162	23	105.0	0.019524680009	2.335359
milex_h_1	3.5897436	2.222222	21	97.5	0.033606003154	2.124768
money_l_1	1.1965812	2.393162	7	105.0	0.044987545236	-2.004771
balance_l_1	1.1965812	2.393162	7	105.0	0.044987545236	-2.004771
distrust_h_1	1.1965812	2.393162	7	105.0	0.044987545236	-2.004771
milex_l_1	1.0256410	2.393162	6	105.0	0.018473355993	-2.355991
popgrow_h_1	0.8547009	2.393162	5	105.0	0.006480196441	-2.722439
ef_l_1	0.8547009	2.393162	5	105.0	0.006480196441	-2.722439
povhea685_h_1	0.8547009	2.393162	5	105.0	0.006480196441	-2.722439
trade_l_1	0.6837607	2.393162	4	105.0	0.001885989219	-3.107622
povhea365_h_1	0.5128205	2.393162	3	105.0	0.000436818692	-3.516778
rights_l_1	0.3418803	2.393162	2	105.0	0.000075429289	-3.958477
infla_h_1	0.3418803	2.393162	2	105.0	0.000075429289	-3.958477
povhea215_h_1	0.3418803	2.393162	2	105.0	0.000075429289	-3.958477
geff_esti_l_1	0.1709402	2.393162	1	105.0	0.000008626805	-4.449007
cpi_h_1	0.1709402	2.393162	1	105.0	0.000008626805	-4.449007
suicide_l_1	0.1709402	2.393162	1	105.0	0.000008626805	-4.449007
democra_l_1	0.0000000	2.051282	0	90.0	0.000004431196	-4.590060

CLUSTER`2`

	Intern %	glob %	Intern freq	Glob freq	p.value	v.test
milex_l_1	4.6153846	2.393162	27.0	105.0	0.000852366990	3.335204
verysat_h_1	4.2735043	2.393162	25.0	105.0	0.004504640599	2.840475
gdpgrow_h_1	4.1025641	2.393162	24.0	105.0	0.009617231790	2.589296
geff_esti_h_1	3.9316239	2.393162	23.0	105.0	0.019524680009	2.335359
democra_h_1	4.0170940	2.393162	23.5	105.0	0.019524680009	2.335359
trade_h_1	3.9316239	2.393162	23.0	105.0	0.019524680009	2.335359
povhea685_l_1	3.9316239	2.393162	23.0	105.0	0.019524680009	2.335359
rights_h_1	3.7606838	2.393162	22.0	105.0	0.037665048294	2.078481
povhea365_l_1	3.7606838	2.393162	22.0	105.0	0.037665048294	2.078481
balance_h_1	1.1965812	2.393162	7.0	105.0	0.044987545236	-2.004771
popgrow_l_1	1.1965812	2.393162	7.0	105.0	0.044987545236	-2.004771
ef_l_1	1.1965812	2.393162	7.0	105.0	0.044987545236	-2.004771
povhea215_h_1	1.1965812	2.393162	7.0	105.0	0.044987545236	-2.004771
rights_l_1	1.0256410	2.393162	6.0	105.0	0.018473355993	-2.355991
povhea365_h_1	1.0256410	2.393162	6.0	105.0	0.018473355993	-2.355991
geff_esti_l_1	0.8547009	2.393162	5.0	105.0	0.006480196441	-2.722439
trade_l_1	0.8547009	2.393162	5.0	105.0	0.006480196441	-2.722439
povhea685_h_1	0.8547009	2.393162	5.0	105.0	0.006480196441	-2.722439
gdpgrow_l_1	0.6837607	2.393162	4.0	105.0	0.001885989219	-3.107622
democra_l_1	0.4273504	2.051282	2.5	90.0	0.000506680056	-3.477200
verysat_l_1	0.5128205	2.393162	3.0	105.0	0.000436818692	-3.516778
milex_h_1	0.0000000	2.222222	0.0	97.5	0.000001373229	-4.828851

CLUSTER `3`

	Intern %	glob %	Intern freq	Glob freq	p.value	v.test
distrust_h_1	4.7863248	2.393162	14	105	0.018184342	2.361843

gdpgrow_h_1	4.4444444	2.393162	13	105	0.041929431	2.034220
money_h_1	4.4444444	2.393162	13	105	0.041929431	2.034220
trade_h_1	4.4444444	2.393162	13	105	0.041929431	2.034220
shareprop_h_1	4.4444444	2.393162	13	105	0.041929431	2.034220
suicide_l_1	4.4444444	2.393162	13	105	0.041929431	2.034220
povhea215_h_1	4.4444444	2.393162	13	105	0.041929431	2.034220
noregula_l_1	0.6837607	2.393162	2	105	0.049936960	-1.960504
popgrow_h_1	0.6837607	2.393162	2	105	0.049936960	-1.960504
ef_l_1	0.6837607	2.393162	2	105	0.049936960	-1.960504
povhea365_l_1	0.6837607	2.393162	2	105	0.049936960	-1.960504
trade_l_1	0.3418803	2.393162	1	105	0.011469233	-2.528067
money_l_1	0.3418803	2.393162	1	105	0.011469233	-2.528067
gdpgrow_l_1	0.3418803	2.393162	1	105	0.011469233	-2.528067
shareprop_l_1	0.3418803	2.393162	1	105	0.011469233	-2.528067
suicide_h_1	0.3418803	2.393162	1	105	0.011469233	-2.528067
povhea215_l_1	0.3418803	2.393162	1	105	0.011469233	-2.528067
distrust_l_1	0.0000000	2.393162	0	105	0.001320992	-3.211380

CLUSTER `4`

	Intern %	glob %	Intern freq	Glob freq	p.value	v.test
povhea685_h_1	3.8974359	2.393162	57	105	0.000012467824	4.369243
balance_l_1	3.8290598	2.393162	56	105	0.000030438864	4.170158
democra_l_1	3.1452991	2.051282	46	90	0.000646145777	3.411466
verysat_h_1	3.5555556	2.393162	52	105	0.000745097793	3.372424
povhea365_h_1	3.5555556	2.393162	52	105	0.000745097793	3.372424
gdpgrow_l_1	3.4188034	2.393162	50	105	0.002956517009	2.972223
shareprop_l_1	3.4188034	2.393162	50	105	0.002956517009	2.972223
distrust_l_1	3.3504274	2.393162	49	105	0.005577059017	2.771664
suicide_l_1	3.2820513	2.393162	48	105	0.010147872386	2.570749
noregula_h_1	3.1452991	2.393162	46	105	0.030181241104	2.167704
povhea215_h_1	3.0769231	2.393162	45	105	0.049357003640	1.965495
povhea215_l_1	1.7094017	2.393162	25	105	0.042400000818	-2.029573
noregula_l_1	1.6410256	2.393162	24	105	0.024305772806	-2.252261
suicide_h_1	1.5042735	2.393162	22	105	0.006865655758	-2.703291
distrust_h_1	1.4358974	2.393162	21	105	0.003369033387	-2.931893
gdpgrow_h_1	1.3675214	2.393162	20	105	0.001562890024	-3.162745
shareprop_h_1	1.3675214	2.393162	20	105	0.001562890024	-3.162745
democra_h_1	1.2991453	2.393162	19	105	0.000683748969	-3.396014
verysat_l_1	1.2307692	2.393162	18	105	0.000281363661	-3.631880
povhea365_l_1	1.2307692	2.393162	18	105	0.000281363661	-3.631880
balance_h_1	0.9572650	2.393162	14	105	0.000004109059	-4.605788
povhea685_l_1	0.8888889	2.393162	13	105	0.000001184176	-4.858267

CLUSTER `5`

	Intern %	glob %	Intern freq	Glob freq	p.value	v.test
noregula_l_1	4.1025641	2.393162	60.0	105	0.00000068269713	4.966222
ef_l_1	3.8974359	2.393162	57.0	105	0.00001246782429	4.369243
verysat_l_1	3.7606838	2.393162	55.0	105	0.00007158092283	3.970969
cpi_h_1	3.6923077	2.393162	54.0	105	0.00016217790376	3.771640
balance_h_1	3.6239316	2.393162	53.0	105	0.00035408008552	3.572137
trade_l_1	3.5555556	2.393162	52.0	105	0.00074509779345	3.372424
geff_esti_l_1	3.4871795	2.393162	51.0	105	0.00151151179683	3.172464
rights_l_1	3.4871795	2.393162	51.0	105	0.00151151179683	3.172464
money_l_1	3.3504274	2.393162	49.0	105	0.00557705901662	2.771664
distrust_h_1	3.3846154	2.393162	49.5	105	0.00557705901662	2.771664
infla_h_1	3.2136752	2.393162	47.0	105	0.01781494259074	2.369442
govsiz_l_1	3.0769231	2.393162	45.0	105	0.04935700364025	1.965495
shareprop_h_1	3.0769231	2.393162	45.0	105	0.04935700364025	1.965495
govsiz_h_1	1.7094017	2.393162	25.0	105	0.04240000081803	-2.029573
shareprop_l_1	1.7094017	2.393162	25.0	105	0.04240000081803	-2.029573
infla_l_1	1.5726496	2.393162	23.0	105	0.01325688831826	-2.476793
money_h_1	1.4358974	2.393162	21.0	105	0.00336903338686	-2.931893
distrust_l_1	1.4017094	2.393162	20.5	105	0.00156289002443	-3.162745

geff_esti_h_1	1.2991453	2.393162	19.0	105	0.00068374896915	-3.396014
rights_h_1	1.2991453	2.393162	19.0	105	0.00068374896915	-3.396014
trade_h_1	1.2307692	2.393162	18.0	105	0.00028136366124	-3.631880
balance_l_1	1.1623932	2.393162	17.0	105	0.00010859114323	-3.870548
cpi_l_1	1.0940171	2.393162	16.0	105	0.00003918322163	-4.112244
verysat_h_1	1.0256410	2.393162	15.0	105	0.00001317210494	-4.357226
ef_h_1	0.8888889	2.393162	13.0	105	0.00000118417609	-4.858267
noregula_h_1	0.6837607	2.393162	10.0	105	0.00000001666619	-5.643465

Source: Own elaboration.

II.8.3 Table A3 Coordinates and contributions 2017-2019

i) coordinates

Country	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5
Argentina	-0.26191741	0.55463428	-0.111919084	-0.171621503	-0.05370694
Bolivia	0.28724629	0.27499130	-0.308346549	-0.100638899	-0.07173644
Brazil	0.10198116	0.34208145	-0.008693143	0.239418469	-0.23240198
Chile	-0.57788148	-0.21533451	0.099445712	0.191964432	0.15819412
Colombia	0.30329698	0.14954774	0.493773972	-0.096587468	0.14675438
Costa Rica	-0.48654812	-0.20335293	-0.012497486	-0.103935768	-0.07672326
Dominican Republic	0.13520864	-0.33899113	-0.301923119	-0.190765394	0.07865207
Ecuador	0.20107013	0.43185430	0.094248091	-0.031135538	0.08831042
El Salvador	0.20450701	-0.23448039	-0.231417519	0.293846475	0.19729028
Honduras	0.72159164	-0.16323827	0.054971827	-0.002596034	0.03864115
Mexico	0.12951994	-0.01426067	0.081942960	-0.063215695	0.14296901
Panama	-0.08811002	-0.43906459	-0.028634759	-0.292665820	-0.12685129
Paraguay	0.03809526	-0.02758625	-0.216493970	0.221004770	-0.11571293
Peru	0.01571596	-0.31497766	0.368764773	0.100617291	-0.28099602
Uruguay	-0.72377598	0.19817734	0.026778293	0.006310680	0.10731743

ii) contributions

Country	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5
Argentina	3.43778302	23.20580281	1.76604325	6.909932860	0.9326050
Bolivia	4.13483876	5.70454627	13.40513607	2.376086167	1.6638588
Brazil	0.52118227	8.82759136	0.01065483	13.447629236	17.4629055
Chile	16.73506010	3.49792470	1.39432870	8.645138702	8.0912852
Colombia	4.60984043	1.68710801	34.37553214	2.188628193	6.9633626
Costa Rica	11.86318509	3.11949333	0.02202107	2.534314371	1.9032284
Dominican Republic	0.91613319	8.66881732	12.85244579	8.537478351	2.0001249
Ecuador	2.02602516	14.06882032	1.25238591	0.227427598	2.5215104
El Salvador	2.09587855	4.14759398	7.55067036	20.256826074	12.5848552
Honduras	26.09352210	2.01014396	0.42606257	0.001581070	0.4827663
Mexico	0.84066500	0.01534132	0.94670864	0.937519398	6.6087710
Panama	0.38904545	14.54253166	0.11560593	20.094372041	5.2026741
Paraguay	0.07272633	0.05740749	6.60822241	11.458657073	4.3291297
Peru	0.01237745	7.48415374	19.17308055	2.375065944	25.5291999
Uruguay	26.25173711	2.96272375	0.10110178	0.009342924	3.7237229

iii) coordinates

Variable	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5
povhea215_l_2	-0.49199431	-0.05018840	-0.24130634	-0.068244913	0.162412786
povhea365_l_2	-0.52120826	-0.02112040	-0.26221529	-0.116287032	0.087791318
povhea685_l_2	-0.52237577	0.07171270	-0.19993370	-0.125566951	-0.091228275
povhea685_h_2	0.52237577	-0.07171270	0.19993370	0.125566951	0.091228275
povhea365_h_2	0.52120826	0.02112040	0.26221529	0.116287032	-0.087791318
povhea215_h_2	0.49199431	0.05018840	0.24130634	0.068244913	-0.162412786
suicide_l_2	0.43418920	-0.34111617	0.14158280	-0.114211782	-0.137618885
suicide_h_2	-0.43418920	0.34111617	-0.14158280	0.114211782	0.137618885
shareprop_l_2	-0.08709003	0.33820701	0.40711932	-0.039993334	-0.169852807
shareprop_h_2	0.08709003	-0.33820701	-0.40711932	0.039993334	0.169852807
ef_l_2	0.25322360	0.53899599	-0.10079127	-0.018272518	-0.014914816
trade_h_2	-0.31945308	-0.45463221	-0.01489163	0.009260753	-0.094476074
rights_h_2	-0.49349905	-0.12398642	0.27653909	-0.046887687	-0.086443019

democra_h_2	-0.52992597	-0.18746455	-0.02014461	0.056920670	-0.117837007
cpi_l_2	-0.50776689	0.07045385	0.20419078	-0.069149809	-0.008753665
infla_l_2	-0.30187910	-0.24835221	0.13183656	0.275995733	0.225586898
money_h_2	-0.10870016	-0.46699133	-0.13515670	0.173037528	-0.114320602
noregula_h_2	-0.10937527	-0.35153407	0.43422595	-0.071097812	0.111594578
popgrow_l_2	-0.29029800	0.08820452	-0.23449784	0.198445220	0.081177471
govsiz_h_2	0.21224046	-0.45148803	-0.08585313	0.129549079	0.169903835
milex_l_2	-0.08596522	-0.26906319	-0.26973391	-0.192251774	-0.196028577
balance_h_2	-0.41801377	0.12451250	0.08663583	0.122422543	-0.277172292
gdpgrow_h_2	0.23715961	-0.43332790	-0.12604573	-0.181944732	-0.153210842
distrust_l_2	-0.27029083	0.25895397	-0.15165455	-0.350737172	0.107133341
distrust_h_2	0.27029083	-0.25895397	0.15165455	0.350737172	-0.107133341
gdpgrow_l_2	-0.23715961	0.43332790	0.12604573	0.181944732	0.153210842
balance_l_2	0.41801377	-0.12451250	-0.08663583	-0.122422543	0.277172292
milex_h_2	0.09257793	0.28976036	0.29048267	0.207040372	0.211107699
govsiz_l_2	-0.21224046	0.45148803	0.08585313	-0.129549079	-0.169903835
popgrow_h_2	0.29029800	-0.08820452	0.23449784	-0.198445220	-0.081177471
noregula_l_2	0.10937527	0.35153407	-0.43422595	0.071097812	-0.111594578
money_l_2	0.10870016	0.46699133	0.13515670	-0.173037528	0.114320602
infla_h_2	0.30187910	0.24835221	-0.13183656	-0.275995733	-0.225586898
cpi_h_2	0.50776689	-0.07045385	-0.20419078	0.069149809	0.008753665
rights_l_2	0.49349905	0.12398642	-0.27653909	0.046887687	0.086443019
trade_l_2	0.31945308	0.45463221	0.01489163	-0.009260753	0.094476074
ef_h_2	-0.25322360	-0.53899599	0.10079127	0.018272518	0.014914816
democra_l_2	0.61824697	0.21870864	0.02350205	-0.066407448	0.137476508
verysat_l_2	-0.21212986	0.30105666	-0.11607134	0.378963023	-0.162148316
verysat_h_2	0.21212986	-0.30105666	0.11607134	-0.378963023	0.162148316
geff_esti_l_2	0.47332414	-0.02858925	-0.29014182	0.117365969	-0.137896644
geff_esti_h_2	-0.47332414	0.02858925	0.29014182	-0.117365969	0.137896644

iv) contributions

Variable	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5
povhea215_l_2	4.3544499	0.06821082	2.94709372	0.392224237	3.061545486
povhea365_l_2	4.8869256	0.01207955	3.47994584	1.138823526	0.894547539
povhea685_l_2	4.9088437	0.13926397	2.02315192	1.327836357	0.965960145
povhea685_h_2	4.9088437	0.13926397	2.02315192	1.327836357	0.965960145
povhea365_h_2	4.8869256	0.01207955	3.47994584	1.138823526	0.894547539
povhea215_h_2	4.3544499	0.06821082	2.94709372	0.392224237	3.061545486
suicide_l_2	3.3913388	3.15102050	1.01455930	1.098539480	2.198145091
suicide_h_2	3.3913388	3.15102050	1.01455930	1.098539480	2.198145091
shareprop_l_2	0.1364426	3.09750367	8.38880112	0.134700458	3.348464814
shareprop_h_2	0.1364426	3.09750367	8.38880112	0.134700458	3.348464814
ef_l_2	1.1535104	7.86715440	0.51416472	0.028118402	0.025818801
trade_h_2	1.8358082	5.59715090	0.01122382	0.007222482	1.035962316
rights_h_2	4.3811264	0.41628892	3.87052184	0.185144783	0.867281611
democra_h_2	5.0517699	0.95166676	0.02053876	0.272856224	1.611623868
cpi_l_2	4.6381192	0.13441759	2.11022485	0.402694615	0.008893652
infla_l_2	1.6393785	1.67025458	0.87968705	6.415028546	5.906470346
money_h_2	0.2125561	5.90560313	0.92455262	2.521589926	1.516873252
noregula_h_2	0.2152046	3.34642785	9.54306796	0.425702629	1.445394749
popgrow_l_2	1.5160071	0.21068240	2.78313437	3.316462870	0.764841278

govsiz_h_2	0.8103442	5.52000019	0.37305143	1.413391632	3.350477048
milex_l_2	0.1329409	1.96044736	3.68237119	3.112680683	4.460043140
balance_h_2	3.1433615	0.41982910	0.37988445	1.262166503	8.916612815
gdpgrow_h_2	1.0117998	5.08487079	0.80410498	2.787871994	2.724452761
distrust_l_2	1.3142433	1.81589926	1.16403851	10.359944961	1.332139128
distrust_h_2	1.3142433	1.81589926	1.16403851	10.359944961	1.332139128
gdpgrow_l_2	1.0117998	5.08487079	0.80410498	2.787871994	2.724452761
balance_l_2	3.1433615	0.41982910	0.37988445	1.262166503	8.916612815
milex_h_2	0.1431672	2.11125100	3.96563051	3.352117658	4.803123382
govsiz_l_2	0.8103442	5.52000019	0.37305143	1.413391632	3.350477048
popgrow_h_2	1.5160071	0.21068240	2.78313437	3.316462870	0.764841278
noregula_l_2	0.2152046	3.34642785	9.54306796	0.425702629	1.445394749
money_l_2	0.2125561	5.90560313	0.92455262	2.521589926	1.516873252
infla_h_2	1.6393785	1.67025458	0.87968705	6.415028546	5.906470346
cpi_h_2	4.6381192	0.13441759	2.11022485	0.402694615	0.008893652
rights_l_2	4.3811264	0.41628892	3.87052184	0.185144783	0.867281611
trade_l_2	1.8358082	5.59715090	0.01122382	0.007222482	1.035962316
ef_h_2	1.1535104	7.86715440	0.51416472	0.028118402	0.025818801
democra_l_2	5.8937315	1.11027789	0.02396189	0.318332262	1.880227846
verysat_l_2	0.8094998	2.45438727	0.68187773	12.094489110	3.051582879
verysat_h_2	0.8094998	2.45438727	0.68187773	12.094489110	3.051582879
geff_esti_l_2	4.0302358	0.02213361	4.26066260	1.160054075	2.207027172
geff_esti_h_2	4.0302358	0.02213361	4.26066260	1.160054075	2.207027172

Source: Own elaboration.

II.8.4 Table A4 Description of each cluster by quantitative variables (2017-2019)

CLUSTER `1`

	Intern %	glob %	Intern freq	Glob freq	p.value	v.test
geff_esti_h_2	4.4444444	2.393162	39	105	0.000057838232201	4.021461
cpi_l_2	4.4444444	2.393162	39	105	0.000057838232201	4.021461
democra_h_2	4.4444444	2.393162	39	105	0.000057838232201	4.021461
rights_h_2	4.4444444	2.393162	39	105	0.000057838232201	4.021461
povhea365_l_2	4.3304843	2.393162	38	105	0.000141726024697	3.805136
infla_l_2	4.2165242	2.393162	37	105	0.000333587738822	3.587716
suicide_h_2	4.2165242	2.393162	37	105	0.000333587738822	3.587716
povhea685_l_2	4.2165242	2.393162	37	105	0.000333587738822	3.587716
povhea215_l_2	4.1025641	2.393162	36	105	0.000754036942879	3.369138
ef_h_2	3.8746439	2.393162	34	105	0.003408748239440	2.928251
trade_h_2	3.7606838	2.393162	33	105	0.006813958020667	2.705802
balance_h_2	3.6467236	2.393162	32	105	0.013067759934533	2.481917
distrust_l_2	3.5327635	2.393162	31	105	0.024038403988802	2.256515
popgrow_l_2	3.5327635	2.393162	31	105	0.024038403988802	2.256515
popgrow_h_2	1.2535613	2.393162	11	105	0.012812092035426	-2.488950
distrust_h_2	1.2535613	2.393162	11	105	0.012812092035426	-2.488950
balance_l_2	1.1396011	2.393162	10	105	0.005445717891992	-2.779413
trade_l_2	1.0256410	2.393162	9	105	0.002089935152504	-3.077145
ef_l_2	0.9116809	2.393162	8	105	0.000716632233367	-3.383136
povhea215_h_2	0.6837607	2.393162	6	105	0.000056916957869	-4.025241
infla_h_2	0.5698006	2.393162	5	105	0.000012705278405	-4.365120
suicide_l_2	0.5698006	2.393162	5	105	0.000012705278405	-4.365120
povhea685_h_2	0.5698006	2.393162	5	105	0.000012705278405	-4.365120
povhea365_h_2	0.4558405	2.393162	4	105	0.000002343640812	-4.721281
geff_esti_l_2	0.3418803	2.393162	3	105	0.000000342891862	-5.098204
rights_l_2	0.3418803	2.393162	3	105	0.000000342891862	-5.098204
cpi_h_2	0.3418803	2.393162	3	105	0.000000342891862	-5.098204
democra_l_2	0.0000000	2.051282	0	90	0.000000002978364	-5.932786

CLUSTER `2`

	Intern %	glob %	Intern freq	Glob freq	p.value	v.test
trade_h_2	4.6153846	2.393162	27.0	105.0	0.000852366990	3.335204
ef_h_2	4.2735043	2.393162	25.0	105.0	0.004504640599	2.840475
suicide_l_2	4.2735043	2.393162	25.0	105.0	0.004504640599	2.840475
popgrow_h_2	4.1025641	2.393162	24.0	105.0	0.009617231790	2.589296
noregula_h_2	4.1025641	2.393162	24.0	105.0	0.009617231790	2.589296
gdpgrow_h_2	3.7606838	2.393162	22.0	105.0	0.037665048294	2.078481
rights_l_2	1.1965812	2.393162	7.0	105.0	0.044987545236	-2.004771
money_l_2	1.1965812	2.393162	7.0	105.0	0.044987545236	-2.004771
distrust_l_2	1.1965812	2.393162	7.0	105.0	0.044987545236	-2.004771
milex_h_2	1.1111111	2.222222	6.5	97.5	0.034711679045	-2.111706
gdpgrow_l_2	1.0256410	2.393162	6.0	105.0	0.018473355993	-2.355991
noregula_l_2	0.6837607	2.393162	4.0	105.0	0.001885989219	-3.107622
popgrow_l_2	0.6837607	2.393162	4.0	105.0	0.001885989219	-3.107622
ef_l_2	0.5128205	2.393162	3.0	105.0	0.000436818692	-3.516778
suicide_h_2	0.5128205	2.393162	3.0	105.0	0.000436818692	-3.516778
trade_l_2	0.1709402	2.393162	1.0	105.0	0.000008626805	-4.449007

CLUSTER`3`

	Intern %	glob %	Intern freq	Glob freq	p.value	v.test
noregula_l_2	4.2735043	2.393162	50	105	0.00000530756927	4.552248
ef_l_2	4.2735043	2.393162	50	105	0.00000530756927	4.552248
govsiz_l_2	4.0170940	2.393162	47	105	0.00008118185533	3.940884
infla_h_2	3.9316239	2.393162	46	105	0.00018690799362	3.736084
trade_l_2	3.8461538	2.393162	45	105	0.00041444317373	3.530712
verysat_l_2	3.5897436	2.393162	42	105	0.00360583883135	2.910731
money_l_2	3.5042735	2.393162	41	105	0.00687922108300	2.702635
suicide_h_2	3.4188034	2.393162	40	105	0.01264041841203	2.493743

democra_l_2	2.9914530	2.051282	35	90	0.01417120141161	2.452894
gdpgrow_l_2	3.3333333	2.393162	39	105	0.02237130498660	2.284004
gdpgrow_h_2	1.4529915	2.393162	17	105	0.01463901831590	-2.441188
democra_h_2	1.4529915	2.393162	17	105	0.01463901831590	-2.441188
suicide_l_2	1.3675214	2.393162	16	105	0.00713135716584	-2.690647
money_h_2	1.2820513	2.393162	15	105	0.00324302523240	-2.943711
verysat_h_2	1.1965812	2.393162	14	105	0.00137094022418	-3.200700
trade_h_2	0.9401709	2.393162	11	105	0.00006355373545	-3.999212
infla_l_2	0.8547009	2.393162	10	105	0.00001900615200	-4.276257
govsiz_h_2	0.7692308	2.393162	9	105	0.00000511919070	-4.559843
ef_h_2	0.5128205	2.393162	6	105	0.00000004763209	-5.459931
noregula_h_2	0.5128205	2.393162	6	105	0.00000004763209	-5.459931

CLUSTER `4`

	Intern %	glob %	Intern freq	Glob freq	p.value	v.test
govsiz_h_2	4.1025641	2.393162	36.0	105	0.00075403694	3.369138
geff_esti_l_2	3.9886040	2.393162	35.0	105	0.00163640314	3.149339
shareprop_h_2	3.8746439	2.393162	34.0	105	0.00340874824	2.928251
rights_l_2	3.6467236	2.393162	32.0	105	0.01306775993	2.481917
cpi_h_2	3.7037037	2.393162	32.5	105	0.01306775993	2.481917
money_h_2	3.5327635	2.393162	31.0	105	0.02403840399	2.256515
money_l_2	1.2535613	2.393162	11.0	105	0.01281209204	-2.488950
rights_h_2	1.1396011	2.393162	10.0	105	0.00544571789	-2.779413
cpi_l_2	1.0826211	2.393162	9.5	105	0.00208993515	-3.077145
shareprop_l_2	0.9116809	2.393162	8.0	105	0.00071663223	-3.383136
geff_esti_h_2	0.7977208	2.393162	7.0	105	0.00021676559	-3.698631
govsiz_l_2	0.6837607	2.393162	6.0	105	0.00005691696	-4.025241

CLUSTER `5`

	Intern %	glob %	Intern freq	Glob freq	p.value	v.test
povhea685_h_2	4.3304843	2.393162	38.0	105	0.000141726025	3.805136
povhea365_h_2	4.2165242	2.393162	37.0	105	0.000333587739	3.587716
suicide_l_2	3.8746439	2.393162	34.0	105	0.003408748239	2.928251
povhea215_h_2	3.8746439	2.393162	34.0	105	0.003408748239	2.928251
verysat_h_2	3.7606838	2.393162	33.0	105	0.006813958021	2.705802
money_l_2	3.7606838	2.393162	33.0	105	0.006813958021	2.705802
balance_l_2	3.7606838	2.393162	33.0	105	0.006813958021	2.705802
democra_l_2	3.3618234	2.051282	29.5	90	0.007840313318	2.658870
noregula_h_2	3.6467236	2.393162	32.0	105	0.013067759935	2.481917
trade_l_2	3.5327635	2.393162	31.0	105	0.024038403989	2.256515
cpi_h_2	3.5327635	2.393162	31.0	105	0.024038403989	2.256515
cpi_l_2	1.2535613	2.393162	11.0	105	0.012812092035	-2.488950
trade_h_2	1.2535613	2.393162	11.0	105	0.012812092035	-2.488950
noregula_l_2	1.1396011	2.393162	10.0	105	0.005445717892	-2.779413
verysat_l_2	1.0256410	2.393162	9.0	105	0.002089935153	-3.077145
balance_h_2	1.0256410	2.393162	9.0	105	0.002089935153	-3.077145
money_h_2	1.0256410	2.393162	9.0	105	0.002089935153	-3.077145
democra_h_2	1.0826211	2.393162	9.5	105	0.002089935153	-3.077145
suicide_h_2	0.9116809	2.393162	8.0	105	0.000716632233	-3.383136
povhea215_l_2	0.9116809	2.393162	8.0	105	0.000716632233	-3.383136
povhea365_l_2	0.5698006	2.393162	5.0	105	0.000012705278	-4.365120
povhea685_l_2	0.4558405	2.393162	4.0	105	0.000002343641	-4.721281

III Basic Educational programs in Colombia and the effect of free school program

Abstract

This paper presents the Free Basic Education Program (FEP) implemented in Colombia since 2011 with the purpose of examining its impact on the employment rate and the labour force participation rate by sex, and on the different gross enrollment rates: pre-primary, primary, secondary, and middle school. Using data from 24 departments of Colombia and covers the period between 2007 and 2019 we employ a multiperiod difference-in-differences approach to capture the dynamic effect of this policy. The findings document that the most important effect of the program is on the gross primary and total enrollment rates in the official sector, and in the labour market there is a significant positive effect on the labour force participation rate in the same period of program implementation and on the employment rate one period after implementation, the effects are very similar for both men and women.

Keywords: Government Expenditures and Education. Government Expenditures and Welfare Programs. Education and Economic Development

JEL Clasification: H52, H53, I25

Programmi educativi di base in Colombia e effetto del programma scolastico gratuito

Riepilogo

Si presenta il Programma d'istruzione gratuito implementato in Colombia dal 2011 con lo scopo di esaminare il suo impatto sul tasso di occupazione e sul tasso di partecipazione per sesso e sui diversi tassi lordi di iscrizione: scuola materna, primaria, secondaria e media. Utilizzando i dati provenienti da 24 dipartimenti della Colombia per il periodo tra il 2007 e il 2019, utilizziamo un approccio diff&diff per catturare l'effetto dinamico di questa politica. I risultati documentano che l'effetto più importante del programma è sui tassi lordi di iscrizione primaria e totale nel settore ufficiale, e nel mercato del lavoro vi è un significativo effetto positivo sul tasso di partecipazione nello stesso periodo di attuazione del programma e sul tasso di occupazione un periodo dopo l'attuazione, gli effetti sono molto simili sia per gli uomini che per le donne.

Parole chiave: Spesa pubblica per amministrazione e istruzione, Spesa pubblica e programmi di welfare. Istruzione e sviluppo economico.

Classificazione JEL: H52, H53, I25

III.1 Introduction

Social policy is aimed at ensuring that the people and families of a community have access to the minimum goods and services to satisfy their needs and to enhance their capacities so that they become people who contribute to the development of society. The main objective of Colombia's social policy is to ensure that all Colombians have access to education, equitable and solidarity-based social security, the labour market – promoting formalization or supporting entrepreneurship – and effective social promotion mechanisms. For this reason, the national government is carrying out the formulation of social security programs aimed at social assistance through aid and subsidies to the most vulnerable, to guarantee access to health, food, and education services through aid in cash and/or kind (National Planning Department, 2008). Colombia's transition towards peace and higher levels of development depends on many factors, but none will be more important to the country's future than its ability to build a strong education system. Colombia has many assets: a young population, rich natural resources, and an open economy. To turn this potential into the foundation for strong and inclusive growth will require higher levels of learning and skills (OECD. 2016).

The Colombian education system has historically been characterised by an important contribution from the private sector. From a comparative perspective, considering total spending on primary, secondary, and tertiary education, Colombia spent more than the OECD country average, in 2014 with the combined contribution of the public and private sectors representing 5.8% of GDP, compared to an average 5.2% in the OECD. Colombia's total spending on education was also higher than that of other Latin American countries such as Argentina, Brazil, Chile, and Mexico, very similar to Portugal and well above Spain. However, this was the result of a greater private sector contribution to the education system.

On the contrary, compared to other Latin American countries with available data, total education spending by the Colombian "public" sector only surpassed that of Chile but was below the level of Argentina and Mexico. Similarly, a study of 18 countries in Latin America and the Caribbean, showed that total public spending on education in Colombia is below the average of 5% of GDP in the region, although it is higher than Ecuador, El Salvador, Panama, Paraguay, and Peru, and very similar to Chile, Nicaragua, and Uruguay (Cetrángolo and Curcio, 2017).

Spending on education per student in Colombia is well below the average of OECD countries Per-student spending in primary education reached only 28.5% of the OECD average in 2014, and 35.9% for secondary education. This figure is also the lowest among Latin American countries with comparable information, namely Argentina, Brazil,

However, the low level of spending per student in Colombia can be explained both by its lower per capita income – lower than the other Latin American countries with which Colombia is compared – and by the large proportion of school-age children and youth among the country's population. But even, Colombia's public spending on primary and lower secondary education was higher than the OECD average and like other Latin American countries on the other hand, public spending on early childhood and upper secondary education is far below the level observed among the different countries in the comparison, which is mainly linked to problems of educational coverage that are particularly critical in rural areas. In sum, these results show that Colombia's current level of spending in primary and secondary education is reasonable given its current level of economic development, but that significantly greater efforts need to be made for the low levels of coverage in secondary education in Colombia.

Colombia has suffered from a complex internal conflict lasting more than half a century and causing an estimated number of at least 220.000 deaths between 1958 and 2012, 80% of which were unarmed civilians (GMH, 2016). The conflict has equally affected children's education and the school system, causing interruptions to the education of displaced students, through recruitment into armed groups, threats to teachers or damage to physical infrastructure (González, 2016). The conflict also has had a negative effect on equity in terms of access to education, leading to school dropout especially for disadvantaged children (Vargas, Gamboa and García, 2013).

Since 2008 under the boost of the larger the South America-wide organisation (CLADE) , which campaigns for the right to education in and building on previous experiences, for example in Bogotá (Bonilla and González, 2012) the recognition of the right to free education was promoted, and even in the beginning the government didn't do much but then in 2011 they issued a decree 4807 which declare that family payments to public schools have been prohibited in all public schools that serve children between the transition year to the end of upper secondary education in order to provide free education and thereby ensure access and retention of all children in the education system. More than 12 million students are now guaranteed an education free of fees thanks to the result of this case.

At the same time, unfortunately, the public spending on school education as a proportion of GDP has been gradually reduced, down from 3.8% of GDP in 2010 to 3.3% in 2017, and the free school programme was not supported by the additional free of charge of the indirect costs of education including books, buses, meals, and uniforms and, also, without ensuring the quality of public education.

In a 2014 report conducted by CLADE (2012) percent of families said they were putting more than 30 percent of their monthly income towards paying for the education of their children, 17 percent of absent children were missing school due to costs and nine percent of children had no access to education at all. Their research also revealed that 34 percent of teachers supplied some of the teaching material for the students they taught from their own salaries, while 87 percent said they didn't have enough funding to appropriately teach all their students.

The impact of this policy on educational coverage at the national level has not been evaluated, it is clearly an important measure to ensure the right to education of all children and youth and moves towards the adequate public financing of education as a fundamental right. This result is consistent with the evaluation of the early free education policy of the city of Bogotá (Barrera-Osorio, Linden and Urquiola, 2007]), which improved educational coverage for students of the most vulnerable levels in primary education and for those from medium-low socio-economic levels in secondary education (Radinger, et al, 2018) (SISBEN 1 and 2 respectively according to the system for targeting social protection)[13].
The purpose of this paper is to examine the impact of the Free Education Program (PEG) on the employment rate and the labour force participation rate, both male and female, and on the different gross enrollment rates: pre-primary, primary, secondary, and middle school. For this reason, we collect data for 24 departments of Colombia covering the period between 2007 and 2019. Then, in the first part, Is show

[13] The System for the Identification of Potential Beneficiaries of Social Programs (Sistema de Identificación de Potenciales Beneficiarios de Programas Sociales - SISBEN) is an information system designed to target social protection to families in need in Colombia. Using data from a register about individual and household characteristics and considering local circumstances, a set of algorithms computes a continuous index that ranges between 0% (highest vulnerability) and 100% (lowest vulnerability). Within this range, social programmes apply different cut-off points to determine their target group. Groups within cut-off points are referred to as SISBEN levels. The register questionnaire and scoring method are revised every few years.

the theoretical review, in the second part is presented the educational system in Colombia, in the third part the programs developed in Colombia in relation to basic education are presented, that is, primary, secondary, and middle. Then in the fourth part is developed the dif and dif methodology and the data set, in the fifth part there are the results.

III.2 Theoretical Review

Education is a bulwark of support for nations because it is the engine of their integral development and is one of the determining factors that most influences the advancement and progress of people and societies. In addition to providing knowledge, education enriches culture, spirit, values, and everything that characterizes us as human beings. This pillar is configured as an instrument that increases social mobility, labour competitiveness, access to and quality of employment, improves the level of income and participation in a globalised world such as todays.

Schultz (1961) developed the Human Capital Theory and emphasized education as an investment, in a context where access to education and health was determined by income level. Advances in knowledge and improved education, according to Schultz, are determining factors for the well-being of the population, so investments should be made in education and health, especially for people with low income or poor, which for Schultz they were most of the world's population. For him, it is in this context that the decisive factors for well-being are the improvement of the quality of the population and education.

In 1970, Schultz published his work "Education and Economic Growth"; In it, it states that education can consider consumption, when enjoying a reading, a movie, a conversation about an interesting topic or a work of art; and an investment, when the social and economic status is improved, goods and services are acquired; it is considered a waste of time when it is not useful for enjoyment or improvement; and a hindrance or impediment, when education is not in accordance with the tastes, preferences and opportunities of the individual (Martínez, 1997: 14). In his book "Investing in People: The Economics of Population Quality", Schultz (1961) emphasizes the economics of poverty, where the key to contributing to human well-being is to invest in population quality, as it largely determines the prospects of the person.

Becker (1964) defines human capital as the set of productive capacities that an individual acquires by accumulating general or specific knowledge. For this author, the individual incurs education expenses at the same time as at an opportunity cost for remaining in the economically inactive population and not receiving current income; however, in the future your training will give you the possibility of higher wages. One of his contributions was to consider the education sector as the main producer of human capital, being a generator of the best knowledge. In the case of children, the development of their human capital, while dependent on education and their teachers, also depends to an important extent on their parents and their time. Becker (1964) also believes that schooling, training, mobility, etc., they represent forms of investment in human capital, where young people are more likely to invest because they will receive a return on their capital over more years; for this, the possibility of profit over more years would provide young people with a greater incentive to invest.

In the human capital theory, investment in people is highlighted as a fundamental factor for the growth and welfare of countries; education generates an accumulation of human capital that contributes to general economic growth and to the increase of per capita income, considering that education gives workers the possibility of accessing better paid jobs and increasing their quality of life (Mincer, 1974; Becker 1983).

According to Becker, when human capital increases, thanks to high investment in the education sectors, the return on investment in human capital increases until it grows sufficiently and finds an equilibrium, the per capita income of society increases due to the direct relationship with economic growth and the stock of human capital (Becker, 1990:2).This author stresses the importance of education to increase the level of future income and raises graphically, that, although for a person who has access to education the initial income level is lower than average, because he will surely find himself inactive or with a few hours of work, he reaches a point where education begins to provide returns and in the long run the level of income increases much more than that of those who didn't have access to education.

It is often argued that education plays a central role as a driver of endogenous growth. One of the pioneering and influential contributions to the endogenous growth literature is that of Lucas (1988), he emphasizes human capital accumulation as an alternative source of sustained growth (Aghion and Howitt, 1998). Lucas distinguishes between two main sources of human capital accumulation: education and learning by doing. Lucas's approach, inspired by Becker's (1964) theory of human capital, is based on the idea that it is human capital formation itself that, by not diminishing marginal returns, creates endogenous growth. According to Lucas (1998), the higher the level of education of the labour force, the higher the overall productivity of capital because the more educated are more likely to innovate and thus affect the productivity of all.

The second approach designed primarily by Nelson and Phelps (1966) and recently revived by the Schumpeterian growth literature, describes growth as driven by the stock of human capital, which in turn affects a country's ability to innovate or catch up with more advanced countries.

Differences in growth rates across countries are then first caused by differences in human capital stocks and thereby in those countries' abilities to generate technical progress. In 1990 Romer stated that human capital is “the key input to the research sector, which generates the new products or ideas that underline technological progress”, meaning that countries with higher initial stock of human capital experience a more rapid rate of introduction of new goods in their economy and then tends to grow faster (Barro, 1991).

Becker, Murphy, and Tamura (1990) assume that the rates of return on investments in human capital rise as the stock of human capital increases, until the stock becomes large, an effect that could increase due to the spillover benefits of human capital that Lucas (1988) underlines. In this context, the increase in the level of human capital per person tend to lead to higher rates of investment in human and physical capital, and, consequently, to higher per capita growth. The higher growth in human capital contributes to higher output growth, and higher stock of human capital increases the ability of a country to innovate or catch up with more advanced countries by imitation.

The positive externality produced by education is even more relevant for developing countries this externality is generated as the increased education of individuals raises not only their own productivity but also that of others with whom they interact, so that total productivity increases as the average level of education rises (Perotti, 1993). The impact of education on the nature and growth of exports, which, in turn, affect the aggregate growth rate, is another way in which human development influences macro performance. The education and skills of a developing country’s labor force influence the nature of its factor endowment and consequently the composition of its trade. It has been argued that even ‘unskilled’ workers in a modern factory normally need the literacy, numeracy, and discipline, which are acquired in primary and lower secondary school (Wood ,1994).

Quality education is considered as an investment for the accumulation of human capital throughout people's lives since it gives the child the tools to know their environment and the basics of science and society. It also gives the young person the possibility of discovering and developing his skills and abilities making him more productive and gives the adult the ability to consolidate and specialize in a trade. This accumulation of human capital throughout a person's life will have important returns that will allow them a more valuable standard of living, thanks to the possibility of accessing the opportunities provided by knowledge and culture, including a higher level of income and the ability to adapt to unforeseen changes and risks in the environment, including economic crises. Therefore, education can be considered as one of the main weapons in the fight against poverty.

The strengthening of human capital through education also promotes scientific and technological development, which is central when it comes to building capacity for innovation, adapting technology to the needs of countries, and addressing the risks of technological change. Enhancing the components of coverage, quality and information in education provides great economic and social advantages that allow the consolidation of a relevant and competitive human capital that leverages the development of the country's future. (National Planning Department, 2018).

III.3 The Education System Colombia

In Colombia, education is defined as a process of permanent, personal, cultural, and social formation that is based on an integral conception of the human person, his dignity, his rights, and his duties. The Political Constitution of Colombia gives the fundamental notes of the nature of the educational service as indicated in the article below:

Article 67 of the Political Constitution of Colombia states:

"*Education is a right of the individual and a public service that has a social function; it seeks access to knowledge, science, technology, and the other goods and values of culture...*

... The State, society and the family are responsible for education, which will be compulsory between the ages of five and fifteen and will include at least one year *of pre-school and nine years of basic education.*

Education shall be free of charge in State institutions, without prejudice to the collection of academic fees from those who may pay for them. It is the responsibility of the State to regulate and exercise the supreme inspection and supervision of education in order to ensure its quality, the fulfilment of its purposes and the better moral, intellectual and physical training of learners; to guarantee adequate coverage of the service and to ensure that minors have the necessary conditions for their access and permanence in the educational system...".

The Colombian education system is made up of preschool education, basic education (primary five grades and secondary four grades), middle education (two grades), and higher education in professional, technical, and technological level, and like complementary the education for work and human development.

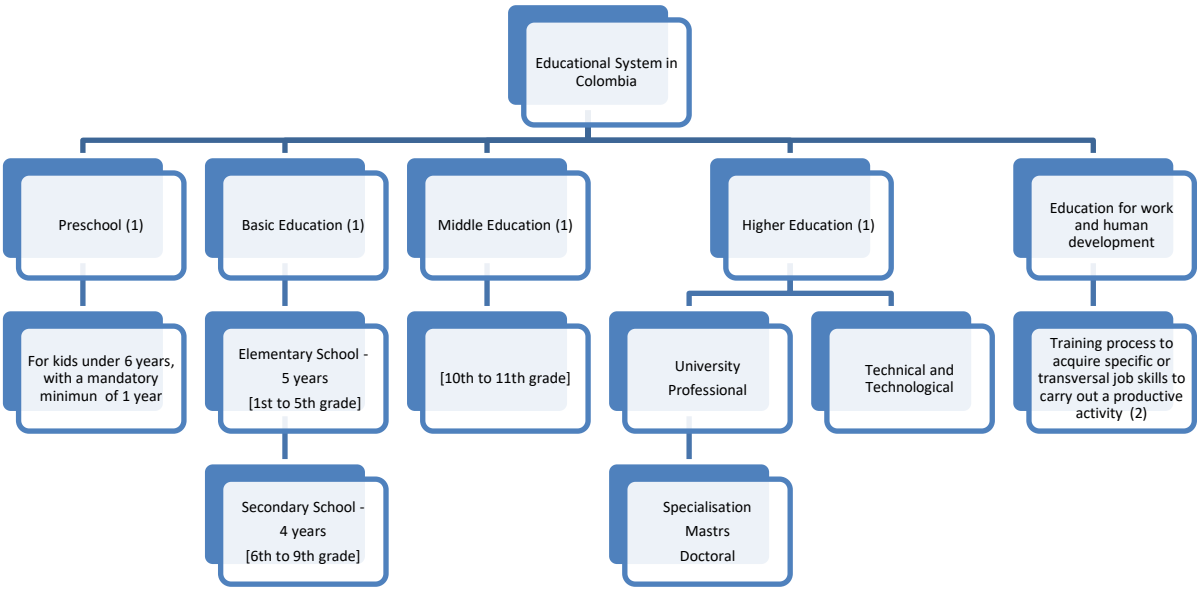


Figure 1 Educational System in Colombia
(1) Law 115 of 1994.
(2) Decree 2020 of 2006
Source: National Planning Department, 2018.

In 1991, with the new constitution, education was declared a public service and the basic and free levels of the formal sector were ratified. These legal provisions are expanded and regulated by the General Education Law (Law 115 of 1994, Article 1) – still in force – which defines education as "a process of permanent, personal, cultural and social formation that is based on an integral conception of the human person, his dignity, his rights and his duties."

Thus, Colombia's educational structure is divided into four distinct stages. In the transition grade, students theoretically join the educational system (Grade 0 or age 5). Then, basic education lasts nine years (Grades 1-9 for children aged 6 to 14) and consists of five years of primary education (grades 1-5 for kids between 6-10 years) and four years of lower secondary education (grades 6-9 for children of 11-14 years old). Finally Upper secondary or middle instruction lasts two years (Grades 10-11 for young people aged 15 and 16 year). one year less than the OECD average of three years (UNESCO-UIS, 2015).

Table 1. Education System in Colombia

AGE	**GRADE**	**LEVEL**
0		
1		
2	Nursery	Preschool or Early childhood education
3	Pre kinder	
4	Kinder garden	
5	0 – Transition	
6	1	Primary education
7	2	

AGE	GRADE	LEVEL
8	3	
9	4	
10	5	
11	6	Lower secondary education
12	7	
13	8	
14	9	
15	10	Upper secondary education or middle education
16	11	

Own elaboration with information of National Ministry of Education of Colombia

III.4 Basic education programs in Colombia

For Colombia improving coverage in education has been a challenge, and the. To this end, the public policy strategy has been to establish free basic and middle education program and accompany it with complementary programs designed and implemented by the Colombian State that allow it to guarantee access to education and promote its permanence. The most important programs implemented to achieve this goal are the school feeding program, school transportation, families in action which have positively impacted the educational processes, contributing to guarantee the rights to education and food, through the increase of coverage and the reduction of school dropouts.

III.4.1 Free basic and middle school education

The free basic education was legalized in Colombia in 2011 thanks to the initiative and social mobilization of some agents and institutions that joined together in the "Colombian Coalition for the Right to Education" to appeal against Article 183 of Law 115 of 1994 "By which the general education law was issued", which allowed the collection of some periodic costs in education. This article was decreed unconstitutional by judgment C-376 of 2010. (Sánchez & Ceballos, 2012)

For 2011 law 1450 of 2011 by which the National Development Plan, 2010-2014, was issued, Article 140 already includes free education and states that "The resources of the General System of Contributions for education that are destined to free education will be transferred directly to educational institutions, in accordance with the regulations established by the National Government". Then, to regulate Article 140 of Law 1450 of 2011, Decree 4807 of 2011 was issued "Whereby the conditions for the application of free education for students in preschool, elementary school, first and second grade of basic secondary education in state educational institutions were established and other provisions for its implementation were issued". Thus, the Decree 4807 of 2011 that was issued to establish and guarantee the resources allocated for the free education program up to grade 9, and for the year 2012 the execution of the resources begins.

As of the 2015 validity through decree 1075 of 2015 in section 4 of chapter 6, title 1, part 3, book 2 (through which the Single Regulatory Decree of the Education Sector is issued), in its article 2.3.1.6 .4.1. Purpose and scope of application. the educational gratuity is regulated for all students of state educational institutions enrolled between the transition and eleventh grades. Free education is understood as

exemption from payment of academic fees and complementary services. Consequently, state educational institutions cannot charge for academic fees or ancillary services.

This program is aimed at boys, girls, and adolescents from 1st to 11th grade of Basic Education in age between 6 to 16 years, enrolled in "SIMAT" the enrollment System as official students throughout the Colombian territory without any discrimination. This free education program is a direct non-monetary programme that provides a universal service, that all Colombian children and adolescents have access to. In 2020, this program covered 7,900,000 beneficiaries with a budget allocation of 25.7 billion pesos of investment. (General Budget of the Nation year 2020).

Since the payment does not create a barrier to entry into the education system, net coverage rates are expected to be very close to 100%. However, it is important to note that, although considerable efforts have been made to improve coverage rates, these are still far from reaching 100% at the secondary, middle, and tertiary levels, and there is still a long way to go when it comes to the issue of the quality of education.

The alternative of access to formal education is in many cases the only one presented to families in situations of poverty and vulnerability and the educational service is used mostly by families from lower incomes.

One of the main disadvantages of the official education system (public schools) is related to quality, which can be measured on the one hand by the results in the tests of the students in 3rd, 5th, 9th and 11 grade, where the results of the public schools are lower than those of the private schools. In addition, the ranking of the best 10 schools only includes the private sector. On the other hand, there are also deficiencies in terms of infrastructure, physical spaces, endowment, laboratories, computer rooms, internet access. For example, according to data from the Ministry of National Education (here on referred to as MEN) for 2017, the average of official educational institutions with internet access in Colombia was 34%. The data further highlighted that in departments such as Guajira and Caquetá with no private schools, only 8.3% of the institutions had access to this important service.

The low quality of education limits the possibility of access to public higher education or to the scholarships provided by the State or private educational institutions, since access to such depends on the skills and knowledge acquired in basic and secondary education, on the scores of admission exams or the result 11^{th} grade test (called SABER). If the student obtains low results, either because the quality of the education he received was low and / or because his effort was medium or low, he is left only with the option of private university education that has a high cost and to which a large part of the poor population cannot afford.

One of the disadvantages of this national program is that free of charge is guaranteed only until grade 9 since 2011 and until grade 11 since 2015, which is very recently. Although there were territorial entities that allocated their own resources to cover the free of charge of these last two school years, this does not happen in all cases. Thus, in places where only the national policy of free of charge was applied before of 2015, the vulnerable population was left without the opportunity to finish high school studies, which prevented to young people to access to higher education and/or to the jobs where this degree was required.

In this context, the school communities highlighted the fact that, since the implementation of universal free education in 2011, each public school in Colombia directly receives resources from the bag for Quality-

Free Education. These funds have allowed school directive councils to finance or co-finance various initiatives that are critical for the improvement of the quality of education or the operation of the school in line with their school educational project (PEI). Schools can also generate other sources of income (e.g., through the sale of services, leasing of rooms, among others) or apply for programme initiatives to receive equipment or infrastructure improvements.

However, the total amount of resources allocated directly to schools is quite small. In 2017, the initial budget for the Quality-Free Education sub-component represented only 3.2% of the total resources of the SGP Education, which means the impact school leadership can have on solving their school's main challenges is very limited.

Other important programmes to ensure the right to education and improve access and retention in schools are related to school meals, school transport and textbooks, which receive some funding from the General System of Transfers (SGP). There is a specific SGP component to partially finance the School Meal Programme (PAE). However, the resources allocated to these items of the SGP are also very small. What is more, the sources of financing and distribution of responsibilities are not clear (as analysed below), especially in the case of the departments that share funding and responsibility for these parts of educational provision with their non-certified municipalities.

In sum, universal free education has been achieved in the Colombian public school system through the end of compulsory monthly co-payments as well as other initiatives, such as the School Meal Programme (PAE), which also provides resources to students who are not disadvantaged. But the complementary services needed to safeguard the right to universal free education are not always guaranteed, for students belonging to the most vulnerable groups, even though the coverage of complementary services as part of free education is established by law. On the contrary, complementary services have greater coverage in those certified territorial entities with more resources that prioritise investment in education, implying important asymmetries across the country (Radinger et al., 2018).

III.4.2 Complementary School Programs

III.4.2.1 School Feeding Program

A complementary strategy that promotes access to and permanence in school for school-age children and adolescents, which are registered in the official enrolment, is the implementation of the School Feeding Program (PAE). PAE is the provision of a food supplement through which healthy lifestyles are promoted, the learning capacity of students is improved and the permanence of students in the educational system is promoted. This is a program of indirect non-monetary support for the education sector.

The School Feeding Program in Colombia was created from the year 1936 by the issuance of Decree 219, assigned to the MEN. After being administered for approximately 32 years by the MEN, in 1968 the program was transferred to the "Instituto Colombiano de Bienestar Familiar - ICBF". Finally, between 2006 and 2016, the PAE was linked to the education system and transferred again from the ICBF to the MEN. This transfer takes place with the issuance of Law 1450 (National Development Plan 2010 - 2014), to achieve universal coverage and that the MEN develop guidance, execution, and articulation with territorial entities.

This program in 2020 reached the coverage of 5,600,000 beneficiaries with a budget allocation of $1.2 billion pesos of investment. (General Budget of the Nation year 2020). The program is implemented through the coordination of the various institutional actors such as the MEN, the Certified Territorial Entities, Parents, Program Operators, Child Beneficiaries, Rectors, and teachers of the Educational Institutions. They are responsible for establishing the conditions and guidelines for the operation of the PAE, providing most of the resources for its implementation, planning, articulating, prioritizing, and selecting the children and adolescents who receive the food supplement, implementing the programme in accordance with the established guidelines and exercising social control over the implementation of the PAE in the different educational institutions.

This program is designed for children and adolescents from 5 to 18 years of age from rural and urban areas, of different ethnic groups, enrolled in the SIMAT Enrollment System as official students with SISBEN scores of 48.49 for 14 cities and 45.34 for the urban rest. Prioritizing students from Educational Institutions in rural areas that serve ethnic communities (indigenous, Afro-Colombian, Raizal, Gypsies) and the population victim of the armed conflict, Educational Institutions that provide preschool education are also prioritized, subsequently providing the preschool education level. of basic primary education and finally the level of secondary and secondary education.

The School Feeding Program is carried out through the delivery of a food supplement to the children and adolescents prioritized in the educational institutions of the public sector, the delivery is made in the school in restaurants or dining rooms located within the institutions. The PAE delivers two types of rations: a morning or afternoon supplement that provides 20% of the daily calories and nutrients and a lunch that provides 30% of the daily calories and nutrients required by school-age children based on a daily diet of 2000 calories. (Technical - Administrative Guidelines, Standards and Minimum Conditions of the School Feeding Program - PAE 2017). One problem of the program is the wastage of food in schools since it is not possible to force the child or beneficiary to consume it. There are always cases in which the food received is thrown away and then the nutritional contribution that is sought is not achieved eventually.

III.4.2.2 School Transport Program

Another complementary strategy implemented by the Territorial Entities, which contributes to guaranteeing the access and permanence of children, adolescents, and young people to the educational system by eliminating the distance barriers between school and home, is the School Transport Program. This is also an indirect and non-monetary support program just like the school feeding program. The School Transportation Program was created in 2015 by decree 1079, which is modified with decree 746 of 2020 and Resolution 012880 of July 14, 2020, for which reason, this program is in restructuring. No data are available on the number of beneficiaries, or the amount allocated to this program.

From the Ministry of Education, the resources are allocated, and the Territorial Entities oversee managing them and carrying out the contracting of the operators. Specifically, territorial entities must consider the following criteria when prioritizing students who will benefit from the school transport strategy. (Ministry of National Education, Decree 1079 of 2015)

III.4.2.3 Flexible Educational Models

Colombia has a diverse range of flexible education models to service disadvantaged groups, in words of National Ministry of Education, the Flexible Educational Models are formal education proposals that allow

to attend to diverse populations or in conditions of vulnerability, who present difficulties to participate in the traditional educational offer. This educational model along with its programs, was created in 2014, initially with primary, secondary, and middle school children and by 2017 it was extended to preschool. The programs implemented are: New School, Challenges for giants, special academic support, active secondary, acceleration of learning and post-primary. Approximately 8.6% of basic education student are enrollment in this modality and is possible to see the number of children enrolled in the table 2.

Table 2. enrollment in flexible educational models

Year	Enrollment in Flexible Educational Models	Total enrollment	%
2014	795,846	9,352,332	8.5%
2015	935,536	9,300,660	10.1%
2016	803,664	9,148,399	8.8%
2017	746,143	9,108,215	8.2%
2018	752,513	9,040,239	8.3%
2019	754,396	9,121,135	8.3%
2020	742,639	9,133,362	8.1%

Source: own elaboration with data of DANE

III.4.2.4 School programs implemented for rural area.

In addition, it should be not forget the implementation of the Rural Education Program (Programa de Educación Rural, PER) between 2001 and 2015 was a very important experience (Radinger et al., 2018). The program, which was financed by a World Bank loan, involved a first phase and a second phase. In its first phase, the program worked with 120 non-certified municipalities in 30 departments: in the second with 36 certified territorial entities, reaching 72% of non-certified municipalities. Targeting pre-school and school education, the program aimed to increase access to quality education in rural areas, reduce dropout rates and make education relevant to the needs of rural students. An impact evaluation of the first phase of the program found that it had increased promotion rates and reduced dropout (Rodríguez, Sánchez, and Armenta, 2010). The analysis of differences in student achievement between urban and rural areas as measured by the OECD PISA 2006 and 2012 also suggests that these initiatives have had an impact on reducing urban-rural performance gaps in Colombia (Ramos, Duque, and Nieto, 2016). The program has furthermore offered very relevant lessons for improving rural education, which were gathered in the publication Colombia's Rural Territory: An Educational Policy for the Countryside (MEN, 2015).

In 2009 start the second phase of the program. It helps the Certified Territorial Entities so they may, with the help of instructors and guidelines, better understand the educational requirements of rural areas and how to address them, resulting in more equal access, improved school performance, and improved student learning outcomes. PER provides technical assistance and training for the design and implementation of tools for their curricula to be based on competencies, use of information and communication technologies, improvement of second language teaching, and design and development of productive pedagogical projects in accordance with educational projects and institutional improvement plans, with a focus on rural educational establishments with lower performance and those with good practices. (MEN, 2023)

In September 2016, the Colombian government, and the Revolutionary Armed Forces of Colombia (Fuerzas Armadas Revolucionarias de Colombia – Ejército del Pueblo, FARC-EP) reached a historic peace agreement. This agreement includes also a special national plan to improve public services and infrastructure. For education, this includes the development and implementation of a Special Rural Education Plan (Plan Especial de Educación Rural, PEER). In the zones most affected by the conflict and poverty, these national plans, including the one linked to education, will be implemented through Development Program with a Territorial Approach (Programas de Desarrollo con Enfoque Territorial, PDET). To strengthen political participation and inclusion, a policy of peace education has been developed and implemented as of 2018. As part of the program for the social and economic reincorporation of the former guerrilla, the Ministry of National Education (Ministerio de Educación Nacional, MEN) and the National Learning Service (Servicio Nacional de Aprendizaje, SENA) are developing education programs adapted to the needs of demobilised fighters and their families.

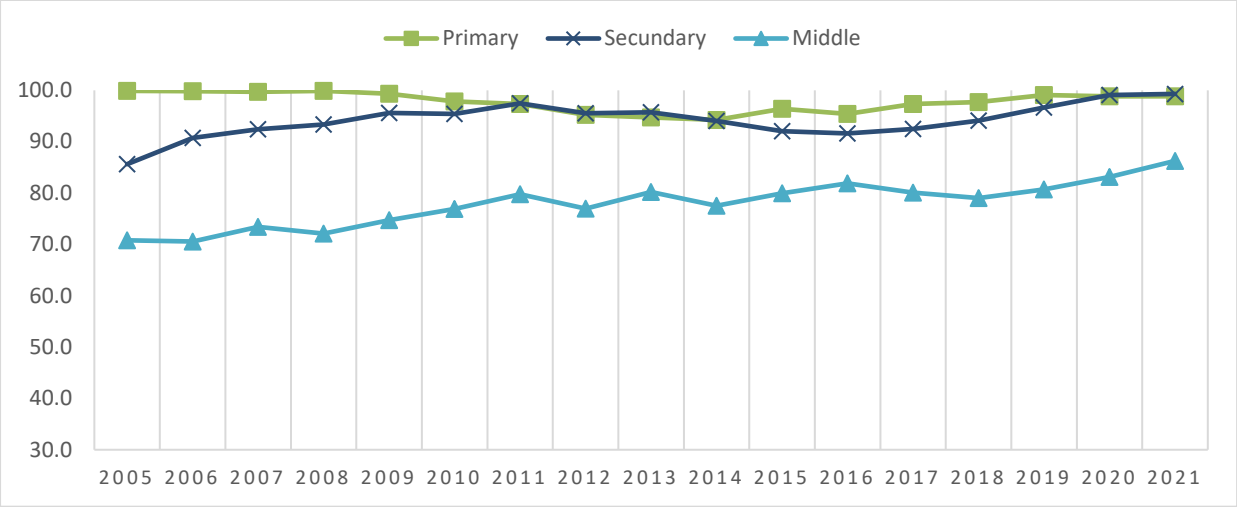
The objective of this plan is to strengthen comprehensive early childhood care in rural areas and the conditions for children, adolescents, young people and adults to follow educational trajectories with quality and relevance under a comprehensive perspective. The plan has 5 components: Comprehensive early childhood care, quality educational strategies, permanence of rural education, inclusive and quality rural higher education, and institutional and intersectoral strengthening.

III.4.3 Enrolment rates

Having mentioned the main programmes related to basic education, it is important to review the indicators of the net enrolment rate, the results of which reflect the efforts made to improve the timely admission and permanence of the school population in the education system, and the dropout indicator, which are presented below.

Graph 1 shows the net enrollment rates for the primary, secondary, and middle school levels. For the primary level, this was at a level of 100% until 2010, then this level decreased mainly due to the implementation of SIMAT, or Integrated Enrollment System in Colombia, which systematized the enrollment information since 2011, so that by 2012 the primary enrollment rate decreased to 95%, from that moment on this rate increased to 99% in 2019. At the secondary level, the trend was increasing between 2005 and 2011 and between 2016 and 2021. In 2012, the coverage rate dropped from 97% to 95%, also due to the data cleaning exercise, and in 2014 and 2015 the decrease is explained by the increase in the dropout rate. At middle level, the net enrollment rate has not reached 100%, therefore, even when the free service is provided after 2015, there is still a problem of access, however, when observing the graph elaborated with ELAC data, it can be seen that this rate had an advance from 70% in 2005 to 80% in 2019, however, there is still a way to go since this means that 20% of the population that should have completed middle education did not do so, which generates a gap that does not allow most young people to access higher (tertiary) education levels in Colombia.

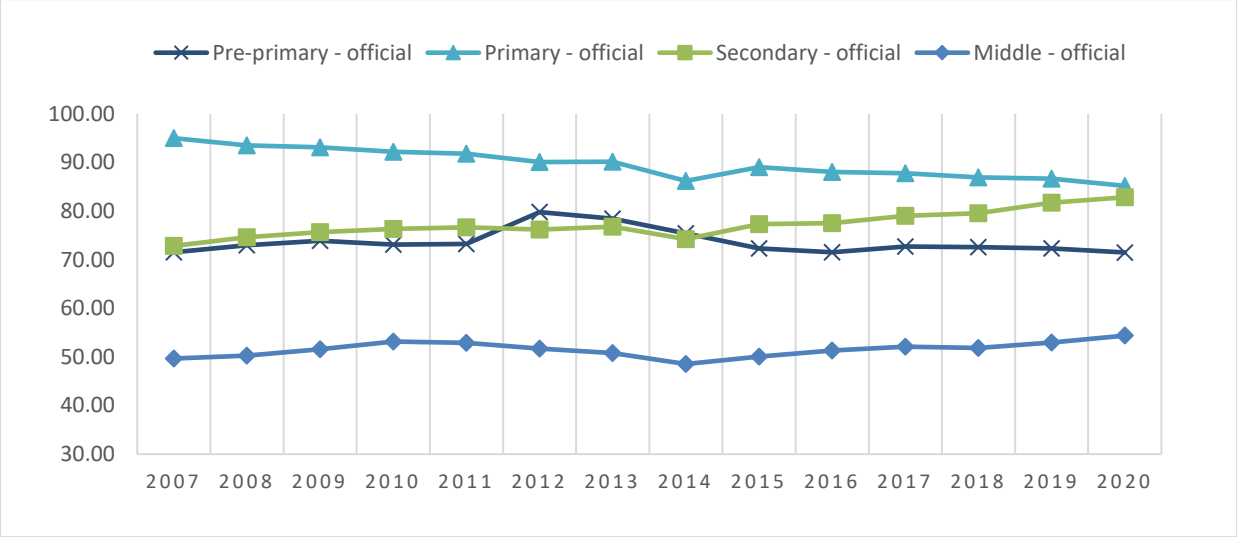
Graph 1 Net enrollment rates in basic and middle education in Colombia



Source: Own elaboration with data from ELAC

This document uses information on gross enrollment rates by educational level (pre-primary, primary, secondary, and middle school) for the official sector, considering that the free education policy applies only to this sector. This indicator, unlike the net rates, may show values higher than 100%, because it also considers over-age students. Graph 2 shows the behaviour of these rates. In the case of the primary level, a decrease in the official gross enrollment rate is observed. If the comparison is made with the net rate that increased since 2012, it is possible to note that this decrease is since there are fewer and fewer children in extra-age for this level. For secondary the gross rate of the official sector increased during the period of 2011 and 2019 from 76.6% to 81.7%. The gross enrollment rate for official sector schools at the middle school level was around 50% in 2007, while for 2019 it was approximately 53%.

Graph 2 Gross enrollment rates in basic and middle education in Colombia by official sector



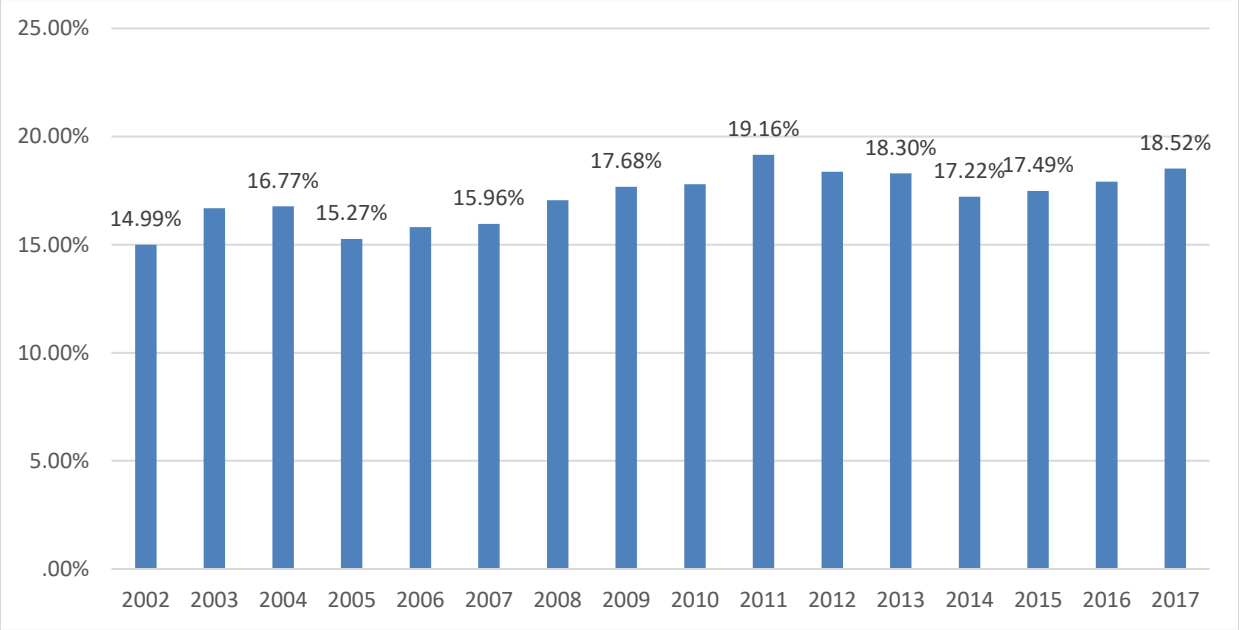
Source: Own elaboration with data of enrollment and population of DANE

At level of primary, the departments where enrollment rate fell by more than 10 percentage points between 2011 and 2017 in primary schools were Antioquia, Caquetá, Nariño Putumayo, Quindío, Risaralda, and Valle del Cauca, while the departments where increase the enrolment rate were Atlántico, Bogotá, Guajira, San Andres, and Vichada.

On the other hand, enrollment has also decreased at all levels due to the implementation of the information system, which helped to clean up the enrollment databases. According to the statistical yearbook of education 2012 of the MEN, for 2011 and 2012, “the reduction in enrollment and consequently of the coverage indicators responds to an exercise of Good Governance and transparency that from the Ministry of National Education is developed through the enrollment audits and by the Certified Territorial Entities (ETC), through the purification of the Enrollment Information System. The effect of this exercise is most visible in 2011 and 2012, with 2012 being the year in which the 94 certified education secretariats are first audited for the first time.” (Ministry of National Education, 2014)

One explanation for the decrease in net enrollment might be due to a reduction in educational spending by the government for the same period for which the net enrollment falls. To be specific, spending on education as a percentage of total state spending decreased from 19.2% in 2011 to 17.2% in 2014.

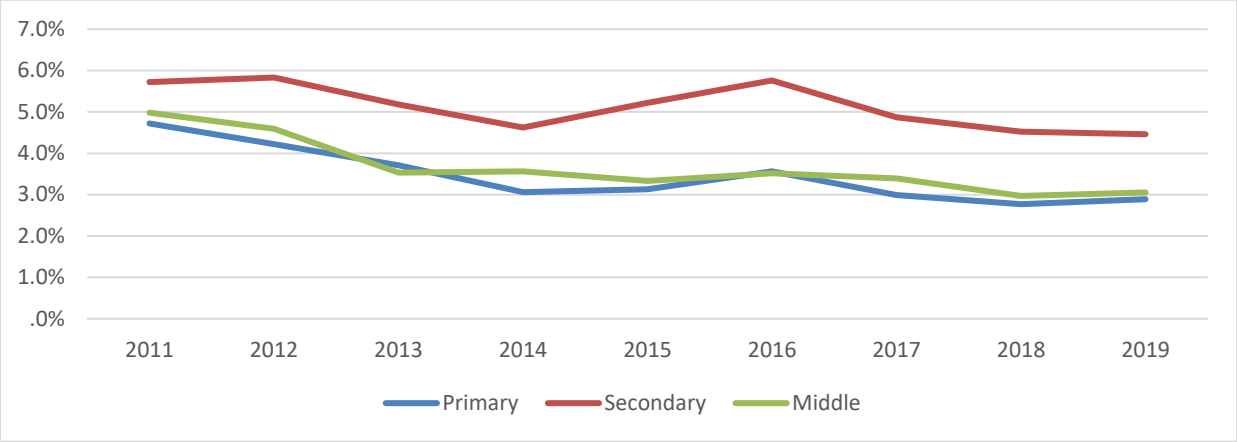
Graph 3 Public Expenditure on Education as a percentage of Total State Expenditure in Colombia



Source: Own elaboration with data from the Ministry of National Education

Similarly, the dropout rate in basic education decreased in the last decade with an increase for the period between 2014 and 2016 across primary, secondary, and middle levels. According to the National Dropout Survey (NSDS), carried out by the MEN, the main causes of school dropouts in Colombia are related to social, family, individual and community factors, among which are: the poor taste for study, the economic problems of the home, forced displacement and the fact that the establishment is far from home. (Ministry of National Education, 2014)

Graph 4 Net dropout rates in basic education in Colombia



Source: Own elaboration with data from the Ministry of National Education MEN

III.5 Effect of free school access Policy.

III.5.1 Data on Departments in Colombia

In order to analyse the effect of the free school program on both the gross enrolment rate of school of the official sector and on the employment rate and labour force participation rate by sex, the data used were taken from DANE (Departamento Administrativo Nacional de Estadística), institution in charge of the production of statistics in Colombia, for the periods from 2007 to 2019, this is since the free policy ends up being implemented in 2012 and considering that 2019 is the year in which we have the latest data on the funding received by educational establishments.

Since in the database published by the Ministry of National Education the enrollment rates are found only since 2011 and are not discriminated by sector, the data of gross enrollment rate of school of the official sector are of own elaboration using DANE data of formal education and population. To obtain this indicator, the data of educational enrollment by department, educational level and sector published annually were taken and divided by the population data (2018 census) of the age group corresponding to the educational level, according to the Education System in Colombia (See table 1).

The next table provides the list of the variables using in our analysis and their sources distinguishing between control variables (namely homicide rate, elevation average, that is meters above sea level, extreme poverty rate; poverty gap; extension in thousands of km2, unemployed hidden and production of Cocaine in hectares) and dependent variables (namely official gross enrolment rate for school for levels: pre-school, primary, secondary, middle), employment and labour force participation rate of women and men). It is important to note that each gross enrolment ratio was calculated taken the number of students enrolled in that grade over the population with age for that grade. For example, for the primary gross enrolment ratio the number of children enrolled in primary school (grades 1 to 5) divided by the population from 6 to 10 years of age is taken. Each department is weighted with the inverse of the population density of department.

Table 3. List of the variables included in the analysis.

VARIABLE	MEAN	SOURCE
Dependent Variables	.	.
Official gross enrollment rate - pre-primary	80.0	Own elaboration with DANE data
Official gross enrollment rate – primary	98.2	Own elaboration with DANE data
Official gross enrollment rate – secondary	80.0	Own elaboration with DANE data
Official gross enrollment rate - middle education	51.6	Own elaboration with DANE data
Official gross enrollment rate – total	83.0	Own elaboration with DANE data
Employment rate – Women	40.5	DANE
Labour force participation rate – Women	47.8	DANE
Employment rate – Men	67.5	DANE
Labour force Participation rate – Men	73.1	DANE
Control Variables		
Incidence of Extreme Monetary Poverty	15.1	DANE
Poverty Gap	17.8	DANE
Extreme Poverty Gap	5.7	DANE
Elevation average (meters above sea level)	1.308.4	website of each government entity
Extension (Thousands of Km2)	37.796.1	website of each government entity
Population	1.353.823.5	DANE
Population density (Inhab/Km2)	230.9	Colombia.gov.co
Homicide rate	41.5	DANE
Unemployed Hidden	15.1	DANE
Cocaine hectares	3.657	UNODC

Source: Own elaboration

The monetary transfers to schools start in 2012 according to the Decree 4807 of 2011 "Establishing the conditions for the application of free education for students in pre-primary, primary, secondary and middle degree". For the treatment analysis we chose to use a continuous type of treatment starting in 2012 hence we have value >=0 from 2012 until 2019. The previous years (2007-2010) are used to test the parallel trends. The assumption of not violated the parallel trends cannot be granted in the econometric models but should be tested using the placebo estimators proposed by the econometric models itself.

The data of percentage of public schools receiving resources for grant the free school were reconstructed by hand by extrapolating the beneficiary schools from the ministerial resolutions that allocated the sums to the schools, such total number of beneficiary schools by department was divided by the total number of public schools in each department. The next table show for each department the share in per cent of public school receiving the financing for grant the free school[14] Free School Program (FEP)

[14] We cannot consider a discrete treatment given that the free school start for all department in the same period, the differences is the number of public schools in each department which receive the founding. We could, hypothetically, have created a database of all the schools that have and have not received funding over the years.

Table 4. Percentage of public school receiving the financing for grant the free school.

Department	2012	2013	2014	2015	2016	2017	2018	2019
Antioquia	1.749086	1.649909	1.70521	1.162249	1.21298	0.919734	0.546984	0.54598
Atlántico	0.246914	0.240329	0.232922	0.220576	0.22963	0.249332	0.271581	0.267754
Bogotá D.C.	0.155158	0.138519	0.16015	0.149334	0.158902	0.163877	0.169476	0.172283
Bolívar	0.415265	0.379043	0.429495	0.379043	0.438551	0.445044	0.450704	0.447514
Boyacá	0.468182	0.45	0.451515	0.443939	0.451515	0.464063	0.475806	0.472756
Caldas	0.580808	0.563131	0.575758	0.532828	0.636364	0.63587	0.635294	0.642012
Caquetá	0.769231	0.67094	0.773504	0.555556	0.769231	0.768212	0.762557	0.77169
Cauca	0.734644	0.603194	0.743243	0.444717	0.737101	0.730964	0.723097	0.72526
Cesar	0.413386	0.389764	0.448819	0.383858	0.433071	0.427419	0.419421	0.440476
Chocó	0.792035	0.623894	0.814159	0.619469	0.871681	0.880531	0.884956	0.884956
Cundinamarca	0.2687	0.523602	0.267248	0.259259	0.266521	0.278201	0.290297	0.282797
Córdoba	0.648721	0.655451	0.647376	0.601615	0.654105	0.660969	0.667171	0.656627
Huila	0.534935	0.530568	0.539301	0.508734	0.528384	0.522702	0.516854	0.512249
La Guajira	0.52649	0.433775	0.55298	0.281457	0.57947	0.564784	0.546667	0.561688
Magdalena	0.343305	0.343305	0.35755	0.356125	0.35755	0.370315	0.382911	0.389241
Meta	0.373518	0.333992	0.351779	0.337945	0.37747	0.386961	0.395506	0.380531
Nariño	0.820833	0.8275	0.840417	0.76125	0.830417	0.880174	0.934247	0.863824
Norte de Santander	0.429224	0.360731	0.380518	0.340944	0.418569	0.407195	0.392226	0.466071
Quindío	0.578231	0.557823	0.585034	0.544218	0.564626	0.574468	0.585185	0.572464
Risaralda	0.547297	0.540541	0.504505	0.403153	0.416667	0.409037	0.397985	0.395522
Santander	0.35524	0.348135	0.351687	0.337478	0.350799	0.364323	0.379658	0.376258
Sucre	1.5	0.670833	0.641667	0.625	0.629167	0.655135	0.683146	0.68018
Tolima	0.446602	0.438511	0.621359	0.433657	0.436893	0.451342	0.466899	0.470175
Valle del Cauca	0.154125	0.152918	0.156942	0.15171	0.155734	0.183031	0.222092	0.235661
Total	0.577164	0.517767	0.547214	0.451421	0.521058	0.516403	0.508363	0.508915

Own elaboration with data of National Ministry of Education of Colombia

III.5.2 Methodological framework:

Difference-in-differences (DID) is a method to estimate the effect of a treatment. In its basic version, a "control group" is untreated at two dates, whereas a "treatment group" becomes treated at the second date. In other word the traditional difference-in-differences estimation consists in using a double fixed effects estimator (DFE hereafter), where group fixed effects control for time-constant group heterogeneity, and time fixed effects control for general time trends. Under the "assumption of common trends" (i.e., the trend on the mean outcome without treatment is the same in both groups) and with constant treatment effects. The DFE estimate the effect of the treatment by comparing the evolution of the mean outcome in the two groups. However, in many applications of the DID method, no group remains fully untreated, and the treatment effects are so heterogeneous, that the DFE- based average treatment effect is likely to be biased. Moreover, De Chaisemartin & D'Haultfœuille (2018) (hereafter DCDH)

demonstrate that the DFE estimate is especially likely to involve negative weights and therefore give biased estimates if treatment effects differ between periods many versus few treated groups, or between groups treated for many versus few periods.

In this case, we have a sample of 24 departments excluding those without a balanced panel, for a period of 13 years (2007-2019). The treatment is continuous and follow a staggered design that meaning that group's treatment can only increase over time and can change at most once;[15]. moreover, each department could be characterized by heterogeneity of treatment effects and the parallel trends assumption may be violated.

In such fuzzy designs, a popular estimator of treatment effects called Wald-TC (*Time Correct*) estimator of the dynamic treatment effects among switcher (see Section 5.2 De Chaisemartin & D'Haultfœuille et al, 2018) could be applied. In fact, to overcome a potential bias, De Chaisemartin & D'Haultfœuille et al. (2018; 2020a; 2020b) (DCDH) propose this alternative estimator (Wald-TC estimator: DID_M in the following[16]) that is robust to treatment effect with heterogeneity across groups and time periods. This estimator consists in computing, at each time, a difference-in-differences based on switchers (i.e., groups of which treatment status changes at that time) as compared to groups with stable treatment. These differences-in-differences are then averaged over the whole observation period, with weights that depend on the number of switchers at each time. The DID_M estimator generalizes the standard DID estimator with two groups, two periods and a binary treatment to situations with many groups, many periods, and a non-binary treatment, as in this case.

During the 2021-2023 also other models are proposed to estimate the effect of a treatment/policy as Callaway and Sant'Anna (2021) (CSA) Sun and Abraham (2021) (SA) Borusyak et al (2021) (BJS). For binary staggered designs: under parallel trends, CSA, SA and BJS estimators estimate the same quantity and should be close.

The estimators in de Chaisemartin and D'Haultfoeuille (2020) can, of course, also be used with a binary and staggered treatment. Without covariates in the estimation, they are then equivalent to the estimators proposed by Callaway and Sant'Anna (2021) using the not-yet-treated as controls. With covariates, the estimators in Callaway and Sant'Anna (2021) and de Chaisemartin and D'Haultfoeuille (2020) differ. Callaway and Sant'Anna (2021) consider time-invariant covariates and assume that trends are parallel. De Chaisemartin and D'Haultfoeuille (2020) instead consider time-varying covariates and assume that trends are parallel once the linear effect of those time-varying covariates on the outcome is accounted for. This for instance allows them to include group-specific linear trends in the estimation. With covariates, the parallel trends conditions in Callaway and Sant'Anna (2021) and de Chaisemartin and D'Haultfoeuille (2020) are not nested, and in principle one could combine both. The advantage of DCDH is that could be used in binary staggered design and not only. It's possible to use DCDH also with continuous and staggered

[15] Probably the definition of a staggered design many people have in mind is that a group can only switch from untreated to treated and may do so at different points in time and the groups remain exposed to this treatment at all times afterwards, and this definition is sufficient for binary treatment, However, the sentence: "a staggered design meaning that group's treatment can only increase over time and can change at most once", extends the definition of a staggered design to non-binary treatment (de Chaisemartin and D'Haultfoeuille, 2022) .

[16] The Wald_DID is the estimator when the data have two groups and two periods, the DID_M estimator is an extension of the Wald_DID with multiple periods and groups. Moreover, the DID_M estimator is related to the Wald-TC estimator with many groups and periods proposed in de Chaisemartin and D'Haultfoeuille (2018)

treatment design with dynamic effect and outcome affected by past treatment. In this case it should be possible also to use Callaway et al (2021) but it's not implemented in Stata as CSA and DCDH.

DCDH use the groups' t_s-1 outcome in the last period before, the treat group'*s* gets treated (time to start is t_s), as the baseline outcome (as in CSA and SA) but differently by BJS' estimator which instead uses average outcome from period 1 to $t_s - 1$ (for this reason the BJS' estimator is more precise and efficient if cov($Y_{g,s}$ (0); $Y_{g,t}$ (0)) the never-treated potential outcomes $Y_{g,t}$ (0) be independent of each other, both across groups and over time). Finally, for continuous and non-staggered treatments, de Chaisemartin et al. (2022) extend their baseline estimators to allow for dynamic effects. In our case we used a continuous and staggered model with DCDH.

Hence even when we are in presence of a staggered and not staggered adoption designs where treatment is binary and nonbinary, and where groups' treatment is increasing with time, it's possible to use DID_M, including the number of dynamic treatments that could be estimated. When the robust dynamic option is specified, long-difference placebos are computed, to assess the plausibility of the "common trends assumption" underlying the Wald-M estimator (see Section 3.3 of Chaisemartin & D'Haultfœuille et al., 2018). The placebo estimators make possible to test the parallel trends assumptions and comparing the outcome trends of switchers and non-switchers before the switchers switch. The lth placebo compares first-time switchers' and not-yet switchers' outcome evolution, from the last period before first-time switchers' treatment changes to the *l +1st* period before that change (this comparison goes from the future towards the past, to be consistent with event-study regressions where everything is relative to the period prior to the event).

Thus, the lth placebo assesses if parallel trends hold over l+1 periods, the number of periods over which parallel trends must hold for the lth dynamic effect to be unbiased.[17] For each pair of consecutive time periods t-1 and t and for each value of the treatment "d", the package computes a DID estimator comparing the outcome evolution among the switchers, the groups whose treatment changes from "d" to some other value between t-1 and t, to the same evolution among control groups whose treatment is equal to "d" both in t-1 and t. Then the DID_M estimator is equal to the average of those DIDs across all pairs of consecutive time periods and across all values of the treatment. Under a parallel trend's assumption, DID_M is an unbiased and consistent estimator of the average treatment effect among switchers, at the period when they switch.

We first consider the gross education enrollment of different level of education in public school, and we evaluate the effect of the treatment (introduction of the free education program) in 24 departments in Colombia. The treatment starts in 2011 and we follow up the Department up to 2019, and we impose 8 dynamic treatment effects to be estimated and 4 placebo estimators when the dependent variables is the official gross enrolment rate at all the level, and three dynamic treatment and three placebo estimators, when the dependent variable are the employment or the labour force participation rate. Hence the period considered span along 2007 and 2019 (4 years before and 8 years after the 2011).

[17] See De Chaisemartin & D'Haultfœuille et al. (2020a, 2020b) for further details.

III.5.3 Results

The results show the time-varying effects of the DID_M-based program, with the same control variables mentioned above. This temporal breakdown of the effects shows point estimates after 8 periods. We include 8 number of dynamic treatment effects to be estimated and 4 placebo estimators[18]. DID estimators of the instantaneous treatment effect, of dynamic treatment effects if the dynamic option is used, and of placebo tests of the parallel trends assumption if the placebo option is used. The estimators are robust to heterogeneous effects, and to dynamic effects if the robust dynamic option is used.

Below are the results of the estimates for the dependent variables also listed in Table 3, it is official school enrolment rates and female and male labour force participation rate and employment rates.

III.5.3.1 Effect on the gross enrolment rates

An indicator that roughly estimates education coverage is the Gross Enrollment Ratio (MBR), which is defined as the number of students enrolled in each level of education, regardless of age, with respect to the total population of the theoretical age group for that same educational level. result expressed in percentage (Unesco, 2010). In this section, the DID is estimated for the gross enrollment rate at each educational level, preschool, primary, secondary, middle, and total for the official sector, considering that the free education policy applies to schools of the public sector.

It is worth mentioning that the official gross enrollment rates used in this analysis are due to their own calculations, considering that there is no information available on these before 2011, therefore the information of enrolled students and population published by DANE was used. This is one reason that why net coverage rates are not used, in addition to the fact that the net enrollment rate excludes over-age students.

Below are the results for gross enrollment rates in official sector:

Table 5. Effect on Official Gross Enrollment Rates

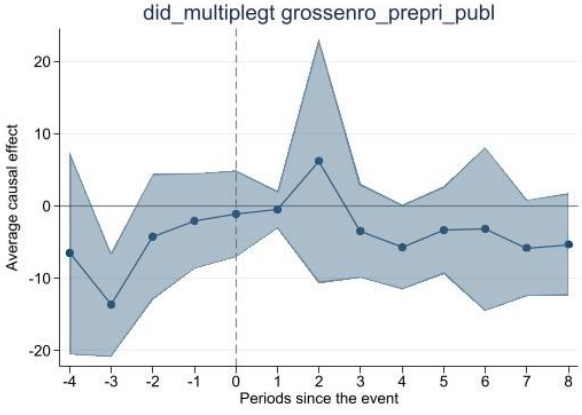
Level	Pre-primary				Primary				Secondary			
	Estimate	SE	LB CI	UB CI	Estimate	SE	LB CI	UB CI	Estimate	SE	LB CI	UB CI
Effect_0	-1.1	3.0	-7.0	4.9	1.6	1.7	-1.6	4.9	-3.3	2.6	-8.5	1.9
Effect_1	-0.5	1.3	-3.1	2.1	6.0	4.7	-3.1	15.2	-2.6	4.1	-10.7	5.5
Effect_2	6.3	8.6	-10.7	23.2	**21.0**	**5.3**	**10.6**	**31.5**	-3.2	6.4	-15.7	9.4
Effect_3	-3.4	3.3	-9.9	3.1	6.8	5.8	-4.6	18.3	-6.9	6.6	-19.7	6.0
Effect_4	-5.7	3.0	-11.6	0.2	9.5	6.1	-2.4	21.4	-1.5	7.9	-16.9	14.0
Effect_5	-3.3	3.1	-9.4	2.7	8.4	4.9	-1.3	18.0	-0.8	7.7	-15.8	14.2
Effect_6	-3.2	5.8	-14.5	8.2	9.2	5.9	-2.5	20.8	-1.3	7.5	-16.0	13.3
Effect_7	-5.8	3.4	-12.4	0.9	8.8	7.4	-5.7	23.3	-1.1	8.2	-17.2	15.1
Effect_8	-5.3	3.6	-12.4	1.8	10.6	8.2	-5.3	26.6	-0.8	8.5	-17.5	15.9
Average	-7.3	7.7	-22.5	7.8	28.3	15.8	-2.8	59.3	-7.5	20.1	-46.9	31.8

[18] We can include more period, given more yearly observations for the data set.

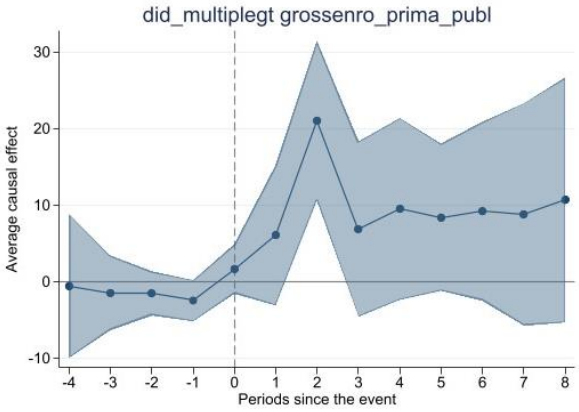
Level	Pre-primary				Primary				Secondary			
Placebo_1	-2.0	3.4	-8.6	4.6	-2.5	1.4	-5.2	0.2	2.3	1.5	-0.6	5.1
Placebo_2	-4.2	4.4	-12.9	4.5	-1.6	1.5	-4.4	1.3	4.0	2.7	-1.2	9.2
Placebo_3	**-13.7**	**3.7**	**-20.9**	**-6.4**	-1.5	2.5	-6.4	3.4	4.6	2.4	-0.2	9.4
Placebo_4	-6.5	7.2	-20.5	7.5	-0.6	4.8	-10.0	8.9	**5.0**	**2.5**	**0.01**	**9.9**

Level	Middle				Total			
	Estimate	SE	LB CI	UB CI	Estimate	SE	LB CI	UB CI
Effect_0	-1.1	0.8	-2.7	0.5	-0.7	1.3	-3.3	1.9
Effect_1	-1.9	1.1	-4.0	0.2	1.3	2.3	-3.3	5.9
Effect_2	-4.5	2.9	-10.2	1.2	**7.5**	**3.4**	**0.8**	**14.3**
Effect_3	**-4.3**	**2.1**	**-8.5**	**-0.2**	-0.4	3.8	-7.8	7.0
Effect_4	-4.3	3.5	-11.2	2.6	2.3	4.6	-6.7	11.3
Effect_5	-5.3	4.0	-13.1	2.5	2.1	4.2	-6.0	10.3
Effect_6	-6.2	4.4	-14.8	2.5	2.3	3.2	-4.0	8.6
Effect_7	-5.8	5.1	-15.9	4.2	2.2	4.2	-6.1	10.4
Effect_8	-5.4	6.1	-17.2	6.5	3.3	4.6	-5.8	12.4
Average	-13.3	9.7	-32.3	5.7	6.8	10.3	-13.4	27.1
Placebo_1	-0.2	0.6	-1.3	0.9	-0.5	0.5	-1.5	0.5
Placebo_2	-1.1	2.0	-5.1	2.9	0.2	1.0	-1.9	2.2
Placebo_3	-1.3	2.6	-6.3	3.8	-0.4	1.6	-3.6	2.8
Placebo_4	-1.9	2.2	-6.2	2.3	0.7	2.6	-4.5	5.8

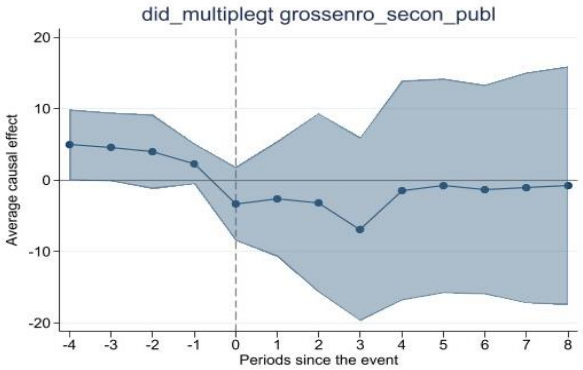
Source: Own elaboration



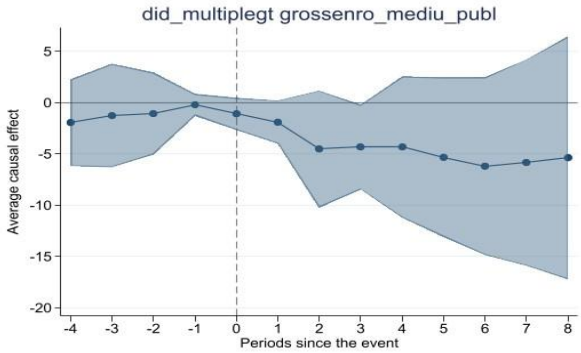
Panel a. Official gross enrollment rate - preprimary



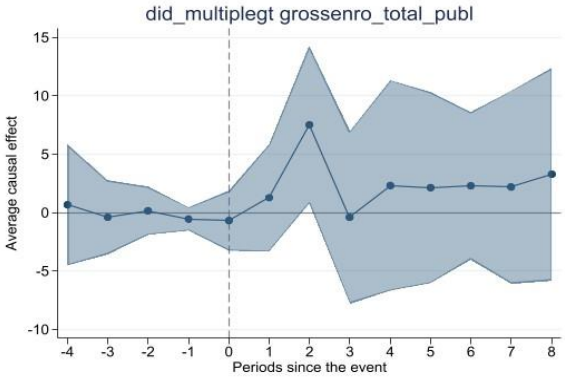
Panel b. Official gross enrollment rate - primary



Panel c. Official gross enrollment rate - secondary



Panel d. Official gross enrollment rate - middle



Panel e. Official gross enrollment rate - Total

Figure 2 DID Gross enrollment ratio - official.
Source: Own elaboration

The table 5 and the figure 2 display the time-varying effects of the program official gross enrollment ratio based on DID:M. This temporal decomposition of effects shows point estimates after 8 period. Overall, the time-varying estimates confirm the presence of a significant and positive impact of the free education program on official gross enrollment rate in primary and total two period after star the program, for the other periods, in both cases the effect is positive but smaller. There is also a significative negative effect in the 3 period for official gross enrollment ratio at level middle, for the other periods the effect continues to be negative but is no longer significant. Finally, in the case of the pre-primary and secondary levels, the effects are almost all negative but not significant. The placebo coefficients (previous the treatment) are significantly for gross enrollment pre-primary for 3rd period and secondary 4th period and are not significantly for the other levels (primary medium, and total).

It is important to note that for the primary level the effect is positive, strong, and much greater than for the other levels. The fact that the coverage in official sector in the levels primary and total increased thanks to this policy of free education, which in turn is complemented by other important policies such as the school feeding and transport programs, let us know that is a policy in favour of equity and universality of the education like a right. However, the fact that it has not yet shown significant effects on the secondary and middle school levels indicates that additional efforts are needed, especially in relation to the quality of formal education. This said that the program also requires the necessary infrastructure to effectively accommodate the entire school-age population. On the other hand, families and adolescents should be made aware of the importance of attending school and finishing high school, since high school education is essential for accessing either tertiary education or the formal labour market.

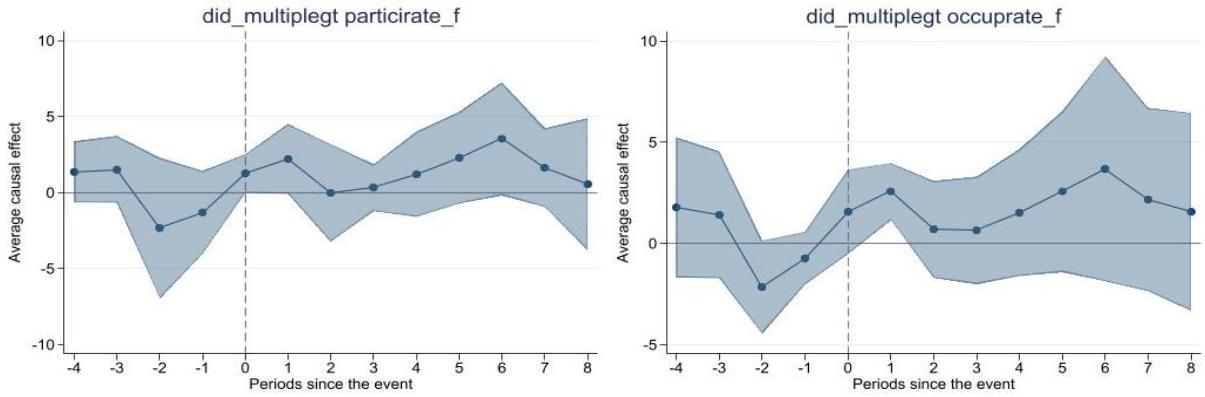
III.5.3.2 Effect on the labour market: labour force participation and employment rate

The employment rate is calculated like the quotient between the number of people employed divided in the population in working age. Labour force participation rate is obtained of divided the economically active population on the population in working age. If we consider the effect of the treatment on labour force participation rate and employment rate by sex the results are showing follow:

Table 6. DID_M effect on labour force participation rate and employment rate – Female

	Labour force participacione rate - female				Employment rate – female			
	Estimate	SE	LB CI	UB CI	Estimate	SE	LB CI	UB CI
Effect_0	**1.3**	**0.7**	**0.0**	**2.5**	1.6	1.1	-0.5	3.7
Effect_1	2.2	1.2	-0.1	4.5	**2.6**	**0.7**	**1.2**	**4.0**
Effect_2	0.0	1.6	-3.2	3.2	0.7	1.2	-1.7	3.1
Effect_3	0.3	0.8	-1.2	1.9	0.6	1.4	-2.0	3.3
Effect_4	1.2	1.4	-1.6	4.0	1.5	1.6	-1.6	4.7
Effect_5	2.3	1.5	-0.7	5.3	2.6	2.0	-1.4	6.6
Effect_6	3.5	1.9	-0.2	7.3	3.7	2.8	-1.9	9.3
Effect_7	1.6	1.3	-1.0	4.2	2.2	2.3	-2.4	6.7
Effect_8	0.5	2.2	-3.8	4.9	1.6	2.5	-3.3	6.5
Average	**4.5**	**2.1**	**0.4**	**8.6**	5.9	3.4	-0.9	12.6
Placebo_1	-1.3	1.4	-4.0	1.4	-0.7	0.7	-2.0	0.6
Placebo_2	-2.3	2.4	-7.0	2.3	-2.2	1.2	-4.5	0.2
Placebo_3	1.5	1.1	-0.7	3.7	1.4	1.6	-1.7	4.6
Placebo_4	1.4	1.0	-0.7	3.4	1.8	1.8	-1.7	5.2

Source: Own elaboration



Panel a. Labour force participation rate - Female Panel b. Employment rate – Female

Figure 3 DID labour force participation rate and employment rate – Female
Source: Own elaboration

The table 6 and the figure 3 display the time-varying effects of the program on employment rate and labour force participation rate for women based on DID:M This temporal decomposition of effects shows

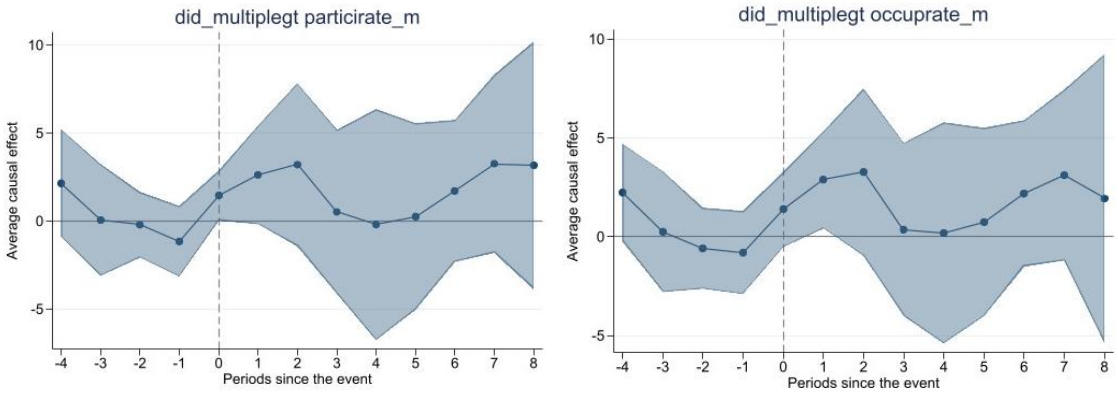
8 points estimates with a significant impact of the free education program on female employment rate in the first period after the intervention. For the second period the effect continues to be positive, but it is much smaller and then begins to increase gradually until it reaches its maximum in the sixth period. In the case of the labour force participation rate for women, the there is a significative contemporary impact for 2011 that is the year when start the intervention, for the other periods this ratio shows the same trend of employment, only in a slightly smaller dimension. The placebo coefficients (previous the treatment) are small and are not significantly different from 0.

The positive effect of the zero and first period is consistent with the immediate effect of the program on mothers who can dedicate time to work once their children start attending school. The delayed effect for the subsequent periods also includes the fact that girls who finish elementary and middle school can also enter the labour market; in fact, the strong effect for the sixth and seventh year after the start of the free education program is consistent with those girls who started secondary school in the year the program began and who 6 and 7 years later have finished high school.

Table 7. effect on labour force Participation rate and employment rate – Male

	Labour force participacione rate male				Employment rate male			
Period	Estimate	SE	LB CI	UB CI	Estimate	SE	LB CI	UB CI
Effect_0	**1.5**	**0.7**	**0.04**	**2.9**	1.4	1.0	-0.5	3.3
Effect_1	2.6	1.4	-0.2	5.4	**2.9**	**1.3**	**0.4**	**5.3**
Effect_2	3.2	2.4	-1.4	7.8	3.3	2.2	-1.0	7.5
Effect_3	0.5	2.4	-4.1	5.2	0.4	2.2	-4.0	4.8
Effect_4	-0.2	3.4	-6.8	6.4	0.2	2.9	-5.4	5.8
Effect_5	0.3	2.7	-5.0	5.6	0.7	2.4	-4.0	5.5
Effect_6	1.7	2.1	-2.3	5.8	2.2	1.9	-1.5	5.9
Effect_7	3.3	2.6	-1.8	8.3	3.1	2.2	-1.2	7.4
Effect_8	3.2	3.6	-3.9	10.2	1.9	3.7	-5.4	9.2
Average	5.6	6.7	-7.5	18.6	5.6	6.0	-6.2	17.4
Placebo_1	-1.2	1.0	-3.2	0.8	-0.8	1.1	-2.9	1.3
Placebo_2	-0.2	1.0	-2.1	1.7	-0.6	1.0	-2.6	1.5
Placebo_3	0.1	1.6	-3.1	3.2	0.3	1.6	-2.8	3.3
Placebo_4	2.2	1.6	-0.9	5.2	2.2	1.3	-0.2	4.7

Source: Own elaboration



Panel a. Labour force participation rate – Male Panel b. Employment rate – Male

Figure 4 DID Participation rate and Employment rate – Male

Source: Own elaboration

The table 7 and the figure 4 Display the time-varying effects of the program on employment rate and labour force participation rate for men based on DID:M. This temporal decomposition of effects shows point estimates after 8 period. Overall, the time-varying estimates confirm a significant impact of the free education program on labour force participation rate in the same period of their implementation, the impact is too significant for the employment ratio in the first period. The placebo coefficients (previous the treatment) are not significantly.

The results show that the program has a positive effect also on employment rate and on the labour force participation rate for men, indicating that if children do indeed attend school, their parents have a greater chance of accessing the labour market. As in the case of women, for men there is a delayed positive effect that is related to the fact that once young people finish basic and secondary education, they have more options to access the formal labour market.

The impacts on both men and women are very similar; for the employment rate the impact is slightly higher for women, while for the labour force participation rate the impact is slightly higher for men.

III.6 Conclusions

The Colombian education system is deployed at the basic, secondary, and tertiary levels. Basic education comprises 10 years and runs from grade 0 or transition to ninth grade, middle education covers grades 10 and 11 and tertiary education offers a portfolio of options from technical and technological education to professional. There are also postgraduate levels that include specializations, master's degrees, and doctorates.

In Colombia, according to the political constitution of 1991, education is a fundamental right and therefore it is possible to affirm that Colombia has made an important effort in relation to educational policy, which is headed by the Ministry of National Education. This policy has been developed in different fields and at all levels of education and aims to universalize access to basic and middle education, also aims to prevent dropping out and improve quality. The programs that stand out are the free school program, rural programs, the PAE school feeding program, transport program and the flexible model's program, all of

which tend to guarantee the right to inclusive basic and middle education by contributing to the access and permanence of children and young people of school age.

The free education program was implemented since 2011 thanks to the social mobilization that developed in Colombia around the issue of free education, with the demand to Article 183 of Law 115 of 1994 that allowed the collection of educational costs in public schools, so thanks to the C-376 ruling of 2010 Colombians can enjoy free basic education. This policy was implemented in a staggered manner in the schools that started to receive the free education resources directly as they were complying with the requirements demanded by the Ministry of Education as of 2012.

The free education program is chosen to monitor its effects on pre-primary, primary, secondary, middle, and total school enrolment rates in the official sector, as well as on two labour indicators: employment rate and labour force participation rate for women and man.

In the case of enrollment rates, it is concluded that the significant effect occurs on official gross enrollment primary and total. In the case of the secondary enrollment rate, the effect is not significant, while for the official gross enrollment rate in the middle level the effect is negative, since many 15 and 16 year olds must drop out of public school for economic reasons. This leads us to conclude, as in the first chapter, that educational policies do not cover the poorest population, in the sense that a percentage of children and young people in poverty must work to contribute economically to the family and cannot access education even if it is free.

Here it is important to mention that the implementation of the policy of free basic and middle education for children between 5 and 16 years of age, has a collateral positive effect on the labor indicators, since if children can go to school, both, mothers and fathers acquire the possibility to dedicate a part of the time to work. Thus, a significant positive effect on the labour force participation rate in the same period of program implementation mean that that the parents of these children become part of the economically active population as soon as the policy is implemented, if not working, at least looking for work. In the same way, the fact that there is a significant impact on the employment rate one period after implementation, means that the occupation of a job does not occur instantaneously, in this case it is observed after one year.

On the other hand, those young people who finish their basic and secondary education and do not want to or cannot continue with higher education, can enter the labor market (increasing the economically active population and therefore the labour force participation rate), and can find work more quickly, thus increasing the employment rate.

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III.8 Appendix

Program	Goals	Typology	Budget 2020 Billion - COP	Budget 2021 Billion – COP	Beneficiaries	Requirements of the Beneficiaries	Program start date
Free of charge of the educational service.	Ensure that students in state educational establishments enrolled between grades 0 to 11 do not pay academic fees or complementary services and thus strengthen the link and permanence to the educational system.	Non-monetary-direct	25.7	24.2	7,900,000 Beneficiaries	Boys, girls and adolescents studying grades 1 to 9 of Basic Education, registered in the SIMAT Enrollment System as official students.	2011
School Feeding Program	Contribute to the access and permanence of school-age children and adolescents, who are registered in the official enrollment, promoting healthy lifestyles, and improving their learning capacity, through the provision of a supplement.	Non-monetary-indirect	1.2	1.2	5,600,000 Beneficiaries	Boys, girls and adolescents aged 5 to 18 years from rural and urban areas, from different ethnic groups, registered in the SIMAT Enrollment System as official students with SISBEN scores of 48.49 for 14 cities and 45.34 for urban rest. Prioritizing students from Educational Institutions in rural areas that serve ethnic communities (indigenous, Afro-Colombian, Raizal, Gypsy) and the population victim of the armed conflict, Educational Institutions that provide pre-school education are also prioritized, later that provide the level of pre-school education. of basic primary education and finally the level of secondary and secondary education.	1936
school transport	To contribute to the access and permanence of school children, young people, and adolescents, registered in the official registration, through the school transport service.	Non-monetary-indirect	-	-	-	Students who are in the socioeconomic level of SISBEN 1 and 2 (Low-income people), whose home is located at a distance greater than two kilometers from the place of residence to the educational establishment, when the means of transport is land and those students with some type of disability / reduced mobility.	2015
Families in Action	Contribute to the formation of human capital of families in poverty with children under 18 years of age, through a conditional monetary subsidy that encourages the	Monetary-direct	1.9	2.0	2,200,000 Families	This benefit is given to a maximum of three (3) children or adolescents per family, between 4 and 18 years of age who are in the school system, as long as the family fulfils two commitments: the children and adolescents must attend at least 80% of the scheduled classes and they	2000

Program	Goals	Typology	Budget 2020 Billion - COP	Budget 2021 Billion – COP	Beneficiaries	Requirements of the Beneficiaries	Program start date
	consumption of food, the incorporation of nutritional habits and health care actions, as well as the enrollment, attendance, and permanence in school at the levels of basic primary, secondary and middle education.					cannot miss more than two school years. If one of the participants is 18 or 19 years old, they must be in at least 10th grade, and if they are 20 years old, they must be 11th grade.	
Rural Education Program (Programa de Educación Rural, PER)	Improve access to quality education from preschool through high school, reduce dropout rates and make education more responsive to the needs of rural students, in order to improve the quality of life of the rural population.	Non-monetary-direct	No information available	No information available	45 certified territorial entities with technical assistance for the formulation of Rural Education Plans. 35 Territorial Entities with support and cooperation agreements with the Ministry of National Education. 26 ethnic groups accompanied.	Certified territorial entities Ethnic groups accompanied	Fase I: 2001 – Fase II: 2009

Program	Goals	Typology	Budget 2020 Billion - COP	Budget 2021 Billion – COP	Beneficiaries	Requirements of the Beneficiaries	Program start date
Special rural education plan (Plan especial de educación rural PEER)	The objective of this program is to strengthen comprehensive early childhood care in rural areas and the conditions for children, adolescents, young people and adults to follow educational trajectories with quality and relevance under a comprehensive perspective.	Non-monetary-direct	1.85	1.98	No information available	Rural population	2017