

Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Economics



Master's Thesis

**Influence of economic growth on income inequality: The
case of Colombia in the period 2017-2019**

Ricardo Alberto Cárdenas Muñoz

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DIPLOMA THESIS ASSIGNMENT

Bachelor of Science Ricardo Alberto Cárdenas Muñoz

Economics and Management

Thesis title

The economic growth and income inequality: The case study of Colombia

Objectives of thesis

The diploma thesis aims to evaluate the connection between income inequality and economic growth in Colombia.

Having observed rising economic growth as well as the rising GINI index in Colombia from 2017 to 2019, this study aims to determine whether increments in Gross Domestic Product (GDP) benefited the poorest 20% of Colombian society or they do not.

Methodology

The research question of this thesis is: How much is the Colombian economic growth from 2017 to 2019 under the determination of pro-poor or pro-rich variables? Based on this research question, the author of the thesis will define the research hypothesis.

In the Introduction, the author will shortly introduce the topic and explain why this topic is relevant to be studied. In the following section, the Aim of the thesis, the author will specify his aim and the potential contribution of his work to the current research. The creation of the literature review will follow. This part will provide a detailed overview of the literature and the current state of knowledge focusing on income inequality and economic growth. It will critically analyse the most relevant studies, including methods, results found, and limitations. Methodologically, this part of the thesis will be the analysis of documents.

The literature review creates a background for the author to specify the methods used for the analytical part of the thesis. The chapter Methodology will describe all of the methods; it will also include a description of the obtaining data and its processing before the analysis.

In the following step (analytical part), the author will use the knowledge gained during the literature study with the methods specified in the previous section to analyse the obtained data. This part is the core component of the thesis. The author will focus on Colombia. This part of the thesis will include the analysis results and comparison (discussion) with other authors concentrating on the same topic. This part can also have recommendations for policymakers or other stakeholders.

In the final part (Conclusion), the author will summarise his findings, mention the limitation of the research and include possible further research.

The proposed extent of the thesis

50 – 70 pages

Keywords

Economic growth, pro-poor, income inequality, poverty,

Recommended information sources

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The Diploma Thesis Supervisor

doc. Ing. Irena Benešová, Ph.D.

Supervising department

Department of Economics

Electronic approval: 16. 6. 2022

prof. Ing. Miroslav Svatoš, CSc.

Head of department

Electronic approval: 27. 10. 2022

doc. Ing. Tomáš Šubrt, Ph.D.

Dean

Prague on 30. 03. 2023

Declaration

I declare that I have worked on my master's thesis titled " Influence of economic growth on income inequality: The case of Colombia in the period 2017-2019" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the master's thesis, I declare that the thesis does not break any copyrights.

In Prague on 30.03.2023



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Influence of economic growth on income inequality: The case of Colombia in the period 2017-2019

Abstract

This Diploma Thesis goes beyond the common confrontation about economic growth and economic development and propose an analytical Pro-Poor method based on inequations that allows the author to provide an answer to the formulated question, which looks for analyse if the growing economic growth and growing inequality in terms of Gini index produced benefits to the poorest population of the 24 metropolitan areas of Colombia. This determination is carried out using the median incomes for both the richest and the poorest segment of the studied population; this research proposes the creation of a new variable call income which unify not only wages but other extra incomes and fill the missing values using the fitted values of a lineal regression under the Mincer Model.

The author found that the economic growth from 2017 to 2019 and the increase of Gini index in Colombia was no neither pro-poor nor pro-rich under any approach, and the inequality increased even when the richest segment of the studied population reduces their median incomes in percentual terms. The author also found that the financial sector is growing faster than the industrial and agricultural sectors, causing financialization, which, along with neoliberalism, has caused low economic growth and increased inequality.

Keywords: Growth, Inequality, Pro-Poor, Poverty, Financialization, Development, Income, Colombia.

Vliv ekonomického růstu na nerovnost příjmů: případ Kolumbie v období 2017-2019

Abstrakt

Tato diplomová práce přesahuje společnou konfrontaci o ekonomickém růstu a ekonomickém rozvoji a navrhuje analytickou Pro-chudou metodu založenou na nerovnostech, která umožňuje autorovi poskytnout odpověď na formulovanou otázku, která hledá analyzovat, zda rostoucí ekonomický růst a rostoucí nerovnost z hlediska Giniho indexu přinesly výhody nejchudším obyvatelům 24 metropolitních oblastí Kolumbie. Toto stanovení se provádí pomocí mediánu příjmů pro nejbohatší i nejchudší segment studované populace; tento výzkum navrhuje vytvoření nové proměnné call income, která sjednotí nejen mzdy, ale i další dodatečné příjmy a doplní chybějící hodnoty pomocí přizpůsobených hodnot přímé regrese podle modelu mlýnku.

Autor zjistil, že ekonomický růst od roku 2017 do roku 2019 a nárůst Giniho indexu v Kolumbii nebyl ani pro-sonda, ani pro-bohatý v žádném přístupu a nerovnost se zvýšila, i když nejbohatší segment studované populace snižuje jejich střední příjmy v procentech. Autor také zjistil, že finanční sektor roste rychleji než průmyslový a zemědělský sektor, což způsobuje financionalizaci, která spolu s neoliberalismem způsobila nízký ekonomický růst a zvýšenou nerovnost.

Klíčová slova: Růst, Nerovnost, Pro-Chudé, Chudoba, Financializace, Rozvoj, Příjem, Kolumbie.

Table of content

1	Introduction	11
2	Objectives	13
3	Theoretical Overview of Economic Growth, Income Inequality and Poverty ...	14
3.1	Theoretical review of Economic Growth	14
3.1.1	Pro-Poor Growth	18
3.2	Social and Political contextualization of Colombia	20
3.3	Income inequality and Poverty	21
4	Methodology	26
4.1	Preparation of the database and construction of the income variable	27
4.2	Pro-Poor model Development	30
5	Macroeconomic Analysis of Colombia 2017 to 2019	36
5.1	Current Account analysis	41
5.2	Value Added Analysis	42
5.3	Poverty incidence analysis by gender	45
6	Evaluation Of Economic Growth on Income Inequality under The Analytical Pro-Poor Growth Assessment	47
6.1	Analysis of the variables	49
6.1.1	Analysis of gender inequality in terms of income and economic growth	50
6.1.2	Analysis of education in terms of income and economic growth	53
6.2	Economic Pro-Poor Growth Analysis	56
7	Social, Economic and theoretical debate under the obtain results	66
8	Conclusion	70
9	References	72

List of Tables

Table 1: Number of observations of the original Income variable.....	28
Table 2: Number of observations of the new Income variable.....	30
Table 3: Macroeconomic indicators	36
Table 4: Correlation real interest rate and foreign direct investment, net inflows (% of GDP),2017to 2019	38
Table 5: Correlation real interest rate and foreign direct investment, net inflows (% of GDP),2015to 2020	39
Table 6: Value added by economic activity in 2017 and 2019.....	43
Table 7: Descriptive Statistics for years of education of the 20% bottom and top, 2017,2019.	53
Table 8: Correlation between income and years of education (α).	55
Table 9: Descriptive statistics from income medias	58
Table 10: Percentual differences in terms of median income.....	59
Table 11: Determinants of EPPG.....	62

List of Equations

Equation 1:Economic Growth	14
Equation 2: Production Function	15
Equation 3: Neoclassical production equation – Cobb Douglas.....	15
Equation 4: Mincer equation using Income variable.	29
Equation 5: Mincer econometric equation using Income variable.	29
Equation 6: Years of work experience.....	29
Equation 7: Equation of missing values of variable income.	30
Equation 8: Description of variable in equations.....	31
Equation 9: Pro-Poor Scenarios.....	34
Equation 10: Pro-Rich scenarios.....	34
Equation 11: Equation of Correlation.....	35

Equation 12: Median income growth of poorer Colombian population in 2017.....	49
Equation 13: Median income growth of poorer Colombian population in 2019.....	50
Equation 14: Median income growth of richer Colombian population in 2017.....	50
Equation 15: Median income growth of richer Colombian population in 2019.....	50
Equation 16: Inequation of median Income for (α, r) in 2017.....	61
Equation 17: Inequation of Median Income for (α, r) in 2019	62
Equation 18: Left hand result of Pro - Poor growth in (α)	63
Equation 19: Inequation, right hand result of Pro - Poor growth in (r)	63

List of Graphs

Graph 1: Inflation and Unemployment.....	37
Graph 2: Exports and Imports Colombia.....	41
Graph 3: GDP growth (%) and Gini index from 2017 to 2019	47
Graph 4: Total population by gender of the richest and poorest segment	51
Graph 5: Total population by gender of the richest and poorest segment	52
Graph 6: Histogram, Population with years of education (α, r) in 2017.	55
Graph 7: EPPG in monetary units (α)	59
Graph 8: EPPG in monetary units (r)	60

List of Figures

Figure 1: Map of Colombia, Poverty incidence by sex and by department.....	46
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List of Abbreviations

GDP	Gross Domestic Product
EPPG	Economic Pro-Poor Growth
R&D.....	Research and Development
EGT	Exogenous Growth Theory
DANE	The National Administrative Department of Statistics
COP	Colombian Peso

1 Introduction

The classical and its subsequent schools of economic thought have based their analysis on the changes in nations' gross domestic production (GDP), currently known as economic growth, following the idea that the free market and the invisible hand were the main drivers of social welfare growth. Aside from that, some nations began to experience increasing economic gains but with no overall improvement in their people's standards of living and a lack of human dignity.

This study goes beyond the typical debate and confrontation between economic growth and development. The analysis of income disparities in Colombian society using the suggested Pro-Poor growth approach provides the academic sphere with a variable that connects growth with development. Pro-Poor growth can be understood as greater or more significant benefits gained by the poorest compared to the wealthiest segment of society, which comes from increments in economic growth.

In this research, median income is stipulated as a variable for measuring the distribution and benefits of economic growth, understanding that income is not the single factor determining poorness in a complex society like Colombia, as there are families with lands and cattle but without income. The diploma thesis proposes an analytical Pro-Poor growth method and in order to carry it out, the author built a robust variable of income using Mincer model to fill the missing data.

By 2017 Colombia got an economic growth of 1.4 % with a Gini index of 49,7. One year later, the South American country got an economic growth of 2.6% with a Gini index of 50,4, and by 2019 the Colombian GDP grew by 3.2% with increments of inequality of 0,9, reaching 51.3 points in the Gini index. In the timeframe studied (2017,2019), those GDP improvements also represented income distribution decreases. Therefore, this study is influential when analysing the Colombian economy's performance.

The literature and the economic theory evolution offer different points of view to consider when conducting this research. The classical theory that supports free markets and laissez-faire implies that economic growth can increase notwithstanding inequality. The interesting analysis of the top 20% and the bottom 20% of income distribution that this diploma thesis brings analyses poverty, social and economic changes in which the Pro-Poor

empirical developed method takes place to determine if the economic growth was Pro-Poor according to the explanation of different Pro-Poor growth (EPPG) approaches.

Since income inequality is about social justice and economic growth should benefit the whole of Colombian society as a democratic country, an inquiry arises whether ***growing income inequality and economic growth during 2017 and 2019 were beneficial to the 20% of society in the condition of poverty?***

2 Objectives

Having observed rising economic growth as well as the rising GINI index in Colombia from 2017 to 2019, this study aims to determine whether increments in Gross Domestic Product (GDP) benefited the poorest 20% of Colombian society or they do not.

- Based on the main objective, this diploma thesis also aims to build a new analytical method to develop a new intuitive method of Pro-Poor economic growth and analyse the influence of economic growth to poorest and richest quantiles through an inequation system.
- As economic development is distinct from economic growth, the purpose of this diploma thesis is to combine the examination of economic development and economic growth into a single study.
- Determine what sort of economic Pro-Poor growth approach take place in the 24 metropolitan areas of Colombia in 2017 and 2019.

3 Theoretical Overview of Economic Growth, Income Inequality and Poverty

The author of this thesis considers inclusive economic growth as growth that serves the poor people; therefore, inclusive economic growth = Pro-Poor growth.

3.1 Theoretical review of Economic Growth

Economic growth is one of the most important factors to study in the economic field, and its theory has evolved from the classical theory of Adam Smith and David Ricardo to the Keynesian heterodox approach. One of the main goals of central banks, governments, and economic academies is to improve the production of goods and services in any economy. Since the supply of land, capital, and labour varies by geography and natural endowments, changes in production factors (capital and labour) can affect the economy's performance in either a positive or negative way, but the literature shows contrasting ways to do this. The pursuit of improving the production of goods and services under the circumstances of any economy is one of the main goals of central banks and economic academies. Taking into account that the supply of land, capital, and labour vary varies according to geography and heterogeneity in natural endowments, changes in production factors (capital and labour) can alter the economy's performance either positively or negatively, but the literature shows contrasting ways that can cause GDP to shift without focusing solely on the amount of capital and labour.

Equation 1: Economic Growth

$$\text{Economic Growth} = \Delta GDP = \left(\frac{GDP_t - GDP_{(t-1)}}{GDP_{(t-1)}} \right) * 100 \quad (1)$$

Economic growth represents the formula (1), which is assessed by percentual changes in GDP from the previous year (**t-1**) to the current studied period (**t**). It can be understood from two perspectives: exogenous and endogenous, both of which emphasise that economic growth is achieved through technological change.

Neoclassical thinking agrees on exogenous growth since external forces of the market carry the economy to convergence (the catching up of developing countries with developed

ones). Technological progress is the unique variable that guarantees a long-run growth rate and thus explains differences in per capita income among countries. The factors that drive the technological progress are diminishing returns to capital, saving rates and constant returns to scale, among others. The endogenous approach, on the other hand, is based on two ideas: the first is that increasing returns to scale produced by capital destined for innovation, human capital, research and development (R&D) and knowledge, and the second is that government spending, inflation, and real interest rates can influence capital efficiency, (Chirwa and Odhiambo, 2018), endogenous means that economic decisions made by economic agents on non-external factors produce technical progress.

Schumpeter (1934) explained how economies could grow in the long-run with an entrepreneurial perspective in which maximization of profit and minimization of costs are adjusted according to the business cycle and addressed by innovations. The neoclassical approach appears to explain how the production (GDP) of countries increases under orthodox assumptions such as perfect competition and free markets., The most representative and remarkable theory of growth is the one proposed by (Solow, 1956), in which technological progress and capital accumulation are the main primary variable to boost the current economic performance since equation (2) is maximized by improvements in the production factor produced by technological changes (A), thus (Y) can shift up without altering the amount of capital (K) or/and labour (L).

Equation 2: Production Function

$$Y = A f(K, L) \quad (2)$$

Equation 3: Neoclassical production equation – Cobb Douglas

$$Y = a \cdot K^b \cdot L^{(1-b)} \quad (3)$$

The logic behind Solow (1956) is based on higher rates of investment in physical capital and higher levels of technology. With higher rates of investment in physical capital

and a specific population growth rate, the production structure becomes more significant, because one part of the output (Y) is consumed, and the other is saved with the sole purpose of investing. Investment increases the rate of capital stock growth, and steady-state output per capital rises in lockstep with technological progress, raising full-employment national income.

Neoclassical growth began to be famous with Solow (1956), but the idea of capital accumulation was previously seen in (Ramsey F. P., 1928) with its explanation about optimal savings in order to maximize utility. The difference between these two models is the way how they include savings rates into the model. In Ramsey's model, the saving rate is endogenous and is chosen optimally by representative households. In the Solow's model saving rate variable is taken as exogenous.

Before the exogenous model of Solow (1956), the predominant growth model studied was the one explored by (Domar, 1946; Harrod, 1939), also based on savings and capital but explains how economies can grow without having balanced growth and some disparities such as rising unemployment as is explained by the Keynesian school. It is important to highlight that the use of the three concepts of growth in Domar (1946); Harrod (1939) , warranted growth (the optimal rate of growth that satisfies everyone in society), actual growth (the real increment in GDP), and natural growth (the rate at which the economy should work to maintain full employment). All the assumptions of the Harrod-Domar model were taken in Solow (1956) except that production is carried out under fixed proportions.

Neoclassical economists criticized the Solow model, and the endogenous growth theory (EGT) arose to resolve problems in the exogenous neoclassical model. This new growth perspective began to develop after Solow's work in 1956, but the mainstream was in the middle 1980s. The notion that economic growth is driven by full employment and market forces in EGT is now null. Economic growth has to be analysed endogenously, taking control of the variables. Now, human capital is an engine for economic growth since knowledge interpreted as human capital affects positively and directly the labour force's productivity and shift rates of growth with unemployment. The government's intervention in the economy is now needed, given that policies are essential in increasing education and investment.

Harrod (1939); Domar (1946) established the path to understand growth either endogenous or exogenous. Since their analysis Solow (1956) took an exogenous approach

which could not resolve the growth problem and the EGT was formulated to explain those problems. However, EGT was not either feasible, on the other hand, the first Post-Keynesian and of course, heterodox approach appears, the Cambridge Equation, which follows the Keynesian Hypothesis that establishes a causality between investment and saving, in this case the investment determines savings since production has some limitations in capacity.

But EGT was not possible either. On the other hand, the Cambridge equation is one of the first Post-Keynesian and, of course, heterodox approach. It is based on the Keynesian hypothesis, which says that there is a cause-and-effect relationship between saving and investment.

In order to have an economy that follows entrepreneurial plans, the Cambridge equation assumes adjustments in the distribution between what workers receive and capitalists' profits. The Heterodox and Cambridge thinking analyses the society and establish savings for workers (S_w) and saving of capitalists (S_c) as uneven, $S_c > S_w$. The problem in this perspective is that savings and investment which generate the growth, are equal by income distribution instead of the aggregate demand approach.

Problems found in the Cambridge equation give way to the neo-Kaleckian model based on (Kalecki, 2013), I clarify that his first publication was in 1954. Kalecki gave a great contribution to the studies of economic growth because of his proposal based on income distribution and degree of monopoly, his final conclusion is that there is an inverse relationship between the degree of monopoly and the percentage of GDP that is contributed by wage labour.

The idea of this diploma thesis is analysing the income inequality when the Colombian economy processes growth, therefore, is important to contextualize the theories of economic growth and distribution, aside from Kalecki and the Cambridge Equation, theories that were explained above analyse how capitalist class support the economic growth, there exist complementary theories based on social classes and inequalities.

A remarkable theory in economic growth that focus on income distribution between two sides of the society, on one side the people who earns wages and on the other side, those who earn profits and income property ownership. Because capitalists are more likely to save than workers, (Kaldor, 1955), Kaldor showed that a redistribution of income in their favour would increase the saving rate, leading to a bigger accumulation of capital. Increased

Investment makes it possible to hire people who were previously without work. The income distribution can explain economic growth since the rate of savings and investment depends on the allocation and appropriation of domestic output between capitalists and owners of the means of production and wage-earners.

The relationship between state and the financial and real sector has triggered manipulation of the law and capital between entrepreneurs and the government. The alliances between landowners, capitalists, government officials and arms groups of extreme right ideology have created a phenomenon in Colombia in which the level of corruption correlates with the inequality of income, (Jasmin Hristov, 2015) As government alliances with land and bank owners have strengthened over time, neoliberal policies have led to a significant increase in inequality and poverty.

3.1.1 Pro-Poor Growth

Economic Pro-Poor growth has been studied from many years ago, but its methods are not interesting for those who just follow the classical approach which focus on growth without care about inequality or problematics in the bottom part of the society. The EPPG (Pro-Poor Growth) focus on the gains that poor people obtain when there exists economic growth.

The term EPPG is derived from economics for development, as its core theory states that a country must first achieve economic growth in order to achieve development. An economy can only be developed if a country cares about poor people, the productivity of any cation can not only be interpreted as improvements in technology, but the productivity is also carried out by improving quality of life of those without opportunities, when a poor society improves its quality of live the knowledge and competitiveness increases thus the economy grow.

Kuznets (1955) showed to the world and theorized that inequality is not important since economic growth is carried out by companies, capitalists and rich people, the famous economic term “trickle down” applied by the Regan’s presidency said that poor have to appreciate to richer people because their wealth is the one who provide poor resources to live. The Kuznets curve determines that income inequality worsens during the early stages of economic growth but improves during later stages, it can be seen as a positive thinking

because in the end there is growth but nowadays this approach is refused since Kuznets (1955) is a modern interpretation of the Say's law, supply cannot determine its own demand as Keynes (1936) inferred.

On the other hand, Chenery et al. (1974) rejected what Kuznets proposed, and their model of redistribution in conjunction with economic growth intensified the measurement of policies, thereby providing a social context in which public policies need to be evaluated based on the benefits that these generate to various social groups. For this reason, development is not aimed at maximizing profits but rather at improving people's lives in some definitive manner.

Since Chenery et al. (1974) statements, the economy thinking has reformulated the main purpose of economic growth and the formulation of new theories and methodologies to assess the performance of economic policies. The inclusion of the whole society in the evaluation of policies give the opportunity to develop the real theory of Economic Pro-Poor growth.

If the growth in the income of the poor is greater than or equal to the growth in the income of the entire population, then the growth in the economy is Pro-Poor (EPPG). It means, if relative inequality decreases as a result of the growth in the economy, then the growth in the economy is EPPG (White, 1999), this definition cannot represent any equation proposed in this diploma thesis because the author does not include the middle part of the society.

The literature was expanded by Kakwani and Pernia (2000) with the development of the Pro-Poor index (PPI), which demonstrates that EPPG is achieved when inequality and poverty are reduced, implying that EPPG exists when poorer people benefit more than non-poor people.

There are two different views on this issue (EPPG): the first and strict one considers growth that reduces poverty to be "Pro-Poor", with its benefits falling more heavily on the poor, while the second and general, more nuanced view, finds that poverty declines regardless of the rate of growth or how that growth is distributed across the population. The strict approach emphasizes growth that helps the poor by making them primary beneficiaries of economic growth, it can be studied in McCulloch and Baulch (2000), Kakwani & Pernia (2000) and Son (2004).

The absolute approach, which is a subset of the strict approach, holds that the poor should receive a larger share of the benefits of economic growth than the non-poor but the growth of the non-poor segment is not important for the determination of EPPG, one amazing interpretation of this definition is seen in Kakwani & Son (2008). According to the relative approach that is also a subset view of the strict approach, the benefits from growth to the poorest segment increases at a higher rate than the non-poor, leading to a more rapid decline in poverty (Son, 2007).

Additionally, to the approaches explained previously, the scope and theory of economic Pro-Poor growth is extended and explains proposes the partial and full approach. On one side, the partial approach has the ability to determine growth as Pro-Poor or antipoor without requiring a measurement or determination of a poverty line or threshold, the best example of this approach is the use of a curve which is based on the first-order dominance in which the curve shows that the gains are greater for the poorest segments than the other parts of the society, the advantage of the use of this perspective is demonstrated in Ravallion et al. (2003)

3.2 Social and Political contextualization of Colombia

Colombia, a country located in South America with 50.24 million inhabitants by 2019, with 1.141.748 km² of total area, two oceans, with the Amazon, which has the 40% of the tropical rainforest of the entire world and the 25% of terrestrial biodiversity, rich in minerals and natural resources, faced from 2017 to 2019 increments in its Gross Domestic Production for 1,8% but also augmentations in the concentration of income to the minorities, with a rise of 1,6 points in the Gini index.

In order to understand the economic growth in Colombia is relevant to analyse the first economic sector. The roots of extreme dependence to the so-called extractive sector that Colombia has fallen goes back to Cesar Gaviria presidency's plan based on the neoliberal and neo-classical economic approach. Colombia has advantages in natural endowments compared to wealthier countries, but it has been one of the biggest social, economic and political problematics. The dependence to the land and specially to subsoil richness, has produced lacks in the productive apparatus and thus to employment and quality of life.

The main issue when it comes to inequality in Colombia, is the land, this is one of the more complex mains of production since it is dependent of externalities and worthy because of its valuation. Land is also related to investments from drug traffickers who aims to wash the illegal money buying lands and cattle.

“Despite the widespread belief that land is an issue of the past, violence today continues to be largely linked to patterns of land ownership, control, and use. While the relationship between violence and capital accumulation has been historical, today there is a novelty in its expression – coercive power is strengthened through paramilitary groups and economic power is strengthened through particularly lucrative activities such as mining, agroindustry and drug-trafficking”(Jasmin Hristov, 2015).

The predominant relationship between paramilitarism, narcotraffic, governance, economic and political policies and neoliberalism has been notorious during the past 15 years to the studied period. As the previews quote says the relationship between violence and capital accumulation is very strong in Colombia, for that reason is important to study the poverty and the gains that the economic growth brings to the people in situation of need.

3.3 Income inequality and Poverty

With the purpose of assessing the income inequality in Colombia using the proposed economic Pro-Poor growth method, it is important to contextualize the different concepts of poverty based on the research of Laverde & Gómez (2015).

Poverty can be measured and comprehended in either relative terms or by thresholds. Poverty can be recognized setting certain criteria about levels of income and house endowments that guarantees the minimum standards of living, in contrast, poverty can be determined subjectively and is expressed by feelings of people according the environmental where they live in, they can feel excluded or with lacks decent living standards. On top of this, absolute poverty is seen when citizens lack means of subsistence as consequence of low or null income.

When people belong less or feels scarcity of some standards of living when compared with their surroundings, relative poverty is perceived. Additionally, dynamic poverty pays attention on the time and the duration of the lack of resources and can determine if poverty is either temporary or permanent.

When money and lack of access to services are met together comprehensive poverty is analysed, beyond of that, nowadays and in Colombia there exist poverty in many aspects which converts the poverty in a multidimensional measuring aside from the single but strong unidimensional poverty (income) of this diploma thesis.

With the purpose of providing a comprehensive contextualization about the economic fields, de Janvry & Sadoulet (2021) determines seven factors or variables where development studies take place: growth, poverty, vulnerability, inequality, basic needs, sustainability, and quality of life. When it comes to development in terms of economics the previous dimensions are the more relevant, but they also have some problematics at the moment of assessing and measure them since they are interrelated with each other. A problem that concerns to this diploma thesis is determination of poverty or inequality using only one variable, the income. When it comes to poverty or inequality, the determination of poorness or inequality should be assessed using a holistic approach and also multidimensional models in which the determinants are multidimensional, since a person in Colombia could have cattle and a large estate but no income at all, so when income is used to determine the poverty of that person the result could be biased, for that reason is important to take into the account which poverty perspective to use when study this topic.

“Income growth is a key dimension of development, but that development goes beyond income. However, even in a multidimensional perspective, an important question is whether income growth will deliver the other dimensions of development. We have seen that income growth—for example, in China—has been the main cause of poverty reduction” (de Janvry & Sadoulet, 2021).

According to de Janvry and Sadoulet (2021), the development of a nation cannot be directly proportional to the rate of that nation's economic growth. This is because economic growth can be understood as a country's “budget” to begin the improvement of the seven dimensions of development. In accordance with that, the use of growth or income as a standalone variable is not sufficient to determine a nation's level of development. This is demonstrated not only by China but also by a great number of other nations and Colombia in particular.

An additional thinking about this, is the differentiation of the economic and development in the two perspectives or ideologies in economics, the orthodox approach

agrees that the most important factor in an economy is the economic growth and when it happens the country develops by itself developing markets and decreasing unemployment, in contrast. On the other hand, the heterodox approach focuses more on the development variables and clarifies that the growth is needed but it is not the most important factor to improve since the economic growth can produce poverty, inequality and environmental devastation, that will affect the society and quality of life of citizens.

Following the concept of the classical approach to economics, in which the proportion to invest is greater for the wealthiest people, and thus their yields of investments are greater than those who spend all of their income on essential consumption and the proportion to save is not possible, it is viable to understand and accept income inequality as a normal and acceptable phenomenon (Delbianco et al., 2014).

There are a number of factors that can be harmful to the expansion of the economy, including rent-seeking activities, social unrest, and imperfections in the credit market. According to the models of rent-seeking, inequalities encourage members of the population that is at a disadvantage to participate in activities that seek rent either legally or illegally, these situations reduce the wealth of the economy, which is detrimental to productivity and, as a result, growth.

Having explained what poverty is and how it can be understood according to different perspectives, this diploma thesis requires the explanation of income inequality. The inequality can be measured by income or by a multidimensional approach, in this case the diploma thesis expresses a notion on inequality based on income. The inequality is taken as the disparity in terms of income between two people or between two or more segments of a society, that disparity brings conflicts into the societies and produces social and political confrontations. The inequality is studied by the heterodox approach of economics since it is vital to be able to set policies of development, however inequality can also bring positive results in terms of economic growth as people who contribute in a lower proportion to the economic growth is not taken into account when gains of it are distributed.

The rise of inequality is correlated with the evolution of capitalism. It is explained by the trickle-down theory which determines that the responsibility of production only relies on the supply side, following the Say's law. Therefore, the unequal distribution of income is legal and appropriate for many economies. Following that idea, the wealthiest part the

society, which owns the factors of production receives greater remuneration because they are the ones that are putting their capital in risk in order to provide goods and services to the society. However, this perspective is totally unfair since the production of goods and services is made by workers who sell their labour or human capital and as result receives a payment, but the ownership of the produced products belongs to the owners of capital. This social differentiation between owners of means of production and owners of the production is one of the main problematics in terms of inequality.

The remuneration for those who sell their human capital either low or high, is always regulated by laws and it is not related to how much they produce. The remuneration for the owners of capital is proportional to the production that labour does. It means that the owners of capital increases their incomes by the job of the labour; following that idea, the income inequality in terms of remuneration can be represented as $R_s = R_c + \overline{R}_L$ in which R_s represents the remuneration or income of the society that in turns is represented by the sum of the remuneration or income of capitalists R_c and remuneration or income of labour, which is constant .

In other words, the income of the capitalists is always greater than the constant remuneration of labour and following that idea inequality exists by fairness as well since the capitalists are the risk takers, but if Marxian contributions are taken into account the fairness is not represented in this case, since there is unfair appropriation of the goods and services produced.

The income inequality is supported by Kuznets (1955), since countries needs inequality in the first steps of development in terms of production until the point that an undeveloped country reaches per capita income of the developed countries, this concept is seen in the catching up theory Solow (1956).

Aghion et al. (1999) explains that the income inequality over the time has been related in a greater proportion to the change of an economy from rural to industrial one, this statement is also supported by the theory of Kuznets (1955), because the societies that are in the developing stage have the particularity that the owners of productions are taking the responsibility of transforming the economic apparatus and for that reason the inequality grows. On the other side the endogenous theory of growth supports that inequality reduces

growth since wealth inequality determines the contribution of capital formation and thus the yields of capital.

The inequality is also based on demographic perspective, explains how inequality in gender terms is very important to take into the account. This study shows how work-family balance is problematic given the fact that women invest a period of their time raising their children and also say that policies are more than important because subsidies determine the performance of the labour force. The main point is that women are do not tend to invest to much in education or if they do, they have to change their field in order to get well-payments.

However, there are societies such as Colombian in which the opportunities to get in academic world are more restrictive for women than men, Botello & Guerrero (2019) demonstrates that the education is a deterministic variable in terms of income and inequality, women who does not have the resources to access to education are not valued in the labour market for that reason the income of a family is totally uneven.

4 Methodology

The diploma thesis uses a quantitative method which assesses the influence of increasing economic growth on the poorest quantiles in one of the most unequal counties in the world. The empirical research takes place in Colombia using the large extensive household survey provided by The National Administrative Department of Statistics (DANE) from 2016 to 2019. However, the research focuses on years 2017 and 2019 as the main ones to answer the problem question.

This household survey is chosen because it provides data about employment conditions and incomes. “INCOME” is the primary variable to evaluate in this research. The population to study is the urban perimeter represented as “municipal head” that includes 24 metropolitan areas (Antioquia, Atlántico, Bogotá, D.C., Bolívar, Boyacá, Caldas, Caquetá, Cauca, Cesar, Córdoba, Cundinamarca, Chocó, Huila, La guajira, Magdalena, Meta, Nariño, Norte de Santander, Quindío, Risaralda, Santander, Sucre, Tolima, Valle del Cauca). It is essential to highlight that DANE is the most trusty and reliable entity that provides data on Colombia.

Firstly, the diploma thesis provides a theoretical underpinning about economic growth and income inequality using different perspectives of the economic thinking. Knowing already what those concepts and their standpoints are, the author explains in greater depth what the macro-economic performance in Colombia was from 2015 to 2020, in order to provide a better view of the economic situation.

Therefore, the practical part is divided into two sections, chapter 5 and chapter 6. The first one contextualizes the economic performance using general data from World Bank and provides correlations that offer a better understanding of the relationships of the macro indicators. The second one is focused on reaching the aims of the thesis.

Secondly, the core analysis takes place with the use and implementation of the proposed empirical and analytical Pro-Poor models, which is based on changes of in the income's medians from 2017 to 2019. Before beginning to explain the method to determine if Colombian economic growth between 2017 and 2019 is Pro-Poor, is critical to clarify the construction of the income variable.

4.1 Preparation of the database and construction of the income variable

Given that Colombia's economy is characterised by high labour informality, which accounts for 61.9% and 62.1% of total employment in 2017 and 2019, respectively, it is highly complicated to measure the exact amount of income that citizens receive. Therefore, the variable income extends its scope and considers other incomes beyond the wage. The variable obtained from the sizeable extensive household survey is INCOME, which includes the wages of employed people and other remunerations. The author includes other incomes such as subsidies, extra working time, income for transport, bonifications and food, clothes, family subsidies, earnings from inactive workers, rents and pensions instead of only earnings from a job, to get a robust variable which relates the incomes more broadly.

In order to carry out the elaboration of this variable (INCOME), it is firstly necessary to combine the data files that DANE provides. There are twelve files each year, separated by each month of the selected years. Since the study focuses on the topic of economic growth, it is necessary to obtain data not only from 2017 and 2019, but also from both of those previous years (2016 and 2018) in order to be able to determine how much income has changed throughout the period.

There are two steps to obtain the desired database and thus be able to obtain a more robust variable (INCOME) and the necessary observations. Firstly, the databases of General Characteristics, Unemployed, Labour force, Inactive workers, Employed, Other activities and aid, Other income, Housing and Households, for each month. Each of these adds new variables and observations from January to December that in this case are people. Subsequently, the 12 bases obtained previously are joined to thus form a single data base per year. It is essential to indicate that databases must be merged with (m:m), which in the statistical software STATA means merging of databases adding variables horizontally and observations (people) vertically.

Furthermore, the wage is not a determinant variable because the labour market in Colombia is not wholly formal in terms of employment and more than half of the total labour force lives with daily incomes from companies or by to get by. However, the poorest people are in the condition of acceptance, meaning they will take any monetary or physically income as income because they follow the axiom of monotonicity. More commodities or income is preferred to less (Shon, 2008).

The complexity of getting data is recognized worldwide; in Colombia's case is even worse. The accessibility of data is challenging since people do not trust in people who recollects it, or it is hard to reach citizens who lives in isolated places. Therefore, the 24 metropolitan areas are chosen to infer any conclusion in this research.

This diploma thesis has a value-added given the fact that the variable to answer the formulated inquiry (INCOME) is built through data engineering process. The data obtained presented several issues regarding format files, for the year 2019 the data was in .dta format, the one used in Stata software and the merging process and creation of the variable INCOME did not present major complications. However, for the years 2016, 2017 and 2018 the files extracted from the official website of DANE were in format .csv and .txt and the STATA program does not allow those formats for that reason the author has to convert each of the 96 datafiles (8 datafiles for 12 months) and later on doing the merging process previously explained.

In some of the data bases already converted to .dta format, the variables are not recognized as variables since the data are recognised as words or invalid. Thus, it is necessary to transform each variable which occurs that problem into a numerical one.

To make sure that the INCOME variable has a robust data, it is required to inspect the original variable, which provides data about wages, and the result showed the following output from the software STATA.

Table 1: Number of observations of the original Income variable.

	Number of Observations		
	Total	Integers	Nonintegers
Negative	-	-	-
Zero	2,321	2,321	-
Positive	150,079	150,079	-
Total	152,400	152,400	-
Missing	346,582		
	498,982		

Source: Output generated by Stata

The table one shows that the variable INLGABO which is the name given by DANE representing earnings from work has 346,582 missing values and if those missing values were eliminated the population would be reduced in 69.51%. It would not be representative to infer any general conclusion from Colombian society, for that reason this diploma thesis requires to the economic academic methods and uses a model which is based on education and labour experience in other to simulate the missing values.

Equation 4: Mincer equation using Income variable.

$$\mathbf{Income = years\ in\ education + years\ of\ experience + years\ of\ experience^2(4)}$$

Equation 5: Mincer econometric equation using Income variable.

$$\mathbf{Ln\ Income = \beta_0 + \beta_1 esc + \beta_2 exp + \beta_3 exp^2 + e \quad (5)}$$

In order to build the model proposed by Mincer (1975), in which the wages or income variable can be found following the equation (4) and (5). It is firstly needed to build the variable Exp, which represents year of experience and follow the equation (6).

Equation 6: Years of work experience.

$$\mathbf{Exp = age - years\ in\ eduction - 6 \quad (6)}$$

The equation (6) is built with the purpose of representing the period of time measured in years, during which a person has been employed or has worked in a certain industry or function.

After building the Mincer model, the author did a lineal regression with the purpose of getting the adjusted values which will represents the incomes of the missing 346,582 missing values. The regression is processed by the software STATA and the program has the option of generating the fitted values using the command “predict”. The results from the Log-lineal regression of the equation (5) have to be changed by a mathematical method in order to cancel the logarithm using the following equation.

Equation 7: Equation of missing values of variable income.

$$\mathbf{Missing\ values = e^{Ln(Income)}} \quad (7)$$

The equation (7) represents the real values that will replace the missing data of variable Income, the number $e = 2.718281828$ cancels the logarithm of Income and those result are the missing values that will be replaced in the missing data to get zero missing values as seen in the following Stata output. Now the INCOME variable is ready to be proceed using the proposed economic Pro-Poor growth model. This method of findings the missing values is done for each of the years concerned, 2016, 2017, 2018, 2019.

This diploma thesis uses real data for that reason is important to built a robust variable. The idea of using the Mincer model is to use the academic tools and provide more complete research, the use of maths is required since it is a positivist research and the results can be verified without any complication.

Table 2: Number of observations of the new Income variable.

	Number of Observations		
	Total	Integers	Nonintegers
Negative	-	-	-
Zero	2,251	2,251	-
Positive	496,731	177,908	318,823
Total	498,982	180,159	318,823
Missing	-		
	498,982		

Source: Output generated by Stata

4.2 Pro-Poor model Development

Having built and understood the income variable, now, the new EPPG method is used, measuring of the median of the new income variable for the 20% of the poorest and 20%

richest wealthiest people of the Colombian society for each year, subsequently, the changes between income medians between 2017 and 2019.

$$\alpha = \textit{the 20\% of people on the Bottom of the society}$$

$$r = \textit{the 20\% of people on the top of the society}$$

Having obtained the division of the society, now each segment of the population to study will be classified according to their incomes.

$$\theta = \textit{median income}_{2017}$$

$$\phi = \textit{median income}_{2019}$$

The declaration of the variables α and r is very important to be able to analyse either poverty or richness and its changes as single variables across the time, even the evaluation of the gains and losses into each segment of the society, in cases when the growth is Pro-rich with greater benefits to the poor or opposite.

Equation 8: Description of variable in equations.

$$\alpha_1 = (\phi > \theta) \tag{8}$$

$$\alpha_2 = (\phi < \theta) \tag{9}$$

$$r_1 = (\phi > \theta) \tag{10}$$

$$r_2 = (\phi < \theta) \tag{11}$$

Equation (8) and (9) represents poverty, or unqualified and low productive labour force since the poorest only have their labour to share in the economy and education is limited in the Colombian situation; in the first, we can see how the poorest 20% (α) of Colombian

society improves their income caused by economic growth (inflation is not considered); in addition, it explains the real gains to and among the poorest 20%. This scenario can also occur when economic growth results in higher income growth for the wealthiest 20% of the population (Pro- Rich), The ability to explain gains to the poorest, and changes in poverty even when economic growth is Pro-Rich, is what lends credibility to this method. In addition, equation (2) observes increments in poverty and reduction in incomes to the bottom of the society (α), it can happen either in Pro-Poor or Pro- Rich scenarios.

On the other side, equation (10) and (11) have the same variables to study but represents the other tail of the income distribution, the richest, and t . Thus, investment rate or highly qualified labour, changes in them will determine if the Colombian economy is either driven by (r), investment of the richest into the economy, high labour productivity, or both at the same time.

Those first four equations cannot determine anything about Pro-Poor or Pro- Rich growth by themselves, but they can reflex gains and losses to (α) and (r) over the time, and it is one of the principal affairs in this diploma thesis given that economy is about limited resources, human lives and their interactions. Beyond studying if the economic growth is Pro-Poor or Pro-Rich, this research focuses on the people with few resources and poverty.

Understanding the meaning of (α) and (r), it is time to begin formalising the events that can occur when an economy experiences economic growth.

In the presence of economic growth or increases in GDP, the benefits of that performance can be captured by unqualified people who work either formally or informally; in Colombia, the majority, if not all, work informally. As previously stated, (α) can represent labour with low education, low productivity, or both, but their efforts to contribute to GDP expansion can be represented by increases in their incomes increases in their incomes can represent their efforts to contribute to GDP expansion; in this case, this technique will demonstrate if the growth is Pro-Poor.

When the economy grows, fairness is not guaranteed; growth can only benefit the rich or the poor, and rarely both. When there is growth and resources are allocated efficiently in economic terms, that efficiency guarantees neither fairness nor equality. It is clearly seen in the first and second theorem of welfare economics or Pareto efficiency, and the alternative

for a country to be competitive and have health market is applying distributive transfers as explained in Shen (2008).

Three components of this empirical and analytical method must be understood. The first one is the left side which represents poverty, low productive labour, and the poorest and less educated part of the society, in this, the reduction of poverty can be analysed by measuring the income median or setting a threshold.

Furthermore, the central component is the symbol located in the middle of the equation; if the symbol is (\succ) represented by $(\alpha \succ r)$, it indicates that economic growth is Pro-Poor because the income median of the poor (α) grew faster than the income median of the rich (r). This symbol is the most important at the moment of when determining if the growth is Pro-Rich or Pro-Poor and the distribution of economic growth. In contrast, if the equation gets (\prec), it indicates that the economic growth is Pro-Rich since the income median of the rich (r) grew faster than the income median of the poor (α), Pro – Rich is represented by $(\alpha \prec r)$. The third component to analyse is the right side of the equation, which observes changes in the rich, movements in richness, in capital to invest or in high qualified and productive labour.

The three components must be analysed individually, to give a comprehensive overview of economies and societies. Those are the possible scenarios that Colombia or any other country could have. It is essential to say that the complex analysis must be done according to the countries' circumstances and particularities.

There are many ways to determine whether economic growth is Pro-Poor. However, distributions, curves, and other applied techniques developed over the years only demonstrate mathematical knowledge rather than the real goal, which is the evaluation of poverty, gains to the rich or to the poor, or income inequality. As a result, it is critical to develop the following method, which provides anthropocentric scenarios where the important factor is human lives and the improvement of quality of life.

The following inequations are proposed in order to assess not only economic Pro-Poor growth but the changes in the poverty and richness in unidimensional terms. Income as the main variable to evaluate the disparities of the 24 metropolitan areas studied. Furthermore, in the practical part, chapter 6, there will be the merge of the variables (α), (r), (θ), (Φ) in percentage terms with the purpose of creating the robust variables to answer the formulated

question, the merge of these four variables will have the division of the society in terms of the top and bottom quintiles and their earning in each of the studied years, 2017 and 2019.

Equation 9: Pro-Poor Scenarios

$$(\phi > \theta)_\alpha > (\phi > \theta)_r = (\alpha_1 > r_1) \quad (12)$$

$$(\phi < \theta)_\alpha > (\phi > \theta)_r = (\alpha_2 > r_1) \quad (13)$$

$$(\phi > \theta)_\alpha > (\phi < \theta)_r = (\alpha_1 > r_2) \quad (14)$$

$$(\phi < \theta)_\alpha > (\phi < \theta)_r = (\alpha_2 > r_2) \quad (15)$$

Equation 10: Pro-Rich scenarios

$$(\phi > \theta)_\alpha < (\phi > \theta)_r = (\alpha_1 < r_1) \quad (14)$$

$$(\phi < \theta)_\alpha < (\phi > \theta)_r = (\alpha_2 < r_1) \quad (15)$$

$$(\phi > \theta)_\alpha < (\phi < \theta)_r = (\alpha_1 < r_2) \quad (16)$$

$$(\phi < \theta)_\alpha < (\phi < \theta)_r = (\alpha_2 < r_2) \quad (17)$$

Additionally, this diploma thesis extends its analysis using correlations to observe the relationship between some macroeconomic indicators, this statistical measurement of relationships can obtain a value between -1 and 1 meaning that if the relationship is under 0 the assessed macroeconomic indicators have an inverse relationship, on the other hand if it takes a value greater than 0 the relationship between the macroeconomic indicators are having a direct relationship or follow the same trend. The formula to measure this relationship is the following.

Equation 11: Equation of Correlation

$$\mathbf{r} = \frac{\mathbf{n}(\Sigma\mathbf{xy}) - (\Sigma\mathbf{x})(\Sigma\mathbf{y})}{\sqrt{[\mathbf{n}\Sigma\mathbf{x}^2 - (\Sigma\mathbf{x})^2][\mathbf{n}\Sigma\mathbf{y}^2 - (\Sigma\mathbf{y})^2]}} \quad (18)$$

n = Quantity of years of population to assess

Σx : Total of all values for the first variable.

Σy : Total of all values for the second variable.

Σxy : Add up of the multiplication of the first and second values.

Σx^2 : Add up of the squares of the first value.

Σy^2 : Add up the squares of the second value.

The relationships between macroeconomic indicators are not used to measure the strength of the relationship but the directions of the variables in order to understand the trends of the economy without infer any causality.

5 Macroeconomic Analysis of Colombia 2017 to 2019

According to Kaldor (1984), primitive societies just produce food. When farmers generate more food than they need and trade their "agricultural surplus" for less essential items such as clothing and shelter, a secondary economy and value added is created. Although the manufacturing sector is typically viewed as the "engine of growth," this secondary sector will gain importance as development advances. When new scientific discoveries make it possible to meet new wants, people's tastes alter and expand, resulting in the development of new products and firms in this industry.

The macroeconomic performance of Colombia is evaluated to determine patterns or sources of economic growth, and income inequality. This diploma thesis assesses the most important macroeconomic variables and their political, economic and social interrelations.

Table 3: Macroeconomic indicators

MACROECONOMIC INDICATORS	2015	2016	2017	2018	2019	2020
GDP Bill (constant 2015 US)	293.48	299.61	303.68	311.47	321.39	298.74
GDP growth (annual %)	2.96%	2.09%	1.36%	2.56%	3.19%	-7.05%
GINI	51.0	50.6	49.7	50.4	51.3	54.2
Exports (%GDP)	15.7%	14.7%	15.1%	15.9%	15.9%	13.5%
Imports (%GDP)	22.7%	21.5%	20.1%	20.6%	21.7%	20.4%
NX (%GDP)	-7.1%	-6.8%	-5.0%	-4.7%	-5.8%	-6.9%
Current account balance (% of GDP)	-6.37%	-4.45%	-3.18%	-4.20%	-4.58%	-3.46%
Inflation	4.99%	7.51%	4.31%	3.24%	3.52%	2.53%
Domestic credit to private sector by banks (% of GDP)	46.9%	47.1%	49.8%	49.6%	51.6%	54.3%
Unemployment, total (% of total labor force)	8.30%	8.69%	8.87%	9.11%	9.96%	15.04%
Foreign direct investment, net inflows (% of GDP)	3.96%	4.90%	4.39%	3.38%	4.33%	2.76%
Real interest rate (%)	8.79%	9.03%	8.13%	7.15%	7.47%	8.38%
Labour Force, total	24,759,082	25,039,982	25,528,732	26,010,171	26,304,741	24,932,942
Population, total	47,119,728	47,625,955	48,351,671	49,276,961	50,187,406	50,930,662
Labour force (% total population)	52.55%	52.58%	52.80%	52.78%	52.41%	48.95%

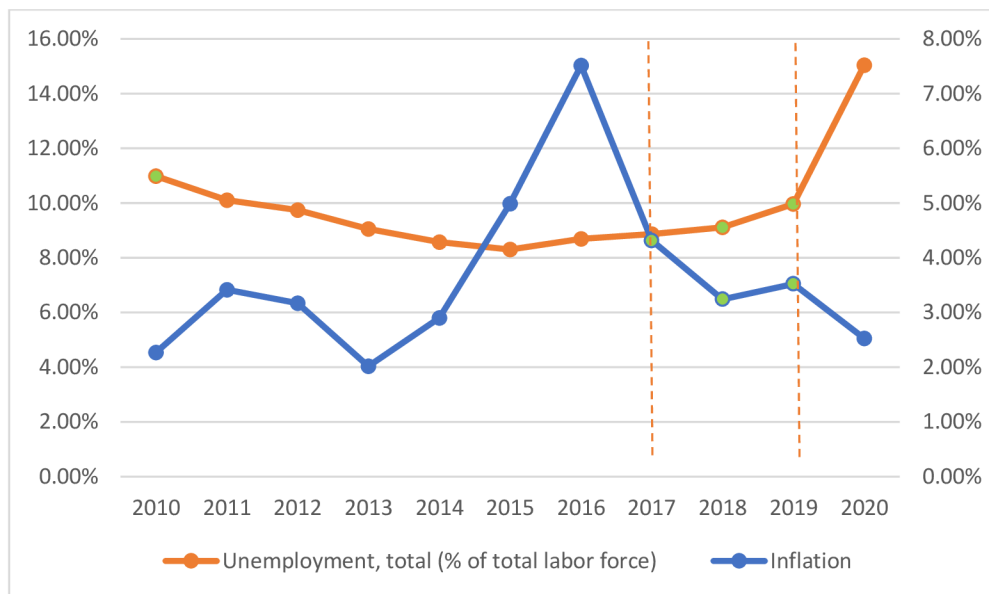
Source: Own elaboration, data from World Bank

The growth of the Gross Domestic Product (GDP) according to formula (I) was constant over the time period that was studied, from 2017 to 2019, with growth rates of 1.36 percent in the first year, 2.56 percent in the second year, and 3.19 percent in the last year, for an average growth rate of 2.37 percent.

The motivation of this diploma thesis goes beyond an analysis of the behaviour of economic growth. It analyses the growing income inequality the Colombian economy has accompanied economic growth. For 2017, Colombia obtained a Gini of 49.7, for 2018 of 50.4 and for 2019 51.3, this growing behaviour of inequality is the point of analysis of the author since there is a growth of GDP accompanied by a greater inequality. At first sight, it can be inferred that economic growth and income inequality in Colombia in the period studied are correlated, since these two variables have a constant growth. In the next section, the income inequality and economic growth will be studied as whole using economic Pro-Poor approach.

Despite many practical studies showing the opposite, the unemployment and inflation rate theoretically have an inverse correlation (Phillips, 1958).

Graph 1: Inflation and Unemployment



Source: Own elaboration, data from World Bank

Keynes also expressed that an economic boost is accompanied by more liquidity or inflation, which in turn alters companies' hiring because there is more money in the pockets of the agents and the demand for product and labour is increased. Negro et al. (2020) also demonstrates differences in performance according to the trade-off between inflation and

unemployment, this paper demonstrates that when there are structural, or policy changes the aggregate demand gets less steep given that inflation sensitivity decreases.

Phillip's curve is present during the period under consideration (the one that falls between the parallel dashed lines) because unemployment is rising even as inflation is falling. It demonstrates that the implemented policies followed what was stated in Keynes (2007) and Phillips (1958). Even though the economy's liquidity and the overall price of goods and services increased by 0.28 percent between 2018 and 2019, the unemployment rate increased by 0.85 percent. It is important that this conclusion was reached through exhaustive research; In general, however, the boost to the economy caused by inflation was sufficient to satisfy the trade-off between unemployment and inflation strictly.

In terms of investment, the Colombian economy is not the most profitable or attractive for foreign investment since social problems and the dependence of adjusting interest rates to international markets limits the expected targets. Table 3 shows the performance of net inflows of capital in terms of share of GDP, which in average fluctuate between the 4 %, and it is relevant to express that in the studied period the foreign direct investment fluctuated from 4,39% in 2017 to 4,33% in 2019 and from 2,5 % and 5% from 2015 to 2020, meaning that the studied period got an outstanding performance.

Table 4: Correlation real interest rate and foreign direct investment, net inflows (% of GDP), 2017 to 2019

2017 to 2019		
Indicators	Foreign direct investment, net inflows (% of GDP)	Real interest rate (%)
Foreign direct investment, net inflows (% of GDP)	1	
Real interest rate (%)	0.782515713	1

Source: Own elaboration in excel, data from World Bank.

Table 5: Correlation real interest rate and foreign direct investment, net inflows (% of GDP), 2015 to 2020

2015 to 2020		
Indicators	Foreign direct investment, net inflows (% of GDP)	Real interest rate (%)
Foreign direct investment, net inflows (% of GDP)	1	
Real interest rate (%)	0.307170957	1

Source: Own elaboration in excel, data from World Bank.

Table (4) and (5) shows the correlation between Foreign direct investment, net capital inflows (% of GDP) and Real interest rate. The relationship between those variables is positive meaning that when the real interest rate (the interest rate without inflation) increases, the inflow of capital increases as well. This correlation is important for foreigners and for national investors as well. However, the relationship in the studied period is stronger than the one in table (5), indicating that the return of investment from foreigners are grows while real interest rate rises. This can also provide an argument for the economic growth from 2017 to 2019, the investment that can be understood as capital formation or a boost of the economy.

In terms of balance of payments, the net inflow of capital is the one who boosts the economy if it is compared with the current account which represents in average almost the 4,0% of the GDP, the average between the three studied years in terms of Foreign direct investment was of 4,03% of GDP, it means that the outflows of money because of the exceeding imports is compensated with the inflows of capital that comes from overseas.

Colombian capitalists tend to be landowners, and over the history they have owned land instead of investing in production. This behaviour has triggered one of the mains problematics in economic terms. Land valuation has been seen as a great income producer by drug lords, government officers, capitalists and anyone with land purchasing power. They, with long-term thinking, have invested in large estates with the rational and classical economic reasoning.

The valuation of land, let us determine it as (v), is the income gained by the valuation of the land, and it has generated that the better and productive lands have a little or zero

production, it is what affects to the Colombian economy, the incentives (v) that the land valuation or rent give turns Colombia into feudalism because of the reliance on rent. The interest rate of the land is the rent or valuation. The rational investor buys land to receive the cost of the land (p) plus the valuation or rent over time, ($p+v$), when incentive of rent drives the investment in land ownership, the trade-off between crops and land valuation occurs.

In Colombia, rather than being utilized as a societal resource production, the land is employed for long-term investments. The production of a nation is what determines its wealth. However, Colombia's tendency toward financialization and land investment has led it astray from the path of a productive nation, in which land and banking are not viewed as capital accumulators but rather as use values for the purpose of producing along the path of industrialization. This has caused Colombia to fall behind other nations in terms of its level of wealth (Echavarria, 2018).

Additionally, domestic credit to private sector by banks (% of GDP) makes up almost the 50% of the GDP of Colombia, fluctuating between 49% and 52% in the studied years, the tendency of the Colombian economy to be leveraged by credits, has influenced the economic growth in a bad way, given that the value creation is null or very low and the real shifts in aggregate demand and supply are not in terms of production.

“When the financial logic prevails over the production logic in an economy, we speak of that economy as being financialized. This phenomenon can be seen from both a quantitative and a qualitative point of view: on the one hand, the actions of businesses and investors are increasingly geared toward the pursuit of financial reward rather than gains in the productive process” (Bonniec et al., 2005).

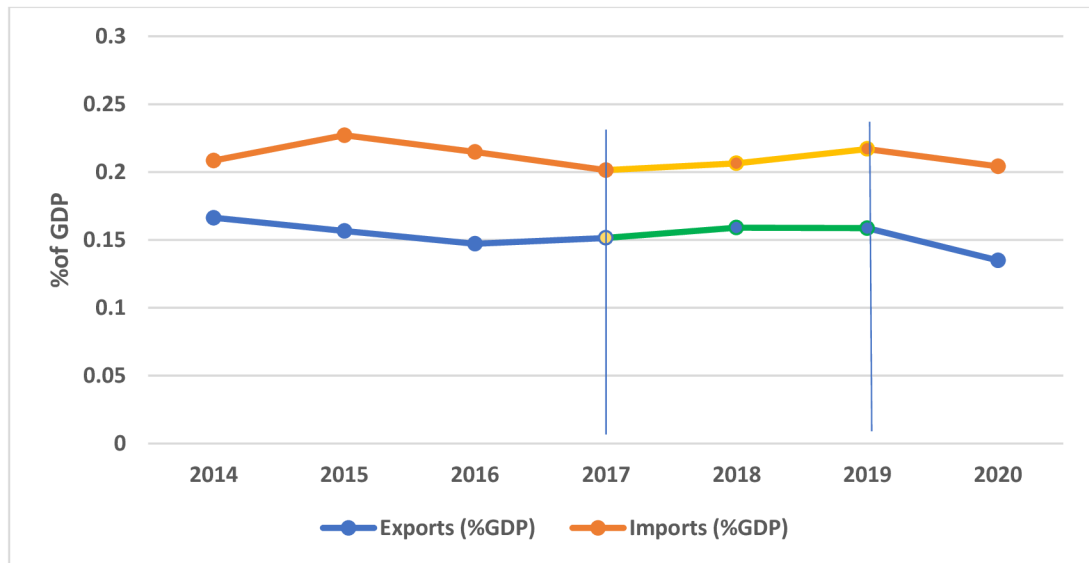
The difficulties in terms of society and production that were researched in Bonniec et al., (2005); Echavarria (2018); Jasmin Hristov (2015) contribute to an understanding of Colombia's rising standard of living and economic expansion. In addition, the percentage of people working in informal settings reached 47% in Colombia's 23 largest cities in 2019. “Rebusque”, also known as street vending, is the primary engine that drives the Colombian economy.

This type of commercial activity generates a significant portion of family income. It is common knowledge that commercial and financial activities do not contribute anything of value to the economy or the expansion of the economy. In 2019, only 52.41 % of the

population had formal employment. This is similar to the 52.58 % of the population who had jobs in 2017. Half of the population possesses the potential to produce value or innovation, both of which contribute to the expansion of the economy.

5.1 Current Account analysis

Graph 2: Exports and Imports Colombia



Source: Own elaboration, data from World Bank

The current account is calculated by subtracting the total of goods and services exported to foreign countries from those purchased from abroad. This accounting is used to better understand international trade and Colombia's competitiveness in terms of production, which is also influenced by exchange rates. Colombia exported 15,15 percent of its GDP in 2017, but internal markets required a total of 20,14 percent of GDP from abroad; this trade imbalance translates to a net export deficit of 5% of the GDP.

Trade balance deficit has a direct influence on the measurement of GDP, since the net exports is one of the variables taken into account of the GDP following the macro formula $Y = C + I(i) + G + NX$, as a result. The commercial deficit produced a reduction of GDP in 2017, and it had a direct impact to the economic growth because it represents the lack in terms of production. Colombia requires more foreign products even when it is a country rich in natural resources. The main products that Colombia exported in 2017 were petroleum oils, coal, coffee and gold. On the other hand, Colombia's, main products imported in 2017 were automobiles, transmission apparatus, petroleum and medicaments.

The main commercial partners in terms of exports were United States, Panama, China, Netherlands and Mexico, and the main countries that exported to Colombia in 2017 were United States, China, Mexico, Brazil, Germany. United States, Mexico, Brazil, Panama are peripheral countries what means that the transport cost is lower, and it also supports the gravity model that determines that countries will have better and greater commercial relationship if they are closer (Krugman & Obstfeld, 2004).

In 2019, the production of goods and services that foreign countries needed from Colombia was 15.9 percent; however, the deficit in the country's gross domestic production was greater, and the country's residents and businesses imported a total of 21.7 percent; this led to an imbalance in the country's current account of 5.8 percent of the GDP.

The main commercial partners for 2019 in terms of Colombian exports were, United States, China, Panama, Ecuador, Brazil. On the other hand, the main commercial partners that exported their products and services to Colombia were United States, China, Mexico, Brazil, Germany, and in this year is also applicable the gravity model of international economics explained in Krugman & Obstfeld (2004).

In terms of value added that is the engine of the economic growth and the real indicator that shows the gains or problematics in the performance of the economy in terms of contribution to the shifts in the GDP, the table below shows the percentual changes in the different economic activities in terms of value added.

5.2 Value Added Analysis

Economies only growth when the gross domestic production is expanded in both aggregate demand and supply. The Colombian performance in terms of economic growth has to be analysed based on the creation of value that is the real wealth of the economy, the rational and profit-seeking behaviours that suppliers have distorts the real concept of economic growth. Not all industries can create value, the main sector that produces changes in economic growth is the industrial one but the rapid growth of other sectors such as financial or commercial only distribute the money and can obtain gains.

The profitability of a sector and contribution in proportion to the GDP must not be understood as economic growth.

Table 6: Value added by economic activity in 2017 and 2019.

Economic activity/sector	Growth rate (%)2017	Growth rate (%)2019
Agriculture, Livestock, Hunting, Forestry And Fishing	5.5	2.3
Mining and Quarrying	-5.7	1.7
Manufacturing Industries	-1.8	1.2
Supply Of Electricity, Gas, Steam And Air Conditioning	2.9	2.5
Construction	-2.0	-1.9
Wholesale And Retail Trade, Transportation, Accommodation And Food Services	1.9	3.7
Information And Communication	-0.2	1.1
Financial And Insurance Activities	5.4	6.3
Real Estate Activities	3.1	3.3
Professional, Scientific And Technical Activities	1.3	3.4
Public Administration and Defence, Education and Health	3.5	5.1
Arts, Entertainment And Recreation And Other Service Activities	2.2	13.0
Total Value Added	1.4	3.2

Source: Own elaboration in Excel, data from DANE, 2017, 2019.

The table above depicts how the economic growth was built by each of the economic activities in which Colombia performs, by 2017 the greatest value was added by agriculture, livestock, hunting, forestry and fishing with a total of 5.5%, followed by the financial and insurance activities which contribute with a 5.4% and the other remarkable performance in terms of value added was made by government affairs such as public administration and defence, education and health, the Colombia economy also saw a decrease in value added in mining and quarrying (-5.7%), construction (-2.0%), manufacturing industries (-1.8%).

It was very important performance in terms of production, but agriculture, livestock, hunting, forestry and fishing is not a sector that generates the value added needed to compete to the other countries of the Organisation for Economic Co-operation and Development, the 5.4% of contribution added by financial and insurance activities is remarkable but this is not a sector which cannot help to economic growth since banks or bankers works in favour of its own benefit and focus on short-run gains in trading or other activities but not to the investment of productive activities (Stiglitz, 2013).

In the year 2019, the Colombian economy added value in most of economic activities as table (5) shows, the greater contribution to the GDP was by arts, entertainment and recreation and other service activities as a result of the orange economy that the new president Ivan Duque promoted, the result was very significant with a share of 13%, public administration and defence, education and health contributed in 5.1% that represents an increase of 1.3% from the value added by 2017. Additionally, it is also important to say that in this year the financial and insurance activities contributed to the economy in almost 1% more than in 2017, the unique sector which reduced value added in 2017 and 2019 was the construction one.

The total value added in 2017 was of 1.4% and 3.2% in 2019, meaning that the Colombian economy had an increment of 1.8%, the numbers from World Bank and DANE are reliable and congruent. A must to do analysis in this concern should be in terms of manufacturing since this is the real sector that produce wealth to the economy, by 2017 this sector did not contribute to the economy, meaning that the real production of the Colombian economy was reduced by 1.8% and in 2019 the contribution made by the industrial sector only represents the 19% of financial contribution.

The financial sector is taken the control of the economy what it very important given the fact that the promote the consumption and the investment but in terms of production this sector is generating more attractiveness and profitability, this is very remarkable because consumption increases, and the GDP is beneficiated. However, the industrial sector is not contributing as it should and it is translated in low salaries because the creation of wealth is driven by the production of good of services but this one is not remarkable in the studied years, this phenomenon is understood as financialization of the economy and in the Colombian case the short-run profitable investments are preferable than others, producing a movement of capitals to the financial sector .

Colombia is a developing country in which the agriculture has to be enhanced and industrialized, there were many attempts to industrialize the agriculture sector in Colombia with the purpose of producing more value added when commodities are transformed in new products. In the studied period the Agriculture, Livestock, Hunting, Forestry and Fishing generated an increase in the contribution to the GDP of 5.5% from 2016 to 2017 and from 2018 to 2019 it only represented a growth of 2.3, but in general terms this sector decreased

3.2%. Countries which are rich in natural resources should take advantage and produce more derived products but, the lack of industry and transformation of commodities is very harmful and produce poverty, since people who receives low income ought to transform that product in order to increase their incomes and thus the wealth of Colombia. A development of an economy is driven by this the transformation of the agriculture sector into a more productive and industrial one in which the rates of production in terms of capital or labour are growing.

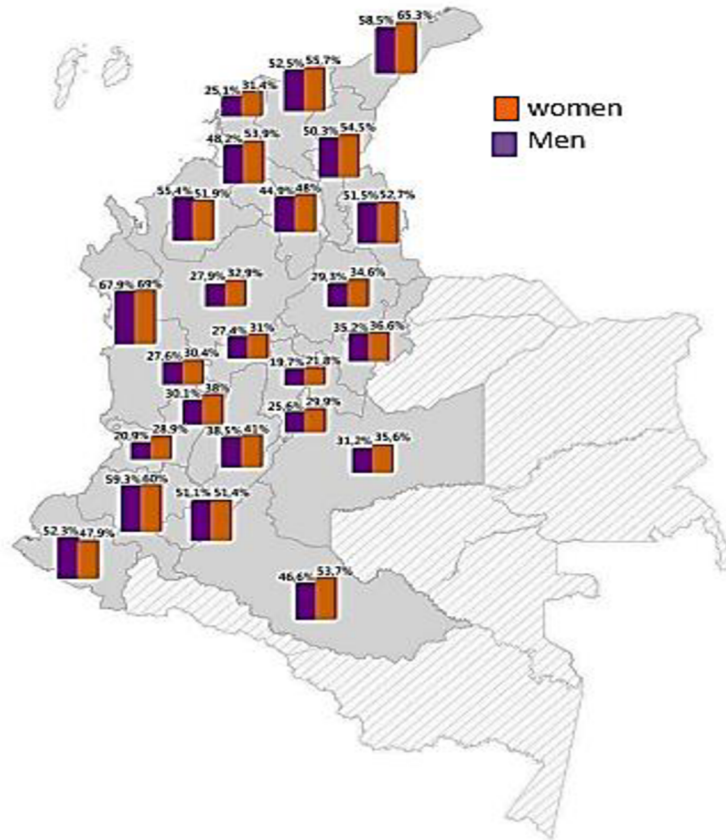
5.3 Poverty incidence analysis by gender

The limitations of poor families to access to credits are very high and in the case of Colombia women suffers a discrimination and it can be explained in the following map where poverty incidence by gender is notorious, what represents a lack in credits to afford education or living expenses.

Many things, such as discrimination in the workplace and differences in educational attainment and labour force participation rates, contribute to the gender income gap. Affirmative action programmes and gender-specific wage regulation are examples of policies that promote gender equality on the labour market and could be utilised to address this problem. In Colombia, the persistent wage gap between men and women is a major factor in the disparity in poverty rates between the sexes. On average, women in Colombia have significantly less economic autonomy and access to resources than men.

In order to see the 24 metropolitan areas that this diploma thesis study, the following map illustrates them with a perspective of gender inequality.

Figure 1: Map of Colombia, Poverty incidence by sex and by department



Source: DANE 2019

In Chocó, one of the departments with the greatest social and monetary deficiencies located in the west coast of the territory, it shows that both men and women have an incidence of poverty of more than 50 percent, which means that the children are already born without any means of support. The map represents a geographical perspective of how the inequality between men and women is worrisome. The notorious inequality occurs because women in most departments cannot access the same salary conditions or job opportunities as men.

On the other hand, the incidence of poverty among women reaches 63 percent in the department of La Guajira, located in the north of Colombia, and 53 percent in the department of Amazonas, which is located in the south of the country. This suggests that the departments that are the most geographically isolated are not being treated democratically.

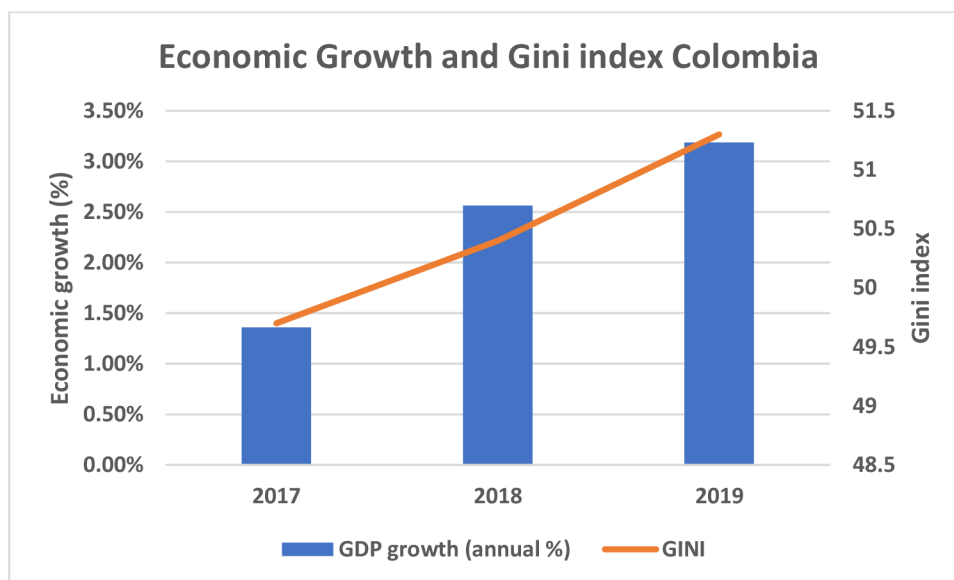
6 Evaluation Of Economic Growth on Income Inequality under The Analytical Pro-Poor Growth Assessment

The primary motivation of this diploma thesis is to assess the economic Pro-Poor growth in a period when the economic performance is ambiguous in terms of quality of life. The starting point of this research comes from analysing two macro indicators from two different disciplines of the economic theory, on one side, the economic growth and the other, the economics of development.

Regarding economic growth, GDP is the chosen indicator that shows the improvements or lacks in the production of goods and services over a specific time period, in this case, from 2017 to 2019, when the Colombian economy experienced an upward trend. On the other hand, the Gini index is used to evaluate the benefits of economic growth as well as the quality of life, taking into account that the lower the index, the more evenly the distribution of income is distributed.

A better appreciation of the constant rise in GDP and income inequality can be represented in the following graph.

Graph 3: GDP growth (%) and Gini index from 2017 to 2019



Source: Own elaboration, data from World Bank

The annual growth of GDP in the period studied produced an increase in inequality; this situation escalated in many analyses applied to developing countries. However, the

important thing here is to take a deeper look at what happens with wealthy societies and with those that do not have enough income to meet their basic needs.

As explained in the literature review, economic growth does not a guarantee of qualitative improvements in society. As a result, the heterodox approach to economics is used as a theoretical inclination in this study, in which economic growth is not a determinant of development or improvements in quality of life. Thus, the author wants to evaluate if economic growth gains reduce income inequality or poverty.

The main purpose of expanding production of goods and services within the Colombian borders is to provide the monetary resources that will be used to implement policies focused on nation's development. The use of resources is determined by the ideology of the political parties that are in charge.

The political orientation that Colombia has had in the studied period is the right wing. That government follows the neoliberal model using the neoclassical economic approach and very low state intervention in the economy. Based on the fact that human rationality and the laissez-faire will regulate by themselves the performance of the economy and thus of the society, in which the individual human chase for a better life is basically based on the motivation that a person or family have, and problematics such as the inequality rises basically for motivational lacks. In the case of Colombian society, that political and economic orientation has been the predominant one, and the property rights based on liberalism policies have been the ones that have been the most relevant.

Following that idea, the analytical method of Pro-Poor growth using the inequations seen in the equations (10,11) evaluates if the implemented policies by the Colombian government and central bank provided gains to the 20% most rich (r), to the 20% most poor (α) or both parts of the society, and it is one of the motivations of this research given the fact that the many analysis such as Tsuei (2009) have demonstrated that economic growth and income inequality rises when neoliberal policies are implemented in underdeveloped countries. Additionally, the constitution or Magna Carta of the republic of Colombia agreed in 1991, stablish a democratic society, in which it must represent all the thoughts or ideologies of the citizens that in turns are influenced by the economic organization and ownership of the means of production.

6.1 Analysis of the variables

In order to understand the proposed and implemented method that determines if the poorer 20% of the Colombian society obtains gains from economic growth in terms of median income, we need to build the variables (θ, Φ) which are the median income for 2017 and 2019 respectively, which in turn are the most important ones given the fact that they are a measure of income. Firstly, it is necessary to split the population into quintiles, given the fact that each of the quintiles represents one-fifth of society. After dividing the studied population into 5 segments, we will only use the upper and lower ones.

- *The bottom quintile (α) refers to the 20% of the population.*
- *The top quintile (r) refers to the 20% of the population.*

Since the variables (α, r) only represents the population to study, but they do not provide any additional information to determine poorness or richness, therefore, it is now needed to generate the two most important variables (θ, Φ) .

- *The median income in 2017 of the metropolitan areas of Colombia represented as θ .*
- *The median income in 2019 of the metropolitan areas of Colombia represented as Φ .*

Following the formula (1) that represents economic growth, we can obtain the variables in terms of percentage (%) in order to assess changes of median incomes between years. As a result of merging the four previous variables, we can now obtain the indicators to assess the changes in median income for both commented tails (α, r) of the Colombian society.

Equation 12: Median income growth of poorer Colombian population in 2017

$$\theta\alpha(\%) = \left(\frac{\text{Median income 2017} - \text{median income 2016}}{\text{Median income 2016}} \right)$$

$\theta\alpha$ = The median income growth of 20% poorer population of the Colombian metropolitan areas in 2017.

Equation 13: Median income growth of poorer Colombian population in 2019

$$\phi\alpha(\%) = \left(\frac{\text{Median income 2019} - \text{median income 2018}}{\text{Median income 2018}} \right)$$

$\Phi\alpha$ = The median income growth of 20% poorer population of the Colombian metropolitan areas in 2019.

Equation 14: Median income growth of richer Colombian population in 2017

$$\theta r(\%) = \left(\frac{\text{Median income 2017} - \text{median income 2016}}{\text{Median income 2016}} \right)$$

θr = The median income growth of 20% richer population of the Colombian metropolitan areas in 2017.

Equation 15: Median income growth of richer Colombian population in 2019

$$\phi r(\%) = \left(\frac{\text{Median income 2019} - \text{median income 2018}}{\text{Median income 2018}} \right)$$

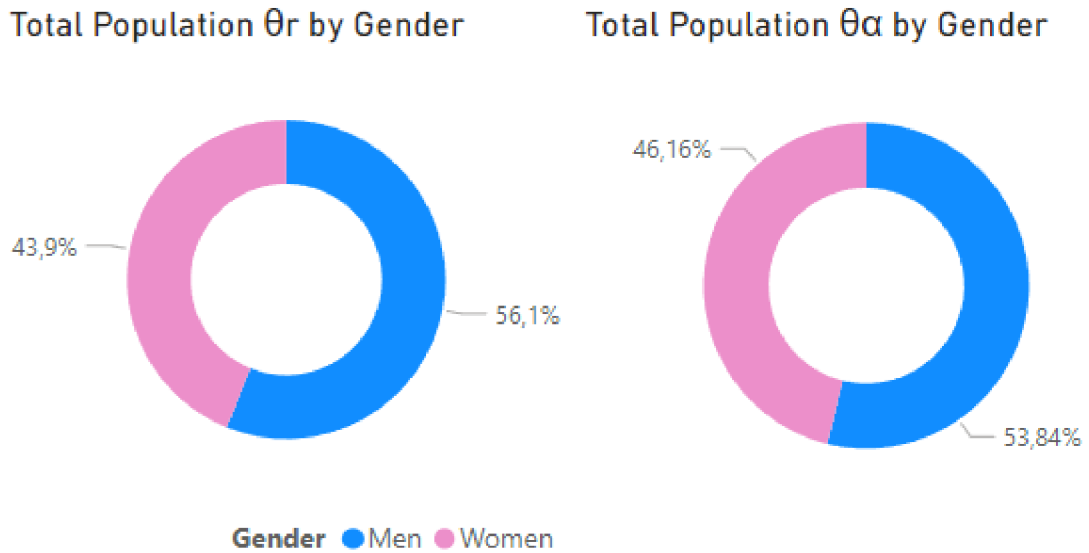
Φr = The median income growth of 20% richer population of the Colombian metropolitan areas in 2019.

6.1.1 Analysis of gender inequality in terms of income and economic growth

The population analysis regarding gender is fundamental since it influences changes in unemployment. That is one of the significant macro-economic variables affecting economic growth. As explained before, the unemployment rate from 2017 to 2019 grew but the inflation decreased, representing an unexpected trend. Following that idea, the income variables are divided by women and men to see if the policies applied during the two

presidential terms that occurred in the studied period produced changes in gender equality. Using the data set, this is the results by gender.

Graph 4: Total population by gender of the richest and poorest segment

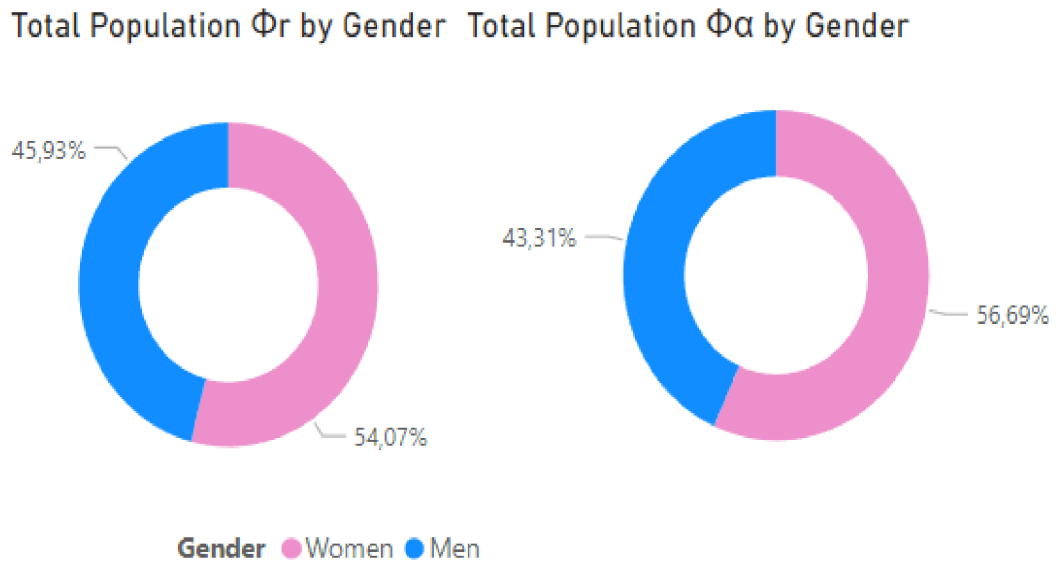


Source: Own elaboration.

According to the data presented in the preceding graph (4), the population under study exhibited only a marginal gap between the sexes in terms of income in 2017. This was true both for the top 20 percent of earners and the bottom 20 percent. Although men make up 66,1 percent of the population in Colombia, women make up just under half of the population in the 24 metropolitan areas that were analysed for this study. In contrast, women make up only 43,9 percent of the population in (α), while men make up 66,1 percent. The difference of 12,2 percentage points can be attributed to the fact that women who have greater privilege in terms of income tend to have lower levels of education or less work experience as a result of the pregnancy.

Additionally, the most vulnerable population (a) of these 24 metropolitan areas shows only a very slight income inequality by gender, which comes in at 7,8 percent. This is because households with the greatest needs must go out and look for food. In any event, putting aside Colombia's traditional machismo needs to be done.

Graph 5: Total population by gender of the richest and poorest segment



Source: Own elaboration.

As the right side of the graph (5) demonstrates, in the 24 metropolitan areas of Colombia that were analysed in 2019, women have a higher participation rate in terms of income. Women make up 56,69 percent of the population with the lowest income (α), while men make up 43,31 percent. This results in a gender inequality of 13,37 percent in terms of income. It demonstrates that there were more women in poverty in terms of median income in 2019 than in 2017.

On the other hand, data for the population in Colombia with the highest income in 2019 reveals that women have a higher participation rate than men. Women make up 54 percent of this population, which is 8.13 percent higher than the proportion of men who make up 43.31 percent. It is interesting to analyse this because in 2019, women obtained a greater participation, which demonstrates that the policies applied in 2019 were inclusive and even in favour of gender equality at both ends of the society studied in 2019. In conclusion, the economy from 2017 to 2019 was based on inclusive gender policies since 2019 showed that women turned up the trend in terms of income participation in (α) and (r).

6.1.2 Analysis of education in terms of income and economic growth

Capital (K) and labour (L) are essential inputs according to the classical economic thinking in terms of economic growth, because they are the tools for producing of goods and services. However, depending on the business cycle and external factors, their optimal combination can vary, producing surpluses or shortages. This can have a negative impact on economic growth. Furthermore, the creation of value represented as economic growth or productivity of the production factors have to be driven by variables that produce qualitative changes in the performance of capital and labour.

Labour productivity is necessary in a capitalist world because labour is the source of wealth but not the wealth multiplier. This is due to the fact that the labour force or population growth can be extremely high even though the production of wealth is very low. For this reason, Mankiw et al. (1995) expressed nonconformity with Solow's model by explaining that education produces qualified labour that in turn produces more goods and services with the same amount of labour.

Following the idea of qualitative improvement of production by higher qualified people, it is important to analyse the education of the studied population.

Table 7: Descriptive Statistics for years of education of the 20% bottom and top, 2017,2019.

	Variable	Mean	Std. Dev	Min	Max
2017	Years of education (α)	5.8	4.76	0	25
	Years of education (r)	13.1	4.55	0	26
2019	Years of education (α)	5.0	4.20	0	26
	Years of education (r)	13.9	3.44	0	26

Source: Own elaboration

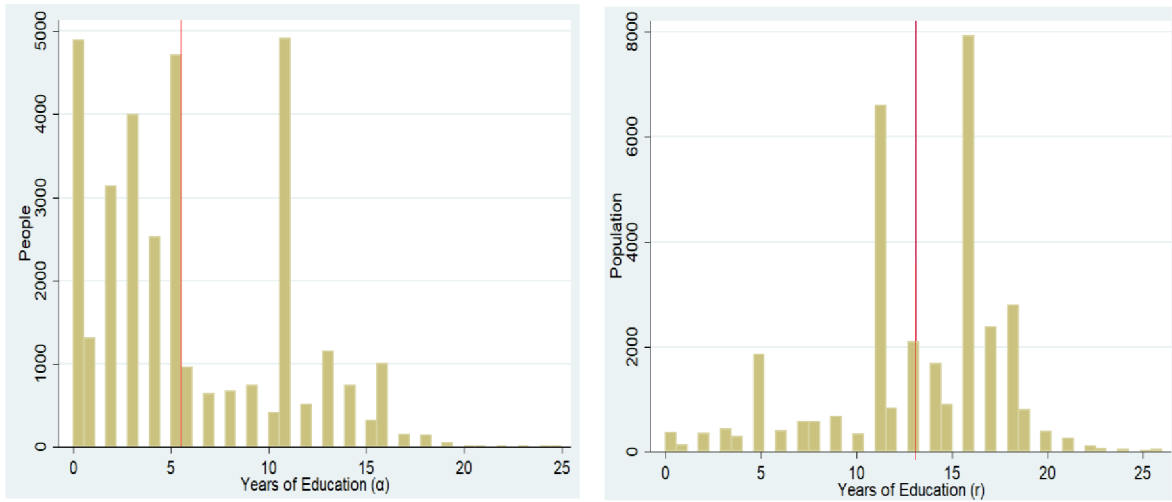
The mean of academic years of (α) in 2017 is only 5,8 and for the top 20% of the studied population is 13,1, taking in consideration the assumption that, the less education a person has, the less the value added is created. It follows the idea that people who receive the 20% lowest income of the data set analysed should not be able to create significant

amounts of value added when performing any activity. However, the result is totally different in this case given the fact that there are people who have coursed 25 years of studies but receives very low income. This circumstance can be produced by unemployment or by not remunerated jobs. In this case the median cannot be analysed because the outliers are describing unpredictable assumptions. This circumstance can be explained by either frictional or cyclical unemployment, the first one is caused by changes from one job to another or when people is looking for their first job. The cyclical one which is explained in the Keynesian theory is caused by the contractions and expansion of the economy in which some positions in this case very qualified ones, are not needed or are very expensive to afford by companies.

On top of that, the people located in the fifth quintile of the studied population in terms of income have an average of 13,1 years of education that is very low in comparison to developed countries, 13 years of education represents people who have reached at most a college degree or started a bachelor program without finishing, to have a better view of this, it need to see the following histogram.

In 2019 the gap between the average years of education between (α) and (r) was even bigger than in 2017. The average years of education of the poorest segment of the society is 5 and for the richest segment of the society was of 13.9 meaning that (r) are 276% more educated in average then (α) what represents a lack in terms of productivity and social consciousness. Education is one of a society's aspects to achieve economic growth. Taking into account equation (2), in which variable A is the technological change. In this case, that variable can be taken as endogenous and be transformed into education. That result from the economic model explained by (Romer, 2018), and following that idea the contribution to productivity is very uneven also, the innovation is biased since the spill overs can only be appropriated by (r) because they are the unique one who has a comprehensive skill to catch it.

Graph 6: Histogram, Population with years of education (α , r) in 2017.



Source: Elaborated in Stata software

The red line in the histograms (graph 6) represents the average years of school in (α) and (r). The differences between the two means is of 8 years, what confirms the theory of Mincer (1975) in which the income that a person receives depends on the education obtained. However, in this case there exist an asymmetry given the fact that in Colombia the remuneration is not proportional to the years of education and in many cases people with master's degree receive the same wage than a person with bachelor's degree.

Botello & Guerrero (2019) proposed a methodology to study this phenomenon and both methods implemented showed that the majority of the population with a college degree has an excessive amount of education. In contrast, the number of people with inadequate amount of education is either very low or non-existent. This disparity is likely the result of university graduates being hired for positions requiring excessive education.

Table 8: Correlation between income and years of education (α).

Correlation Income and Years of education	
Correlations	
2017 (α)	-0,4643
2019 (α)	-0,2858
2017 (r)	0,0674
2019 (r)	0,0911

Source: Own elaboration

In terms of economic growth, education is one of the variables that produces qualitative changes in the performance of the economy, as seen in the literature review Mankiw et al., (1995); Mincer (1975); Romer (1986). Education produces shifts in aggregate supply and demand even keeping labour force constant, this can also translate to rises in wages. In the 24 metropolitan areas studied, the data set showed an inverse correlation between years in education and income for the popular in (α) for 2017 and 2019.

This inverse correlation between years of education and income in a society with more needs in terms of income (α), determines that in Colombia people with lower incomes are not interested in improving their education. Since more education requires more money that they do not have and also if they got that extra education the income would not increase. It is also rectified in the study of Botello & Guerrero (2019). The informal labour market is greater than 50%, meaning that the Colombian economy is based on the commercial sector that does not produce notorious creation of value added. If people with the lowest incomes would take the risk of getting credit from a bank to afford its further education, the return of the money for this investment in education is very small or even 0.

Inequality is notorious at the moment of correlation analyses, given the fact that the poorest 20% of people do not get improvements in terms of income if they have access to better education. On top of that, the 20% of people with the better incomes could improve their incomes with gains in education but the relationship between those two variables is weak.

6.2 Economic Pro-Poor Growth Analysis

The pro-poor economic growth method proposed in this study aims to determine whether the growth in the production of goods and services between 2017 and 2019, which caused increases in income inequality (GINI), resulted in income gains for the most economically vulnerable population in terms of income. As previously described in the methodology, the system of inequations solves the problem question formulated in this diploma thesis.

The field of economic growth does not assess nor consider the distribution of income or poverty, but to achieve income fairness or solutions of normative warnings is necessary to apply the economic development theory. When discussing economic growth, citizens of

a country feel satisfied if it has improved its behaviour, which is represented in this case in Colombian pesos. However, increases in the production of goods and services do not guarantee that all people of a country benefit from this growth, which is why it must be counted in percentages because currency numbers cannot be used to evaluate changes between periods because of inflation.

Suppose the most vulnerable population is satisfied with the Colombian central bank's positive reports but looks around and realises that their quality of life or economic situation is not correlated with the annual report. In that case, GDP per capita is also meaningless to the population in general. Since GDP per capita is not a determinant of quality of life, as classical economists believed, it is necessary to examine changes in income, in this case in (α, r) .

Economic Por-Poor growth can be understood under different approaches. It has been studied more since the analysis of the Kuznets curve, and the assumption that the poor will always obtain gains if the richest receive more income. They spend that money into the economy and also create more jobs, and the circulation of the money through the economy will bring more income for (α) . This controversial thinking is known as trickle-down.

To answer the proposed question, the author attempts to use the relative EPPG approach, which implies that the benefits from economic growth are distributed more evenly between (α, r) but focuses on whether the gains in (α) were more significant than the gains for (r) , but the results could determine other performance. The relative approach implies a reduction in poverty and inequality, and it is the democratic way to see if the requirements of (α) are taken into account when economic growth and distributive policies are planned.

$$(\phi > \theta)_\alpha > (\phi > \theta)_r = (\phi\alpha > \theta\alpha) > (\phi r > \theta r) \quad (12)$$

The left side of the inequation $(\phi\alpha > \theta\alpha)$ represents the poverty of the 24 metropolitan areas studied, the changes in poverty have to result in its reduction. On the other side, the richness of the studied population $(\phi r > \theta r)$ should result in decreasing, given the fact that the relative approach aims to reduce inequality. The symbol ($>$) located in the middle demonstrates whether the economic growth is Pro-Poor or not.

The table (9) and (10) represent the results of the processed data after building the variable income joining by month and year data sets.

Table 9: Descriptive statistics from income medias

	2016		2017		2018		2019	
	α	r	α	r	α	r	α	r
Median	COP 347.939	COP 1.038.237	COP 379.996	COP 1.200.000	COP 412.052	COP 1.361.763	COP 350.000	COP 1.462.227
Min	COP 0	COP 856.200	COP 0	COP 921.717	COP 0	COP 1.041.540	COP 0	COP 1.113.500
Max	COP 437.147	COP 153.000.000	COP 497.339	COP 50.000.000	COP 512.259	COP 56.500.000	COP 486.415	COP 202.000.000
Mean	COP 312.629	COP 1.420.339	COP 316.290	COP 1.670.063	COP 1.720.165	COP 1.887.171	COP 322.255	COP 1.938.435

Source: Own elaboration.

The results are very interesting, but before analysing them, it is important to mention that the data processed provided unexpected results. Maximum income in 2018 and 2017 is very low compared to the maximum income in 2019 and 2016. In 2017 the maximum income was reduced by 67,3%; by 2018, the maximum income was 257,5% less than in 2019. This could happen because of the problem when doing the surveys in the metropolitan areas.

In the year 2016, the average income for (α) and (r) was COP 312.629 and COP 1.420.339, respectively and the maximum for (α) and (r) was COP 437.147 and COP 153.000.000, which represents a very high inequality. One year after, the average income for (α) and (r) was COP 316.290, and COP 1.670.063, respectively and the maximum for (α) and (r) was COP 497.339 and COP 50.000.000, which represents a very high inequality. The average income for (α) grew by 1,17%, but in 2017 the average income for (r) grew by 17,58%, representing real inequality in terms of average income; the average income grew more for riches than the poorest.

From 2018 to 2019, the maximum income for (r) was COP 56.500.000 and COP 202.000.000, respectively. This represents a growth of 257,52%; on the other hand, the maximum income for (α) was of COP 512.259 in 2018 and COP 486.415 in 2019, which represents only a rise of 5%. The average income in 2018 for (α) was of COP 325.779; in 2019 was COP 322.255, representing a decrease of 1,08%. Once again, the inequality between (r) and (α) shows itself when looking at the maximum income and the average income, and the wealthier population obtained more significant increases in both of these measures.

Table 10: Percentual differences in terms of median income

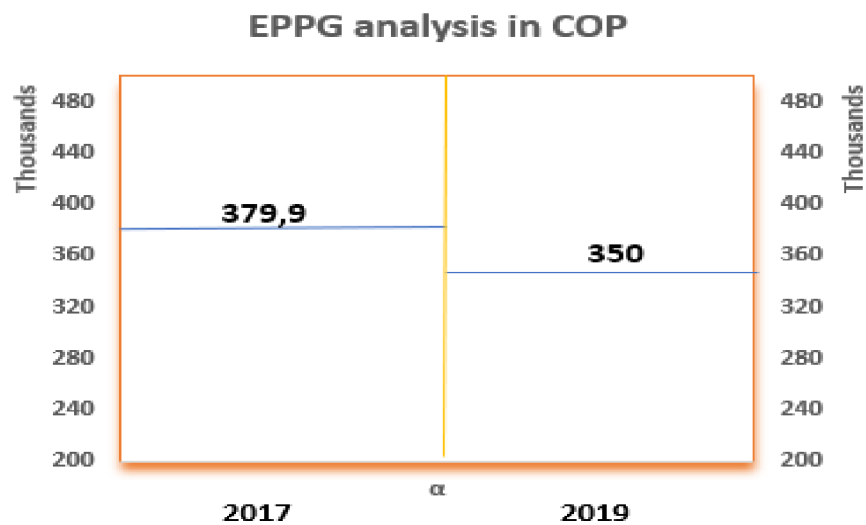
$\Delta\%$ Median	2017 growth (%)		2019 growth (%)	
	α	r	α	r
	9,21%	15,58%	-15,06%	7,38%

Source: Own elaboration

Since the median income is the predetermined variable used to evaluate the EPPG model, it is essential to examine the changes between 2016 and 2017 and between 2018 and 2019. Table (10) represents the percentual changes in the median incomes in the years 2017 and 2019, which were the years in which there was a direct correlation between economic growth and income inequality. The median income growth for (α) was 9,21% in 2017, and for (r) was 15,68% in 2019, representing a gap in terms of income medians of 6,37%. The median incomes are a reliable variable to determine changes in income since it does not include outliers but provides an understandable performance in terms of distribution.

The author creates the following graph to illustrate the differences in median incomes in the 20% poorest segment of the studied population (α) and (r).

Graph 7: EPPG in monetary units (α)

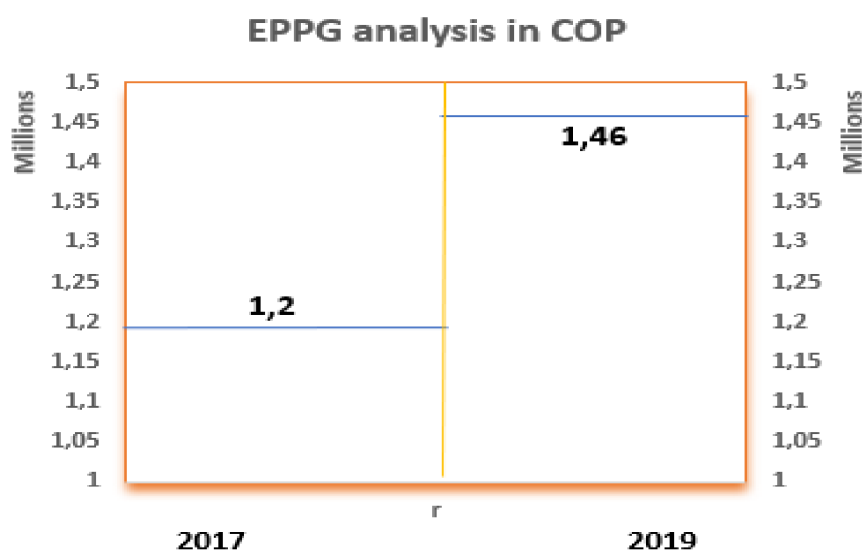


Source: Own elaboration.

The graph (7) illustrates the decrease of median income from 2017 to 2019 in the poorest segment of the 24 Colombian municipal areas that this research studies, in terms of units of currency this change was of -COP 29.996 meaning that in 2019 (α) people can afford less than in 2017, and if the analysis takes into the account the inflation which decreases in 0,79%, the purchasing power in ambiguous given the fact that they receive less median income but the purchasing power increase. The living situation in which this population lives is very impressive given the fact that there exist social disorder and the feeling of getting poorer through the years does not produce an incentive for getting a better job or even to continue studying, producing less competitiveness in the low qualifies labour.

The problematic is evident given the fact that population with scarcity does not have opportunities, and the streets offers more income incentives than the educational and labour system. The informality in terms of jobs is caused by a lack of opportunities in high education or the labour market, the cases of robbery rises even when the number of police officers are very high and the expenditure in defence in proportion to GDP is also very high and even more significant than in expenditure in education or culture. The decrease in median income for the population produces incentives to incur in alternative jobs like prostitution or drug traffic that break the social moral.

Graph 8: EPPG in monetary units (r)



Source: Own elaboration.

On the other hand, the changes in median incomes from 2017 to 2019 in the wealthiest segment of the 24 municipal areas in Colombia where this research is conducted are depicted in graph (8). Because inflation has been brought under control and the median income has increased by COP 262.227, it is common knowledge that the richest segment of the population has seen an increase in their purchasing power and thus can save or consume more than it can translate in some way to a better quality of life.

The rise of COP 262.227 in the median income of the wealthiest studied population is explained by the rate of investment in education or better personal or familiar contacts, given the fact that most of them have access to universities or assets that back the credits given by banks. Education is very important to explain this, since the educational system is based on meritocracy, people who have the resources to afford better schools are the ones who can pass the entrance exams of the public and low-cost universities. It is important to inform that there is a big inequality into (α) and (r) , and even people classified as (r) in this data set does not have the incomes to afford their studies or studies of their family, which generates a relative inequality in each of the studied groups.

After having a perspective on monetary units, the analysis of EPPG can go further to determine if the economic growth provided any benefit to the 20% population with the lowest median income.

The main results to answer the formulated question are in table (10). The inequality of income measured by the Gini index showed that in Colombia, the unfair distribution was 49,7 and 50,4 by 2019. This inequality was also perceived in the proposed method; in terms of EPPG theory, it is necessary to use the proposed method to be able to have a specific decision about the poorest segment of society.

The results of the growth from 2016 to 2017 in terms of median income were 9,21% for (α) and 15.58% for (r) , which can be represented as:

$$\theta\alpha = 9.21\% ; \theta r = 15.58\%$$

Equation 16: Inequation of median Income for (α,r) in 2017

$$\theta\alpha < \theta r \quad (18)$$

The economic growth from 2016 to 2017 was 1.36% but the gains were absorbed to a greater extent by the wealthiest segment of the 24 metropolitan areas studied meaning that the economic growth was pro-rich. Nevertheless, this result is very interesting since the Gini index change from 2016 to 2017 decreased by 0.009 points.

In the case of the changes from 2018 to 2019, there was an economic growth of 3.19% the greatest in the studied timeframe and the changes in median income were -15.06% for (α) and 7.38% for (r), which can be represented as:

$$\phi\alpha = -15.06\% ; \phi r = 7.38\%$$

Equation 17: Inequation of Median Income for (α , r) in 2019

$$\phi\alpha < \phi r \quad (19)$$

The outstanding performance of the economy in 2019 brought negative results in terms of inequality and poverty reduction. There were more significant gains to the wealthiest segment of the society of the 24 metropolitan areas studied. The Gini index also increased by 0.009 points, determining that the results of this method are congruent in determining a pro-rich economic growth from 2018 to 2019.

The main purpose of this diploma thesis and the answer to whether the economic growth during 2017 and 2019 were beneficial to the 20% of society in poverty can be found in the following analysis.

Table 11: Determinants of EPPG

Changes in median income between Θ and Φ		
	α	r
$\Delta\%$	-24.27%	-8.20%

Source: Own elaboration in Excel.

Determining whether a society functions in favour of the wealthiest portion of the society or the entire society is complex, but in this case, the instrument to carry it out is the median income of the 24 metropolitan areas of Colombian society, divided into two segments. On the one hand, the poorest one (α) and, on the other hand, the richest one (r). Pro-poor growth is a field of economics which has proposed different ways and approaches to measuring and determining it. The table (11) provides information about the changes of ϕ and θ and connects Colombia's growth and development in only one analysis.

The changes in median income from 2016 to 2017 for the poorest segment of the society in Colombia were 9.21 percent, and the changes in median incomes from 2018 to 2017 for the same segment of the Colombian society were -15.06 percent; as a result, the growth from those two changes was -24.27 percent, which indicates that the studied population experienced a significant decrease in their median incomes even when the performance of the economy was growing during that time. It can be represented as:

Equation 18: Left hand result of Pro - Poor growth in (α)

$$\theta\alpha > \phi\alpha \quad (8)$$

Analysing the wealthiest segment of the economy, which obtained a growth of 15.58% in terms of median incomes from 2016 to 2017 and a rise of 7.38% from 2018 to 2019, did not obtain the same performance when comparing those rates. Even if the growth rates from 2016 to 2017 and from 2018 to 2019 were positive, the changes in median incomes between (θr) and (ϕr) were negative, with a total decrease of 8.20%. It can also be represented as:

Equation 19: Inequation, right hand result of Pro - Poor growth in (r)

$$\theta r > \phi r \quad (10)$$

As a result of the two previous inequations, a final one can be built to determine what happened to the poorest part of the 24 metropolitan areas studied.

$$(\phi\alpha < \theta\alpha) < (\phi r < \theta r) \quad (17)$$

The left side of the previous inequation represents people with the lowest income and can be categorized as the less qualified labour force, and the right side represents the wealthiest people who contribute a more significant proportion to the GDP. The production of goods and services from 2017 to 2019 improved by 1.83%. However, the result from the proposed EPPG system showed no gains in median income to the most needed population nor to the wealthiest one.

It is inferred that the economic growth from 2017 to 2019 was Pro-Rich, given that the reduction in median incomes was more remarkable for the society with more needs than the reduction in median incomes from the 20% richest population. That conclusion also provides this diploma thesis with an expected relationship between income inequality and economic growth. The important point from the previous equation is that the inequality grew even when the richest 20% obtained reductions in their median incomes.

In terms of poverty, the problematic was more dramatic because it worsened even when there was more production of goods and services. It means that there was a lack of budget to purchase that production, and if the country is a net importer, the prices of goods and services are more competitive than the national ones producing in the long run a shrink of the gross production of Colombia.

The Pro-Poor Growth Theory takes the general approach that public policies should be based on economic growth because this will lead to a reduction in poverty and inequality. This will also include benefits for wealthy people, those who are poor, and those who are not poor. If this approach is taken into account based on the results of this diploma thesis, the author can deduce that in the 24 metropolitan areas where the research was conducted, the economic policies did not improve the lives of either the poor or the rich in terms of median incomes.

Additionally, the economic growth and policies applied during the studied period were not in favour of the poor nor in favour of the rich under the strict approach, since the economic growth is the main point, and it cannot be affected by reduction of poverty or inequality. This strict approach focuses on reducing poverty without harming economic growth. However, in a developing country like Colombia, is very hard to apply fiscal policies and capital investments while inequality or poverty are taken place.

Based on the partial approach of Ravallion et al. (2003) which is purely based on the poverty, the studied poor population obtained gains in terms of median income from 2016 to 2017 but this segment of the Colombian society decreased their median incomes in the studied period. It is understandable since poverty policies affect the budget and investments that should be focused on economic growth. The poverty in terms of income is biased since there were people who could contribute to the economic growth regarding labour productivity, but they were included in the poorest segment.

Under the full approach (Ravallion et al., 2003), the studied population does not obtain any gain from economic growth. The richest segment decreased their incomes, and the poor did not receive any benefits either. It means that there were no policies that pursued gender inclusion, infrastructure or academic development, and for that reason, the economic growth was not pro poor for the studied population in the 24 metropolitan areas during 2017 and 2019.

As a result, this diploma thesis can infer that increasing economic growth of 1.83% from 2017 to 2019 was not beneficial to the 20% of society in the condition poverty. Inequality is also represented when there is a reduction in the median incomes, meaning that the most affected segment of the society is (α) given the fact that the 24 metropolitan areas studied in that period obtained a decrease of 24.27% in their median incomes and the (r) richest segment only reduced their incomes in 8.20%. This results in a lack of democracy since the economy and politics are conducted in favour of the richest segment of the society. This is also explained by the neoliberal approach taken by the two presidencies that took place in the studied period. Those policies are based on the Say's law which builds a social and economic system based on the richest persons who are the production owners and control the supply side of production.

7 Social, Economic and theoretical debate under the obtain results

According to the findings, Colombia is an unequal country, and the people who have the most significant shortcomings in terms of quality of life and median income are the ones who suffer the consequences of the policies that have been implemented. This was determined based on the results that were obtained. It is generally accepted that the nation's profits and losses ought to be distributed equitably among all of its civilians in a democratic state, and if the owners of the capital are the ones who obtain the highest return on their investments or for putting their capital at risk, then they too ought to suffer the greatest losses; alternatively, the nation ought not to operate under a supply-based system in which businesspeople or the wealthy exert political influence. Consequently, those negatively affected would be those whose average education level is less than six years. However, this does not imply that they should experience the greatest median income loss.

According to Solow (1956), economic growth can achieve multiple results when the economy is in conditions of full employment. This is due to the fact that capital and labour can produce to a greater extent when technological changes are included in the economy as exogenous factors. In the case of Colombia, this is something that is impossible to occur because of the rate of job informality; however, during the time period that was studied, "economic growth" was not based on technological changes or innovation processes, which are the major contributors to changes in the production of goods and services as denoted by Mazzucato, (2011). On the contrary, the 1.8 percent GDP growth was based on sectors that do not produce, such as the financial and commercial sectors, which complicates the country's competitiveness from an international point of view.

Following the idea "the financial sector has perfected its skills in a wide range of rent-seeking activities"(Stiglitz, 2013), Colombia is not the exception as it was seen in the chapter 6, where the sector which more contributed to the economy was the financial one both in 2017 and 2019. However. the critique here is about the lack in production from the manufacturing sector that only the 1.2% in 2019 and -1.8% to the creation of value of the Colombia economy, in 2019 it only represented the 33% of the total value added from the financial sector that is catastrophic for a country with a wide variety of commodities that are not transformed with the purpose of creating value added.

The problem with the Colombian economy and society is the narcoculture and the pursuit of short-term profit, and both are related. Echavarría (2018) expressed that the rent seeking tendency in Colombia has been notorious for more than 50 years even before the cocaine boom. Therefore, the period previous to the neoliberalism instauration the rent-seeking from the land valuation was one of the major habits in terms of investment but the problem lies in the purchase of land with no aim of exploitation, meaning that the low value added in production of goods in 2017 and 2019 is based on a lack in the exploitation of land because the rent that produces the land is enough and it does not require any investment.

Economic growth based on productivity in the case of Colombia is also explained by the social problematics in terms of illegal appropriation of land as explained in (Hristov, 2015). The research of Jasmin Hristov (2015) also demonstrates that neoliberalism has affected the social development of Colombian and the economy.

In terms of development, the Pro-Poor analysis of this diploma analysis was very congruent, given the fact that from 2017 to 2019, the economic growth was not Pro-Poor and the living conditions in terms of median income are affected since the responsibility of the unfair income distribution is taken by the poorest 20% of the 24 studied metropolitan areas.

The neoliberalism showed that the Colombian economy is not prepared for competitive international markets. Therefore, the exports were lower than imports by 5% in 2017 and 5.82% in 2019, the implemented policies have triggered a complex problematic between the economic growth and the social needs. The open markets and low intervention into the economy, and very flexible trade policies have affected the internal market because of social distortions.

Londoño (2011) showed that the beginning of the neoliberalism in Colombia was beneficial for people with not qualified labour but it also increased the unmet basic needs. The study of Botero (2021) shows how the hegemony of the capital control the political sphere and thus the policies, the poverty increases as result of protection of the capital.

“Theoretically, as people's savings are redirected into financial speculation, there will be less money available for investments. The result is a decline in productivity, which in turn increases the absolute surplus value because any increase in profit that can be

transferred to financial rent must be achieved through wage cuts or increased working hours to increase unpaid work.” Bonniec et al. (2005)

The relationship between financialization and income inequality are based on what Bonniec et al. (2005) says, because people with low incomes have not enough money to access financial assets and the rate of savings is very low or even 0. Those who can save, however, have a tendency to invest in speculative and risky ventures, which has a dramatic impact on productivity because the ratio of labour to GDP ($\frac{L}{Y}$) is not increasing due to the generation of profits through alternative ways to labour.

The results obtained in this diploma thesis present some complications given the fact that poverty cannot be determined using the median incomes, because incomes are tied to the labour market and informality, which distorts the results. The method proposed in Laverde & Corredor González (2016); Laverde & Gómez, (2015) showed that in the case of Colombia, the measurement of poverty or determination of the benefits that the poor get, using income as the indicator is unsuitable and the results between the Colombian regions can vary notoriously. The reduction of poverty and inequality by GDP growth is not seen in the results of the implemented method of this diploma thesis, because economic growth in Colombia has not followed the idea of generating added value. Gómez & Torres (2006) shows that inequality in Colombia is reduced by distributive policies and economic growth, but the distributive policies are more representative than economic growth.

The section (6) also showed how Colombian economy has deficiencies in the primary sector, and it is needed an agrarian reform which looks for incentives to invest in the industrialization of this sector in order to produce more competitive products given the fact the more productivity in capital ($\frac{K}{Y}$) and labour ($\frac{L}{Y}$), the lower the products will cost and thus the transformation from a net importer to a net exporter will be achieved.

Economic transformation is needed in Colombia, based on the results in which economic growth produced inequality and exacerbated poverty from 2017 to 2019 in the 24 metropolitan areas studied. It is important to go beyond that and analyse the policies that should drive Colombia to a sectoral change in terms of production and employment. Low income in (α) and the lowest incomes in (r) can be improved if policies are applied and focus

in the value chains and sectoral productivity, these policies should drive the needed structural transformation of the Colombian economy since the inter-sectoral gaps are huge.

The structural change combined with an agrarian reform will produce in the Colombia economy shifts in labour from low productivity sectors to the sectors with high capital intensity. However, firstly the primary sector has to be transformed in order to produce more value and thus the value chain will be enforced. The value chain improvement has to be accompanied by educational improvements. Timmer (2008) contributes to the idea that static gains in the agriculture will lead the economy to the creation of value added and a faster technological change that was the main thesis of Solow (1956). The agriculture employment has to be reduced by labour movement to more productive sectors like industrial one. Southeast Asia is the best example to follow and compare the Colombian economy.

The narcotraffic and the illegal appropriation of land explained in Jasmin Hristov (2015) explains the low income and huge inequality in Colombia, but the government has to transform the rural zone into a productive zone in order to achieve reduction in both inequality and poverty and at the same time lower incomes would increase. Agriculture and land reform in Colombia are Pro-Poor since people with low incomes will obtain labour opportunities and the current agricultures will move out to more productive industries, producing economic growth, reduced unemployment, and increments in low incomes.

8 Conclusion

The author can infer that income or median income is not a variable to determine poverty or to analyse inequality since the population studied showed that there were people with high academic preparation who do not receive any income but their productivity and contribution to economic growth could be very high and cannot be classified as poor. For that reason, the poverty or determination of poorness has to be carried out under a multidimensional approach in which median income is not the unique determinant of it.

During the studied period, the studied population demonstrates that individuals with 25 years of education have incomes that classify within the lowest 20 percent, resulting in an inverse relationship between income and years of education, meaning that further education will not result in rises in income, this problematic produces a lack of productivity and thus lacks in the value creation or economic growth.

The education and labour systems do not work in favour of the economic growth, given that people with the lowest median income should resort to requesting credits with the purpose of investing them in further education. However, the return of the investment that would be represented in income rises is not representative or even zero. This problem generates that people located in the 20% in situation of poorness cannot improve their quality of lives under more educated they get, as consequence inequality rises.

Additionally, this diploma thesis can conclude that economic growth from 2017 to 2019 did not guarantee an increase in the median incomes of either the wealthiest 20% or the poorest 20% of the studied population. The trickle-down theory can explain this situation but cannot generalize the obtained result given the fact that the wealthiest 20% of the studied population also includes people with incomes not than high.

Finally, this diploma thesis can conclude that in the studied period (2017-2019), the studied population sought short-term income and tended not to produce but to invest in the financial sector that is giving higher profits and, therefore, higher contributions to GDP, but the industrial sector which produces real added value is lagging behind and this explains the low generation of wealth and income inequality. This problem can be solved through policies that lead to a structural transformation of the economy in which the agricultural sector is

industrialized producing intersectoral labour movements, increases in average incomes for the whole society, poverty reduction and added value creation.

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