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Resilience and Path Dependency: Income Distribution Effects of GDP in Colombia

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Abstract: This study examines the effect of GDP per capita on the Gini index, which measures income concentration, in Colombia. The methodology used is an econometric analysis of time series with data extracted from the Inter-American Development Bank and the World Bank. The econometric results suggest that, at least during the period studied here, there is no evidence that GDP per capita has been an explanatory variable of the behaviour of income distribution in Colombia. The results also align with the understanding that the problem of inequality in the distribution of income is not merely economic but concerns persistent matters such as political and historical issues.

Keywords: Income Distribution, Colombia, Resilience, inequality.

JEL Classification: C43, D6, H3, H11, H21.

1. Introduction

The topic that motivated the present investigation is income inequity. This is a subject that has been extensively studied and that, especially in countries with developing economies, matters for fundamental reasons. First, in developing markets, high levels of inequality are likely to slow down economic growth. Second, with greater inequality, the political and economic institutions will be less

able to offer a market environment that promotes investment and growth. Third, high inequality may harm civic and social life (Birdsall, 2007) because the high concentration of income in the wealthiest quintile of the population undermines the stability of democracy and, incidentally, full compliance with civil rights. Besides, in ethical terms, there are no reasons to justify that individuals should be condemned to differential access to economic resources throughout their lives or that they should bear the responsibility of their descendants (Aysan, Castillo-Téllez, Demirbas and Disli, 2021 and Ray, 1998).

According to the World Bank figures on Colombia in 2013, the richest 20% gained 57.97% of national income, while the poorest 20% participated with only 3.35% of total income in the interior of the country. Colombia is the second most unequal country in Latin America, reaching a Gini index of 53.49 in 2013. Moreover, economic policies within the country promote and defend economic growth as a means of contributing to more equitable income distribution (OECD, 2015). From this perspective, economic growth is protected to such an extent that it is granted many privileges and tax incentives to promote investment.

The fundamental question that will be developed in the present research is as follows: has economic growth affected income distribution within the country? Has economic growth contributed to a decrease in income concentration or did it have the opposite effect? Hence, the hypothesis we evaluate is: GDP per capita has affected income distribution, and in the years of economic slowdown, the Gini has increased. The result that this research aims to find is that the behaviour of GDP per capita has indeed been an explanatory variable of the income distribution. Our results, however, show that GDP per capita did not prove to be an explanatory variable of income inequality for the period, not confirming the assumption that growth reduces income inequality in Colombia.

The remainder of this article is organized as follows. The second section contains the literature review. The third section exposes the methodology, data, and econometric model applied to test the hypothesis. The fourth section includes its application and results. Finally, the last two sections are about the context of the Colombian case and fiscal policy.

2. Literature review

The relationship between income distribution and economic growth has been extensively studied from different perspectives and methodologies applied in other countries and periods. However, all these works can somehow be traced back

to the theory developed by Kuznets. According to Kuznets (1955), in the early phases of economic growth, it will be necessary to accept an increase in levels of income inequality, which will improve once the economy expands beyond a certain threshold. All this is in the context of an economy that moves from being primarily agricultural to industrialized.

The Kuznets theory is based on a long-run relationship. However, Latin America during the 1980s did not evidence a change, such as workers from the urban sector moving into agriculture when many economies experienced a downturn (Psacharopoulos, Morley, Fiszbein, Lee, and Wood; 1993). This allows us to recognize the particular conditions of the Latin American economy and the complexity of adjusting this context to the countries of Latin America. This is due to characteristic and decisive factors in the Latin American case: they have an average per capita income much lower, and therefore levels of saving do not reach a high level.

On the other hand, during the 1980s and 1990s, income inequality ceased to decline in Western countries. In the case of the United States, for example, the wage gap between the lowest-paid 10 percent and the highest-paid 10 percent increased by almost 50 percent. From these facts, the Kuznets inverted curve theory linking development and inequality loses the ability to predict the relationship between these two variables. According to Piketty (2015), this puts an end to this great historical law in the study of inequalities and prompts its investigation more thoroughly and from other points.

In the complex debate about the effect of economic growth on income concentration, some researchers find evidence in favour of Kuznets' effect, and another great majority do not see the existence of such an effect. In a cross-country setting, Ahluwalia (1976) finds that relative inequality increases at the beginning of the development process. In later stages, relative inequality decreases, but he has received methodological criticisms. Deininger and Squire (1998) found evidence, although not very strong, of the Kuznets curve. However, Atkinson and Brandolini (2003) posed doubts about the time series that Deininger and Squire built. For South America, Psacharopoulos et al. (1993) do not find evidence of the Kuznets curve, which has been confirmed in other empirical settings by Barro (1999), Tsounta and Osueke (2014), and Luke (2012).

According to Palma (2011, 2016), no homogeneity makes it possible to fulfil the prediction of the inverted-U of Kuznets. Very similar is Fields' (2000) conclusion that Kuznets curve shows no evidence of being a law, so the pattern is that there is no pattern. Fields (1989) also finds no evidence of a tendency for inequality

to increase or decrease systematically with economic growth. What is found in studying a longer period is that inequality increased as often as it fell. Instead, the decisive factor is the type of economic growth as determined by the environment in which growth occurs and the political decisions that are taken (Fields, 2001).

Another essential aspect to consider is the methodological one. The hypothesis of Kuznets is about the economic dynamics that are presented in the economic development process. In this sense, it is necessary to consider a time series framework and not just a cross-section (Atkinson, 2015). It may be that long-term studies will lead to different conclusions because the inclusion of a more extended period takes into account both periods of economic growth and recession. According to Luke (2012), "there has never been general evidence for the Kuznets hypothesis except for the huge number of cross-sectional studies, which we have no reason to believe capture the typical path of inequality within countries". This is because, in the cross-section models, the Kuznets curve can vary depending on whether per capita GDP values are transformed into logarithms, suggesting the Kuznets curve is sensitive to the functional form used.

Regarding the Colombian case, the conclusions have been different. Psacharopoulos et al. (1993), in their analysis of Poverty and Income Distribution in Latin America, find that Colombia (urban) has a negative relationship between the real per capita income and income inequality. Deininger and Squire (1998) include Colombia as the countries with no significant relationship between inequality and income. An opposite conclusion to this one is found in a recent study (Alonso & González, 2017) that analyzes the period 1977-2005 with quarterly data.

This literature review fails to provide evidence of a strong relationship between inequality and economic performance, and this has been even weaker for the case of developing countries. There has also been no homogeneity between countries that would allow the Kuznets theory to be generalized. Limited access to consistent and comparable data over a long period of years has had a significant effect on the development and conclusions of the research. From this fact, there have been essential criticisms of some of the studies and databases. In addition, the econometric analysis results may be sensitive to the use of different scales such as logarithmic.

In general terms, this literature review allows us to understand the path already followed by other authors and the path that remains to be explored where it is fundamental to carefully selected methodologies, concepts, and conclusions. The importance of this topic and the discussions that it has aroused are what motivate its exploration.

3. Methodology, data and econometric model

In the present research, income inequality is understood as the fundamental disparity that allows one individual certain material choices while denying another individual the same choices (Ray, 1998). There are multiple ways to measure income inequality, each from specific valuations concerning what contributes to a greater or lesser extent to reduced inequality of the distribution. Specifically, the indicator of inequality used to measure income inequality is the Gini coefficient due to the ease of its interpretation. Furthermore, Gini coefficient data can be obtained more easily than other possible measures. It is therefore considered a benchmark index, widely used in welfare and equity debates, which also allows comparison with existing literature (see Knowles, 2001).

This coefficient measures the income concentration taking the difference between all pairs of income and simply totals the absolute differences. It is as if inequality is the sum of all pairwise comparisons of "two-person inequalities" that can conceivably be made (Ray, 1998). In this study, the Gini coefficient is measured in terms of income based on total household income per capita for all individuals in a household because it is the one available for a more extended period. This data is obtained from the Inter-American Development Bank, which has drawn them directly from the Encuesta Nacional de Hogares (1989-2000) and Encuesta Continua de Hogares (2001 - to date) of Colombia.

On the other hand, GDP per capita figures are taken from the World Bank database and are in constant 2010 U.S. dollars. The data of the Gini coefficient and the GDP per capita are observed during the period 1991-2015 at regular annual intervals. Although a long-term study is desirable since it allows taking into account the dynamics of the economy throughout its development process, the time of study for Colombia cannot be longer. This is because the data before 1991 only included some cities, and it was not until December 1991 that national measurement began. As a result, the Gini coefficient data before 1990 are incomparable with those of the following years and, consequently, these methodological changes can introduce spurious leaps.

The effect of the gross domestic product per capita on income inequality from 1991 to 2015 is analyzed using the econometric tool. We will specifically study a time-series regression model that is a sequence of N observations (data) ordered and equidistant chronologically on a characteristic (univariate or scalar series) or several characteristics (multivariate or vectorial series) of a unit observable at different moments.

The econometric model is based on Lind and Mehlum (2010) and the equation to be estimated is as follows:

$$Ln(Gini_t) = \beta_1 + \beta_2 \ln(GDPPC_t) + \beta_3 [\ln(GDPPC_t)]^2 + \varepsilon_t. \quad (1)$$

Where the dependent variable is $Gini_t$, that is, the Gini coefficient and the independent variables are $Ln(GDPPC_t)$ and $[\ln(GDPPC_t)]^2$, representing the natural logarithm of the gross domestic product per capita and the latter squared (see Lind and Mehlum (2010), Ravallion (2009), Barro (1999), and Luke (2012)). To comply with the Kuznets hypothesis, β_2 should be negative, denoting that economic growth reduces inequality. Besides, the opposite sign would be expected for β_3, i.e., positive.

4. Empirical results

The first step in the analysis of a time series is to identify trends, seasonality, and irregular variations to know if the Gini variable and the logarithmic variable of GDP per capita are stationary, that is, if the mean and/or the variance do not change over time, it is necessary to make some formal tests of unit root contrast in the residuals. In this case, the Augmented Dicky-Fuller unit root tests (ADF), the Phillips-Perron (PP) test, and Smichdt and Shin (KPSS) tests are applied, and their results are presented in Table 3.1. The ADF and PP statistical values are within the acceptance region where there is a unit root. In the KPSS test, the statistical values fall outside of the acceptance region and there is no unit root. Because the series is non-stationary, the results estimated from these series may lead to erroneous conclusions.

Table 3.1: Unit Root Test

	ADF Test		PP Test		KPSS Test
	H0: There is at least one unit root		H0: There is at least one unit root		H0: There is no unit root
	Test critical values-3.612		Test critical values-3.612		Test critical values 0.146
Variable	Test statistic	Probability	Test statistic	Probability	Test statistic
Gini	-1.991.185	0.5765	-1.635.159	0.7480	0.185032
$\ln(GDPPC_t)$	-0.749562	0.9568	-0.888770	0.9411	0.168285
$[\ln(GDPPC_t)]^2$	-0.704357	0.9611	-0.843694	0.9466	0.170050

Note: Test statistics based on the statistical confidence level of 95%.

Now it is necessary to determine the order of integration that refers to the number of times, a time series must be differentiated (to calculate its first difference) to convert it into a stationary series. The method of differentiation of the series consists of making no assumptions about the shape of the short-term trend and simply assuming that it evolves slowly over time. It is assumed that the trend at time "t" is very close to the trend at the time "t-1", and a new series is constructed: $Y_t = X_t - X_{t-1}$ which is called a differentiated series. Differentiating the series is equivalent to saying that the trend at "t" is the series value at t-1: $T_t = X_{t-1}$.

As shown in Table 3.2, in the ADF and PP tests the statistical values fall within the rejection region of the null hypothesis of the existence of a unit root. In the KPSS test, the statistic tests fall into the acceptance region that there is no unit root, except in the case of the first difference of the Gini. In general, the tests allow us to conclude that the series of the model are integrated of order one I (1), which means that once the series of the model are differentiated, they become stationary (Gujarati & Porter, 2010).

Table 3.2 Test of units roots in first differences

	ADF Test		PP Test		KPSS Test
	H0: There is at least one unit root		H0: There is at least one unit root		H0: There is no unit root
	Test critical values-2.998		Test critical values-2.998		Test critical values 0.463
Variable	Test statistic	Probability	Test statistic	Probability	Test statistic
ΔGini	-5.897.510	0.0001	-5.897.510	0.0001	0.471343
$\Delta \ln(GDPPC_t)$	-3.370.380	0.0231	-3.370.380	0.0231	0.280776
$\Delta[\ln(GDPPC_t)]^2$	-3.323.509	0.0255	-3.323.509	0.0255	0.297939

Test statistics based on the statistical confidence level of 95%.

When there is a combination of variables that show a similarity in the order of integration, especially when the time series are I (1), the cointegration analysis is essential (Rosales, Perdomo, Morales & Urrego, 2009) to know if any linear combination of the series becomes stationary. To study if the model variables are cointegrated, the Engle-Granger cointegration approach is applied (See Engle &Granger, 1987). To know if the residuals are stationary, the Augmented Dickey-Fuller test is made (see Annex 3.1). Since the ADF statistical value of -3.375718 is greater in absolute value than any of the McKinnon critical values, at a significance level of 1 %, 5%, and 10%, the null hypothesis of non-cointegration is rejected and it is concluded that the residuals are integrated of order I (0). There is a stable long-term relationship, so it is said that the variables Gini and LnGDP per capita are cointegrated.

Next, the Errors Correction Mechanism is made, whose purpose is to link the short-run behaviour of the Gini and LNGDP per capita variables with the long-run behaviour of the variables. The simplest Error Correction mechanism is:

$$\Delta GINI = \alpha_0 + \alpha_1 \Delta \ln(GDPPC_t) - \alpha_2 \Delta [\ln(GDPPC_t)]^2 + \alpha_3 \breve{U}_{t-1} + \varepsilon_t \quad (2)$$

Since the Gini and LNGDP per capita series are cointegrated, it implies that there is a stable long-run equilibrium relationship between them; however, in the short run, there may be an imbalance. The term error Ŭt in the cointegration regression is interpreted as the equilibrium error and this is precisely the one that serves to link the short-run behaviour of the variable GINI with its long-run value.

The estimated first difference equation is as follows (see Annex 3.2):

$$\Delta GINI = 0.392944 + 795.5566\, \Delta \ln(GDPPC_t) - 46.85767\, \Delta[\ln(GDPPC_t)]^2 - 0.669477\, \breve{U}_{t-1} \quad (3)$$

The term - 0.669477 $\breve{U}_{t-1}$ is the Error Correction Mechanism (ECM) (Aysan, Guney, Isac and Khan, 2022). This coefficient shows the correct sign (negative); its value is large and significant even at a level of 1%. The negative sign acts to reduce the imbalance in the next period, in this case, annually. If the variables are imbalanced in period t-1, then ECM acts to restore the variables gradually towards equilibrium in period t, or the future. In this case, 66.95% of the discrepancy between the long and short-term GINI is corrected within one year. This means that the Gini does not show significant imbalances in its values, and if its equilibrium value suffers imbalances, it returns to adjust quickly. Hence, the Gini is not susceptible to prolonged drops in value or prolonged increases. Besides, the above equation shows that the short-run changes in the LnGDP per capita have a positive impact on the short-run changes of the Gini, that is to say, that it causes an increase of the latter. However, its coefficient is not statistically significant with a probability of 0.2151.

Another of the tests that need to be made is that of Granger's causality. This test aims to determine whether past observations of a time series variable allow forecasting another, or in other words, whether a variable causes another. Besides, it helps to establish if there is exogeneity in the model, which is similar to say that there is no causality in Granger's sense (Rosales et al., 2009). The direction of causality may depend critically on the number of lagged terms included (Gujarati & Porter, 2010). This test implies estimating some of the equations by Ordinary Least Squares (OLS) (see Annex 3.3).

The null hypothesis that LnGDP per capita does not cause the Gini and that Gini does not cause LnGDP per capita is accepted with a probability of 0.41 and 0.19,

respectively (see Annex 3.4). So, the Granger causality does not appear in any direction, which is to say that the lagged values of the LnGDP per capita variable do not have a significant impact on the endogenous Gini variable or vice versa.

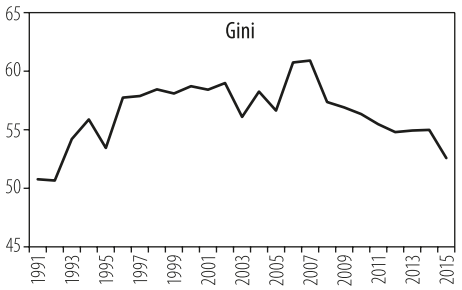
In the process of testing by econometric analysis, if the per capita GDP is an explanatory variable of the Gini behaviour, several important conclusions are obtained. The Gini and GDP per capita series present a non-stationary behaviour, while their first differences are stationary. The series are integrated of order one I (1) and the estimated residuals are stationary. Hence, it is determined that the variables are cointegrated. According to the econometric theory, taking the differences on both sides of the regression is possible to convert spurious regression into a valid regression. However, GDP per capita does not prove to be an explanatory variable of the Gini coefficient. In other words, the fundamental result is that no evidence could be found that per capita GDP influences income inequality.

The above conclusion was obtained from a series of data from 1991 to 2015. This implies that in the future, when a more extensive and complete data set is available for Colombia, further studies will be necessary to contribute to the discussion of this topic from different data, methodologies, and perspectives.

5. Colombian context

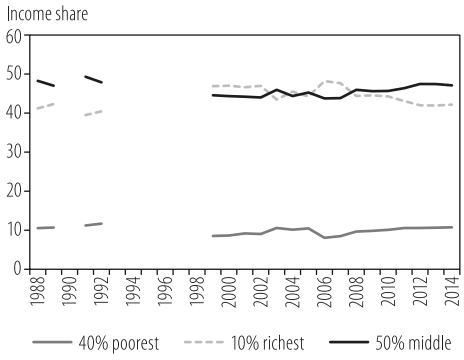
Graph 5.1 shows the dynamics of the Gini coefficient in Colombia. The lowest Gini of this period is displayed in 1991 and the highest in the years 2006 and 2007, which are just the years of greater economic growth (see Annex 5.1). During the economic crisis of 1999, the Gini remained practically unchanged, and in the middle of the economic slowdown of 2008 and 2009, the Gini fell. Despite years of strong economic growth, in 2015, income was as unequally distributed as in the early 1990s. According to the previous figures, it is possible to say that economic growth, which has been assumed as the economic variable capable of boosting economic and social development, had not been contributing to the decline of income inequality even in the years of its best performances.

Figure 5.1: Colombian Gini 1991-2015



Source: Inter-American Development Bank

Graph 5.2: Quintiles income share – Colombia 1988-2014



Source: Author's calculations based on World Bank national data and OECD National Accounts data files

It is also interesting to observe the changes in the income share according to the economic level in the Colombian society. The lowest paid 40% of the population have not shown significant changes in their share of income, which has been around 10%. On the other hand, both the share of the 10% better-paid and the 50% of the half, have oscillated between 40 and 50%; which means that the increase of participation of the richest 10% has involved the decreasing participation of 50% of the medium, and vice versa (graph 5.2).

6. Fiscal policy and recommendations

One policy that is crucial with regard to income concentration, for having the possibility to redistribute income, is the fiscal policy. At the same time, it is considered that this has important effects on capital incentives. For the Colombian case, governments have dispensed with the redistributive function of fiscal policy and, to promote the free movement of domestic production, have granted benefits to privileged sectors such as agriculture, livestock, fisheries, and mining through tax exemptions and deductions in the income tax.

The VAT, which is a regressive tax in Colombia, has been consolidated as the main source of the collection. On the other hand, the collection of private income tax is very small and represented only 0.2% of GDP in 2010. Only 650 thousand individuals declare rent when this figure should be at least 15 million people. While the richest 500 in the country pay less than 1% of the annual income, some people who earn a minimum wage have to pay a withholding of 11% (Redacción Negocios, 2012).

In Colombia, therefore, the private income tax has reduced the Gini by only 0.5%, according to estimates by ECLAC for 2011. The main causes of this situation are a large number of legal tax exemptions and the effects of evasion. According to Alvaredo and Londoño (2014), in Colombia, the average effective income tax rate

that pays the top 1% is so low (7-8%), compared to OECD standards, that the incentives to hide income could be smaller than is believed.

Hernández, Soto, Prada and Ramírez (2000) argue that, as a whole, the tax benefits of the income tax erode the taxable base by about 3.0% of GDP, which represented, for example, a fiscal cost of 1.1% of GDP for the year 2000. The question that arises is, can it be argued that these tax benefits promote the economic growth of the country? According to an investigation carried out by the DNP: "The elimination of tax incentives has a positive impact on the Gross Domestic Product, especially in the case of income tax [...] Eliminating exemptions for an amount (around $ 1.8 billion in each of the cases) the percentage variation of the GDP is minimal (0.01%) in the case of VAT, while for the income tax it would increase by 0.17%. The joint elimination of the tax benefits would increase the Gross Domestic Product by 0.17 percentage points".

Tax incentives erode the base, reduce the efficiency of investment, are ineffective and often inequitable, and encourage income capture and evasion. In contrast, the elimination of tax benefits has important multiplier effects on the national economy and public finances. However, the state arguing the promotion of the free dynamics of national production has promulgated a series of economic policies that have ended up with the widening of the income gap.

If the promotion of economic growth is done at the expense of increasing inequality, what we have is a state that perpetuates inequality of opportunities. Economic growth does not solve by itself, that is, automatically, the complex problem of high concentration of income. The state must promote economic growth, necessary for the economic development of the country, but must do it within the framework of equality. This implies, inter alia, reducing tax injustices by reducing the VAT rate, or by making returns to the poorest; increasing the tax basis of personal income tax; or imposing a tax burden on high pensions. The state must also intervene effectively through the design and implementation of structural education policies. It should expand access to high-quality public education, helping to reduce the gap between public and private education.

In the words of Ocampo, Sánchez Torres and Tovar (2001): "To make compatible economic development, equity, and democracy in Colombia today. This is undoubtedly a complex challenge, but we have the means to face it, and our ability to do so depends on our future as a society". The future of the problem of income concentration in the country depends on political will. The question that arises now is how will this so necessary and urgent political emerge?

7. Conclusions

The impetus for the development of this research was that despite the income concentration topic in Colombia being a complex and important topic, this has not yet been sufficiently studied in Colombia for the years 1991 to 2015. The base hypothesis of this research was that GDP per capita had an effect on income distribution during the years of study and that the Gini increased in the years of economic slowdown. This hypothesis was studied using an econometric method of time series and it could not be accepted, which means that Gini values have been given independently of the GDP per capita values. For the Colombian case and at least the period studied, a positive behaviour of GDP per capita did not contribute to an improvement in the distribution of income. Although macroeconomic stability is one of the conditions necessary to improve the welfare level of the population, it is fundamental that changes in the economic structure also arise so that the positive effects of economic growth reach the whole population (Fabris and Lazić, 2022; Londoño and Székely, 1997).

It is necessary to get rid of search for something like a pattern or merely an economic formula capable of explaining why Colombia is one of the unequal countries in the world. The analysis of income concentration in Colombia must go further and take into account, for example, the nature of the country's growth, its history, and politics. Stiglitz (2016) recognizes that income inequality is not only a problem of economic logic, but also of political imperatives. To approach the problem from another perspective implies rejecting mechanical determinism, the external or exogenous factors that pretend to explain inequality. Instead, recognizing that what is of substance is an individual decision as a society (Palma, 2016). In this sense, countries can be divided into two groups: those that do something to build genuinely sustainable prosperity and those that do not (Stiglitz, 2013).

The economic dynamics cannot contribute on their own to make the income distribution more equitable and on the other, the intervention of the State through policies such as fiscal and education leads to a sharpening of income inequality providing extensive benefits for the few. It is essential to carry out intense follow-ups to state policies regarding income distribution, leaving aside theoretical ideas that have little to do with the real future of the country and recognizing that inequality is a lack of political will. There is no tendency to such a lack of inequality in the long term, but rather it tends to perpetuate this problem unless the policies of redistribution income arise from the government (Aysan, 2007 and Ray, 1998).

Based on empirical data rather than theoretical analysis, the present study attempted to rethink the impact of GDP on unequal income distribution, which will be considered in economic policy decisions (Aysan and Disli, 2019; Aysan, Disli and Ozturk., 2017).This research is also an invitation to study and verify in a more empirical way economic myths for the particular case of each economy taking distance from economic generalizations to try to discover the true forces that move the very varied economic problems. The specific methodology from which the research is developed allows reaching some conclusions that should be expanded and put into a discussion based on new methodologies, data series, theories, etc. This research offers a framework for the interpretation of this subject and also invites to open and extend the debate and research about it.

Certainly, we cannot ignore the role of central banks (Fabris and Lazić, 2022) and their unconventional monetary policies in affecting income inequality. In this study, our focus was to establish the link between growth and income inequality. However, both income inequality and growth are affected by other intermediation decisions by the policymakers (Guillaume, 2021). Hence analyzing the central bank policies and their types are rather crucial in reducing income inequality and fostering growth and reducing inflation (Krušković, 2022) in a sustainable manner. Certainly, after the COVID-19 crisis, there is even increasing attention to resilience (Luburić, 2021; Krušković, 2022). Our paper highlights that resilience begins with sustainable growth, while income inequality concerns must be considered as part of sustainable and resilient growth.

References

1. Ahluwalia, M. (1976). Inequality, Poverty, and Development. *Journal of Development Economics*, 307-342.
2. Alonso, J. and González, A. (2017). Evaluación de la Hipótesis de Kuznets para Colombia con una aproximación de series de tiempo: 1977-2005. Apuntes Del CENES, 36(63), 43-62. Recovered from http://revistas.uptc.edu.co/index.php/cenes/article/view/4642
3. Alvaredo, F. and Londoño, J. (2014). Altos ingresos e impuesto de renta en Colombia, 1993-2010. Revista de Economía Institucional, 16 (31),157-194.
4. Atkinson, A., and Brandolini A. (2001). Promise and Pitfalls in the Use of "Secondary" Data-Sets: Income Inequality in OECD Countries As a Case Study. *Journal of Economic Literature*.
5. Atkinson, A. (2015). Inequality. What can be done? Harvard University Press.
6. Aysan, A.F. (2007). Exchange Rates, Stabilisation Policy and Redistribution of Income," Margin: *The Journal of Applied Economic Research*, National Council of Applied Economic Research, vol. 1(3), 267-298, July.
7. Aysan, A.F. and Disli, M., (2019). Small Business Lending and Credit Risk: Granger Causality Evidence. *Economic Modelling*. Elsevier, vol. 83(C), 245-255.
8. Aysan, A.F. and & Disli M., and Ozturk H., (2017). Financial Crisis, Macroprudential Policies And Depositor Discipline. *The Singapore Economic Review* (SER), World Scientific Publishing Co. Pte. Ltd., vol. 62(01), 5-25, March.
9. Aysan, A.F., Guney I., Isac N. and Khan A., (2022). The probabilities of type I and II error of null of cointegration tests: A Monte Carlo comparison. PLOS ONE, *Public Library of Science*, vol. 17(1),1-15, January.
10. Aysan, A.F., Castillo-Téllez L.C., Demirbas D. and Disli, M., (2021). Foreign Trade, Education, And Innovative Performance: A Multilevel Analysis. *Bulletin of Monetary Economics and Banking, Bank Indonesia*, vol. 24(3), 413-440.
11. Barro, R. (1999). Inequality and Growth in a Panel of Countries. Harvard University Press.
12. Birdsall, N., (2007). Income Distribution: Effects on Growth and Development. CGD Working Paper 188. Washington DC: CGD.
13. Deininger, K., and Squire, Lyn. (1998). New ways of looking at old issues: inequality and growth. Washington: *Journal of Development Economics*.
14. Fabris, N. and Lazić, M. (2022). "Evaluating the Role of the Exchange Rate in Monetary Policy Reaction Function of Advanced and Emerging Market

Economies," *Journal of Central Banking Theory and Practice*, Central Bank of Montenegro, vol. 11(2), 77-96.
15. Fields, Gary. (1989). Changes in Poverty and Inequality in Developing Countries. Cornell University. Recovered from http://digitalcommons.ilr.cornell.edu/articles/979
16. Fields, Gary. (2000). Distribution and Development: A Summary of the Evidence for the Developing World. Cornell University.
17. Fields, Gary. (2001). Distribution and Development: A New Look at the Developing World. The MIT Press/Russell Sage Foundation: Nueva York/ Cambridge/ Londres.
18. Guillaume V., (2021). Great Power, Great Responsibility: Addressing the Underestimated Issue of Central Bank's Social Responsibility. *Journal of Central Banking Theory and Practice*, Central bank of Montenegro, vol. 10(3), 23-39.
19. Gujarati, D. and Porter, D. (2010). Econometría. Quinta edición. Mexico, D.F: McGraw-Hill.
20. Hernández, G., Soto, C., Prada, S. and Ramírez, J. (2000). Exenciones tributarias: costo fiscal y análisis de incidencia. Bogotá: Departamento Nacional de Planeación, Archivos de macroeconomía, Dirección de Estudios Económicos, documento 141, diciembre 7 de 2000. Recovered from https://colaboracion.dnp.gov.co/CDT/Estudios%20Econmicos/141.pdf
21. Knowles, S. (2001). Inequality and Economic Growth: The Empirical Relationship Reconsidered in the Light of Comparable Data. University of Nottingham: Centre for Research in Economic Development and International Trade.
22. Krušković, B. D. (2022). Central Bank Intervention in the Inflation Targeting. *Journal of Central Banking Theory and Practice*, Central Bank of Montenegro, vol. 11(1), 67-85.
23. Kuznets, S. (1955). Economic growth and income inequality. *American Economic Review* 45: 1-28.
24. Lind, T., and Mehlum, H. (2010). With or Without U? The Appropriate Test for a U-Shaped Relationship. *Oxford bulletin of economics and statistics*, 72 (1), 109-118.
25. Londoño, J. L., and Székely, M. (1997). Persistent Poverty and Excess Inequality: Latin America, 1970-1995. Office of the Chief Economist: Inter-American Development Bank.
26. Luburić, R. (2021). Crisis Prevention and the Coronavirus Pandemic as a Global and Total Risk of Our Time. *Journal of Central Banking Theory and Practice*, Central Bank of Montenegro, vol. 10(1), 55-74.

27. Luke, J. (2012). Is There a Kuznets Curve? Broadway: Portland State University.
28. Ocampo, J. A., Sánchez Torres, F. and Tovar, C. E. (2000). Mercado laboral y distribución del ingreso en Colombia en los años noventa. Revista CEPAL, 72. Recovered from http://repositorio.cepal.org/bitstream/handle/11362/10707/1/072053078_es.pdf
29. Palma, G. (2011). Homogeneous middles vs. heterogeneous tails, and the end of the- 'Inverted-U': the share of the rich is what it's all about. Cambridge Working Papers in Economics (CWPE) 1111.
30. Palma, G. (2016). Do nations just get the inequality they deserve? The 'Palma Ratio' re-examined. *Cambridge Working Paper Economics*: 1627.
31. Piketty, Thomas (2015). La economía de las desigualdades: cómo implementar una redistribución justa y eficaz de la riqueza. Argentina: Siglo Veintiuno Editores Argentina S.A.
32. Psacharopoulos, G.; Morley, S.; Fiszbein, A.; Lee, H. and Wood, B. (1993). Poverty and income distribution in Latin America: the story of the1980s. Washington DC: World Bank.
33. Ravallion, M. (2009). Do Poorer Countries Have Less Capacity for Redistribution? Policy Research Working Paper. Washington DC: The World Bank.
34. Ray, D. (1998). Development economics. New Jersey: Princeton University Press.
35. Redacción Negocios. (2012, March 13). Tras la reforma perfecta. El Espectador. Recovered from http://www.elespectador.com/
36. Rosales, R.; Perdomo, J., Morales, C. and Urrego, J. (2009). Fundamentos de econometría intermedia: Teoría y aplicaciones. Apuntes de Clase CEDE, 1, January 2010, 1-414.
37. Stiglitz. (2013). Inequality Is a Choice. The New York Times. Recovered from https://opinionator.blogs.nytimes.com/2013/10/13/inequality-is-a-choice/
38. Stiglitz. (2016). Inequality and Growth: Patterns and Policy: Volume II: Regions and Regularities. New York: International Economic Association.
39. Tsounta, E., and Osueke, A. (2014). What is Behind Latin America's Declining Income Inequality? Washington: International Monetary Fund.

Annexes

Annex 3.1. Augmented Dickey-Fuller test

Null Hypothesis: RES has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.375718	0.0017
Test critical values:	1% level	-2.664853	
	5% level	-1.955681	
	10% level	-1.608793	

* MacKinnon (1996) one-sided p-values.

Annex 3.2. Regression with first differences

Dependent Variable: DGINI
Method: Least Squares
Date: 07/16/17 Time: 16:51
Sample (adjusted): 1992 2015
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLNGDP_PERCAPITA	795.5566	621.4654	1.280130	0.2151
DLNGDP_PERCAPITA2	-46.85767	36.19920	-1.294439	0.2103
RRES	-0.669477	0.191710	-3.492140	0.0023
C	0.392944	0.486873	0.807076	0.4291
R-squared	0.402916	Mean dependent var		0.076125
Adjusted R-squared	0.313353	S.D. dependent var		2.015110
S.E. of regression	1.669804	Akaike info criterion		4.014301
Sum squared resid	55.76490	Schwarz criterion		4.210643
Log-likelihood	-44.17161	Hannan-Quinn criteria.		4.066391
F-statistic	4.498706	Durbin-Watson stat		2.154195
Prob(F-statistic)	0.014389			

Annex 3.3. Granger's causality

This test implies estimating the following pair of equations by Ordinary Least Squares (OLS):

$$GINI_t = \alpha_0 + \alpha_1 GINI_{t-1} + ... + \alpha_1 GINI_{t-1} + \beta_1 LNGDPpercapita_{t-1} + ... + \beta_1 LNGDPpercapita_{t-1} + \varepsilon_t$$

$$LNGDPpercapita_t = \alpha_0 + \alpha_1 LNGDPpercapita_{t-1} + \ldots + \alpha_1 LNGDPpercapita_{t-1} + \beta_1 GINI_{t-1} + \ldots + \beta_1 GINI_{t-1} + u_t$$

Where GINI and LNGDPper capita are the endogenous variables of interest, 1 is the number of lags used, α and β are the parameters to be estimated; ε_t and u_t are the errors or random perturbations, which are interrelated. Equation 1 contends that GINI is related to its past values, as well as past values of LNGDPper capita. Equation 2 contends a similar behavior for LNGDPpercapita. The main idea of the test is to determine if the β_1 parameters that accompany the lagged variables GINI and LNGDPper capita in equations 1 and 2 are statistically different from zero. To determine if a variable precedes another, the hypothesis tests are presented as follows:

Null hypothesis:

$H_0 : \beta_1 = \ldots = \beta_1 = 0$ LNGDPpercapita "does not Granger cause" GINI - There is no causality

$H_0 : \beta_1 = \ldots = \beta_1 = 0$ GINI "does not Granger cause" LNGDPpercapita - There is no causality

Alternative hypothesis:

$H_1: \beta_1 \neq \ldots \neq \beta_1 \neq 0$ LNGDPpercapita "Granger-causes" GINI - There is causality

$H_1: \beta_1 \neq \ldots \neq \beta_1 \neq 0$ GINI "Granger-causes" LNGDPpercapita - There is causality

Annex 3.4. Granger Causality Tests

Pairwise Granger Causality Tests
Date: 07/16/17 Time: 16:49
Sample: 1991 2015
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
LNGDP_PERCAPITA does not Granger Cause GINI	19	1.20256	0.4143
GINI does not Granger Cause LNGDP_PERCAPITA		2.09186	0.1954
LNGDP_PERCAPITA2 does not Granger Cause GINI	19	1.20409	0.4137
GINI does not Granger Cause LNGDP_PERCAPITA2		2.12829	0.1900
LNGDP_PERCAPITA2 does not Granger Cause LNGDP_PERCAPITA	19	0.58404	0.7351
LNGDP_PERCAPITA does not Granger Cause LNGDP_PERCAPITA2		0.59838	0.7258

Annex 5.1. GDP per capita growth (annual %)

Source: World Bank data. The annual percentage growth rate of GDP per capita is based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP per capita is gross domestic product divided by midyear population.