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Relationships between Financial Development and Income Inequality in South America
between the years 2000 and 2020

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Abstract

This paper examines the influence of financial development on income inequality on ten South American countries between the years 2000 and 2020. This work includes the overview of relevant literature as well as the construction of a dataset, and the use of an empirical model using panel data method with a long-run approach. By evaluating the impact of different dimensions of financial development: depth, access and efficiency of financial institutions and financial markets on the level of income inequality, this paper tries to disentangle the opposing views on the relationship between finance and income distribution. The main results of the analysis indicate that first, financial development decreases income inequality. Second, the negative effect on income inequality is mainly through the financial development of institutions rather than financial markets and third, when going into deeper multidimensional analysis, two out of the three measurements of financial development: access and efficiency of financial institutions, tend lower income inequality. We also performed some robustness tests by using other measurement of income inequality, the 90-10 ratio instead of the Gini coefficient, in which we arrived at similar results. With the 90-10 ratio, financial development decreases income inequality and now not only two but the three measurements of financial development in institutions: depth, access and efficiency and the efficiency of financial development in markets have a negative relationship with income inequality. Finally, the analysis was done by country in which two out of five countries chosen (Argentina and Brazil) have a negative relationship between financial development and income inequality. The robustness analysis was also done by income level where we categorized different countries by their income level, and we looked at the effect on the depth, access, and efficiency level. We found that on the country level, the three measurement of financial development affect income inequality differently.

Keywords: Financial Development, income inequality, financial depth, financial access, financial efficiency

1. Introduction

On a global level the richest 10% of the population earns 52% of the income while the poorest half of the population earns only 8% of the total income. When comparing wealth, the gap is also wide, the poorest half of the population owns only 2% of the global wealth whereas the richest 10% owns 76% of it. However, there is not only between-country inequality but also within-country inequality. For example, high-income countries can be very unequal like the US, or relatively equal such as Sweden. For the last two decades between-country inequality has declined while within-country inequality has increased (World Inequality Lab, 2022).

In this paper, we examine the impact of financial development on ten South American countries by estimating the relationships between financial development and income inequality between the years 2000 and 2020. We chose to study this region, given that Latin America is the third most unequal region after MENA (Middle East and North Africa) and Sub-Saharan Africa (World Inequality Lab, 2022). In Latin America, the top 10% of the population captures 55% of national income, compared to 36% in Europe which is the most equal region in the world. Also, when looking at inequality within countries, in Latin America the top 10% of the population captures 77% of total household wealth compared to 1% captured by the bottom 50% (World Inequality Lab, 2022). Moreover, evidence shows that inequality has risen in most countries and regions over the last two decades, but average real income of the poor has increased, which means that inequality has increased in the upper parts of the distribution (Jaumotte et al., 2013).

In this study we focus on financial development which according to the World Bank Group (2017) is the process of reducing costs and improving procedures in the financial sector. With financial development, information is produced ex-ante, investments are monitored, trading, diversification and management of risks is facilitated, savings are mobilized and pooled, and goods and services have an easier exchange. Studying financial development is interesting because it promotes economic growth through the accumulation of capital and technological progress, fostering economic development (World Bank Group, 2017). It also reduces poverty and inequality by enabling access to finance to the poor and to small and medium size enterprises, reduces the vulnerability to shocks with risk management, and increases investment and productivity which results in generation of income (World Bank Group, 2017).

When looking at the relationship between financial development and income inequality, some studies support the inequality-narrowing hypothesis which states that with financial development poor people are able to borrow which reduces the dependency on inherited wealth (Jauch et al., 2016), there is an increase in children's education and a decrease in child labor (Demirgüç-Kunt et al., 2009), there is better allocation of capital (Levine, 2005) which also encourages the formation of new firms and help smaller firms expand (Demirgüç-Kunt et al., 2009), there may be a boost of the demand for low-skilled workers, creating more economic opportunities which changes the distribution of income (Townsend et al., 2006) and it mainly impacts the poorest quintile which results in poverty alleviation (Beck et al., 2007). Nevertheless, other studies support the inequality-widening hypothesis affirming that financial development benefit those who are already in the financial system (Greenwood et al., 1990), which would be why more financial development increases income inequality.

To give some background about financial development, according to Agnoli et al. (2008) in the 90's there was a wave of innovation worldwide which led to advances in communication technologies and facilitated the efficient transmission of data. Transaction costs decreased and there was an increase in market liquidity. Latin America introduced pro-market reforms and liberalized its financial systems to attract capital from international markets. Also, there was privatization of public enterprises, new legislations for the operations of markets and new policies to increase and protect investments. At the end of the 90's there was uncertainty which decreased capital flows, but in the early 2000 the south American economies were increasingly stable (Agnoli et al., 2008).

However according to Heng et al. (2016), South American financial development is behind other emerging markets. The region excels relative to other emerging markets on access to financial institutions because of the financial inclusion of banks and ATMs, but in the matters of depth and efficiency of financial institutions and usage of financial services by households, the region still lags. Chile and Brazil have higher ranks in the development of financial markets and financial institutions. Peru and Colombia are next on the list with the increase of financial institutions (Heng et al., 2016).

For example, according to Heng et al. (2016) Chile reformed their financial system in the 2000s which enabled investors flexibility to increase their domestic equities portfolio, which represents about 40% of GDP and 90% of the market value of their listed companies in the equity market. In Brazil the government implemented a market friendly debt management strategy which helped develop the domestic capital market. The reforms contributed to the development of financial institutions: insurance companies, mutual funds, market for private bonds, equities and derivatives were benefited from this. In Colombia, Peru and Ecuador the

commercial bank branches increased (Heng et al., 2016). It is also pertinent to mention that South American countries are very heterogeneous, which is why we must also consider the informal workers or microentrepreneurs which constitutes about a third of the labor force and generally do not use financial services but informal providers (Trujillo, 2016).

This study will be using income as a measurement of quality of life to see how financial development affects the wellbeing of the South American population. Not only occupation in the labor market is a source of income inequality, but structural and cultural aspects affect income inequality. Income inequality impacts the high poverty rates, low levels of education, sanitation nourishment, medical care and the high rates of child labor and exploitation as well as child mortality (Howard et al., 2020).

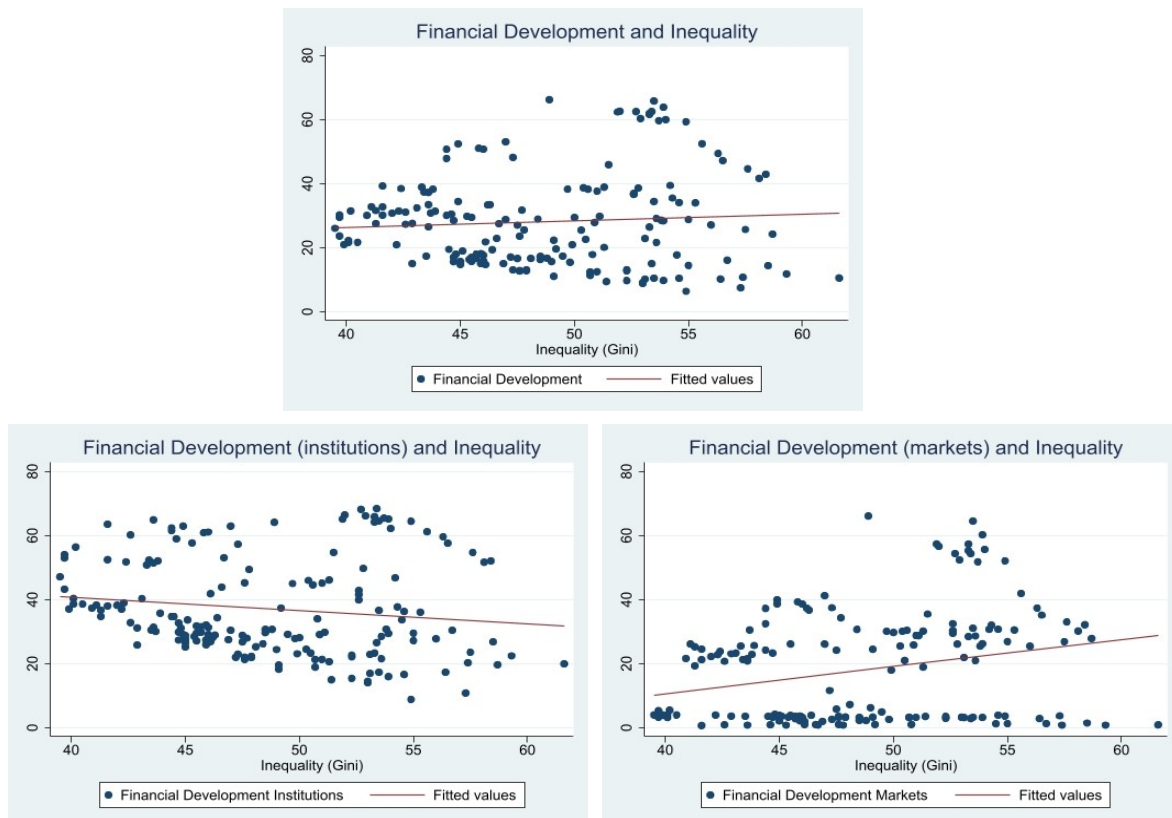
One way to measure income inequality is by using the Gini coefficient, which is a numeric value used as an index of inequality associated with a Lorenz curve (Lows, 1984). This index ranges between 0 and 1, a Gini of 0 indicates perfect equality and a Gini of 1 indicates complete inequality. The Gini coefficient is based on the comparison of cumulative proportions of the population against cumulative proportions of income they receive (OECD, 2022). There are also other measurements of inequality such as the Atkinson Index, the Decile Dispersion Ratio such as the 90/10 ratio or the General Entropy measures, among others (LAC Equity Lab, 2022).

This paper studies a sample of 10 South American countries which are: Brazil, Colombia, Argentina, Peru, Venezuela, Chile, Ecuador, Bolivia, Paraguay, and Uruguay because they are the top ten most populated countries in the region (Worldometer, 2022). The period chosen for this study is between the year 2000 and 2020 because our objective is to observe the relationships between financial development and income inequality with a long-term approach.

Financial development is difficult to measure because it is a vast concept and has several dimensions. Therefore, we will be using the IMF Financial Development Index Database which established three dimensions to identify the variables of a well-functioning financial system. These are financial depth, access, and efficiency. These three dimensions are measured for financial institutions and financial markets (International Monetary Fund, 2022).

Figure 1 shows the relationship between financial development and income inequality, which is positive and would support the inequality-widening hypothesis. But, when focusing on the relationship between financial development on institutions and markets, it seems to be opposite, which is why it is interesting to see the effects financial development has on income inequality from the two perspectives of institutions and markets. Section 3 presents the variables of financial depth, access, and efficiency by mentioning what they comprise.

Figure 1. Relationship between financial development and income inequality



Note: Relationship between Financial Development and Gini coefficient, Financial Development of Financial Institutions and Gini coefficient and Financial Development of Financial Markets and Gini coefficient.

As a contribution to literature, we examine ten South American countries which are heterogeneous, have very high inequality and are lagging in financial development, and analyze these relationships between financial development and income inequality with a long-term approach by using an econometric exercise to analyze if the region has an inequality-widening or inequality-narrowing effect with more financial development. Specifically, through the construction of series at the national level with different measurements of financial development, we aim to answer the question: are there relationships between financial development and income inequality during the time interval 2000-2020 in South American countries? The results of this paper are pertinent for policymakers to understand, improve and reform the financial sector policies which ultimately improves the quality of life of the citizens by reducing inequality and poverty.

Our results show that income inequality measured by the Gini coefficient decreases 0.7% as financial development index increases in one unit for nine South American countries included in our sample (excluding Venezuela due to lack of data availability). Also, financial development in institutions has a stronger impact on reducing income inequality than financial markets development (-0.5% vs -0.1% respectively) and strengthening financial access and efficiency of financial institutions mostly contributes to lowering income inequality (-0.2% and -0.1%) as well as strengthening the efficiency of financial markets (-0.1%). Then, we also performed some robustness tests in which we found that when using the 90-10 ratio as another measurement of income inequality, financial development lowers inequality. When using the 90-10 ratio as well

as the Gini coefficient, financial development in financial institutions rather than financial markets reduces income inequality and, in this case, the three measurements of financial development of institutions: depth, access and efficiency impact income inequality negatively, as well as efficiency in financial markets (see results in section 5, table 6).

Another robustness test was performed by country, in which we chose the five countries with higher income inequality in our sample and found that financial development seems to lower income inequality for some, but on the others the result was positive and not statistically significant. Finally, we performed a test by country and income level by using the different measurements of financial development. The results vary between the countries, when some measurements lower income inequality in some countries, they seem to raise inequality in others. For example for Bolivia the lower-middle income economy of our sample, the efficiency and access of financial institutions seem to lower income inequality while the depth of financial institutions has the opposite effect, and for Colombia one of the upper-middle income economy the efficiency of financial institutions and the depth of financial markets lower income inequality but the depth of financial institutions increase it.

The remainder of the paper is organized as follows: Section 2 reviews some relevant literature. Section 3 describes the data and methodology. Section 4 presents the empirical analysis. Section 5 presents robustness tests and Section 6 concludes.

2. Literature review

As mentioned above, our research question is: are there relationships between financial development and income inequality during the time interval 2000-2020 in South American countries? It has been proven that financial development contributes to growth and reduces

poverty and inequality (World Bank Group, 2017), but the existing literature about the relationship between financial development and inequality is inconsistent. Some studies found that increasing financial development decreases income inequality because it helps channel capital to productive uses, provide insurance against shocks and reduce information asymmetries (Heng et al., 2016) but others state that with more financial development inequality increases because the wealthy part of the population also benefits from financial development which leads to an increase in the overall income inequality (Jauch et al., 2016). That's why this literature review will be mentioning first the inequality-narrowing hypothesis, then the inequality-widening hypothesis, after the inverted U-shaped relationship, and finally some indirect mechanisms in which financial development affects income inequality.

First, according to Jauch and Watzka (2016) financial markets boost economic growth by facilitating borrowing and investment not only for wealthy people but for poor people as well, which reduces the dependency on inherited wealth. The parts of society which were unable to borrow, now can build businesses, increase income, and so on (Jauch et al., 2016). Authors such as Levine (2005), support the inequality-narrowing hypothesis, arguing that financial development boosts growth due to the efficient allocation of capital and fewer borrowing constraints.

Also, Clarke et al. (2006) examined the relationship between finance and income inequality for 83 countries between 1960 and 1995 and found that inequality is lower in countries with better developed financial sectors. Naceur and Zhang (2019) used a sample of 143 countries between 1961 and 2011, they found when analyzing the different dimensions of financial development, that having stronger financial access, depth, stability, and efficiency leads to lower income inequality and poverty, moreover financial institution development exercised a stronger

impact on income distribution and poverty than financial market development. Weychert (2020) studied 59 countries between 2004 and 2014 and found that when analyzing by different aspects of financial development, financial efficiency has no impact on the Gini coefficient but financial access, depth and stability in the long run can significantly lower income inequality.

Likewise, Beck et al. (2007) found that there is a negative relationship between financial development and the growth rate of the Gini coefficient. They mention that financial development may affect the poor through two channels: aggregate growth by improving the efficiency of capital allocation or via the distribution of income. In their work they observed that the effect of financial development has a greater impact on the growth rate of the income share of the poorest quintile beyond the impact it has on aggregate growth, which is associated with poverty alleviation. For Brazil Bittencourt (2010) suggested that financial development reduced inequality in the period studied (1985-1994) not only due the access to credit to the poor for productive activities, but also because people could insulate themselves against poor macroeconomic performance, in this specific case high inflation rates.

Second, there are authors that support the inequality-widening hypothesis. For example, Jauch and Watzka (2016) argue that financial growth is associated with lower economic growth. This study analyzed a dataset of 138 developed and developing countries between the years 1960-2008 and found that an increase in financial development increases the net Gini coefficient. They concluded that more financial development generates an increase in income inequality in countries around the world because when a country reaches a development level, a small fraction of the population can extract rent with their abilities or inherited wealth which consequently increases inequality. However, they argue that the absolute income level of the poor also increases, and they benefit from financial development, which means that all income groups

within country may benefit, but those who are already better off benefit more from financial development which leads to increasing income inequality.

Moreover, Greenwood and Jovanovic (1990) argue that inequality is widened because enhancing finance can benefit those who already have access to the financial system, which would favor mostly the rich while the poor rely on informal or family connections for capital. Clarke et al. (2006) mentioned that when institutions are weak the financial system might mainly channel money to the rich and well connected, who are also able to have collateral and repay the loans, neglecting the poor.

Third, there are studies which include other variables which may affect or clarify the relationship. Chiu and Lee (2019) included country risk when analyzing the relationship between financial development and income inequality. With their sample of 59 countries between 1985 and 2015, they found that the income-widening hypothesis or the income-narrowing hypothesis exist depending on the risk situations of a country. Also, they concluded that in high-income countries income inequality decreases, but in low-income countries inequality increases with more financial development.

On the other hand, Kuznets (1995) proposed the inverted U-shaped relationship between income inequality and development. The inverted U-hypothesis argues that when there is an increase in per capita income, inequality increases. But then when it reaches its highest degree in the intermediate level, inequality decreases. According to Jauch and Watzka (2016) the inverted U-shaped relationship explains for example why rural areas are more equal with lower income compared to rural areas, and why with urbanization societies become more unequal. For instance, when a generation of people living in rural areas move to the cities, their wages increase and income inequality narrows. In this sense financial development enables the poor

access to education or creation of businesses which would ultimately increase jobs, average income, and decrease inequality. Greenwood and Jovanovic (1990) predict an inverted U-shaped relationship between financial development and income inequality arguing that in the early stages of financial development only a small part of society benefits and income inequality increases, but then when financial development reaches a certain stage, income inequality is reduced, and the main mechanism is having better credit availability.

Additionally, Townsend and Ueda (2006) study the case of Thailand between 1976 and 1996 and they mention that there are indirect mechanisms through which finance affects inequality. For example, financial development affects production and allocation of credit which affects the demand of labor. For instance, if financial development boosts the demand for low-skilled workers, there will be more economic opportunities for the low skilled population which changes the distribution of income and reduces income inequality. Also, according to Demirguç-Kunt and Levine (2009) there are other indirect ways in which financial development improve inequality. For example, with more access to credit, the investment in children's education increases and with perfect credit markets high-ability people get schooling regardless of their parent's wealth, child labor decreases, formation of new firms is encouraged, and smaller firms expand, while intensifying competition.

Finally, it is relevant to analyze the financial development by institutions and markets given that they impact different sectors of the population. For example, financial development in institutions will most likely benefit the poor, while financial development in markets may be favorable for the rich. Naceur and Zhang (2016) found that the development of banking shows a more significant impact on income than the development of the stock market. Also, when looking at the specific measurements of financial development, the World Bank (2007) found

that there is evidence on access to finance in reducing income inequality and poverty. Likewise, Weychert (2020) concluded that financial depth, access, and stability can significantly lower income inequality.

As a contribution to literature, we examine ten South American with very high inequality and lagging in financial development, by performing an econometric exercise with a long-term approach, and using the different measurements of financial development. We found that income inequality measured by the Gini coefficient decreases as financial development increases, supporting the inequality-narrowing hypothesis. Also, financial development in institutions has a stronger impact on reducing income inequality than financial development on markets and strengthening financial access and efficiency of financial institutions mostly contributes to lowering income inequality. Then, we also performed some robustness tests in which we found that when using the 90-10 ratio as another measurement of income inequality, financial development lowers inequality. When using the 90-10 ratio as well as the Gini coefficient, financial development in financial institutions rather than financial markets reduces income inequality and, in this case, the three measurements of financial development of institutions: depth, access and efficiency impact income inequality negatively, as well as efficiency in financial markets.

3. Data and methodology

3.1. Methodology

The aim of this thesis is to test if financial development has a negative relationship with income inequality in South America between the years 2000 and 2020. To do so, we built a panel data set for the ten South American countries chosen: Brazil, Colombia, Argentina, Peru,

Venezuela, Chile, Ecuador, Bolivia, Paraguay, and Uruguay, chosen because as mentioned before they are the top ten most populated countries in the region (Worldometer, 2022), Latin America is the third most unequal region in the world (World Inequality Lab, 2022) and its financial development is behind other emerging markets (Heng et al., 2016) which encouraged our hypothesis of a negative relationship between financial development and income inequality.

The regression proposed to see the effect of financial development on income inequality is based on the one used by Naceur and Zhang (2019), which is the basic regressions specification from the income distribution and financial development literature. The regression proposed is also similar to the ones proposed by Clarke et al. (2006), Weychert (2020), Jauch and Watzka (2016), Jaumotte et al. (2013), among other authors.

$$\ln(Ineq_{i,t}) = \alpha + \beta_i \mathbf{FD}_{i,t} + \gamma_1 Y_{i,t} + \gamma_2 Infl_{i,t} + \gamma_3 Gov_{i,t} + \gamma_4 TO_{i,t} + u_i + e_{i,t}$$

In this equation $\ln(Ineq_{i,t})$ represents the logarithm of the Gini coefficient for country i in period t . The variable $\mathbf{FD}_{i,t}$ is the key explanatory vector of the 9 financial development variables presented in depth in the following section, which differentiates financial development by institutions and markets and for their depth, access, and efficiency. In this case, the different β are expected to be negative, following the hypothesis that higher financial development lowers income inequality. The control variables used were also based on the ones used by Naceur and Zhang (2019), $Y_{i,t}$ is the GDP per capita used as a control variable for the wealth effect, given that we are interested not only in the macroeconomic output of the countries, but also in the output per person to compare by quality of life, γ_1 is expected to be negative. $Infl_{i,t}$ is the control variable of inflation and γ_2 is expected to be positive, $Gov_{i,t}$ is the control variable for government expenditure with γ_3 expected to be negative and finally $TO_{i,t}$ is the control variable

for trade openness and γ_4 is also expected to be negative. The following section with the results, mentions how is this equation estimated.

3.2. Sample and variables

We constructed a panel dataset because this study contains observations at a regular time frequency, that in this case is yearly information between the years 2000 and 2020, and across a collection of individuals that in this case are the ten countries chosen. It's better to use panel data in comparison to time series or cross-sectional data because it contains more information, more variability, more efficiency, it can detect and measure more statistical effects and minimize estimation biases (Aptech, 2021). In this case we worked with an unbalanced panel dataset because there were some missing observations.

This panel dataset includes the main variables: income inequality, measured using the Gini coefficient taken from the World Bank Data (The World Bank, 2022) and financial development, taken from the IMF Financial Development Index Database (International Monetary Fund, 2022). The Gini coefficient has a scale of 0 to 100 percentile, which represents the distribution of income. A Gini coefficient of 0 percent would correspond to a perfectly equal country and 100 percent is a very unequal distribution of income where one person takes all the income (Naceur and Zhang, 2019). Our data of the Gini coefficient has some missing values, mainly from Venezuela but also there is a lack of this information for the other countries. In total there are 173 observations with 37 missing values.

As mentioned before, studies found that financial development contributed to the reduction of income inequality, with studies that usually work with the private credit over GDP ratio as the measurement of financial development. In this case, we want to complement the financial development and income inequality literature by also including other measurements of financial

development such as analyzing it by institutions and markets, and including the multidimensional measurements of depth, access, and efficiency. That's why we will be using the IMF Financial Development Index (International Monetary Fund, 2022) which is composed by the following indexes shown in table 1:

Table 1 Financial Development Index variables

Index	Index is composed by
Financial Development index	Relative ranking of countries on the depth, access and efficiency of their financial institutions and financial markets.
Financial Institutions index	Aggregate of Financial Institutions measurements
Financial Institutions Depth index	Bank credit to the private sector in percent of GDP, pension fund assets to GDP, mutual fund assets to GDP, and insurance premiums life and non-life to GDP
Financial Institutions Access index	Bank branches per 100,000 adults and ATMs per 100,000 adults
Financial Institutions Efficiency index	Banking sector net interest margin, lending-deposits spread, non-interest income to total income, overhead costs to total asset, return on assets, and return on equity
Financial Markets index	Aggregate of Financial Markets measurements
Financial Markets Depth index	Stock market capitalization to GDP, stocks traded to GDP, international debt securities of government to GDP, and total debt securities of financial and nonfinancial corporations to GDP
Financial Markets Access index	Percent of market capitalization outside of the top 10 largest companies and the total number of issues of debt (domestic and external, nonfinancial, and financial corporations) per 100,000 adults
Financial Markets Efficiency index	Stock market turnover ratio (stocks traded to capitalization)

Note: Adapted from <https://data.imf.org/?sk=f8032e80-b36c-43b1-ac26-493c5b1cd33b>. Copyright 2022 by International Monetary Fund

It is relevant to analyze the financial development by institutions and markets because they each have a different target audience, for example financial development in institutions will most likely benefit the poor, while financial development in markets may be favorable for the

rich. Naceur and Zhang (2019) found that the development of banking shows a more significant impact on income than the development of the stock market, which is why we expect to have a higher negative effect on income inequality from financial development of institutions than of financial markets. Also, when looking at the specific measurements of financial development, the World Bank (2007) found that there is evidence on access to finance in reducing income inequality and poverty, likewise Weychert (2020) concluded that financial depth, access, and stability (which is not measured in this paper) can significantly lower income inequality, which is why we expect to find a significant effect on this individual measurement.

Finally, as mentioned above, the variables of control were chosen according to Naceur and Zhang (2019) which say that they are determinants of poverty and inequality. The variables are real GDP per capita, government expenditures to GDP, trade openness and inflation rate. These variables were all taken from the World Bank Data and inflation for Argentina and Brazil was taken from the Monetary International Fund and the OECD. The GDP per capita, government expenditure, trade openness and inflation have missing values mostly from Venezuela but also from Uruguay and Argentina.

4. Empirical results

4.1. Descriptive analysis

This section discusses the results from the econometric exercise. First, we will be giving a review of the data and variables, then we will examine the relationship of financial development and inequality. Additionally, this section examines how the different aspects of financial development impact income inequality on the ten countries studied.

Table 2 shows the descriptive statistics of the variables chosen. The main variable studied is inequality, measured by the Gini coefficient with a mean of 48.74 percent, which varies between 39.5 and 61.6 percent. As mentioned above, there is a data constraint due to the scarcity in the Gini coefficient data.

From the financial development variables, it's interesting to see that there is higher financial development in institutions than markets. Also, it is on average higher for institutional efficiency and lower for markets efficiency and depth. The GDP per capita of the ten South American countries is on average \$13,700 which varies between \$5,400 and \$25,000, with a trade openness on average of 50% of the GDP. Lastly, inflation is affected by extreme variables of Venezuela and Argentina which may affect this variable of control.

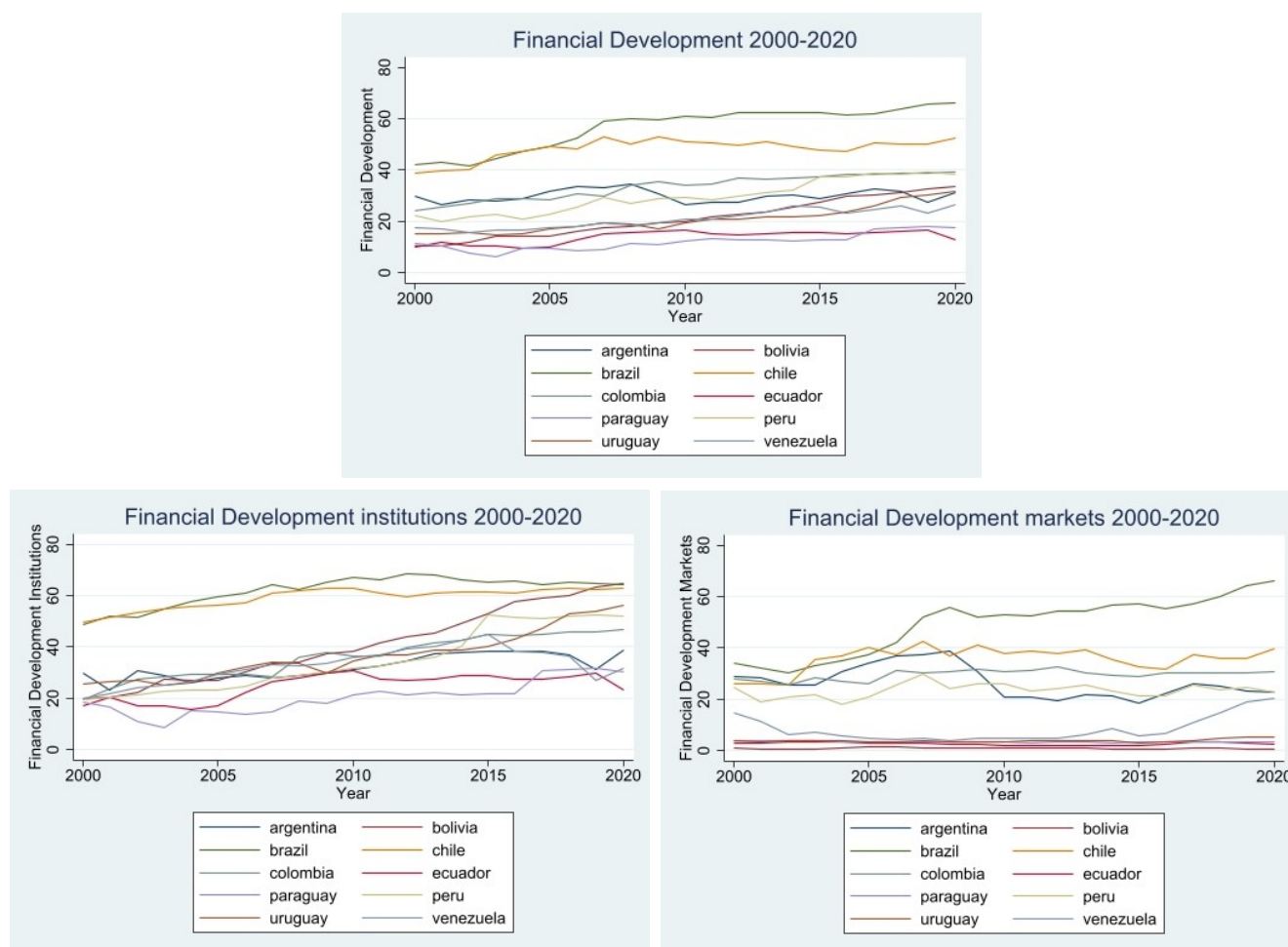
Table 2 Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Gini coefficient	173	48.74	5.09	39.5	61.6
Financial Development	210	28.7	14.61	6.36	66.22
FD Institutions	210	37.97	15.13	8.83	68.34
FD Markets	210	18.39	16.69	.74	66.02
FD Institutions (Depth)	210	24.91	16.35	4.59	70.7
FD Institutions (Access)	210	33.4	17.92	7.69	73.94
FD Institutions (Efficiency)	210	49.75	12.33	12.33	73.18
FD Markets (Depth)	210	15.75	15.18	.67	56.55
FD Markets (Access)	210	24.9	23.83	.35	99.81
FD Markets (Efficiency)	210	14.16	22.32	0	100
GDP per capita (constant 2017, international \$)	189	13776.64	5521.12	5402.76	25034.89
GDP per capita growth	204	1.65	4.17	-12.2	16.26
Government expenditure (% GDP)	199	13.74	2.93	7.43	20.48
Trade openness (% GDP)	204	50.3	16.7	21.85	85.26
Inflation (annual %)	199	728.06	9241.71	-.34	130060.2
90-10 ratio	154	9.96	3.12	6.24	26.31

Note: The table presents the results for the descriptive statistics. The Gini coefficient, financial development indices, Government expenditure, Trade openness and Inflation are in percentage form. The GDP per capita is constant 2017 international US dollars. Obs, Std. Dev., Min, and Max denote observation, standard deviation, minimum, and maximum, respectively.

Figure 2 shows the behavior of financial development of the ten South American countries chosen between the years 2000 and 2020. Financial development has a positive trend with Brazil, Chile, Colombia, and Peru with higher levels of financial development.

Countries such as Bolivia, Ecuador, Paraguay, and Uruguay have lower levels on financial development, which is influenced by their low financial development in markets, given that the financial development index is made of the ranking of the financial institutions and markets index. The correlation between financial development in markets with the financial development index is bigger than the correlation between financial development in institutions, which is why for example in 2020 Ecuador had a financial development of institutions of 23 and financial development of markets of 3 which resulted in a financial development index of 13. Another example is Paraguay that in 2020 had 30 of the institutions index and only 4 of markets index which resulted in 17 in the financial development index. The low level of financial development in markets compared to institutions may be a reason why our exercise shows positive results from financial institutions in reducing income inequality, and results from the financial markets are generally not significant in reducing income inequality.

Figure 2. Financial development in South American countries 2000-2020

Note: Financial Development index, Financial Development for Financial Institutions index and Financial Development for Financial Markets index for the ten sample countries between the years 2000 and 2020.

Table 3 presents the correlation of the Gini coefficient with the Financial Development variables. Column 1 shows that financial development has a positive and non-significant relationship with the Gini coefficient. Then, there is a negative and significant correlation between financial development in institutions and the Gini coefficient supporting the inequality-narrowing effect, nonetheless financial development in financial markets has a positive and significant correlation which would support the inequality widening effect.

After, table 3 also includes the correlations with the specific measurement of financial development. Column 1 shows that for financial institutions, the measurements of access and efficiency are negatively and significantly correlated with the Gini coefficient. For financial development in financial markets the depth and efficiency measurements have a positive and significant correlation with the Gini coefficient. Appendixes 1, 2 and 3 show the different correlations of the Gini coefficient with the financial development variables and the control variables.

Table 3 Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Log Gini coefficient	1.00									
(2) Financial Development	0.07	1.00								
(3) FD Institutions	-0.145*	0.892*	1.00							
(4) FD Markets	0.256*	0.912*	0.627*	1.00						
(5) FDI (Depth)	0.04	0.860*	0.890*	0.672*	1.00					
(6) FDI (Access)	-0.173*	0.740*	0.880*	0.476*	0.618*	1.00				
(7) FDI (Efficiency)	-0.346*	0.533*	0.645*	0.333*	0.510*	0.385*	1.00			
(8) FDM (Depth)	0.236*	0.854*	0.687*	0.846*	0.757*	0.480*	0.420*	1.00		
(9) FDM (Access)	0.03	0.652*	0.351*	0.804*	0.425*	0.163*	0.332*	0.531*	1.00	
(10) FDM (Efficiency)	0.393*	0.759*	0.545*	0.811*	0.516*	0.561*	0.09	0.614*	0.389*	1.00

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Note: The table presents the results for the correlations. *, **, and *** denote statistically significant coefficient at 10%, 5% and 1% levels, respectively.

As mentioned before, figure 1 (presented in the introduction) shows the small but positive relationship between financial development and income inequality, the negative relationship between financial development in institutions and income inequality and the positive relationship between financial development in markets and income inequality. These graphs complement our analysis of the correlations mentioned before, where the Gini coefficient has a positive correlation with financial development and financial development in financial markets, which would support the inequality-widening hypothesis, and a negative correlation with financial

development in institutions which defends the inequality-narrowing hypothesis. Nevertheless, we must be careful when analyzing the correlations because it only considers the movement of both variables in a linear way, but it cannot be used to analyze causality.

4.2. Results

Now we will be analyzing the relationships between income inequality and financial development by using the regressions proposed in the methodology section. First, we performed the Hausman test to check whether an estimate for an unknown parameter is consistent or not. In this test, the null hypothesis is that the preferred model is the random effects. After performing the test, we rejected the null hypothesis and concluded that the analysis would be performed by using fixed effects estimations to avoid the omitted variables bias. Also, the fixed effects estimator is used because even though the sample is made up of Latin American countries, the fixed effects estimator controls for the possible idiosyncratic differences of each country, such as social differences and differences in the political system that can affect inequality from income.

Then, we also decided to use the robust standard errors to avoid the heteroskedasticity bias. After that, we did the Granger causality test between the variable's inequality and financial development. This Granger causality test concluded that financial development is an exogenous variable because the lag of inequality is not useful to predict the future value of financial development, but the lags of financial development are useful to predict inequality. Our analysis will be only performed from now on for only nine countries due to lack of data availability for Venezuela.

Table 4 shows the effects that financial development and its different measurements have on the Gini coefficient. The regression results suggest that financial development and financial

development on institutions have a negative and significant effect on income inequality (column 1 and 2). Also, when looking at the different measurements of financial development, the access and efficiency of financial institutions reduce income inequality, as well as the efficiency of financial markets (column 3).

On average, at 5 percent significance level, the Gini coefficient can be reduced by 0.7% for an increase in 1 unit of financial development index as seen on column 1. Column 2 reports the impact of financial development in institutions and markets, which negatively affect the income inequality variable. At 1 percent significance level, the Gini coefficient can be reduced by 0.5% with an increase in 1 unit of financial development in financial institutions index which support the inequality-narrowing hypothesis. Columns 2 results also show that financial development for financial market is not significant for reducing income inequality in the countries studied between the years 2000 and 2020.

Finally, column 3 reports similar effects of financial development on income inequality, which support the inequality-narrowing hypothesis. On average at 5 percent significance level, income inequality can be reduced by 0.2% for a 1 unit increase in financial development of institutions access index which gathers information from additional bank branches per 100,000 adults and ATMs per 100,000 adults. Also at 10 percent significance level, the Gini coefficient is reduced at 0.1% by a 1 unit increase in the financial development of institutions efficiency index which is formed from the Banking sector net interest margin, lending-deposits spread, non-interest income to total income, overhead costs to total asset, return on assets, and return on equity, and at 10 percent significance level, income inequality is affected at 0.1% by 1 unit increase in the financial development of markets efficiency index which gathers information from the Stock market turnover ratio. These results show that for the South American countries

studies, the most important is to have institutions and the ability of using the financial tools, but also having an easy access to the services they provide with branches and ATMs.

The coefficients on depth to financial institutions and markets, and access to financial markets are not significantly statistically in reducing income inequality. The insignificance of financial markets can be explained because as mentioned before, with the development of institutions the poor have access to credit for productive activities and can isolate themselves against poor macroeconomic performances (Bittencourt, 2010). But financial markets have adverse selection and moral hazard problems which is why borrowers need collateral that the poor don't have (Clarke et al., 2006), which could be a reason why financial development through markets can worsen inequality.

From the control variables considered, table 4 shows that the GDP per capita, the government expenditure and trade openness seem to reduce income inequality, even though the results are not always statistically significant. Inflation has the opposite result, increasing income inequality.

From table 4 it can also be seen that the R-squared is 0.73, 0.77 and 0.78 which means that we are explaining 73% of the variation in income inequality in the first regression and more on the second and third regressions.

Table 4 Regression results with fixed effects

Variable	Log Gini coefficient		
	(1)	(2)	(3)
Financial Development	-0.007** (0.0028)		
FD Institutions		-0.005*** (0.0013)	
FD Markets		-0.001 (0.0004)	
FD Institutions (Depth)			-0.002 (0.0016)
FD Institutions (Access)			-0.002** (0.0009)
FD Institutions (Efficiency)			-0.001* (0.0006)
FD Markets (Depth)			0.000 (0.0007)
FD Markets (Access)			0.001 (0.0009)
FD Markets (Efficiency)			-0.001* (0.0003)
GDP per capita	-0.000* (0.0000)	-0.000* (0.0000)	-0.000** (0.0000)
Government expenditure (% GDP)	-0.014** (0.0048)	-0.009 (0.0049)	-0.006 (0.0070)
Trade openness (% GDP)	-0.001 (0.0009)	-0.001 (0.0007)	-0.001 (0.0007)
Inflation	0.000* (0.0002)	0.000** (0.0002)	0.001** (0.0002)
Constant	4.429*** (0.1040)	4.325*** (0.0781)	4.272*** (0.1077)
Observations	151	151	151
R-squared	0.735	0.774	0.783
Number of countries	9	9	9

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: The table presents the results for the estimated coefficients and their robust standard errors in parenthesis. The dependent variable is the logarithm Gini coefficient for 9 countries (excluding Venezuela because of lack of information). The R-squared is also reported. *, **, and *** denote statistically significant coefficient at the 10%, 5% and 1% levels, respectively.

We could compare our results to the ones of Naceur and Zhang (2019), considering that they use similar variables but include more countries in their paper. We found similar results in

the reduction of income inequality with more financial access and efficiency to institutions and efficiency to financial markets. Also, like us, they found that access to financial markets was not significant. However, unlike our research, the financial depth measurement reduces income inequality for both institutions and markets. This difference in the results may be because in our sample the countries have low indices of financial depth for institutions and it is even lower for markets, while Naceur and Zhang (2019) study a sample of 143 countries which include more financial developed countries.

In their study, Naceur and Zhang (2019) found that the Gini coefficient can be reduced by a percentage point of 0.019 for each additional account opened per 1000 adults, which is their measurement of access to financial institutions. In the access to financial markets their results were not significant. Also, a 1 percentage point increase in the private credit to GDP ratio (measurement of financial depth for institutions) tends to reduce the Gini coefficient by more than 0.041 percent and the ratio of stock market total value traded to GDP (measurement of financial depth for markets) are negative and significant (-0.022 on the Gini regression). Moreover, they found that a reduction of 1 percentage point in the net interest margin (measurement of financial efficiency for institutions) can reduce inequality by a percentage point of 0.44. Also, a 1 percent increase in the stock market turnover ratio (financial efficiency for markets) can reduce the Gini coefficient by a percentage point of 0.055.

4.2.1. Dynamic panel analysis

Then, we did the analysis using a dynamic panel approach, given that inequality is a highly persistent variable. We included the dependent variable lagged as a regressor to provide dynamic adjustment and see how income inequality depends on its own past realizations. Table 5 shows that indeed the lag of income inequality affects the current level of inequality. Also,

comparing the results shown on table 4, financial development decreases income inequality because the Gini coefficient can be reduced by 0.6% for an increase in 1 unit of financial development index. This effect is mainly seen on financial development of institutions since income inequality can be reduced by 0.4% for a 1 unit increase in financial development in financial institutions index (column 2). Additionally, income inequality can be reduced by 0.2% for a 1 unit increase in financial development of institutions efficiency index (column 3), but in this case the access of institutions is not significant when lowering income inequality as it was in table 4.

Table 5 Regression results with fixed effects and inequality lagged

Variable	Log Gini coefficient		
	(1)	(2)	(3)
Inequality lag	0.292** (0.0921)	0.255** (0.1061)	0.253* (0.1302)
Financial Development	-0.006* (0.0027)		
FD Institutions		-0.004** (0.0015)	
FD Markets		-0.000* (0.0002)	
FD Institutions (Depth)			-0.002 (0.0016)
FD Institutions (Access)			-0.002 (0.0012)
FD Institutions (Efficiency)			-0.002** (0.0006)
FD Markets (Depth)			0.000 (0.0006)
FD Markets (Access)			0.001 (0.0009)
FD Markets (Efficiency)			-0.000 (0.0004)
GDP per capita	-0.000 (0.0000)	-0.000 (0.0000)	-0.000* (0.0000)
Government expenditure (% GDP)	-0.010* (0.0027)	-0.006 (0.0027)	-0.004 (0.0027)

	(0.0049)	(0.0043)	(0.0058)
Trade openness (% GDP)	-0.001	-0.001	-0.001
	(0.0008)	(0.0006)	(0.0008)
Inflation	0.000***	0.001***	0.000**
	(0.0001)	(0.0001)	(0.0002)
Constant	3.160***	3.225***	3.198***
	(0.4218)	(0.4593)	(0.5153)
Observations	135	135	135
R-squared	0.776	0.803	0.807
Number of country	9	9	9

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: The table presents the results for the estimated coefficients and their robust standard errors in parenthesis. The dependent variable is the logarithm Gini coefficient for 9 countries (excluding Venezuela because of lack of information). The R-squared is also reported. *, **, and *** denote statistically significant coefficient at the 10%, 5% and 1% levels, respectively.

5. Robustness

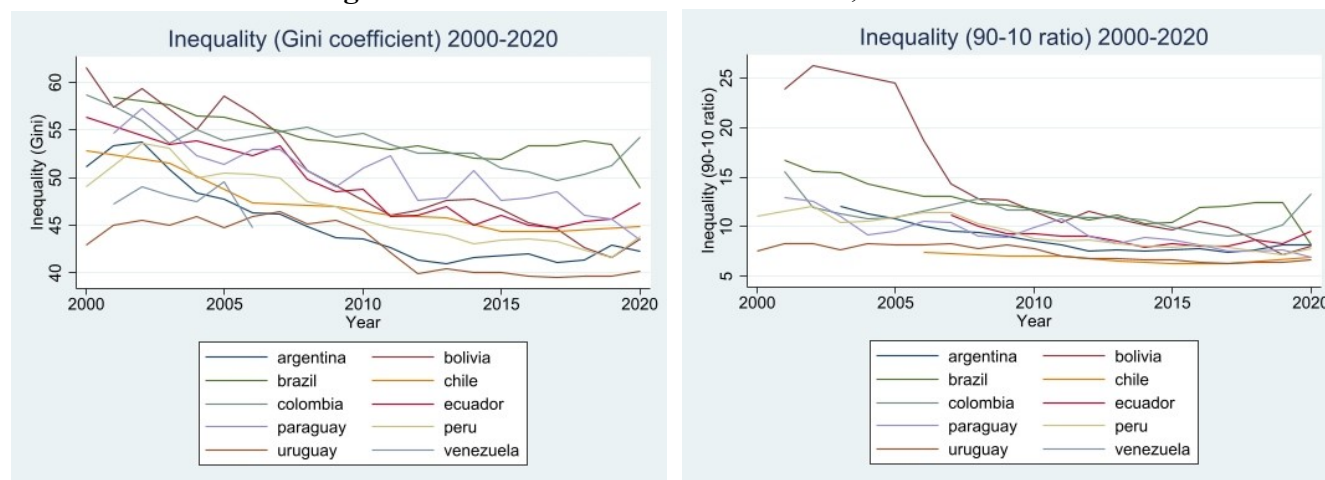
5.1. 90-10 ratio

Then, as a robustness test, we used another measurement of income inequality. Instead of using the Gini coefficient as the dependent variable, we are now using the 90-10 ratio of inequality which measures the dispersion ratio of the average income or consumption of the richest 10% of the population (90th percentile) with the poorest 10% (10th percentile) (LAC Equity Lab, 2022). According to the LAC Equity Lab (2022) this ratio is a good measurement of inequality, but it does not consider the middle population of the distribution.

Figure 3 shows the behavior of the Gini coefficient and the 90-10 ratio for the years 2000 to 2020 for the countries chosen. In 2020 the countries with more inequality according to the Gini coefficient are Colombia, Brazil, Ecuador, and Chile. For 2020, the countries with higher 90-10 ratio are Colombia, Ecuador, Argentina, and Brazil. Both variables have a decreasing trend and unfortunately there's data restrictions for both measurements of inequality. Yet, when analyzing both indices of income inequality there are cases in which they seem to differ. For example, in

2020 Argentina is the third country with highest income inequality in the sample according to the 90-10 ratio, but when looking at the Gini coefficient it is the eighth, which would mean that the income inequality in that country is mainly on the extreme ends of the population and not in the middle of the population, which could be the case of Chile which has higher Gini coefficient than 90-10 ratio.

Figure 3. Gini coefficient and 90-10 ratio, 2000-2020



Note: Gini coefficient and 90-10 ratio for the ten sample countries for the years 2000 to 2020.

Table 1 shows that the 90-10 ratio has a mean of 9.96, that varies between 6.24 and 26.31. This means that on average for the ten countries studied between 2000 and 2020, the population that belongs to the 90th percentile earned an estimate of 9.96 more times than workers at the 10th percentile. For Colombia, the country with highest 90-10 ratio in 2020, it can be as high as 13.

Table 6 shows the results of the analysis made with the logarithm of the 90-10 ratio instead of the logarithm of the Gini coefficient as the income inequality measurement. This analysis is also performed by using fixed effects estimations. The results found are similar to the ones in table 4, which suggest that financial development has a negative and significant effect on the

logarithm of the 90-10 ratio (column 1), this effect is seen on financial institutions, and it is negative but not significant for financial markets (column 2). However, in this case not only the access and efficiency of financial institutions is relevant for decreasing the income inequality, but the depth of financial institutions is also pertinent (column 3). For financial markets the only measurement that seems to have an inverse effect with income inequality is the efficiency.

Table 6 Regression results with fixed effects using the 90-10 ratio

Variable	Log 90-10 ratio		
	(1)	(2)	(3)
Financial Development	-0.024** (0.0093)		
FD Institutions		-0.018** (0.0060)	
FD Markets		-0.004 (0.0027)	
FD Institutions (Depth)			-0.010* (0.0046)
FD Institutions (Access)			-0.008** (0.0034)
FD Institutions (Efficiency)			-0.005** (0.0018)
FD Markets (Depth)			0.002 (0.0035)
FD Markets (Access)			0.004 (0.0031)
FD Markets (Efficiency)			-0.003*** (0.0008)
GDP per capita	-0.000 (0.0000)	-0.000 (0.0000)	-0.000 (0.0000)
Government expenditure (% GDP)	-0.015 (0.0123)	0.000 (0.0114)	0.012 (0.0160)
Trade openness (% GDP)	-0.001 (0.0034)	-0.000 (0.0029)	-0.000 (0.0027)
Inflation	-0.001 (0.0020)	-0.001 (0.0015)	0.000 (0.0013)
Constant	3.386*** (0.4113)	3.060*** (0.2732)	2.831*** (0.2877)
Observations	141	141	141

R-squared	0.616	0.672	0.698
Number of country	9	9	9

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: The table presents the results for the estimated coefficients and their robust standard errors in parenthesis. The dependent variable is the logarithm 90-10 ratio for 9 countries (excluding Venezuela because of lack of information). The R-squared is also reported. *, **, and *** denote statistically significant coefficient at the 10%, 5% and 1% levels, respectively.

5.2. Gini coefficient by country

Then, we also did the analysis of the relationship between financial development and income inequality by country. We went back to using the Gini coefficient because there is more data availability than the 90-10 ratio. The five countries chosen for this analysis are: Argentina, Colombia, Brazil, Chile, and Ecuador because they were the four countries with higher Gini coefficient and 90-10 ratio (Colombia, Ecuador and Brazil were at the top of the list for both). Table 7 shows the results, in this case financial development has an inverse relationship with income inequality for Argentina, Colombia, Brazil, and Ecuador, but it is only statistically significant for Argentina and Brazil.

Table 7 Regression results with fixed effects by country

Variable	Log Gini coefficient				
	Argentina	Colombia	Brazil	Chile	Ecuador
Financial Development	-0.008*** (0.0018)	-0.001 (0.0022)	-0.002** (0.0007)	0.003 (0.0030)	-0.007 (0.0046)
GDP per capita	-0.000*** (0.0000)	-0.000*** (0.0000)	-0.000*** (0.0000)	-0.000*** (0.0000)	-0.000*** (0.0000)
Government expenditure (% GDP)	-0.019** (0.0070)	-0.020** (0.0071)	-0.020** (0.0071)	-0.020** (0.0069)	-0.018* (0.0079)
Trade openness (% GDP)	-0.002 (0.0012)	-0.002 (0.0012)	-0.002 (0.0012)	-0.002 (0.0012)	-0.002 (0.0014)
Inflation	0.000 (0.0003)	0.000 (0.0004)	0.000 (0.0004)	0.000 (0.0004)	0.000 (0.0003)
Constant	4.513***	4.510***	4.514***	4.500***	4.483***

	(0.1733)	(0.1661)	(0.1701)	(0.1696)	(0.1874)
Observations	151	151	151	151	151
R-squared	0.629	0.627	0.630	0.628	0.633

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: The table presents the results for the estimated coefficients and their robust standard errors in parenthesis. The dependent variable is the logarithm Gini coefficient for 5 countries independently. The R-squared is also reported. *, **, and *** denote statistically significant coefficient at the 10%, 5% and 1% levels, respectively.

5.3. Gini coefficient by country and income level

Then, we decided to do the analysis by the different measurements of financial development using the World Bank 2021 country classification by income, since Seven and Coskun (2016) research of 45 emerging economies found that financial development impacts income inequality majorly on low-income economies. This classification by income performed by the World Bank is defined using the GNI per capita. In our sample countries, Bolivia is the only lower-middle income economy (GNI per capita of \$1,086 to \$4,255), Argentina, Brazil, Colombia, Ecuador, Peru, and Paraguay are upper-middle income economies (GNI per capita of \$4,256 to \$13,205) and Chile and Uruguay are high-income economies (GNI per capita \$13,205 or more) (World Bank Country and Lending Groups, n.d.).

Table 8 results show that for Bolivia, the lower-middle income economy of our sample, the access and efficiency of financial institutions have a negative and statistically significant (at 1 percent significance level) effect on income inequality. Nonetheless, it seems that for Bolivia the depth of financial institutions and financial markets, and the access of financial markets have a positive and significant effect on the Gini coefficient. Furthermore, when doing the analysis with the financial development index as done in table 7, Bolivia's income inequality can be reduced by 1% by an increase in 1 unit on the index. This result is bigger than all the countries analyzed in table 7, with Argentina having the highest effect of 0.8%, which would align with Seven and

Coskun (2016) findings that financial development has a higher impact on income inequality of low-income countries.

Now when looking at some upper-middle income economies like Argentina, Colombia, and Brazil their results differ. When the analysis was made with the 9 countries (excluding Venezuela), financial institutions development had an inverse effect on income inequality, but now this effect is only true for depth in Argentina and Brazil and for efficiency in Colombia. It is also interesting to highlight that some of the measurements of financial markets development for these countries have a negative effect on income inequality while some measurements of financial institutions development increase income inequality. For example, access and efficiency to financial markets in Argentina, depth to financial markets for Colombia and access to financial markets to Brazil reduce income inequality, while in Colombia the depth of financial institutions and in Brazil the access of financial institutions increase the Gini coefficient.

Finally, the analysis was made for Chile, the only high-income economy in our sample. As mentioned in the introduction, Chile and Brazil have the higher ranks in the development of financial markets and financial institutions. Table 8 shows that for Chile efficiency of financial institutions reduces income inequality, while the depth of institutions and markets increase it. This may be because Chile has already a well established financial system with the reforms made on the year 2000, which is why having deeper institutions and markets would not lower income inequality, but if the existing ones are more efficient this will effectively influence inequality.

According to Cysne et al. (2005) there is evidence that correlates high inflation rates with income inequality, given that the poor have more restricted access to finance assets and the poor pay more inflation taxes than the rich. Therefore, in this analysis by country it is also relevant to mention that some countries in our sample such as Argentina have high inflation rates, which

would explain why the Gini coefficient increases with some of the measurements of financial development. Unfortunately, we don't have enough information to do this same analysis for Venezuela which also has high inflation. Also given that this study is for the years 2000 to 2020, different countries in our study have experienced high inflation periods which is why it would also be relevant to analyze by country and specific macroeconomic trends in future research.

Table 8 Regression results with fixed effects by country all measurements

Variables	Log Gini coefficient				
	Bolivia	Argentina	Colombia	Brazil	Chile
FD Institutions (Depth)	0.007** (0.0026)	-0.045*** (0.0092)	0.006*** (0.0016)	-0.002** (0.0006)	0.003** (0.0013)
FD Institutions (Access)	-0.004*** (0.0008)	0.006* (0.0026)	-0.002 (0.0011)	0.002 (0.0014)	-0.003 (0.0018)
FD Institutions (Efficiency)	-0.003*** (0.0004)	0.004*** (0.0009)	-0.004*** (0.0003)	0.001 (0.0007)	-0.006*** (0.0007)
FD Markets (Depth)	0.016** (0.0060)	0.039*** (0.0059)	-0.002*** (0.0005)	-0.000 (0.0003)	0.003** (0.0010)
FD Markets (Access)	0.042*** (0.0065)	-0.002* (0.0007)	-0.001 (0.0007)	-0.000* (0.0001)	-0.001 (0.0009)
FD Markets (Efficiency)	-	-0.015*** (0.0023)	0.000 (0.0005)	-0.000 (0.0003)	0.001 (0.0008)
GDP per capita	-0.000*** (0.0000)	-0.000*** (0.0000)	-0.000*** (0.0000)	-0.000*** (0.0000)	-0.000*** (0.0000)
Government expenditure (% GDP)	-0.012** (0.0051)	-0.019** (0.0070)	-0.023** (0.0069)	-0.020** (0.0076)	-0.020** (0.0071)
Trade openness (% GDP)	-0.000 (0.0007)	-0.002 (0.0012)	-0.002 (0.0012)	-0.002 (0.0013)	-0.002 (0.0013)
Inflation	0.000 (0.0003)	0.001 (0.0003)	0.000 (0.0004)	0.000 (0.0004)	0.000 (0.0004)
Constant	4.311*** (0.1066)	4.521*** (0.1772)	4.567*** (0.1685)	4.497*** (0.1919)	4.532*** (0.1789)
Observations	151	151	151	151	151
R-squared	0.790	0.642	0.644	0.631	0.638

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: The table presents the results for the estimated coefficients and their robust standard errors in parenthesis. The dependent variable is the logarithm Gini coefficient for 6 countries independently. The R-squared is also reported. *, **, and *** denote statistically significant coefficient at the 10%, 5% and 1% levels, respectively.

6. Conclusions

The goal of this thesis was to analyze the relationships between financial development and income inequality for ten South American countries between the years 2000 and 2020 by using different measurements of financial development. We found by constructing a panel database and through an econometric exercise, that financial development reduces income inequality supporting the inequality-narrowing hypothesis.

Then, expanding the database by including financial development in institutions and markets and three dimensions of financial development: depth, access, and efficiency we found that financial development on institutions lowers income inequality, yet financial development on markets does not have a significant effect on income inequality. Also, this effect was mainly found on the access and efficiency of financial institutions. Nevertheless, improving the efficiency of financial markets can also help reduce income inequality. From the control variables considered, GDP per capita, government expenditure and trade openness also seem to reduce income inequality while inflation has the opposite result, affecting income distribution.

Afterwards, some robustness tests were performed which led to similar results for the financial development index and the financial development for institutions index when using the 90-10 ratio instead of the Gini coefficient as the income inequality indicator. Additionally, the three measurements of financial development: depth, access and efficiency seem to lower income inequality. Then, we also performed tests by country and income level and found that financial development reduces income inequality for some countries (not significant for all) and when looking at the different measurements of financial development they seem to affect each country differently. It is interesting to see how income inequality in low-income and high-

income countries is affected uniquely by financial development. As a contribution to literature, we studied the South American region in the long-term and using different measurements of financial development.

Unfortunately, this study had data limitations. Initially our sample included ten countries for the period studies, but due to data constraints mainly from Venezuela, we performed the analysis for only nine countries. For future research it would be interesting to include more countries of the region and expand the time horizon to see how financial development relates with income inequality.

Finally, the results of this thesis would guide policymakers on the countries studied, to focus on better quality of institutions which would lead to a reduction in income inequality. Specifically, policies aimed at improving the access and efficiency of financial institutions will consequently be targeting economic growth and income distribution.

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7. Appendix

Appendix 1

Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Gini coefficient	1.000							
(2) Financial Development	0.075	1.000						
(3) GDP per capita	-0.574*	0.452*	1.000					
(4) GDP per capita growth	0.068	-0.051	-0.067	1.000				
(5) Government expenditure (% GDP)	0.087	0.604*	0.168*	-0.293*	1.000			
(6) Trade openness (% GDP)	-0.075	-0.428*	-0.230*	0.252*	-0.657*	1.000		
(7) Inflation	-0.091	-0.014	0.167*	-0.218*	-0.059	-0.113	1.000	
(8) 90-10 ratio	0.787*	0.019	-0.520*	0.081	0.244*	-0.100	-0.123	1.000

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix 2

Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Gini coefficient	1.000								
(2) FD Institutions	-0.145*	1.000							
(3) FD Markets	0.256*	0.627*	1.000						
(4) GDP per capita	-0.574*	0.434*	0.384*	1.000					
(5) GDP per capita growth	0.068	-0.089	-0.007	-0.067	1.000				
(6) Government expenditure (% GDP)	0.087	0.624*	0.484*	0.168*	-0.293*	1.000			
(7) Trade openness (% GDP)	-0.075	-0.231*	-0.528*	-0.230*	0.252*	-0.657*	1.000		
(8) Inflation	-0.091	-0.014	-0.012	0.167*	-0.218*	-0.059	-0.113	1.000	
(9) 90-10 ratio	0.787*	-0.095	0.115	-0.520*	0.081	0.244*	-0.100	-0.123	1.000

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix 3

Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Gini coefficient	1.000												
(2) FDI (Depth)	0.038	1.000											
(3) FDI (Access)	-0.173*	0.618*	1.000										
(4) FDI (Efficiency)	-0.346*	0.510*	0.385*	1.000									
(5) FDM (Depth)	0.236*	0.757*	0.480*	0.420*	1.000								
(6) FDM (Access)	0.025	0.425*	0.163*	0.332*	0.531*	1.000							
(7) FDM (Efficiency)	0.393*	0.516*	0.561*	0.086	0.614*	0.389*	1.000						
(8) GDP per capita	-0.574*	0.417*	0.309*	0.431*	0.388*	0.469*	0.107	1.000					
(9) GDP per capita growth	0.068	-0.072	-0.143*	0.084	0.002	0.033	-0.053	-0.067	1.000				
(10) Government expenditure (% GDP)	0.087	0.484*	0.699*	0.225*	0.333*	0.259*	0.604*	0.168*	-0.293*	1.000			

(11) Trade openness (% GDP)	-0.075	-0.115	-0.347*	-0.004	-0.257*	-0.509*	-0.504*	-0.230*	0.252*	-0.657*	1.000		
(12) Inflation	-0.091	-0.091	0.026	0.077	0.109	-0.080	-0.040	0.167*	-0.218*	-0.059	-0.113	1.000	
(13) 90-10 ratio	0.787*	0.025	-0.113	-0.235*	0.049	-0.005	0.228*	-0.520*	0.081	0.244*	-0.100	-0.123	1.000
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$													

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$