Degree Program in Economics and Finance

Course of Macroeconomic Analysis

Exploring Financial Development and Income Inequality Dynamics: A Cross-Country Analysis

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Academic Year 2022/2023

"The banker, therefore, is not a so much primarily a middleman…He authorises people in the name of society…(to innovate)."

Joseph Schumpeter

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Abstract

This study investigates changes in income inequality, income growth of the poor, and financial development across 43 countries during the 1980s and 1990s. Four main objectives guide the research: to assess if (1) financial development reduces inequality, (2) this reduction is linked to the income growth of the poor, (3) a non-linear relationship exists between financial development and income inequality, and (4) the legal origin of a country mitigates endogeneity effects. Exploring financial market imperfections in addressing points (1) and (2), the study suggests that these imperfections contribute to cross-dynasty income disparities by influencing the distribution of human capital. It argues that well-developed financial markets enable individuals with high abilities to access education independently of parental wealth, thereby reducing inequality and enhancing the income growth of those with lower economic means. Concerning point (3), the study acknowledges theoretical contradictions in the finance-inequality correlation and proposes a non-linear relationship, incorporating a quadratic function to better capture the nuanced association. Point (4) underscores the role of legal frameworks in explaining financial development differences among countries, expecting the legal origin to act as a strong instrument in addressing potential endogeneity concerns. Despite these contributions, the study faces constraints such as reliance on cross-country regression, time-averaged data, and an aggregate financial development indicator. Additionally, the results underscore the importance of financial intermediaries in mitigating inequality and poverty but fall short of providing specific policy insights for enhancing the welfare of the poor.

JEL No. G00, O11, O16
Key Words: Financial System, Income Distribution, Economic Growth, Poverty Alleviation, Economic Development

I Introduction

The COVID-19 pandemic has once again brought to light the persistent issues of poverty and inequality in our society. As a result of the pandemic, extreme poverty and inequality increased in 2020 for the first time in over 20 years, with approximately 100 million more people now living on less than $1.90 a day, increasing the global poverty rate from 7.8 to 9.1 (World Bank, 2021). While individuals across all income groups faced economic setbacks during the pandemic, the poorest 20 percent experienced the most significant decline in income. In 2021, incomes continued to decline, with the wealthiest managing to mitigate the impact. However, the poorest 40 percent have yet to recover from their income losses. Regardless of the underlying specific causes of this phenomenon, the aftermath of the pandemic has elevated the issues of income inequality, poverty alleviation and economic growth on the global political agenda.

This study aims to explore the interconnections among economic growth, finance, and inequality. While numerous scholars have established that both inequality and financial underdevelopment can hinder growth, there remains uncertainty regarding the precise relationship between finance and levels of inequality, particularly in terms of finance's impact on poverty alleviation. Dollar and Kraay (2002) assert that financial development has the potential to enhance overall economic growth. However, researchers have not conclusively determined whether financial development disproportionately elevates the income of the poor or if it primarily amplifies investment opportunities for the wealthy. This paper initially investigates the connection between inequality and growth by focusing on the credit market channel. Subsequently, it explores the relationship between finance and income inequalities. This approach serves the dual purpose of reassessing the current literature in finance and growth while also

offering empirical evidence on the associations between alterations in inequality, poverty, and financial development. Notably, considering that credit constraints obstruct the capital flow to those at the bottom of the wealth distribution (Galor and Zeira, 1993; Aghion and Bolton, 1997), thereby diminishing the efficiency of capital allocation in society, this paper indirectly supports the thesis of the market-imperfection channel and challenges the neoclassical perspective that overall inequality fosters growth.

Examining a dataset comprising 43 countries and analysing variations in income inequality, income growth of the poor and financial development from the 1980s to the 1990s, we will subsequently examine whether (1) financial development reduces inequality, (2) whether this reduction in inequality levels is due to income growth of the poor, (3) whether there is a non-linear relationship between financial development and income inequality, suggesting a more complex relationship between the two phenomenon, (4) whether legal origin of a country is able to alleviate effects of endogeneity in the aforementioned relationship.

Regarding points (1) and (2), studies indicate that financial market imperfections can account for disparities in income across dynasties by influencing the distribution of human capital within society. Reminding us that parental choices to invest in the human capital (such as education) of their children significantly contribute to the persistence of relative income differences, in the presence of well-developed financial markets, individuals with high abilities can access education independently of parental wealth. A more effective financial system results in a close association between human capital accumulation and individual abilities. Consequently, the anticipated impact of financial development is a reduction in inequality levels and an increase in the income growth of those with lower economic means. Regarding point (3), theoretical frameworks offer seemingly contradictory forecasts concerning the correlation between finance and

inequality. Existing literature underscores that finance can impact inequality at both an extensive and intensive margin: financial development may broaden the reach of individuals accessing financial services, thereby diminishing intergenerational cross-dynasty income disparities. However, it is also acknowledged that financial development can favour those who are already part of the financial market, such as the affluent and well-established firms, thereby exacerbating overall inequality levels (Greenwood and Jovanovic, 1990). Both theoretical and empirical literature hesitates to propose a linear relationship between finance and inequality, indicating that the association may follow a particular direction up to a certain point and then reverse. We anticipate an enhanced model fit with the data through the incorporation of a non-linear relationship, such as a quadratic function. Regarding point (4), an increasing volume of literature posits that variations in the legal framework across countries play a significant role in elucidating differences in financial development among nations (La Porta, Lopez de Sinales, Schleifer, and Vishny, 1998). We anticipate that the legal origin of a country will serve as a strong instrument when introduced into a regression model that encompasses both inequality and financial development. This expectation is particularly pertinent when addressing concerns regarding the potential endogeneity of financial development within the model.

Nevertheless, the empirical analysis encounters several constraints. Firstly, it relies on cross-country regression; secondly, the employed data are time-averaged, precluding the incorporation of time-series information. Thirdly, the financial development indicator utilized is an aggregate measure, reflecting the amount of savings intermediated to private borrowers relative to GDP, without accounting for the extent to which the population, especially the poor, accesses financial markets. Furthermore, although the results underscore the significance of financial intermediaries in mitigating

inequality and alleviating poverty, they do not provide insights into specific policies that could be implemented to enhance the welfare conditions of the poor.

The paper is organized as follows. Section II briefly discusses the literature in the finance, growth and inequality field. Section III presents existing theoretical models that links inequality and growth in the context of financial market imperfections. Section IV presents the data and the methodology. Section V presents the results and section VI concludes.

II Literature review

The intersection of finance, growth and inequality, has evolved into a distinct field within economics in the past thirty years. While earlier works by Bagehot (1873), Schumpeter (1912), Gurley and Shaw (1955), and notably Goldsmith (1969) underscored the significance of the financial system in economic development, it was not until the 1990s that economic development and finance began to be integrated more cohesively, having previously been largely separate domains of inquiry. Moreover, financial economics showed minimal interest in the influence of financial contracts, markets, and intermediaries on long-term economic growth, poverty alleviation, and income distribution.

From the early 1970s onward, information economics has revealed that inefficiencies in financial markets may occur when one of the parties involved in a transaction possesses superior information regarding the real value of the transaction. In such circumstances it easy to see how intermediaries play a pivotal role. Akerlov (1970), Stiglitz and Weiss (1981), Diamond (1984) and Fama (1985) laid the foundations for a theoretical framework that provides justification for the existence of financial intermediaries. Summarizing, financial systems play a vital role in mitigating market frictions by offering five essential services to the economy: they (1) generate information concerning potential investments and determine the allocation of capital; (2) monitor investments and enforce corporate governance; (3) establish mechanisms for trading, diversification, and risk management; (4) mobilize and aggregate savings from diverse savers; and (5) facilitate the exchange of goods and services (Levine, 2021). The underlying reasoning is that, in the absence of financial intermediaries, investors face high costs in accurately assessing cash flows generated by investments. Enhancing

information about firms, managers, and economic conditions, financial intermediaries have the potential to foster economic growth (Acemoglu, 2003) and reduce income inequality. Market imperfections in the financial sector, and the subsequent improvements in financial development that alleviate these frictions, can impact economic growth by shaping investments in human capital (Galor and Zeira, 1993): barriers to the accumulation of (human) capital, quantified as limited access to education, health services, and more broadly as socio-economic exclusion, represent significant deterrents that impede growth due to the inefficiencies in the credit market .This leads to a socially suboptimal allocation of human capital investment. In such circumstances, financial development has the potential to alleviate financing constraints, enhance the efficiency of human capital investment, and promote long-term economic growth. The rationale behind is that there is a lack of correlation between ability (interpreted as capability to make high returns to investments) and wealth level; the result is that structural underinvestment of the poorer tail leads to overall under accumulation of human capital and thus economic growth is negatively affected both in the short and long run. Moreover, when access to credit is limited, business ideas might not be undertaken (Foellmi and Oechslin, 2010) or firms may not introduce more productive technologies (Foellmi and Oechsiln, 2020).

Subsequent literature has underlined the fact that even when limited borrowing is possible the poor tail of the population is disenchanted to get access to credit because of the cost of credit that largely reduce their returns once they become successful, limiting so the effort of the poor (Aghion and Bolton,1997; Piketty, 1997).

It has been pointed out that under some specific circumstances, inequality might enhance growth even when coupled with market imperfections. The positive link arises in the presence of nonconvex fixed costs of investments. Without inequality there might

be no individual able to pass investments thresholds creating so a positive link between inequality, investment, and growth. When an individual is sufficiently close to the threshold hard work might come at play to reach the minimum level required (Ghatak et al., 2001). Foellmi and Oechshlin (2008) have pointed out that with convex technology higher inequality pin down the interest rate because of a lack of capital demand. The lowered level of the interest rate may allow the poor to get access to credit market in a condition in which the marginal product of investing in human capital is higher.

Galor and Moav (2004) have merged the savings and capital market imperfections theory. They argued that the impact of inequality on growth may reverse in different parts of the development process. At earlier stage, when the economy is in a take-off stage, inequality may be a substantial feature for GDP growth, but later it can be damaging because of credit constraints. Galor (2009) has also pointed out that inequality of the land might be detrimental for human capital accumulation, since land-owning elites retard investments in human capital (especially schooling) that would allow to overcome the problem caused by the presence of capital market constraints. All these arguments that allows for a positive link between inequality and growth in the presence of market constraints shares a common feature: a trickle-down process is postulated. Increase in both savings and investments lower the interest; through this mechanism the income of the rich raises the income of lower part of the distribution, resulting in a higher growth rate level.

Although the majority of the research suggests that finance development is growth enhancing when channelled through wealth inequality, this research does no stress upon who actually benefits from financial development. It may be the case that financial development disproportionately increases the income of the wealthy. Theory (Demirguc-Kunt and Levine, 2009) shows that financial market imperfections can alter

the development of intergenerational income disparities within dynasties by influencing human capital accumulation and remuneration for individuals possessing similar skills. Becker (1979) and Tomes (1986) have demonstrated that a better-developed financial system is able to provide schooling to high-ability individuals irrespective of their initial wealth. Moreover, when families cannot hedge against unfavourable shocks and are unable to borrow to stabilize consumption during such shocks, certain low-income families may withdraw their children from school and engage them in low-wage employment. This, even though such actions impede the accumulation of human capital with high returns (Jacoby and Skoufias 1997; and Baland and Robinson 1998). This inefficiency plays a role in perpetuating intergenerational inequality. Financial frictions are then responsible for: (1) persistence of wealth inequalities, (2) reduce opportunities of the poor, and (3) reduce efficient capital allocation and foster growth. Beck, Demirguc-Kunt and Levine (2007) have examined this relationship testing whether countries with a better developed financial system are associated with lower level of both income inequalities and poverty. Using a sample of 72 countries they found that financial development reduces both inequality and has a positive effect on poverty alleviation.

Both theoretical and empirical literature consistently demonstrates that financial development can promote economic growth by enhancing levels of equality through a more efficient and skill-oriented allocation of capital.

II.I Inequality Measure

The term "economic inequality" encompasses various dimensions depending on the measurement method and research scope. It includes disparities in income distribution, opportunities, wages, land distribution (common in agrarian economies), wealth, and wages. These inequalities can be analysed between countries, within a single country, or among sub-populations. The literature uses measures based on the highest quality data available.

Notably, there is no universally correct concept of inequality, as it depends on the specific relationship under consideration. However, wealth distribution, accounting for both financial and non-financial assets (such as housing and land), is a central focus in theoretical discussions. It is crucial to consider individual savings and investment decisions, encompassing both physical and human capital. The distribution of wealth, regardless of its origin in capital or labour accumulation, is particularly significant for its impact on growth (Aghion et al,. 1999). Distinguishing between capital and labour can be misleading, as human capital, influenced by investment decisions, plays a pivotal role Factors that accumulate over time, such as physical capital, knowledge, and human capital, are shaped by saving behaviour, while non-accumulable factors, like land and intellectual abilities, are exogenously determined (Bertola et al., 2014). Notwithstanding the aforementioned, scholarly discourse predominantly relies upon a singular metric for inequality, namely the Gini coefficient. Nevertheless, certain scholars, as underscored by Voitchovsky (2005), posit concerns regarding the utilization of a sole statistical measure. This apprehension stems from the fact that such a measure solely encapsulates the average impact of inequality on growth, thereby veiling nuanced causal relationships that may be concealed within specific segments of the distribution. The ensuing

discourse furnishes a non-exhaustive overview of the primary measures of inequality employed by empirical researchers. The principal gauge of statistical dispersion employed to assess within-country inequality is the Gini coefficient. Devised by the Italian statistician and sociologist Corrado Gini in 1912, it builds upon the earlier research of the American economist Marx Lorenz. Specifically, its mathematical foundation is rooted in the Lorenz curve, a graphical representation plotting the cumulative income earned by the bottom x percent of the population against the total income of the entire population on the y-axis. The 45-degree line on the graph symbolizes a scenario of complete income equality. In conceptual terms, the Gini coefficient is defined as the proportion of the area between the line of equality and the Lorenz curve (denoted as A in the diagram) to the total area beneath the line representing a state of perfect income equality (comprising areas A and B in the diagram, i.e. $G = \frac{A}{A+B}$). Assuming non-negative income or wealth (excluding heavily indebted or financially distressed individuals), the Gini coefficient spans from 0 (indicating perfect equality) to 1 (representing absolute inequality, where a single individual receives the entire system's income). It is important to note that the computation of the Gini coefficient is influenced by whether it is derived from income before or after taxes. The inclusion of taxes allows for a better understanding of the impact of distribution. Typically, a Gini coefficient below 0.3 is linked to low inequality, while values up to 0.4 suggest a state of normal inequality. Conversely, a Gini coefficient exceeding 0.5 indicates a high level of inequality within a society. An alternative yet equivalently valid method involves redefining the Gini Coefficient as half of the relative mean absolute difference. This difference represents the average absolute difference among all pairs of items within the population, while the relative mean absolute difference is obtained by dividing the mean absolute difference by the average (denoted as $\bar{X}$) to normalize the measure. If $X_i$and n

denote the wealth of individual i and the total number of individuals, respectively, the Gini coefficient is expressed as follows:

$$G = \frac{\sum_{i=1}^{n} \sum_{j=1}^{n} |x_i - x_j|}{2n^2 \bar{X}}$$

In simple terms, the Gini index is the sum of the cumulative income up to each percentile of the population, considering all ordered income percentiles. The widespread adoption of the Gini index stems from its ability to condense the entire income distribution into a single measure. However, a notable drawback of utilizing this statistic is its lack of decomposability, meaning it does not guarantee sensitivity to structural changes within a country that may impact the overall statistic.

A concluding observation is that the previously mentioned statistic has the characteristic of being a summary measures applied to the entire distribution, leading to a reduction in information on inequality. By segmenting the population into various groups, such as percentages, it becomes feasible to derive multiple measures. Describing income distribution based on shares of total income is one such approach, although opting for simplicity in this manner may result in a less robust statistic that may not fully account for the intricacies of the economic system.

III Finance, Inequality and Growth

III.I Introduction: Korea and the Philippines

In the early 1960's the Philippines and South Korea were similar to all major macroeconomic aggregates: urbanization rates, GDP growth rates, and level of human capital (measured as primary and secondary school enrolment). Economist have questioned why it could have been possible that South Korea had experienced "miraculous" growth rates at about 6% in annual terms, while the Philippines stagnated at about 2%.

	Gini (%)	Q1	Q2	Q3	Q4	Q5	Q3+Q4	Q5/Q1	Q5/(Q1+Q2)
1965									
Korea	34.34	5.80	13.54	15.53	23.32	41.81	38.85	7.21	2.16
Philippines	51.32	3.50	12.50	8.00	20.00	56.00	20.50	16.00	3.50
1988									
Korea	33.64	7.39	12.29	16.27	21.81	42.24	38.08	5.72	2.15
Philippines	45.73	5.20	9.10	13.30	19.90	52.50	33.20	10.10	3.67

Figure 1 Korea and the Philippines

Source: Deininger and Squire (1995a) data set; Qi denotes the share of the i–th quintile.

Upon closer examination, it becomes evident that there were notable differences in the income distribution between the two countries. Specifically, the Philippines exhibited higher levels of inequality. This is illustrated by observing that the Lorenz curve for the Philippines lies beneath that of South Korea. The Gini coefficient was 17% higher and by looking also at other indicators as the ratio of

income share of the top 20% to the bottom 20%, or even to the bottom 40% was about twice as large in the Philippines.

Similar variation are registered also with regards of inequality of the land: the Gini coefficient for land ownership was 53.4 for the Philippines and 38.7 for Korea in 1960 and 1961 respectively.[1] This greater concentration in both income and land ownership that still lasts to this days cannot be supported by the fact that the Philippines were under a kleptocratic regime installed by Ferdinand Marcos, since he was first elected president in 1965 and declared a regime only in 1972. Preceding him at presidency there were two governments supported by the United States that have the objective of rebuilt the Philippines through trade openness and institutional reforms. The presented table is not a proof that greater inequality at the beginning leads to stagnation, but it suggests that the answer to the Korean "miracle" may lie outside the representative agent framework.

III.II A trickle down model

The model was developed by Aghion and Bolton (1993) and clarifies the relationship between growth, inequality, and financial market frictions. Moral hazard in this framework emerges due to limited wealth constraints on the side of the borrower. Additionally, credit market imperfections are the primary source of income inequality; understanding this assumption is crucial for the development of the empirical analysis proposed in the next section. It will be shown that pro-growth policies (i.e. growth

[1] The source for Gini of the land is Taylor and Hudson (1972). The twelve-point gap corresponds to about one standard deviation. It is worth to mention that South Korea introduced a land reform during World War II while Philippines experienced a first land reform during World War I under the American occupation. The wide variation between the two land Ginis might be since Philippines' reform was not as egalitarian as in Korea, where individual land holdings were restricted to 3-hectares.

fostering), such as those aimed at improving the financial market (i.e. by alleviating the market imperfections faced by the poor in terms of both information and transactions costs), are effective in reducing both inequality and poverty: the main idea behind is that some of the increased wealth (created by relaxing financial constraints) may trickle down to poor individuals. As more financial capital is accumulated in the economy, more funds and opportunities are available for those at the bottom of the wealth distribution. The focal point of our investigation is the borrowing and lending activities within the credit market. Wealth disparities emerge due to the unpredictable returns generated by investments, and entrepreneurs face challenges in achieving perfect insurance against income risk. While in many models that relate growth, finance and inequality the supply side of the credit market is not explicitly modelled, in this framework interest rates is endogenous and emerges through the process of contracting. It must be emphasized that endogenizing the interest rate is a fundamental step in order to fully understand the mechanism through which capital market development affects the income distribution by alleviating poverty. When the interest rate is endogenous, is not possible to straightforwardly isolate individual's wealth from the broader economy. This is because the uncertain development of an individual's wealth is intertwined with the overall state of the economy through the equilibrium interest rate schedule. The ultimate insight of the model is that not only wealth does trickle-down from the top to the bottom of the distribution, but there is also sufficient room for redistribution policies to foster growth in both magnitude and efficiency terms. Concerning efficiency, the mechanism is the following: because of redistribution of resources, the poor need to borrow less to invest (i.e. the poor have more skin in the game) and therefore they incur in lower level of incentive distortion. When maximizing profits, the poor now have more skin in the game. The trickle-down process is accelerated. We examine a closed economy featuring a continuous spectrum of homogenous agents, collectively constituting a total mass of 1.

Each agent experiences a single period in which both working, and investment decisions are taken. The resulted income (from both labour and investment) is then split between consumption and bequests. Each agent produces a descendant line, and the intergenerational process continues indefinitely. The only source of diversity among agents is assumed to be their endowments. The distribution of these endowments at period t, resulting from previous generation's bequests, is denoted by $G_t(w)$, where w represents financial wealth.

At commencement of each period t, an agent faces the following choices:

A. they can utilize their unit of labour for "routine" activity which requires no capital investment. The return from this choice is assumed deterministic and small, and equal to $n > 0$;
B. they can alternatively invest the unit of labour in a high yield "entrepreneurial" project, necessitating a fixed initial capital outlay $\bar{k} = 1$. The uncertain profit ditribution obtained from investment in the risky alternative is:

$$F(k, L) = \begin{cases} r \ with \ probability \ p \\ 0 \ \ with \ probability \ q \end{cases}$$

If $k \geq \bar{k} = 1 \ and \ l \geq 1$,

$F(k, L) = 0$ otherwise

Probability of success $p = 1 - q$ is affected by individual's effort. The cost of effort is denoted by $C(p)$ and it is assumed quadratic:

$$C(p) = \frac{rp^2}{2a}$$

that is the higher the yield r, the higher the cost of the necessary effort to succeed in the project.

C. agent has the option to either employ their initial wealth w in a productive activity or invest it in a mutual fund that operates at the economy-wide level. The formed equilibrium unit return of this investment is denoted by A_t and it is endogenously determined through savings and investment alignment in the capital market. Free-entry into the mutual fund market is assumed. The latter assumption ensures that no extra-normal profits arising from intermediation are competed away; thus, borrowers can secure funding in exchange for an expected unit repayment on the loan of A_t.

Concerning agent's preferences, risk neutrality is assumed, and utility depends on consumption and bequest. Moreover, individuals are assumed to be altruistic towards their heirs, irrespective of the actual benefit that the descendance derive. Chronology of agent's life develops in three periods: at t^- investment, occupation and effort choice is made; at t return of the investment is revealed; at t^+ consumption, bequest decision is taken. At the onset of each period, individuals make decisions regarding their labour unit and inherited wealth into one (or two) of the listed activities. Upon reaching the end of their lifetime, individuals distribute their net final wealth between consumption and bequests. Agents face Leontieff preferences over both consumption and bequest[2], that is optimal bequest level is a linear function of end-of-period wealth, denoted by $w(t^+)$. Bequest is

$$b_{t+1} = w_{t+1} = (1-\sigma)w(t^+)\,.$$

[2] Ex-ante preferences takes the form $U = \min\{(1-\sigma)c; \sigma b\} - C(p)$, with $c, b, C(p)$ denoting respectively agent's consumption, bequest and effort cost. With $C(p) = 0$ whenever the agent does not engage in entrepreneurial activities.

III.II.I Equilibrium in the Capital Market and the Optimal Lending Contract

Assume now that because of cross-individuals differences in initial endowments the economy as a whole is not able to meet sufficient requirements for entering the capital market.

Assumption 1

$$\int_{w\geq 0} w dG_0(w) = W_0 < 1$$

It is indeed due to income inequalities (income is weighted for the distribution of inequality) that the average income of the entire economy fails to access the financial market. The economy comprehends three classes in every period: the rich, characterised by $w_t > 1$ who are able to invest in both own high-yield projects or other agent's projects through access in capital markets; the middle-class, who is able to invest only in their own high-yield projects with initial wealth $w_t < 1$ and a loan of $(1 - w_t)$ used to cover the set-up cost $\bar{k} = 1$; the poor who do not invest in their own project. The equilibrium at which middle-class will borrow is reached equalizing demand for funds (issued by the midde-class) with supply (issued by the rich and the poor).

Assumption 2

Probability of success is not observable. That is, ex-post moral hazard is on action, since the effort is neither observable nor monitored.

Assumption 3

Borrower's repayment cannot exceed her end-period financial wealth. Known as no Ponzi game condition (NPG), it implies that agents in the economy do not continuously roll-

over their debt or financial obligations indefinitely. Thus the system does not rely on continuous inflow of new investments.

The optimal lending contract between a borrower with insufficient initial wealth and her lender is characterized by the following repayment schedule:

$$R(w) = \begin{cases} (1-w)\rho(w) \\ 0 \end{cases}$$

with $(1-w)$ being the amount borrowed and $\rho(w)$ the per unit repayment rate. In case of failure the lender is left with 0 and the borrower does not suffer any loss because of limited liability. Given this schedule, the borrower sets p (amount of effort) to maximize her profits net of repayments and effort cost :

$$\max_p(pr - p(1-w)\rho(w) - C(p)$$

and by rearranging first order conditions the first best is then

$$p(w) = a\left(1 - (1-w)\frac{\rho(w)}{r}\right). \tag{3.1}$$

That is, keeping the per unit repayment rate constant, the amount of effort is proportional to agent's initial wealth. Thus, the more "skin in the game" the borrower has, the harsher will be her exerted effort. This occurs because in case of success a larger share of marginal returns must be repaid to the lender. Conversely, the amount of effort exerted by the wealthy is the maximum obtainable in the economy and it is independent of the level of wealth. Since she does not need to borrow, the rich individual will maximize

$$\max_p(pr - C(p))$$

which gives

$$p(w) = a.$$

However, the repayment rate must be somehow related to initial wealth, since default risk is clearly affected by the size of the loan. At equilibrium the following condition must hold:

$$p(w)\rho(w) = A_t \tag{3.2}$$

with A_t being the rate of return of the mutual fund (i.e. prevailing market return). Combining solution of the maximization problem of the poor borrower (3.1) with (3.2) we obtain

$$a\rho(w)\left[1 - (1-w)\frac{p(w)}{r}\right] = A_t, \tag{3.3}$$

that is, even when allowing for variations of $\rho(w)$, by equations (3.1), (3.2), (3.3), effort is still increasing in wealth w. Solving (3.2) for $p(w)$, and taking derivatives with respect to wealth, by chain rule, the marginal rate of substitution of exerted effort with respect to wealth equals to

$$p'(w) = -A_t\frac{\rho'(w)}{\rho^2(w)} \tag{3.4}$$

which is positive, assuming that repayment rate is decreasing in wealth.

The latter assumption is relatively trivial. Being the exerted effort a decreasing function of wealth, the lender would ask for higher repayments to be compensated for the risk of default (i.e. lower probability of success $p(w)$).

Defining the effort supply function

$$f(\rho, w) = a\left[\rho - \rho^2\frac{1-w}{r}\right]$$

the intersection between the supply and the horizontal line A_t (cost of capital) and solving for the repayment rate $\rho(w)$ gives the solution for equation (3.3):

$$\rho(w) = \left[1 - \sqrt{1 - \frac{4A_t(1-w)}{ar}}\right]\frac{r}{2(1-w)}.$$

When the wealth level is below $w < \bar{w}(A_t) = 1 - \frac{ar}{4A_t}$, that is the expected return of the loan $(1 - w)$ with $w < \bar{w}$ is stricly less than the rate of return of the mutual fund A_t, borrowers are not able to enter the capital market even if they wish to, since they cannot guarantee the return A_t. We then say that agents are credit rationed when despite their wealth being $w \epsilon (0, \bar{w}(A_t))$, cannot access the credit market. In the light of this, the higher the cost of capital A_t, the larger is the portion of those who are willing to invest in the mutual fund but cannot. However, this is not straaightforward, since in this portion there might be individuals that might not prefer to undertake the high-yield project offered by capital markets. That is they strictly prefer to be lenders when the level of cost of capital is high enough. Formally, individuals who are indifferent from being a borrower or a lender are characterised by $\tilde{w} = \tilde{w}(A_t)$. All those above this treshold finds attractive to borrow, conversely, those below to lend. The indifference condition is then:

$$p(\tilde{w})r - A_t(1 - \tilde{w}) - C\big(p(\tilde{w})\big) - 1 = A_t\tilde{w} + n \tag{3.5}$$

Where the left-hand-side is the expected utility of being a borrower, the right-hand-side is the expected utility of being a lender. Using (3.2), (3.5) becomes:

$$p(\tilde{w})r - C(p(\tilde{w}) - 1 = A_t(\tilde{w}) + n. \tag{3.6}$$

It is now possible to determine both A_t and the treshold at which credit rationing occurs. Dividing the population in funds suppliers and demanders we can build first the aggregate supply:

$$S(A_t) = \int_0^{\breve{w}(A_t)} w dG_t(w) + \int_1^{\infty} (w - 1) dG_t(w) \tag{3.7}$$

That is, supply is composed by two types: the poor, whose financial wealth ranges from 0 up to the level for which is convenient to be a suppliers or is not possible to access the credit market (i.e. up to $\breve{w}(A_t) = \max\{\bar{w}(A_t), \tilde{w}(A_t)\}$, and the wealthy, which have initial

wealth $w > 1$.The poor who are able to invest in the capital market, put w in the mutual fund, while the wealthy put $(w-1)$.

The demand for funds is

$$D(A_t) = \int_{\tilde{w}(A_t)}^{1} (w-1) G_t(w) \tag{3.8}$$

Clearly, demand is decreasing in cost of capital A_t while supply is increasing in A_t. By equating (3.7) with (3.8) is then possible to determine the rate of return attached to the distribution of wealth $G_t(w)$.

Credit rationing happens whenever the poor who wish to borrow are denied access to credit, that is, those individuals whose wealth is above the threshold of indifference between borrowing or lending and simultaneously below the threshold that allow to enter the capital market. Formally, the set of these individuals is characterised by wealth level $\bar{w}(A_t) > \max\{0, \tilde{w}(A_t)\}$.

All individuals with initial wealth $w \epsilon \left[\max\{0, \tilde{w}(A_t), \bar{w}(A_t)\}\right]$ are then said to be under credit rationing. Stiglitz and Weiss (1981, Bernanke and Gertler (1989), predicted that credit rationing is more likely to occur in cases in which the cost of capital is high. By allowing for endogenous agent type formation (i.e. the individual is able to choose whether to be a lender or a borrower), we can reach higher levels of comprehension. The higher the cost of capital, the higher the share of poor who are wishing to lend. The lower the cost of capital (i.e. sufficiently close to 1), the more favourable is the environment for borrowers, and the audience of poor individuals that wish to borrow is enlarged. However, the presence of credit rationing could actually exclude the poor from accessing the credit market even when the cost of capital is relatively low. The direct implication of this outcome is that the poor are particularly hurt by credit rationing, since a low interest rate does not guarantee any investment opportunity when

investment thresholds are set high because of both information and transaction costs. The model creates then room for redistribution in terms of both lump-sum tax (in order to increase financial wealth) and financial constraints easing (in terms of market barriers lowering) to enlarge investment opportunities

Moreover, assuming rapid capital accumulation, that is, returns on investments r and marginal savings rate $(1-\mu)$ are able to offset population growth rate (i.e. $r(1-\mu) > 1+n$), all individuals who have chosen to undertake the risky investment leave higher level of capital for the next generation. This will results in more availability of funds for the offspring and in improved financial conditions. By raising the supply for funds, the interest rate on the mutual fund A_{t+1} will be lower than the one prevailing the previous year. This mechanism allows the economy to undertake even more risky investments.It's easy to see that as the overlapping-generations model it's taken to infinite, the interest rate of the mutual found will reach its lower bound, $A_t = 1$.The assumptions on high productivity of capital and propensity to save is then crucial to permit the economy to exploit all the investment opportunities.However, in the presence of harsh credit constraints, it may be possible that even when the aforementioned assumption holds, promising risky projects are left unexploited.

The rising of capital accumulation has then a direct effect on the cost of capital A_t and can create space for a u-shaped relationship between ecoomic growth and income inequality. When the economy is at its very early-stage, low level of capital accumulation characterizes the capital market: in this phase, because of scarcity of capital suplly, the market interest rate is relatively high. Thus, contracting conditions are definitely in favour of the lender, and there is no space for the poor to invest in risky projects. When aggregate wealth is low, A_t is high indeed. The wealth of the rich is then increased relatively faster. This is quite obvious when recalling that in this context the middle-

class borrower do not have any incentive to exert high effort, because her low level of "skin in the game". As development takes its course, assuming rapid capital accumulation, borrower conditions become more favourable and an increasing share of the population is able to access the capital market. Increasing investment levels of individuals at the bottom-end of the wealth distribution, permit the economy to reach even higher level of capital accumulation.

The role of capital market imperfections its crucial in this process and it reinforces the Kuznets effect: by looking at $p'(w)$ in (3.4), as A_t is high, the growth of probability of success with respect to changes in wealth is increased ceteris paribus.

Recalling that, the first-best choice in the profit optimization problem faced by the wealthy borrower (is the highest possible level of exerted effort ($p = a$)[3], capital (i.e. wealth for the descendants) accumulates at higher rates than in a context in which the average effort level is $p(w) < a$. The latter result arises because high levels of wealth inequality does not allow the economy as a whole to enter the capital market (*assumption 1*). The first -best choice thus dominates the second-best at steady state because of higher levels of wealth. Reminding that the second-best choice is characterized by higher weight given to the poor, there is space for the social planner to decrease inequality in order to reach pareto optimality. It is worth to mention that inequality arises because of the presence of moral hazard in conjunction with limited wealth. Borrowers are not incentivised to exert effort since they cannot appropriate an acceptable share of the marginal profit. Underinvestment in effort causes the returns from risky investment to be low with respect to wealthy individuals which do not need to enter the credit market to invest; this outcome is reinforced by assuming that risk aversion is decreasing in wealth.

[3] The firs-best choice is hard to imagine in real world. The cost of monitoring for the lender should be incredibly low because of not only high levels of collateral but also absence of information asymmetries.

III.II.II Redistribution Policies

The natural policy response should then be to redistribute resources from the wealthy to the poor and the middle-class, since the latter needs to borrow to undertake risky investments. The first argument against this conclusion is that redistribution might be undesirable since it might affect the effort level of the wealthy; the second relies on legal considerations in terms of individual preferences: redistribution of resources through taxation could entail changes on individual's bequest decisions.

A possible way to contrast the first argument is to design a policy that aims to offset the decreased exerted effort of the wealthy with increased exerted effort of the subsidized individuals. It is therefore possible for the social planner to impose a tax on the return yield by the wealthy and redistribute the proceeds to the poor. Starting from the second-best outcome, by taxing the rich, the poor wealth is increased up to $w + \Delta$. Suppose that a fraction a of the rich produce positive returns r on their investment and only succesfull investor have to pay a taz amount of $\tau = \frac{\Delta}{a}$. Define now with p_P, p'_P and with p_R, p'_R, the old and new level of exerted effort of the poor and the wealthy respectively. The marginal cost of effort[4] of the rich is $C'(p_R) = r$ and $C'(p'_R) = r - \frac{\Delta}{a}$; the variation of exerted effort for the rich is

$$p_R - p'_R = \frac{r}{a}\frac{\Delta}{a} \tag{3.9}$$

The marginal cost of exerted effort for the poor is $C'(p_P) = r - p(w)(1 - w)$ and $C'(p'_P) = r - p(w + \Delta)(1 - w + \Delta)$; the variation of exerted effort for the poor is then

$$p'_P - p_P = \frac{r}{a}h[(w + \Delta) - h(w)] \approx \frac{r}{a}h'(w)\Delta \tag{3.10}$$

[4] This result is obtained assuming quadratic cost function specified in section III.II.I

with $h(w) = \rho(w)(1-w) = \left[\sqrt{1-\frac{4(1-w)}{ar}}\right]\frac{r}{2}$ (obtained using : by computing $h'(w)$ we find that

$$p'_P - p_P > 2(p_R - p'_R). \tag{3.11}$$

We have shown that the economy has gained in productive efficiency measured in terms of amount of exerted effort.

As regards the second concern, behavioural economics suggests that agents are altruistic towards their descendant and that subsidies and bequests do not stand in a perfect substitution type of relationship (Andreoni 1989). The outcome of this "warm-glow" preferences framework is that choices in bequest decisions are not altered by the introduction of subsidies.

III.III Spillovers and Externalities

This paragraph aims at enlarging arguments for a negative effect of inequality on economic growth. Departing from the work of Galor and Zeira (1993), Bénabou (1996) uses the presence of learning-by-doing and knowledge spillovers to support this thesis. The aforementioned attribute denotes the capacity of individuals to acquire greater knowledge through increased production, thereby fortifying their understanding in subsequent periods. The notion of knowledge spillovers relies on interpersonal interactions and is grounded in the existence of positive externalities. The heightened knowledge of an individual contributes to an enhancement in the overall technological proficiency of the economy.

The principal assumption of the model posits that the existence of knowledge spillovers and externalities entail that agents encounter a distinct production function compared to the one manifested at the aggregate level of the economy. Being $y_t = \sum_i y_{i,t}$ the aggregate production, and $y_{,i,t} = f(k_{i,t})$ the agent i's output defined as a function of her individual capital stock: generally $\sum_i f(k_{i,t}) \neq f\left(\sum_i k_{i,t}\right)$.

Formally consider the scenario where individual i invests a capital amount (physical or human), denoted as $k_{i,t}$ in period t. The production is determined by the function $y_{i,t} = A_t k_{i,t}^{\alpha}$, where $0 < \alpha \leq 1$ ensures the concavity of the function, and A_t represents the common technical knowledge multiplier applicable to all individuals. The endogenous nature of the technology is then assumed, given the presence of both learning-by-doing and knowledge spillovers in the economy. These assumptions lead to

$$A_t = \int y_{i,t-1}\, d_i = y_{t-1} \tag{3.12}$$

that is, the accumulation of knowledge is a consequence of prior production activities at the aggregate level. Due to the process of learning-by-doing, economic growth is contingent upon individual investment. The rate of growth of the economy between period $t-1$ and t is given by

$$g_t = ln\frac{\int A_t k_{i,t}^{\alpha} d_i}{A_t} = ln \int k_{i,t}^{\alpha} d_i. \tag{3.13}$$

Equation (3.13) can be expressed in terms of mathematical expectation over the output generated by individual $i's$ investment level at date t. This formulation suggests that economic growth is intricately linked to the distribution of individual capital investments, formally stated $g_t = lnE_t\left[k_{i,t}^{\alpha}\right]$, where E_t is the mathematical expectation operator.

It is worth to investigate over the microeconomic determinants of investments. Assume now that individual consumption evolves in the context of a continuum over-lapping generations model (i.e. a model in which two types of individuals, old and young, coexist at the same time period t) characterized by non-altruistic behavior and imperfect capital markets. The overlapping generations families are indexed by $i \in [0,1]$. The utility of each individual i in time period t is given by

$$U_i^t = lnc_t^i + \rho lnd_t^i$$

where c_i^t and d_t^i denote consumption of the individual when young and old respectively. Each individual is endowed with initial resources w_t^i that is indipendently distributed across agents with expectation $w_t = E[w_t^i]$. It is important to remark the fact that each individual is randomly assigned an endowment level at birth, in order to abstract from intergenerational tranfers and bequest decisions. Formally define endowment of individual i at time period t as

$$w_{i,t} = a \cdot \varepsilon_{i,t}$$

where a is a constant and $\varepsilon_{i,t}$ is an identically distributed random variable, with mean $\frac{1}{a}$. At each time period, individuals have the choice to either consume their endowment or allocate resources to the production of future consumption. The production of future consumption is assumed to follow a certain law

$$y_{i,t} = A_t k_{i,t}^{\alpha}$$

with $A_t = y_{t-1}$ and $y_{i,t}$ being the second period pre-tax income . Note that the subscript here is to adress the presence of learning-by-doing assumption.

Assuming absence of capital market frictions, each individual within a generation engages in borrowing and lending with others, at an endogenously determined interest

rate. Given absence of capital market frictions, we find $k_{i,t} \equiv k^*$, that is each agent invest the same portion of resources, no matter the initial endowment (i.e. the initial distribution of human capital). The rationale behind this outcome lies in the equality of opportunity cost associated with undertaking investments, denoted by the endogenous interest rate, which is identical for both lenders and borrowers. Consequently, the optimal investment decision is guided by the Euler Equation, that asserts that each individual seeks to invest up to the point where the marginal product of capital equals the endogenously determined interest rate. Individuals surpassing the optimal investment level become lenders, while those falling below the optimal level are borrowers. Formally, define the amount borrowed by agent i as b_i, that can be grater or less than 0 according to which investment position each individual takes. The market-clearing condition $\int_0^1 b_i d_i = 0$ ensures that, at equilibrium, economic growth remains unaffected by the initial distribution of the endowment.

By altering the reference framework, specifically by introducing the assumption of incomplete capital markets, frictions become prominent, leading to a considerably imperfect credit market marked by resource scarcity and expensive investment decisions. As proposed by Aghion, Caroli and Peñalosa (1999) in a laissez-faire environment, equilibrium investments remain unequal among individuals with heterogeneous initial endowments. By examining the extreme scenario in which borrowing is not only restricted but also rendered impossible, individuals are strictly constrained by their own wealth (i.e. $k_{i,t} \leq w_{i,t}$),. The assumption leads to $k_{i,t} = s \cdot w_{i,t}$: the optimal investment level $k_{i,t}$ is a constant fraction of the individual own wealth level. The significance of this observation is that in the presence of severe capital market imperfections, the optimal investment level varies among individuals based on their initial wealth levels. In this scenario, inequality in the distribution of the initial

endowment may impede overall economic growth by influencing individual investment decisions. Defining the individual output as

$$y_{i,t} = (s \cdot w_{i,t})^{\alpha}$$

the rate of growth is then pinned down by the distribution of wealth, formally

$$g_t = \alpha \ln s + \ln \int w_{i,t}^{\alpha} d_i \,.$$

We can now deduce whether the level of inequality in the economy promotes or impedes growth. Due to the concavity of the production function and consequent diminishing returns with respect to individual capital investments k_i, greater inequality in initial endowments results in diminished aggregate capital accumulation[5]. Consequently, the more unequal the society is in terms of wealth distribution, the lower the current production level and, consequently, the lower the growth rate in subsequent periods. In this context there is a role for redistribution policies in enhancing efficiency in production and therefore growth. Consider now an ex-ante redistribution of endowment levels through direct taxation on highly endowed agents. The after tax endowment of individual i is

$$w_{i,t} = w_{i,t} + \beta\left(w_t - w_{i,t}\right)$$

with $\beta \in (0,1)$ being the tax rate. Individuals above the average income level pay a tax of $\beta\left(w_{i,t} - w_t\right)$, while those below will receive the equivalent net subsidy $\beta\left(w_t - w_{i,t}\right)$. The lump-sum tax, by its nature, does not induce any variation in the marginal product of capital; it solely influences incentives to invest through alterations in the current endowment of each individual. By increasing the tax rate β, the distribution of wealth

[5] This follows from a result in expected utility theory. Let X and Y be two random variables such that Y is obtained from X through a mean-preserving random process. Assuming concavity of utility function, expected utility exhibits the following feature: $E(u(Y)) \leq E(u(X)$. Since the expectation over next period consumption wi,t α depends on the density function of individual endowments $ft\ (w)$ $(Et(w\alpha)\ = \int_0^{\infty} w^{\alpha}\ \cdot\ f_t(w)dw\ )$ the overall growth is reduced by a mean-preserving spread.

becomes more homogenous across agents, causing the investment levels of the poor to grow and the investment level of those at the top of the distribution to decrease.

However, because of decreasing returns with respect to individual capital investments, we expect a positive effect on the overall aggregate output and growth.

The growth rate becomes

$$g_t = \alpha \ln s + \ln \int_0^1 (w_{i,t} + \beta(w_t - w_{i,t}))^{\alpha} \, d_i \tag{3.14}$$

Focusing on the term inside the integral, increasing the tax rate β heterogenity in terms of investment levels (which are proportional to $[w_{i,t} + \beta(1 - w_{i,t})]$) diminishes and so does the efficiency loss caused by inequality in the distribution of w_i. Considering the limit case in which $\beta = 1$, the argument of the integral becomes a constant across individuals, and thus the maximal possible growth rate is achieved.

The implication of the aforementioned model is that in presence of harsh credit constraints, redistribution of wealth towards the poor, that are those who faces the highest conceivable level of marginal returns to investment, will foster the overall economic growth. In conclusion, the mechanism elucidated above does not hinge on incentive design but rather addresses the prospect of generating investment opportunities for individuals unable to make any investment decisions in the absence of redistribution policies. Even when individuals with lower wealth are compelled to allocate all their endowments to future consumption, such as physical or human investment, rather than optimizing intertemporal utility as outlined in the aforementioned model, the implementation of wealth transfers in the distribution of resources must be viewed favourably.

III.IV Inequality and Growth Extension

The modelling of capital-market imperfections presented in the preceding paragraph is somewhat pushed to the extreme, given the assumption of an extremely constrained credit market that eliminates any possibilities for individuals to borrow or lend. Employing this simplified form of market environment, the model has been able to posit that the distribution of resources through a lump-sum tax can generate investment opportunities. Specifically, this mechanism functions irrespective of the source of market imperfection, whether stemming from ex-ante or ex-post moral hazard. In the subsequent discussion, we will examine the implications of the former. It will be demonstrated that under the assumption of ex-ante moral hazard, the redistribution of endowments is always growth-enhancing.

As we have shown in section III.III, Abhijit Banerjee (1993) and Aghion and Patrick Bolton (1997) introduced ex-ante moral hazard as the primary source of capital-market imperfections, specifically highlighting limited liability, wherein a borrower's repayments to lenders cannot exceed their current wealth. To illustrate, consider the scenario where an individual invests in a risky project, and suppose that the project's cash flow depends on whether the individual exerts high or low effort. In the event of success, the borrower gains the outcome minus the amount borrowed; conversely, in case of failure, the individual incurs no loss since they have not invested any of their own resources. The implication of this behaviour is that the borrower will exert an optimal amount of effort that is assuredly less than the effort their lenders would expect. A crucial aspect of this conceptual framework is that the level of effort is a rising function of wealth. In other words, the greater the "skin in the game" for the borrower, the more interest she has in the project's success. In this context, it becomes apparent that the

redistribution of resources can potentially enhance the likelihood of investment success. This phenomenon arises because the more an agent relies on borrowing to initiate an investment, the fewer incentives she possesses to exert high effort. Let assume again the presence of a continuum of non-altruistic, overlapping-generation families, indexed by $i \in [0,1]$. Each individual maximizes her utility

$$U_t^i = c_{i,t} - h(e_{i,t})$$

where $c_{i,t}$is the individual i's consumption at subsequent period (for seek of simplicity we will assume that agents consume only when old), $e_{i,t}$ is the non-monetary effort exerted by each individual when young and $h(e_{i,t}) = A_t \frac{e_{i,t}^2}{2}$ is the non-monetary cost of such effort. The parameter A_t still denotes the productivity level of current technology. Endowment is assumed to be an idiosyncratic fraction of the average knowledge of lever at time period t. It is subsequently unevenly distributed among individuals and takes into consideration the existence of knowledge spillovers. Formally, endowment is defined as $w_{i,t} = \varepsilon_{i,t} \cdot A_t$.

The production function exhibits a U-shaped average cost curve with respect to capital investment, more in depth:

A. production requires a fixed capital investment $k_{i,t} = \theta \cdot A_t$;
B. conditional upon the aforementioned requirement, the investment outcome is uncertain and its distribution is

$$y_{i,t} = \begin{cases} \sigma \cdot A_t & \text{with probability } e_{i,t} \\ 0 & \text{with probability } 1 - e_{i,t} \end{cases}.$$

Assume also that second-period outcomes $y_{i,t}$ are i.i.d. across agents belonging to the same generation. The origin of market frictions is moral hazard with limited liability, thus the lender cannot monitor individual effort e_i and next-period repayments to the lender cannot exceed the subsequent period output $y_{i,t}$.

We now proceed to examine how the optimal effort choice is influenced by the endowment of individual i. Consider the case in which an agent whose endowments are above the investment treshold (i.e. $w_i \geq \theta \cdot A$), that is she does not need to enter the capital-market to invest. The maximization problem for the individual is then

$$\max_e \left\{ e \cdot \sigma A - A\frac{e^2}{2} \right\}$$

which, by taking first order conditions with respect to the choice variable, gives

$e^* = \sigma$.

When considering agents with endowments below the threshold (i.e. $w_i < \theta \cdot A$), she needs to borrow an amount $b_i = \theta \cdot A - w_i$ in order to undertake any investment project. Let r be the per unit interest rate in the market. The maximization problem faced by each individual i is

$$\max_e \left\{ e\big(\sigma A - r(\theta \cdot A - \varepsilon_i \cdot A)\big) - A\frac{e^2}{2} \right\}.$$

The maximization problem is now taking into account for the expected next-period outcome net of both lenders repayment and cost of effort. The resulting level of effort is then a function of both the interest rate r and the wealth level w_i:

$$e(r, w_i) = \sigma - r(\theta - \frac{w_i}{A})$$

which is strictly lower than the first best e^*, and decreasing in r and increasing in w_i. Given the interest rate level, the lower the initial wealth level of the borrower (i.e. the less "skin in the game") the less the devoted effort in order to succeed in the investment project.

A final remark before moving into the effect of redistribution on growth, is that lenders, which are characterised by wealth level $w_i \geq \theta \cdot A$, will systematically exert the first best effort choice ($e^* = \sigma$), since they remain residual claimants on all returns from

such effort. Second, when modelling the relationship between initial wealth and effort, we assumed the interest rate r to be exogenous. However, even when the assumption on the exogeneity of the interest rate is relaxed (as we have shown in section III.II), that is when we are taking into account that the risk of default increases as the loan size increases (i.e. the probability of success $e(r, w)$ decreases as the endowement lowers) and thus r adjusts to changes in default risk, the optimal level of effort is still an increasing function of w.

The growth rate of the economy is defined by

$$g_t = \ln \frac{y_t}{y_{t-1}}$$

and assuming as in the previous paragraph the presence of learning-by doing (i.e. $A_t = y_{t-1}$) we can rewrite the rate of growth as

$$g_t = \frac{\ln \int_0^1 e_i \cdot \sigma A_t di}{A_t}$$

that is,

$$g_t = \ln \sigma + \ln \int_0^1 e_i di$$

where $e_i \leq \sigma$.

If either assumptions on observability of effort e_i or limited liability are violated, then the first best effort level will be chosen by all individuals independently of their initial endowments. Thus, by assuming perfect capital markets the growth rate is

$$g = \ln \sigma^2.$$

In the presence of moral hazard, as the distribution of wealth becomes more unequal among individuals (i.e., with a larger proportion of agents possessing wealth levels below the investment threshold), the aggregate effort exerted by the entire

economy diminishes. The implicit outcome is that inequality exerts a negative impact on economic growth.

Formally, by taxing the above-threshold endowed individuals, whose first best effort level does not depend on w_i, it is possible to enlarge investment opportunities for those below the treshold. By imposing a lump-sum tax $\tau_i < w_{i,t} - \theta A_t$ on the endowments of the richest and redistributing the proceeds among those below the investment treshold, the overall effort in the eonomy is increased. The ultimate impact of fortifying incentives for growth through this tax-subsidy scheme must be appraised positively. The conventional trade-off between incentives and distribution is thereby inverted, demonstrating that in the presence of capital-market imperfections, redistribution proves to be detrimental to growth.

IV Data and Methodology

The underlying premise of the model expounded in Chapter 3 is that the development of financial intermediaries contributes to economic growth, particularly in conjunction with income inequality. We have demonstrated that the redistribution of resources, achieved through taxation or the easing of financial constraints, generates investment opportunities for those situated at the lower echelons of the income distribution. As greater human capital accumulates among the economically disadvantaged, the economy can attain higher growth rates. In a departure from conventional approaches that grapple with endogeneity issues when regressing inequality measures against growth rates, our analysis shifts the focus to the credit market imperfection channel. Specifically, we examine the direct impact of financial development on the income growth of the poor and on the Gini coefficient. The easing of credit constraints is anticipated to disproportionately benefit the impoverished, given that these constraints significantly hinder their financial capabilities. According to the theoretical framework, such constraints curtail opportunities for capital allocation and efficiency, impeding capital flow to individuals at the bottom of the distribution. These individuals exhibit heightened sensitivity to information and transaction costs, lack collateral, and contend with higher interest rates. By alleviating these constraints, financial development not only assists the poor but also enhances capital allocation efficiency, reduces inequality, and has the potential to stimulate higher economic growth rates. To conclude, if financial development benefits the poor, the channel through which inequality positively affect growth is effective.

IV.I Data

A. Indicator of Financial development

To evaluate the impact of easing financial constraints on changes in the inequality rate, we will employ a widely utilized measure in the literature, namely Private Credit. Ideally, the selected indicator should effectively capture the financial system's capacity to identify profitable ventures, monitor and control managerial activities, facilitate risk management, and mobilize resources (Holden and Propopenko, 2001). The measure should encompass both the depth (i.e., liquidity of the market) and breadth of financial intermediation in the economy. Regrettably, amalgamating all these features into a singular index is unfeasible. The suggested metric, denoted as Private Credit, is delineated as claims on the private sector by deposit money banks and other financial institutions expressed as a proportion of the Gross Domestic Product (GDP). With the inclusion of credit from financial intermediaries beyond banks, it is designed to be a comprehensive gauge of credit-issuing intermediaries. Importantly, this indicator excludes credit from central banks and development banks, as well as credit extended to the public sector or state-owned firms. By excluding credits extended by financial intermediaries not classified as deposit money banks, this metric can be regarded as a comprehensive indicator of credit-issuing intermediaries. Furthermore, while Private Credit is more prevalent in the United States and the United Kingdom, it is increasingly becoming a significant asset class in emerging markets. Private credit possesses attractive characteristics, including its bespoke nature, flexibility, structured solutions, and longer maturities (Narayanaswamy and Miryugin, 2021). These features collectively contribute to a reduction in investment uncertainty, rendering it a more valuable asset for individuals situated at the lower end of the distribution who exhibit higher levels of

risk aversion. This notable attribute should enhance the appeal of Private Credit as a well-defined proxy when concurrently addressing the development of financial markets and inequality. Private Credit effectively quantifies the volume of credit channelled from savers to private firms through financial intermediation. Some scholars employ M2[6] as a percentage of GDP as a financial development indicator. However, a limitation arises when using M2, as this measure fails to capture the primary function attributed to financial intermediaries: directing savings toward private sector projects. Another indicator found in the literature is the ratio of commercial bank assets to the total of commercial bank and central bank assets. Nevertheless, the central bank does not actively participate in credit allocation, although it can influence credit flow by encouraging banks to lend to thriving sectors through regulatory means. Additionally, commercial banks do not represent the exclusive intermediaries through which resource allocation occurs. These factors render the ratio of commercial bank assets to the sum of commercial and central bank assets less reliable when considering cross-country variations in financial development. Empirical research demonstrates that Private Credit exhibits a robust and positive impact on GDP per capita, further reinforcing the advantages of utilizing this index (Levine, Loayza, and Beck, 2000).

Data pertaining to Private Credit are sourced from the Financial Structure Database (Beck, Demirguc-Kunt, and Levine, 2001). The data are subsequently averaged over the period 1980-2000, contingent upon the availability of the dependent variable.

[6] M2 is a measure of the money supply that includes cash, checking deposits, and other types of deposits that are readily convertible to cash such as CD.

B. Indicators of income inequality and poverty alleviation

Concerning indicators of income inequality and poverty alleviation, both the increase in the Gini coefficient and the growth of the income share pertaining to the lowest quantile of the income distribution are employed.[7]

Growth of Gini coefficient is the annual growth of the Gini coefficient across one country over all "high quality" observations on the period 1980-2000. As extensively elucidated in Chapter 1, the Gini coefficient considers the entire distribution and ranges from 0 (indicating perfect equality) to 1 (indicating perfect inequality). A larger Gini coefficient signifies higher inequality in society. The data utilized are sourced from the Financial Structure Database (Beck, Demirguc-Kunt, and Levine, 2001). To calculate the change, the first and last observations of the variable were employed, adjusting the time period based on data availability. Subsequently, to express the observations on an annual basis, the values were divided by the number of years between the initial and final observations. All differences are presented in logarithmic terms to approximate percentage changes.

The utilization of Income Growth of the Poor aims to evaluate the impact of financial market development on the lowest quintile of the income distribution. Specifically, it serves as proxy for poverty levels rather than a direct measure of inequality. For instance, the poorest quintile in a wealthy country may be considered affluent when compared to the median income of a less prosperous country. This

[7] The Gini coefficient is defined as the ratio between the area of the Lorenz Curve, which plots the share of population against income share received, and the area below the diagonal. By assuming log-normality of the distribution, the standard deviation is given by $\sigma = (2)^{0.5} * \varphi^{-1}[\frac{1+\frac{G}{100}}{2}]$ with G being the Gini coefficient and φ the cumulative normal distribution function (Dollar and Kraay, 2002 and Besley an Burgess, 2003). The income share of the lowest income quintile is given by $\varphi(\varphi^{-1}(0.2) - \sigma)$.

discrepancy underscores the rationale for using the growth of the lowest income share, calculated as the income of the poorest quintile divided by the country's total income.

The adoption of this indicator is intended to provide a more nuanced assessment compared to the Gini coefficient regarding the effectiveness of policies promoting access to financial markets. It seeks to discern whether such policies not only have the potential to diminish overall inequality but also to uplift the income of the lowest segment of the income distribution. The Gini index, as a measure encompassing the entire income distribution, may not conclusively identify the specific segment responsible for the reduction in inequality.

Data for measures of inequality are from World Development Indicators (WDI) and Dollar and Kraay (2002), who constructed the dataset from various sources, and covers a period that goes from 1960's up to 1990's.

The ultimate sample comprises 52 countries, a figure that diminishes to 43 based on the inclusion of additional controls in the specification.

IV.II Methodology

OLS Specification

A. Income Growth of the Poor

The initial specification enables us to ascertain whether there exists an impact of easing financial constraints on the income share of the lowest quintile of the distribution. It is crucial to note that, given the use of basic ordinary least square

regression, concerns related to reverse causality are not explicitly addressed. When estimating a regression that considers both inequality and financial frictions, a primary challenge lies in discerning a causal effect. Instead, what is observable is a correlation, which does not provide insight into the effectiveness of policies aimed at easing investment thresholds in reducing inequality and alleviating poverty. The first estimated regression is then

$$(y_{i,t} - y_{i,t-n}) = \alpha_i + \beta FD_i + \theta X_i + \varepsilon_i \quad (4.1)$$

with y_i being income growth of the poor, FD_i being the indicator of financial development (Private Credit) and X being a series of control variables, namely inflation and government expenditure which captures macroeconomic stabilty, trade which captures the openness of the economy, and avarage schooling to account for a mesaure that represents initial human capital accumulation.

Inflation is defined as the inflation rate, calculated as the logarithmic difference of the Consumer Price Index (CPI). Government expenditure is represented by government expenditures as a share of GDP. Trade is measured by real exports and imports as a share of real GDP. The average schooling in 1980 is computed as the average number of schooling years in the total population over 25 years old in the year 1980. Observations are sourced from the World Development Indicators (WDI) and the Financial Structure Database (Beck, Demirguc-Kunt, and Levine, 2001). The data are subsequently averaged over the period 1980-2000. The coefficient α in regression (4.1) captures unobservable individual effect, the coefficient β captures the distributional effect of financial intermediary development on the income growth of the poor. Unfortunately, the aforementioned specification does not facilitate the distinction of how much of the positive effect is attributable to distributional changes that directly impact the income of the poor, as opposed to a positive effect that transmits through overall

GDP per capita growth. As per the theoretical framework, we anticipate the coefficient β to be positive, as financial development is expected to positively influence the income of the poor. Additionally, if the coefficient β were to be 0, it should not be interpreted as insignificant. Such an outcome may indicate that financial development does not have a direct impact on the income growth of the poor; instead, the positive effect could be mediated through overall GDP growth. Conversely, if the coefficient β is negative, it would suggest that promoting financial development has an impact on the rich rather than the poor.

B. Growth of Gini Coefficient

To comprehensively explore the impact of financial development on the distribution of wealth, we also analyse its effect on the Gini coefficient. This approach enables us to consider the entire Lorenz curve, providing a holistic assessment of the phenomenon. The second specification is

$$(G_{i,t}, -G_{i,t-n}) = \alpha_i + \beta FD_i + \theta X_i + \varepsilon_i \qquad (4.2)$$

where $G_{i,t}$ is the log of the Gini coefficient of country i in periot t, and the right hands side terms are the same of specification (1).

If the coefficient β is negative, financial development is associated with a reduction in inequality; conversely, if it is positive, inequality tends to increase. It is crucial to emphasize that specification (4.2) does not provide any inference on whether inequality has been diminished or exacerbated due to poverty alleviation. This aspect is addressed by specification (4.1) instead.

TSLS Specification

To ensure consistency and mitigate potential simultaneity bias in the previous estimations, where the explanatory variables (covariates) may be correlated with the error terms and are not entirely exogenous to the model, a re-estimation of the same specifications employing the instrumental variables approach is necessary. The legal origin of the country is utilized as an instrument to isolate the variation induced by exogenous components of financial intermediary development.

A matrix of instruments Z is then introduced to correct for endogeneity bias. It comprises dummy variables that takes the values of 1 or 0 based on whether country i belongs to a specific legal system. The instruments include dummy variables representing British legal origin, French legal origin, German legal origin.

The first stage regression is then

$$FD_i = \beta Z_i + \varepsilon_i \tag{4.3}$$

where FD_i and Z_i are respectively the financial development indicator and the instruments matrix.

According to literature (see La Porta et al., 2008) the coefficient β should take positive values for the covariate British origin and negative or close to 0 for French and German origin.

The second stage regressions mirrors those of OLS but they incorporate the fitted values of FD_i obtained in the first stage. The TSLS specification for (4.1) is then

$$(y_{i,t} - y_{i,t-n}) = \alpha_i + \beta \widehat{FD}_\iota + \theta X_i + \varepsilon_i \tag{4.4}$$

with $\widehat{FD}_\iota$ being the fitted value obtained in the first stage and $(y_{i,t} - y_{i,t-n})$ being the change in income growth of the lowest quintile and X_i beinig the matrix of controls.

The two-stage least squares estimation is reiterated for specification (4.2), resulting in the acquisition of

$$(G_{i,t} - G_{i,t-n}) = \alpha_i + \beta\widehat{FD}_\iota + \theta X_i + \varepsilon_i \quad (4.5)$$

with $\widehat{FD}_\iota$ being the fitted value obtained in the first stage and $(G_{i,t} - G_{i,t-n})$ being the change in the Gini coefficient and X_i beinig the matrix of controls.

To accurately evaluate the strength of the instruments, a first-stage F-test is conducted (Cragg-Donald Statistic). A high value of the Cragg-Donald test suggests that the instruments used in the estimation are strong, indicating that they are likely to be effective in addressing endogeneity concerns and producing reliable estimates. In general, a larger F-statistic implies a lower likelihood of weak instruments. The critical value for the Cragg-Donald test is often set at 10 or higher. If the calculated F-statistic exceeds this threshold and the associated p-value is low (close to 0), it provides evidence against the null hypothesis of weak instruments, supporting the reliability of the instrumental variables estimator. Being the computed statistic equal to 32.3267, the null hypothesis should be rejected. Consequently, instrumental variables estimator is deemed reliable.

IV.II.III Legal Origin and financial development

This section presents a theoretical framework justifying the use of legal origin as an instrumental variable. A growing body of literature suggests that cross-country differences in legal framework contribute to explaining cross-country differences in financial development. La Porta, Lopez de Sinales, Schleifer, and Vishny (LLSV, 1998), demonstrated the significance of a country's Commercial Law (whether British, German, Scandinavian, or French) in explaining differences in rights related to creditors, shareholders, private property, as well as the development of banks and stock markets. Numerous scholars have linked legal institutions to corporate valuations and ownership concentration (LLSV, 2002; Himmelberg, Hubbard, and Love 2002), debt maturity structure, access to external finance and growth (Demirguc-Kunt and Maksimovic, 1998,1999), the informational efficiency of the stock market (Morck, Yeung, and Yu, 2000**)** and cross-industries and cross-country capital allocation (Beck and Levine, 2002). Levine (1998) has further demonstrated how the legal origin of a country can reshape its national financial system, influencing economic growth through capital reallocation within the population. This comprehensive array of features allows for the utilization of legal origin as instruments to control for endogenous variations. The impact of legal origin on the redistribution of resources is effective through the financial development channel. Legal literature emphasizes that the impact of legal origin on financial development is channelled through two primary channels: first, a "political" channel, and second, a so-called "adaptability" channel.

Regarding the political channel, scholars argue that cross-country differences in legal design manifest in the prioritization of private property rights versus the authority of the State to supersede them. The underlying conclusion is that countries favouring

private contracting tend to foster financial development. According to the political perspective, legal systems based on common law facilitate transactions and benefit property owners, leading to positive implications for the financial system. In contrast, countries following civil codes based on French and German legal traditions introduce frictions in the transaction process, potentially discouraging investors and impeding system efficiency. The rationale is that the latter set of countries hinders the contracting process by prioritizing the State's interests over private ones.

The "adaptability" channel highlights the emphasis on the capability of different legal systems to adapt to new circumstances. The more rigid the legal system, the less able the financial system is to address the evolving needs of the changing environment. Scholars have demonstrated that countries based on Common law are more adept at embracing changing conditions by flexibly reshaping institutional design (Posner, 1973). With substantial discretion granted, Common law judges can respond on a case-by-case basis and effectively replace inefficient rules. Legal systems that reject jurisprudence and rely on statutory law face significant challenges in overcoming institutional revisions.

It is crucial to note that the Legal Origin Theory does not universally assert that common law is inherently beneficial for financial market development. Regulation and state control may prove more efficient in situations where the market struggles to overcome failures, such as during times of war or when concentration is excessively high in the economic system (Glaeser and Shleifer, 2003).

Figure 2 shows the distribution of legal origin of commercial and company law throughout the world. Common law legal tradition, that are labelled as LEGOR_UK in the two-stages least square regression, includes the United Kingdom and its former colonies. Common law has then spread to India, South Africa, Canada, United States

and many other countries. In the sample used for the two-least square specification, the share of common law countries is 35.53 % over 53 observations. English common law developed because "landed aristocrats and merchants wanted a legal framework that would provide strong protection for contract rights and property in order to limit the crown's ability to interfere in markets" (Paul G. Mahoney, 2001). Main feature of the Common law system is the presence of appellate judges that establish precedents when solving legal disputes. The resolution of disputes is more adversarial rather than inquisitorial.

This outlook results in independence from both the executive and legislature organisms. his outlook results in independence from both the executive and legislature organisms.

The civil law tradition is the oldest and most widely disseminated worldwide, particularly as numerous emerging economies have reverted to it. Rooted in Roman Law, it relies on statutes and codes as primary sources to organize legal material. Rediscovered in Italy during the Middle Ages, it was adopted by the Catholic Church and subsequently became the foundation for legal systems in numerous European countries. Despite its ancient tradition, the French civil law tradition (labelled as Legor_French), known as civil law, is specifically associated with the context of the French Revolution and Napoleon's codes, formulated in the nineteenth century. Napoleon's army introduced the codes into Italy, the Netherlands, Germany and Italy, and because of colonialism it shaped the legal framework of most of Caribbean and African countries. Similarly, the socialist law is grounded in the French tradition, influenced by the French occupation of the Russian Empire. In the examined sample, countries adhering to the French legal tradition constitute 50% of the sample. The third instrument employed is German legal origin (labelled as Legor_Ge), representing only 5.76% of the sample.

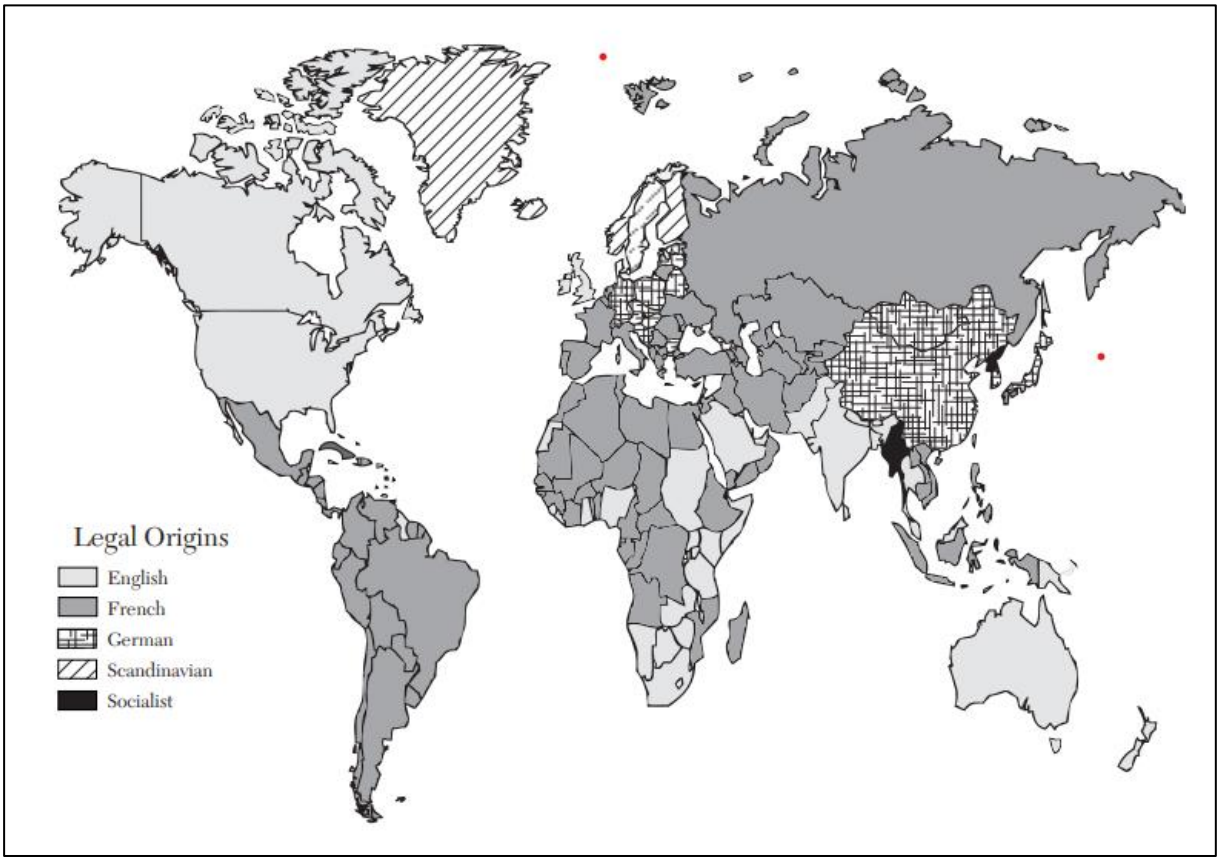

Figure 2 The distribution of legal origin.

Source: La Porta, Lopez-de-Silanes, and Shleifer: Economic Consequences of Legal Origins, 2008.

This legal framework traces its origins to Bismarck's unification of Germany in 1897. While it shares several procedural aspects with the French tradition, it distinctly allows for more discretion for judges.

Additional legal traditions, namely Scandinavian and Socialist, are omitted from the analysis due to their similarities with the French tradition.

V Results

A Finance and Poverty alleviation

Table 3 employs GDP per capita growth of the lowest income quintile as the dependent variable to examine the implications of financial development on poverty alleviation on a sample of 43 countries. Data for the dependent variables are presented in annual terms and averaged over the period from the 1980s to the 1990s.

Coefficient β of equation (4.1) captures the relationship between financial development and growth rate of the income of the poor. It is worth considering that this coefficient does not capture how much of the effect of financial development is due to overall GDP growth and how much is due distributional effect that directly boost the income of the poor.

Results of Table 1 shows that financial development increases the growth rate of the lowest income quintile. When excluding various countries characteristics, in a sample of 52 countries a unit change in Private Credit explains a positive increase in income growth of the lowest quintile. The result is statistically significant at the 1% level. When including an array of conditioning information variables, in a sample made of 43 countries, the coefficient of interest is still positive and significant at 1% level. However, it reduces in magnitude, as part of the increase in income of the poor might be absorbed by some other factors that are included in the regression: average schooling level, that is used as initial human capital accumulation level, generates higher variations than the variable of interest, even though the significance is established at 10%. The R-Squared of the OLS specification is 49% and reduces at 41% when adjusted to account for the number of predictors: the model can explain almost an half of the dependent variable variation. It should be emphasized that we do not expect high levels

of the R-squared since microeconomic level data (as behavioural features) or cultural factors that can noticeably affect human outcomes are not considered in this regression; it might be possible that including these covariates could have resulted in a better fit of the data. In any case, results suggest that financial development encouraging policies are generally pro-poor.

Ramsey Reset test is conducted to examine whether nonlinear combinations of the explanatory variables contribute significantly to explaining the response variable. In other words, the test assesses whether the model is mis specified, suggesting that the data generating process might be better approximated by a polynomial or other non-linear functional form. Under the null hypothesis that second-degree terms of the regressors are jointly and significantly equal to zero, the test fails to significantly detect non-linearity. The significance level is set at 5%. Consequently, there is potential concern for a quadratic relationship between income growth of the poor and financial development.

This implies that there might be at least three stages in which financial development could influence the income growth of the poor: at initial stage, when financial development is at low level, any increase might have a relatively positive large impact on the income growth of the poor. This may occurs because initial financial development (like microfinance, small banking services, etc) can provide critical resources and opportunities previously unavailable for the poor. At intermediate stage, as financial development continues, the rate of income growth of the poor might start to slow down. This could be due to a range of factors such as saturation of services, the beginning of inequalities in accessing financial services, or a shift in focus to more complex financial products that are less accessible to the poor. At advanced stage, beyond a certain point, further financial development might have a diminishing or even negative impact on the income growth of the poor. This could be due factors like a focus

on high-end financial services that largely exclude the poor, increased income inequality, or systemic risks in highly developed financial markets. In essence, a quadratic relationship suggests that the effect of financial development on income growth of the poor in not uniform across different stages of financial development; the overall assessment of policies fostering financial development is then country specific. The Reset test support then the hypothesis that the less wealthy groups in society benefit more in early stages of financial development. This type of analysis is important for policy makers and social planners to tailor financial development programs to maximize benefits for the poor.

Under TSLS specification, by using legal origin as instrumental variables to control for simultaneity bias and endogeneity, the coefficient β of equation (4.4) grows in dimension but loses in significance. The magnitude of the causal effect is raised, and the significance of the explanatory variable is maintained at 1%. We can notice that when controlling for variations in the dependent variable caused by endogenous factors inherent to the explanatory variable, the contribution given by human capital accumulation (i.e. average schooling level) is sharply reduced. The overall causal effect of financial development on income growth of the lowest quintile is thus increased.

Concerning first stage regression (Table 7), that is specification (4.3), dummies representing legal origin enters significantly at 1% level, confirming the hypothesis that legal origin are significantly correlated with financial development. Cragg-Donald test is run to assess the validity of using legal origin as instrumental variable. The value is strictly greater than 10, that thanks a rule of thumb accepted in literature allows us reject the null hypothesis that the instrumental variable is uncorrelated with the endogenous variable. The instrumental variable is then said to be not weak in explaining statistically significant country-differences in financial development: legal origin is thus a reliable instrument.

Concerning covariates used to control for cross-country differences, inflation enters negatively in both OLS and TSLS specification, and significantly in the TSLS specification. The result suggests that macroeconomic volatility (more specifically monetary instability) hurts the lowest income quintile; this is confirmed also by the negative effect of government expenditure, which is interpreted as an alternative measure of macroeconomic volatility. Interestingly, the TSLS specification reveals a negative and statistically significant impact of initial human capital accumulation on poverty alleviation. This may be attributed to the fact that a higher level of initial human capital accumulation could be associated with higher levels of initial cross-dynasty disparities.

B Finance and Inequality

Table 4 shows results for specification (4.2). The equation evaluate the impact of financial development on the inequality distribution for a sample of 43 countries. It must be emphasized that equation (4.2) does not allow us to infer over which part of the distribution the channel affect changes in inequality level. Coefficient β of (4.2) captures the correlation between financial development and the Gini coefficient.

Results of Table 4 shows that financial development has a positive impact in reducing income inequalities. The only-constant specification already shows that countries characterized by higher level of financial development tent to have lower level of inequality. Coefficient is indeed negative and significant.

Even when adjusting for observable country characteristics, the coefficient remains negative and significant at the 5% level. The relatively weaker significance of the coefficient in specification (4.2) compared to specification (4.1) provides insights into the level at which financial development policies operate. Inequality is diminished

because there is evidence that, on average, the income growth of the poor increases. This result is further substantiated when considering country characteristics and endogeneity in specification (4.5), where the negative relationship persists but with a reduced magnitude and significance compared to the results in specification (4.4). This finding suggests that financial development is beneficial for overall inequality, with a particularly positive impact on those at the bottom of the distribution who struggle to meet investment requirements. The R-squared values, especially the adjusted value at 25%, indicate that specification (4.1) better fits the data.

Reset test is run in order to assess non-linearity of the relationship of equation (4.2). Result thus confirms the quadratic relationship hypothesis.

In the context of the analysis, the magnitude of the impact of financial development on inequality appears to be partially absorbed when including controls. Initial human capital accumulation, as represented by average years of schooling, still plays a relatively significant role in accounting for variations in the dependent variable, although its significance is lost compared to the TSLS specification (4.4). On the other hand, trade openness, inflation, and government expenditure do not enter significantly in both OLS and TSLS specifications. This suggests that macroeconomic volatility and trade may not be substantial factors in reducing inequality. However, caution is advised in interpreting these results, as they indicate that these covariates do not exhibit significant income distribution effects when controlling for levels of financial development.

VI Conclusions

A substantial body of literature has demonstrated that fostering a more equitable society contributes to economic growth. In contrast to the Equity-Efficiency Trade-off proposed by Mirlees (1971), finance and growth literature (i.e. credit market imperfections approach) indicates a reversal in the relationship between inequality and growth. A more egalitarian society is not only socially advantageous but also economically efficient. According to Halter (2014), the credit market channel operates by influencing changes in institutions, social norms, or highlighting economic forces that impact shifts in educational attainment. Consequently, credit market imperfections are more likely to have enduring effects on economic growth. As highlighted by Voitchovsky (2005), the credit market channel is intricately linked to inequality, particularly at the lower end of the wealth distribution: by broadening the investor base (ensuring accessibility to the poor) and enhancing human capital accumulation efficiency, the economy can sustain higher growth rates. Specifically, policymakers can address income and opportunity disparities by reducing entry barriers in the credit market, or by redistributing resources. It is therefore pertinent to examine the correlation between financial market imperfections and inequality, particularly focusing on disparities at the lower end. Examining a consistent sample of 43 countries over the 1980s to the 1990s, the cross-sectional analysis reveals that: (1) easing financial constraints leads to a reduction in income inequalities, controlling for various country characteristics and endogeneity; (2) financial development consistently increases the income of the poor; (3) the trickle-down model presented in section III proves reliable; (4) the relationship between income inequality and financial development may follow a non-linear pattern; (5) a country's legal origin can capture variations influenced by exogenous factors in establishing the causal link between income inequalities and financial development; (6)

country characteristics, such as inflation and other measure of macroeconomic instability, do not enter significantly when controlling for financial development. It is crucial to note that this study does not prescribe a specific tool for policymakers to enhance social welfare through financial market development. Further research is needed to identify the most effective means. Indeed, the lack of a singular indicator that comprehensively captures the extent to which credit markets contribute to both economic growth and poverty alleviation makes the identification of the most effective means challenging . In any case, Private Credit emerges as a favourable proxy, encompassing the total financial intermediation by regulated entities in the economy. Thus, it serves as a valuable measure for the overall volume of financial intermediation.

Moreover, an intriguing observation emerges when considering a negative quadratic relationship between inequality and financial development. It indicates that: (1) there might be an asymmetry in impact, that is an increase and a decrease in financial development could impact inequality (income growth of the poor) differently, with the direction and magnitude depending on the specific circumstances; (2) the quadratic nature implies a threshold beyond which the impact of financial development on inequality might reverse; (3) there might be an optimal level of financial development where inequality is maximized. In essence, the negative quadratic relationship implies a non-linear association between financial development and income inequality, highlighting the complexity of the relationship. The results from the reset test suggest that financial development can impact both the extensive and intensive margins (beneficial-to detrimental view). Initially, at early stage of financial development, more inclusive services for those who were previously excluded due to market barriers lowers inequality levels. Once inequality reaches its minimum, financial development may shift to operating on the intensive margin, favouring those who already have access to the financial market, typically high-income individuals. Improving the quality of the

financial market may ultimately contribute to perpetuating cross-dynasty disparities. In their investigation of a subset of developing nations, Jeanneney and Kpodar (2011) observed a tendency for financial development to amplify macroeconomic volatility, a phenomenon that can particularly harm the poor. It is noteworthy that while financial services may primarily benefit the rich, existing literature suggests that the overall economic growth continues to be positively influenced by financial development. Additionally, there exists a potential positive income effect that could extend benefits to the less affluent as well. Yet, a plausible explanation for the non-linearity lies in the fact that the precision of Private Credit as an indicator of financial development differs across distinct phases of economic and financial progress (Benhabib and Spiegel, 2001).

Nonetheless, additional research is necessary to incorporate additional factors when assessing the impact of financial development on poverty, inequality, and growth. It is possible that barriers to entry into the credit market are not solely determined by income levels. As demonstrated, discrimination based on gender, religion, and race has been shown to be a plausible mechanism through which inequality influences the overall economy (Manuel Santos Silva and Stephan Klasen, 2021).

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APPENDIX

1 TABLES

Table 1

Summary Statistics

Variable	N	Mean	Standard Deviation	Min	Max
PRIVATE CREDIT	52	0.4601	0.3219	0.0230	1.4910
GR_POOR	52	0.0206	0.0224	-0.0270	0.0660
GINI COEFFICIENT	52	-2.3256e-04	0.0065	-0.0180	0.0110
INFLATION	52	21.6788	36.1443	0.2956	180.6739
GOV_EXP	51	14.9624	5.3992	7.2011	28.0271
TRADE	50	71.4132	60.6758	18.08595	355.7157
*SCHOOL*_80	47	5.4988	2.7151	0.3900	11.9100

Table 2

Correlations

	PRIVATE CREDIT	*GR_POOR*	*GINI COEFFICIENT*
PRIVATE CREDIT	1.0000	0.6266	-0.2177
GR_POOR	0.6266	1.0000	-0.4916
GINI COEFFICIENT	-0.2177	-0.4916	1.0000

Table 3

Financial development and poverty alleviation OLS

Number of observations: 43 Number of parameters: 6					**Sign and Significance**
Factor	**Coefficient**	**Standard Error**	***t*-stat**	**p-value**	
Constant	0.0165	0.0102	1.6210	0.1135	**Positive**
FD	0.0439	0.0114	3.8516	0.0005	**Positive *****
INFL	-0.0001	0.0001	-1.1325	0.2647	**Negative**
GOV	-0.0010	0.0005	-1.7637	0.0860	**Negative**
TRADE	-0.0000	0.0001	-0.0562	0.9555	**Negative**
*SCHOOL*_80	0.0301	0.0013	-1.7664	0.9474	**Positive**
R-Squared	0.49	F stat	7.3535	RESET	4.1194
Adj R-Squared	0.41	p-value F test	0.0001	p-value RESET	0.0302

Table 4

Financial Development and Inequality OLS

Number of observations: 43 Number of parameters: 6					**Sign and Significance**
Factor	**Coefficient**	**Standard Error**	***t*-stat**	**p-value**	
Constant	0.0027	0.0039	0.6947	0.4916	**Positive**
FD	-0.0951	0.0044	-2.1718	0.0364	**Negative ***
INFL	-0.0000	0.0000	-0.1301	0.8972	**Negative**
GOV	-0.0003	0.0002	-1.4398	0.1583	**Negative**
TRADE	0.0000	0.0002	1.3166	0.1961	**Positive**
*SCHOOL*_80	0.0008	0.0005	1.4952	0.1434	**Positive**
R-Squared	0.34	F stat	1.2410	RESET	4.3605
Adj R-Squared	0.25	p-value F test	0.3099	p-value RESET	0.0261

Table 5

Financial Development and poverty alleviation TSLS

Number of observations: 43 Number of exogenous variables: 5 Number of endogenous variables: 1 Number of instrumental variables: 3 Number of parameters: 6					**Sign and Significance**
Factor	**Coefficient**	**Standard Error**	***t*-stat**	**p-value**	
Constant	0.0000	0.0106	1.4651	0.1513	**Positive**
FD	0.0643	0.0187	3.4433	0.0012	**Positive ****
INFL	-0.0006	0.0002	-3.1626	0.0031	**Negative ****
GOV	0.0000	0.0000	2.0841	0.0441	**Negative ***
TRADE	0.0010	0.0004	2.5148	0.0164	**Negative ***
*SCHOOL*_80	-0.2976	0.0804	-3.7022	0.0007	**Negative *****
Cragg-Donald stat	32.3267				

Table 6

Financial Development and Inequality TSLS

Number of observations: 43 Number of exogenous variables: 5 Number of endogenous variables: 1 Number of instrumental variables: 3 Number of parameters: 6					**Sign and Significance**
Factor	**Coefficient**	**Standard Error**	***t*-stat**	**p-value**	
Constant	0.0030	0.0040	0.7487	0.4588	**Positive**
FD	-0.0061	0.0057	-1.7495	0.0920	**Negative**
INFL	-0.0003	0.0002	-1.4419	0.1577	**Negative**
GOV	0.0000	0.0000	1.1589	0.2539	**Positive**
TRADE	0.0010	0.0008	1.1762	0.2470	**Positive**
SCHOOL	-0.0124	0.0103	-1.2017	0.2371	**Negative**

Table 7

Financial Development and Legal Origin (1st stage)

Number of observations: 43 Number of parameters: 3					**Sign and Significance**
Factor	**Coefficient**	**Standard Error**	***t*-stat**	**p-value**	
Legor_UK	0.5580	0.1039	5.3693	0.0000	**Positive *****
Legor_FR	0.3318	0.0689	4.8126	0.0000	**Positive *****
Legor_GE	0.9177	0.1990	4.6114	0.0000	**Positive *****
F stat	22.2134				
p-value F test	0.0000				

Table 8 Variables Description

Variable	Variable Definition	Source
Income Growth of the poor	GDP per capita growth of the lowest income quintile group	WDI, Dollar and Kraay (2002)
Government Expenditures	Government expenditures as share of GDP	World Bank
Growth of Gini	The Gini coefficient is the ratio of the area between the Lorenz Curve, which plots share Dollar and Kraay (2002) of population against income share received, to the area below the diagonal. It lies between 0 and 1, where 0 is perfect equality and 1 is perfect inequality. The growth rate is calculated as the log difference	Dollar and Kraay (2002)

	between the last and the first available observations, divided by the number of years.	
Private Credit	Claims on private sector by deposit money banks and other financial institutions as share of GDP	IFS. Dollar and Kraay (2002)
Inflation	Inflation rate, calculated as log difference of CPI	IFS, WDI
School_80	Average schooling years in the total population over 25 in 1980	Barro and Lee (1993)
Trade Openness	Real exports and imports as share of real GDP (in log terms)	WDI
Legor_UK	A dummy variable that takes value of one if the origin of the country's legal system is British and 0 otherwise.	Author's calculation
Legor_French	A dummy variable that takes value of one if the origin of the country's legal system is French and 0 otherwise.	Author's calculation
Legor_Ge	A dummy variable that takes value of one if the origin of the country's legal system is French and 0 otherwise	Author's calculation