LUND UNIVERSITY
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The Effects of Income Inequality and Poverty on Economic Growth

by

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Abstract: During the last decades, extreme poverty has been declining globally while income inequality within countries has, in the developing world, been increasing. While the reduction of income inequality and poverty can be seen as crucial targets for development intrinsically, they might also have economic impacts. Existing empirical research and theory suggest that income distribution affects economic growth. The aim of the thesis is to compare the effects of income inequality and poverty on GDP per capita growth. These objectives are investigated using cross-country regressions of 46 developing countries between 1980 and 2018. The results indicate a weak negative short to medium-run effect of income inequality on growth. However, the results are sensitive to regional effects and are not robust to alternative inequality measures. Poverty is not found to affect GDP per capita growth. Thus, the results suggest income inequality to affect economic growth more than poverty in the short to medium-run, but due to the sensitivity of the results no robust conclusions can be drawn. The lack of robust results may be caused by the overlap of the two concepts and the similar theoretical channels through which both variables affect economic growth.

Keywords: Income inequality, Poverty, Economic Growth

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1 Introduction

1.1 Research Problem and Definitions

During the last decades, extreme poverty has been declining globally while income inequality within countries has, in most parts of the world, been increasing (United Nations, 2019). In 1990, 36% of the global population lived in extreme poverty, defined as consumption of less than $1.90 a day (World Bank, 2018). The share of the global population in extreme poverty has since declined to 10% in 2015 and was estimated to include 8.6% of the global population in 2018. Thus, although the decline is persistent, the rate of decline has diminished in recent years. Progress has also been made in absolute numbers, as the number of people living in extreme poverty declined from roughly 2 billion to 736 million between 1990 and 2015 (World Bank, 2018). Inequality within developing countries, on the other hand, has gradually but steadily increased since 1980 (Ravallion, 2014). Between 1990 and 2010, income inequality in developing countries has on average increased by 11% (UNDP, 2013). Spatial inequalities between the urban and rural areas, inequalities of opportunity, and employment in the informal sector have been recognized as some of the drivers of the increasing inequality in developing countries (Keeley, 2015). Especially the increase in income held by the richest 1% is seen as concerning (UNDP, 2013).

Poverty and inequality reduction are seen as important objectives by the World Bank, both being included in the Sustainable Development Goals (SDGs) (United Nations, 2019). In this thesis, the concept of income distribution includes both income inequality and poverty. The income distribution of a society is associated with discrimination, cultural bias, and social exclusion, and affects the levels of self-worth and satisfaction of individuals (UNDP, 2013). While inequality and poverty reduction can be seen as crucial targets for development intrinsically, they might also have economic impacts. Existing research and theory suggest that income distribution affects economic growth. Income inequality could strengthen economic growth through increased capital accumulation (Kaldor, 1957; Bourguignon, 1981) or restrain growth through credit rationing and increased taxation, consequently reducing investments (Galor & Zeira, 1993; Alesina & Rodrik, 1994; Persson & Tabellini, 1994). Poverty, on the other hand, has been argued to create a trap through channels of human capital, health, knowledge, and financial risk, thus preventing the poorest from escaping without an income stimulus, such as aid (Banerjee & Duflo, 2011; Dutt and Tsetling, 2019; Todaro & Smith, 2015). Understanding the impacts of inequality and poverty on economic growth can help to determine the indirect effects of inequality and poverty reduction. A negative effect on growth could further strengthen the argument for operating towards the SDGs, while a positive effect could create a trade-off to be considered in policymaking in order to achieve the SDGs and economic growth simultaneously. It is, therefore, interesting to understand if and how different income distributions affect economic growth. A comparison

of income inequality and poverty could help to evaluate the importance and the consequences of the goals from an economic point of view.

The relationship between poverty and inequality is not direct (Beteille, 2003). They are two distinct concepts that, as seen in the past decades, can vary independently of each other. While the concept of income inequality includes the full distribution of monetary well-being, poverty only focuses on the lower end of the distributional spectrum (McKay, 2002). Inequality describes the differences in living standards and well-being of humans and affects development, democratic life, and social structures (UNDP, 2013). Economic inequality often correlates with social inequalities, such as inequality of ethnicity, religion, gender or language, and political inequality, creating mutually reinforcing forces of marginalisation. Inequality can be viewed as two highly interrelated concepts: inequality of outcomes and inequality of opportunities (UNDP, 2013). Inequality of opportunity stems from the background or conditions that shape an individual's ability to achieve matters, such as access to education. Inequality of outcomes is, on the other hand, measured as results, such as income earned. There is more consensus regarding the injustice of inequality of opportunity, but the concept is more problematic to measure. In this thesis inequality is defined as income inequality, and, more specifically, the Gini index is used as the main measure. While inequality will always exist in a society, the level at which it is accepted can vary because of the political nature of the debate and the ethical reasoning. Understanding the economic effects of income inequality can shape the political and ethical discussions.

Poverty, on the other hand, is often more agreed upon to be a social problem that should be reduced. Poverty can be defined as a "pronounced deprivation in well-being" (World Bank, 2001, p. 15). While poverty is most often measured in monetary terms, the concept is multidimensional and includes also the aspects of education, health, social contact, and relationships, competence, and self-worth among other factors (Wellbeing & Poverty Pathways, 2013; World Bank, 2018). Furthermore, poverty can be categorised as chronic or transient, where the former includes those that are always poor while the latter refers to those who fluctuate in and out of poverty (Coudouel, Hentschel & Wodon, 2002). International poverty lines are often used as absolute standards of measure and allow therefore for comparisons across countries. In this thesis, poverty is defined narrowly in monetary terms, and more specifically the poverty headcount ratio at $1.90 a day is used as the main measure. By using the poverty line at $1.90 a day, the focus is shifted towards extreme poverty.

1.2 Research Aim, Motivation and Scope

Many studies have focused on estimating the growth elasticity of poverty and inequality: the effects of growth on poverty and inequality. This thesis, however, focuses on the opposite relationship between the variables. The aim of the thesis is to compare the effects of income inequality and poverty on economic growth. Comparing the effects of the different income distribution measures on economic growth can provide clarity in the ambiguous debates. Existing empirical research has found contradicting results regarding the effect of inequality on economic growth, while less attention has been placed on the role of poverty. To the

author's knowledge, only one previous study includes both income inequality and poverty as determinants of growth (Lopez & Servén, 2009). Other studies have focused on initial values of inequality and poverty or used alternative dependent variables, although the amount of these studies is scarce (Ravallion, 2012; Dutt and Tsetlin, 2019). Thus, more research can shed light on how income inequality and poverty affect economic growth in comparison to one another. Moreover, the thesis will use contemporary, rather than initial values of inequality and poverty in addition to more recent data than what has been available for previous empirical research. Two research questions are formulated. First, how do income inequality and poverty affect economic growth? And second, does poverty have a stronger effect on economic growth compared to income inequality?

The comparison can help to explore the mechanisms of economic growth. A greater understanding of the roles of the distributional measures on economic growth would be beneficial for policymaking. Results indicating negative effects of income inequality and poverty could provide further support for the development targets. On the other hand, positive relationships could clarify the need for two-fold policies to achieve the SDGs and economic growth simultaneously. The aim of the thesis is investigated by using cross-country regressions of 46 developing countries during the time period 1980 to 2018. The existing research and theory suggest differences in the effects of income distribution on economic growth between developed and developing countries. Thus, developing countries are chosen as the sample in this study for evaluating the relationship. The number of countries and the time period of the sample are limited based on data availability. Theoretical models for both the impacts of inequality and poverty on economic growth are presented to compare the effects on economic growth. The theoretical models are used to interpret the empirical results with the objective of identifying the mechanisms of how, if at all, income inequality and poverty affect economic growth.

1.3 Outline of the Thesis

The thesis is structured as follows: chapter 2 provides the theoretical frameworks for evaluating the relationships between income inequality and economic growth, and poverty and economic growth. Following the theory section, a literature review of the existing empirical research is provided in chapter 3. Chapters 4 and 5 respectively describe the data and the methodology used. The results of the empirical analysis are presented in chapter 6 and discussed in chapter 7. Finally, chapter 8 concludes and provides suggestions for future research.

2 Theory

The effects of inequality and poverty on economic growth are debated in various economic theories. First, the two main strands of theory regarding inequality are presented. Second, theories regarding poverty traps are presented to discuss the effects of poverty on economic growth. Last, the relationship between income inequality and poverty is briefly discussed. The theories are presented separately, but several of the mechanisms are overlapping because of the linkage between the concepts of inequality and poverty.

2.1 Inequality and Economic Growth

The theory regarding the effects of inequality on economic growth has two main strands (Galor, 2000). The classical approach argues for a positive relationship between the variables and is most famously supported by Keynes (1920), Kaldor (1957), and Bourguignon (1981). According to this view, saving rates are increasing functions of wealth. Hence, rich people have a higher propensity to save than poorer people and accumulate larger savings. The larger savings of the rich allow for more investments in comparison to the poorer who can invest less. Overall, this increases the aggregate savings and the capital accumulation in the economy. Income inequality will, therefore, through an increase in the rate of capital investment result in higher economic growth and development. The model implies that the magnitude of the higher propensity to save of the rich is larger than the reduction in investments by the poor, which is identified as a hinder for growth in the models of credit constraints.

The second strand of theory, the modern approach, presents a negative relationship between inequality and economic growth. According to this view, inequality disincentivises human capital investments and hence deters growth. This has been argued to take place through two mechanisms: imperfect capital markets (Galor & Zeira, 1993) and political economy channels (Alesina & Rodrik, 1994; Persson & Tabellini, 1994). The first mechanism of imperfect capital markets focuses on human capital as a source of growth while the political model, alike the classical approach, views physical capital as a driving force of economic growth. When the financing of physical and human capital requires credit, the existence of credit rationing will hinder growth (Galor & Zeira, 1993). This mechanism relies on the assumptions of credit market imperfections and indivisibilities in human capital investments. When information is costly and imperfect, credit rationing will take place because of the asymmetric information between the parties. The poor often have less credibility to prove their ability to reimburse, which is why individuals born into families with less assets are less likely to access credit (Stiglitz & Weiss, 1981). Therefore, at a given level of per capita income, more unequal wealth distribution leads to a higher incidence of credit-constraint and

lower growth (Galor & Zeira, 1993). The initial distribution of wealth is hence a decisive factor for the level of credit-constraint and consequently affects the aggregate level of investments in an economy. The level of credit-constraint not only has short-run but also long-run effects on investments and the skill level. The skill level is affected because of the indivisibility of human capital investments. A higher incidence of credit-constraint diminishes the possibilities for education, causing a lower level of human capital accumulation. The low level of human capital accumulation can have intergenerational effects, as those with a lower skill level often earn less and can therefore not invest in their children's education. As human capital is an important source of growth, a lower aggregate level of human capital hinders economic growth. The differences in growth rates and steady states between countries can, therefore, be explained with differences in wealth distribution, where the more unequal countries lag behind. The more unequal countries have a higher share credit-constraint and consequently lower human capital accumulation.

Alesina and Rodrik (1994) and Persson and Tabellini (1994) present an alternative channel for the negative relationship between inequality and economic growth. They argue that the distribution of wealth and income affects economic growth through political channels. Higher inequality causes conflict over the distributional assets, which can result in political instability and greater volatility in policies. These consequently hinder economic growth. Furthermore, the level of inequality affects the relative position of the median voter. In a more unequal society, the median voter is poorer and, therefore, prefers a higher tax burden. Capital owners, on the other hand, favour a lower tax burden, which is optimal for economic growth (Alesina & Rodrik, 1994). The median voter's preference incentivises the government to increase the tax rates, which in turn decreases the rate of return on private assets and constrains capital accumulation. Thus, the median voter of an unequal society will make political decisions that hinder economic growth. Moreover, the level of inequality affects the possibilities for political lobbying and access to political markets. The rich have more political power through these channels and will take part in rent-seeking activities, which reduce the security of property rights (Persson & Tabellini, 1994). More unequal income distribution, therefore, causes slower economic growth.

Galor (2000) presents a unified model of growth by combining the two strands of theory during a country's development path. The model explains a similar relationship between inequality and growth as is presented in the Kuznets curve (1955). Although both models argue for a shift in the relationship between inequality and income per capita during industrialization, the mechanisms behind the relationships and the changes in them are different in the Kuznets curve and the unified model of growth by Galor (2000). Galor (2000) argues that the positive effect of inequality on growth is applicable in the early stages of industrialization during which physical capital accumulation is the engine of growth. The modern approach, on the other hand, describes a later stage of development where human capital drives growth and the positive effect experienced earlier during development is dominated by this negative effect of inequality on economic growth. The negative effect dominates because of higher capital-skill complementarity, causing higher returns to human capital (Galor, 2000). Throughout time, credit market constraints loosen because of increased wages, but are present in both eras. Thus, developing countries would see a positive relationship between inequality and growth, while developed countries would experience a negative relationship.

2.2 Poverty traps

Poverty traps are defined to exist "whenever the scope for growing income or wealth at a very fast rate is limited for those who have too little to invest, but expands dramatically for those who can invest a bit more" (Banerjee & Duflo, 2011, p. 11). Banerjee and Duflo (2011, pp. 11-13) explain poverty traps as an S-shaped curve, as illustrated in figure 1. At the diagonal line, the current income is equal to future income. In the area where the current income is larger than the future income, to the left of line P in figure 1, individuals become poorer over time and are unable to escape the trap without an income stimulus, such as credit or aid. Individuals at A1 are thus caught in the poverty trap and move towards A2 and A3. Sachs (2005, ch. 3) applies the model to countries, arguing that high incidences of poverty are determined by conditions that affect productivity, such as climate, malaria, and infertile soil. Large initial investments are needed to accumulate technology that allows for higher productivity and an income increase. Without such initial investments, a country is unable to shift to the right of line P and increase their future income. If instead a country or an individual starts initially to the right of line P, they will earn a higher future income compared to current income, resulting in income accumulation over time (Banerjee & Duflo, 2011, p. 11). Individuals at B1 will, therefore, shift towards the right on the figure (B2 and B3) and are not trapped in poverty.

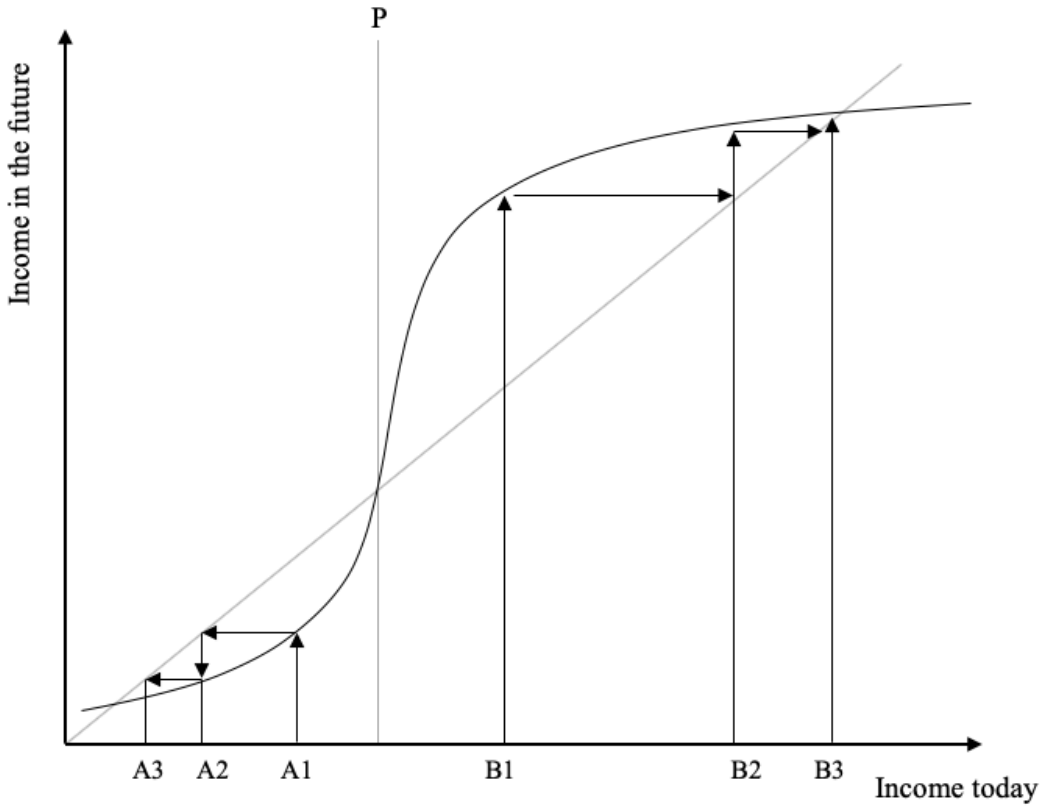

Figure 1. S-shaped curve – poverty trap. Adapted from Banerjee & Duflo, 2011, p.12

There are several possible causes for poverty traps, including malnutrition, health, education, productivity, knowledge, and financial risk (Banerjee & Duflo, 2011; Dutt and Tsetling, 2019; Todaro & Smith, 2015). Childhood malnutrition and health issues are essential challenges because of their long-term effects through educational attainment and future income through productivity (Banerjee & Duflo, 2011, pp. 31-33, 45-46). Spending priorities, lack of knowledge, under-utilized preventive care, and lagged outcomes are, however, some of the causes of why the issues are difficult to battle (Banerjee & Duflo, 2011, pp. 31-33, 50-51). All of the channels are linked to lower productivity. Banerjee and Mullainathan (2008) argue that attention is a scarce resource that has to be divided between home and work life, thereby reducing productivity if one or both lives are stressful. Lack of attention at home can also contribute to higher costs through unnoticed sickness and inefficient use of resources. Limited attention can cause disproportional earnings for the level of human capital attained, even in the absence of market failures. Therefore, the quality, rather than quantity of hours worked might be more crucial for escaping poverty (Banerjee & Mullainathan, 2008).

The poor are generally more risk-averse because of the higher impact of losses on their lives (Banerjee & Duflo, 2011, pp. 144, 154). This is interconnected with the lack of available insurance and the inadequately adapted credit markets for the poor. Thus, the poor have to bear the risk themselves to a higher degree and are therefore less likely to take larger risks. The risk-averse behaviour, although often a safer choice, however, also diminishes their possibilities of achieving greater success. Not only does this lead to a lower chance of escaping the poverty trap, but it also contributes to a lower level of investments in the aggregate economy. In contrast to the classical theory regarding inequality (Keynes, 1920; Kaldor, 1957; Bourguignon, 1981), the lower level of investments by the risk-averse poor is assumed to have a greater effect on the aggregate investments than what the rich can counterweigh through their higher propensity to save. Furthermore, the income of the poorest stimulates local production proportionately more than the spending of rich because of the poor's preference to consume necessities, which are often locally produced (Todaro & Smith, 2015). The rich are more likely to consume and invest their additional income on foreign luxury goods and services that do not contribute to the growth of the domestic economy to the same extent. Thus, poverty reduction benefits local production, employment, and investments, contributing to economic growth.

Human capital is a possible ladder for escaping poverty, as acknowledged in several endogenous growth models such as the Lucas model (1988). The path is, however, often hindered by the quality of education, high drop-out rates and credit constraints, as discussed earlier by Galor and Zeira (1993). Hence, a vicious cycle of poverty causing low educational attainment and vice versa is established (Moav, 2005). The mechanism is especially strong in the presence of credit constraints. Financial markets are incentivised to create credit constraints and unfavourable process for the poor because of the large fixed costs and higher risk in financial services (Banerjee & Duflo, 2011, p. 269). Furthermore, a functioning socio-economic environment is of importance for efficient educational attainment and productive use of the acquired human capital (Banerjee & Duflo, 2011, p. 232). This includes better urban planning and the construction of safety nets that facilitate migration to urban employment. Credit constraints are a central growth-reducing mechanism recognized in both poverty and inequality theories. Overall, Banerjee and Duflo (2011, p. 267) emphasize the role of manpower and knowledge for economic growth, and hence advocate for education,

security, and nutrition as a foundation for growth. Lack of knowledge and the responsibility to make the correct decisions for themselves are some of the reasons for the persistence of poverty.

On the contrary, some argue that figure 2 describes the earning possibilities of individuals more realistically than figure 1. Figure 2 allows for individuals to become richer regardless of their initial income level. According to this view, poverty traps do not exist. Easterly (2011) defends this view, arguing that aid reduces incentives for problem-solving, undermines local institutions, and contributes to corruption. Free markets and correct incentives provide conditions in which the poor themselves are able to escape poverty. Therefore, Easterly (2011) argues that aid causes more harm than assistance. Neoclassical growth theories, such as the Solow model (1956), provide further evidence for the lack of poverty traps. The theory suggests that poor countries grow at a faster rate because of the low ratios of capital to labour that yield high marginal products and high returns to capital. Furthermore, developing countries have a latecomer advantage of replicating the existing technologies, production processes and institutions of developed countries (Mathews, 2006). Thus, there will be convergence across countries to a steady-state equilibrium as the poor countries catch up with the rich countries. This view, therefore, not only implies that poverty traps do not exist, but also that the poor countries have an advantage in reaching higher per capita growth rates.

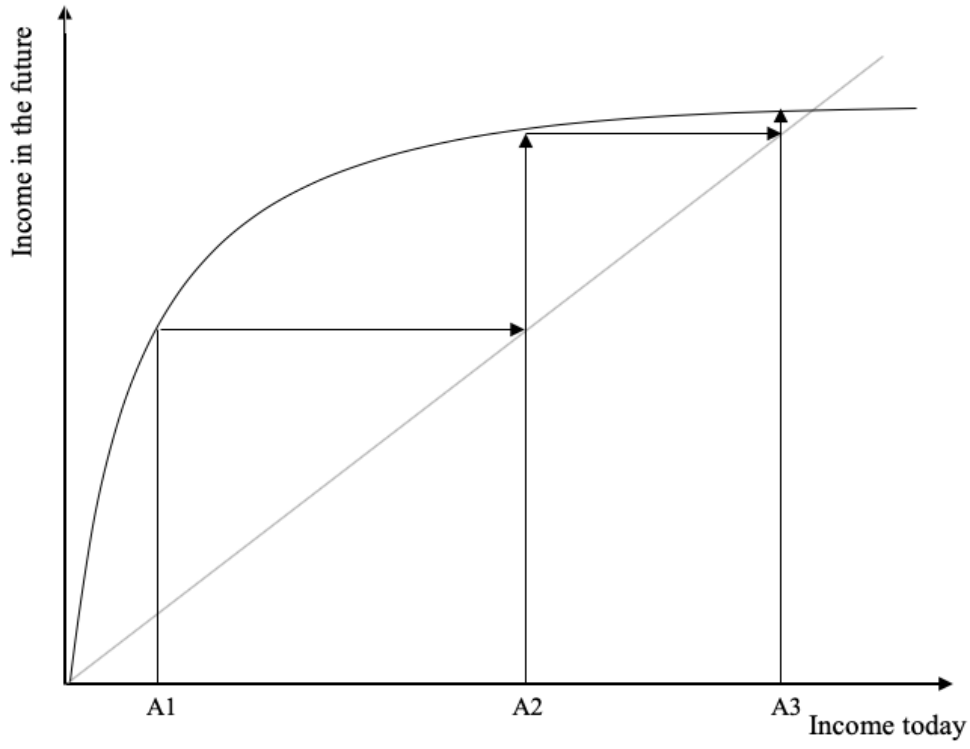

Figure 2. The inverted L-shaped curve – no poverty trap. Adapted from Banerjee & Duflo, 2011, p.13.

The convergence debate is widely discussed, and largely recognized theories, such as the social capabilities theory by Abramovitz (1986), argue instead for conditional convergence across countries. Conditional convergence allows for convergence between rich and poor

countries, but only after the poor countries have acquired the appropriate social capabilities needed to absorb technology, attract capital, and function in global markets. Countries that lack these pre-requisites cannot benefit from the latecomer advantage, leading to lower growth rates. The theory relies on the assumption that there is free global movement of technology and capital, allowing for countries to exploit them. This is, however, not always the case and countries can therefore stagnate because of the high costs or inaccessibility of capital. Abramovitz (1986) argues that social capabilities explain the persistent contemporary divergence between countries. Banerjee and Duflo (2011, p. 13) reason that figures 1 and 2 are both plausible, and the applicability depends on each specific context.

2.3 Inequality and Poverty Relationship

Finally, the relationship between inequality and poverty should be mentioned. Studying the relationship is beyond the scope of this paper but understanding the linkages can help in interpreting the results of the paper. Furthermore, it provides some explanation for the intersection of the theoretical mechanisms seen in this chapter. In his poverty-inequality-growth triangle, Bourguignon (2004) explains how the changes in absolute poverty can be attributed to changes in income growth and income inequality. Changes in poverty can be seen as a function of growth in the mean income and changes in the distribution of the relative income. Hamner and Naschold (2000) discuss the relationship between income growth and poverty reduction – the growth elasticity of poverty. The growth elasticity of poverty measures the change in the poverty headcount caused by a one percent change in GDP per capita. The growth elasticity of poverty is found to vary with levels of income inequality, where higher initial inequality is associated with lower growth elasticity of poverty at a given positive growth rate (Ravallion, 1997). Thus, more unequal income distribution hinders the poverty reducing effect of growth. High levels of inequality mean that the poor acquire a lower share of the current and future income, and the poverty reduction is, therefore, slower. Although Bourguignon (2004) disregards the effect of poverty on economic growth, combining his theory with the previous theories of poverty traps can aid in understanding the indirect linkages between the variables. If poverty affects economic growth, inequality would then, indirectly through poverty, affect growth. While Bourguignon (2004) does not discuss the relationship of poverty on inequality, the definitions themselves indicate a two-way relationship. Thus, it is also plausible that changes in poverty can indirectly through inequality affect growth. Income inequality and poverty are therefore theoretically interrelated and can affect one another, consequently also affecting growth.

3 Literature Review

The relationship between income distribution and economic growth has been widely researched. Most attention has been placed on investigating the effects of initial inequality on growth. First, a representative overview of studies on the relationship between inequality and economic growth is presented. A hypothesis is constructed based on the existing literature and the theoretical frameworks. Some of the evidence regarding the effects of inequality on growth suggests that focus should instead be shifted to the bottom share of the income distribution. Subsequently, the literature regarding poverty traps and the effect of poverty on growth is discussed, and a second hypothesis is formulated. Finally, the few studies that include both inequality and poverty as determinants of growth are presented to lay a foundation for this thesis. These are used to formulate the third hypothesis.

3.1 The Effect of Inequality on Growth

The relationship between inequality and economic growth is widely researched. Alesina and Rodrik (1994) and Persson and Tabellini (1994) present similar theoretical models in which the distribution of wealth and income affects economic growth negatively through political channels. Alesina and Rodrik (1994) test their theory empirically using a sample of countries at various levels of development between 1960 and 1985. Their estimations indicate that both land inequality and the Gini index are significantly and negatively correlated with subsequent growth in the long run. Clarke (1995) confirms the findings for various measures of inequality and several regression specifications. He uses a sample that consists of both developing and developed countries between 1970 and 1988. Despite the significance of the results, the size of the effect is small, as a one standard deviation decrease of inequality below the mean increases annual economic growth between 1.3 and 2.5%. Likewise, Persson and Tabellini (1994) confirm the results using the initial relative position of the median income earner as a measure of inequality for both pre- and post-war data. The pre-war data consists of developed countries while the post-war sample includes both developed and developing countries. The negative effect of inequality is found to apply to both samples, but their findings are conditional on the presence of democracy in the countries. Inequality is only found to have a significant effect on economic growth in democratic countries. Thus, they suggest that the mechanism through which inequality affects growth could be political. The finding is, however, disputed by Alesina and Rodrik (1994), Clarke (1995), and Deininger and Squire (1998), where the first two do not find a difference in the relationship regarding democracy and the latter find contradicting results.

Deininger and Squire (1998) find a negative relationship between initial asset inequality and long-term economic growth. The relationship is found to be robust for a sample of developing

countries but becomes insignificant when only high-income countries are included in the sample. They discuss two possible theories for the negative relationship: credit rationing (Galor & Zeira, 1993) and political bargaining (Persson & Tabellini, 1994). However, the insignificant results for democratic countries counterprove the idea of the growth effects of political bargaining and voting mechanisms. More credible reasoning, according to Deininger and Squire (1998), is that credit rationing of indivisible investments excludes those with limited or no assets from making profitable investments. This is supported by the finding that initial inequality is found to be more harmful to the poor than the rich. Thus, their results challenge the political theories presented by Alesina and Rodrik (1994) and Persson and Tabellini (1994). Instead, the mechanism might operate at a lower level of inequality, suggesting that more focus should be placed on poverty. Deininger and Squire (1998) also test the effect of initial income inequality on subsequent growth but do not find it to be significant. Furthermore, the significance of the initial asset inequality ceases when regional dummies are introduced, which causes the authors to question the robustness and validity of the results. These results suggest that regional-specific characteristics may instead be driving the relationship between initial asset inequality and economic growth. Deininger and Squire (1998) are, therefore, cautious about a relationship between inequality and subsequent growth.

In contrast, Forbes (2000) and Iradian (2005) find a positive relationship between inequality and growth in the short to medium-term by using average three to seven-year panels. Forbes (2000) studies a data set of 45 countries between 1966 to 1995, limited to mainly developed countries. Both studies use the Gini index as a measure of inequality. Forbes (2000) finds a 10% increase in the Gini index to cause a 1.3% increase in average annual growth. The data is skewed towards developed countries due to data quality issues, which causes to question the applicability and robustness of the results for developing countries. The sample used by Iradian (2005), however, includes a higher share of developing countries between 1965 and 2003, and confirms the positive relationship also for developing countries. The positive relationship between inequality and growth is weaker in countries with more financially developed markets, suggesting that inequality drives growth through credit market imperfections (Iradian, 2005). These results support the classical theories regarding inequality and growth, where the rich accumulate higher savings and subsequently invest more. Credit market imperfections may further facilitate the economic resources to the richest and thereby strengthen the process of increased rate of capital investment. Countries with less developed financial markets would, therefore, achieve higher growth in the presence of high inequality.

Iradian (2005) emphasizes the significance of data quality, period length, and regression specification for results. The ambiguity in the existing empirical research might thus be linked to a lack of robustness in the results. Forbes (2000) finds the positive relationship to cease to be significant when 10-year periods are used instead of the five-year averages. Relatedly, Iradian (2005) suggests that the sign of the effect may shift with time, as he finds the long-term relationship between inequality and economic growth, measured as 10 to 20-year averages, to be negative. The aforementioned studies that found evidence for a negative relationship between inequality and economic growth estimated a long-run relationship (Alesina & Rodrik, 1994; Persson & Tabellini, 1994; Deininger & Squire, 1998). The length of the time periods can, therefore, be decisive for whether a positive or a negative relationship is found. Overall, the literature is ambiguous about the relationship between inequality and economic growth. The studies have focused largely on initial inequality in their estimations to

avoid reverse causality. It is, therefore, of interest to study the topic further and study the relationship without using initial values. Additionally, Deininger and Squire (1998) and Iradian (2005) imply that the mechanisms driving the relationship, regardless of its sign, could be linked with poverty.

Despite the lack of a general consensus in the empirical research and the theoretical frameworks, the hypothesis is based on the unified model of growth by Galor (2000) and the empirical research by Forbes (2000) and Iradian (2005). The unified model of growth by Galor (2000) was chosen because of the distinctions made between the effects experienced in developed and developing countries. Moreover, this thesis will use similar five-year average panels to estimate the short to medium-run relationship as used by Forbes (2000) and Iradian (2005). Hence, the following hypothesis is constructed:

Hypothesis 1: Income inequality has a positive effect on economic growth in developing countries.

3.2 The Effect of Poverty on Growth

The literature regarding the effects of poverty on economic growth focuses to a large degree on poverty traps. Poverty can restrict parts of the population from participating in the economy, consequently preventing them from contributing to economic growth (Lopez & Servén, 2009). The limited economic contributions by the poor can create a poverty trap, possibly with multiple equilibria, where poverty is self-reinforcing. Quah (1993; 1996; 1997) establishes theoretical and empirical "emerging twin peaks", where countries cluster at the two ends of the income level spectrum. Thus, the evidence supports stratification and the convergence club theories instead of simple divergence or convergence theories. The stratification trends in the empirical evidence could be linked with the theory of social capabilities and conditional convergence by Abramovitz (1986), where the peaks represent different levels of social capabilities.

McKay and Perge (2013) take a different approach in investigating the existence of poverty traps by measuring wellbeing with assets rather than consumption or income in order to achieve less volatile results. They aim to distinguish between the transient poor and chronic poor to understand the differing effects on growth. While they are unable to find evidence for multiple dynamic equilibria, the results cannot refute the existence of a static structural poverty trap at a low level of asset ownership. The accumulation of income and assets may create multiple equilibria due to hinders that only allow for some to escape the traps (McKay & Perge, 2013). The traps can emerge at various income levels and those who have low initial assets or income can be caught in a poverty trap. There is a strong correlation between low levels of asset ownership and chronic poverty. The correlation is stronger for those living in chronic poverty than for those in transient poverty or who are not poor. Asset poverty could hinder growth through a different mechanism than explored in the regression analysis by McKay and Perge (2013) as empirical testing multiple dynamic equilibria poverty traps is difficult to conduct. Vijayakumar (2013) argues that the lack of social and economic

participation can hamper economic growth, creating a cycle of poverty and deterioration. He finds a significant and positive relationship between the dependency ratio and poverty, and vice versa using cross-country data of Asia, Sub-Saharan Africa, and Latin America. The dependency ratio is a demographic measure of the dependent population, under the age of 14 or over the age of 65, to the working-age population. Furthermore, economic growth is negatively and significantly associated with the dependency ratio. Vijayakumar (2013) thus argues that increasing poverty increases the dependency ratio, which causes a negative spiral of the poverty trap over generations. He mentions education, health, and awareness as key variables to reduce the dependency ratio and achieve growth.

Lopez and Servén (2009) research the role of poverty on economic growth using a sample of developing and developed countries between 1960 and 2000. They establish a negative impact of poverty on economic growth. The results are robust for various poverty line measurements, different sets of control variables, and estimation methods. High poverty levels are found to hamper growth through investments. This mechanism is found at low levels of financial development, which is contradicting to the results by Iradian (2005). Lopez and Servén (2009) discuss the level of financial development as a key mechanism in poverty traps through credit rationing. The findings indicate a 10% increase in poverty to cause a 0.8 to 1.1% reduction in annual per capita growth. Inequality is included as a controlling variable to ensure that the effect is driven by the bottom share of the income distribution and is found to be insignificant. Therefore, the paper advocates for poverty reduction policies as a mechanism to aid economic growth.

Overall, the literature on poverty focuses more on multiple dynamic equilibria poverty traps rather than a static structural poverty trap, which is one of the aims of this thesis. The literature is not able to confidently prove the existence of multi-equilibria poverty traps, possibly due to estimation difficulties. While the empirical evidence is ambiguous and context-specific, it can be argued that the majority of the theoretical frameworks support a negative relationship between poverty and economic growth. Thus, the following hypothesis is constructed based on the poverty trap theory and the research by Lopez and Servén (2009):

Hypothesis 2: Poverty has a negative effect on economic growth in developing countries.

3.3 The Effects of Inequality and Poverty on Growth

Relatively little research has been done on comparing the effects of inequality and poverty on growth. Feldstein (1999) argues, with reference to the Pareto principle, that increased income of top earners does not make the poorer worse off and inequality is, therefore, not necessarily harmful. Increasing inequality is caused by returns to human capital, entrepreneurial activities, longer working hours, and capital, none of which harm the poorer. Policies should, therefore, shift towards a poverty reduction focus. Feldstein (1999) discusses the three sources of poverty to be long-run unemployment, lack of earnings ability, and individual choice. These causes should be prioritized in policymaking instead of inequality reducing aims, as they are harmful to all parties.

Dutt and Tsetlin (2019) compare the explanatory power of poverty and inequality for economic development but do not focus on economic growth. They use various machine learning approaches to predict and compare the explanatory powers of different measures of income distribution. The results indicate the poverty headcount ratio to be of higher significance for predicting schooling, institutional quality, and income per capita than the Gini index. The poverty headcount ratio is also more strongly correlated with the schooling and income per capita at the time, while neither poverty nor the Gini index are associated with the contemporary institutional quality. The results question the strong focus on inequality the literature and suggest that more attention should be directed towards the bottom of the income distribution. Similarly, Ravallion (2012) finds initial poverty to have a negative effect on growth in developing countries, but only conditional on the controlling of the initial mean income distribution. High levels of initial poverty both hamper subsequent growth as well as reduce the effect of growth on poverty reduction. Furthermore, the initial inequality is only found to affect growth when it includes a high incidence of poverty. The results are, therefore, more applicable to developing countries where the poverty headcount ratio is likely larger than in developed countries. Dutt and Tsetlin (2019) discuss several reasons why poverty could be more decisive than inequality for development. As already discussed by Deinigner and Squire (1998), credit rationing reduces possibilities for profitable investments, especially human capital investments. In similarity to Alesina and Rodrik (1994) and Persson and Tabellini (1994), Dutt Tsetlin (2019) also acknowledge the political power that is associated with wealth, arguing that it can result in institutional change in favour of the rich. Poverty can also reduce productivity and consequently lead to lower income, as discussed earlier in the theoretical section regarding poverty traps. Finally, poverty traps can cause the economies to stagnate on the aggregate level.

These studies provide a foundation for this thesis, but also highlight the scarcity of studies comparing the effects of inequality and poverty on economic growth and the ambiguity of the results. There is still a gap in the existing research regarding the effects of changes in poverty and inequality on economic growth. Several of the identified mechanisms also emphasize the effect to be larger for developing countries, which will be further explored in this thesis. Most of the existing literature indicate poverty to be of higher importance than income inequality for the income per capita level and suggest that initial poverty has a higher explanatory power than initial inequality for economic growth. Based on these studies, a third hypothesis is conducted. The hypothesis is, unlike the first two hypotheses, only based on empirical research because of the lack of theories comparing the effects.

Hypothesis 3: Poverty has a larger effect than income inequality on economic growth in developing countries.

4 Data

The panel data set consists of 46 low- and lower-middle-income countries, as defined by the World Bank (World Bank, 2020b). The list of countries included in the sample can be found in appendix A. The availability of the independent variables is the main motivation for the inclusion of countries and the chosen time period between 1980 and 2018. The panel is unbalanced due to a lack of available data for all years. The reason for the missing values in the data set should be considered to avoid bias in unbalanced panel estimation (Wooldridge, 2013, p. 491). In this sample, the reason for the missing data is possibly correlated with the level of economic development, where the least developed countries have lower data availability. Average five-year panels of the data are calculated by the author from the annual data to reduce volatility in variables. The last average panel is instead a four-year panel to include the most recent data for the years 2015 to 2018. The descriptive statistics for the non-interpolated annual data are reported in appendix B. The use of five-year average panels is motivated by the reduced volatility of especially the dependent variable and the persistence in the independent variables. Longer panel length was unfeasible because of the lack of data and the requirement of a satisfactory number of time periods for the empirical analysis. The data has been interpolated to reduce attrition and to achieve a more suitable sample for the chosen empirical methods. Linear interpolation was conducted to reduce gaps in the average five-year panel data.

4.1 Dependent variable

The GDP per capita growth rate (at constant 2010 $US) is chosen as the dependent variable and is provided by the World Bank (2020b). The descriptive statistics are presented in table 1, which shows a large variation between the minimum value of -11.88 and the maximum of 11.06. The volatility is, however, lower in comparison to the annual data presented in appendix B, where the values range from -47.50 to 37.54. The reduced volatility of the five-year averages allows for more stable analysis as it is less affected by short-term disturbances in growth rates. This is of importance because of the assumed relatively long-term impact of the independent variables on GDP per capita growth rates. Due to the high data availability, no values were interpolated for the dependent variable.

Table 1. Descriptive statistics for the five-year average panels.

Variable	Obs.	Mean	Std. Dev.	Min	Max
GDP per capita growth	353	1.67	3.03	-11.88	11.06
Gini index	258	41.81	8.32	24.78	67.87
Poverty headcount ratio	230	35.57	25.09	0.08	94.10
Average years of education	286	3.30	2.31	0.00	11.34
Inflation	339	42.34	376.67	-1.33	6424.99
Population growth	368	2.22	1.00	-4.07	6.57
Gross capital formation	344	22.77	10.14	0.00	77.50
Price level of capital formation	364	0.49	0.32	0.06	3.12

4.2 Independent variables

4.2.1 Income inequality

The independent variable of inequality is measured as the Gini index and the data for it is provided by the UNU-WIDER (2020). The choice is based on the aim of capturing the income distribution of the population as a whole. The Gini index can capture the changes in the income distribution more comprehensively than income quintile measures, which only focus on fragments of the income distribution. The Gini index is a relative measure of inequality within a country and ranges from 0 to 100, where 100 represents perfect inequality (UNU-WIDER, 2018). The Gini index is calculated as the area within the Lorenz curve as a share of the total area below the line of total income equality, where the Lorenz curve expresses the cumulative share of income distribution against the cumulative share of the population.

The included data consists of household data that is representative of the whole population (not only rural or urban areas). If several measures were available for a given year, the source rated to have the highest quality according to UNU-WIDER (2020) was used. In the cases where several measures for a given year had the same quality rating, an average of the measures was calculated. The interpolation of the data created 26 additional Gini observations, but the standard deviation and the mean value remained highly similar to the

original data. As seen in table 1, the values range from 24.78 to 67.87. A limitation in the data is that the living standard indicator to measure the Gini index varies within the sample, as both income and consumption expenditure are used (UNU-WIDER, 2018). The use of both income and consumption expenditure is motivated by the low data availability. The Gini measures are, therefore, not perfectly comparable since income typically has more unequal distribution and is more volatile than consumption (UNU-WIDER, 2018; World Bank, 2020b). Furthermore, two countries with the same Gini index can have different Lorenz curves, and accordingly their income distributions can differ. The Gini index cannot account for the ownership of assets that increase an individual's ability to invest or increase their productive capacity, which is a shortcoming in comparison to using land (asset) inequality as a measure (Deininger & Squire, 1998). Whereas several existing empirical studies use land inequality as a measure of inequality, income inequality is chosen for this study because of the desire for monetary comparison of inequality and poverty.

4.2.2 Poverty

The independent variable of poverty is measured as the poverty headcount ratio at $1.90 a day (in 2011 international prices, purchasing power parity (PPP) adjusted), presented in percentages and provided by the World Bank (2020b). The poverty line at $1.90 a day captures extreme poverty, as defined by the international poverty line by the World Bank (World Bank, 2018). Extreme poverty is the sufficiency threshold at which individuals can attain monetary well-being through the purchasing of the most necessary goods and services. The poverty headcount ratio ranges widely in the sample, with a minimum value of 0.08 and a maximum of 94.10, as seen in table 1. Of the 230 observations, 23 were obtained through interpolation. The interpolation did not significantly affect the mean or the standard deviation of the sample. The additional observations were necessary because of the low data availability of the variable. Despite the interpolation, the number of observations is relatively low. The poverty headcount ratio is a relative measure of poverty and is, therefore, better for cross-country analysis than absolute measures of poverty. Furthermore, the choice of $1.90 a day poverty line is most suitable for capturing extreme poverty in developing countries. As mentioned afore, this is a narrow measure of poverty and does not capture the multidimensionality of the concept. Despite its limitations, the poverty headcount ratio is chosen because of the higher data availability of monetary than multidimensional poverty measures. Moreover, the monetary measurement allows for a more equivalent assessment of the independent variables.

4.2.3 Control variables

The choice of control variables is based on growth theories and the existing literature on the relationship between inequality and economic growth. The data for the average years of education is provided by the World Bank Education Statistics (2020a) and the data for the price level of investments is provided by the Penn World Table 9.1 (Feenstra, Inklaar & Timmer, 2015). Data for all other control variables is provided by the World Bank Development Indicators (2020b).

The average years of education completed among the population over the age of 25 is included as a measure of human capital. This measure is chosen because accumulated human capital measures are argued to be more accurate than variables that measure the flow of expenditure into education (Barro, 1991). Furthermore, the variable is representative of current, rather than future, human capital accumulation. Human capital is recognised as a determinant of growth in several theoretical models, including the Lucas model of endogenous growth and variations of the Solow growth model (Lucas, 1988; Mankiw, Romer & Weil, 1992). The average in years of education and economic growth are predicted to have a positive relationship. Inflation, as measured by the consumer price index, is included to account for macroeconomic stability. Inflation has been included as a control variable in previous empirical studies and is expected to have a negative impact on economic growth (Iradian, 2005; Lopez & Servén, 2009; Clarke, 1993). The population growth rate is used as a control variable as it has been argued to be a determinant of growth in the Solow growth model (Solow, 1956). The model explains a negative relationship between the population growth rate and economic growth. Another crucial factor in the Solow (1956) model is investment, which is in this thesis proxied for by the gross capital formation as a percentage of GDP. According to the Solow model (1956), increasing investments have a positive effect on economic growth. Moreover, the role of investments for growth is emphasized in the credit constraint theories (Galor & Zeira, 1993) as well as the classical view regarding the impact of inequality (Keynes, 1920; Kaldor, 1957; Bourguignon, 1981). Finally, the price level of capital formation (at constant 2011 $US) is included as a control variable. The price level of capital formation is used as a proxy for market distortions, as also used by Forbes (2000). Market distortions are expected to have a negative effect on economic growth, as found in existing research.

5 Methodology

To estimate the effects of income inequality and poverty on growth, three different empirical panel models are explored. First, a pooled ordinary least squares (OLS) method with and without dummy variables for time and continents is estimated. Second, a panel fixed effects estimator is used to capture unobserved heterogeneity in the data. Third, a system generalised method of moments (GMM) is used to estimate the effects of income inequality and poverty on economic growth. The five-year average panels are used for all estimation methods. The use of five-year averages allows for the estimation of short to medium-term effects of the variables. The estimation of long-term effects would also have been of interest but is unfeasible because of insufficient data.

5.1 Baseline specification

The formation of the baseline equation is similar to several existing empirical papers that estimate the effects of inequality on economic growth (see for instance Deininger & Squire, 1998; Forbes, 2000; Iradian, 2005). The effects of inequality and poverty on economic growth are estimated with the following baseline equation.

Equation 1.

$$Growth_{it} = \beta_0 + \beta_1 Gini_{it} + \beta_2 Poverty_{it} + \beta_3 X_{it} + \varepsilon_{it}$$

In equation 1, $Growth_{it}$ denotes the GDP per capita growth rate of country i at the time t, Gini denotes the Gini index of country i at the time t and Poverty denotes the poverty headcount ratio in country i at the time t. X_{it} represents the control variables, including the average years of education, inflation, population growth, gross capital formation, price level of capital formation and the lagged GDP per capita growth for each country i at the time t. The model is therefore dynamic. Additionally, dummy variables for continents and years will be included in some of the estimations. First, the pooled OLS method will be used to estimate equation 1.

The Hausman test was conducted to guide in the decision between the panel fixed effects and random effects models. The Hausman test is used to determine if the individual error terms are correlated with the explanatory variables (Wooldridge, 2013, p. 496). The results indicate that the null hypothesis could not be rejected, and the use of random effects model is, therefore, recommended. However, the random effects model requires that the unobserved effects are uncorrelated with the explanatory variables (Wooldridge, 2013, p. 492). This requirement is unlikely to be met in this sample because of the plausibility of country specific effects that affect the income distribution and the control variables of each country. This cautiousness against using the random effects model is strengthened by the use of the fixed

effects model in previous empirical research. The panel fixed effects model is hence chosen. The fixed effects model also corrects for the possible attrition bias in the unbalanced panel data (Wooldridge, 2013, p. 491). If the reason for missing data and consequent attrition is correlated with the error term, this will result in biased results in the pooled OLS estimation. The attrition is possibly correlated with higher poverty and inequality rates, which would cause the coefficients of the variables to be upward biased. However, this bias is corrected by using the fixed effects model, which allows for correlation between attrition and the error term.

The Wooldridge test for autocorrelation was performed to assess whether the data is serially correlated. The null hypothesis was rejected, and therefore the standard errors were clustered in both the fixed effects and the pooled OLS estimations to correct for the bias (Wooldridge, 2013, p. 483). The Wald test was performed to test for heteroscedasticity in the data. However, the test is unreliable in samples with few time periods and a large number of individuals, such as the sample used in this thesis. Although the Wald test did not indicate heteroscedasticity, the clustered standard errors also correct for possible heteroscedasticity in the data.

5.2 The Generalized Method of Moments

The generalised method of moments (GMM) estimation methods by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998) are suitable for samples with few time periods and a large number of individuals, as the sample in this thesis. Moreover, they are suitable for dynamic linear models where the independent variables are not strictly exogenous and the data includes fixed individual effects, autocorrelation and heteroscedasticity within individuals but not across them (Roodman, 2009). The difference GMM by Arellano and Bond (1991) transforms the independent variables, often through differencing, and uses them in the GMM model. The system GMM is a further development of the difference GMM where an additional set of moment conditions are used (Arellano & Bover, 1995; Blundell & Bond, 1998). The system GMM therefore uses both the original equation and the transformed equation. The method relies on the assumption that the first differences of the independent variables are uncorrelated with the fixed effects. To determine between the use of the difference and system GMM, the guidelines by Bond, Hoeffler and Temple (2001) were used. The difference GMM results suggested that the coefficients were downward biased, and thus the system GMM was chosen. Furthermore, the system GMM performs better with unbalanced panel data, as the data in this thesis. The complexity of the system GMM should be recognized and the results should therefore be interpreted with caution (Roodman, 2009).

Two main criteria for achieving efficient estimation results with the system GMM are that there is no second-order serial correlation and that the instruments have over-identified restrictions and are thus valid (Roodman, 2009). The Arellano-Bond test is conducted to test for autocorrelation in the error terms. Second-order correlation in the first differences can be rejected according to the test. The Sargan-Hansen tests for over-identifying restrictions

indicate that the instruments are robust but relatively weak. However, the tests have weaknesses and should not be considered as absolute answers. The data is considered to fit the criteria of exogenous instruments without second-order serial correlation and is thus suitable for the system GMM method.

6 Empirical Analysis

6.1 Results

The results from the pooled OLS and panel fixed effects models are presented in table 2. Columns one, two, and three present the results from the pooled OLS model, the second column including continent dummies and third including time dummies. Columns four, five, and six present the results from the fixed effects model, the fifth column including continent dummies and sixth including time dummies. The coefficient for the Gini index is negative in the pooled OLS estimations, but statistically significant at the 10% level only in the first and third column. The coefficient ceases to be significant in the second column when the continent dummies are included. The panel fixed effects estimations, although not statistically significant, also estimate a negative coefficient for the Gini index. Overall, the results in table 2 indicate some evidence of a weak negative effect of income inequality on economic growth. However, the relationship might be connected to more specific country or regional fixed effects. The coefficient for poverty is negative in all estimations except the sixth column but is not statistically significant in any of the estimations. In other words, table 2 does not provide evidence for an effect of poverty on GDP per capita growth in the short to medium-term.

The coefficients for the average years of education and inflation have varying signs and are not statistically significant. Population growth was found to have a negative effect on growth in all models but was significant only in the fixed effects models. The gross capital formation has a positive and statistically significant coefficient at the 5% level in all columns. This indicates a positive relationship between investments as a share of GDP and economic growth. The price level of capital formation, used as a proxy for market distortions, is statistically significant in all estimations in table 2. The results thus suggest a negative relationship between market distortions and GDP per capita growth in developing countries. The coefficient of the lagged dependent variable varies in its sign but is only statistically significant in the pooled OLS models where the coefficient is positive. The generally low number of observations is due to missing data in the data set and should be recognized as a weakness in the reliability of the results.

Table 2. Results from the pooled OLS and fixed effects estimation of the dependent variable GDP per capita growth.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OLS	OLS	OLS	FE	FE	FE
Gini index	-0.0544**	-0.0426	-0.0519**	-0.0120	-0.0120	-0.0108
	(0.0210)	(0.0359)	(0.0204)	(0.0287)	(0.0287)	(0.0305)
Poverty headcount ratio	-0.00375	-0.00533	-0.00162	-0.00712	-0.00712	0.000967
	(0.00977)	(0.0111)	(0.00967)	(0.00983)	(0.00983)	(0.0150)
Average years of education	0.0185	-0.00484	0.0400	0.0249	0.0249	0.0369
	(0.0954)	(0.0999)	(0.0944)	(0.134)	(0.134)	(0.155)
Inflation	0.0108	0.00964	0.0215	-0.0293	-0.0293	-0.0165
	(0.0228)	(0.0232)	(0.0197)	(0.0241)	(0.0241)	(0.0246)
Population growth	-0.312	-0.177	-0.284	-0.781**	-0.781**	-0.604*
	(0.290)	(0.369)	(0.288)	(0.294)	(0.294)	(0.357)
Gross capital formation	0.0675**	0.0667**	0.0678**	0.0741**	0.0741**	0.0708**
	(0.0297)	(0.0271)	(0.0298)	(0.0311)	(0.0311)	(0.0305)
Price level of capital formation	-1.754**	-1.760***	-1.646**	-2.497**	-2.497**	-2.171*
	(0.672)	(0.648)	(0.675)	(0.954)	(0.954)	(1.156)
Lagged GDP per capita growth	0.168***	0.164**	0.157**	-0.0193	-0.0193	-0.0436
	(0.0620)	(0.0652)	(0.0687)	(0.0660)	(0.0660)	(0.0647)
Constant	4.234***	4.720**	3.719**	4.439**	4.439**	3.463*
	(1.502)	(1.807)	(1.514)	(1.803)	(1.803)	(1.880)
Observations	172	172	172	172	172	172
R-squared	0.401	0.407	0.427	0.214	0.214	0.241
Number of countries				46	46	46
Time dummies	No	No	Yes	No	No	Yes
Continent dummies	No	Yes	No	No	Yes	No

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3 presents the results from the system GMM estimation. The first column is without any dummy variables, the second column includes continent dummies, the third column includes time dummies and the fourth column includes both continent and time dummies. The Gini index has a negative and statistically significant coefficient in columns one and three at a 10% level. However, when the continent dummies are introduced, the significance ceases although the sign is still negative. This indicates a weak negative relationship between income inequality and GDP per capita growth, alike the results in table 2. The poverty headcount ratio has a negative coefficient but is not found to be statistically significant in any of the estimations, similarly to table 2. Overall, the estimations in tables 2 and 3 indicate a weak negative effect of the Gini index, but no statistically significant effect of poverty on economic growth in the short to medium-term.

The average years of education, inflation, and population growth are not found to be statistically significant in table 3. The gross capital formation has a positive and statistically significant coefficient at the 1% level in all columns, supporting the results of table 2. Increased investments appear to have a positive effect on economic growth. Likewise, the price level of capital formation has a negative and statistically significant coefficient at the 1% or 5% level, alike the results of table 2. The evidence from tables 2 and 3 suggest that market distortions have a negative effect on economic growth. The lagged dependent variable is found to have a statistically significant and negative effect on GDP per capita growth. This is contradicting to the positive coefficients obtained in table 2.

Table 3. Results from the system GMM estimation of the dependent variable GDP per capita growth.

VARIABLES	(1) GMM	(2) GMM	(3) GMM	(4) GMM
Gini index	-0.0711**	-0.0597	-0.0761**	-0.0500
	(0.0283)	(0.0460)	(0.0302)	(0.0471)
Poverty headcount ratio	-0.00630	-0.00874	-0.000200	-0.00272
	(0.0113)	(0.0132)	(0.0120)	(0.0134)
Average years of education	0.0228	-0.0245	0.00958	-0.0118
	(0.118)	(0.133)	(0.126)	(0.131)
Inflation	-0.0160	-0.0123	0.0102	0.00932
	(0.0288)	(0.0303)	(0.0296)	(0.0293)
Population growth	-0.458	-0.222	-0.384	-0.189
	(0.345)	(0.437)	(0.358)	(0.424)
Gross capital formation	0.113***	0.116***	0.113***	0.107***
	(0.0340)	(0.0303)	(0.0335)	(0.0287)
Price level of capital formation	-1.770**	-2.133***	-2.309***	-2.109***
	(0.868)	(0.734)	(0.763)	(0.648)
Lagged GDP per capita growth	-0.245***	-0.242***	-0.273***	-0.283***
	(0.0863)	(0.0865)	(0.0806)	(0.0844)
Constant	5.251***	4.412	0	0
	(1.768)	(2.721)	(0)	(0)
Observations	172	172	172	172
Number of countries	46	46	46	46
Time dummies	No	No	Yes	Yes
Continent dummies	No	Yes	No	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

6.2 Sensitivity Analysis

To test the sensitivity of the results, alternative measures of income inequality and poverty are introduced. The income share held by the highest 10% and 20% of the population and the Palma ratio are used as alternative measures of income inequality. The income share held by the richest 10% and 20% are chosen because of the use in previous literature and the alarming view regarding the increasing income share held by the absolute richest. The data for the income shares held by the highest decile and quintile are provided by the World Bank (2020b). The Palma ratio measures the ratio of the income or consumption concentration by the richest 10% of the population divided by the poorest 40% of the population (Cobham, Schlogl & Sumner, 2015). It is based on the Palma Proposition, which argues that the income or consumption share held by the middle is relatively stable across time and countries. Thus, the first four and the tenth deciles are the most explanatory for the changes in inequality and should be focused on to understand trends in inequality (Cobham, Schlogl & Sumner, 2015). A larger Palma ratio indicates a higher incidence of inequality. The data for the Palma ratio is provided by the UNU-WIDER (2020). Alike the Gini index, the coefficients of the alternative inequality measures are expected to be negative, as predicted in the hypothesis.

The income shares held by the poorest 10% and 20% as well as the poverty headcount ratio at $3.20 a day (2011 international prices, PPP adjusted) are chosen as alternative measures for poverty. The data for all alternative measures of poverty is provided by the World Bank (2020b). The lowest income shares are chosen to capture poverty from a different angle, looking at the income share held by a certain share of the population rather than the share of the population that has a certain income. Considering the descriptive statistics and the low- or lower-middle-income classification of the countries in the sample, it is likely that these segments include high shares of poverty. The higher poverty line at $3.20 a day was chosen to capture a larger share of poverty instead of capturing only the extreme poverty. While the poverty headcount ratio at $3.20 a day is expected to yield similar results as the previously used poverty line measure, the income shares held by the lowest 10% and 20% are instead expected to have a positive coefficient sign in accordance with the hypothesis. The opposite coefficient is expected for the lowest 10% and 20% because a higher income share implies less poverty, and hence the effect on economic growth should be positive according to the hypothesis. Only the results regarding the alternative measures of income inequality and poverty, and not the control variables, are discussed below.

Table 4 presents the results using the income shares held by the highest and lowest deciles as the independent variables in the pooled OLS and fixed effects models. The income share held by the highest 10% has a positive coefficient in all columns but is not statistically significant. Similarly, the coefficient of the income share held by the lowest 10% is positive but statistically insignificant. The results using the income shares of the highest and lowest quintiles are presented in appendix C for clarity in the text. The results using the highest and lowest 20% are highly similar to the results in table 4, with positive but statistically insignificant results for both the highest and lowest quintiles. These results further indicate that the robustness of the negative effect of inequality on economic growth is weak.

Furthermore, the statistically insignificant effect of poverty on economic growth is maintained.

Table 4. Results from the pooled OLS and panel fixed effects estimation using the income shares held by the top and bottom 10% as the independent variables.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OLS	OLS	OLS	FE	FE	FE
Income share held by highest 10 %	0.0106	0.00129	0.0201	0.0548	0.0548	0.0570
	(0.0737)	(0.0778)	(0.0737)	(0.0588)	(0.0588)	(0.0697)
Income share held by lowest 10 %	0.457	0.257	0.508	0.0757	0.0757	0.0461
	(0.373)	(0.382)	(0.380)	(0.374)	(0.374)	(0.447)
Average years of education	0.0440	0.0149	0.0619	0.0441	0.0441	0.0183
	(0.0985)	(0.102)	(0.0985)	(0.125)	(0.125)	(0.153)
Inflation	-0.00583	-0.00648	-0.00407	-0.0323***	-0.0323***	-0.0279***
	(0.00642)	(0.00648)	(0.00754)	(0.00504)	(0.00504)	(0.00566)
Population growth	-0.359	-0.193	-0.313	-0.859***	-0.859***	-0.661*
	(0.225)	(0.251)	(0.231)	(0.298)	(0.298)	(0.348)
Gross capital formation	0.0764**	0.0730**	0.0776**	0.0827***	0.0827***	0.0761**
	(0.0319)	(0.0298)	(0.0315)	(0.0297)	(0.0297)	(0.0286)
Price level of capital formation	-1.803***	-1.771***	-1.631**	-2.718***	-2.718***	-2.433**
	(0.623)	(0.576)	(0.631)	(0.996)	(0.996)	(1.130)
Lagged GDP per capita growth	0.153**	0.158**	0.138*	-0.0179	-0.0179	-0.0478
	(0.0740)	(0.0727)	(0.0802)	(0.0649)	(0.0649)	(0.0653)
Constant	0.319	0.796	-0.494	1.751	1.751	1.301
	(3.858)	(4.042)	(3.976)	(3.040)	(3.040)	(3.403)
Observations	174	174	174	174	174	174
R-squared	0.385	0.395	0.412	0.255	0.255	0.287
Number of countries				46	46	46
Time dummies	No	No	Yes	No	No	Yes
Continent dummies	No	Yes	No	No	Yes	No

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5 presents the results for the pooled OLS and panel fixed effects model estimations using the Palma ratio and the poverty headcount ratio at $3.20 a day as alternative measures of income inequality and poverty. The Palma ratio has a negative coefficient in all estimations, but is statistically significant only in columns one, three, four and five. It ceases to be significant in the pooled OLS model when the continent dummies are used, similarly to tables 2 and table 3. In the fixed effects estimation, it becomes insignificant when the time dummies are included. The estimations using the Palma ratio thus provide some evidence for the previously found weak negative effect of income inequality on GDP per capita growth. However, these results, alike the previous estimations, are not robust. The coefficient for the poverty headcount ratio at $3.20 a day is positive in all columns except for columns four and five but is statistically insignificant in all. These statistically insignificant results are similar to those obtained in tables 2 and 3. Positive coefficients for poverty have, however, not been obtained previously. Thus, the sensitivity analysis of the pooled OLS and panel fixed effects models in tables 4 and 5 indicate that there is no robust effect of poverty on GDP per capita growth. Income inequality, on the other hand, shows some robustness when using the Palma ratio as the independent variable.

Table 5. Results from the pooled OLS and panel fixed effects estimation using the Palma ratio and the poverty headcount ratio at $3.20 a day as independent variables.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OLS	OLS	OLS	FE	FE	FE
Palma ratio	-0.270***	-0.216	-0.223**	-0.174*	-0.174*	-0.136
	(0.0969)	(0.129)	(0.0944)	(0.0969)	(0.0969)	(0.105)
Poverty headcount ratio at $3.20	0.00354	0.00163	0.00513	-0.00276	-0.00276	0.00415
	(0.00697)	(0.00760)	(0.00703)	(0.00791)	(0.00791)	(0.0146)
Average years of education	0.0276	-0.00117	0.0512	0.0315	0.0315	0.0413
	(0.0919)	(0.0926)	(0.0919)	(0.136)	(0.136)	(0.158)
Inflation	0.00114	-0.000367	0.0122	-0.0273	-0.0273	-0.0154
	(0.0244)	(0.0245)	(0.0209)	(0.0259)	(0.0259)	(0.0267)
Population growth	-0.468*	-0.306	-0.443	-0.775**	-0.775**	-0.598
	(0.277)	(0.339)	(0.279)	(0.314)	(0.314)	(0.383)
Gross capital formation	0.0738**	0.0720**	0.0722**	0.0748**	0.0748**	0.0701**
	(0.0328)	(0.0300)	(0.0331)	(0.0301)	(0.0301)	(0.0298)
Price level of capital formation	-1.683**	-1.613**	-1.633**	-2.295**	-2.295**	-2.040*
	(0.685)	(0.641)	(0.694)	(1.029)	(1.029)	(1.187)
Lagged GDP per capita growth	0.176**	0.167**	0.171**	-0.0159	-0.0159	-0.0320
	(0.0728)	(0.0759)	(0.0773)	(0.0674)	(0.0674)	(0.0620)
Constant	2.506**	3.382***	2.121*	4.119***	4.119***	2.993*
	(1.111)	(1.081)	(1.247)	(1.251)	(1.251)	(1.580)
Observations	168	168	168	168	168	168
R-squared	0.405	0.413	0.428	0.226	0.226	0.253
Number of countries				45	45	45
Time dummies	No	No	Yes	No	No	Yes
Continent dummies	No	Yes	No	No	Yes	No

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6 presents the system GMM results using the various alternative measures of income inequality and poverty. The first three columns estimate the effects of the income shares of the top and bottom 10% on economic growth with and without time and continent dummies. Columns four to six estimate the effects of the Palma ratio and the poverty headcount ratio at $3.20 a day with and without time and continent dummies. The results from using the income shares of the top and bottom 20% with and without time and continent dummies are presented in appendix D for clarity in the text. The results are highly similar to the results obtained using the highest and lowest deciles in table 6. The coefficient for the income share held by the highest 10% is negative and statistically significant only in column two, where the continent dummies are included. In columns one and three the effect is positive but not statistically significant. The Palma ratio has a negative coefficient in all three columns but is only statistically significant in column one where no dummies are included. The GMM estimation therefore gives limited support for the robustness of the previously found weak negative effect of income inequality on economic growth.

The income share held by the lowest 10% is found to have a statistically significant effect on economic growth in all columns. In columns one and three the effect of the income share held by the lowest decile is positive. However, in column two, where continent dummies are included, the effect is instead negative and relatively large in size. These results indicate a non-robust relationship between the income share held by the bottom of the income distribution and economic growth. Similarly, the poverty headcount ratio at $3.20 a day has a varying coefficient sign in columns three to six. The coefficient is not statistically significant in any of the estimations. The insignificance of the poverty coefficient is in line with the previous findings when using the poverty line of $1.90 a day. Overall, table 6 presents ambiguous results for both income inequality and poverty and no clear evidence regarding the effects on GDP per capita growth of either variable can be concluded.

Table 6. Results from the system GMM estimation using the income shares held by the top and bottom 10%, the Palma ratio and the poverty headcount ratio at $3.20 a day as the independent variables

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	GMM	GMM	GMM	GMM	GMM	GMM
Income share held by highest 10 %	0.0303	-0.681*	0.0637			
	(0.0769)	(0.341)	(0.0771)			
Income share held by lowest 10 %	0.818*	-4.342*	1.044**			
	(0.423)	(2.458)	(0.437)			
Palma ratio				-0.421*	-0.365	-0.375
				(0.222)	(0.277)	(0.267)
Poverty headcount ratio $3.20				0.0369	-0.00451	0.0515
				(0.0247)	(0.0131)	(0.0837)
Average years of education	0.0604	-0.141	0.0383	0.111	-0.0452	0.124
	(0.119)	(0.186)	(0.132)	(0.148)	(0.131)	(0.273)
Inflation	-0.0221***	-0.00779	-0.0154*	-0.0392	-0.0254	-0.0241
	(0.00703)	(0.0584)	(0.00851)	(0.0334)	(0.0330)	(0.0460)
Population growth	-0.539*	0.363	-0.424	-1.003***	-0.332	-1.161
	(0.292)	(0.624)	(0.298)	(0.364)	(0.443)	(1.153)
Gross capital formation	0.125***	0.0599	0.126***	0.133***	0.120***	0.125**
	(0.0357)	(0.0601)	(0.0317)	(0.0417)	(0.0322)	(0.0537)
Price level of capital formation	-1.854**	-3.959***	-2.023***	-1.296	-1.881**	-1.593
	(0.893)	(1.426)	(0.683)	(1.178)	(0.811)	(1.313)
Lagged GDP per capita growth	-0.268***	-0.151	-0.308***	-0.189**	-0.246***	-0.212***
	(0.0931)	(0.136)	(0.0795)	(0.0794)	(0.0879)	(0.0671)
Constant	-1.106	35.49**	-4.012	1.210	2.957	0
	(4.110)	(17.57)	(4.248)	(2.461)	(1.785)	(0)
Observations	174	172	174	168	168	168
Number of countries	46	46	46	45	45	45
Time dummies	No	No	Yes	No	No	Yes
Continent dummies	No	Yes	No	No	Yes	No

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

7 Discussion

The first hypothesis predicted income inequality to have a positive effect on economic growth in developing countries. The hypothesis is based on the unified model of growth by Galor (2000), which argues that the positive effect is caused by the higher propensity to save by the rich and the consequent increase in investments. The positive effect dominates in developing countries, where the growth process is driven by capital accumulation. Moreover, the empirical studies by Forbes (2000) and Iradian (2005) laid a foundation for the hypothesis, as they estimated a positive short to medium-run effect of inequality on economic growth. On the contrary, the results of this thesis indicate a weak negative effect of the Gini index on GDP per capita growth in the pooled OLS and GMM estimations. Because of the use of five-year average panels in the estimation, the results should be considered in the short to medium-term. The negative results are in line with previous research by Alesina and Rodrik (1994), Clarke (1995), and Deininger and Squire (1998), which estimated a long-run effect of inequality on growth. Hence, the results of this thesis strengthen their findings by also establishing a short to medium-run negative effect. When the continent dummies are introduced to the model, the coefficient for income inequality ceases to be significant, similarly to the results by Deininger and Squire (1998). According to Deininger and Squire (1998), this suggests that the effect of income inequality consists instead of regional-specific effects that affect economic growth. These regional-specific characteristics can be, but are not necessarily, linked to income inequality. The results of this thesis indicate further evidence for this theory. Thus, regional characteristics may be more explanatory for the growth rate of a country than changes in the Gini index.

The sensitivity analysis shows that the weak negative effect of income inequality on economic growth is not robust. The positive effects of the income share held by the highest 10 and 20% are in line with the hypothesis but contradict the original results obtained using the Gini index. The coefficients for the income shares held by the highest 10 and 20% are statistically insignificant. Estimations using the Palma ratio yield similar results to the Gini index, indicating a negative but non-robust impact on growth. The reason for the contradictory results might lie in the differences in what the different inequality measures capture. The Gini index and the Palma ratio capture the income distribution in a more comprehensive matter than the highest 10% and 20%, which only capture changes in income inequality among the richest. Because of the weak statistical significance of the negative relationship, conclusions should be drawn with caution. The ambiguity of the results highlights the contradicting theoretical and empirical effects of inequality in the existing research. The effect of income inequality on economic growth may be undetectable or contradicting in the existing empirical research because of the opposing forces of positive and negative impacts. Which of these forces dominates could also be regional or country-specific, as suggested by the introduction of the continent dummies in this paper and by Deininger and Squire (1998). Moreover, in comparison to the existing research, contemporary, rather than initial values of the Gini index, are used to estimate growth. The different use of the variables

can contribute to the lack of robustness of the results. Overall, the results of the thesis do not provide evidence for the first hypothesis.

The second hypothesis anticipated a negative effect of poverty on economic growth in developing countries. The hypothesis is based on the poverty trap theory, where those living in poverty have a lower possibility of increasing their income than those with a higher initial income (Banerjee & Duflo, 2011). The results indicate no statistically significant effect of poverty on GDP per capita growth in the short to medium-run, although the coefficient sign is always negative. Thus, the results do not support the previous findings by Lopez and Servén (2009) who found poverty to have a negative and robust effect on economic growth even when controlling for inequality. The sensitivity analysis somewhat contradicts the initial findings, as the income share of the bottom 10% and 20% are found to have a statistically significant effect on growth in the GMM estimations. However, due to the varying coefficient sign, the insignificance of the pooled OLS and fixed effects estimations, and the lack of significant results using the poverty headcount measures, the results cannot be considered to be robust. Overall, the results do not indicate poverty to affect GDP per capita growth in the short to medium-run and thus do not provide evidence for the hypothesis.

Ravallion (2012) discusses the conditionality of the results he obtained when estimating the effects of initial inequality and initial poverty on growth. According to his results, countries with a higher poverty rate have lower growth rates, but only when controlling for the mean income. It is, therefore, possible that the effects of poverty are conditional on the mean income level of the country. This theory possibly coincides with the conditional convergence theory (Abramovitz, 1986), if social capabilities and the mean income level are correlated. This could explain the lack of statistically significant results regarding poverty. Conditional convergence or the mean level of income were, however, not tested in this thesis. Furthermore, the existence of multiple dynamic equilibria poverty traps was not tested in this thesis although it has been discussed in previous literature (see for instance McKay & Perge, 2013). It is, therefore, possible that poverty traps exist in different forms, but could not be detected in this linear model that assumed a stable poverty trap. The lack of statistically significant results is surprising because they contradict the hypothesis based on theory and previous empirical research. Thus, the results should be interpreted with caution. In this line, a cautious conclusion would be that countries with higher poverty rates have neither a disadvantage nor an advantage in achieving economic growth.

Investments, measured as the gross capital formation as a percentage of GDP, are found to have a positive and statistically significant effect on growth in all models. The results, therefore, imply that investments contribute to higher GDP per capita growth. The level of investments made in an economy is affected by the level of inequality and poverty, as discussed in the theories regarding credit constraints (Galor & Zeira, 1993; Banerjee & Duflo, 2011). The effects of income inequality and poverty on growth can, therefore, indirectly be captured in the coefficient. Furthermore, market distortions, measured as the price level of capital formation, were negative and robust in all models. Similar results were obtained by Forbes (2000). Market distortions are another possible channel through which inequality and poverty affect economic growth. Market distortions may be unfavourable for the poor, thus creating a disadvantage in economic participation and lowering their profitability. It is

possible that the effects of poverty and inequality are indirectly captured in these coefficients, reducing the statistical significance of the Gini index and the poverty headcount ratio.

The third hypothesis predicted poverty to have a larger effect than income inequality on economic growth. The results do not provide evidence for this hypothesis. On the contrary, the results suggest that income inequality affects economic growth more than poverty. However, due to the sensitivity of the results, conclusions should be drawn with caution. The overlap of the two concepts should be considered when interpreting the results. As Bourguignon (2004) discusses, changes in poverty are affected by changes in the relative income distribution. Similarly, the Gini index captures changes in poverty, and the inclusion of both measures can therefore weaken the significance of the coefficients. Inequality and poverty are also found to have similar channels through which they affect growth in the theoretical models, further magnifying the overlap. Moreover, the effects of the two concepts may be conditional on one another. According to Ravallion (2012), high initial inequality affects growth only when it includes a high share of initial poverty. Similarly, a small middle class causes a disadvantage in achieving growth, but only when controlling for poverty (Ravallion, 2012). It is, therefore, possible that income inequality and poverty affect economic growth only in the presence of one another.

The results of the study should not be generalized to a longer time frame or outside of the developing world, as the effects of income inequality and poverty can vary depending on the context. Overall, the results suggest a weak negative effect of income inequality on economic growth. Poverty, on the other hand, is not found to affect economic growth. Thus, in the short to medium-run, income inequality has a larger effect than poverty on GDP per capita growth.

7.1 Limitations

The sensitivity of income inequality and poverty in the estimations highlights the variety in income distribution measures, as also discussed by Iradian (2005). There are several other measures of the two concepts that might yield different results, depending on which shares of the income distribution are focused on. Some of the measures may capture different mechanisms that affect growth, thus producing different results. The use of the narrow monetary definitions of income inequality and poverty do not allow for a comprehensive evaluation of the effects. Moreover, the choice of period length, countries, and control variables likely shape the results, as also illustrated in the ambiguity of the results obtained in the existing empirical research. Although the model was constructed to include an accurate portrayal of the determinants of GDP per capita growth, it is possible that it is not correctly specified and can suffer from omitted variable bias. Some of the possible bias was reduced by using the fixed effects model and the GMM, but not everything can be captured in them. Furthermore, all models are linear and can, therefore, not capture the nonlinear effects of income inequality and poverty.

The availability of data from developing countries limits the study. The time frame prohibits long-term estimation of the effects, although this would have been of interest to investigate.

The long-term results may differ significantly from the results obtained in this thesis, as illustrated in the existing empirical research. Furthermore, the availability of data forms the set of countries included. The data may suffer from attrition bias, as discussed in the data and methodology sections. However, this should be corrected through the use of the fixed effects and GMM models. Finally, the linear interpolation used to reduce gaps in the sample can give false values for the variables. The assumption of a linear trend will not capture any unexpected shocks or non-linear trends in the variables. The use of interpolation is motivated by the relative stability in the Gini index and the poverty headcount ratio variables over time and the use of the five-year average panels that aim to reduce short-run fluctuation. Thus, the risk of incorrect interpolated values is considered to be relatively low.

8 Conclusion

8.1 Research Aims and Objectives

The aim of the thesis was to compare the effects of income inequality and poverty on economic growth. Previous studies have focused on the effects of inequality on growth but found ambiguous results (Alesina & Rodrik, 1994; Clarke, 1995; Forbes, 2000). The few studies focusing on the effects of both initial inequality and poverty found poverty to have a higher impact (Lopez & Servén, 2009; Ravallion, 2012). This thesis investigates the relationships further and focuses on the contemporary changes in income inequality and poverty instead of initial values. Furthermore, more recent data has become available for use than what has been used in previous empirical research. The following research questions were formulated: how do income inequality and poverty affect economic growth? And, does poverty have a stronger effect on economic growth compared to income inequality? Understanding the impacts of income distribution on growth is helpful for evaluating the policies regarding income inequality and poverty in developing countries. The thesis explored the questions through empirical research using cross-country regressions of five-year average panels which estimate the short to medium-run relationship between the variables. The data consists of 46 developing countries between 1980 and 2018. Three hypotheses were formulated based on the theoretical frameworks and the existing research: 1) income inequality has a positive effect on economic growth, 2) poverty has a negative effect on economic growth, and 3) poverty has a larger effect than income inequality on economic growth.

The results of the thesis indicate a weak negative effect of the income inequality on GDP per capita growth, which is contradictory to the first hypothesis. The results' significance ceases as the continent dummies are introduced, suggesting regional-specific effects of income inequality. Similar results were obtained by Deininger and Squire (1998). The sensitivity analysis reveals that the negative relationship is not robust. The sensitivity of the results is not unexpected because of the debate regarding both the positive and negative effects of inequality in the theoretical frameworks as well as the ambiguous results of the existing empirical research. It is thus possible that the sum of the contradictory forces creates an insignificant overall effect on growth. Whether the positive or negative effects of income inequality on growth dominates could also be regional- or country-specific.

The results do not indicate a statistically significant effect of poverty on GDP per capita growth. Although the coefficients are negative in all estimations, they are not statistically significant. The sensitivity analysis generated contradicting results, including both positive and negative coefficients for the income shares held by the lowest 10% and 20%. The results contradict the second hypothesis as well as the previous research by Lopez & Servén (2009),

who found poverty to have a negative and robust effect on economic growth. The results should, therefore, be interpreted with caution. It is possible that the poverty traps are not static, as estimated in this thesis, or are conditional on the mean income level.

Finally, the results do not provide evidence for the third hypothesis. On the contrary, the results suggest income inequality to affect economic growth more than poverty. However, due to the sensitivity of the results, no robust conclusions can be drawn. The non-robust results may partially be caused by the overlap of the two concepts. Moreover, the theoretical frameworks identified similar channels through which inequality and poverty affect growth. Thus, the separate effects of each are difficult to distinguish in empirical research. Previous studies have found the two concepts to affect growth only conditionally on one another, which could be a reason for the insignificant results in this study. Furthermore, the scarcity of previous research should be considered, as there is to the author's knowledge only two studies of a similar kind to compare the results to.

8.2 Practical Implications

The reduction of income inequality and poverty are seen as valuable targets according to the SDGs. While poverty reduction is more accepted as a fundamental objective, the optimal level of income inequality is a more controversial topic because of its political nature. The conclusions of the thesis are only evaluated considering the impacts on economic growth and not through a political lens. The practical implications of the study are limited because of the lack of robust results. The results provide some evidence for the economic benefits of income inequality reduction in developing countries. Thus, countries with lower income inequality may experience higher GDP per capita growth rates. Country or regional characteristics may affect the impact income inequality has on growth, which decreases the credibility of universal implications. Due to the political nature of the topic, no general recommendations can be given regarding what is a desirable level of income inequality. However, the results suggest that policies for inequality reduction may accelerate economic growth. The lack of significant effects of poverty suggests that poverty reduction does not have an additional benefit on the economy through economic growth. The results neither indicate poverty reduction to be a hinder for economic growth. Hence, poverty reduction policies are not found to impact the achievement of economic growth in developing countries.

8.3 Future Research

The lack of available data prohibited the estimation of long-term relationships in this thesis. Such investigation could be conducted in future research as data becomes available. This is of interest because of the previously found change in the effect of inequality depending on the panel length. Future research could thus contribute to the debate, as well as explore the long-term effects of other income distributional measures, including poverty. Furthermore, the regional-specific effects suggested to affect income inequality in this thesis and previously by

Deininger and Squire (1998) could be further explored in future research. Comprehending the regional effects of income distribution would be beneficial for a more accurate description of the relationships and the contradictory positive and negative effects in a practical context.

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Appendix A

Bangladesh

Benin

Bhutan

Bolivia

Burkina Faso

Burundi

Cabo Verde

Cameroon

Central African Republic

Comoros

Congo, Dem. Rep.

Congo, Rep.

Djibouti

Egypt, Arab Rep.

El Salvador

Ethiopia

Gambia

Ghana

Guinea-Bissau

Haiti

Honduras

India

Indonesia

Kyrgyz Republic

Lao PDR

Lesotho

Madagascar

Malawi

Mali

Moldova

Mongolia

Morocco

Nepal

Nicaragua

Nigeria

Pakistan

Philippines

Rwanda

Senegal

Sudan

Syrian Arab Republic

Tanzania

Togo

Tunisia

Uganda

Vietnam

Appendix B

Table 7. Descriptive statistics for the annual data

Variable	Obs.	Mean	Std. Dev.	Min	Max
GDP per capita growth	1,697	1.65	4.68	-47.50	37.54
Gini index	406	41.26	9.07	24.10	69.20
Poverty headcount ratio	344	27.60	23.59	0	94.10
Average years of education	273	3.27	2.34	0	11.34
Inflation	1,592	42.65	678.89	-18.11	23773.13
Population growth	1,794	2.23	1.06	-6.77	8.12
Gross capital formation	1,608	22.56	10.48	0	89.38
Price level of capital formation	1,729	0.49	0.35	0.05	4.67

Source: the World Bank (2020a, 2020b), UNU-WIDER (2020) and The Penn World Table 9.1 (Feenstra, Inklaar & Timmer, 2015).

Appendix C

Table 8. Results from the pooled OLS and panel fixed effects estimation using the income shares held by the top and bottom 20% as the independent variables.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OLS	OLS	OLS	FE	FE	FE
Income share held by highest 20 %	0.0252	0.00655	0.0363	0.0853	0.0853	0.0872
	(0.0990)	(0.102)	(0.0996)	(0.0752)	(0.0752)	(0.0885)
Income share held by lowest 20 %	0.281	0.164	0.313	0.173	0.173	0.160
	(0.278)	(0.278)	(0.281)	(0.237)	(0.237)	(0.280)
Average years of education	0.0427	0.0132	0.0603	0.0353	0.0353	0.00948
	(0.0983)	(0.102)	(0.0981)	(0.127)	(0.127)	(0.153)
Inflation	-0.00609	-0.00662	-0.00432	-0.0322***	-0.0322***	-0.0279***
	(0.00633)	(0.00641)	(0.00745)	(0.00501)	(0.00501)	(0.00561)
Population growth	-0.358	-0.198	-0.314	-0.886***	-0.886***	-0.700*
	(0.225)	(0.253)	(0.231)	(0.296)	(0.296)	(0.357)
Gross capital formation	0.0773**	0.0740**	0.0782**	0.0834***	0.0834***	0.0765**
	(0.0316)	(0.0294)	(0.0310)	(0.0299)	(0.0299)	(0.0288)
Price level of capital formation	-1.765***	-1.744***	-1.595**	-2.687**	-2.687**	-2.437**
	(0.616)	(0.574)	(0.623)	(1.000)	(1.000)	(1.128)
Lagged GDP per capita growth	0.149**	0.154**	0.135*	-0.0208	-0.0208	-0.0499
	(0.0736)	(0.0722)	(0.0796)	(0.0653)	(0.0653)	(0.0651)
Constant	-1.179	0.203	-2.237	-1.399	-1.399	-1.808
	(6.985)	(7.142)	(7.044)	(5.222)	(5.222)	(5.836)
Observations	174	174	174	174	174	174
R-squared	0.388	0.397	0.415	0.256	0.256	0.288
Number of countries				46	46	46
Time dummies	No	No	Yes	No	No	Yes
Continent dummies	No	Yes	No	No	Yes	No

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix D

Table 9. Results from the system GMM estimation using the income shares held by the top and bottom 20% as the independent variables.

VARIABLES	(1) GMM	(2) GMM	(3) GMM
Income share held by highest 20 %	0.0689	-1.044**	0.108
	(0.0995)	(0.508)	(0.104)
Income share held by lowest 20 %	0.543*	-3.530*	0.674**
	(0.291)	(1.896)	(0.308)
Average years of education	0.0582	-0.147	0.0366
	(0.119)	(0.197)	(0.132)
Inflation	-0.0222***	-0.00969	-0.0156*
	(0.00693)	(0.0595)	(0.00839)
Population growth	-0.540*	0.519	-0.432
	(0.294)	(0.676)	(0.300)
Gross capital formation	0.126***	0.0573	0.127***
	(0.0353)	(0.0641)	(0.0313)
Price level of capital formation	-1.755*	-4.396**	-1.946***
	(0.890)	(1.673)	(0.677)
Lagged GDP per capita growth	-0.271***	-0.123	-0.310***
	(0.0920)	(0.151)	(0.0782)
Constant	-4.830	77.08**	-8.653
	(7.039)	(37.98)	(7.404)
Observations	174	172	174
Number of countries	46	46	46
Time dummies	No	No	Yes
Continent dummies	No	Yes	No

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1