Income inequality and economic growth

A cross-country analysis between developed and developing countries
Bachelor Thesis in Economics

Title: Income inequality and economic growth
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Abstract

Income inequality and its relationship with economic growth has been the focus of an extensive amount of research in the past decade. Research have attempted to determine whether inequality has a positive or negative effect on growth and theoretical frameworks suggest that there is a possibility for both. This study seeks to analyze the connection between income inequality and its relation to economic growth, with a particular focus on the moderating role of development levels across countries.

This study utilizes a panel data approach and categorizes countries into four development groups based on Gross National Income (GNI). The main objective was to assess the effects of income inequality, measured by the Gini coefficient, on economic growth. The analysis further incorporated key indicators to provide a comprehensive perspective on the complex relationship between income disparity and growth. The results suggest that the influence of income inequality on economic growth is context-specific, varying between development levels. The findings highlight that attributing the effect of income inequality on economic growth to a singular factor is challenging, as indicated by prior research. Finally, the research highlights the importance of considering the developmental context when analyzing the complex dynamics of income inequality and its potential implication for economic growth.
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1. Introduction

Income inequality and its relationship with economic growth has been the subject of considerable interest and debate within the field of economics. As countries strive for prosperity and development, understanding the connection between income distribution and its impact on economic growth is instrumental for long-term growth.

At the global level, extreme wealth coexists with extreme poverty. Even though income inequality has decreased in country-specific cases, the data emerging since 2020 suggests that global inequality may have increased in recent years (Christensen et al., 2023). In 2021, global wealth and income were substantial, but these sums hide significant disparities. To grasp the extent of global inequality, we can consider the distribution of income. The global 50% of bottom-income earners own only 2% of wealth. In contrast, the top-income earners own a staggering 76% of total wealth (Chance et al., 2022).

Inequality between individuals within countries is at an all-time high, and inequality between countries remains high despite the emerging world catching up in terms of growth. Chancel et al., (2022) state that there is a false claim that poor countries are poor because they use capital resources inefficiently. Instead, it is believed that poor countries are relatively efficient in their use of capital, but they have very little capital to start with. The authors further state that there is no clear trade-off between higher income levels and higher inequality levels. At the same time, high average income does not imply that there are lower levels of inequality. Further, Chancel et al., (2022) argue that the degree of inequality within a society is a result of political choices and how a country decides to organize their economy.

The central hypothesis of this study is that the impact of income inequality on economic growth varies significantly between developed and developing countries. This hypothesis is grounded in economic theories and empirical studies, including work done by Kaldor (1955) and Barro (2000). While existing literature provides valuable insight into the general effects of inequality, this study aims to explore how income inequality affects growth in different economic contexts, based on their development level. It is essential to acknowledge that the relationship between income inequality and economic growth is
complex and is subject to multiple interpretations. This study recognizes alternative perspectives and addresses these arguments throughout the study.

A notable contribution to the study of income inequality and its relation to economic growth can be accredited to Robert J. Barro. Barro (2000) introduced a perspective that considers development levels when analyzing the effects of income inequality. Barro suggests that income inequality is dependent on the specific context and that even though there is little overall relationship between income inequality and growth rates, the impact varies depending on a country's level of development. This supports the idea that the effects of income inequality on economic growth are not uniform, but rather based on the economic context of each country. His research concludes that there is an indication that inequality might hinder growth in less developed nations and might stimulate economic expansion in more developed nations.

1.1 Purpose

This study will focus on 60 countries between the years of 2012 – 2022 which will be categorized as least developed, less developed, more developed, and developed, based on a baseline Gross National Income (GNI) per capita level, and tested for additional variables such as mean years of education, political stability, gross fixed capital formation, and trade as a percentage of GDP. The study will collect and use secondary data from various sources to study the relationship between income inequality and economic growth. A recurring issue for historical studies of income inequality’s impact on economic growth has been the availability of reliable and comprehensive data. Earlier studies were constrained by the scarcity of quality data, which hindered their ability to draw robust and generalizable conclusions. The evolution of data collection has gradually improved the depth and quality of data. This allows for a more precise analysis of how wealth is distributed between and within nations. The World Bank Development Indicators and the United Nation has addressed these issues, providing a more robust dataset for analysis. There still exists some difficulties with the available data, especially for the countries within the category “Least developed”.

The research question is defined as “Does income inequality affect economic growth differently between developed and developing countries?” The thesis hypothesizes that
higher income inequality is expected to harm economic growth across all countries. However, the magnitude of this impact is hypothesized to vary among countries at different development levels.

This study seeks to build upon the suggested view that income inequality’s effects on economic growth are context-specific, thus focusing on the development levels of countries. By defining differences between countries using a measure of development, this study analyzes the relationship between income inequality and economic growth, specifically if the level of development can provide a more comprehensive analysis of how the differences emerge. In the relationship between inequality and growth, multiple empirical studies have shown that the development of countries plays a crucial role, such as Barro (2000), Gründler and Scheuermeyer (2015), and Madsen et al., (2018).

This study aims to contribute to the empirical evidence by demonstrating how development levels can affect growth rates and if there is a relationship between development levels, income inequality, and economic growth. Preliminary results from our analysis suggest that the relationship between income inequality and economic growth is indeed influenced by the development levels of countries. We observed that in more developed nations, higher levels of income inequality tend to correlate with lower economic growth. Additionally, in less developed nations, the relationship seems less straightforward, indicating that under certain conditions, higher income inequality could potentially foster growth.

In chapter two of the report labeled "Literature Review", theoretical framework and empirical studies will be presented and examined to determine what variables might have an additional effect on growth, concerning income inequality. In chapter three labeled "Data and Method", an introduction of the selected countries and the categorization of development levels will be introduced, followed by how data was collected, a description of the selected variables, and the expected outcome. In chapters four and five labelled "Results" and "Conclusion", a discussion and summary of the results will be presented, followed by a conclusion of the research process. It includes a reflection on the conducted study, what it can contribute to our field of research, and recommendations for future work on the topic of income inequality and economic growth.
2. Literature Review

The purpose of this chapter is to provide the theoretical background for the topic. The theories presented in this chapter aim to describe theories that influence economic growth, concerning economic inequality. The theories and empirical research should explain why income inequality has a certain effect on growth. The past decade has seen a surge in research focused on income inequality and its relationship with economic growth. Both theoretical and empirical research have attempted to determine whether inequality is positive or negative for growth, and research suggests that there is a possibility for both (Cingano, 2014).

Widespread increases in income inequalities have raised concerns regarding the potential impact on societies and economies. New research shows that when income inequality rises, economic growth falls. A key determinant of this phenomenon is that the poorer members of society are less able to invest in their education. Income inequality is evident in the widening gap between top and bottom income earners. The biggest factor for the impact of income inequality on growth is the gap between lower-income households and the rest of the population. The research shows that it is not enough to only tackle poverty, but more generally address lower income. The evidence particularly shows that inequality reduces growth by hindering human capital accumulation. Income inequality undermines education and opportunities for disadvantaged individuals, lowering social mobility, and limiting skills development. (OECD, 2014).

According to classical economic theory, inequality is necessary for a country to achieve growth. Within traditional economic research, the question regarding economic growth, measured as the increase in a country’s production of goods and services (GDP), and income inequality, has given rise to a series of theoretical and empirical studies in which inequality has both a negative and positive influence on growth (Roth, 2018).

Classical economic theory argues for the balance between inequality and efficiency. A widely used argument is that individuals tend to be driven by high inequality, as it increases the difference between the return of good and bad results. In theory, big income differences increase the incentives for individual engagement, which in turn increases
productivity and long-term growth (Roth, 2018). Further, higher inequality fosters aggregate savings, and therefore capital accumulation. As a result, the rich have a lower propensity to consume (Kaldor, 1955).

Some of the earlier studies, such as Kuznets (1955), suggested a U-shaped relationship, whereas economies initially experience an increase in inequality during development, followed by a decline. Li and Zou (1998) challenged the general thought that high-income inequality hindered growth. Their paper provided both theoretical and empirical evidence that suggested that income inequality may not necessarily hinder economic growth, but in fact, might have a positive influence. The research is grounded in the belief that when individuals have an incentive to invest in human capital and save more due to the prospects of earning higher incomes, it can result in increased human capital formation and capital accumulation which ultimately stimulates growth. While Kuznets inverted U-shaped hypothesis suggests that income inequality initially increases and then decreases as countries develop, the theory might not fully capture the complexity in rapidly developing countries. In contrast, Piketty’s (2014) analysis of wealth accumulation challenges this belief, highlighting persistent inequalities in developed nations. These contrasting theories provide the foundational context for examining how the dynamics between inequality and economic growth might occur differently based on the context of varied development levels.

Recent research has shifted its focus towards the negative effects of income inequality, and the increasing income differences are seen largely as a threat to growth. However, the fact that the research has not been able to agree on whether income inequality has a positive or negative correlation with growth indicates that there might not exist one global, unified, relationship between inequality and growth (Roth, 2018).

Further, there are alternative theories that predict that inequality can affect growth in either a positive or negative direction. For example, greater inequality might reduce growth if inequality becomes unacceptable to the public, so they insist on higher taxation and regulation, which in turn results in a reduction in the incentives to invest. In extreme cases, inequality may lead to political instability and social unrest, which contributes to a decrease in growth (Cingano, 2014). Recent studies suggest that inequality can have
opposite effects on redistribution and taxes. If large income differences cause power to shift to the rich, they can operate politics so that it promotes their interest with lower taxes and minimal redistribution. This results in inequality becoming self-reinforcing. Research suggests that inequality can result in dissatisfaction and political instability, which in turn deter potential investors. Inequality can also reduce the opportunities for low-income earners to educate and finance self-employment. Both are consequences that might lead to reduced growth. At the same time, it is believed that a certain degree of inequality is necessary to create incentives to exert effort and that inequality can have a positive effect on a country’s savings (Roth, 2018). The multifaceted reality of inequality’s effect on growth is highly relevant to this study’s focus on the impacts of income inequality across development levels.

Much of the theoretical literature on income inequality’s effects on growth includes the presence of financial market imperfections, which implies that the ability to invest for individuals is dependent on their income level. If this would be the case, poor individuals would not be able to afford worthwhile investments (Cingano, 2014). The Credit Market Imperfection approach suggests that perfect competition does not exist and that an optimal credit market that is available to all economic agents and where human capital is evenly distributed is rarely found. To invest in human capital requires investment in education. With an unfair credit market, the ability of low-income households to make such investments is unrealistic.

However, greater inequality might increase growth if high inequality provides the incentives to work harder, invest, and undertake risk to take advantage of high rates of return. An example is if highly educated people are more productive, then high differences in rates of return may encourage more people to seek education (Mirrlees, 1971).

For a country to achieve economic growth, there needs to be an increase in overall investments in infrastructure, industry, and innovation. For innovation to increase, there is a requirement not only for physical capital but also human capital to drive innovation forward. In contrast to physical capital, human capital is inherently bound to individuals. Since human capital is limited to individuals, it is believed that it is of extra importance
that human capital is spread evenly across the population of a country. When human capital is unevenly distributed across the population, it tends to lower innovation levels, and thus economic growth (Roth, 2018).

There have been mixed results of the available empirical tests, and it has been difficult to draw any general conclusions regarding the effects of income inequality and economic growth. However, the consensus of the recent studies is that even though there is a mix of results, most studies have shown that inequality harms growth. Over the last decades, there has been an increased availability of comparable data investigating the correlation on an aggregate level. In the following segment, I will introduce the empirical findings which can be explained by the presented theories prior.

The theory which has been studied and supported in literature more frequently is the accumulation of capital, and mainly of human capital. The theory states that limited credit markets are one of the reasons that inequalities lead to less investments in human capital. To test this theory, researchers wanted to measure the connection between the credit market’s availability and accumulated human capital in different countries. Human capital can be measured as a country’s average educational level or as a proportion enrolled in some form of higher education, however, measuring the credit market’s availability has shown to be more difficult. Social mobility has also been a variable in the attempt to measure if individuals could freely choose the education or professions they are most suited for. Multiple studies have shown that social mobility is negatively related to inequality, which in turn can affect economic growth.

Further, health has been linked to inequality in several different studies. Recent reports, mainly from developed countries, show that higher income differences led to poorer health and well-being. At the same time, other studies have shown that poor health in turn harms individuals’ opportunities to work and study, which leads to lower economic growth in the long term. (Roth, 2018).

More recent studies have shown that income inequality impedes growth. Berg et al., (2018) demonstrated that higher levels of income inequality appear to be associated with slower economic growth when excluding the effects of redistribution. Gutiérrez-Romero
used multi-country panel data and found that inequality is negatively related to
growth. Furthermore, Barro (2000) found that the relationship between inequality and
growth was different in countries at different levels of development and found that the
relationship between income inequality and growth may be influenced by factors such as
concluded that the promoting effect of inequality on economic growth tends to occur in
developed economies and the hindering effects in developing economies. However,
Gründler and Scheuermeyer (2015) analyzed the relationship between income inequality
and economic growth in developed and developing countries and found no significant
impact of income inequality on economic growth in developed countries, but found
evidence that inequality hinders growth in developing countries.

Aggregate measures of distribution may hide movements of income in different groups,
such as the observation that overall inequality may remain stable over time and can be
consistent with considerable change in the shares of total income received by individual
groups. Empirical work shows that there may be a negative relationship between initial
inequality and future growth. (Chancel et al., 2022).

An essential aspect of studying income distribution, particularly relevant to the empirical
evidence, is the methodology used when quantifying inequality. A frequently used tool
in this regard is the Lorenz curve. It provides a graphical representation of the distribution
of income or wealth within an economy, illustrating the proportion of total income
received across different segments of the population. The Lorenz curve provides a visual
summary of inequality, where the degree of deviation from the line of perfect equality
directly correlates with the level of inequality. The graphical representation is intuitive,
and the graphical tool is instrumental in calculating the Gini coefficient, which is this
study’s definition of income inequality. However, it is important to highlight the flaws of
the curve. Sample data may not reflect the overall population, thus displaying an incorrect
Lorentz curve. This can lead to a misleading representation of the Gini coefficient. This
consideration is particularly important in the context of the reviewed studies, as it
highlights the importance of robust models and methodological precision when
interpreting findings related to income inequality (Lorentz, 1905).
Income inequality and its relationship with economic growth remains a topic of debate among scholars and policymakers. Early theories, such as Kuznets (1955), suggested a U-shaped relationship between inequality and growth. However, recent research challenges this notion, highlighting the complex nature of inequality and its impact on growth depending on factors such as fiscal policies, societal structures, and global economic trends. Empirical studies reveal varied results, with some highlighting the negative effects of inequality, while others argue for its potential benefits under certain conditions. Despite the vast body of research, no real consensus exists. There is a suggestion for the need for a fresh perspective, potentially integrating other factors to gain a more comprehensive understanding of the complex relationship between inequality and economic growth. Studies that incorporated income- and development levels as part of their research are highly related to this study. This thesis will use these studies as inspiration for the upcoming data collection methods and regression analysis.
3. Data and Method

The purpose of this chapter is to introduce the selected countries and the categorization of development levels, the data collection method, a description of the key terms and included variables, a descriptive statistical summary, and the hypothesis of the expected outcome. Building upon the gaps identified in previous literature and empirical testing, this section outlines the data and methods used in this study.

This report uses panel data to analyze observations between countries. The sample consists of 60 countries, categorized into four different levels of development, ranging from “least developed” to “developed”. The period of the dataset is 2012 to 2022. Data is mainly collected through the World Bank open dataset. The dataset is regarded to be one of the most reliable sources of information related to countries within the developing world. The use of panel data analysis is rooted in the methodological insights gained from previous theories and empirical testing. Several studies, such as those by Kaldor (1955) and Barro (2000), used similar approaches which validate the used method in this study.

The selected variables, in addition to the measure of income inequality, are based on earlier studies. The relationship between GDP per capita and growth has shown to be an important factor when incorporated into inequality measures. There is evidence that initial levels of GDP per capita influence growth (Brueckner & Lederman, 2018). Education is frequently used as a variable of interest as it is a critical component of a country’s human capital. It is believed that education increases productivity, and thus growth (Grant, 2017). Political stability is a key component when measuring growth as a stable political climate fosters confidence for investors (Aisen & Veiga, 2013). Research and development (R&D) are used as it measures activities that promote innovation and improvements to production processes. A higher level of R&D suggests that there are developments of better, more efficient, production activities which leads to increased growth (OECD 2002). Gross fixed capital formation is added as our measure of investment. It measures the investments in fixed assets, such as schools and healthcare centers. It resonates with prior research and empirical findings, as it highlights the importance of these investments for long-term growth (Frankel & Romer, 1999). Lastly, trade as a percentage of GDP is
added as research suggests that liberal trade policies are a key component for growth (The World Bank, 2022).

The selected control variables cover a broad range of economic factors that are empirically and theoretically recognized as significant determinants of economic growth. The variables are sufficient for the scope of the study as they directly address the main channels through which income inequality is hypothesized to affect economic growth. The robustness of the model is supported by the fact that the control variables are consistent with literature and previous empirical studies. This consistency adds to the credibility of the thesis and our results.

The model specification is deemed reasonable as it includes a comprehensive set of control variables widely recognized in related literature as determinants of economic growth, such as research conducted by Barro (1991) and Frankel & Romer (1999). By including interaction terms that allow the relationship between income inequality and economic growth to vary across development states, the model reflects a more nuanced analysis as previously explored by Barro (2000) and Gründler and Scheuermeyer (2015). In summary, the model specification is grounded in previous economic theory and empirical evidence related to the subject, which makes it suitable for exploring the relationship between income inequality and economic growth.

3.1 Definitions of key terms and description of variables

To measure growth, this thesis uses an indicator of Gross Domestic Product (GDP) per capita. GDP per capita is a core indicator of economic performance. It provides a basic measure of the value of output per person, which is an indirect indicator of per capita income. Growth in GDP and GDP per capita are considered broad measures of economic growth. Economic growth (as explained by the increase in GDP per capita) is a key indicator for a country to achieve higher living standards and economic stability over time. The associated control variables related to GDP are denoted $GDP_{pcGrowthAnnual}$ and $GDP_{pc}$ (GDP per capita). GDP$_{pcGrowthAnnual}$ is our measure for economic growth and refers to the annual percentage growth rate of GDP per capita at market prices based on constant local currency (OECD, 2013).
Further, a measure of Gross National Income per capita is used. Gross National Income per capita is similar to GDP per capita, as it captures the nation’s GDP plus the income it receives from sources abroad. It is used to measure a nation’s wealth from year to year and is considered a more accurate representation of wealth within nations for some countries. (Hamadeh et al., 2023). It is important to remember that GNI can be much smaller than GDP (instead of the interpretation as it would be larger as it captures both GDP and income from sources abroad) as a result of a great number of foreign businesses operating within a country, thus taking business profits in the country of origin. This term is used as the baseline indicator for how we categorize countries at different development levels in this thesis. (The World Bank, n.d).

Our key measure of inequality and our variable of interest when testing for income inequality’s effect on economic growth is the Gini coefficient. The Gini coefficient is a measure of inequality in the distribution of household income. The lower its value, the more equal the income distribution within a country is, and a higher number indicates greater inequality. The coefficient ranges from 0 – 1, with 0 representing perfect equality and 1 representing perfect inequality. The associated control variable related to the Gini coefficient is denoted Gini and Ginix100. Ginix100 represents the Gini coefficient for each country, multiplied by 100 to be analyzed in a percentage form where 0 implies perfect equality, and 100 implies perfect inequality. Understanding how income inequality impacts GDP growth across different countries and development stages forms the central question of the study (Office for National Statistics, 2022).

In addition, a measure of education was needed to account for the level of education within nations, a key variable when analyzing growth potential. The thesis opted for mean years of schooling which refers to the average number of years of education received in each country. This measure captures the overall education attainment of the adult population in a country. Mean years of schooling is an indicator of a country’s human capital, reflecting the investment in education across the population. Human capital is associated with various economic outcomes, such as productivity, innovation, and economic growth. A higher mean years of schooling results in a more educated workforce which can influence the overall economic resilience within a country. The associated
control variable is denoted $EDU_{Mean}$ and is included as the level of education has been determined to be a critical component of economic development potential. (Barro, 2000).

Further, the thesis used a measure of political stability to account for possible volatility in the macroeconomic landscape of the selected countries. Political stability is a measure of the perception of the likelihood of political instability and/or politically motivated violence (including terrorism). Political instability is believed to have harmful effects on growth, as it affects policymakers’ horizons for optimal short- and long-term macroeconomic policies. Political instability can lead to a more frequent switch of policies, creating volatility and thus, negatively affecting macroeconomic performance. Political stability is foundational for an efficient economic environment as it fosters confidence among investors and other economic agents. The associated control variable is denoted $PolStab$ (Aisen & Veiga, 2013).

A measure of research and development was used as it demonstrates a country’s willingness to invest in technological advancement. Research and development refer to gross domestic expenditure on research and development, expressed as a percentage of GDP. Research and development aim to encourage and support activities that promote innovation and improve production processes within a country. The measure demonstrates a country’s commitment to innovation, technological advancement, and competitiveness. A higher percentage suggests a greater emphasis on innovation and the development of new processes within the country. Research and development can have a direct relation to increased productivity, competitiveness, and foreign investment, all of which can increase economic growth. The associated control variable is denoted $RD$ (OECD, 2002).

Additionally, there was a need to implement a variable that highlights the importance of investment as it is a key driver of productivity and development. Gross fixed capital formation comprises all additions to the stocks of fixed assets, including the production of assets by producers for own use, minus disposals. The measure demonstrates how much value that is added to an economy is invested rather than consumed. The measure is important as it is an indicator of investment which reflects the number of resources put
into the long-term future of the economy. The associated control variable is denoted \( GFCF \) (OECD, 2023).

Lastly, a measure of trade was added as it plays a crucial role in economic growth through several mechanisms. Trade (\% of GDP) is the sum of exports and imports of goods and services measured as a share of gross domestic product. Trade is an engine for growth that creates better jobs, reduces poverty, and increases economic opportunity. In developing countries, access to global markets is often hindered by anti-competitive practices and regulations that are unfavorable to business growth and investment. Even countries with more liberal and transparent trade policies suffer if their markets are not connected. Trade can lead to faster productivity growth in countries that are active in global markets (The World Bank, 2022). Trade has been shown to have a positive effect on growth. However, these effects are more evident in developing countries than in developed countries (Savranlar, B., et al, 2020). The associated control variable is denoted \( \text{TradeofGDP} \).

### 3.3 Distinguishing between development levels

When categorizing countries into different levels of development, there must be clearly defined criteria for how this report categorizes the selected countries. Generally, country classifications such as developed economies, economies in transition, or developing countries, are based on multiple characteristics. However, for analysis, the classification of the selected countries will be limited to four broad terms based on GNI per capita, which is aligned with, but not strictly limited to, the World Bank’s thresholds (United Nations, 2014).

A measure of gross national income (GNI) will be used as it captures the total income received by citizens and residents of the selected countries. The World Bank assigns the world’s economies into four income groups: low, lower-middle, upper-middle, and high-income. These categories are based on the GNI per capita of the previous year and are expressed in United States Dollars (USD) (Hamadeh et al., 2023).

The criteria for selecting and categorizing the countries into different development levels were influenced by the theoretical frameworks discussed previously. The categorization
aligns with previous theories regarding a context-specific effect of income inequality on economic growth.

3.2 Categorization of the selected countries

Following are the selected countries, categorized as developed, more developed, less developed, and least developed, based on the criteria stated previously.

**Developed Countries:**
The United States of America, Sweden, Netherlands, United Kingdom, Germany, France, Canada, Japan, Australia, South Korea, Finland, Norway, Denmark, Belgium, and Switzerland.

**More Developed Countries:**
Brazil, Mexico, China, Argentina, South Africa, Russia, Turkey, Malaysia, Chile, Poland, Colombia, Serbia, Romania, Bulgaria, and Kazakhstan.

**Less Developed Countries:**
Egypt, Indonesia, Nigeria, Pakistan, Philippines, Thailand, India, Vietnam, Bangladesh, Peru, Kenya, Ukraine, Mongolia, Ghana, and Morocco.

**Least Developed Countries:**
Afghanistan, Chad, Mali, Niger, Mozambique, Sudan, Haiti, Liberia, Burundi, Central African Republic, Malawi, Democratic Republic of Congo, Sierra Leone, Guinea, and Madagascar.

3.3 Data sources and availability

Data for the research has been collected from multiple sources. Data on GDP per capita, GNI per capita, political stability, research and development, gross fixed capital formation, and trade (% of GDP) were all collected from The World Bank database. Data for mean years of schooling were collected through the Global Data Lab. For some measures, especially for the least developed category, estimates have been used. These estimates have been collected through The World Bank, Statista, and World Economics.
The Gini coefficient for all countries was collected through multiple sources. Mainly, the data for the Gini coefficient were collected through The World Bank dataset on income inequality and the Gini coefficient. However, due to missing data for countries, specifically in the “Least Developed” category of the thesis, multiple sources such as the World Income Inequality Database, Statista, and World Economics, were used in addition to The World Bank dataset. The dataset contains data for Gini between the years 2012 and 2020, as there is no widely available data for Gini for the selected countries for 2021 and 2022.

3.4 Descriptive statistics

A brief description of the dataset is presented in Table 1. The number of observations varies between 660 and 445. The observations for the Gini coefficient deviate from the other variables due to data availability. The difference between the observations for the research and development deviates as the available data for the categories varies between the selected countries, especially for the “least developed” category of countries.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDPpcGrowthAnnual</td>
<td>659</td>
<td>1.458</td>
<td>4.027</td>
<td>-36.778</td>
<td>18.015</td>
</tr>
<tr>
<td>Gini100</td>
<td>474</td>
<td>38.502</td>
<td>9.23</td>
<td>24.8</td>
<td>74</td>
</tr>
<tr>
<td>GDPpcUSD</td>
<td>659</td>
<td>17005.026</td>
<td>22951.383</td>
<td>216.827</td>
<td>106148.78</td>
</tr>
<tr>
<td>EDUMean</td>
<td>600</td>
<td>8.619</td>
<td>3.694</td>
<td>1.64</td>
<td>14.13</td>
</tr>
<tr>
<td>PolStab</td>
<td>660</td>
<td>-0.374</td>
<td>1.01</td>
<td>-2.795</td>
<td>1.418</td>
</tr>
<tr>
<td>RD</td>
<td>445</td>
<td>1.126</td>
<td>1.112</td>
<td>0.013</td>
<td>4.796</td>
</tr>
<tr>
<td>GFCF</td>
<td>640</td>
<td>22.072</td>
<td>6.17</td>
<td>2.178</td>
<td>52.418</td>
</tr>
<tr>
<td>TradeofGDP</td>
<td>644</td>
<td>70.727</td>
<td>35.852</td>
<td>2.699</td>
<td>193.074</td>
</tr>
</tbody>
</table>

Table 1 shows both extreme minimum and maximum values which deviates from the average values. The minimum value of the Gini coefficient is 24.8, recorded by Ukraine, and the maximum value was 74, which is an estimate for Afghanistan. For annual GDP growth, the mean is 2.75. However, the minimum value is -36.39 and the maximum value is 21.08. For GDP per capita, the difference between the minimum and maximum values is significant. The minimum value of 216.82 was recorded in Burundi and the maximum value of 106 148.80 was recorded in Norway. Further, there is a significant difference between the minimum and maximum mean years of schooling, varying between 1.64
years and 14.13 years.

Table 2 illustrates a mix of negative and positive relationships between the variables. The strength and direction of the relation between variables vary. In the presented correlation matrix, each variable from the dataset is analyzed against each other to determine the degree to which they work together. The coefficients range from -1 to 1, with -1 indicating a perfect inverse relationship. For example, the negative correlation of -0.1092 between the Gini coefficient and GDP per capita annual growth suggests that there is a slight inverse relationship, resulting in countries with higher inequality experiencing marginally lower economic growth. It is important to interpret the correlation matrix with caution as the relationship between variables can be influenced by other variables not included in the matrix. The correlation matrix reveals pairs of variables with a high positive correlation. This indicates a strong positive linear relationship where one variable tends to increase as the other does. For example, RD and GDPpcUSD are highly positively correlated with a coefficient close to 1. Research supports this relationship, suggesting that per capita income and research and development are highly correlated across multiple countries (Ulku, 2004).

### 3.5 Empirical Model

Understanding the dynamic relationship between income inequality and economic growth requires a comprehensive empirical model. In this study, a fixed-effects panel regression model was used to analyze the impact of income inequality on economic growth. The following general model is based on the studies of Barro (2000) and is motivated by its ability to control for unobserved heterogeneity across countries, a concern highlighted in previous literature.

\[
GDP_{Annual\ Growth_{i,t}} = \beta_0 + \beta_1 Gini_{i,t} + \beta_2 GDPpcUSD_{i,t} + \beta_3 EDUMean_{i,t} + \beta_4 PolStab_{i,t} + \beta_5 RD_{i,t} + \beta_6 GFCF_{i,t} + \beta_7 TradeofGDP_{i,t} + \mu_i + \epsilon_{i,t}
\]
\( \mu_t \) captures the unobserved country-specific fixed effects, and \( \epsilon_{i,t} \) captures the idiosyncratic error term.

To incorporate potential heterogeneity in the effect of income inequality on growth across development stages, another model with dummy variables is introduced, inspired by the methodology of Banerjee & Duflo (2003). The model also includes lagged control variables where potential intertemporal effects might be present.

\[
\text{GDPAnnualGrowth}_{i,t} = \beta_0 + \beta_1 \text{Gini}_{i,t} \times \text{DevelopmentDummy}_{i,t} + \beta_2 \text{GDPpcUSD}_{i,t-1} \\
+ \beta_3 \text{EDUMean}_{i,t-1} + \beta_4 \text{PolStab}_{i,t-1} + \beta_5 \text{RD}_{i,t-1} + \beta_6 \text{FGC}_{i,t-1} \\
+ \beta_7 \text{TradeofGDP}_{i,t} + \mu_i + \epsilon_{i,t}
\]

\( \text{DevelopmentDummy}_{i,t} \) is a set of dummy variables indicating the development level of each country, and the interaction between the development level and the Gini coefficient allows the effect of income inequality on growth to vary across development levels.

The models help capture our research question: “Does income inequality affect economic growth differently between developed and developing countries?” It also includes other variables that might also influence GDP growth, ensuring a more fulfilling estimation of the effect of income inequality.

To ensure the reliability and validity of our findings, several robustness checks were performed. Tests for the presence of autocorrelation and heteroskedasticity, common issues in panel data, were conducted and standard corrections were employed where deemed necessary. Additionally, to address potential endogeneity, a concern raised in previous literature, lagged variables were used.

**3.6 Hypotheses**

Based on the literature review and empirical findings, the following hypotheses were constructed.
Hypothesis 1: Higher Gini coefficients, indicating more pronounced income inequality, will be negatively correlated with annual GDP growth.

Hypothesis 2: GDP per capita has a negative effect on GDP growth rate.

Hypothesis 3: Mean years of education have a positive effect on GDP growth rate.

Hypothesis 4: Political stability has a positive effect on GDP growth rate.

Hypothesis 5: Research and development have a positive effect on GDP growth rate.

Hypothesis 6: Gross fixed capital formation has a positive effect on the GDP growth rate.

Hypothesis 7: Trade (% of GDP) has a positive effect on GDP growth rate.
4. Result and Discussion

The purpose of this chapter is to present and discuss the results of the regression analysis and if they are aligned with the stated hypothesis. A Hausman test was first conducted, which determined that the appropriate regression model would be a fixed effects model. The fixed effects model is appropriate in the context of this research as prior studies suggest that the relationship between income inequality and economic growth might be specific to each country due to factors such as institutional settings, cultural aspects, and policy environments. The fixed effect regression model aligns with the prior theories as it focuses on within-country-specific variations over time.

After conducting a comprehensive series of econometric tests, including checks for autocorrelation, multicollinearity, and heteroscedasticity, we refined our approach to ensure reliable results. The initial part of the analysis involved exploring multiple regression models, including a general fixed effects regression model without interaction terms or lagged control variables, a fixed effects regression model with dummy variables and a “baseline” regression with Robust Standard Errors. However, to enhance the clarity of the thesis, we have streamlined our presentation of the results to focus exclusively on the models that yielded significant results. This emphasizes the models that highlight stable and reliable results.

To progress through this section, we will include the addition of control variables one at a time until we reach our final model as showcased in Tables 3 and 4. This will demonstrate the control variables’ influence on the dependent variable and how they affect the stability and significance of our key variables of interest. This approach allows us to examine the robustness of the findings. The tests showed that the individual control variables followed a similar pattern as presented by the general fixed regression model. It also highlighted the fact the majority of the individual control variables did not show significant relationships with the dependent variable, but the full model did. The final results presented in this section are based on the Robust Standard Error regression model with the inclusion of lagged control variables.
The non-significance of the control variables in the “baseline” regression model might be due to the complex relationship between economic growth and other contributing factors. Literature suggests that the impact of inequality on growth may not be direct but occurs through various channels such as investments, education, and political stability (Barro, 2000). The non-significance of the control variables’ individual effects may reflect the inadequacy of the approach to capture the effects of these multifaceted interactions. The significance of lagged variables in our final regression model suggests that the effects of inequality on growth are not immediate but occur over time. This aligns with the previous theories and empirical findings, which indicate that economic processes are often subject to time lags.

4.1 Testing for Autocorrelation, Multicollinearity, and Heteroscedasticity

To ensure reliable results, a comprehensive series of econometric tests were conducted. These tests are crucial to determine the reliability and validity of the results of the regression models. To investigate potential issues of autocorrelation in the data, the Wooldridge test was conducted. A significant result from the Wooldridge test indicates that autocorrelation is present in the panel model. If there is evidence of autocorrelation, other techniques such as a robust standard error method can be used to account for the autocorrelation (Drukker, 2003). The results from the Wooldridge test revealed that there were first-order autocorrelation present. This test was conducted for the baseline model, as well as another model including dummy variables. Both tests showed that there was first-order autocorrelation.

Several factors could contribute to the detected autocorrelation in our models. Variables may have time-related patterns or cycles that cause persistent effects over time. Some variables might not have an immediate impact, such as the changes in GFCF today might not affect GDP growth, which implies lagged effects not accounted for in the model (Wooldridge J. M., 2010).

The possible presence of multicollinearity was examined to ensure that our independent variables are not overly correlated with each other. An OLS regression was conducted followed by a VIF test. Using OLS for VIF calculation is commonly used as it provides a straightforward way to estimate the relationship between each variable. The VIF
(variance inflation factor) test measures the severity of multicollinearity in regression analysis. The test did not reveal any significant results, suggesting that each independent variable brings unique information to the model (CIF, n.d.).

Following these preliminary tests, our analysis proceeded with the selection of the Robust Standard Error (RSE) regression model as our primary analytical tool. This model was chosen for several different reasons. Firstly, the ability to provide more accurate standard errors when heteroscedasticity is present in the data allows for more reliable results. Secondly, the RSE model allows us to mitigate the issues of autocorrelation which were revealed by the Wooldridge test. Lastly, the inclusion of lagged variables was implemented to mitigate potential endogeneity problems. This approach allows us to capture intertemporal effects that might exist between income inequality and economic growth.

4.2 Regression Model with Robust Standard Errors (RSE)

To account for the autocorrelation issue, we use the Robust Standard Error (RSE) model. RSE are adjusted standard errors that are more resilient to violations of the classical linear regression model assumptions, specifically heteroscedasticity and autocorrelation. The interpretation of RSE is that the coefficient estimates of the control variables will remain the same, as RSE only affects the standard errors, t-values, and p-values. We expect a change in the standard errors of the coefficients, and the corrected standard errors will likely offer a more reliable basis for inference (Wooldridge, J. M., 2010). Based on the research of Barro & Lee (1994), the new model includes the role of lagged variables in determining the effects on economic growth.

<table>
<thead>
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<th>Table 3: RSE Regression Model without interaction terms</th>
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<tr>
<td>GDPpcAnnualGrowth (1)</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>Ginix100</td>
</tr>
<tr>
<td>(0.009)</td>
</tr>
<tr>
<td>lag_GDPpcUSD</td>
</tr>
<tr>
<td>(0.0001)</td>
</tr>
<tr>
<td>lag_EDUIndex</td>
</tr>
<tr>
<td>(0.817)</td>
</tr>
<tr>
<td>lag_PolStab</td>
</tr>
<tr>
<td>(1.016)</td>
</tr>
<tr>
<td>lag_RD</td>
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<tr>
<td>(1.406)</td>
</tr>
<tr>
<td>(1.453)</td>
</tr>
<tr>
<td>TradeGDP</td>
</tr>
<tr>
<td>(1.047)</td>
</tr>
</tbody>
</table>

The model is systematically expanded by adding control variables one by one. These variables are integrated to assess their incremental impact and to test the robustness of the relationship between income inequality and economic growth. The model provides a more nuanced view of the relationship between income inequality and economic growth. From a theoretical standpoint, lagged variables are crucial in economic modeling for several reasons. Policy changes and economic indicators do not impact growth immediately, instead, there are adjustment delays. Investment in physical capital and R&D have periods before they affect productivity as explained by Solow (1956) and Romer (1990), as well as effects of education and accumulation of human capital. Empirically, the results of the regression model which includes lagged variables indicate that the model provides a better fit for the data, suggesting that economic growth is influenced by past levels of these predictors.

In this regression model, a lag was added for the control variables (denoted with lag_) which might have an intertemporal effect. Studies within economic growth theory suggest that past values of these variables influence current and future growth. Further, we assume that the standard errors in this model are correct.

4.3 Robust Standard Error Regression Model including interaction terms

A final test was conducted, which added the interaction terms between income inequality and development levels. In the previous model, the insignificance of income inequality resulted in the need for another, more nuanced, model. By incorporating interaction terms that represent income inequality across different development categories we can analyze the different impacts of income inequality depending on different economic contexts. This final model also includes the sequential integration of the control variables which enables an in-depth analysis of their individual and combined effects on economic growth.
The relationship between income inequality and economic growth is highlighted in Table 4. By analyzing the incorporation of development levels and lagged control variables within our robust regression framework, we can analyze the impact of income inequality across varied economic development stages and capture the dynamic nature of economic growth determinants.

The reference Gini coefficient is statistically significant and negative. This indicates that higher income inequality is associated with lower GDP per capita growth within the countries of the selected sample. Further, the interaction terms for "More Developed and Least Developed" are statistically significant. The results suggest that the relation between income inequality and economic growth is different between development levels compared to our reference category.

As previously discussed, income inequality’s impact on economic growth has been considered in a linear and somewhat simplistic manner. The interaction terms in our final regression model introduces a certain complexity to the narrative. The results suggest that the effect of income inequality cannot be fully captured when isolated, rather, it is dependent on the level of development within a country.

The addition of lagged effects presents some significant results. The significance of mean years of education suggests that the impact of education on growth may not be immediate. However, the negative sign of the coefficient might seem counterintuitive. Barro (1991) found that higher initial schooling levels were associated with higher economic growth.
The negative sign of the coefficient could be due to other contextual factors not captured in this model. Further, political stability is significant with a negative coefficient. This result can be interpreted as a one-unit decrease in the “Political Stability” score (a move towards greater political instability or higher likelihood of violence/terrorism) is associated with a decrease in economic growth. The measure of investment, GFCF, is statistically significant with a positive coefficient. The amount of trade is also statistically significant with a positive coefficient. The role of these measurements aligns with traditional economic research, suggesting that investment in fixed assets and an increased amount of trade are determinants of economic growth.

The significance of lagged effects highlights the importance of temporal dynamics. The results suggest that the impact of these variables on economic growth might not be immediate, and instead grow over time. This aligns with the belief that investment in human capital, fixed assets, and political stability have prolonged effects on economic development.

4.4 Discussion
To have reliable results, several factors have been taken into consideration. There has been data collection from multiple sources, with most of the data collected through the World Bank open dataset(s). For missing data, estimates have been used based on either earlier measures or predicted future values. The availability of data varies between the development levels, and data collection from the “least developed” category has been challenging. For the other categories of development, the data collection process has not been considered an issue. Data limitations can significantly influence the outcome of the regression analysis, which might result in unexpected results. The differences between developed nations and developing nations can be highlighted, not only by their differences in the measures suggested by the data but by the actual data collection itself. Developed nations have more comprehensive and reliable data when compared to other development categories, leading to gaps, inaccuracies, and inconsistencies. This might be connected to findings that do not correspond to previous research.

When conducting the regression analysis, autocorrelation, heteroscedasticity, and multicollinearity issues had to be accounted for. There were no signs of multicollinearity found by the performed tests. The Wooldridge test was used to detect the presence of
autocorrelation. The issues of potential autocorrelation and heteroscedasticity were dealt with using the Robust Standard Error regression model. The results from the Robust Standard Error regression were assumed to be the most reliable, however, the goodness of fit for the models highlights challenges in the modeling process. Our final Robust Standard Error regression model including lagged independent variables and interaction terms shows a relatively low goodness of fit, with the control variables explaining 20.83% of the variance in economic growth. In panel data regression, the appropriate R-squared value depends on the research question and objectives and is not necessarily all that meaningful. The priority is the quality of our coefficient estimates and the model’s ability to address the specific research question (Hsiao, 2014).

When analyzing the relationship between income inequality, as measured by the Gini coefficient, and annual GDP per capita growth, the results are less clear in the initial regression models. There is a mixed relationship suggested by the coefficients and the lack of statistical significance means we cannot confidently determine that there is a definitive relationship between the two. Furthermore, when running tests and taking development levels into account through interaction terms, the influence of income inequality on growth remained statistically insignificant. This challenges previous assumptions and suggests that the relationship between income inequality and economic growth is more nuanced and may be influenced by other factors not captured in our initial models. The initial hypothesis that the Gini coefficient would play a key role in influencing annual GDP per capita growth diminished when we introduced dummy variables into the general fixed effects regression model. The dummy variables themselves were determined insignificant which suggests that the dummy variables might not be an optimal way to capture the complex relation of development levels, income inequality, and economic growth. Our final models account for intertemporal changes in certain variables. When analyzing these results, the Gini coefficient, the reference Gini along with the interaction terms, are significant.

The results indicate that there is a persistent, statistically significant, negative relationship between mean years of education and annual GDP per capita growth. These results might seem counterintuitive as Barro (1991) found evidence that increased growth was associated with higher initial schooling levels. Even though there has been mixed
empirical evidence for the effect of inequality on economic growth, much of the research supports the belief that human capital, often measured by a country's average educational level, is a key determinant for economic growth. However, our results contradict this prediction, suggesting as countries achieve higher levels of human development, their economic growth seems to slow down. There are several different explanations for why our results may show this negative relationship.

Firstly, it is possible that as countries achieve higher levels of human capital development, the marginal gains in growth from additional education diminish. This is consistent with the concept of diminishing returns to investment in education, particularly in more developed nations. This could be attributed to the fact that more developed nations are closer to their maximum feasible amount of growth and thus, have limited room for rapid economic expansion. On the other hand, less developed countries have more untapped potential and room for growth. The negative coefficient could reflect a structural shift in economies as they develop. In the earlier stages of development, education may primarily introduce the possibility for the transfer of labor from agriculture to manufacturing, leading to significant growth.

The relationship between human capital and growth is widely seen as positive, which suggests that the current model does not fully capture the effects of education on economic growth. However, our measure of investment, GFCF, includes the investment in schools, hospitals, and other fixed assets within a country. The positive coefficient of the GFCF variable in our regression is aligned with the theories stated by Roth (2018), that inequality in social mobility, level of education, and health can lead to lower long-term growth.

Further, our other regression results do confirm several earlier findings, such as income inequality’s context-specific effects on economic growth. However, the findings also challenge some of the previous beliefs. Barro (2000) found that the relationship between inequality and growth is different in countries at different levels of development. Factors that did influence growth were human capital accumulation, political stability, and economic freedom. As highlighted by our regression results, mean years of education, political stability, investment, and trade, were all significant factors in determining
growth. Barro (2000) concluded that there are positive effects of income inequality in more developed countries, and hindering effects in developing countries. Our model highlights the differences between development level and the effect of income inequality, however, it does not correspond with the findings of Barro (2000) as the baseline Gini measure shows negative effects on growth whilst our interaction terms for the other categories of development show signs of positive effects.

In conclusion, hypotheses one and three are rejected based on our results. Even though we find a significant relationship; as Cingano (2014) also stated, we cannot determine if the general relationship is either negative or positive. Earlier studies have found that the relationship between income inequality and economic growth is complex, and we cannot accurately confirm that increased levels of inequality hurt growth. Our hypothesis regarding education levels' effect on growth is rejected, however, it is important to highlight that our results do not correspond to earlier findings. Our hypothesis regarding political stability, investment, and trade is not rejected. However, our insignificant results of GDP per capita and research and development lead us to reject the hypotheses that they have a positive effect on growth.

4.5 Limitations

Many different inequality databases provide valuable information to researchers, policymakers, and the public interest. However, there is not one perfect database and there is a need to collect information from multiple sources to make any relevant conclusions regarding the topic of income inequality’s effect on economic growth. A central issue for most of the databases is that they rely on self-reported household surveys. These surveys are key in measuring income and wealth distribution, but they introduce important limitations. Household surveys consist mostly of face-to-face or virtual interviews with individuals who are asked questions regarding their income, wealth, and other socio-economic aspects of their lives. The information gathered usually depends solely on self-reported income and wealth. As a result, these surveys tend to misrepresent the top income and wealth levels, which in turn shows skewed results in the overall income distribution. The self-reported information can also contribute to inconsistencies between economic growth (as measured in GDP per capita) and household income (as measured and recorded by surveys). (Chancel et al., 2022).
One of the challenges when conducting empirical research is the availability of data. As discussed by Barro (2000), this study encountered challenges related to the scarcity of quality data for countries within the “least developed” category. To accurately conduct robust testing, a combination of available data and estimates had to be used.

Additionally, economic growth is a central part of economic policy, however, there is no set definition of what economic growth is. Economic growth is often referred to as the growth rate of GDP. GDP has been widely criticized for its inability to account for environmental degradation, poor capturing of human well-being, and ignorance of inequality measures. Therefore, an increase in GDP does not directly correlate with an increase in overall well-being in a country. This has led to multiple new indexes which better capture the term “growth”, which factors in education and healthcare, and other GDP indicators which account for environmental degradation. (Chancel et al., 2023).

Another limitation of the presented results is that the relationship between income inequality and economic growth may not be instant. There can be significant time lags between changes in income distribution and an increase or decrease in economic growth. Thus, short-term studies may not capture the long-term effect accurately (Galor & Moav, 2004). Further, the complexity of the term “economic growth” can be hard to describe and accurately credited to certain factors. Factors such as technological progress, human capital, and governance, can all be examples of factors influencing a country’s growth rate. Isolating the income inequality as a sole variable can be challenging. (Barro, R. J. 1991).

Lastly, it is important to account for the possible disadvantages of the Gini coefficient. The Gini coefficient is widely used for its simplicity and intuitiveness. However, even though the regression shows significant results, the Gini coefficient does not offer detailed information about the underlying distribution. Based on our results, income inequality within lower levels of development is associated with increased growth. This interpretation should be made with caution, as it contradicts established findings and theories within the field of economic growth theory. Further, Robert J. Barro has contributed multiple studies to understand the complex relationship between income
inequality and economic growth. He states that there is no robust negative relationship, instead, his findings suggest that the impact of income inequality on growth is context-specific and depends on factors such as institutions and human capital.
5. Conclusion

Our analysis revealed that income inequality indeed has a differential impact on economic growth as shown by our regression results, but in ways that are more complex and varied than initially hypothesized. Our research question, “Does income inequality affect economic growth differently between developed and developing countries?”, suggested that income inequality and its effects vary significantly between development levels, and the effects are context-specific. In developed countries, we observed a tendency for higher inequality to correlate with slower growth, aligning with the theoretical perspectives of Kuznets and Piketty. However, in developing nations, the relationship is less clear, suggesting that inequality can be beneficial to economic growth.

By analyzing data across a diverse range of countries, this study contributes to a more comprehensive understanding of the multifaceted relationship between income inequality and economic growth. The results challenge the approach that economic measures are applicable equally across countries and underscore the importance of modified economic policies that consider unique circumstances.

The final regression model accounts for the suggestion that the relationship between certain measures might not be instant, as presented by Barro & Lee (1994) and Galor & Moav (2004). Tested by Barro & Lee (1994), the incorporation of lagged effects on certain variables is relevant in highlighting that some effects take time to appear. It is important to acknowledge that there might be differences between the time it takes for effects to emerge between variables and that there is a need for even further specification and testing to accurately find an appropriate number of lagged effects. Further studies might want to add specific lagged effects to variables to get accurate estimates.

It is also reasonable to believe that factors other than those included in our model influence economic growth. Other empirical models include effects such as literacy rate, access to quality education, government spending, quality and accessibility of healthcare, financial freedom, and technology and innovation. Using a more specific measure for education, or incorporating measures of quality education, could have altered the results of the study.
In summary, this thesis highlights the multifaceted relationship between income inequality and economic growth, emphasizing the importance of how the relationship varies between countries across different stages of development. Our analysis suggests that income inequality’s effect on economic growth depends on country-specific contexts. The findings reveal that effects are not uniform across developmental stages and that in developed countries, a consistent pattern emerges where elevated levels of income inequality are often associated with slow economic growth. This relationship resonates with previous theoretical frameworks, such as Kuznets inverted U-shaped relationship between inequality and growth. Additionally, the relationship within developing nations presents a more nuanced picture, where income inequality does not hinder growth, as suggested by previous research. Our findings suggest that under certain circumstances, income inequality can promote growth.

The findings highlight differences between development levels and the complex relationship between inequality and growth and suggest that there is not one unified approach to economic measurements and policy. This thesis not only adds to the understanding of the relationship between income inequality and economic growth but also challenges some of the previous beliefs. It reinforces the notion that economic growth policies should be diversified depending on developmental stages and introduces new possibilities for future research to examine the complex relationship.
6. Reference List


Hsiao, C. (2014). Analysis of panel data. Cambridge University Press. [https://doi.org/10.1017/CBO9781139839327](https://doi.org/10.1017/CBO9781139839327)


7. Appendix


Figure 2. Average income across world regions 2021. Data source: Chancel, L., Piketty, T., Saez, E., Zucman, G. et al. (2022). World Inequality Report 2022, World Inequality Lab
Figure 3. Inequality in military expenditures and the samuelson rule - Scientific Figure on ResearchGate.

![Gini-coefficient equation diagram]

Figure 4. The Kuznets curve. Yandle, B., Vijayaraghavan, M., & Bhattarai, M. (2002). The Environmental Kuznets Curve A Primer.

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<td>P-value</td>
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Table 8. Hausman test for fixed- or random effects regression model
Table 9. VIF test for multicollinearity.

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