An Empirical Analysis of the Impact of Income Inequality on Economic Growth for Developed and Developing Countries

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Abstract

This thesis investigates the relationship between income inequality and economic growth in developed and developing countries. This study utilises panel data analysis, controlling for other relevant factors, to examine this relationship for 49 countries over a 15-year period from 2004 to 2018. The study employs three different approaches to analyse this relationship, the first approach considers the overall impact of income inequality on economic growth when countries are grouped together. The second approach considers the impact of income inequality on economic growth when accounting for a country's developmental classification and the third approach considers the influence of a country's political regime on the impact of income inequality on economic growth. The findings reveal that income inequality has a statistically insignificant relationship with economic growth when developmental statuses are not accounted for. While income inequality has a more positive impact on economic growth for developing countries compared to developed countries. Additionally, income inequality has a more negative impact on economic growth for non-democratic countries compared to democratic ones. The findings also reveal that human capital, physical capital and trade positively impact economic growth while population growth and polity negatively impact economic growth. These results have important policy implications as they provide insights into the factors that affect economic growth and inform policymakers on potential strategies to promote economic development.

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1. Introduction

Income inequality has become an increasingly pressing issue in today's global economy with significant social, economic, and political implications. The rise of income inequality has been observed in both developed and developing countries since the 1980s, and it has become particularly pronounced in many countries like the United States, where the top 1% of earners now hold more wealth than the bottom 90% of the population. Concerns have been raised regarding the potentially harmful impact of income inequality's tendency on economic growth and social cohesion.

Despite the enormous literature on the relationship between income inequality and economic growth, studies have failed to conclude a consensus on the relationship with some claiming that inequality is detrimental to growth and others claiming that it is a requirement for growth. For instance, Aghion et al (1999) argue that income inequality has a detrimental impact on economic growth by limiting access to education for the less fortunate due to inefficient capital markets which affect the human capital formation in a country. Additionally, income inequality causes political instability by increasing social problems such as crime and vandalism, which has a negative impact on economic growth as these issues result in there being no incentives for society to make investments (Alesina and Perotti, 1996). On the contrary, Kaldor (1957) claims that income inequality has a positive impact on economic growth as it encourages the wealthiest people in society to save enabling them to make expensive investments that promote growth. Furthermore, Galor and Tsiddon (1997) also claim this relationship to be true and assert that income inequality promotes research and development leading to economic growth.

The empirical evidence on this relationship yields contradictory findings. Studies in the 1990s such as Persson and Tabellini (1994) among others, performed their analysis using cross-sectional data on a standard growth regression and added income inequality as an additional independent variable. These studies presented evidence of a statistically significant and negative relationship between income inequality and economic growth. However, Forbes (2000) and Panizza (2002) found evidence of a statistically significant and positive relationship between income inequality and economic growth in more recent research utilising panel data models.

A major concern with the existing empirical literature in this field is that studies either focus on single-country or a general cross-country analysis. Li and Zou (1998), Barro (2000) and Berg and Ostry (2017) are some studies that use a different approach. These studies separate countries into their relative income groups based on either their GNI per capita or GDP per capita. However, there is a lack of studies that consider the relationship between income inequality and economic growth based on the different developmental classifications and political regimes of countries.

Considering these research gaps, this thesis aims to contribute to the existing literature by conducting an empirical analysis of the relationship between income inequality and economic growth that incorporates both the developmental classifications and political regimes of countries. To analyse these relationships, three regression models are run using panel data with the best available data that covers 49 countries from 2004 to 2018.

The remainder of this paper is organised as follows: Section 2 reviews the theoretical and empirical literature on the relationship between income inequality and economic growth. Section 3 presents the methodology and data. Section 4 presents the empirical findings and sensitivity analysis. Section 5 discusses the findings of this paper in line with the existing empirical evidence. Section 6 presents the conclusions of this paper's research and provides suggestions for future research in this field.

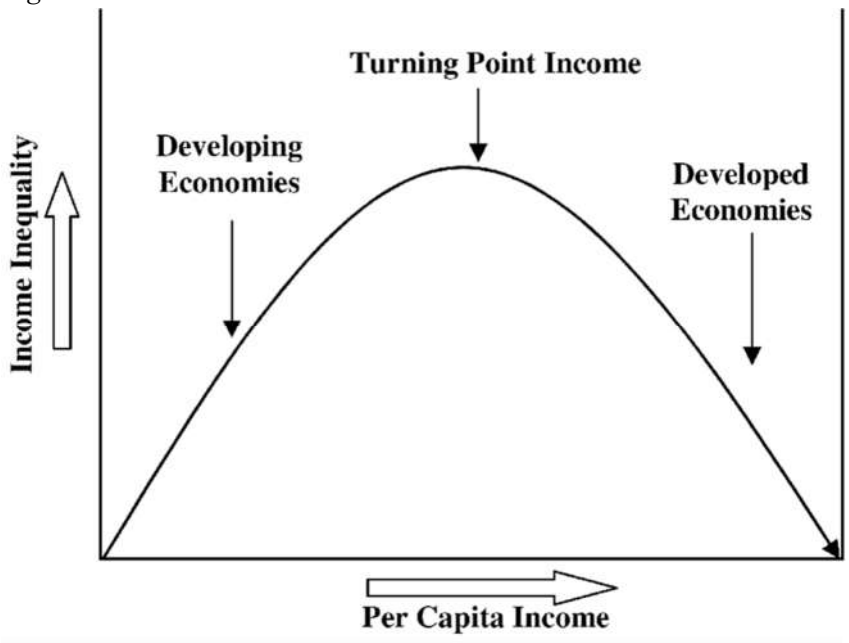
2. Theoretical and Empirical Literature

2.1 Background

Early research into this field has suggested a connection between income inequality and economic growth. Lewis (1954) concluded that since many entrepreneurs prefer to save a substantial percentage of their income compared to other groups in the economy, inequality has a positive correlation with the amount of savings generated by the wealthy. Hence, Lewis established a relationship between the growth rate of GDP per capita and a country's savings rate. This relationship infers that with an increase in a country's saving rate, investment within the economy will also rise, resulting in economic growth.

Kuznets (1955) established the framework for further studies on the relationship between income inequality and economic growth. He launched the discussion of how economic growth may impact inequality. In this regard, Kuznets proposed that there is a pattern that countries adopt when switching from a developing economy to a developed economy. He defined this pattern as a "long swing". According to his theory, income inequality and economic growth have an inverted U-shaped relationship as seen in Figure 1.

Figure 1: The Kuznets Curve



The Kuznets Curve shows how inequality rises in the early stages of growth and development before declining in advanced (developed) economies. The inverted U-shaped curve shows the process of an economy undergoing industrialisation. During the early stages of an economy's development, new investment opportunities emerge for those who have incumbent capital to invest. These opportunities provide people who are currently wealthy with the opportunity to become even wealthier. In contrast, the influx of cheap rural labour to cities keeps working-class wages low, widening the income gap and escalating inequality. However, once a certain level of average income is reached, inequality is expected to decrease, as are the processes associated with industrialisation such as democratisation.

Given the availability of data in the 1950s, the idea Kuznets proposed could be considered as a hypothesis and this appeared to be correct for the United States economy until the 1970s when the share of total wealth possessed by the 10% richest households increased from 50% in 1770 to nearly 75% in 1870, then decreased back to 50% in 1970. However, this hypothesis came under scrutiny in future investigations of the relationship between income inequality and economic growth. Deininger and Squire (1998) argued that Kuznets' hypothesis is flawed due to problematic cross-country data. Via the use of panel data, Deininger and Squire find that for many nations per capita income does not always change when there are changes in the level of inequality. They also discover that many initially impoverished nations did not see an increase in inequality while their per capita income increased quickly.

Two clusters with opposing views have formed over time to debate the Kuznets hypothesis. One cluster aligns with the ideas proposed by Kuznets that growth impacts inequality. However, an alternate cluster believes that inequality impacts growth. This paper's approach to the literature will concentrate on the second cluster of studies.

2.2 Theories

In the context of flawed capital markets, Aghion et al. (1999) claim that inequality is detrimental to growth. Investments are reliant on an individual's personal income assets in the absence of functional credit markets. Therefore, it is possible that the poor population within society are unable to make any adequate investments to improve their human capital. This population compared to the wealthier population have a larger marginal return on their human capital investments and if redistribution does not occur to overcome faulty capital markets, the poor will be unable to start enterprises, pay for insurance or educate themselves and their children. These obstacles keep a country from experiencing the growth potential that a more equitable distribution may have provided.

Persson and Tabellini (1994) examine how disagreements over the degree of income distribution may result in policies that stifle growth. Economic growth occurs because of the accumulation of physical capital and human capital required for production. Redistribution policies run the risk of distorting individuals' motives because it is crucial for an individual to take ownership of the benefits of their labour. This is referred to as the fiscal policy approach which has two different mechanisms described by Perotti (1996). Equal societies require less redistribution which leads to reduced taxation, the political mechanism, and greater levels of investment and growth, the economic mechanism. The fiscal policy approach posits a nuanced distinction between political regimes characterised by democracy and those that are not. Within the context of democratic countries, the outcomes of policy decisions are expected to reflect the preferences of the median voter. However, if income inequality becomes sufficiently high, the median voter's income will fall to a level below the economy's average income level, creating a negative relationship between growth and inequality. Thus, creating a situation where policymakers are faced with the challenging task of balancing distributional concerns. In contrast, within non-democratic countries lacking a majority voting system, the fiscal policy approach predicts a lack of direct association between income inequality and economic growth.

Galor and Zeira (1993) and Piketty (1997) showed a connection between borrowing restrictions income inequality and society's overall investment in human capital, which ultimately results in slower economic growth. The initial distribution of income/wealth will greatly influence society's investment patterns if people are unwilling or find it very difficult to borrow against future income due to borrowing restrictions. In other words, people will be able to invest in human capital if there is greater equality in society, which will lead to better growth.

Alesina and Perotti (1996) argue that high levels of income inequality can lead to political instability as marginalised groups may potentially turn to rent-seeking activities and violent means such as crimes or coups. They draw attention to the fact that socio-political instability may discourage investments and disturb the regular flows of markets and thus affect production, impacting growth negatively.

Income inequality can positively impact economic growth as it provides incentives for entrepreneurship and innovation (Lazear and Rosen, 1981). For example, a greater number of people will be more inclined to pursue and invest in education if it has a high rate of return. Furthermore, the upper-income stratum has a greater marginal propensity to save than the lower-income stratum, implying that in more unequal societies saving and investments and thus economic growth would be higher (Kaldor, 1957).

The high expenses associated with making investments, including starting new businesses, and executing innovations, are another example of how income inequality may potentially promote growth. If income is more concentrated, there will be enough individuals that will have the resources to promote new investments (Aghion et al, 1999). Mirrlees (1971) converses the motivations that inequality is needed for growth, in the model he establishes, agents' unobservable effort is what determines how much output is produced. A person will be deterred from exerting any further effort if these agents are all compensated at the same amount of pay, which is unrelated to their productivity. As a result, some inequality may be required to promote productivity and growth. According to Galor and Tsiddon (1997), periods of time marked by significant technological advancements are also characterised by rising levels of income inequality. Enhanced mobility and a concentration of highly qualified individuals in high-tech industries will lead to more rapid technological development and growth.
Galor and Moav (2004) propose a unified theory of growth and inequality. Their theory explains economic growth in terms of a nation's level of development. In the first phase of development, where nations have not completed their industrialisation process, the accumulation of physical capital is the main engine for economic growth made possible by income disparities among individuals. As only rich people can afford the large costs associated with large investments due to being more efficient at saving. In the second phase, human capital accumulation drives economic growth which is achieved through investing in education. However, flaws in capital markets make these difficult and government policies should focus on reducing income inequality to facilitate poor people's access to education. They also suggest that in the modern world, less developed nations may also need to accumulate human capital in the initial stages rather than only physical capital. Furthermore, the inflows of foreign capital may limit the encouragement for the wealthy to amass physical capital and boost economic growth, which could condition the positive impact of income inequality on economic growth for less developed nations.

2.3 Empirical Evidence

The 1990s saw the first noteworthy body of empirical research examining the relationship between income inequality and economic growth. Most of these empirical studies measured income inequality via the Gini coefficient and added this variable to a reduced-form economic growth equation using cross-sectional data from a sizable number of countries; (Alesina and Rodrik, 1994), (Perotti, 1996) and (Persson and Tabellini, 1994). The growth rate of GDP per

capita over a period of 20–30 years is used as the dependent variable in the research, and income inequality took the initial value at the start of the period under reflection, to control for potential reverse causality. The model also included a set of independent variables used as control variables for economic growth. For many of these studies, the coefficient of inequality is statistically significant and negative implying that it is detrimental to growth in the long run. Both Perotti (1996) and Persson and Tabellini (1994) find that the coefficient of inequality changes to being insignificant when regional dummies are added to the regression.

The lack of data and the poor quality of the available data on inequality was a fundamental problem for the earlier studies that investigated the relationship between inequality and economic growth. An income distribution dataset of high quality was compiled by Deininger and Squire (1998) and resulted in panel data being applied to the reduced form economic growth equation by economists such as Li and Zou (1998) and Forbes (2000). Compared to the previous studies, econometric analysis using panel data enables the elimination of time-invariant effects that may cause omitted variable bias. These studies used a five-year period to analyse the impact of inequality on economic growth. Li and Zou (1998) used fixed effects and random effects panel data model estimations and Forbes (2000) used the same estimations as Li and Zou (1998) but also used a first-difference general method of moments (GMM) estimation. Both Forbes and Li and Zou find that income inequality exhibited a positive coefficient indicating that it benefits economic growth. Many of the early studies that revealed a negative relationship using cross-sectional data between income inequality and economic growth are likely to have economic flaws such as measurement error and omitted-variable bias, making it difficult to establish a causal relationship.

Barro (2000) argues that the relationship between income inequality and economic growth is not linear. He models a system of equations with instrument variables, using a large panel of countries covering the time of 1965-1995 to investigate the impact of the initial level of income inequality on the average growth rate. He finds that when all countries are pooled together there is an insignificant relationship between income inequality and economic growth. However, when he separates the countries within the sample into their specific income classifications based on their respective GDP per capita, he finds that the coefficient of income inequality is different for rich and poor countries; the coefficient for poor countries is negative while for the rich it is positive. Therefore, suggesting that a non-linear relationship exists between the two variables. These findings can support distributional policies in poor countries where GDP per capita tends to be low. But in rich countries where GDP per capita tends to be high, redistribution may come at the expense of slower economic growth. This relationship was also confirmed by Barro in 2008 when he used updated data from the World Income Inequality Dataset. Hasanov and Izraeli (2011) similarly discover a non-linear relationship between income inequality and economic growth. Using data from 48 US states from 1960-2000, they find that growth can benefit from constant inequality but can suffer from decreased inequality and significant increases in inequality.

The study conducted by Barro (2000) emphasises the significance of considering the degree of economic development of the countries used within the empirical analysis of the relationship

between income inequality and economic growth. This explains why some empirical literature did not produce statistically significant coefficients, ostensibly because of this omitted variable bias or misspecification. Pooling countries with similar development levels together without considering a potential interaction between income inequality and countries' development classification results in an estimate of the average effect across all countries that would not deviate significantly from zero if the impact is positive in countries with developed economies and negative in countries with economies that are less developed. This is a significant flaw within much of the existing empirical research done so far.

Chen (2003) and Banerjee and Duflo (2003) question the non-linear relationship found by Barro (2000). In their respective examinations of the relationship between income inequality and economic growth, they consider the level of inequality and changes in inequality as potential factors influencing the computed coefficient. In the regression analysis, Chen (2003) discovers a statistically significant quadratic term indicating that income inequality and economic growth have an inverted U-relationship, like Kuznets (1955). According to Banerjee and Duflo (2003), there will be reduced growth in the short run when there are changes in the inequality variables, regardless of the direction it changes.

Cingano (2014) investigated the relationship between economic growth and inequality in 20 OECD countries between 1985 and 2005 using the system GMM estimation technique. The Gini coefficient and the income share of the top 10% were two of many metrics of income inequality employed in the study. The findings discovered indicated that income inequality has a negative and statistically significant impact on economic growth. Berg and Ostry (2017) claimed to have also obtained these findings in a similar study. The human capital accumulation theory is further examined by Cingano. He provides evidence that inequality may impact economic growth through the human capital channel. The income disparity between low-income households and the rest of the population appears to be a significant element for economic growth, as greater income inequalities diminish skill development among persons with lower parental education backgrounds. There is little evidence to suggest that the income disparity between high-income households and the rest of the population has any effect on economic growth or educational performance.

A meta-analytic re-evaluation of the impacts of income inequality on economic growth is carried out by Dominicis et al (2008). They note that the estimating method, data quality and sample coverage play a critical role in determining how much of an impact income inequality is expected to have on economic growth. The findings of this paper indicate that income inequality's impact on economic growth is often negative and more pronounced in developing countries. When the model includes regional dummies and other measures of inequality, the impact is weakened significantly. Dominicis emphasises that studies utilising fixed effects estimators appear to uncover a stronger impact of income inequality on economic growth.

3. Methodology and Data

3.1 Data Source

This paper consists of secondary data that has been acquired from the World Bank, the United Nations Development Programme and Systemic Peace. The sample data was chosen based on the following criteria: availability of data for the specific variables that will be used in the regression models, the period for full data is greater than 10 years and whether the data sources contained enough data for both developed and developing countries. Given these conditions, 49 countries were selected for the period of 2004-2018 as this is the most recent and reliable data available, resulting in 735 observations for the variables in this examination. The sample represents a diverse set of countries from different regions of the world with varying levels of income, economic development, and political systems. This diversity enables cross-country comparisons and aids in identifying the underlying mechanisms that drive the relationship between income inequality and economic growth. Table 1 presents the countries selected for this paper's analysis within their respective development classifications.

Table 1: Developmental Classifications of Countries

Classification	**Countries**
Developing	Armenia, Belarus, Bolivia, Brazil, Costa Rica, Dominican Republic, Ecuador, El Salvador, Georgia, Honduras, Indonesia, Kazakhstan, Kyrgyz Republic, Moldova, Panama, Paraguay, Peru, Thailand, Turkey, Ukraine
Developed	Argentina, Austria, Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Lithuania, Luxembourg, Latvia, Netherlands, Norway, Poland, Portugal, Russia, Slovak Republic, Slovenia, Spain Sweden, United States, United Kingdom

The average Human Development Index (HDI) from 2004-2018 has been used to determine a country's development classification. The HDI ranges from 0.000 (lowest development) to 1.000 (highest development). According to the World Bank, countries that have an average HDI between 0.800 and 1.000 are classified as developed and countries that had an average HDI below 0.800 are classified as developing.

The decision to select HDI over GDP per capita and GNI per capita to determine the development status of countries is based on the limitations of the latter two economic metrics. GDP per capita and GNI per capita only consider the economic output of a country and do not consider other critical aspects of development such as health and education. Moreover, these metrics can be influenced by natural resources and multinational firm economic operations which are external factors that may not accurately reflect the general population's well-being. This means that countries with high economic output, but poor human development may be categorised as developed, despite having significant inequities or inadequate social welfare. HDI, on the other hand, is a composite statistic that considers various aspects of development such as income, education, and health. Thus, it provides a more comprehensive picture of a country's development and well-being, recognising that development is about more than just economic wealth but also about improving the quality of life for all members of society.

The Polity 5 Index has been used to determine the political regimes of the sample countries. This measure of democracy has been selected instead of other indices because it considers numerous aspects of democracy, such as electoral competitiveness, freedom of expression and executive accountability. This multidimensional approach enables a more nuanced and accurate assessment of a country's democratic status. Secondly, it has a lengthy history, having been used to assess countries' levels of democracy since the 1970s, making it one of the most established and time-tested metrics of democracy. Thirdly, it is objective and transparent and is updated on a regular basis to reflect changes in a country's political system. Finally, academics, politicians, and other specialists in the field of democracy and governance universally recognise the Polity 5 Index, making it a trustworthy and helpful instrument for judging a country's level of democracy.

Panel data has been selected to examine the impact of income inequality on economic growth in a cross-country setting as opposed to both cross-sectional data and time-series data because it is a combination of these data types. According to Hsiao (1995), panel data allows for more accurate inference of model parameters as it contains more degrees of freedom and sample variability. It also allows for the study of more complicated data and controls for the impact of omitted variables.

3.2 Variables

Dependent Variable

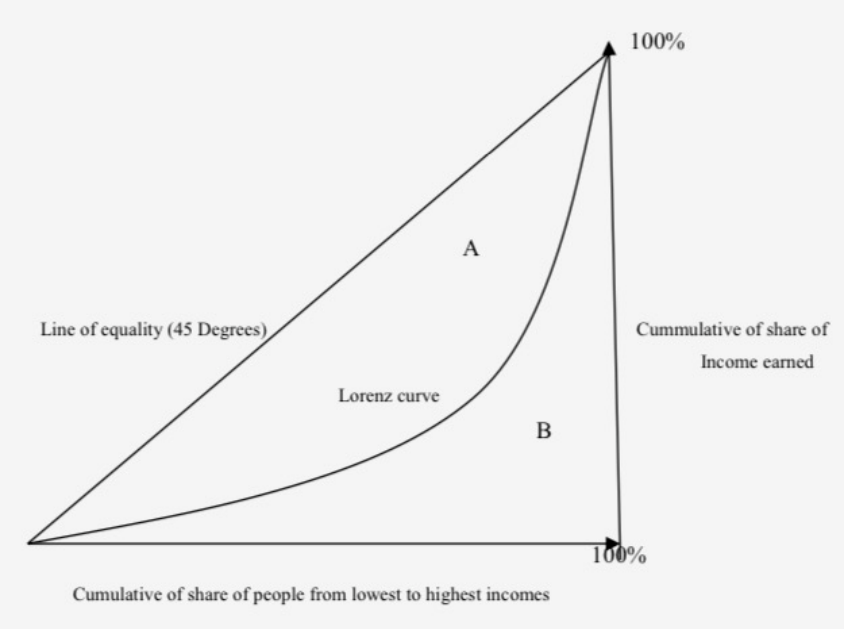
GDP Growth is conveyed as the logarithmic difference in GDP per capita in the current period compared to the previous period. It is essential for GDP Growth to be expressed in current international dollars converted by purchasing power parity (PPP) conversion factor to assess cross-country comparisons. Gross Domestic Product (GDP) per capita is a core indicator of economic performance and is commonly used as a broad measure of average living standards

or economic well-being (OECD). The main reason why this variable is expressed using natural logarithms is to reduce the heteroskedasticity of the data and the variance.

Independent Variables

Gini represents income inequality measured as the Gini coefficient. The Gini coefficient measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution. A Gini coefficient value of 0 indicates perfect equality and a value of 1 indicates perfect inequality. It can be calculated via the Lorenz Curve seen in Figure 2.

Figure 2: The Lorenz Curve



The Gini coefficient is the ratio of area (A) between the 45-degree line of equality and the Lorenz curve to the total area (A+B) under the equality line.

Gastwirth (2017), states that the Gini coefficient is the most used measure of income inequality. This is because it aligns with three principles: (1) Population independence: it is not affected by population size; (2) Anonymity: it does not reveal the identities of the high-income or low-income people in a population; and (3) Scale of independence: it is independent of a country's wealth or the economy's size.

Human Capital is conveyed as the average years of secondary school education completed by individuals over 16 years old for the years 2004 to 2018. Higher levels of human capital are associated with higher productivity and economic growth, as educated and skilled workers are more productive and innovative and can drive economic growth.

Physical Capital is conveyed by the Gross Capital Formation (% of GDP) which consists of outlays on additions to the fixed assets of the economy plus net changes in the level of

inventories for the years 2004 to 2018. Countries with well-developed infrastructure and capital stock are more likely to be productive and efficient, leading to faster economic growth.

Population Growth is expressed as the annual population growth rate for year t. It is the exponential rate of growth of the midyear population from year t-1 to t expressed as a percentage for the years 2004 to 2018. On the one side, an increasing population can expand the labour force and consumer base, boosting economic activity. Rapid population expansion, on the other hand, might strain resources and create economic issues.

Trade is expressed as the sum of exports and imports of goods and services measured as a share of GDP for the years 2004 to 2018. It enables countries to specialise in producing goods and services where they have a comparative advantage. Increased trade can result in increased output, productivity, and innovation.

HDI and **Polity** are expressed as dummy variables. HDI takes the value of 0 to represent a country being developed (reference group) and 1 when a country is developing. Polity takes the value of 0 when a country is democratic (reference group) and 1 when a country is non-democratic. Accounting for differences in the development status and political regimes of countries allows for the understanding of their different impacts on the relationship between income inequality and economic growth.

3.3 Hypothesis and Expected Results

Previous empirical literature utilising panel data models has yielded varying results for the impact of income inequality on economic growth in different scenarios. Most of the literature however tends to support the premise that income inequality hinders economic growth, especially in developing nations. The examination within this paper aims to answer the following research questions:

1. What is the overall impact of income inequality on economic growth
2. Does the impact of income inequality on economic growth differ for developed and developing countries
3. Does a country's political regime influence the impact of income inequality on economic growth

To answer these questions, the following 3 hypotheses have been constructed where H_0 represents the null hypothesis and H_1 represents the alternative hypothesis:

1. H_0: Income inequality has a negative impact on economic growth.
   H_1: Income inequality has a positive or no impact on economic growth.

2. H_0: The impact of income inequality on economic growth is the same for both developed and developing countries.

H_1: The impact of income inequality on economic growth differs between developed and developing countries.

3. H_0: The impact of income inequality on economic growth is the same for both democratic and non-democratic countries.
   H_1: The impact of income inequality on economic growth differs between democratic and non-democratic countries.

Table 2 presents the expected signs of the independent variables used in the regression analysis.

Table 2: Expected signs of the Independent Variables

Variable	Expected sign
Gini	Negative
HDI-Gini	Negative
Polity-Gini	Negative
Human Capital	Positive
Physical Capital	Positive
Population Growth	Positive
Trade	Positive
Polity	Negative
HDI	Positive

3.4 Econometric Models

We carry out 3 different approaches to answer the research questions proposed in the previous subsection. Approach (1) focuses on the overall impact of income inequality on economic growth across all countries. Approaches (2) and (3) incorporate interaction terms to capture the idea that income inequality may have a greater or lesser impact on economic growth in (2) developing countries compared to developed countries and (3) non-democratic countries compared to democratic countries. These approaches help to control for potential differences in the underlying economic, social, and political structures of the countries used in the sample. Thus, uncovering a more accurate and reliable estimate of the impact of income inequality on economic growth.

The econometric regressions used in this analysis are:

(1) $GDPGrowth_{i,t} = \beta_0 + \beta_1 Gini_{i,t} + \beta_2 Z_{i,t} + \delta_1 HDI_i + \delta_2 Polity_i + \alpha_i + \mu_{i,t}$

(2) $GDPGrowth_{i,t} = \beta_0 + \beta_1 Gini_{i,t} + \beta_2 Z_{i,t} + \delta_1 HDI_i + \delta_2 Polity_i + \delta_3 HDIi*Gini_{i,t} + \alpha_i + \mu_{i,t}$

(3) $GDPGrowth_{i,t} = \beta_0 + \beta_1 Gini_{i,t} + \beta_2 Z_{i,t} + \delta_1 HDI_i + \delta_2 Polity_i + \delta_3 Polityi*Gini_{i,t} + \alpha_i + \mu_{i,t}$

Where i,t denotes a country (i) at the time (t) and Z is a vector of control variables (Human Capital, Physical Capital, Population Growth and Trade). HDI*Gini is the developmental

classification and income inequality interaction term. Polity*Gini is the political regime classification and income inequality interaction term. α is the unobserved effect and u is the composite error term.

Econometric regressions run as panel data models are likely to suffer from unobserved heterogeneity, omitted variables bias, captured in α. Unobserved heterogeneity refers to the presence of observed factors that systematically influence the dependent variable but are not included in the model. Therefore, the covariance of the unobserved heterogeneity and one or more of the independent variables is not equal to zero, Cov (X_i, αi) ≠ 0, which is a violation of the zero conditional mean OLS assumption. These unobserved factors can lead to inconsistent and biased coefficient estimates.

3.5 Model Specification

Hausman Test

To overcome the issue of unobserved heterogeneity in panel data models a Hausman test is carried out to test for model misspecification. The test determines whether a Fixed Effects (FE) Model or a Random Effects (RE) Model is most appropriate for the panel data analysis. The FE Model includes individual-specific fixed effects in the model to capture unobserved heterogeneity, controlling for time-invariant unobserved factors that may vary across groups. In contrast, the RE Model assumes that the unobserved heterogeneity is uncorrelated with the observed variables and treats it as a random error term. Both models allow for a more accurate estimation of the coefficients of the unobserved variables.

The Hausman test checks the null hypothesis (H_0) that the RE Model is the preferred model against the alternative hypothesis (H_1) that the FE Model is the preferred model. The corresponding P-values associated with the hypothesis test will determine which of the two models is most suitable for the data. A significant P-value, less than 0.05, indicates that the FE Model should be used. Whereas an insignificant P-value, greater than 0.05, indicates that the RE Model should be used.

Sensitivity Analysis

To check the robustness of the panel data models employed in this analysis, classical OLS assumption tests will be performed to check the robustness of these models. Classical OLS assumption tests are used to determine whether the assumptions of a linear regression model are valid for the data under consideration. These include the following tests: Normality of residuals, Heteroskedasticity and absence of Multicollinearity.

The normality of residuals tests is carried out to check whether the residuals within the regression model are normally distributed. The heteroskedasticity test is performed to determine if the variance of the errors in a regression model depends on the values of the

independent variables. Multicollinearity tests are used to discover if the independent variables experience a linear correlation. These tests are important because if any of them fail the estimates of the regression coefficients may be biased and the standard errors may be incorrect.

3.6 Empirical Strategy

The programming language R has been selected to execute the statistical and empirical analysis of the panel data models in this paper. This is because R is an open-source language and environment for statistical computing and graphics (r-project.org). R can handle a wide range of file types, making it suitable for large datasets. R's package system allows it to run a variety of econometric tests, highlighting whether estimates are reliable. When a model is estimated, R can detect problems and assist future researchers who may use this methodology and model to solve the problem. As a result, it was chosen as the software for this paper.

4. Empirical Results

In this section, the estimation of regression models (1), (2) and (3) from section 2.4 will be presented. First, the descriptive statistics and correlation analysis will be discussed, and then the regression analysis and sensitivity analysis will follow.

4.1 Descriptive Statistics and Correlation Analysis

Table 3 presents some of the important descriptive statistics of the dataset used in this paper's examination.

The average value for GDP Growth for the period 2004-2018 is 0.005% for the 49 countries, indicating that countries experience a small degree of positive economic growth on average. Moreover, the Gini coefficient expressed as Gini provides evidence of moderate-income inequality in the countries included in the sample. The mean value is 0.360 which is a distance away from the perfect equality standard of 0, suggesting a noticeable gap between the rich and poor.

Table 3: Descriptive Statistics

Variables	*Observations*	*Mean*	*Standard Deviation*	*Minimum*	*Maximum*
GDP Growth	735	0.005	0.005	-0.028	0.028
Gini	735	0.360	0.083	0.232	0.595
HDI-Gini	735	0.194	0.209	0.000	0.595
Polity-Gini	735	0.045	0.118	0.000	0.534
Human Capital	735	6.533	0.956	5.000	9.000
Physical Capital	735	23.676	5.738	11.022	47.943
Population Growth	735	0.611	0.842	-2.258	2.891
Trade	735	95.869	50.989	22.106	360.132
HDI	735	0.490	0.500	0.000	1.000
Polity	735	0.129	0.336	0.000	1.000

The mean and standard deviation of the Polity variable indicate that there are considerable variations in the political regimes of the countries present in the dataset. On the other hand, the mean and standard deviation for HDI is relatively close suggesting that there is little variation in the level of development status across countries. The values for the interaction variables HDI-Gini and Polity-Gini indicate that there are significant variations in the relationship between countries' developmental status and political regimes with income inequality. The remaining independent variables in the descriptive statistics table seek to explain any remaining variations in GDP Growth.

Table 4: Correlation Matrix

	GDP Growth	*Gini*	*HDI-Gini*	*Polity-Gini*	*Human Capital*	*Physical Capital*	*Population Growth*	*Trade*	*HDI*	*Polity*
GDP Growth	1.000									
Gini	0.085	1.000								
HDI-Gini	0.195	0.659	1.000							
Polity-Gini	0.054	-0.001	0.298	1.000						
Human Capital	0.002	-0.412	-0.331	0.118	1.000					
Physical Capital	0.334	-0.077	0.163	0.217	0.022	1.000				
Population Growth	-0.090	0.427	0.307	0.011	-0.348	0.047	1.000			
Trade	0.075	-0.359	-0.255	-0.094	0.161	0.119	-0.030	1.000		
HDI	0.205	-0.426	0.948	0.384	-0.268	0.204	0.188	-0.216	1.000	
Polity	0.055	-0.071	0.278	0.976	0.141	0.239	-0.024	-0.073	0.393	1.000

The above table shows a very strong correlation between the interaction variables and their respective dummy variables; HDI-Gini and HDI, Polity-Gini and Polity. This may be problematic for the regression outcomes of regression models 2 and 3 as it can lead to multicollinearity being present. When multicollinearity is present determining the effect of each variable on the dependent variable is challenging. Therefore, to ensure robust results the HDI variable will be removed from regression model 2 and the Polity variable will be removed from regression model 3. Additionally, Gini and HDI-Gini exhibit a moderate correlation that is not problematic.

4.2 Regression Analysis

To study the impact of income inequality on economic growth (1), and whether the impact of income inequality on economic growth differs between (2) developed and developing countries and (3) non-democratic and democratic countries, 3-panel data regression models have been run.

First, we begin this analysis by illustrating the relationships between income inequality and economic growth as well as the relationship of HDI-Gini and Polity-Gini with economic growth as seen in figures 3, 4 and 5 below.

Figure 3: Gini and GDP Growth

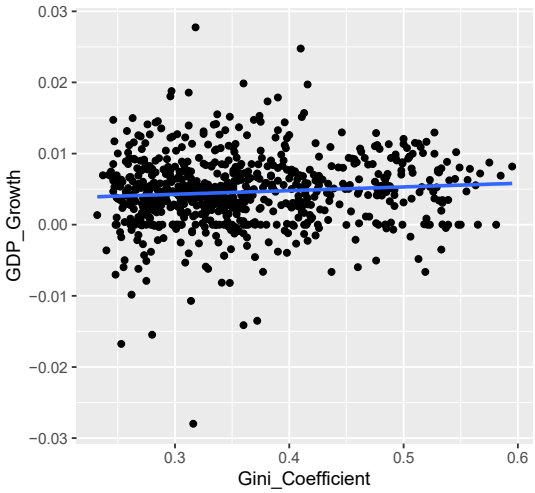


Figure 4: Polity-Gini and GDP Growth

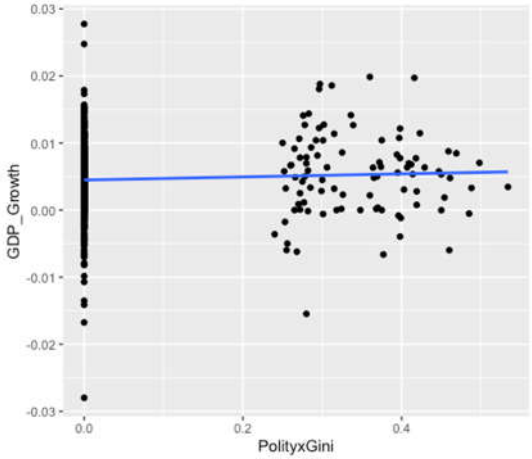
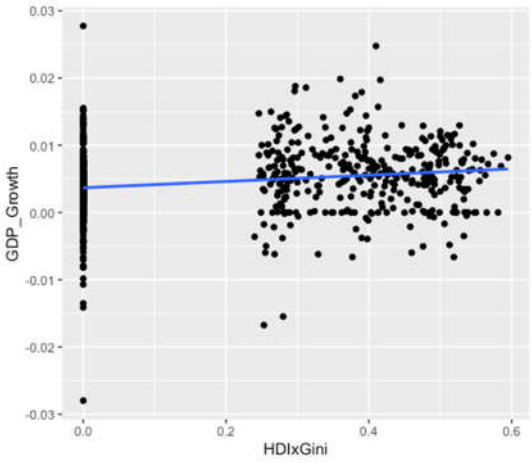


Figure 5: HDI-Gini and GDP Growth



The fitted line between GDP Growth and Gini in Figure 3 is close to flat, indicating that there lacks a strong relationship between the two variables from 2004-2018. Most countries have slow growth rates, clustering below 2 per cent and have a Gini coefficient range below 0.5. Figures 4 and 5 also have a relatively flat fitted line indicating no significant relationship between HDI-Gini and Polity-Gini with GDP Growth.

As previously mentioned in section 3.4 panel data models are likely to suffer from unobserved heterogeneity hence a Hausmann test is run to determine the most appropriate model specification for the regressions used in this paper's examination. Table 5 provides the P-values obtained from the Hausman test and the preferred model specification for each of the regressions.

Table 5: Hausman Test Results

Model	P-value	Preferred Model
1	4.051e-10	Fixed Effects Model
2	1.714e-11	Fixed Effects Model
3	7.534e-10	Fixed Effects Model

It is worth noting that, while the Hausmann test suggests that the Fixed Effects Model is the preferred model for all econometric regressions considered, the results of the Random Effects Models and the Pooled OLS Models are still reported in this paper for comparative purposes and to provide robust results.

Regression Model 1: The Impact of Income Inequality on Economic Growth

Table 6: Regression output for Regression Model 1

Panel Data Models

	Dependent Variable:		
	GDP Growth		
	(1)	(2)	(3)
Gini	0.011***	-0.005	0.011***
	(0.003)	(0.009)	(0.003)
Human Capital	0.0002	0.001*	0.0002
	(0.0002)	(0.001)	(0.0002)
Physical Capital	0.0003***	0.0004***	0.0003***
	(0.00003)	(0.00005)	(0.00003)
Population Growth	-0.001***	-0.002***	-0.001***
	(0.0002)	(0.001)	(0.0002)
Trade	0.00001***	0.0001***	0.00001***
	(0.00000)	(0.00001)	(0.00000)
Polity	-0.001*	-0.002**	-0.001*
	(0.001)	(0.001)	(0.001)
HDI	0.002***		0.002***
	(0.0004)		(0.0004)
Constant	-0.008***		-0.008***
	(0.002)		(0.002)
Observations	735	735	735
R^2	0.180	0.172	0.180
Adjusted R^2	0.172	0.106	0.172
F Statistic	22.837*** (df = 7; 727)	23.520*** (df = 6; 680)	22.837*** (df = 7; 727)
Significance Levels			*p<0.1; **p<0.05; ***p<0.01

Table 6 reports a set of results using 3-panel data models. Column (1) represents the Pooled OLS Model results, Column (2) represents the Fixed Effects Model results and Column (3)

represents the Random Effects Model results. All models are statistically significant at the 1% level based on their F-Statistics.

Focussing on the Fixed Effects Model, we can see that Gini exhibits a negative relationship close to zero with GDP Growth. Indicating that a 1 unit increase in income inequality decreases economic growth by 0.5%. However, as this variable is statistically insignificant, we cannot prove that it has any relationship with economic growth. Therefore, we are unable to reject or accept the first null hypothesis of this paper that income inequality has a negative impact on economic growth.

Across all 3 models Physical Capital, Population Growth and Trade are statistically significant at the 1% level. Polity is also statistically significant across all models, but it has different significance levels, it is statistically significant at the 10% level for both the Pooled OLS Model and the Random Effects Model but is statistically significant at the 5% level for the Fixed Effects Model. Human Capital is only statistically significant at the 10% level in the Fixed Effects Model.

We can interpret the coefficients of the variables from Table 6 while holding all other variables constant. A 1 unit increase in Human Capital increases GDP Growth by 0.1%, indicating that individuals with higher education levels can positively impact economic growth. Similarly, a 1 unit increase in Physical Capital increases GDP Growth by 0.04%, suggesting that greater infrastructure investment can also contribute to economic growth. A 1 unit increase in Trade increases GDP Growth by 0.01%. However, a 1 unit increase in Population Growth decreases GDP Growth by 0.2%, revealing that greater population sizes can potentially impact economic growth negatively. A 1 unit increase in Polity indicates that non-democratic countries will see a decrease in GDP Growth by 0.02% compared to democratic countries.

Overall, we find that there is a lack of significance of the independent variables used in this regression model in explaining the variation in GDP Growth (economic growth) as the adjusted R^2 of the Fixed Effects Model is 0.106 which is lower than the Pooled OLS and Random Effects Model. This means that the independent variables only explain 10.6% of the variation in economic growth.

Regression Model 2: Accounting for the Development Status of Countries

Table 7: Regression output for Regression Model 2

Panel Data Models			
	Dependent Variable:		
	GDP Growth		
	(1)	(2)	(3)
Gini	0.008**	-0.051***	0.008**
	(0.003)	(0.018)	(0.003)
Human Capital	0.0001	0.002**	0.0001
	(0.0002)	(0.001)	(0.0002)
Physical Capital	0.0003***	0.0004***	0.0003***
	(0.00003)	(0.00004)	(0.00003)
Population Growth	-0.001***	-0.003***	-0.001***
	(0.0002)	(0.001)	(0.0002)
Trade	0.00001***	0.0001***	0.00001***
	(0.00000)	(0.00001)	(0.00000)
Polity	-0.001	-0.003**	-0.001
	(0.001)	(0.001)	(0.001)
HDI-Gini	0.004***	0.059***	0.004***
	(0.001)	(0.021)	(0.001)
Constant	-0.007***		-0.007***
	(0.002)		(0.002)
Observations	735	735	735
R^2	0.177	0.182	0.177
Adjusted R^2	0.169	0.115	0.169
F Statistic	22.327*** (df = 7; 727)	21.533*** (df = 7; 679)	22.327*** (df = 7; 727)
Significance Levels			*p<0.1; **p<0.05; ***p<0.01

Table 7 reports the set of results using panel data models. Column (1) presents the results for the Pooled OLS Model, Column (2) presents the results for the Fixed Effects Model and Column (3) presents the results for the Random Effects Model. Similarly, to Regression Model 1, all panel data models are statistically significant at the 1% level based on their F-Statistics. Physical Capital, Population Growth and Trade all remain statistically significant at the 1% level. Polity is statistically significant at the 5% level for all models whereas in Model 1 its statistical significance varied. Compared to Regression Model 1, Human Capital's statistical significance increased to the 5% level in the Fixed Effects Model.

Focussing on the Fixed Effects Model, the inclusion of the HDI-Gini interaction variable results in Gini becoming statistically significant at the 1% level whereas in Regression Model 1, it is statistically insignificant. It has a negative coefficient that suggests a 1 unit increase in income inequality decreases economic growth by 5.1% holding all other factors constant. HDI-Gini is statistically significant at the 1% level for all models indicating that the relationship between income inequality and economic growth does differ based on a country's development

status, therefore the second null hypothesis in this paper that suggested the impact of income inequality on economic growth is the same for developed and developing countries can be rejected. The positive coefficient of this variable indicates that income inequality has a more positive impact on economic growth in developing countries. Therefore, a 1 unit increase in income inequality increases economic growth by 5.9% in developing countries compared to developed countries.

The coefficients of Physical Capital and Trade remain the same as in Regression Model 1. However, the coefficient of both Human Capital, Population Growth and Polity changes in size when a modification is made to Regression Model 1. Human Capital has seen an increase in its coefficient by 0.001 and has become statistically significant at the 5 per cent level. This indicates that the effect of Human Capital on economic growth is stronger in the presence of the interaction term. Both Population Growth and Polity have a decrease in their respective coefficients by 0.001 when an interaction term is introduced. This may be because the impact of income inequality on economic growth is now captured separately for each country's level of development rather than being assumed to be the same for all countries, affecting the relationship of these variables with economic growth. We can infer that a 1 unit increase in Human Capital, Physical Capital, Population Growth, Trade, and Polity will lead to in percentage terms a 0.2, 0.04, -0.3, 0.01 and-0.3 impact on economic growth holding all other variables constant.

The Fixed Effects Model has a slightly higher adjusted R^2 of 0.115 compared to the first regression model. The variables in this regression model explain 11.5% of the variation in economic growth. This increase may have occurred due to the HDI-Gini interaction term capturing an additional source of variation in economic growth that was not captured by the main effects of the Gini, HDI and the other control variables.

Regression Model 3: Accounting for the Political Regimes of Countries

Table 8: Regression output for Regression Model 3

Panel Data Models			
	Dependent Variable:		
	GDP Growth		
	(1)	(2)	(3)
Gini	0.011***	-0.004	0.011***
	(0.003)	(0.009)	(0.003)
Human Capital	0.0002	0.001*	0.0002
	(0.0002)	(0.001)	(0.0002)
Physical Capital	0.0003***	0.0004***	0.0003***
	(0.00003)	(0.00005)	(0.00003)
Population Growth	-0.001***	-0.002***	-0.001***
	(0.0002)	(0.001)	(0.0002)
Trade	0.00001***	0.0001***	0.00001***
	(0.00000)	(0.00001)	(0.00000)
HDI	0.002***		0.002***
	(0.0004)		(0.0004)
Polity-Gini	-0.003*	-0.006**	-0.003*
	(0.002)	(0.003)	(0.002)
Constant	-0.008***		-0.008***
	(0.002)		(0.002)
Observations	735	735	735
R^2	0.180	0.170	0.180
Adjusted R^2	0.172	0.104	0.172
F Statistic	22.735*** (df = 7; 727)	23.264*** (df = 6; 680)	22.735*** (df = 7; 727)
Significance Levels			*p<0.1; **p<0.05; ***p<0.01

Table 8 reports the results of the final regression model in this paper's examination. Like the previous two regressions, all panel data models are significant at the 1% level based on their F-Statistics. This equation has the same statistically significant control variables and coefficient signs as regression model 1 for the Fixed Effects Model; Physical Capital, Population Growth and Trade are statistically significant at the 1% level while Human Capital is statistically significant at the 10% level. We can infer from these findings, holding all other factors constant, a 1 unit increase in Human Capital, Physical Capital, Population Growth and Trade results in a 0.1%, 0.04%, -0.2% and 0.01% impact on economic growth.

Polity-Gini is statistically significant at the 5% level for the Fixed Effects Model and at the 10% level for the Pooled OLS and Random Effects Models. This indicates that the impact of income inequality on economic growth differs between non-democratic and democratic countries and so the third null hypothesis of this paper which suggested that the impact of income inequality on economic growth is the same for democratic and non-democratic countries can be rejected. The coefficient of this interaction variable is negative, indicating that a 1 unit increase in income inequality decreases economic growth by 0.6% in non-democratic countries compared to democratic countries.

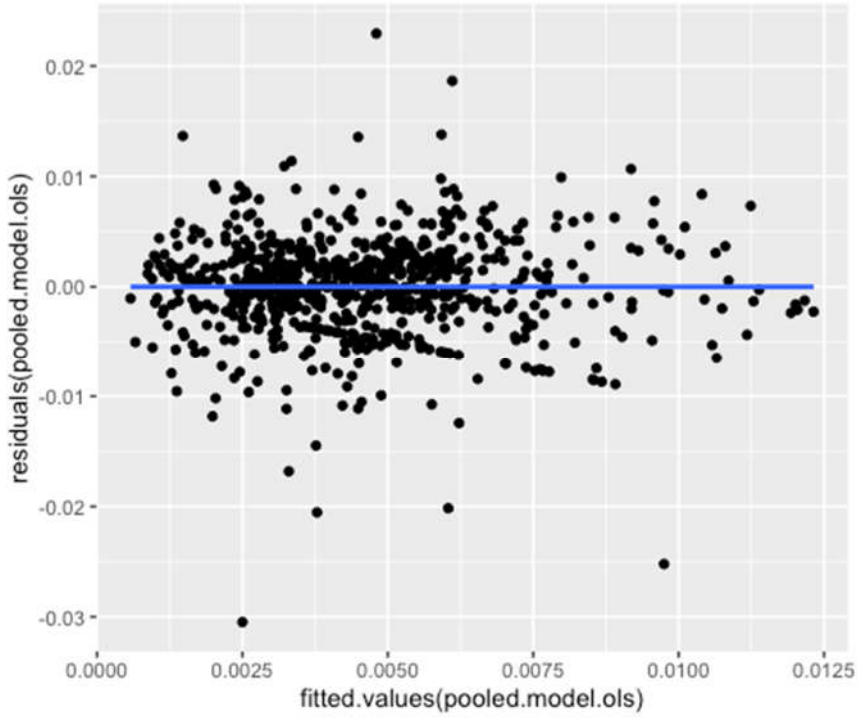
The Fixed Effects Model has a slightly lower adjusted R^2 of 0.104 compared to regression models 1 and 2 indicating that the independent variables only explain 10.4% of the variation in economic growth. A possible reason for this may be due to the Polity-Gini interaction term not being as significant as the HDI-Gini interaction term in regression model 2. This would result in a reduction of the explanatory power of the model, thus decreasing the adjusted R^2.

4.3 Sensitivity Analysis

To assess the reliability of the estimates in Tables 6, 7 and 8 sensitivity analysis is performed to check the robustness of the panel data regression models. To check the robustness of the regression models, 4 classical OLS assumption tests were run to detect whether the models present biased estimates and weak predictions.

Linearity: The residuals versus fitted plot (Figure 6) shows a straight line along the horizontal axis with no noticeable pattern. Therefore, we can assume that the dependent variable and independent variables have a linear relationship.

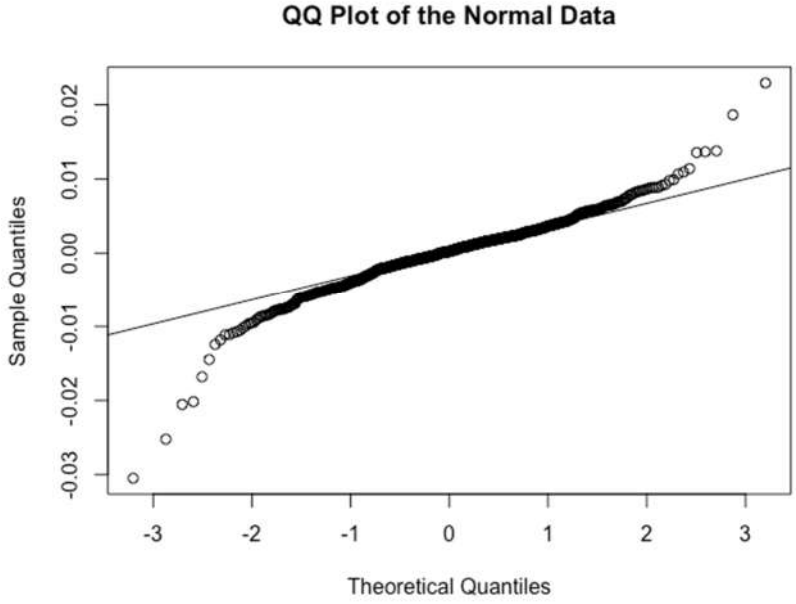
Figure 6: Residuals vs Fitted values plot.



Normality of residuals: To determine the normality of the residuals, we used the Sharpiro-Wilk normality test. We obtained the following results, W = 0.93801 for regression model 1, W = 0.93765 for regression model 2 and W = 0.93793 for regression model 3, with the P-value for all regressions being < 2.2e-16 at the 5% significance level. These results indicate that the

residuals may not have a normal distribution, which may alter the standard errors of the OLS estimates, reducing their accuracy. This finding could be attributable to the presence of outliers, but we can conclude that most of the residuals follow a normal distribution as seen in the normal probability QQ plot (Figure 7) hence the analysis can continue.

Figure 7: QQ Plot of residuals



Heteroskedasticity (constant variance of residuals): We performed a Breusch-Pagan Lagrange Multiplier (LM) test to determine whether the variance of the errors in the panel data regression models is constant across all observations (homoscedastic), or whether they vary systematically (heteroskedastic). We obtain the following LM Statistics and P-values shown in Table 9.

Table 9: Heteroskedasticity Test Results

Regression	LM Statistic	Degrees of Freedom	P-value
1	17.024	7	0.01725
2	16.762	7	0.019
3	15.987	7	0.02524

As the P-values are less than the 95% significance level (0.05) we reject the null hypothesis of homoscedasticity and conclude that there is evidence of heteroscedasticity in the regression models. Therefore, the regression models are estimated using robust standard errors which allow for the variance of the errors to differ across observations and allow the standard errors to adjust to reflect the correlation structure of the data, accounting for heteroskedasticity and

serial correlation in the data to ensure more accurate standard errors and unbiased coefficient estimates.

No multicollinearity: Table 10 displays the variance inflation factor for the panel data regression models. This table reveals that the regression does not suffer from multicollinearity, with 4 being the tolerance VIF level (Hair et al, 2010).

Table 10: VIF Values

Independent Variable	VIF Values Model 1	VIF Values Model 2	VIF Values Model 3
Gini	1.833	2.543	1.782
HDI-Gini		2.328	
Polity-Gini			1.303
Human Capital	1.337	1.316	1.334
Physical Capital	1.125	1.316	1.122
Population Growth	1.322	1.319	1.322
Trade	1.210	1.208	1.209
HDI	1.686		1.610
Polity	1.384	1.321	

5. Discussion

This section discusses the main findings of our models, compares them to the existing literature and presents policy implications.

Income inequality can have both positive and negative effects on economic growth which highlight the complexity of the issue. These opposite effects can offset each other resulting in the relationship being statistically insignificant as uncovered in the first regression model. This finding obtained its expected sign and is consistent with Ostry et al. (2014). Policymakers must consider the various channels through which income inequality impacts economic growth and consider the trade-offs when designing policies to address income inequality and promote economic growth. For instance, policies that redistribute income such as progressive taxation and reduce inequality may improve social cohesion and political stability, but they might stifle innovation and entrepreneurship, which would ultimately be detrimental to economic growth. Conversely, policies that encourage entrepreneurship and innovation may boost the economy and exacerbate income inequality. Thus, policymakers must carefully balance these conflicting priorities when designing policies, recognising that a one-size-fits-all solution may not be possible to reduce income inequality and promote economic growth.

Surprisingly in the second regression model, the coefficient exhibited by the interaction term accounting for the impacts of income inequality on economic growth for developed and developing countries is positive suggesting that income inequality has a more positive impact on economic growth in developing countries compared to developed countries. This finding

contradicts that of Barro (2000) who argued that income inequality has a more negatively pronounced impact on developing countries compared to developed countries, due to individuals in developing countries being unable to sufficiently invest in their human capital. It can be argued that in developing countries income inequality can serve as a motivation for individuals to work harder and invest more, with the hope of achieving greater economic success and upward mobility. In contrast, in developed countries, where the basic needs for human survival are already met, income inequality may create social and political instability leading to lower economic growth (Alesina and Perotti, 1996). This suggests that policymakers need to consider the unique economic and social conditions of their country when designing policies to address income inequality and promote economic growth.

As expected in the third regression model, the coefficient for the interaction term involving a country's political regime and income inequality is negative, indicating that income inequality has a more negative impact on economic growth in non-democratic countries compared to democratic countries, which is consistent with the existing literature. This suggests that political institutions play a crucial role in determining the relationship between income inequality and economic growth. Non-democratic countries may be more inclined to implement policies that benefit a small elite at the expense of the general population, resulting in higher income inequality (Acemoglu and Robinson, 2000). This can lead to economic inefficiencies and a reduction in incentives for innovation and investment, resulting in lower economic growth (Stiglitz, 2012). Therefore, policymakers in non-democratic countries should implement policies such as minimum wage laws and social safety nets as they will mitigate the negative impacts of income inequality and promote incentives for innovation and investment that can lead to economic growth. Whereas policymakers in democratic countries can prioritise policies that improve Human Capital, Physical Capital and Trade as these factors have a greater impact on economic growth.

Human Capital, Physical Capital, and Trade exhibit their positive expected signs and are statistically significant, indicating that as they increase economic growth increases. Studies have revealed a strong correlation between investments in Human Capital, such as education and training, and economic growth (Mankiw, Romer and Weil, 1992). Physical Capital refers to the infrastructure, equipment and machinery used in production. Increased investment in Physical Capital, such as the construction of factories can lead to improved efficiency, productivity, and economic growth (Solow, 1956). Trade can enhance competition and innovation, which will result in higher productivity and economic growth by enabling the flow of products and services across international borders. Hence policymakers should focus on policies such as lifelong learning opportunities, public investment in infrastructure and reducing trade barriers to enhance these factors to increase long-run economic growth.

Surprisingly Population Growth produced an unexpected coefficient sign that is statistically significant. One would think that an increase in population would result in an increase in the size of the labour force and thus greater production of goods and services leading to economic growth. However, the coefficient sign obtained is negative. Rapid population expansion can increase the dependence ratio, which is the ratio of non-working-aged people (children and the

elderly) to working-aged people. This can lead to a decline in the available labour force and a decrease in worker productivity, both of which can have a detrimental impact on economic growth (Barro,1991). Similarly, the Polity variable is negative and statistically significant. Under non-democratic regimes, there is a risk of corruption and rent-seeking behaviour, which can lead to resource misallocation and economic inefficiencies. This is especially harmful to long-term economic growth. To mitigate the negative effects of Population Growth policymakers should implement policies that promote family planning and access to education and employment opportunities. Policymakers could also implement a more democratic political system that promotes political stability and reduces the negative impact of inequality on growth. This can be established by policymakers supporting civil society organisations, enhancing the rule of law, and defending freedom of speech and the press.

It is crucial to remember that the findings of the regression analysis only show correlation, not causation. Although the significant variables provide insight into the factors that may impact economic growth, they do not prove that these factors directly cause changes in economic growth. Hence, caution should be taken when interpreting this paper's findings in terms of causation and further research should be carried out to establish any causal relationships.

6. Conclusion

The objective of this study is to assess the following: the overall impact of income inequality on economic growth, whether the impact of income inequality on economic growth differs for developed and developing countries and whether a country's political regime influences the impact of income inequality on economic growth. To reach the objective, we employ a set of panel data, using Fixed Effect Models, for 49 countries during the period 2004-2018. This is appropriate for determining long-run correlations between the dependent variable and independent variables. Depending on the channel and time employed on a regression model, the existing literature on the impact of income inequality on economic growth suggests a positive, negative or no relationship between the two variables. However, these theories are hotly discussed and frequently provide ambiguous answers.

Our main findings suggest that across all 3 regression models, income inequality negatively impacts economic growth, but it is only statistically significant for the second model that incorporates an HDI-Gini interaction variable. The HDI-Gini interaction variable exhibits a positive and statistically significant relationship with GDP Growth indicating that income inequality impacts economic growth more positively for developing countries compared to developed countries. Additionally, the Polity-Gini interaction variable implemented in regression model 3 exhibits a negative relationship with economic growth indicating that income inequality impacts economic growth more negatively for non-democratic countries compared to democratic countries. Human Capital, Physical Capital, Trade and Population Growth are the control variables employed in each regression model and these variables are all

statistically significant determinants for economic growth, aligning with existing theoretical and empirical literature.

The findings of this paper have important implications for policymakers and other stakeholders as they shed light on the complex relationship between income inequality and economic growth by adding new insights and nuances to the debate on this relationship. The negative impact of income inequality across all models indicates that policies that aim to reduce income inequality can lead to higher economic growth. Moreover, the positive relationship displayed by income inequality on economic growth for developing countries demonstrates the necessity for policies to consider the unique situation of each country. The negative relationship displayed by income inequality on economic growth for non-democratic countries demonstrates that promoting democratic institutions can be a useful strategy for lowering income inequality and promoting economic growth.

While this paper's methodology may be limited by the lack of data for all countries in the world and the possibility of reverse causality in the regression models employed, future research could overcome these drawbacks by utilising instrumental variables and using other databases to acquire a greater sample size. Future research should also investigate how different political regimes such as hybrid regimes affect the relationship between income inequality and economic growth. This paper could be expanded further in future research in the following ways: by including another inequality indicator such as the Hoover Index, by including more economic growth control variables such as technological advancements and by estimating cross-sectional models.

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