Income Inequality and Economic Growth: An Analysis

Nicholas Martin

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Income Inequality and Economic Growth: An Analysis

by

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Advisor: Dr. Amy Farmer

An Honors Thesis in partial fulfillment of the requirements for the degree Bachelor of Science in Business Administration in Economics.

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Abstract

Income inequality and its relationship with economic growth has been a subject of debate in academia for decades. This paper examines the relationship the Gini index of five selected countries and four macroeconomic variables (GDP growth, unemployment rate, lending interest rate, and savings rate) for each country with two developed nations being represented (United States and Italy) and three developing nations being represented (Peru, Belarus, and Indonesia). After reviewing the literature on the relationship between income inequality and economic growth, a multivariate regression analysis of each country is presented; first with GDP growth as the dependent variable, followed by a second exercise using the Gini index as the dependent variable. In the first exercise, the Gini index was not a statistically significant variable for any of the selected countries in relation to GDP growth. In the second exercise, the selected macroeconomic variables in use changed depending on the significance level of the variables in a particular country from an initial regression. Overall, in the second exercise, the significant variables for each country can explain 73% of the variance in the Gini index for the United States, 65% of the variance in the Gini index for Italy, 84% of the variance in the Gini index for Peru, 80% of the variance in the Gini index in Belarus, and 63% of the variance in the Gini index in Indonesia.
Introduction

Income distribution has been a subject of debate for decades, specifically income inequality. Some argue that income inequality is necessary for a thriving economy, others contend that income inequality is harmful to economic growth in a country. Income inequality refers to how evenly income and income growth is distributed across the population (US Census 1).

This paper examines five selected countries’ Gini indices (two developed and three developing) and how the indices correlate with economic growth factors, specifically GDP growth, unemployment rate, lending interest rate, and savings rate to attempt to get a clearer picture of the relationship between income inequality and economic growth. Along with this, the addition of the classification of developed or developing is an attempt to examine the relationship that income inequality has on economic growth in economies in different stages.

This paper will first discuss the literature on income inequality and its impact on economic growth. In the literature review, there is an explanation of the measure of income inequality that will be used throughout this paper. The explanation is followed by an analysis of theoretical income inequality mechanisms on economic growth. After the theoretical income, a multivariate regression analysis will be conducted for each of the five selected countries (United States, Italy, Peru, Belarus, and Indonesia) to examine the relationship between income inequality and economic growth using GDP growth (annual %) as the dependent variable. Lastly, an additional multivariate regression will be conducted using the Gini index as the dependent variable.
Literature Review

The literature on income inequality and economic growth is vast and varied. Empirical studies that examine the relationship between income inequality and economic growth have been conducted using a variety of measures and methodologies with mixed findings. Some studies show a negative relationship between income inequality and economic growth, while others show a positive relationship or no relationship at all (Mdingi & Ho, 2021).

A common finding in the literature is that higher levels of income inequality are associated with lower economic growth. In the study “Inequality and Unsustainable Growth: Two Sides of the Same Coin?” (Berg & Ostry, 2011), the authors found that higher levels of income inequality decreased the amount of time a period of growth in a country’s economy will be sustained. Similarly, a study conducted by the Organization for Economic Cooperation and Development (OECD) found that higher levels of income inequality in a country’s economy have a negative and statistically significant impact on the subsequent growth of that country’s economy, particularly in developing countries (Cingano, 2014). Both studies show the potential negative impact that high levels of income inequality have on the sustainable growth of an economy.

Research showing the ambiguity of the impact of income inequality on economic growth is also prominent in the literature. The paper “Inequality and Growth in a Panel of Countries” (Barro, 2000) finds a negative relationship between income inequality and economic growth for poor countries, while the relationship for rich countries is positive. However, the study found that the overall effect of income inequality on economic growth and investment is weak (Barro, 2000). More recent research has proposed that there is no connection between income inequality and economic growth. In the article “How does income inequality affect economic growth at different income levels?” (Shen & Zhao, 2022), the authors constructed a regression model to include several variables in countries of varying levels of development. The study found that there is no overall relationship between inequality and growth, however, economies in earlier stages of development could be more sensitive to macroeconomic effects from income inequality (Shen & Zhao, 2022). These results conflict with the findings in previous studies discussed, displaying the complexity of defining the relationship.

One of the barriers to researching income distributions is the lack of data on some economies, as discussed in the 1997 article, “Economic Growth and Income Inequality: Reexamining the Links” (Deninger & Squire, 1997). The article discusses how accurate Gini coefficients can be hard to find, specifically before the 1960s (Deninger & Squire, 1997). This makes accurate analysis of income distributions more difficult. Since this paper was published, there is more data on Gini coefficients, but there is still a lack of data for many economies (The World Bank). The paper also discusses how the way income data is collected for Gini coefficients is important when maintaining the integrity of the data; the paper states that for the most accurate income data, the data must be collected using a nationally representative survey, rather than synthetic estimates from national data (Deninger & Squire, 1997). This is important to consider when selecting data on a country’s Gini coefficient. Accurate Gini coefficient data could potentially allow for a better understanding of the relationship between income inequality and economic growth. Using a new cross-country data set on inequality, Deninger & Squire found that an unequal distribution of assets can impede growth more than an unequal distribution of income (Deninger & Squire, 1997). This adds a level of complexity when analyzing the
connection between income inequality and economic growth. Data limitations once again make this a difficult point to analyze when examining a nation’s economy.

**Income Inequality Measures**

The most common measure of income inequality found in the literature on income inequality and the measure that will be used for the remainder of this paper is the Gini index (Gini 1912). The Gini index quantifies the state of income distribution in a particular economy based on the percentage of income distributed amongst the percentage of the population. The Gini index ranges from 0%-100% or 0-1 depending on the units used. Both scales have the same meaning with a Gini index of 0% being perfect equality in an economy with everyone in the economy earning the same income and a Gini index of 100% (or 1) being the condition of an economy with a concentration of income amongst one person or a small group (perfect inequality). Both 0 and 100 are extreme Gini indices and are not feasible goals to strive towards for an economy. However, this measurement will show whether the income in an economy is becoming less equal or more equal depending on the case, which is helpful for analyzing the impacts of income inequality on economic growth (Lorenz, 1905). Additionally, consolidating the income distribution of an economy into a single statistic allows for comparisons with other economies that have different population sizes (Sitthiyot & Holasut, 2020). The Gini index can be derived and graphically viewed from the Lorenz curve (Lorenz, 1905) as Figure 2 on the next page shows.

(Figure 1. Placeholder Data used for Lorenz Curve Example)

*This data is used strictly for example purposes and does not come from a particular economy*
Figure 2 shows an example of a Lorenz curve. The orange line is the line of perfect equality and is an example of what a Lorenz curve would look like if the country had a perfectly equal distribution of income. As previously discussed, no economy has a Lorenz curve with perfect equality. The Lorenz curve (shown in blue) is closer to what an economy’s Lorenz curve would look like in the real world. The Gini index is calculated as the ratio of the area between the line of equality and the Lorenz curve (A) divided by the total area under the line of equality (A+B) (Sitthiyot & Holasut, 2020). The Gini index will be used as the measurement of income inequality for the remainder of this paper.

**Theoretical Income Inequality Mechanisms**

Further expanding on the review of “Inequality and Growth in a Panel of Countries” (Barro 2000), Barro proposes four broad categories of theoretical effects of inequality on growth and investment that will be used to guide the methodology later in this paper.

The impact that income inequality has on economic growth occurs through a variety of mechanisms. One mechanism through which income inequality can impact economic growth is its effect on investments in human capital. Individuals that come from low-income households often face significant barriers to accessing education and training opportunities, which can lead to a relatively less skilled and productive workforce. A less skilled and productive workforce then leads to less economic growth. A study analyzing the relationship between income distribution and investment in human capital “Income Distribution and Macroeconomics” (Galor & Zeira 1993) found that higher levels of income inequality have a negative relationship with investments in human capital. This negative relationship remained through the next generation, showing the decrease in investment had an impact on economic growth in the short-run, as well
as the long-run. The reason for this in the study is due to imperfect credit markets in which individuals would have limited access to credit. The limited access to credit disincentivizes individuals in an economy to invest using credit, leading to a decrease in investment in human capital (Galor & Zeira 1993).

Another mechanism through which income inequality can impact economic growth that is discussed by Barro is through the political economy (Barro 2000). Barro discusses how in an economy with higher levels of income inequality, individuals in that economy tend to vote in favor of redistribution policies. These redistribution policies can have a negative impact on people’s incentives to produce in the economy. For example, if citizens in the economy vote for a tax on the wealthy, the tax may make people work less to avoid taxation. This is inefficient for economic growth as people are incentivized to work less and not generate their full potential output.

The third mechanism purposed is socio-political unrest (Barro 2000). The greater the inequality of wealth in an economy, the greater the incentives for poor individuals in the economy to engage in disruptive activities, such as crime, riots, etc. This point also factors in investment as the more socio-political unrest there is in an economy, the less incentivized individuals will be to invest in those economies (Barro 2000).

The final mechanism purposed that income inequality impacts economic growth through is the impact on saving rates (Barro 2000). Barro expresses how some economists believe that individual saving rates rise with the level of income, which would then increase investment and promote economic growth (Barro 2000).

These four mechanisms will be important to keep in mind later in the paper when it comes to deciding which macroeconomic variables to examine.

Closing Remarks on Current Literature

The current literature on income inequality and economic growth highlights the complex relationship between the two variables. While there is no clear consensus on the exact mechanism(s) through which income inequality impacts economic growth, there is evidence that income inequality can negatively impact the economic growth of an economy, as well as the sustainability of the growth the economy is experiencing, particularly in developing countries. The literature reinforces that different economic and social contexts will change the impact that income inequality has on economic growth, therefore the context that a certain economy is viewed in is important to consider when trying to answer the question of how much income inequality can impact economic growth.

Regression Analysis

Methodology, Data Selection, and Limitations

There will be two exercises conducted in the remainder of this thesis to examine the relationship between income inequality and economic growth. Both exercises will use a multivariate regression for analysis. The multivariate regression in the first exercise will use GDP growth as the dependent variable in the regression equation. The multivariate regression in the second exercise will use the Gini index as the dependent variable. The two approaches are used to gather data on the relationship that income inequality has with economic growth from
both sides with the first exercise looking at how income inequality impacts economic growth and the second exercise focusing on how economic growth impacts income inequality.

**Exercise 1 Methodology**

Exercise 1 will utilize multivariate regression. The independent variables that I will be using for the regression will be the Gini coefficient, unemployment rate (annual %), lending interest rate (annual %), and savings rate (annual % of GDP) of the country being examined. For the dependent variable I will be using GDP growth (annual %) of the country that is being examined. Data for the dependent variable and all independent variables comes from The World Bank. The countries that will be examined are United States, Italy, Peru, Belarus, and Indonesia.

**Exercise 2 Methodology**

Exercise 2 will utilize multivariate regression. The independent variables that I will be using for the regression will be GDP growth (annual %), unemployment rate (annual %), lending interest rate (annual %), and savings rate (annual % of GDP) of the country being examined. For the dependent variable I will be using the Gini coefficient of the country that is being examined. Data for the dependent variable and all independent variables comes from The World Bank. The countries that will be examined are once again United States, Italy, Peru, Belarus, and Indonesia.

**Data Selection/Limitations: Exercises 1 & 2**

Due to certain gaps in the data, some selected countries will have less observations than others. This can impact the significance of the regression and will be something to consider going forward. Additionally, the macroeconomic variables chosen for the regression and the Gini index have the possibility of being endogenous variables. Estimating a simultaneous system would be more appropriate for finding the relationship between income inequality and economic growth, but that is outside the scope of this thesis.

The reasoning behind choosing the four macroeconomic variables of GDP growth, unemployment rate, interest rate, and savings rate is because of the findings in the literature review section of this paper that demonstrate a potential relationship between income inequality and these variables. Along with this, the four chosen macroeconomic variables can be used as economic health and growth indicators to examine their impact on income distributions. There are many other potential macroeconomic variables that could be included to give a better picture of the relationship in a subsequent study. Once again, this should be kept in mind going forward as income inequality and economic growth have a complex relationship that can be hard to discover from any number of variables.

The reasoning for the selection of countries is to attempt to explore the magnitude of the relationship between income inequality and economic growth in both developed countries (United States and Italy) and developing countries (Peru, Belarus, Indonesia). Along with this, these countries have the most data on their Gini index in recent years. However, this is a small selection of countries that could be expanded in a subsequent analysis to get a better understanding of the different effects on developed and developing countries.
Figure 3 shows the number of observations for each country, average Gini index of each country, minimum and maximum Gini index of the dataset, standard deviation of the Gini index for each data set, and the first and last years that are included in the dataset. For the data on GDP growth, unemployment rate, lending interest rate, and savings rate, I will be using the same years that the Gini index data includes.

**Equations**

**Exercise 1: GDP growth as dependent variable**

The implicit function that will be used for the purpose of regression modeling using GDP growth (annual %) as the dependent variable is shown below:

\[
\text{GDP Growth} = f(\text{Gini index, unemployment rate, lending interest rate, savings rate as a percent of GDP})
\]

The following function will represent the output of the analysis for the purpose of regression modeling:

\[
Y = \beta_0 + \beta_1 X_G + \beta_2 X_U + \beta_3 X_I + \beta_4 X_S + \varepsilon
\]

In this equation, \(Y\) represents GDP growth (annual %) of the country being analyzed, \(\beta_0\) represents the intercept of the regression; \(\beta_1, \beta_2, \beta_3,\) and \(\beta_4\) represent the calculated coefficients from the regression; \(X_G, X_U, X_I,\) and \(X_S\) represent Gini index, unemployment rate, lending interest rate, and savings rate as a percent of GDP from the country being analyzed, respectively; \(\varepsilon\) represents the error term of the regression. The addition of the unemployment rate, lending interest rate, and savings rate are used as control variables for the regression based on the potential influence the variables have on the relationship between income inequality and economic growth according to the theoretical mechanisms of income inequality on economic growth discussed in the literature review section of this paper.

For the first exercise, there will be five regression summaries in total. An alpha of .05 will be used for the following analyses.

**Exercise 2: Gini Index as dependent variable**

The implicit function that will be used for the purpose of regression modeling using the Gini Index as the dependent variable is shown below:

(Figure 3. Source: The World Bank)
Gini Index = f(GDP growth, unemployment rate, lending interest rate, savings rate as a percent of GDP)

The following function will represent the output of the analysis for the purpose of regression modeling:

\[ Y = \beta_0 + \beta_1 X_G + \beta_2 X_U + \beta_3 X_I + \beta_4 X_S + \varepsilon \]

In this equation, \( Y \) represents Gini index of the country being analyzed, \( \beta_0 \) represents the intercept of the regression; \( \beta_1, \beta_2, \beta_3, \) and \( \beta_4 \) represent the calculated coefficients from the regression; \( X_G, X_U, X_I, \) and \( X_S \) represent GDP growth, unemployment rate, lending interest rate, and savings rate as a percent of GDP from the country being analyzed, respectively; \( \varepsilon \) represents the error term of the regression.

In the second exercise, there will be five initial regression summaries in total: one for each country. I will use the alpha level of .05 for the following analyses. First a regression using all four macroeconomic variables will be utilized for each country. After these initial regressions, I will update the regression equation by removing any insignificant variables based on the alpha level of .05.
Exercise 1 Regression Analysis: Developed Countries

United States Summary Output

(Figure 4. United States Summary Output)

The first statistic to analyze is the significance F. The significance F of this output is below the selected alpha of .05, so this regression is valid and can be interpreted. The only independent variable with a p-value below the selected alpha was the savings rate. The model had an R square value of approximately .39 or 39%, meaning that the independent variables can explain approximately 39% of the variance in GDP growth in the United States. The Gini index had the highest p-value of all the independent variables in this regression, meaning that the Gini index is not a significant variable in this regression model. All independent variables had a positive relationship with GDP growth.
The first statistic to analyze is the significance F. The significance F of this output is above the selected alpha value of .05, meaning that a model with no independent variables fits the data almost as well as the model using the four macroeconomic variables as independent variables. However, the significance F is only approximately .09 higher than the alpha of .05. With this in mind, we can analyze this output. The R square value was approximately .41 or 41%, meaning that the independent variables can explain approximately 41% of the variance in GDP growth in Italy. The unemployment rate and lending interest rates had a negative relationship with GDP growth, while the savings rate and Gini index had a positive relationship with GDP growth in this model. The Gini index did not have a statistically significant relationship with GDP growth in this model.
The significance $F$ of this model was below the selected alpha level of .05, meaning that this model is significant and can be interpreted. The $R$ square was approximately .71 or 71%, meaning that 71% of the variance in GDP growth can be explained by the independent variables in this model. The unemployment rate and lending interest rate had a negative relationship with GDP growth, while the savings rate and Gini index had a positive relationship with GDP growth in this model. However, once again the Gini index did not have a statistically significant relationship with GDP growth in the Peru model.

(Figure 6. Peru Summary Output)
The significance F of this model is below the selected alpha value of .05. The R square for this model is approximately .66 or 66%, meaning that approximately 66% of the variance in GDP growth in Belarus can be explained by the four macroeconomic variables. The unemployment rate, savings rate, and Gini index had a positive relationship with GDP growth in this model, while the lending interest rate had a negative relationship with GDP growth. The only independent variable that was not statistically significant in the Belarus model was the Gini index.
The significant F for the Indonesia model was below the selected alpha value of .05, meaning this model is significant enough to interpret. The lending interest rate was the only independent variable with a p-value below the alpha of .05. The unemployment rate and Gini index had a positive relationship with GDP growth, while the lending interest rate and savings rate had a negative relationship with GDP growth in this model. In the final model in Exercise 1, the Gini index did not have a statistically significant relationship with GDP growth, as was the case with the previous four models.
Exercise 2 Regression Analysis: Developed Countries

United States Analysis

The summary output for the initial regression equation for the United States is shown below:

<table>
<thead>
<tr>
<th>INITIAL SUMMARY OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regression Statistics</strong></td>
</tr>
<tr>
<td>Multiple R</td>
</tr>
<tr>
<td>R Square</td>
</tr>
<tr>
<td>Adjusted R Square</td>
</tr>
<tr>
<td>Standard Error</td>
</tr>
<tr>
<td>Observations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>df</td>
</tr>
<tr>
<td>Regression</td>
</tr>
<tr>
<td>Residual</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

(Figure 9. Initial Regression Analysis Output for United States)

The first statistic to be interpreted is the significance F. Since the value is lower than the selected alpha level of .05, this means that this regression is significant enough to interpret. In terms of the variables for analyzing the United States, unemployment rate and lending interest rate were the only significant variables in terms of p-value. This regression will now be run using the new formula below on the following page.

\[
Y = \beta_0 + \beta_1 X_U + \beta_2 X_I + \varepsilon
\]
The R square value for the fixed regression equation was approximately .73 or 73%. This means that approximately 73% of the variance in the Gini index can be explained by the remaining independent variables (unemployment rate and lending interest rate). Surprisingly, as the two remaining independent variables (unemployment rate and lending interest rate) decrease, the model shows that the Gini index will increase. This coincides with the theoretical literature on how an increase in income inequality can promote economic growth in a developed nation (Barro 2000).

(Figure 10. Final Summary Output for United States)
The summary output for the initial regression equation for Italy is shown below:

<table>
<thead>
<tr>
<th>Regression Statistics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple R</td>
<td>0.84021703</td>
</tr>
<tr>
<td>R Square</td>
<td>0.705964638</td>
</tr>
<tr>
<td>Adjusted R Square</td>
<td>0.632455822</td>
</tr>
<tr>
<td>Standard Error</td>
<td>0.340407348</td>
</tr>
<tr>
<td>Observations</td>
<td>21</td>
</tr>
</tbody>
</table>

**ANOVA**

<table>
<thead>
<tr>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>Significance F</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>11.21878694</td>
<td>2.80496734</td>
<td>9.603805849</td>
<td>0.000371423</td>
</tr>
<tr>
<td>18</td>
<td>4.672641684</td>
<td>0.292040102</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>15.89142857</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Coefficients**

<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Standard Error</th>
<th>t Stat</th>
<th>P-value</th>
<th>Lower 95%</th>
<th>Upper 95%</th>
<th>Lower 95.0%</th>
<th>Upper 95.0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>30.77608621</td>
<td>2.18428557</td>
<td>14.0876461</td>
<td>1.94625E-10</td>
<td>26.14555895</td>
<td>35.40654657</td>
<td>35.40654657</td>
</tr>
<tr>
<td>GDP Growth</td>
<td>0.07412985</td>
<td>0.07886271</td>
<td>0.939986029</td>
<td>0.361200281</td>
<td>-0.093051637</td>
<td>0.241311336</td>
<td>-0.093051637</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>0.350376638</td>
<td>0.059747729</td>
<td>5.864267007</td>
<td>2.39685E-05</td>
<td>0.22371711</td>
<td>0.477036166</td>
<td>0.22371711</td>
</tr>
<tr>
<td>Lending Interest Rate</td>
<td>0.069010555</td>
<td>0.089069699</td>
<td>0.774772726</td>
<td>0.449761444</td>
<td>-0.119808772</td>
<td>0.257829882</td>
<td>-0.119808772</td>
</tr>
<tr>
<td>Savings Rate (as percent of GDP)</td>
<td>0.01372976</td>
<td>0.113348587</td>
<td>0.121112864</td>
<td>0.905097304</td>
<td>-0.22655851</td>
<td>0.25401803</td>
<td>-0.22655851</td>
</tr>
</tbody>
</table>

(Figure 11. Initial Summary Output Italy)

For Italy, the significance F statistic is below the selected alpha of .05, meaning this regression is significant enough to interpret. Only one of the independent variables (unemployment rate) had a p-value below the alpha of .05. The regression for Italy will now be run using a single independent variable on the following page as shown in the equation below.

\[ Y = \beta_0 + \beta_1 X_U + \epsilon \]
The final summary output for Italy using only the unemployment rate as an independent variable resulted in an R square of approximately .65 or 65%. This means that 65% of the variance in the Gini index can be explained by the unemployment rate. The relationship between the Gini index and unemployment rate in Italy is positive, meaning as the unemployment rate increases, the Gini index also increases.

(Figure 12. Final Summary Output for Italy)
**Regression Analysis: Developing Countries**

**Peru Analysis**

The summary output for the initial regression equation for Peru is shown below:

(Figure 13. Initial/Final Output for Peru)

The regression for Peru had a significance F below the alpha value of .05, meaning this data is valid and can be analyzed. Along with this, all four independent variables had a p-value below the alpha of .05, meaning that this regression will serve as both the initial and final output due to the regression equation remaining the same. The R square value was approximately .84 or 84%. This means that 84% of the variance in the Gini index can be explained by the four selected macroeconomic variables (GDP growth, unemployment rate, lending interest rate, and savings rate). The unemployment rate was the most significant independent variable in this regression. In Peru, according to my regression, the GDP growth, unemployment rate, and lending interest rate have a positive relationship with the Gini index. Also, the savings rate has a negative relationship with the Gini index in Peru according to my regression.
Belarus Analysis

The summary output for the initial regression equation for the Belarus is shown below:

(Figure 14. Initial Summary Output Belarus)

With the significance F below our selected alpha (.05), we can see that this output is valid and can be used for analysis. GDP growth, lending interest rate, and the savings rate had a p-value above the alpha of .05, meaning that they will no longer be in the final regression equation for Belarus. The regression will be run again on the following page using only the unemployment rate as shown in the equation below:

\[ Y = \beta_0 + \beta_1 X_U + \varepsilon \]
The final regression of Belarus using only the unemployment rate resulted in an R square of approximately .80 or 80%. This means that 80% in the variance in the Gini index can be explained by the unemployment rate. According to my regression, there is a positive relationship between the unemployment rate and the Gini index in Belarus.
**Indonesia Analysis**

The summary outputs for the initial regression equation for the Indonesia is shown below:

(Figure 16. Initial Summary Output Indonesia)

With the significance F level below the selected alpha (.05), we can see that this output is valid and can be used for analysis. However, none of the independent variables have a p-value below the alpha of .05, so the relationship between all macroeconomic variables used and the Gini index is not significant. There is not a final summary to be run due to this, but this output can still be analyzed with that in mind. The regression had an R square of approximately .63 or 63%, meaning that 63% of the variation in the Gini index for Indonesia can be explained by the four macroeconomic variables. GDP growth and the savings rate had a positive relationship with the Gini index in this regression. The unemployment rate and lending interest rate had a negative relationship with the Gini index.
These regressions were initially utilized to examine the relationship between how income inequality can impact economic growth in both developing and developed countries. In the literature, as previously discussed, there is varying data on the effect of income inequality on economic growth depending on the stage of development a country is in. This was the reasoning behind the choice of countries (2 developed, 3 developing). However, based on the regressions, income inequality and the chosen macroeconomic variables do not have the same relationship in all cases, even in nations with the same classification (developed or developing).

In the first exercise, for all countries selected, there was not a statistically significant relationship between income inequality (represented by the Gini coefficient) and economic growth (represented by GDP growth (annual %)). As previously stated, estimating a simultaneous system with the variables utilized would allow for a better understanding of how the variables interact with each other, as well as providing greater statistical significance. Although the relationship was not statistically significant in the model, the Gini index had a positive relationship with GDP growth in both the developed countries selected (United States and Italy) and the developing countries selected (Peru, Belarus, and Indonesia), indicating that as a country’s GDP increases, the income inequality (measured by the Gini index) in that country also increases.

In the second exercise, for the developed countries, the United States initially had a positive relationship between GDP growth and income inequality and a negative relationship with the unemployment rate, lending interest rate, and the savings rate. After removing GDP growth and savings rates from the equation due to the p-values being below the significance level, the negative relationship with the Gini index remained for the unemployment rate and lending interest rate. Italy had a positive relationship with all four macroeconomic variables selected in the initial regression. The final regression dropped GDP growth, unemployment rate, and lending interest rate from the final equation. The positive relationship remained between the unemployment rate and Gini index in the final regression. These results were interesting to me as I expected initially that the developed countries would have the same relationship for the variables being tested. This turned out to not be the case and is one example of the complex relationship that income inequality can have in an economy depending on the context the economy is viewed in.

For the developing countries in the second exercise, Peru had a positive relationship between three of the selected macroeconomic variables (GDP growth, unemployment rate, and interest rate) and the Gini index. Peru had a negative relationship between the savings rate and the Gini index. Peru was the only country that was able to utilize all four economic variables in the final regression. Belarus had a positive relationship between three macroeconomic variables (GDP growth, unemployment rate, and savings rate) and the Gini index in the initial regression. In the final regression, only the unemployment rate remained, showing a positive relationship between the unemployment rate and the Gini index. Once again, we see varying relationships depending on the country, even though all countries examined in this section were in the same classification. However, in this instance, Peru and Belarus had the same relationships between their four macroeconomic variables and the Gini index.

Lastly on the second exercise, only one of the countries selected (Peru) had p-values below the alpha of .05 for all four macroeconomic variables. This made it more difficult to see how the independent variables were impacting the Gini index. To address this issue, the possible
addition of more data points in a subsequent study could potentially solve the problems with my model. Along with this, analyzing the impact of more macroeconomic variables than the ones I selected could give a better picture of the interaction between the variables and the Gini index.

The relationship between income inequality and economic growth for developed and developing countries remains unclear. As discussed in the limitations section of this paper, a wider selection of countries could potentially give a clearer picture of the different impacts on developing and developed economies in a subsequent study.

Overall, this paper has reinforced the complexity that comes with discussing income inequality and its impact on economic growth. The literature has a vast number of conflicting effects of income inequality on macroeconomic variables and my regression models continue to show the conflicting nature of the relationship between the chosen macroeconomic variables and income inequality.
References


