AN ANALYSIS ON INEQUALITY, ECONOMIC GROWTH, AND UNEMPLOYMENT IN KALIMANTAN ISLAND

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ABSTRACT

This study analyzes income inequality across 56 cities and regencies in Kalimantan Island over a decade (2014-2023) using panel data regression. Key variables examined include the Gini index, economic growth, population growth, average years of schooling, and inflation rate. The findings highlight that GDP growth alone does not suffice to reduce income inequality in the region. Rapid population growth is identified as a significant barrier to equitable economic outcomes, while increased average years of schooling play a critical role in promoting economic equity. Additionally, the research reveals that inflation has a statistically significant adverse impact on income equality. These insights emphasize the need for targeted policy measures to address inequality beyond mere economic growth, particularly in the areas of education and inflation control, to foster sustainable and inclusive development in Kalimantan. This study contributes to the ongoing discourse by offering insights into the complex dynamics between income inequality and key socioeconomic factors in a developing regional context. By examining the roles of GDP growth, population growth, education, and inflation on income distribution, this research highlights the limitations of traditional economic growth as a sole strategy for achieving equity.

Keywords*: inequality, growth, population, education, inflation, regression, panel*

ABSTRAK

Penelitian ini menganalisis ketimpangan pendapatan di 56 kota dan kabupaten di Pulau Kalimantan selama satu dekade (2014-2023) menggunakan regresi data panel. Variabel utama yang dianalisis meliputi Indeks Gini, pertumbuhan ekonomi, pertumbuhan penduduk, rata-rata tahun pendidikan, dan tingkat inflasi. Hasil penelitian menunjukkan bahwa pertumbuhan PDB saja tidak cukup untuk mengurangi ketimpangan pendapatan di wilayah tersebut. Pertumbuhan populasi yang cepat diidentifikasi sebagai hambatan signifikan terhadap hasil ekonomi yang adil, sementara peningkatan rata-rata tahun pendidikan memainkan peran kritis dalam mempromosikan keadilan ekonomi. Selain itu, penelitian ini mengungkapkan bahwa inflasi memiliki dampak negatif yang signifikan secara statistik terhadap kesetaraan pendapatan. Temuan ini menekankan perlunya langkah kebijakan yang ditargetkan untuk mengatasi ketimpangan di luar pertumbuhan ekonomi semata, terutama di bidang pendidikan dan pengendalian inflasi, guna mendorong pembangunan yang berkelanjutan dan inklusif di Kalimantan. Studi ini berkontribusi pada diskusi yang sedang berlangsung dengan menawarkan wawasan tentang dinamika kompleks antara ketimpangan pendapatan dan faktor-faktor sosioekonomi kunci dalam konteks regional yang sedang berkembang. Dengan menganalisis peran pertumbuhan PDB, pertumbuhan populasi, pendidikan, dan inflasi terhadap distribusi pendapatan, penelitian ini menyoroti keterbatasan pertumbuhan ekonomi tradisional sebagai strategi tunggal untuk mencapai keadilan.

Kata Kunci: Ketidaksetaraan, Pertumbuhan, Populasi, Pendidikan, Inflasi, Regresi, Panel

1. INTRODUCTION

Economic development is a multifaceted process that encompasses the improvement of living standards, reduction of poverty, and the enhancement of overall economic health within a

region or country. It involves not only increases in income but also the equitable distribution of wealth, the advancement of infrastructure, and the fostering of sustainable growth. As economies evolve, they undergo structural transformations that can lead to greater productivity, innovation, and competitiveness on a global scale. However, the path to economic development is often riddled with challenges such as inequality, unemployment, and external economic shocks.

Kalimantan Island, one of Indonesia's largest and most economically significant regions, is characterized by its rich natural resources and diverse economic activities. Despite its potential, the region faces enduring challenges that impede its development. Economic disparities, high unemployment rates, and uneven growth patterns are persistent issues that undermine the overall prosperity and stability of Kalimantan. These challenges are further complicated by external factors such as fluctuating global commodity prices, varying levels of infrastructure development, and regional policy differences.

Indonesia, as a developing nation, has made considerable strides in economic growth over the past few decades. However, this growth has not been uniformly distributed, leading to significant regional inequalities. Kalimantan, with its vast agricultural, mining, and industrial sectors, exemplifies these disparities. While some cities and regencies have experienced rapid growth and development, others lag behind, suffering from high unemployment and stagnant economic conditions. This uneven development exacerbates inequality and poses a significant obstacle to achieving inclusive economic progress.

Inequality remains a pressing global challenge, influenced by various interrelated factors that shape economic and social landscapes. Economic growth, while often seen as a driver of prosperity, can also exacerbate inequality if the benefits are not equitably distributed. Rapid population growth introduces additional complexities, as expanding demographics can strain resources and limit access to opportunities, particularly for marginalized groups. Furthermore, the average years of schooling in a population play a crucial role in determining access to quality jobs and economic mobility; higher educational attainment typically correlates with lower inequality. Lastly, inflation can disproportionately affect lower-income households, eroding their purchasing power and widening the wealth gap. Understanding these factors is essential for developing effective policies aimed at fostering inclusive growth and addressing the root causes of inequality.

While previous studies have investigated individual aspects, there is a paucity of research that comprehensively examines the interplay between these variables within the context of Kalimantan Island. Understanding how these variables interact is crucial for designing effective economic policies that can foster sustainable and inclusive development. This study aims to fill this gap by providing a detailed analysis of the relationships between inequality, economic growth, population growth, average years of schooling, and inflation.

2. THEORETICAL FRAMEWORK AND EMPIRICAL STUDIES

Theoretical Framework

The theoretical framework of this research is built upon the interplay between economic growth, population growth, average years of schooling (AYS), and inflation rate, and their collective impact on income inequality as measured by the Gini index in Kalimantan Island. This framework draws from various economic theories and models that help explain the dynamics of income distribution within a growing economy. The interplay between these variables is analyzed

using established economic theories and models. This framework guides the analysis and helps in understanding the complex dynamics at play in Kalimantan Island.

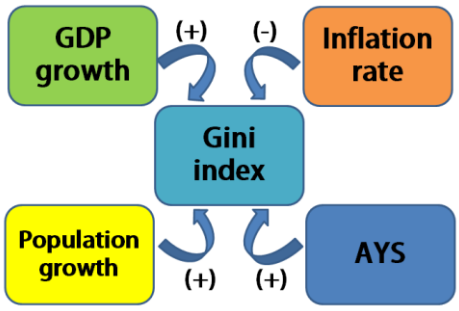

Figure 1. Conceptual Framework

Economic Growth and Income Inequality

Economic growth is often viewed through the lens of the Kuznets Curve, which posits that as an economy develops, income inequality initially increases and then decreases after a certain level of average income is reached. Simon Kuznets proposed that in the early stages of economic growth, inequality tends to increase, and after reaching a certain level of income per capita, it starts to decrease (Copeland & Taylor, 2004; Ota, 2017; Yossinomita et al., 2022).

Endogenous growth theory, developed by economists such as Paul Romer, emphasizes the role of internal factors—such as human capital, innovation, and knowledge—in driving economic growth (Cvetanović et al., 2015; Pan & Ngo, 2016; Wijayanto, 2019). Unlike traditional growth theories, it does not assume diminishing returns to capital.

Population Growth and Its Effects

Population growth can exert pressure on resources, infrastructure, and social services, potentially exacerbating inequality if economic growth does not keep pace. Theories such as Malthusian growth suggest that unchecked population growth can lead to poverty and resource scarcity. This research examines how population dynamics in Kalimantan influence income distribution, considering factors such as employment opportunities and the provision of public services.

Thomas Malthus posited that population growth would inevitably outstrip food production, leading to widespread poverty and suffering (Malthusian Theory). This theory suggests that unchecked population growth can lead to resource depletion, straining economic systems and exacerbating inequality (Malthus & Kahn, 2022). In the context of Kalimantan, rapid population increases may challenge the region's capacity to provide essential services, ultimately impacting living standards and income distribution.

Education and Its Role in Reducing Inequality

The average years of schooling (AYS) serve as a crucial determinant of human capital, influencing an individual's ability to participate in and benefit from economic growth. The Human Capital Theory posits that education enhances productivity and earning potential, which can lead to more equitable income distribution. This theory, associated with economists like Gary Becker, suggests that investments in education and training enhance workers' productivity, leading to economic growth and reductions in inequality and unemployment (Fix, 2021; Wuttaphan, 2020).

The Equal Opportunity Theory posits that education is a mechanism for providing equal opportunities to all individuals, regardless of their background. By ensuring access to quality

education, societies can level the playing field, enabling individuals from disadvantaged backgrounds to improve their economic prospects. Research shows that equitable access to education is critical in reducing systemic inequalities (Ladd & Fiske, 2009).

Inflation and Its Impact on Economic Equity

Theories of inflation often distinguish between cost-push inflation, which occurs when production costs rise (e.g., wages, raw materials), and demand-pull inflation, which happens when demand exceeds supply. According to the Phillips Curve (Phillips, 1958), there is an inverse relationship between inflation and unemployment, suggesting that policies aimed at reducing unemployment may lead to higher inflation. However, if wage increases do not keep pace with inflation, lower-income households may suffer disproportionately, exacerbating income inequality.

The theory of adaptive expectations posits that individuals form their expectations about future inflation based on past experiences. If people anticipate higher inflation, they may demand higher wages, which can lead to a wage-price spiral (Friedman, 1977). This cycle can exacerbate inequality if wage increases primarily benefit higher-income earners while leaving lower-wage workers behind.

Inflation can impact the effectiveness of social safety nets designed to protect low-income households. Programs indexed to inflation, such as food assistance or social security, can help mitigate the negative effects of rising prices. However, if these programs do not keep pace with inflation, the real value of benefits declines, further entrenching economic inequity (Hahn & Danziger, 2015).

Empirical Review

Several empirical studies have investigated the relationship between economic growth and inequality, often finding mixed results. For instance, Barro (2000) analyzed panel data from multiple countries and observed that, in the early stages of development, growth tends to exacerbate inequality, supporting the Kuznets Curve hypothesis. However, in more developed economies, growth often leads to a reduction in inequality.

In the context of Indonesia, studies by Pratiwi (2021); and Royan et al. (2019) have shown that regional economic growth has been uneven, with some areas experiencing rapid development while others lag behind. This disparity has contributed to rising inequality within the country. Similarly, research by Wibowo (2015) found that despite overall economic growth, inequality in Indonesia has increased, particularly in resource-rich regions like Kalimantan.

Recent research has provided valuable insights into the relationship between economic growth and equity. A study by Ostry et al. (2014) found that while growth is essential for poverty reduction, the manner in which growth occurs—specifically, whether it is inclusive or exclusive—significantly affects income distribution. They concluded that high levels of inequality could hinder sustainable economic growth, creating a feedback loop that perpetuates disadvantage for lower-income groups.

Several studies have explored the relationship between population growth and income inequality. For instance, a study by Klasen & Lam (2021) found that high population growth rates in developing countries often correlate with increased income inequality, particularly when economic growth does not keep pace. Similarly, research by Zhou & Wei (2023) indicated that demographic factors significantly influence income distribution in developing countries,

emphasizing the need for policies that address both population dynamics and economic development.

Recent studies support the assertion that education is crucial in reducing income inequality. For instance, a study by Checchi (2021) found that educational inequality significantly contributes to income inequality across OECD countries, emphasizing the need for policies that promote equitable access to education. Furthermore, a meta-analysis by Glaeser et al. (2020) demonstrated that educational policies aimed at increasing access and improving quality can lead to substantial reductions in income inequality over time.

In developing regions, the role of education is even more pronounced. A report by UNESCO (2021) highlights that increased educational access for girls can lead to significant economic gains, as educated women are more likely to participate in the labor force and contribute to household income. This not only benefits individual families but also promotes broader economic development and reduces gender-based inequalities.

Recent studies highlight the nuanced relationship between inflation and economic equity. A study by Ostry et al. (2014) examined the relationship between inflation and income inequality across advanced and emerging economies. They found that moderate inflation could be associated with lower inequality, as it can reduce the real burden of debt and benefit borrowers. However, higher levels of inflation tend to exacerbate inequality, particularly when wages do not adjust accordingly.

In contrast, research by Bénassy-Quéré et al. (2017) emphasized the importance of inflation expectations and their role in influencing economic behavior. They found that uncertainty around inflation can lead to reduced investment and savings, disproportionately affecting lower-income households that rely on stable economic conditions for financial security.

3. RESEARCH METHODS

Form of Research

This study adopts a quantitative research approach, specifically employing panel data analysis to examine the relationships between inequality, economic growth, population growth, average years of schooling, and inflation rate in Kalimantan Island, Indonesia. The panel data encompasses 56 cities and regencies over a ten-year period from 2014 to 2023. Panel data, also known as longitudinal or cross-sectional time-series data, consist of observations on multiple entities (in this case, cities and regencies) over multiple time periods. This structure allows for the analysis of both cross-sectional and temporal variations, offering a comprehensive understanding of the dynamics under investigation.

Data and Collecting Procedures

The study employs time-series annual data spanning from 2014 to 2023. The data for this study are obtained from multiple sources to ensure comprehensiveness and reliability. All mathematical computations in this study are carried out by using Eviews.

Research Variables

In this research, several key variables are examined to understand their impact on income inequality, as measured by the Gini index, in Kalimantan Island. The primary independent variables include economic growth, population growth, average years of schooling (AYS), and

inflation rate. Each of these factors plays a distinct role in shaping the socio-economic landscape of the region, influencing wealth distribution and contributing to the overall dynamics of inequality.

Analytical Method

The study begins with descriptive statistics to provide an overview of key variables, such as measures of central tendency, dispersion, and correlation coefficients. This analysis offers insights into the distribution and relationships between the variables.

The primary analytical tool employed is panel regression analysis, which enables the estimation of relationships between multiple variables while accounting for both cross-sectional and time-series variations. Various regression models, such as fixed-effects, random-effects, and pooled OLS models, may be employed to explore the relationships between inequality, economic growth, and unemployment, while controlling for exogenous factors.

The study conducts robustness checks to ensure the validity and reliability of the results. This includes testing for heterogeneity across regions and time periods, as well as assessing the sensitivity of findings to different model specifications and estimation techniques. Given the longitudinal nature of the data, dynamic panel data models may be utilized to account for potential endogeneity and autocorrelation issues, providing more accurate estimates of the relationships under study.

The data processing technique in this research involves using parametric statistical tools, specifically EViews 9, with a significance level of 5% (or 0.05). The estimation model is as follows:

$$GINIit = \alpha + \beta1GDP\_GROWTHit + \beta2POP\_GROWTHit + \beta3AYSit + \beta4INFit + eit$$

Where:

GINIit = Gini index of city/regency-i year-t
$\beta0$ = intercept
$\beta1, \beta2, \beta3$ = coefficient
GDP_GROWTHit = GDP growth of city/regency-i year-t
POP_GROWTHit = population growth of city/regency-i year-t
AYSit = average years of schooling of city/regency-i year-t
eit = the error term or error component for city/regency-i year-t

4. DATA ANALYSIS AND DISCUSSIONS

a. Descriptive Results

Gini Index

In 2019, the distribution of the Gini Index among the 56 cities and regencies in Kalimantan revealed a significant picture of income inequality across the island. At that time, a substantial 35 of these cities and regencies reported Gini Index values above 0.30, indicating moderate income disparity, with indices ranging from 0.302 to 0.357. This moderate disparity reflected underlying economic challenges, particularly in urban areas where the concentration of wealth from resource extraction and industrial activities was pronounced.

Conversely, 21 cities and regencies reported Gini Index values below 0.30, classified as having low disparity, with indices between 0.262 and 0.299. These regions typically encompass

more rural areas where income levels were lower but more evenly distributed. While these areas faced challenges related to poverty and underdevelopment, the lower Gini Index suggested that economic inequalities were not as pronounced. This scenario underscores the complexity of economic dynamics in Kalimantan, where rural populations often experience a more stable but less prosperous economic reality compared to their urban counterparts.

The COVID-19 pandemic further complicated the economic landscape in Kalimantan. Many low-income households faced job losses and reduced incomes, leading to a temporary increase in income inequality in certain areas. Recovery efforts are ongoing, and while some regions are bouncing back, the impact of the pandemic on the most vulnerable populations remains a concern.

By 2023, a notable shift occurred in the income distribution landscape of Kalimantan. The number of cities and regencies with Gini Index values above 0.30 dropped to 23, indicating a potential reduction in the level of moderate disparity. The Gini Index values for these areas ranged from 0.305 to 0.323, suggesting that while inequality remained a concern, there was a slight improvement compared to 2019. This change could be attributed to local government initiatives aimed at promoting equitable economic growth and enhancing opportunities for marginalized communities, although the persistence of moderate disparity indicates that more comprehensive measures may be necessary.

At the same time, the increase in the number of regions classified as having low disparity rose to 33, with Gini Index values between 0.225 and 0.299. This improvement suggests that targeted economic policies may have begun to bear fruit, particularly in rural areas where investments in agriculture and small enterprises could have contributed to a more equitable income distribution. The fact that these regions saw a decline in disparity highlights the importance of fostering economic resilience in areas that historically lag behind urban centers.

b. Panel Data Regression

Descriptive Test Results per Variable

Descriptive test results per variable provide a comprehensive overview of the data, highlighting key statistical measures such as mean and standard deviation. This foundational analysis is crucial for understanding the underlying structure of the data and guides further inferential statistics, ensuring that subsequent interpretations and conclusions are well-informed and accurate.

Table 1. Descriptive Test Results per Variable

	GINI	GDP_GROWTH	POP_GROWTH	AYS	INFL
Mean	0.353755	4.205081	1.809714	8.161610	4.494937
Median	0.307000	4.920000	1.550000	7.940000	3.870000
Maximum	26.64000	29.85000	24.11000	11.65000	52.56000
Minimum	0.156000	-7.170000	-21.95000	5.190000	-25.99000
Std. Dev.	1.114248	2.939107	2.592647	1.255399	6.651700
Skewness	23.55004	0.189135	0.799117	0.617671	2.322932
Kurtosis	556.0713	13.91902	32.76412	2.895582	17.97217
Observations	559	559	559	559	559

Source: Eviews

With the Gini index, the mean value of 0.354 indicates a moderate level of income inequality, while the substantial maximum value of 26.64 suggests the presence of significant outliers or anomalies in the data. The skewness of 23.55 highlights a pronounced right skew, indicating that a small number of regions experience extreme levels of inequality. The extremely high kurtosis value of 556.07 further confirms this, suggesting that the distribution has heavy tails and a peak that is much sharper than a normal distribution.

For GDP growth, the mean of 4.21% reflects overall positive economic performance; however, the minimum value of -7.17% indicates that some areas have faced severe economic downturns. The skewness of 0.19 suggests a fairly symmetrical distribution around the mean, while the kurtosis of 13.92 indicates a distribution with heavier tails than normal, which may be indicative of occasional extreme growth rates.

Population growth shows a mean of 1.81%, with a concerning minimum of -21.95%, suggesting potential issues such as out-migration or negative demographic trends in certain regions. The positive skewness (0.80) indicates that most areas are experiencing moderate to low growth, while a few areas might be seeing significant increases.

The average years of schooling (AYS) has a mean of 8.16, which reflects a reasonable level of education, yet the range from a minimum of 5.19 to a maximum of 11.65 suggests disparities in educational attainment across different regions. The skewness of 0.62 indicates a slight rightward bias, suggesting that while most regions have relatively low to average educational attainment, a few regions achieve significantly higher levels.

The inflation presents a mean of 4.49%, with a maximum of 52.56% indicating hyperinflationary conditions in certain areas. The skewness of 2.32 shows a pronounced right skew, suggesting that most regions experience moderate inflation while a few faces extreme rates. The kurtosis of 17.97 further confirms the presence of outliers in inflation rates, signaling economic volatility in specific areas.

Chow Test

The Chow test is used to assess the stability of regression parameters between two subgroups of data and to determine the best model between fixed effects and common effects. The Chow test results indicate a Chi-square value of 60.716649 with a p-value of 0.849941, suggesting that there is no significant difference between the coefficients of the groups being analyzed. A high p-value, particularly one above the conventional threshold of 0.05, indicates that we fail to reject the null hypothesis, which posits that the data across different cross-sections can be pooled without significant variance in their parameters. This implies that the models for the groups are similar,

reinforcing the idea that any observed differences in the dependent variable may not be attributable to the distinct characteristics of the groups in question. Consequently, the results suggest that a combined analysis of the data may be appropriate, as the underlying relationships appear to be consistent across the examined cross-sections.

Table 2. Chow Test

Redundant Fixed Effects Tests

Effects Test		Statistic	Prob.
Cross-section F		1.040958	0.3996
Cross-section Chi-square		60.716649	0.2775
Prob(F-statistic)	0.849941		

Source: Eviews

Hausman Test

The Hausman test is used to determine the best estimation model between fixed effects (FE) and random effects (RE). By comparing the coefficients obtained from both models, the test assesses whether the differences in estimates are statistically significant.

The results from the cross-section random effects model show a value of 4.209344 with a p-value of 0.3784, which is greater than the conventional threshold of 0.05. This indicates that we fail to reject the null hypothesis (H0), suggesting that the random effects model (RE) is more appropriate than the fixed effects model (FE) for the data being analyzed. The implication is that the unobserved individual-specific effects are not correlated with the independent variables, allowing for the assumption that these effects can be treated as random. Consequently, using the random effects model may lead to more efficient estimates and better overall fit for the data, emphasizing the importance of model selection based on statistical testing.

Table 3. Hausman Test

Equation: REM

Test Summary		Chi-Sq. Statistic	Prob.
Cross-section random		4.209344	0.3784
Prob(F-statistic)	0.492622		

Source: Eviews

Lagrangian Multiplier Test (LM Test)

The LM test is used to determine whether the random effects model (RE) or the common effects model (CE) is the better choice.

Table 4. Lagrange Multiplier Tests

Lagrange Multiplier Tests for Random Effects

	Cross-section	Time	Both
Breusch-Pagan	0.008250	0.959715	0.967965
	(0.9276)	(0.3273)	(0.3252)

Source: Eviews

The Breusch-Pagan cross-section test yielded a value of 0.008250 with a p-value of 0.9276, which exceeds the conventional significance level of 0.05. This result indicates that we fail to reject the null hypothesis (H0), suggesting that there is no significant evidence of heteroskedasticity in the model. Consequently, this implies that the common effects model (CE) is more appropriate

than the random effects model (RE) for the data being analyzed. The high p-value indicates that the assumptions underpinning the common effects model hold true, leading to the conclusion that the CE model is preferable for capturing the underlying relationships in the data. This decision is crucial for ensuring that the chosen model provides accurate and reliable estimates, ultimately enhancing the validity of the analysis.

Panel Data Regression Model Estimation, Common Effect Model

The final model chosen for analysis is the common effects model (CE), determined through the application of the LM test. This selection indicates that the CE model is more suitable for the data at hand, as the test results showed no significant evidence of heteroskedasticity, allowing the assumption that the individual-specific effects can be treated as constant across observations.

Table 5. Common Effect Model

R-squared	0.002460	Mean dependent var	0.353755
Adjusted R-squared	-0.004743	S.D. dependent var	1.114248
S.E. of regression	1.116887	Akaike info criterion	3.067872
Sum squared resid	691.0798	Schwarz criterion	3.106567
Log likelihood	-852.4702	Hannan-Quinn criter.	3.082983
F-statistic	0.341510	Durbin-Watson stat	2.219482
Prob(F-statistic)	0.849941		

The Prob(F-Statistics) value of 0.849941 in a common effect model indicates that there is insufficient evidence to reject the null hypothesis. In the context of regression analysis, this means that the independent variables tested do not significantly impact the dependent variable. A value close to 1 suggests that the variability explained by the model is not better than a simple model. Consequently, this result implies a need for further evaluation of variable selection or the model used.

Detecting Deviations from Classical Assumptions

Normality Test #1

The normality test is conducted to determine whether the data follows a normal distribution. In this case, the method used is the Jarque-Bera test. This test evaluates the distribution of the data based on the values of skewness and curtosis of the dataset. By analyzing these two statistical properties, the Jarque-Bera test helps assess how closely the data aligns with a normal distribution, providing valuable insights for subsequent analyses.

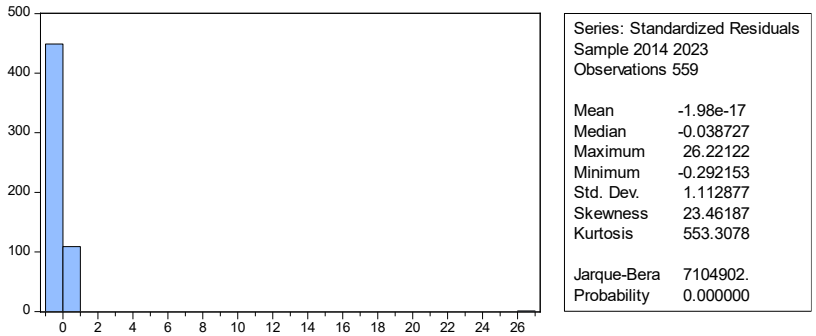

Figure 1. Jarque-Bera Normality Test Result #1

A P-value of 0.0000 is significantly lower than the threshold of 0.05, leading to the acceptance of the alternative hypothesis (H1). This suggests that there is a statistically significant effect or relationship present. Additionally, the reference to a histogram not forming a bell shape indicates that the residuals are not normally distributed. As a result, the assumption of normality is violated, which is important for certain statistical tests that rely on this assumption. In summary, the findings suggest significant results but also highlight issues with normality in the data distribution.

Heteroscedasticity Test

The heteroskedasticity test employs the GLEJSER method, which involves regressing the independent variable against the absolute values of the residuals. Heteroskedasticity is indicated when a majority of the partial t-test P-values are less than 0.05, as well as when the P-value from the overall F-test is also less than 0.05. This suggests that the variance of the residual's changes across levels of the independent variable, violating the assumption of constant variance, which is critical for the validity of many statistical analyses. Identifying and addressing heteroskedasticity is important, as it can affect the efficiency and reliability of regression estimates.

Several variables show a partial t-test P-value (PROB) greater than 0.05, leading us to accept the null hypothesis (H0). Additionally, the P-value from the overall F-test is 0.435442, which is also greater than 0.05, resulting in the acceptance of the null hypothesis in this context as well. This indicates that the model does not exhibit issues of heteroskedasticity, meaning that the variance of the residuals is consistent across different levels of the independent variables. As a result, the model meets the criteria for homoscedasticity, a key assumption in regression analysis that ensures the reliability and validity of the model's estimates. This lack of heteroskedasticity strengthens the findings and conclusions drawn from the regression analysis.

Table 6. Heteroscedasticity Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.127537	0.325982	0.391238	0.6958
GDP_GROWTH	-0.028277	0.016196	-1.745965	0.0814
POP_GROWTH	0.013730	0.018114	0.757989	0.4488
AYS	0.007250	0.037572	0.192952	0.8471
INFL	0.002797	0.007133	0.392167	0.6951

Source: Eviews

Autocorrelation Test

The Autocorrelation test is conducted using the Breusch-Godfrey LM Test for serial correlation. This test involves regressing all independent variables, along with the residuals from lag 1 and lag 2, against the residuals themselves. The purpose of this procedure is to detect the presence of autocorrelation in the residuals, which can indicate that the errors are correlated across observations over time.

In more detail, the Breusch-Godfrey LM Test checks whether the current residuals are influenced by previous residual values. If significant correlations are found (typically indicated by a low P-value), it suggests that the model may be mis-specified, leading to inefficient estimates and unreliable statistical inferences. By examining both lag 1 and lag 2 residuals, the test can capture more complex patterns of autocorrelation that might not be detected by simpler tests.

Addressing any identified autocorrelation is crucial for ensuring the accuracy and validity of regression results.

Table 7. Autocorrelation Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.018843	0.427658	0.044061	0.9649
RESID01(-2)	0.001478	0.047815	0.030920	0.9753
RESID01(-1)	0.001501	0.047821	0.031379	0.9750
GDP_GROWTH	-0.005731	0.021699	-0.264124	0.7918
POP_GROWTH	0.000923	0.021126	0.043670	0.9652
AYS	0.001107	0.049191	0.022513	0.9820
INFL	-0.000269	0.008333	-0.032263	0.9743
Prob(F-statistic)	0.999990			

Source: Eviews

The partial t-test P-values (Prob) for most variables are greater than 0.05, leading us to accept the null hypothesis (H0). Additionally, the P-value from the F-test is 0.999990, which is also greater than 0.05, resulting in the acceptance of the null hypothesis in this context as well. This indicates that there is no serial correlation present in the model, meaning that the residuals do not exhibit autocorrelation.

The absence of autocorrelation is significant because it confirms that the errors in the regression model are independent from one another over time. This is a crucial assumption in regression analysis, as violating it can lead to inefficient estimates and misleading inferences. Since both the partial t-test and the F-test indicate a lack of serial correlation, we can conclude that the model adheres to the assumption of non-autocorrelation, thereby reinforcing the reliability and validity of the model's findings.

The conclusion of the analysis indicates that there is a violation of the autocorrelation assumption within the model. To address this issue, the chosen solution is to employ a common effects approach using the Generalized Least Squares (GLS) method and to calculate Cross-Section Weights through the use of the Pooled Cross-Section Estimator (PCSE).

The common effects approach allows researchers to directly model the impact of independent variables on the dependent variable, assuming a uniform effect across all observational units in the sample. This method is particularly useful when the researcher wants to analyze overall trends without accounting for individual variations.

GLS addresses the issue of autocorrelation by assigning appropriate weights to the observations, which enhances the efficiency of the estimations. By assigning different weights based on the variance of each observation, GLS corrects problems that arise when the assumption of homoscedasticity (equal variances) is not met.

The implementation of GLS or Cross Section Weights within a fixed effects framework is known as Feasible Generalized Least Squares (FGLS). This method, utilizing the PCSE, provides significant benefits by strengthening the model's resilience against violations of assumptions such as autocorrelation, heteroskedasticity, and cross-sectional dependence.

By leveraging PCSE, the model becomes more robust, as it accommodates structural variations among cross-sectional groups. This results in more reliable and valid estimates, ultimately leading to more accurate conclusions drawn from the analysis. The integration of these methods thus enhances the overall integrity of the model and its applicability in real-world contexts.

Tabel 8. Panel FGLS (Cross-section Weights)

Variable	Coefficient
C	0.242432
GDP_GROWTH	0.000800
POP_GROWTH	0.000285
AYS	0.008717
INFL	-0.000755

Source: Eviews

Based on the coefficient values above, the regression equation from the Feasible Generalized Least Squares (FGLS) with the Pooled Cross Section Estimator (PCSE) is as follows:

GINI = 0.242432 + 0.000800* GDP_GROWTH + 0.000285* POP_GROWTH + 0.008717* AYS - 0.000755 INFL

The calculation of Generalized Least Squares or Cross Section Weights within the Common Effects framework, referred to as Feasible Generalized Least Squares (FGLS) with the Pooled Cross Section Estimator (PCSE), renders the model robust against violations of assumptions, including autocorrelation. As a result, it is no longer necessary to conduct tests for normality, autocorrelation, heteroskedasticity, and cross-sectional dependence.

Normality Test #2

A P-value of 0.0000, which is significantly less than the threshold of 0.05, leads to the acceptance of the null hypothesis (H0). This indicates that there is sufficient evidence to suggest that the model's assumptions are met. Additionally, the histogram of the residuals displays a bell-shaped curve, signifying that the residuals are normally distributed. This observation confirms that the assumption of normality is satisfied, which is essential for the validity of many statistical analyses. Furthermore, according to the Central Limit Theorem, when the sample size exceeds 30, the data can be considered to be approximately normally distributed regardless of the original distribution. This reinforces the findings, as a larger sample size lends further support to the conclusion that the residuals conform to the normality assumption, thereby enhancing the reliability of the statistical model being analysed.

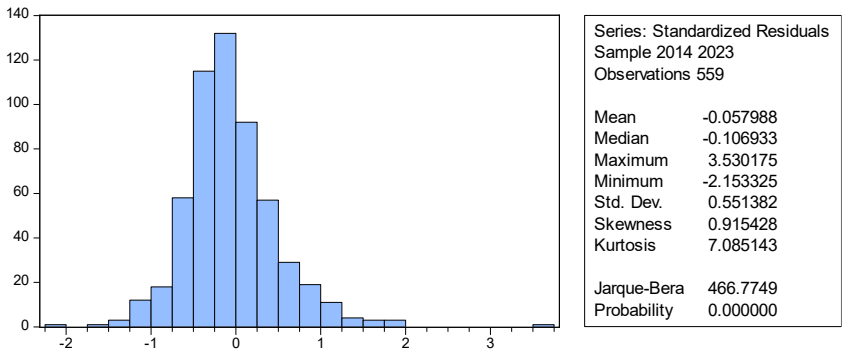

Figure 2. Jarque-Bera Normality Test Result #2

Multicollinearity Test

Below is the detection of multicollinearity using the correlation matrix of independent variables:

Table 9. Multicollinearity Test

	GDP_GROWTH	POP_GROWTH	AYS	INFL

GDP_GROWTH	1.000000	-0.009803	-0.085964	0.143240
POP_GROWTH	-0.009803	1.000000	-0.042450	0.014216
AYS	-0.085964	-0.042450	1.000000	0.027487
INFL	0.143240	0.014216	0.027487	1.000000

Source: Eviews

The results of the correlation test among the independent variables indicate that there are no strong correlations present, as none of the correlation coefficients exceed 0.9 or fall below -0.9. This suggests that the independent variables are sufficiently independent from one another, thereby indicating that multicollinearity is not an issue within the model. Multicollinearity can lead to unreliable coefficient estimates and inflate standard errors, which can compromise the interpretability of the model. The absence of strong correlations among the independent variables enhances the robustness of the regression analysis, allowing for clearer insights into the individual effects of each variable on the dependent variable. Thus, the model appears to maintain its integrity and validity for further analysis and interpretation.

Confident Interval

Below are the lower and upper bounds of the estimated coefficients obtained from the regression analysis at a 95% confidence level. For instance, the estimated coefficient for GDP_GROWTH is 0.000800. This means that at a 95% confidence level, the actual effect of GDP_GROWTH on the dependent variable could vary within a range from -0.000282 to 0.001882. This interval provides a measure of uncertainty around the estimated coefficient, indicating that while the best estimate is 0.000800, there is a possibility that the true coefficient could be slightly negative or significantly positive.

Table 10. Coefficient Confidence Intervals

Variable	Coefficient	Low	High
C	0.242432	0.221933	0.262930
GDP_GROWTH	0.000800	-0.000282	0.001882
POP_GROWTH	0.000285	-0.001066	0.001635
AYS	0.008717	0.006348	0.011085
INFL	-0.000755	-0.001202	-0.000307

Source: Eviews

Understanding these bounds is crucial for interpreting the strength and reliability of the relationship between the independent variable and the dependent variable, as it helps in assessing the range within which the actual impact is likely to fall, thus informing decision-making and further analysis.

Significance Analysis Results

The analysis using the Fixed Effects model with the Generalized Least Squares (GLS) method yields the following results:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.242432	0.010436	23.23063	0.0000
GDP_GROWTH	0.000800	0.000551	1.453029	0.1468
POP_GROWTH	0.000285	0.000688	0.414290	0.6788
AYS	0.008717	0.001206	7.228281	0.0000

NFL	-0.000755	0.000228	-3.311671	0.0010

Source: Eviews

The regression output presents several key statistics for each variable, which provide insights into their relationships with the dependent variable (Gini Index). The constant term (C) has a coefficient of 0.242432, a standard error of 0.010436, and a t-statistic of 23.23063, with a P-value of 0.0000, indicating that it is highly significant. This suggests that when all independent variables, i.e. GDP growth, population growth, average years of schooling, and inflation are zero, the Gini Index is expected to have a value of approximately 0.242432.

Among the independent variables, GDP growth has a coefficient of 0.000800 with a standard error of 0.000551, resulting in a t-statistic of 1.453029 and a P-value of 0.1468. This indicates that GDP growth is not statistically significant at the typical alpha level of 0.05, suggesting its effect on the dependent variable is weak or potentially negligible. On the other hand, population growth has a coefficient of 0.000285 and a P-value of 0.6788, further confirming its insignificance in explaining variations in the dependent variable.

Conversely, the variable AYS (average years of schooling) has a coefficient of 0.008717, a standard error of 0.001206, and a highly significant t-statistic of 7.228281 with a P-value of 0.0000. This strong significance suggests that AYS has a meaningful positive impact on the dependent variable.

Inflation has a negative coefficient of -0.000755, a standard error of 0.000228, and a significant t-statistic of -3.311671 with a P-value of 0.0010. This indicates that inflation has a statistically significant negative effect on the dependent variable, suggesting that increases in this variable are associated with decreases in the dependent variable.

Overall, the analysis indicates that while some variables like AYS and inflation demonstrate significant relationships with the dependent variable, others like GDP growth and population growth do not contribute meaningfully to explaining its variation. This highlights the importance of focusing on the more impactful variables when interpreting the model's results.

Test of Goodness of Fit

The analysis using the common effects model with the Generalized Least Squares (GLS) method yields the following results:

R-squared	0.146141
Adjusted R-squared	0.139976
S.E. of regression	0.556427
F-statistic	23.70482
Prob(F-statistic)	0.000000

Simultant Test (F-Statistic)

The calculated F-statistic is 23.70482, with a corresponding P-value of 0.0000, which is significantly less than the threshold of 0.05. This accepts the alternative hypothesis (H1), indicating that, collectively, all independent variables (GDP growth, population growth, average years of schooling, and inflation) have a significant impact on the dependent variable (Gini Index). The F-statistic serves as a measure of the overall significance of the regression model, assessing whether the variation explained by the independent variables is substantial relative to the variation unexplained. A high F-statistic value, like 23.70482, suggests that the GDP growth, population growth, average years of schooling, and inflation, when considered together, contribute

meaningfully to explaining the variability in the Gini Index. Consequently, this result strengthens the validity of the model, affirming that the independent variables are indeed influential factors in predicting the outcome of the dependent variable.

Partial Test (t-Statistic)

The partial regression analysis provides insights into the significance of each variable in relation to the dependent variable, Gini Index. The constant term (C) has a t-statistic of 23.23063 and a P-value of 0.0000, indicating that it is highly significant and serves as a baseline for the model.

For GDP growth, the t-statistic is 1.453029 with a P-value of 0.1468, which is greater than 0.05. This leads to the acceptance of the null hypothesis (H0), suggesting that GDP growth does not have a significant partial effect on Gini. Similarly, population growth has a t-statistic of 0.414290 and a P-value of 0.6788, also resulting in the acceptance of H0. This implies that population growth is not significantly influencing Gini Index either.

In contrast, AYS (average years of schooling) has a t-statistic of 7.228281 and a P-value of 0.0000, which is less than 0.05. This leads to the rejection of the null hypothesis, indicating that AYS has a significant partial effect on Gini Index, suggesting that increases in education are associated with changes in income inequality.

Lastly, the inflation shows a t-statistic of -3.311671 and a P-value of 0.0010, which also leads to the rejection of H0. This suggests that inflation has a significant negative effect on Gini Index, indicating that higher inflation may be associated with lower income inequality.

Overall, while GDP growth and population growth do not significantly affect Gini, both AYS and inflation have notable impacts, with AYS contributing positively and inflation negatively to the income inequality measure. This highlights the importance of education and inflation in understanding and addressing issues related to income distribution.

Determination Coefficient

The R-squared value of 0.146141, coupled with an Adjusted R-squared of 0.139976, indicates that the set of independent variables (GDP growth, population growth, average years of schooling, and inflation) accounts for approximately 13.99% of the variability in the dependent variable (Gini Index). Since this value is less than 0.5, it suggests that the GDP growth, population growth, average years of schooling, and inflation have a weak explanatory power regarding the Gini Index. However, the simultaneous test indicates acceptance of the alternative hypothesis (H1), signifying that, despite the weak correlation, the GDP growth, population growth, average years of schooling, and inflation collectively have a statistically significant effect on the Gini Index. Importantly, this means that a substantial portion—86.01%—of the variation in the Gini Index is influenced by factors outside of the included independent variables (GDP growth, population growth, average years of schooling, and inflation) in the study. This highlights the potential oversight of other significant variables that could enhance the model's explanatory power, underscoring the need for further investigation to identify these external factors and improve the overall understanding of the dynamics at play.

5. CONCLUSIONS, RECOMMENDATIONS, AND LIMITATIONS

This research provides valuable insights into the complex relationships between economic growth, population growth, average years of schooling, inflation, and economic equity in Kalimantan. The findings highlight several key points:

1) Economic Growth and Equity: While economic growth is essential for enhancing overall wealth, its impact on economic equity is nuanced. The analysis indicates that GDP growth alone does not guarantee a reduction in income inequality. The distribution of growth benefits is critical; without inclusive policies, growth can exacerbate disparities rather than alleviate them.
2) Population Growth Challenges: The study demonstrates that rapid population growth poses significant challenges to achieving equitable economic outcomes. As the population increases, the demand for resources, jobs, and services intensifies. If economic growth does not keep pace, the result may be heightened inequality, underscoring the need for effective population management and planning.
3) Importance of Education: The findings underscore the vital role of average years of schooling in promoting economic equity. Higher educational attainment is strongly associated with improved income distribution, as it enhances individuals' earning potential and fosters social mobility. Investments in education are essential for creating a more equitable society and leveraging the benefits of economic growth.
4) Inflation's Negative Impact: The research reveals that inflation has a statistically significant negative effect on economic equity. Rising prices disproportionately affect lower-income households, further widening the income gap if wages do not keep up with inflation. This highlights the importance of stable economic policies that control inflation and protect vulnerable populations.
5) Policy Implications: Overall, the research suggests that policymakers in Kalimantan must adopt a multi-faceted approach to address the intertwined issues of growth and equity. This includes implementing inclusive economic policies that ensure equitable distribution of resources, investing in education to empower the workforce, and maintaining stable inflation rates to protect low-income households.

In conclusion, achieving economic equity in Kalimantan requires a comprehensive strategy that considers the interplay of economic growth, demographic changes, educational attainment, and inflation. By addressing these factors holistically, the region can foster sustainable development that benefits all segments of society.

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