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Population and Unemployment Effects On Poverty In South Sulawesi: A Panel Data Analysis

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Abstract

This study aims to examine the impact of population and unemployment on poverty levels in South Sulawesi, Indonesia, using panel data from 2018 to 2022 across ten districts. The analysis employs a Random Effect Model (REM) after comparing Common Effect and Fixed Effect Models through Chow and Hausman tests. The findings reveal that population significantly increases poverty, while unemployment does not show a statistically significant effect. Overall, population and unemployment jointly influence poverty levels. The model explains 77% of the variation in poverty, highlighting the demographic challenge in regional poverty alleviation policies.

Keywords: Poverty, Population, Unemployment, Panel Data, South Sulawesi

INTRODUCTION

Poverty remains a fundamental issue in economic development,especially in developing countries like Indonesia. South Sulawesi, as one of the provinces with high population growth, faces persistent poverty levels despite continuous development efforts. According to Todaro & Smith (2020), demographic and labor factors such as population growth and unemployment are central in explaining regional poverty disparities.

Several empirical studies (Ravallion, 2001; Loayza & Raddatz, 2010) confirm that unemployment is positively correlated with poverty. However, this relationship may vary across regions depending on economic structure, informality, and social protection

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systems. This study aims to analyze the extent to which population and unemployment influence poverty in South Sulawesi using panel data econometrics.

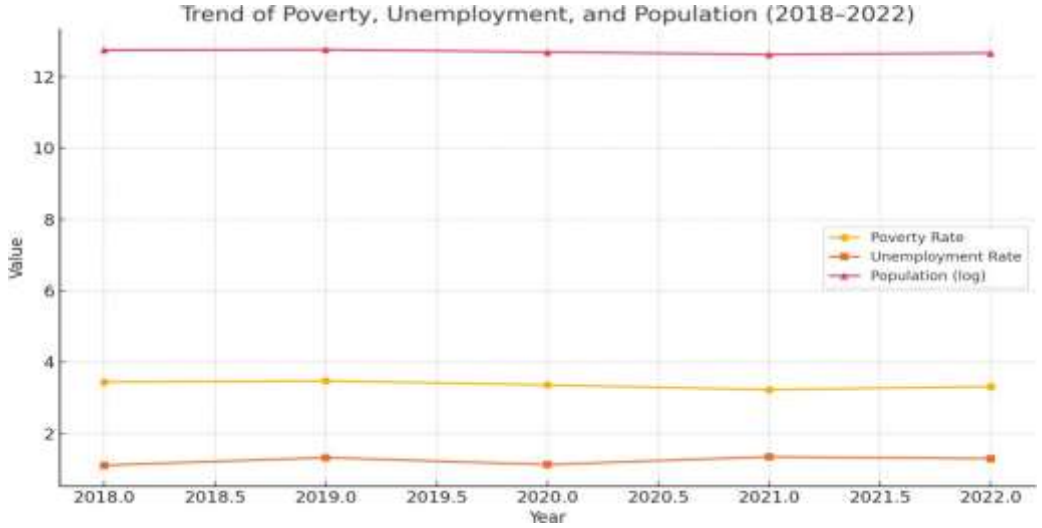
Theoretical Perspectives

The findings of this study can be interpreted using several economic development theories. First, the Malthusian theory posits that rapid population growth without corresponding growth in resources leads to poverty and food scarcity. This theory aligns with the significant effect of population on poverty found in this research.

Second, the Dual-Sector model of Arthur Lewis (1954) explains how labor transitions from the traditional agricultural sector to the modern industrial sector affect development. In regions with high informal employment, unemployment may not directly reflect economic distress, which may explain why it was not statistically significant in our findings.

Lastly, Keynesian economic theory suggests that unemployment reduces aggregate demand, worsening poverty. However, the lack of significance in our case may be due to underemployment or informal work dynamics in the region. This implies that traditional unemployment metrics may underestimate labor market challenges in South Sulawesi.

Figure A1. Trend of Poverty, Unemployment, and Population (2018–2022)



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METHOD

This study employs a quantitative method using panel data covering 10 regencies in South Sulawesi from 2018 to 2022. The dependent variable is poverty rate (Y), while the independent variables are log of population (X1) and unemployment rate (X2). Data were obtained from local statistical bureaus.

The estimation techniques include:

- Common Effect Model (CEM)
- Fixed Effect Model (FEM)
- Random Effect Model (REM)

Model selection was based on Chow and Hausman tests. EViews 12 software was used to perform the data analysis.

RESULTS AND DISCUSSION

Model Selection Tests Explanation To determine the most appropriate panel data model for this study—between Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM)—a series of specification tests were conducted, namely the Chow Test and Hausman Test.

Chow Test (FEM vs CEM)

The Chow test examines whether there are significant individual (cross-section) effects across the observational units (districts). The test results are as follows: F-statistic = 3.105043, Prob = 0.0068 (< 0.05)

Redundant Fixed Effects Tests
Equation: EQ01
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	3.105043	(9,38)	0.0068
Cross-section Chi-square	27.562041	9	0.0011

Interpretation: Since the probability value is less than 5%, the null hypothesis (which assumes CEM is sufficient) is rejected. This indicates that the Fixed Effect Model (FEM)

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is statistically better than the Common Effect Model. Therefore, the analysis proceeds to the Hausman test.

Hausman Test (FEM vs REM)

The Hausman test evaluates whether the unobserved individual effects are correlated with the regressors. The result is: Chi-square = 2.678754, Prob = 0.2620 (> 0.05)

Correlated Random Effects - Hausman Test
Equation: EQ01
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.678754	2	0.2620

Interpretation: Because the p-value is greater than 5%, the null hypothesis (which favors REM) is not rejected. This means the Random Effect Model (REM) is more efficient and consistent than FEM for this data.

Model Chosen: Based on the test sequence:

- Chow Test → FEM preferred over CEM
- Hausman Test → REM preferred over FEM
- Therefore, REM is selected as the best-fit model for estimating the influence of population and unemployment on poverty.

The regression result based on the Random Effect Model (REM) is presented as follows:

$$Y = -9.414765 + 1.016291 X1 - 0.102973 X2$$

The coefficient for X1 (Population) is positive and statistically significant at the 1% level (p = 0.000), indicating that a 1% increase in population contributes to a 1.01% increase in poverty. The coefficient for X2 (Unemployment) is negative but statistically insignificant (p = 0.1914). The joint significance test (F-test) shows that both variables together significantly affect poverty (p < 0.05). The R-squared value is 0.77, meaning the model explains 77% of the variation in poverty.

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These findings suggest that demographic pressures are more dominant in determining poverty outcomes in the region compared to labor market status. This could be explained by the high share of informal employment, where open unemployment is underreported.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C (Constant)	-9.414765	1.015231	-9.273522	0.0000
Population (X1)	1.016291	0.080455	12.63175	0.0000
Unemployment (X2)	-0.102973	0.077678	-1.325644	0.1914

The insignificant effect of unemployment suggests the need for better labor market data and consideration of informal employment. Meanwhile, the strong influence of population underlines the importance of integrating demographic strategies into poverty alleviation programs.

Classical Assumption Tests

In order to validate the robustness of the regression model, several classical assumption tests were conducted:

Multicollinearity Test : The correlation coefficient between independent variables X1 (Population) and X2 (Unemployment) was 0.140737, which is far below the threshold of 0.85. This indicates no multicollinearity problem among the regressors.

Heteroskedasticity Test : The Likelihood Ratio Test showed a p-value of 0.0059, suggesting the presence of heteroskedasticity. However, since the estimation uses the Generalized Least Squares (GLS) method within the Random Effect Model, which accounts for heteroskedasticity and autocorrelation across panels, the issue is mitigated and does not bias the coefficient estimates. Autocorrelation Consideration : The Durbin-Watson statistic in the REM model is 0.920339, which indicates the presence of some level of positive autocorrelation. However, since panel data inherently include repeated observations and the model is estimated using REM with robust standard errors, this autocorrelation is accommodated within the REM framework.

Overall, the regression model meets the primary classical assumptions required for panel data analysis, and any minor violations are addressed through appropriate estimation techniques.

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CONCLUSION

The study confirms that population significantly influences poverty levels in South Sulawesi, while unemployment does not significantly impact poverty in the observed period. Regional poverty alleviation policies should prioritize demographic control and labor productivity. Further research could incorporate additional socioeconomic indicators such as education and income inequality to improve model accuracy and policy relevance.

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