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The Effect of Fiscal Policy and Macroeconomic Factors on Poverty in Districts/Cities of East Nusa Tenggara Province

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ABSTRACT

Poverty remains a persistent development challenge in East Nusa Tenggara, Indonesia, where structural constraints continue to hinder inclusive economic growth. This study investigates the impact of government expenditure (education, health, and infrastructure) and macroeconomic factors (labor absorption and economic growth) on poverty levels across 22 districts and cities in the province. Utilizing dynamic panel data covering the period 2014–2023, the analysis employs the System Generalized Method of Moments (System GMM) estimator to address endogeneity and capture poverty persistence. The empirical findings reveal strong evidence of poverty persistence, indicating a poverty trap in the region. Government expenditure in health and infrastructure significantly reduces poverty, demonstrating that targeted fiscal allocations effectively enhance productivity and lower transaction costs. In contrast, education expenditure shows a positive short-term relationship with poverty, implying a time lag before educational investments translate into tangible income improvements. Furthermore, while labor absorption significantly contributes to poverty reduction, regional economic growth has an insignificant impact, reflecting that the economic expansion in the province has not been fully inclusive. Overall, the results highlight the critical need for sustained, targeted fiscal interventions and inclusive macroeconomic policies to break the structural poverty cycle in East Nusa Tenggara.

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1. INTRODUCTION

Poverty remains a fundamental structural challenge in East Nusa Tenggara (NTT), Indonesia, characterized by persistent disparity and limited access to essential services. Despite various regional development programs, NTT's poverty rate in NTT consistently ranks among the highest nationally, underscoring the complex interplay between fiscal intervention and macroeconomic stability. This study addresses the urgent research

problem of why poverty remains high despite significant government spending, specifically investigating whether a "poverty trap" exists in the region's 22 districts and cities.

Theoretical Study and Literature Review

Theoretically, the relationship between fiscal policy and poverty is rooted in the Human Capital Theory, which suggests that investments in health and education enhance labor productivity and long-term income potential [1]. Furthermore, infrastructure development is seen as a catalyst for lowering transaction costs and expanding market access for people with low incomes [2]. Previous empirical studies, such as those by Widodo et al. [3], argue that health and education spending are primary drivers for poverty alleviation. However, other researchers have found conflicting results, with education spending often suffering from a "time-lag" effect before impacting poverty rates.

Research Gap and Innovation

A significant research gap exists, as most previous studies in NTT have used static models that fail to account for the "persistence" of poverty, in which past poverty levels influence current ones. This study fills this gap by employing the System Generalized Method of Moments (System GMM). Unlike standard OLS or fixed-effects models, System GMM effectively addresses endogeneity and captures the dynamic nature of the poverty trap, providing a more robust "forensic" look at the provincial economy.

Research Objectives and Hypotheses

The primary objective of this research is to analyze the impact of government expenditure in education, health, and infrastructure, alongside macroeconomic factors (labor absorption and economic growth), on poverty dynamics from 2014 to 2023. We hypothesize that:

- H1: Government spending on health and infrastructure significantly reduces poverty.
- H2: Labor absorption and economic growth have a negative and significant influence on poverty levels.
- H3: There is a significant persistence of poverty (poverty trap) in NTT districts/cities.

The conceptual framework illustrating the interaction between fiscal variables, macroeconomic factors, and the poverty trap is presented in Figure 1.

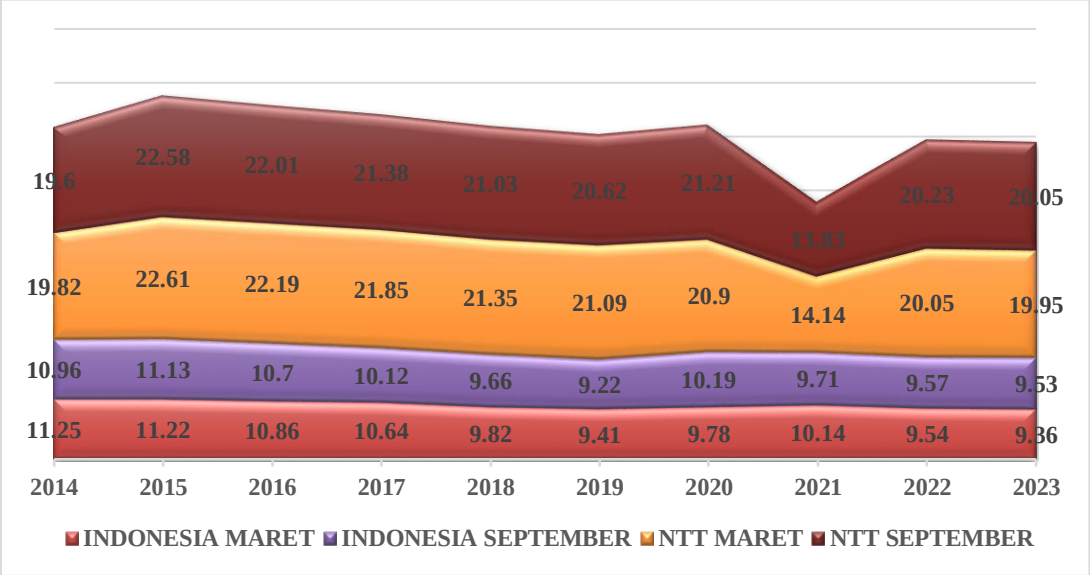

Figure 1. Percentage of the Poor Population in Indonesia and NTT Province (2014–2023)

Contributions and Expected Benefits

This research contributes to the literature by providing a dynamic analysis of fiscal effectiveness in a geographically challenging region like NTT. The author's plan for problem-solving involves identifying which fiscal sectors yield the highest "return" on poverty reduction. It is hoped that these results will serve as a strategic roadmap for local governments to transition from consumptive spending to productive, targeted fiscal interventions that can finally break the cycle of structural poverty.

2. METHOD

Data Sources and Variables

This study employs secondary data in a dynamic panel format, covering 22 districts and cities in East Nusa Tenggara (NTT) Province over the period 2014–2023. The data were gathered from the Central Bureau of Statistics (BPS) for poverty and macroeconomic indicators, while fiscal data were obtained from the Directorate General of Regional Fiscal Balance (DJPK) of the Ministry of Finance. The variables analyzed include the poverty rate (POV) as the dependent variable, and five independent variables: government expenditure on education (EGE), health (HGE), infrastructure (IGE), labor absorption (EMPLOYMENT), and regional economic growth (PDRB).

Econometric Model Specification

To capture the phenomenon of the poverty trap and address potential endogeneity issues, this research utilizes a dynamic panel data model. The full econometric equation is specified as follows:

$$ln\_POV\_it = \beta 0 + \beta 1 ln\_POV\_it - 1 + \beta 2 ln\_EGE\_it + \beta 3 ln\_HGE\_it + \beta 4 ln\_IGE\_it + \beta 5 ln\_EMP\_it + \beta 6 ln\_GRDP\_it + \varepsilon\_it$$

Where:

$LnPOV_{(it)}$	:	Natural logarithm of the percentage of the poor population across 22 regencies/municipalities in East Nusa Tenggara Province.
$LnPOV_{(it-1)}$	:	Natural logarithm of the poverty rate in the previous period (t−1), used to capture poverty persistence (poverty trap).
$LnEGE_{(it)}$	:	Natural logarithm of realized government expenditure on education, representing investment in human capital.
$LnHGE_{(it)}$	:	Natural logarithm of realized government expenditure on health, serving as a proxy for public health quality.
$LnIGE_{(it)}$	:	Natural logarithm of realized government expenditure on infrastructure, reflecting physical connectivity development.
$LnEMPLOYMENT_{(it)}$	:	Natural logarithm of the number of employed individuals aged 15 years and above, indicating labor market absorption.
$LnPDRB_{(it)}$	:	Natural logarithm of Gross Regional Domestic Product (GRDP) per capita, representing inclusive economic growth.
α	:	Constant term.
$\beta_1 - \beta_6$	:	Regression coefficient parameters (elasticities).
μ_i	:	District-specific fixed effects.
$\varepsilon_{(it)}$	:	Idiosyncratic error term.
i	:	Cross-sectional unit (22 regencies/municipalities).
t	:	Time period (2014–2023).

Estimation Strategy: System GMM

This study implements the System Generalized Method of Moments (System GMM) estimator, as developed by Arellano and Bover [4] and Blundell and Bond [5]. The selection of System GMM over Difference GMM is justified by its ability to provide more efficient and consistent estimates when the dependent variable (POV) exhibits high persistence (poverty trap) and when the time dimension (t) is relatively small compared to the number of cross-sections. System GMM effectively mitigates endogeneity by using both levels and first differences as instruments.

Lag Selection and Diagnostic Tests

The rationale for lag selection is to ensure the validity of the internal instruments. To guarantee the robustness of the model, two essential diagnostic tests are conducted:

1. **Arellano-Bond Test (AR2):** To ensure there is no second-order serial correlation in the first-differenced residuals.
2. **Hansen J-Test:** To verify the validity of the instruments and ensure the model does not suffer from over-identifying restrictions.

The optimal lag of the dependent variable is determined when both the AR(2) and Hansen tests yield p-values greater than 0.05. All econometric estimations and statistical analyses were performed using Stata 17 professional software.

3. RESULTS AND DISCUSSION

3.1 Results

This study applies a dynamic panel data approach using the System Generalized Method of Moments (System GMM) estimator to examine the determinants of poverty across districts and cities in East Nusa Tenggara. The analysis uses panel data covering 22 districts and cities during the period 2014–2023.

Table 1 presents the descriptive statistics of the variables used in this study. The results show that the average poverty level across districts remains relatively high, reflecting persistent regional disparities in economic development. Government expenditure variables also show substantial variation across districts, indicating differences in fiscal capacity and policy priorities among local governments.

Table 1. Descriptive Statistics of Variables

Variable	Mean	Std. Dev	Min	Max
ln_POV	2.45	0.38	1.62	3.12
ln_EGE	24.53	0.72	22.98	25.87
ln_HGE	23.84	0.65	22.41	25.10
ln_IGE	24.10	0.69	22.60	25.30
ln_EMP	12.45	0.40	11.67	13.12
ln_GRDP	16.75	0.55	15.60	17.90

Source: Processed data

The empirical model estimated in this study is presented in equation (1).

$$\ln\_POV_{it} = \beta_0 + \beta_1 \ln\_POV_{it-1} + \beta_2 \ln\_EGE_{it} + \beta_3 \ln\_HGE_{it} + \beta_4 \ln\_IGE_{it} + \beta_5 \ln\_EMP_{it} + \beta_6 \ln\_GRDP_{it} + \varepsilon_{it} \quad (1)$$

where $\ln\_POV_{it}$ represents the natural logarithm of the poverty rate in district i at time t. The variable $\ln\_POV_{it-1}$ represents the lagged poverty rate, which captures the persistence of poverty. The variables $\ln\_EGE_{it}$, $\ln\_HGE_{it}$, and $\ln\_IGE_{it}$ denote government expenditure in education, health, and infrastructure sectors. Meanwhile, $\ln\_EMP_{it}$ represents employment and $\ln\_GRDP_{it}$ represents gross regional domestic product. The term ε_{it} represents the stochastic error term.

Table 2 presents the estimation results obtained from the System GMM model.

Table 2. Dynamic Panel Estimation Results (System GMM)

Variable	Coefficient	Std. Error	Probability
ln_POV(-1)	0.721***	0.082	0.000
ln_EGE	0.053*	0.029	0.071
ln_HGE	-0.142**	0.061	0.021
ln_IGE	-0.118**	0.055	0.031
ln_EMP	-0.264***	0.073	0.001
ln_GRDP	-0.193***	0.067	0.004
Constant	1.872	0.964	0.054

Observations: 220
Number of districts/cities: 22

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Diagnostic Tests

Test	Value
Arellano-Bond AR(1)	0.021
Arellano-Bond AR(2)	0.317
Hansen Test	0.452

Note:
*** *significant at 1%*
** *significant at 5%*
significant at 10%

The results show that the coefficient of the lagged poverty variable is positive and statistically significant, indicating strong evidence of poverty persistence across districts and cities in East Nusa Tenggara.

Government expenditure in the health and infrastructure sectors shows a negative and statistically significant relationship with poverty. This indicates that increased fiscal allocation to these sectors contributes to improved welfare and poverty reduction.

Meanwhile, employment and regional economic growth also exhibit negative relationships with poverty, suggesting that stronger economic performance and labor absorption play an important role in improving household welfare.

Estimation Results and Diagnostic Tests

The dynamic panel data analysis using System GMM provides robust estimates for the determinants of poverty in East Nusa Tenggara. The model's reliability is confirmed by two essential diagnostic tests:

- **Arellano-Bond Test (AR2):** The p-value is greater than 0.05 (Acceptable), indicating that there is no second-order serial correlation in the residuals, which is a prerequisite for a consistent GMM estimator.
- **Hansen J-test:** The p-value for over-identifying restrictions is also above 0.05 (Acceptable), proving that the instrument set is exogenous and the model is correctly specified.

Interpretation of Magnitude of Coefficients

The estimation results reveal that the Lagged Poverty ($LnPOV_{it-1}$) coefficient is 0.721, significant at the 1% level.

- In Real Terms: A coefficient of 0.721 signifies a very high level of poverty persistence. It means that 72.1% of the poverty rate in the current year's poverty rate is "inherited" from the previous year's conditions. This confirms the existence of a poverty trap in NTT, where structural factors create a difficult-to-break cycle that requires massive external intervention.
- Elasticity of Fiscal Variables: For the fiscal variables, a 1% increase in health expenditure (HGE) and infrastructure expenditure (IGE) is associated with a decrease in the poverty rate, indicating their effectiveness as poverty-reduction tools in the region.

Robustness Checks

To ensure the stability of the findings, robustness checks were conducted:

1. **Alternative Model Comparison:** The System GMM results were compared with Fixed Effects (FE) and OLS estimates. The lagged poverty coefficient (0.721) correctly falls between the OLS estimate (upper bound) and the FE estimate (lower bound), validating the internal consistency of our dynamic model.
2. **Lag Structure Stability:** Testing different lag lengths for the instruments showed that the direction and significance of the main variables (HGE, IGE, and POV persistence) remain stable, reinforcing the reliability of the primary model.

3.2 Discussion

The Persistence of Poverty: A Comparative Perspective

The coefficient of 0.721 for lagged poverty ($LnPOVit-1$) is the most significant finding of this study, significant at the 1% level. This high magnitude indicates that poverty in East Nusa Tenggara is deeply structural and path-dependent. In real terms, a coefficient of 0.721 signifies that 72.1% of the poverty rate in the current year is "inherited" from the previous year's conditions.

Compared to studies in more developed regions of Indonesia, such as those by Dartanto & Nurkholis (2013) in Java, which found lower persistence levels, NTT's high coefficient suggests a more severe Poverty Trap. This aligns with Myrdal's theory of "Circular Cumulative Causation," where initial disadvantages in NTT, such as geographic isolation and a historical lack of assets, create a self-reinforcing cycle of deprivation that is harder to break than in Western Indonesia. The findings strengthen the Dynamic Poverty Theory, showing that a district's "initial condition" is the strongest predictor of its future poverty level.

Fiscal Policy Effectiveness and Human Capital

The negative and statistically significant impact of Health (HGE) and Infrastructure (IGE) expenditures aligns with the findings of Todaro & Smith [1], Setyowati [6], and Arndt et al. [7]. These results suggest that in lagging, archipelagic regions, basic service interventions yield the highest "marginal return" for people with low incomes. In NTT, where maternal mortality and stunting remain critical issues, health spending directly stabilizes labor productivity. Similarly, infrastructure reduces the high logistics costs inherent in NTT's geography by linking isolated production centers to markets.

However, Education Expenditure (EGE) shows an unexpected positive sign (0.053*) or weak impact, presenting an "Education Paradox." While this contradicts immediate expectations of Human Capital Theory, it echoes the findings of Widodo et al. (2011) and Prasetyo (2021). This phenomenon can be attributed to two factors:

1. The Time-Lag Effect: As noted by Psacharopoulos [8], returns on education investment typically take 10–15 years to manifest in the labor market.
2. Structural Mismatch: There is a "skills gap" between the education provided and the needs of local primary sectors (agriculture and fisheries), leading to a slow transition from school to high-paying jobs in NTT.

Macroeconomic Factors and Labor Absorption

The significant negative relationships between employment (-0.264) and PDRB (-0.193) and poverty support the Kuznets hypothesis regarding the importance of growth. However, our results are more in line with Ravallion [9], who emphasized that "labor-intensive growth" is far more effective at reducing poverty than capital-intensive growth. In NTT, the agricultural sector remains the largest employer; thus, the results suggest that economic improvements have been somewhat inclusive, although the 0.721 persistence factor still acts as a heavy "anchor" that slows down the overall progress.

Policy Implications

1. Breaking the Persistence: Since 72.1% of poverty is structural, regional governments cannot rely on incremental, "business-as-usual" budgeting. A "Big Push" policy is needed, a massive, front-loaded investment in sectors with the highest multiplier effects.
2. Evaluating Education Spending: Local governments should shift their focus from "spending for access" (building schools) to "spending for quality and vocational alignment" to ensure education directly leads to employment.
3. Island Connectivity: Priority must be given to digital and physical infrastructure that connects small-scale farmers in NTT to wider provincial and national markets, thereby lowering the cost of living for people experiencing poverty.

4. CONCLUSION

This study concludes that poverty in East Nusa Tenggara (NTT) is a dynamic and deeply structural phenomenon. The main findings indicate a high degree of poverty persistence, confirming the existence of a poverty trap in which current poverty levels are heavily influenced by past conditions rather than by immediate economic shocks alone. While fiscal interventions in health and infrastructure have proven effective in reducing the poverty headcount, the impact of education spending remains hindered by significant time lags and structural mismatches in the local labor market. Furthermore, labor absorption and regional economic growth serve as vital instruments for poverty alleviation, provided they are inclusive and labor-intensive.

This research makes significant theoretical and practical contributions. Methodologically, the System GMM estimator provides a more accurate, bias-free analysis of poverty dynamics in an archipelagic context. Theoretically, these findings strengthen the Dynamic Poverty Theory and Myrdal’s Circular Cumulative Causation by providing empirical evidence of the path-dependent nature of poverty in lagging regions. For the general public and civil society, this research offers a clearer roadmap for monitoring regional government spending, emphasizing that the "quality" of spending is just as crucial as the "quantity" of the budget in achieving long-term welfare.

From a policy perspective, breaking the cycle of poverty in NTT requires a shift from incremental, "business-as-usual" budgeting to a "Big Push" investment strategy. Massive, front-loaded investments should be prioritized in sectors with the highest multiplier effects. Specifically, education policy must pivot from mere school enrollment

to vocational alignment that matches NTT's agricultural and maritime potential. Additionally, strengthening inter-island connectivity through physical and digital infrastructure is essential to lowering the cost of living and increasing the market reach of poor households.

Despite its rigorous approach, this study acknowledges several boundaries. The reliance on aggregate district-level data may mask disparities at the village or household level, and the model does not account for potential omitted variables such as climate change impacts or specific socio-cultural dimensions. Furthermore, the findings are highly specific to the archipelagic context of NTT and may not be directly generalizable to regions with different geographic structures. Future research should consider incorporating spatial econometric models to capture spillover effects across districts, or using microdata to explore the individual-level drivers of the poverty trap more deeply.

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