AN EMPIRICAL STUDY ON THE INFLUENCE OF MACROECONOMIC VARIABLES ON ECONOMIC GROWTH IN EAST JAVA PROVINCE

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Abstract
This study analyzes the influence of the Open Unemployment Rate (TPT), Labor Force Participation Rate (TPAK), and Human Development Index (HDI) on the economic growth of districts/cities in East Java Province. This study aims to test the extent to which labor market and human development indicators are able to explain variations in regional economic growth performance. The study used a quantitative approach with a panel data regression method in 38 districts/cities during the period 2017–2023, which was processed using EViews 13. The selection of the estimation model was carried out through the Chow test, the Hausman test, and the Lagrange Multiplier test, with the results showing that the Random Effect Model (REM) is the most suitable specification. Empirical findings indicate that partially, Open Unemployment Rate has a negative and significant effect (p=0.0042) and Human Development Index has a positive and significant effect (p=0.0000), while Labor Force Participation Rate has a positive but insignificant effect (p=0.8627). The R-squared value ±0.20 indicates that the model is able to explain about 20% of the variation in economic growth, while the rest is influenced by other factors outside the model. In conclusion, strengthening economic growth in East Java is more determined by efforts to reduce unemployment and improve the quality of human development, while increasing labor participation needs to be accompanied by improving the quality of work and productivity in order to have a real impact on growth.

Keywords : *Economic Growth, Open Unemployment Rate, Labor Force Participation Rate, Human Development Index*

1. INTRODUCTION

Poverty is still a major development challenge in many regions because it has a direct impact on quality of life, productivity, and social stability. In the macroeconomic framework, economic growth is seen as one of the important prerequisites for poverty reduction, but its impact depends largely on the quality of growth whether it is able to create job opportunities, increase real incomes, and expand access to basic services (Agussalim et al., 2024). Therefore, identifying the factors that drive regional economic growth is crucial so that development policies do not stop at the growth target, but also encourage the improvement of welfare more evenly (Akbar et al., 2022).

In the context of Indonesia, East Java Province has a strategic position as one of the centers of national economic activity, while facing a large burden of poverty in absolute terms (Hardjoko et al., 2021). BPS data shows that poverty in East Java has indeed decreased, but the number of poor people is still at a high level in March 2024 recorded at 9.79% or around 3.983 million people, decreased in September 2024 to 9.56% or around 3.893 million people, and decreased again in March 2025 to 9.50% or around 3.876 million people (Timur, 2024c, 2025c, 2025b). These findings underscore the urgency of evidence-based policies to strengthen the engine of regional growth that is more inclusive and pro-welfare (Purwanti, 2024).

In line with that, the dynamics of East Java's economic growth also show episodes of shocks and recoveries that are important to observe (Umam & Kartiasih, 2023). Economic growth as measured through real GDP contracted in 2020 by -2.39% due to weakening economic activity during the pandemic, then gradually recovered in 2021 (c-to-c) by 3.57% and strengthened in 2022 by 5.34%. However, the next growth rate tends to be moderate in 2023 growing 4.95% and in 2024 growing 4.93% (East, 2022, 2023a, 2025a). This pattern indicates a post-pandemic recovery, but strengthening sustainable growth still requires a sharper understanding of the determinants (Sunge et al., 2024).

One of the main channels that connects economic growth to prosperity is the labor market. A high unemployment rate reflects unutilized production capacity and has the potential to hold back increased output, while labor force participation rates reflect the involvement of the working-age population in economic activities that can expand the production base. BPS East Java noted that employment conditions improved from 4.88% (August 2023) to 4.19% (August 2024), along with an increase in TPAK from 72.56% to 73.45% in the same period (East, 2023c, 2024a). However, improvements in labor market indicators do not always automatically increase growth if an increase in participation occurs in low-productivity sectors or is not followed by an improvement in the quality of work (McMillan et al., 2014). This makes empirical testing important to ascertain the direction and strength of its influence in the context of East Java.

In addition to employment, the quality of human development is also a key determinant of growth through increased productivity, capability, and resource use efficiency (Sofilda et al., 2023). HDI is often used as a proxy for human capital because it summarizes the dimensions of health, education, and decent living standards. In East Java, the HDI in 2024 will reach 75.35, an increase of 0.70 points compared to 2023 which was 74.65 (East, 2023b, 2024b). The relevant policy question is the extent to which such an increase in HDI is actually converted into an acceleration of growth, especially when the economy is in a phase of recovery and restructuring of the labour market structure (Regina et al., 2025).

Based on this background, this article focuses on an empirical study on the influence macroeconomic variabel on economic growth in East Java Province. This focus is important because regional growth is determined not only by aggregate production factors, but also by the quality of labor, economic participation, and human capacity that make up long-term productivity. The results of the study are expected to provide a stronger basis for the formulation of employment and human development policies so that East Java's economic growth is more sustainable and effective in supporting poverty reduction.

2. METHODOLOGY

This study uses a quantitative approach with panel data design because the unit of analysis includes inter-region (cross section) and inter-time dimensions (time series). The use of relevant panel regression to capture the heterogeneity of the characteristics of each district/city that is not observed (*unobserved heterogeneity*) and changes in economic conditions across years, resulting in more informative estimates than pure crosssection or time series regression (Mursyidin et al., 2023). In addition, panel data generally has a greater number of observations, increases the degree of freedom, and allows for the control of individual differences and time effects in the model (Saputri et al., 2020).

The data source in this study is the Central Statistics Agency (BPS) of East Java Province, with coverage of 38 districts/cities during the 2017–2023 period. The dependent variable is economic growth that is proxied using GDP per capita. Independent variables include Open Unemployment Rate (TPT), Labor Force Participation Rate (TPAK), and Human Development Index (HDI). All data is tabulated in a panel format and processed using EViews 13.

Econometrically, the relationships between variables are estimated through the following panel regression equations:

$$Growth_{it} = \alpha + \beta_1 TPT_{it} + \beta_2 TPAK_{it} + \beta_3 IPM_{it} + \varepsilon_{it}$$

Description:

$Growth_{it}$: economic growth in districts/cities in years it

α : konstanta

$\beta_1, \beta_2, \beta_3$: regression coefficient

TPT_{it} : Open Unemployment Rate in districts/cities in the year $.it$

$TPAK_{it}$: Labor Force Participation Rate in districts/cities in $.it$

IPM_{it} : Human Development Index in districts/cities in the year $.it$

ε_{it} : error term

i : cross-section units (38 districts/cities in East Java Province).

t : time period (year 2017–2023).

The estimation was carried out by comparing three main approaches, namely Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The selection of the best model is determined through a panel specification test procedure, namely the Chow test (CEM vs FEM), the Hausman test (FEM vs REM), and the Lagrange Multiplier test (CEM vs REM) (Irmeilyana et al., 2022). After the model is selected, diagnostic testing is performed to ensure the reliability of the estimates, including examination of the potential for multicollinearity as well as the handling of heteroscedasticity and/or autocorrelation issues according to the panel data (Arellano, 1987; Driscoll & Kraay, 1998).

With the following models and hypotheses:
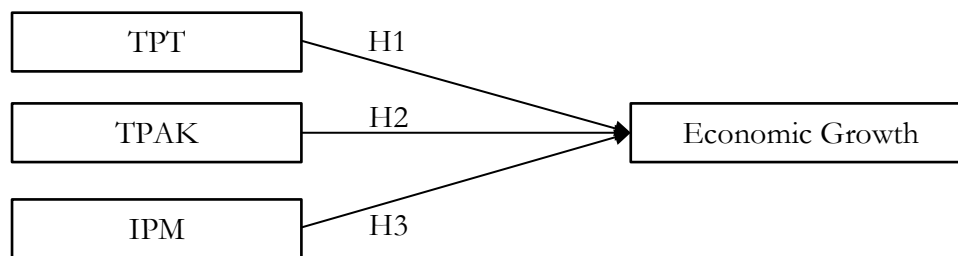
Hipotesis:

H1: TPT has a negative effect on the economic growth of districts/cities in Java

H2: TPAK has a positive effect on the economic growth of districts/cities in Java

H3: HDI has a positive effect on the economic growth of districts/cities in East Java.

3. RESULT AND DISCUSSION

In the analysis of panel data regression, there are three commonly used model specifications, namely Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The determination of the most suitable model is carried out through a series of specification tests. The initial stage generally begins with the Chow test as a basis for comparing CEM and FEM. This test aims to assess whether there is a significant difference in individual effects (districts/cities) if the difference is proven to be significant, then FEM is more appropriate to be used than CEM.

Table 1. Chow Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1321.46676	(37,225)	0.0000
Cross-section Chi-square	1432.65109	37	0.0000

Source: Data processed, 2024

The results of the Chow Test (Effects Test) in Table 1 show the value of Cross-section F = 1321.46676 with Prob. 0.0000 and Cross-section Chi-square = 1432.65109 with Prob. 0.0000. A probability value much smaller than the significance level of 5% indicates that the null hypothesis stating the Common Effect (CEM) model is adequately rejected. Thus, there are significant cross-section effects, so that economic growth behavior cannot be assumed to be homogeneous across regions. Implicitly, the more appropriate model to use is the Fixed Effect Model (FEM) because it is able to accommodate differences in characteristics that are not observed in each district/city in East Java, such as the regional economic structure, the quality of local institutions, and labor market conditions that have the potential to affect the relationship between TPT, TPAK, and HDI to economic growth.

Table 2. Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	7.040130	3	0.0706

Source: Data processed, 2024

Based on the Hausman Test in Table 2, the Chi-Square statistical value of 7.040130 with a free degree of 3 and a probability of 0.0706 was obtained. The probability value is greater than 0.05, so the null hypothesis that the Random Effect Model (REM) is more precise and consistent than the Fixed Effect Model (FEM) cannot be rejected. Thus, the difference in estimated coefficients between FEM and REM is not systematic, which indicates that the components of individual effects (district/city-specific characteristics that are not observed) tend to be uncorrelated with the explanatory variables in the model. Therefore, REM was chosen as a more efficient model to estimate the influence of TPT, TPAK, and HDI on economic growth. Given that REM has been indicated to be more suitable at this stage, the next step is to conduct a Lagrange Multiplier Test (LM Test) to determine whether the REM panel model is more suitable for use than the Common Effect Model (CEM).
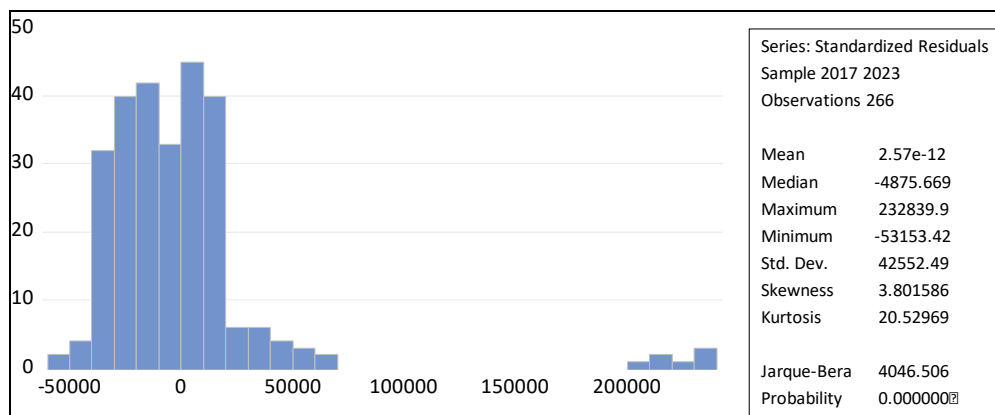
Table 3. LM Test

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	772.1965 (0.0000)	3.486090 (0.0619)	775.6826 (0.0000)

Source: Data processed, 2024

Based on the Breusch Pagan Lagrange Multiplier (LM) Test in Table 3, the probability for the cross-section component is 0.0000 and for the both component is 0.0000, while the time component shows a probability of 0.0619. A probability value smaller than the 5% significance level at the cross section and both indicates that the null (H0) hypothesis is rejected, i.e. that the Common Effect (CEM) model is inadequate because there is a significant variation in random effects between districts/cities. Thus, the more appropriate model to use is the Random Effect Model (REM), because it is able to capture heterogeneity across regions through a random error component. Meanwhile, the results on the insignificant time component (0.0619 > 0.05) suggest that time-based variation is not dominant at a significance level of 5%, but overall the LM findings reinforce the decision that the random-effect panel approach is more feasible than CEM in estimating the influence of TPT, TPAK, and HDI on economic growth in East Java.

The normality test aims to assess whether the residual in the regression model follows the normal distribution, which is one of the important assumptions in parametric inferential testing. In this study, residual normality was evaluated using the Jarque Bera (JB) test, which is a test that checks the suitability of residual distribution based on skewness and kurtosis values. The results of these tests are used to determine whether the residual can be considered normally distributed or vice versa.

Figure 1. Normality Test

Series: Standardized Residuals	
Sample 2017 2023	
Observations 266	
Mean	2.57e-12
Median	-4875.669
Maximum	232839.9
Minimum	-53153.42
Std. Dev.	42552.49
Skewness	3.801586
Kurtosis	20.52969
Jarque-Bera	4046.506
Probability	0.000000

Source: Data processed, 2024

Based on the results of the Normality test which shows the statistical value of Jarque Berra of 4046,506 > 0.05, it can be concluded that the data is distributed normally.

Table 4. Multicollinearity Test

CORRELATION			
	TPT	TPAK	IPM
TPT	1.000000	-0.327733	0.557161

TPAK	-0.327733	1.000000	-0.241854
IPM	0.557161	-0.241854	1.000000

Source: Data processed, 2024

Based on the multicollinearity test using the independent intervariable correlation matrix in Table 4, all correlation values are below the limit of 0.85 which is generally used as an indication of strong multicollinearity. The correlation between TPT and TPAK was -0.3277, between TPT and HDI was 0.5572, and between TPAK and HDI was -0.2419. These values show a low to moderate relationship and do not indicate a high correlation between explanatory variables. Thus, the panel regression model in this study can be considered not to experience serious multicollinearity problems, so that the estimation of the coefficients of each independent variable is relatively stable and the interpretation of the partial influence of TPT, TPAK, and HDI on economic growth can be carried out more reliably.

Table 5. Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-70716.57	15453.23	-4.576167	0.0000
TPT	-526.7882	182.2092	-2.891118	0.0042
TPAK	18.21674	105.2466	0.173086	0.8627
IPM	1564.711	223.0766	7.014229	0.0000
R-squared				0.200486
Adjusted R-squared				0.191332
S.E. of regression				3149.524
F-statistic				21.89973
Prob(F-statistic)				0.000000

Source: Data processed, 2024

The results of the FEM model regression test in Table 5 with the following explanation:

1. The results of the REM test showed a probability number of TPT variables worth 0.0042 which showed significance at the level of $\alpha = 5\%$. The results show that the TPT variable has a significant effect on economic growth in 38 districts/cities in East Java Province.

2. The results of the REM test showed a probability number of TPAK variables worth 0.8627 which showed insignificance at the level of $\alpha = 5\%$. The results show that the TPAK variable does not have a significant effect on economic growth in 38 districts/cities in East Java Province.

3. The results of the REM test showed a probability number of the HDI variable value of 0.0000 which showed significance at the level of $\alpha = 5\%$. The results show that the HDI variable has a significant effect on economic growth in 38 districts/cities in East Java Province.

Based on the results of the F test in Table 5, an F-statistic value of 21.89973 was obtained with Prob(F-statistic) = 0.0000. The probability value is smaller than the significance level of 5% (0.05), so H0 is rejected. This means that the variables of TPT, TPAK, and HDI simultaneously have a significant effect on the economic growth (GDP per capita) of districts/cities in East Java Province during the 2017–2023 period. Thus, the regression model used is considered fit to explain the variation in economic growth based on the combination of the three independent variables.

Based on Table 5, the value of R-squared is 0.200486 and Adjusted R-squared is 0.191332. These results show that the variation in economic growth (GDP per capita) of districts/cities in East Java Province for the 2017–2023 period can be explained by the variables of TPT, TPAK, and HDI of around 20.05%. After considering the number of variables in the model, the more conservative explanatory ability of the model is reflected in the Adjusted R-squared of 19.13%. Thus, there is still around 79.95%–80.87% variation in economic growth influenced by other factors outside the model, such as investment, economic sector structure, government spending, productivity, infrastructure, regional inflation, and the institutional characteristics of each region.

The Effect of the Open Unemployment Rate (TPT) on Economic Growth

The regression results showed that TPT had a negative and significant effect on economic growth (Prov. 0.0042). Theoretically, these findings are in line with the idea that unemployment reflects untapped production capacity, thereby reducing real output and holding back economic expansion (Elhorst & Emili, 2022; Jolianis et al., 2024; Porras-Arena & Martín-Román, 2023). In the regional context, an increase in TPT can indicate a weakening of labor absorption in key sectors, a decrease in effective working hours, or a mismatch of skills with the needs of the labor market (Khoiruddin et al., 2024). Thus, reducing unemployment is not only a social target, but also an economic channel that strengthens regional production performance through increasing the utilization of labor factors and household consumption activities (Fagereng et al., 2024).

These findings are in line with Ardin, (2023) Pramesty & Adianita, (2023) Rahman et al., (2025) Safitri et al., (2023) Suparman & Muzakir, (2023) In general, it shows that the Open Unemployment Rate (TPT) tends to have an inverse relationship with economic growth. The majority of findings confirm that the rise in unemployment reflects unabsorbed labor and untapped production capacity, thus depressing output and slowing growth. However, some studies also show that the influence of TPT can be weakened or insignificant in certain periods, especially when there is a major shock (e.g. during a pandemic) or when changes in the structure of the labor market make the unemployment indicator not fully capture the dynamics of productivity (e.g., increased informality/underemployment). Thus, the literature emphasizes that the impact of TPT on growth is not only determined by the magnitude of unemployment itself, but also by the quality

of job creation, the structure of economic sectors, and policy responses in absorbing labor productively.

The Effect of Labor Force Participation Rate (TPAK) on Economic Growth

The TPAK coefficient is positive but not significant (Prov. 0.8627), which indicates that increased labor force participation has not been shown to statistically boost economic growth in this period and sample. Conceptually, higher participation does expand the labor supply, but its impact on growth is highly dependent on the quality of labor absorption. If the increase in TPAK is dominated by the entry of workers into low-productivity sectors, informal employment, or an increase in half-unemployment (*underemployment*), additional participation does not automatically increase per capita output (Kumar M & Balu, 2023; Pratomo, 2015; Sultana et al., 2022). These findings suggest that employment policies are not sufficiently oriented towards increasing participation alone, but must ensure the availability of productive jobs, skills upswing, and improving the quality of work so that participation can be converted into growth (Maryati et al., 2021).

These findings are in line with Baerlocher et al., (2021) Margono & Nuryadin, (2024) Nadhilla & Ichsan, (2023) Novita & Samsuddin, (2024) Umair et al., (2024) concluding that the influence of TPAK/LFPR on economic growth is contextual in some regions/countries, an increase in labor participation can encourage growth due to expanding production capacity, but in other contexts the impact can be weak or even negative when increased participation is not followed by productive labor absorption (e.g. dominance of the informal sector, skills mismatch, or underemployment). The findings across studies also confirm that the effect of TPAK tends to be stronger when supported by the quality of human capital (education and health) and that increased participation of certain groups such as women can provide a growth bonus if productivity barriers can be suppressed.

The Effect of the Human Development Index (HDI) on Economic Growth

The Human Development Index has a positive and significant effect (Prob. 0.0000), which reinforces the view of human capital theory that improving the quality of education, health, and living standards increases productivity, workforce adaptability, and resource use efficiency. In the perspective of endogenous growth, the improvement of human quality strengthens the capacity for innovation, technology adoption, and improvement of work organizations, which ultimately promotes sustainable growth (Aghion & Howitt, 1992; Lucas, 1988). The significance of HDI in this model also implies that development strategies in East Java will be more effective if they place human investment as an engine of growth, not just as a social agenda (Muqorrobin & Soejoto, 2017).

These findings are in line with Aji et al., (2024) Hung & Thanh, (2022) Regina et al., (2025) Setyowati, (2022) Sofilda et al., (2023) emphasized that HDI/HDI is an important determinant of economic growth, because improving the quality of education, health, and living standards strengthens labor productivity, innovation capacity, and efficiency in the use of production factors. Consistently, empirical findings suggest that regions with better HDI tend to have higher growth performance, both at the national and regional levels, although the magnitude of the effect can vary between regions and observation periods. Some studies have also emphasized that the influence of HDI on growth often interacts with institutional/policy factors (e.g. fiscal decentralization) so that investment in human development will be more effective when supported by proper governance and public budget allocation. Thus, the literature reinforces the argument that growth acceleration strategies do not rely enough on economic expansion, but need to place human development as the engine of long-term growth.

4. CONCLUSION

Based on the estimated data of the panel of 38 districts/cities in East Java for the 2017–2023 period with the Random Effect model, the results show that simultaneously TPT, TPAK, and HDI have a significant effect on economic growth, but partially TPT has a significant negative effect, HDI has a significant positive effect, while TPAK is insignificant, the power to explain the model is in the range of $\pm 20\%$, so there are many other factors outside the model that affect growth. The policy implications of these findings emphasize the importance of reducing open unemployment through the creation of productive jobs, training based on industrial needs, and strengthening the matching of the labor market, as well as accelerating investment in human development (education and health) as it has been proven to be a driver of growth. Meanwhile, improving work quality and productivity needs to be prioritized so that the increase in work participation is truly converted into growth. The weaknesses of this study include the limitation of variables (potential *omitted variable bias*), the use of growth proxies based on GDP per capita, and the lack of exploration of possible differences in impact between sectors/spaces as well as broader *robustness* tests. The next research recommendation is to add control variables such as investment, government spending, sectoral structure, inflation/cost of living, and infrastructure quality, using more robust error standards, and test advanced approaches such as dynamic panels or spatial panels to capture the effects of interregional linkages and long-term growth dynamics.

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