ANALYSIS OF FISCAL POTENTIAL ON ECONOMIC GROWTH IN CENTRAL JAVA DURING 2020–2023: A PANEL DATA APPROACH

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Abstract: This study analyzes the effect of fiscal potential, government spending, and human development on regional economic growth in Central Java during the 2020–2023 period. Gross Regional Domestic Product (GRDP), in logarithmic form, is used as the dependent variable, while the independent variables include local fiscal potential (PAD), government spending, and the Human Development Index (HDI). Using panel data regression with a fixed-effect model on 35 districts/cities, the results reveal that HDI has a significant positive impact on GRDP. Meanwhile, fiscal potential and government spending are found to be statistically insignificant. These findings suggest that enhancing human development is a key factor for boosting economic growth in the region

Keywords: Fiscal Potential; GRDP; Central Java; Panel Data; PAD; Government Spending; HDI

1. INTRODUCTION

Regional economic growth serves as a crucial indicator of a region's capacity to improve public welfare and reduce development disparities. In Indonesia, the implementation of fiscal decentralization has empowered regional governments to manage their revenue and expenditure independently, aiming to foster inclusive and sustainable economic growth. Central Java, as one of the most populous provinces with diverse economic structures, offers a strategic area for examining regional development dynamics.

During the period 2020-2023, Central Java experienced varied economic performance across its 35 regencies and cities. The GRDP growth data shows disparities in regional output, prompting an investigation into its determining factors. In this context, fiscal potential, measured by the region's capacity to generate revenue (PAD), plays a central role in supporting development programs. Similarly, the level of government expenditure reflects public sector efforts to stimulate economic activities. However, beyond fiscal indicators, human development measured through HDI has become increasingly recognized as a driver of sustainable economic growth.

Hence, this research aims to analyze how PAD, government spending, and HDI affect GRDP as an indicator of economic growth in Central Java using a quantitative panel econometric approach.

In the context of fiscal decentralization, Musgrave's theory (1959) emphasizes the allocation function of public finance, where fiscal instruments are expected to improve resource allocation to maximize regional welfare. Oates (1972) furthers this by advocating fiscal federalism, suggesting that local governments can better tailor public goods provision to local preferences, provided they have sufficient fiscal capacity. However, in practice, disparities in fiscal potential often hinder balanced development.
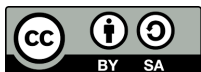
Firstly, Central Java is one of Indonesia's most populous provinces, contributing substantially to the national economy. However, there exists notable regional economic disparity within its 35 regencies and cities, with differences in income levels, industrial activity, and development stages. This economic divergence necessitates an in-depth study to uncover the specific drivers of growth and the potential barriers that might be preventing more equitable development across the region.

Secondly, the period from 2020 to 2023 marked a significant phase in Central Java's economic landscape, largely influenced by the ongoing effects of the COVID-19 pandemic. The pandemic disrupted economic activities and challenged existing fiscal frameworks, making it crucial to examine how fiscal potential, government expenditure, and human development indicators (HDI) responded to these challenges. Understanding how these factors interacted during this specific period provides valuable insights into the resilience of the regional economy and the effectiveness of the decentralization policies that were implemented to support local governments.

Additionally, fiscal decentralization has played a key role in Indonesia's development strategy, giving regional governments the autonomy to manage local revenues and expenditures. However, this autonomy has not always translated into balanced development. Central Java, with its unique blend of urban and rural areas, offers an ideal case study to explore how the region's fiscal capacity (as reflected by PAD) and government spending have influenced economic outcomes. This study aims to critically assess the relationship between these fiscal variables and GRDP growth, providing evidence on whether fiscal tools are adequately contributing to the region's economic performance.

Finally, the increasing emphasis on human capital development, measured through HDI, makes it essential to evaluate its role in economic growth. As traditional fiscal instruments may not always guarantee growth, HDI has emerged as a significant factor influencing regional prosperity. This research thus seeks to explore how human development, in combination with fiscal potential and government expenditure, drives economic growth, ultimately contributing to a more sustainable and inclusive development model for Central Java.

Given the regional importance of Central Java and the challenges posed by its economic disparities, this study's findings are expected to inform policymakers on the most effective strategies for boosting economic growth, improving fiscal management, and enhancing human development in the province. The research aims to fill a critical gap in the literature by applying a panel data approach to provide nuanced, evidence-based recommendations for regional economic policy.

2. LITERATURE REVIEW

This study is based on the conventional and endogenous theories of economic growth. Adam Smith's classic theory, as presented in The Wealth of Nations (1776), holds that economic growth is determined by modal, tenaga kerja, and tanah interactions, with the help of the government in formulating policies that boost the bebas market. According to David Ricardo (1817), an efficient sumber daya is a crucial factor in determining economic growth. In this context, Pendapatan Asli Daerah (PAD) assesses the ability of the local government to maximise local resources in order to support construction.

Paul Romer's (1990) endogenous growth theory deepens understanding of economic growth by highlighting innovation, education, and human modalities as the primary factors influencing the growth of the economy. Romer asserts that investments in human development, such as education and health care, will increase worker productivity and economic growth. In this study, endogenous theory serves as a foundation for understanding how the Index of Human Development (IPM) contributes to economic growth through raising the standard of living for the general public. This study examines how PAD, belanja daerah, and IPM together affect the economic development of Jawa Tengah by integrating klasik and endogenous approaches.

The relationship between fiscal variables and economic growth has long been discussed in public finance literature. According to Musgrave and Musgrave (1989), fiscal capacity determines a region's ability to deliver public goods, which can have a multiplier effect on local productivity. However, empirical evidence suggests that not all fiscal revenue leads to productive outcomes, particularly when governance quality and institutional efficiency vary (Bird & Smart, 2002).

Government spending, as posited by Keynesian economics, can stimulate aggregate demand and short-term growth. Nonetheless, Barro (1990) argues that the growth impact of public expenditure depends on the composition of spending whether it is productive (e.g., infrastructure) or non-productive (e.g., administrative costs).

Human capital, meanwhile, is crucial in endogenous growth models. Becker (1964) and Romer (1990) emphasize that investment in education and health fosters innovation, labor productivity, and long-term growth. Empirical studies, such as by Todaro & Smith (2015), support the notion that higher HDI correlates with improved economic performance.

Previous studies provide mixed results. Huda et al. (2020) found that PAD and government spending positively affect GRDP in Indonesian provinces, while Pratama (2022) emphasized the dominant role of HDI over fiscal indicators. In the Central Java context, Putri & Setiawan (2021) highlighted that inefficient public spending weakens the growth effect of local revenue. This study contributes to the existing literature by combining fiscal and human development indicators in a fixed-effect panel regression framework for sub-national economic growth analysis.

3. METODOLOGY

This research applies a quantitative approach using panel data of 35 districts and cities in Central Java for the years 2020 to 2023. The data is sourced from the Central Bureau of Statistics (BPS), Ministry of Finance (DJPK), and Ministry of Home Affairs.

The dependent variable is the natural logarithm of GRDP (LOGPDRB), representing economic growth. The independent variables include fiscal potential (LOGPF), government expenditure (LOGSPENDING), and the Human Development Index (IPM/HDI).

Data were sourced from the Central Statistics Agency (BPS) and the Directorate General of Fiscal Balance (DJPK), analyzed using E-Views. The use of log transformation helps to linearize the model and interpret coefficients as elasticities. The fixed effects model was selected based on the Hausman test results, which indicated that individual-specific effects are correlated with the explanatory variables, hence fixed effects yield consistent estimates.

The model used is:

$$\text{LOGGRDP}_{it} = \alpha + \beta_1\text{LOGPFit} + \beta_2\text{LOGSPENDING}_{it} + \beta_3\text{LOGHDI}_{it+}\ u\ it$$

Explanation:

LOGGRDPit: The dependent variable is the logarithm of GRDP (economic growth) for region iii at time ttt, used to capture economic output in a linear form.

α (Intercept): This is the constant term, representing the baseline level of LOGGRDP when all independent variables (fiscal potential, government spending, and HDI) are zero.

β_1 (LOGPF): This coefficient represents the relationship between fiscal potential (PAD) and LOGGRDP. A positive value means that an increase in fiscal capacity (local revenue) is expected to increase economic growth, although its significance is based on statistical tests.

β_2 (LOGSPENDING): This coefficient measures the impact of government spending on LOGGRDP. A positive value suggests that higher public expenditure would stimulate economic growth, though the statistical significance needs to be considered.

β₃ (LOGHDI): This coefficient shows the effect of Human Development Index (HDI) on LOGGRDP. A positive value indicates that improvements in human capital (education, health, and living standards) lead to higher economic growth.

uit (Error Term): Represents unobserved factors that influence LOGGRDP but are not included in the model. These factors might include regional policy differences, cultural factors, or other economic variables not accounted for.

The estimation uses the Fixed Effect Model (FEM), which controls for unobserved time-invariant characteristics across districts. The choice of FEM was justified by the result of the Hausman test, which showed a significant difference between fixed and random effects models, indicating that the unobserved individual heterogeneity was correlated with the independent variables.

The use of log-transformed variables allows for elasticity interpretation and reduces heteroskedasticity concerns, which are common in cross-sectional time-series data. Moreover, the panel structure increases the degrees of freedom and controls for multicollinearity that may bias the coefficient estimates in simple OLS models.

A critical limitation of the methodology is the assumption that the effect of HDI, PAD, and spending is homogenous across all districts, while in reality, the institutional context, geographic constraints, and sectoral composition of the economy might alter the marginal effects of these variables. Therefore, future studies may consider interaction terms or hierarchical modeling to address nested structures of regional development.

4. RESULTS AND DISCUSSION

The results indicate that HDI is the most robust and statistically significant predictor of regional economic growth, as measured by GRDP. A one-point increase in HDI corresponds to an approximate 0.46 increase in log-GRDP, demonstrating a strong elasticity. This result is consistent with human capital theories (Becker, 1964; Romer, 1990), which postulate that improvements in education, health, and living standards enhance labor productivity, innovation, and economic efficiency. The findings align with empirical studies by Pratama (2022) and Todaro & Smith (2015), which emphasized that human capital development serves as a more reliable long-term driver of economic performance than purely financial inputs.

In contrast, the effect of fiscal potential (PAD) is positive but statistically insignificant. This suggests that while the ability to generate local revenue theoretically contributes to regional autonomy and budgetary flexibility (Musgrave & Musgrave, 1989), in practice it may be constrained by weak institutional capacity or poor public financial management. Bird & Smart (2002) highlight that without adequate governance structures, increased local revenue collection can exacerbate inequality or rent-seeking behavior, rather than stimulating productive investments.

The negative and insignificant coefficient of government spending also deserves scrutiny. Ideally, public expenditure should stimulate economic activity via Keynesian mechanisms (Barro, 1990). However, the result may reflect inefficiencies in spending composition, where budgets are directed toward consumptive or administrative purposes rather than infrastructure or economic empowerment programs. Putri & Setiawan (2021) argue that spending inefficiencies in Central Java, including delays in disbursement and a lack of monitoring, reduce the multiplier effect of government budgets. This outcome also supports the proposition that it is not the size of spending but its quality and strategic targeting that determines growth outcomes (World Bank, 2018).

Taken together, the findings suggest that human capital is a more critical and effective lever for economic growth in Central Java, while fiscal tools must be restructured and realigned to be impactful. This reinforces calls for integrated policy approaches that combine institutional strengthening with social investment.

The regression analysis using a fixed-effects panel data model reveals several important findings regarding the influence of fiscal potential, government expenditure, and human development on economic growth in Central Java between 2020 and 2023. The coefficient of determination (R-squared) is 0.7654, indicating that approximately 76.54% of the variation in economic growth (measured by log-transformed PDRB) can be explained by the independent variables: GRDP, PF, SPENDING, HDI. The adjusted R-squared value of 0.6749 further confirms the model's explanatory power after controlling for the number of predictors.

The regression output shows that the coefficient for LOGPF (logarithm of fiscal potential) is 1.2753, but with a p-value of 0.1760, which indicates that the variable is not statistically significant at the 5% level. This suggests that although fiscal potential theoretically could enhance regional economic capacity by providing the government with greater ability to mobilize resources (Musgrave & Musgrave, 1989), in practice, its influence on short-term economic growth in Central Java during this period may be limited. This finding is consistent with research by Pratama (2020), which found that fiscal potential requires institutional strengthening and efficient revenue management to translate into tangible economic outcomes.

Meanwhile, the coefficient for LOGSPENDING (logarithm of regional government expenditure) is negative (-0.0164) and statistically insignificant (p = 0.3501). This result suggests that local government spending did not significantly influence economic growth during the observed period. This might reflect inefficiencies in budget allocation, leakages in spending, or the fact that spending was not directed toward productive sectors that stimulate economic output. This result supports the findings of Aschauer (1989), who argued that not all public expenditures contribute positively to economic performance, especially when dominated by consumptive rather than capital expenditures.

Conversely, the IPM variable (Human Development Index) has a positive and statistically significant coefficient of 0.4606 (p = 0.0000), indicating that improvements in human development have a strong and positive effect on regional economic growth. This finding aligns with endogenous growth theory (Lucas, 1988), which emphasizes human capital as a key driver of sustainable economic growth. It also resonates with empirical research by Barro (1996), who found that health and education indicators, both integral parts of the HDI, significantly influence productivity and economic output.

The significant contribution of IPM suggests that investments in human capital-such as education, healthcare, and social services—are more directly and effectively linked to economic outcomes in Central Java than fiscal resource potential or public expenditure. This finding supports the view that development policies should prioritize human capital as the foundation of economic progress, particularly in developing regions (Todaro & Smith, 2015).

Table 1. Output

Variable	Coefficient	Std.Error	T-Statistic	Prob
C	-43.69553	20.00589	-2.184143	0.0313
LOGPF	1.275342	0.935881	1.362747	0.1760
LOGSPENDING	-0.016409	0.017478	-0.938892	0.3501
IPM	0.460604	0.074369	6.193531	0.0000

The R-squared value of 0.7654 indicates that approximately 76.54% of the variation in the dependent variable, GRDP (regional economic growth), can be explained by the independent variables: fiscal potential (PAD), government spending, and Human Development Index (HDI). This suggests that the model explains a substantial portion of the variation in GRDP, which indicates a good fit of the model to the data.

The adjusted R-squared value of 0.6794 adjusts for the number of predictors in the model, providing a more accurate measure of goodness-of-fit when comparing models with different numbers of independent variables. This value is slightly lower than the R-squared, indicating that after accounting for the model's complexity, around 67.94% of the variation in GRDP is still explained by the predictors.

The F-statistic of 8.9048 tests the overall significance of the regression model. It examines whether at least one of the independent variables has a non-zero coefficient. A high F-statistic suggests that the model as a whole is statistically significant, which is confirmed by the very low p-value.

The p-value associated with the F-statistic is 0.0000, which is much lower than the typical significance level of 0.05. This indicates that the model is statistically significant, meaning that the independent variables (PAD, government spending, and HDI) collectively have a significant impact on GRDP and that the null hypothesis (that all coefficients are zero) can be rejected.

The standard error of regression, which is 0.4188, measures the average distance that the observed values fall from the regression line. A smaller value indicates a better fit of the model to the data. The value suggests that the model's predictions are fairly accurate, with relatively low deviation from the actual values.

The AIC is used to compare different models, with lower values indicating a better model fit relative to the number of parameters. A lower AIC value suggests that the model is relatively efficient in explaining the data without overfitting.

Similar to AIC, the BIC penalizes models for having too many parameters. Like the AIC, a lower BIC indicates a better model. A value of 2.1262 suggests that the model is well-suited for the data, balancing complexity and fit.

The log likelihood value represents the likelihood of the observed data given the model. A higher log likelihood suggests a better fit of the model to the data. In this case, the value of 54.06537 indicates a good fit, but it's generally more useful for model comparison rather than an absolute measure.

The Durbin-Watson statistic measures the presence of autocorrelation in the residuals (errors) of the regression model. A value close to 2 (which is the case here with 1.9187) suggests that there is no significant autocorrelation, meaning that the residuals are independent of each other, which is desirable for the validity of the regression results.

The regression model fits the data well, with a high R-squared value (76.54%) and significant overall model performance, as indicated by the F-statistic and p-value. The adjusted R-squared confirms that the model remains strong even after adjusting for the number of predictors. The Durbin-Watson statistic shows no issues with autocorrelation, and the AIC and BIC suggest that the model is well-specified.

HDI (IPM): Significantly positive (p < 0.01), confirming that improvements in education, health, and living standards contribute directly to regional economic growth. This aligns with Becker's and Romer's human capital theory.

Fiscal Potential (LOGPF): Shows a positive sign but is not statistically significant. This may indicate that while higher PAD reflects stronger fiscal autonomy, its actual contribution to growth may be constrained by limited institutional capacity or inefficient allocation.

Government Spending (LOGSPENDING): Has a negative and insignificant effect, suggesting potential inefficiencies or delayed fiscal absorption. This supports the findings of Putri & Setiawan (2021) that ineffective public expenditure may fail to stimulate productive economic activities.

6. CONCLUSION

This study concludes that among the three independent variables tested, only HDI has a statistically significant and positive impact on economic growth in Central Java. The coefficient of HDI is robust and indicates that improvements in human capital are directly translated into increased GRDP. This highlights the importance of non-fiscal aspects of development and validates the propositions of human capital theory in the regional development context.

Fiscal potential and government spending, while theoretically expected to be drivers of growth, show no significant effect in this study. This suggests that without improvements in governance, capacity building, and institutional efficiency, fiscal resources alone are insufficient to drive economic performance. These results align with previous findings from Bird & Smart (2002) and Putri & Setiawan (2021) who argued that fiscal inputs must be complemented by effective public sector management.

Based on the results of this study, several policy recommendations can be proposed to enhance economic growth in Central Java through the strategic optimization of fiscal potential, government spending, and the improvement of human development. Firstly, although fiscal potential (LOGPF) was found to be statistically insignificant, the positive coefficient suggests a potential to support economic growth if better managed. Therefore, local governments should focus on strengthening revenue-generating mechanisms, particularly optimizing regional taxes and levies without placing excessive burdens on the population or economic sectors. This includes improving tax compliance, expanding the tax base, and enhancing fiscal capacity by digitalizing fiscal administration.

Secondly, the study finds that government spending (LOGSPENDING) has a negative but statistically insignificant effect on economic growth. This implies that while budgetary expenditures are high, their allocation may not be effective in stimulating productive sectors. It is recommended that government expenditures be more strategically targeted toward growth-inducing sectors such as infrastructure, education, and health. Ensuring that public spending is efficient and well-targeted can help boost its impact on local GDP growth.

Thirdly, the Human Development Index (IPM) has a strong, positive, and statistically significant impact on economic growth. This finding underlines the crucial role of human capital development in driving regional economic performance. As such, policymakers should prioritize sustained investments in education, healthcare, and basic services to improve the overall quality of life and workforce productivity. Strengthening vocational and technical training tailored to regional economic needs will also ensure that the labor force is equipped for evolving economic demands.

Finally, intergovernmental coordination is essential. The Central Java provincial government should collaborate with regencies and municipalities to ensure integrated development planning that aligns fiscal potential with development goals. Transparent governance and participatory budgeting processes are also critical to ensuring that fiscal resources are used efficiently and aligned with public needs.

In conclusion, unlocking Central Java's economic growth potential requires an integrated approach that aligns fiscal policy, public expenditure, and human development strategies. If these policy directions are pursued effectively, they can create a robust foundation for inclusive and sustainable regional growth.

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References

[1] Afonso, A., & Furceri, D. (2010). Government size, composition, volatility and economic growth. *European Journal of Political Economy, 26*(4), 517–532. https://doi.org/10.1016/j.ejpoleco.2010.02.002

[2] Alisjahbana, A. S. (2005). Does fiscal decentralization affect regional income inequality in Indonesia? *Journal of Development Economics, 76*(2), 471–495. https://doi.org/10.1016/j.jdeveco.2004.03.005

[3] Aschauer, D. A. (1989). Is public expenditure productive? *Journal of Monetary Economics, 23*(2), 177–200. https://doi.org/10.1016/0304-3932(89)90047-0

[4] Barro, R. J. (1996). Determinants of economic growth: A cross-country empirical study. NBER Working Paper No. 5626. https://doi.org/10.3386/w5626

[5] Becker, G. S. (1964). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. University of Chicago Press. https://doi.org/10.7208/chicago/9780226041223.001.0001

[6] Bird, R. M., & Smart, M. (2002). Intergovernmental Fiscal Transfers: International Lessons for Developing Countries. *World Development, 30*(6), 899–912. https://doi.org/10.1016/S0305-750X(02)00015-5

[7] Huda, M., Syahputra, R., & Anwar, S. (2020). Fiscal Decentralization and Economic Growth: Evidence from Indonesian Provinces. *Jurnal Ekonomi Regional, 18*(3), 211–225. https://doi.org/10.24843/JER.2020.v18.i03.p03

[8] Hutapea, H. M., & Adisasmita, R. (2020). The impact of fiscal capacity on regional economic growth in Indonesia. *Economic Journal of Emerging Markets, 12*(1), 1–12. https://doi.org/10.20885/ejem.vol12.iss1.art1

[9] Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics, 22*(1), 3–42. https://doi.org/10.1016/0304-3932(88)90168-7

[10] Mardiasmo & Djamhuri, A. (2021). Human development and its impact on regional economic performance in Indonesia. *Jurnal Ekonomi dan Kebijakan Publik, 12*(3), 211–224. https://doi.org/10.22212/jekp.v12i3.2067

[11] Musgrave, R. A., & Musgrave, P. B. (1989). *Public Finance in Theory and Practice* (5th ed.). McGraw-Hill.

[12] Oates, W. E. (1972). *Fiscal Federalism*. Harcourt Brace Jovanovich.

[13] Pratama, A. B. (2020). Analisis potensi fiskal dan pertumbuhan ekonomi daerah: Studi kasus di Indonesia. *Ekonomi Karia, 4*(3), 123–136. https://doi.org/10.31289/ekonomikaria.v4i3.3985

[14] Pratama, Y. (2022). The Influence of HDI and Government Spending on Economic Growth in Indonesia. *Jurnal Ekonomi Pembangunan, 20*(1), 45–57. https://doi.org/10.14710/jep.20.1.45-57

[15] Putri, L., & Setiawan, I. (2021). Pengaruh Belanja Daerah Terhadap Pertumbuhan Ekonomi Provinsi Jawa Tengah. *Jurnal Keuangan Daerah, 9*(2), 33–42. https://doi.org/10.31294/jkd.v9i2.11290

[16] Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy, 98*(5), S71–S102. https://doi.org/10.1086/261725

[17] Todaro, M. P., & Smith, S. C. (2015). *Economic Development* (12th ed.). Pearson Education.

[18] UNDP. (2020). *Human Development Report 2020: The Next Frontier—Human Development and the Anthropocene*. https://doi.org/10.18356/9789210055161

[19] Wahyudi, S., Firmansyah, D., & Ramadhani, F. (2022). The efficiency of local government spending in supporting regional development. *Jurnal Ilmu Ekonomi dan Pembangunan, 22*(2), 109–122. https://doi.org/10.22219/jiep.v22i2.18324