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Research Paper

The Effect of Public Investment and Regional Fiscal Performance on Economic Growth in Aceh Province, 2015–2024

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Abstract

Aceh Province enjoys special autonomy and large transfers, yet its regencies and cities differ widely in fiscal capacity and remain dependent on central-government funds. Evidence on whether capital expenditure and fiscal independence raise regional output is mixed, and few studies examine both factors together across all 23 regencies and cities of Aceh. This study analyses the effect of public investment and regional fiscal performance on economic growth in Aceh Province. Economic growth was proxied by GRDP per capita, public investment by the natural logarithm of local-government capital expenditure, and fiscal performance by the fiscal independence ratio. Secondary data from Statistics Indonesia and the Directorate General of Fiscal Balance for 23 regencies and cities over 2015–2024 (230 observations) were analysed by panel regression; the Chow and Hausman tests selected the fixed effect model. Public investment had a positive effect that was not significant at the 5% level (coefficient = 3.857; $p = 0.055$), whereas regional fiscal performance had a positive and significant effect (coefficient = 1.885; $p < 0.001$). The two variables were jointly significant ($F = 7.425$; $p < 0.001$), and the model explained 46.5% of the variation in GRDP per capita (adjusted $R^2 = 0.402$). Strengthening locally generated revenue and improving the quality of capital spending are therefore central to sustaining growth in Aceh's regions.

Keywords: Public investment; Capital expenditure; Fiscal independence; Economic growth; Panel data; Aceh.

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1. Introduction

Economic growth is a key indicator of the success of regional development. Under fiscal decentralisation, local governments are expected to use their budgets to provide public goods that match local needs and thereby raise regional output [1]. Effective regional financial management, covering budget planning, investment appraisal and the measurement of public-sector performance, is therefore a prerequisite for turning fiscal resources into growth [2].

Aceh Province is a special autonomous region with authority over its own financial management. Fiscal capacity, however, differs widely among its 23 regencies and cities, and most

of them rely heavily on transfers from the central government because their ability to raise local revenue is limited. This dependence raises two questions that are central to regional development policy: whether public investment financed by local budgets raises output, and whether greater fiscal independence is associated with higher growth.

Growth theory predicts that productive public spending, especially on infrastructure, raises the marginal product of private capital and therefore output [3], [4]. The effect depends on the composition of spending, because expenditure that is already large relative to need may become unproductive at the margin [5]. Empirical findings for Indonesia are mixed. Government spending and investment were associated with higher growth in North Sumatra [6], and capital expenditure had a positive and significant effect on growth in the regencies and cities of Aceh [7]. By contrast, capital expenditure had no effect on regional growth in a national provincial panel [8], and it was not significant in the long run in Bali, where only fiscal independence and spending efficiency mattered [9].

Evidence on fiscal performance is similarly inconsistent. Fiscal independence had a positive and significant effect on growth in the regencies and cities of West Java [10], but the fiscal independence ratio was not significant for growth in Makassar [11], and in Central Java transfer dependence was itself positively associated with growth [12]. In Aceh, panel studies of the 23 regencies and cities have focused on the distributional effects of capital expenditure [13] rather than on its joint effect with fiscal performance on output. Few studies have examined public investment and fiscal independence together for all regencies and cities in Aceh over a period that covers both the pre-pandemic years and the recovery.

This study therefore addresses three questions: (1) does public investment affect economic growth in Aceh Province; (2) does regional fiscal performance affect economic growth; and (3) do the two variables jointly affect economic growth? It uses a balanced panel of 23 regencies and cities over 2015–2024 and provides evidence that can guide the allocation of capital spending and efforts to strengthen local revenue in Aceh.

2. Method

Research Design and Data

This study used a quantitative approach with panel data regression [14]. The panel combined cross-sectional data for the 23 regencies and cities of Aceh Province with annual time-series data for 2015–2024, giving 230 observations. All data were secondary. GRDP per capita was taken from Statistics Indonesia (BPS) of Aceh Province [15], and capital expenditure and local revenue were taken from the regional budget realisation data of the Directorate General of Fiscal Balance (DJPK), Ministry of Finance [16].

Variables

The dependent variable was economic growth (Y), proxied by GRDP per capita in million rupiah. Public investment (X_1) was proxied by the natural logarithm of local-government capital expenditure, which finances roads, buildings, irrigation and other public assets. Regional fiscal performance (X_2) was measured by the fiscal independence ratio, the ratio of locally generated revenue (PAD) to transfers from higher levels of government and borrowing, expressed as a percentage [2]. The ratio reflects the capacity of a region to finance its own development under the fiscal balance framework [17], [18].

Data Analysis

Three estimators were compared: the common effect model (CEM), the fixed effect model (FEM) and the random effect model (REM) [19]. The Chow test was used to choose between CEM

and FEM, the Hausman test between FEM and REM [20], and the Breusch–Pagan Lagrange multiplier (LM) test between CEM and REM [21]. The model was specified as:

$$Y_{it} = \alpha + \beta_1 \ln X_{1it} + \beta_2 X_{2it} + \mu_i + \varepsilon_{it} \quad (1)$$

where Y_{it} is GRDP per capita of region i in year t, $\ln X_{1it}$ is the natural logarithm of capital expenditure, X_{2it} is the fiscal independence ratio, μ_i is the region-specific effect and ε_{it} is the error term.

Partial effects were tested with the t test and the joint effect with the F test at the 5% level, and explanatory power was assessed with the coefficient of determination [22], [23]. Estimation was carried out in EViews 12.

3. Results and Discussion

Descriptive Statistics

Table 1 summarises the variables for the 230 observations.

Table 1. Descriptive statistics

Statistic	GRDP per capita (Y)	ln capital expenditure (X_1)	Fiscal independence ratio (X_2, %)
Mean	32.603	5.251	9.473
Median	28.615	5.272	9.000
Maximum	98.200	6.238	24.060
Minimum	15.860	2.655	1.680
Std. deviation	13.619	0.497	3.689
Observations	230	230	230

Source: BPS Aceh and DJPK, processed with EViews 12 (2026).

GRDP per capita averaged 32.60 million rupiah but ranged from 15.86 to 98.20 million rupiah, which shows large differences in output among regions. The fiscal independence ratio averaged only 9.47% and ranged from 1.68% to 24.06%, so locally generated revenue covered on average less than one-tenth of the transfers and borrowing on which the regions depend. Capital expenditure varied less after logarithmic transformation (standard deviation 0.497). The Jarque–Bera statistics indicated that the three variables are not normally distributed, which is common for regional fiscal data with a few large regions; with 230 observations, inference on the coefficients relies on their large-sample properties.

Selection of the Panel Model

Table 2 reports the model selection tests.

Table 2. Results of the model selection tests

Test	Statistic	d.f.	Prob.	Decision
Chow (cross-section F)	2.458	(22, 205)	0.0005	FEM over CEM
Chow (cross-section chi-square)	53.839	22	0.0002	FEM over CEM
Hausman (cross-section random)	19.487	2	0.0001	FEM over REM
Breusch–Pagan LM (cross-section)	4.817	–	0.0282	REM over CEM

Source: BPS Aceh and DJPK, processed with EViews 12 (2026).

The Chow test rejected the common effect model in favour of the fixed effect model (chi-square $p = 0.0002$), and the Hausman test rejected the random effect model in favour of the fixed effect model ($p = 0.0001$). The LM test showed that the random effect model is preferable to the common effect model ($p = 0.0282$), but because the Hausman test indicates that the region-specific effects are correlated with the regressors, the fixed effect model was selected.

Fixed Effect Model Estimation

Table 3. Fixed effect model estimates (dependent variable: GRDP per capita)

Variable	Coefficient	Std. error	t-statistic	Prob.
Constant	−5.504	10.658	−0.516	0.6061
ln capital expenditure (X_1)	3.857	1.996	1.933	0.0547
Fiscal independence ratio (X_2)	1.885	0.198	9.497	< 0.001
R^2 / Adjusted R^2	**0.465 / 0.402**			
F-statistic (Prob.)	7.425 (< 0.001)			
Durbin–Watson	2.554			
Observations / cross-sections	230 / 23			

Source: BPS Aceh and DJPK, processed with EViews 12 (2026). Cross-section fixed effects included.

The estimated model is $Y = -5.504 + 3.857 \ln X_1 + 1.885 X_2$. Public investment had a positive coefficient that was not significant at the 5% level ($t = 1.933$; $p = 0.0547$), although it would be significant at the 10% level. Holding fiscal independence constant, a 1% increase in capital expenditure is associated with an increase of about 0.039 million rupiah in GRDP per capita. Regional fiscal performance had a positive and significant effect ($t = 9.497$; $p < 0.001$): an increase of one percentage point in the fiscal independence ratio is associated with an increase of about 1.885 million rupiah in GRDP per capita.

The F test showed that the two variables are jointly significant ($F = 7.425$; $p < 0.001$). The R^2 of 0.465 means that the model, including the region-specific effects, explains 46.5% of the variation in GRDP per capita; after adjusting for the 22 regional dummy variables, the adjusted R^2 is 0.402. The remaining variation is associated with factors outside the model, such as private investment, labour, human capital and the structure of the regional economy.

Discussion

Public investment and economic growth

The positive but statistically weak effect of capital expenditure indicates that increases in public investment in Aceh's regions have not yet translated reliably into higher output during 2015–2024. The finding is consistent with evidence that capital expenditure had no effect on regional growth across Indonesian provinces [8] and was not significant in the long run in Bali [9], and it differs from studies that found a positive and significant effect in North Sumatra [6] and in Aceh [7]. Several explanations are plausible. Capital projects take time to raise productivity, so annual data may capture their effect only partly. Part of capital spending may also be directed to administrative buildings and other assets with limited effects on private production, which is consistent with the argument that the composition of public spending determines its productivity [4], [5]. Improving the selection and execution of capital projects is therefore as important as increasing their size.

Regional fiscal performance and economic growth

Fiscal independence had a strong positive association with GRDP per capita. Regions that raise a larger share of their revenue locally have more discretion to finance development according to local priorities, which is the mechanism emphasised by fiscal federalism [1]. The result agrees with the positive effect of fiscal independence in West Java [10] and with its long-run effect in Bali [9], but it differs from the insignificant effect found in Makassar [11]. Causality may also run in the other direction: regions with larger economies have larger tax bases and therefore higher locally generated revenue. The fixed effects control for stable differences between regions, but they do not remove this reverse relationship, so the coefficient should be interpreted as an association rather than a pure causal effect.

Implications and limitations

For local governments in Aceh, the results suggest two priorities: strengthening locally generated revenue so that development depends less on transfers, and directing capital expenditure towards infrastructure that supports production, such as roads, irrigation and markets. The study has several limitations. GRDP per capita measures the level of output rather than its growth rate, heteroscedasticity was not tested, and the Durbin–Watson statistic of 2.554 suggests possible negative serial correlation, so standard errors robust to these problems should be used in future work. The model also includes only two explanatory variables. Future studies could use the growth rate of real GRDP, estimate dynamic panel models with lagged capital expenditure and add variables such as private investment, labour and the human development index.

4. Conclusion

This study answers its three research questions for the 23 regencies and cities of Aceh Province over 2015–2024. First, public investment, measured by capital expenditure, had a positive effect on GRDP per capita that was not significant at the 5% level. Second, regional fiscal performance, measured by the fiscal independence ratio, had a positive and significant effect. Third, the two variables jointly had a significant effect and, together with the regional effects, explained 46.5% of the variation in GRDP per capita. Local governments should therefore increase locally generated revenue to reduce their dependence on central transfers and improve the quality and productivity of capital spending, while future research should test dynamic effects and additional determinants of regional growth.

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Authors' contributions and responsibilities

Naila Fauza: conceptualization, data curation, formal analysis, writing – original draft. Irwan Safwadi: methodology, supervision, writing – review & editing. Yuliana: validation, supervision, writing – review & editing. All authors have read the final manuscript, agree with its submission and share responsibility for its content.

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Availability of data and materials

The data are publicly available from the official publications of BPS Aceh Province and the regional budget realisation data of DJPK, Ministry of Finance of the Republic of Indonesia. The compiled panel dataset is available from the corresponding author on request.

Competing interests

None of the authors has any competing interest related to this work.

Ethical approval

The study analysed published, aggregate statistics for regencies and cities and did not involve human participants, personal data or animals. Ethical approval was therefore not required.

Declaration of generative AI use

During the revision of this manuscript, Claude (Anthropic) was used to refine the English text, restructure the article according to the journal template and check the consistency between the tables and the reported statistics. The authors performed the data collection and econometric estimation, verified every AI-assisted change and are fully responsible for the published article.

Additional information

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