

Do Fiscal Instruments Promote Regional Economic Growth? Evidence from Local Governments in Indonesia

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ARTICLE INFORMATION

ABSTRACT

Publication information

Research article

HOW TO CITE

Diana, Mariana, Irawan, Y., Zulkarnaini, from 504 Indonesian local governments, the Arifai, M., & Yunita, A. (2026). Do fiscal study analyzes 1,758 observations from instruments promote regional economic growth? Evidence from local governments with cluster-robust standard errors. Results in Indonesia. *International Journal of Accounting and Finance in Asia Pacific* 2.012102; p = 0.290106) and regional investment ($\beta = -0.256702$; p = 0.417639) have insignificant effects. Local tax revenue has a significant negative effect ($\beta = -1.539717$; p = 0.043935), whereas capital expenditure has a significant positive effect ($\beta = 9.105280$; p < 0.001). Capital expenditure does not significantly moderate debt or investment effects but positively moderates the tax revenue–growth relationship ($\beta = 0.056629$; p = 0.040994). These findings emphasize that fiscal resources alone cannot ensure economic growth; productive capital expenditure allocation and effective utilization are essential for supporting sustainable regional economic development.

DOI:

<https://doi.org/10.32535/ijafap.v9i2.4808>

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Received: 14 April 2026

Accepted: 17 May 2026

Published: 20 June 2026

This study examines the effects of local government debt, regional investment, and local tax revenue on regional economic growth, with capital expenditure as a moderator. Using quantitative panel data 2019–2022 through fixed-effects regression indicate that local government debt ($\beta = -2.012102$; p = 0.290106) and regional investment ($\beta = -0.256702$; p = 0.417639) have insignificant effects. Local tax revenue has a significant negative effect ($\beta = -1.539717$; p = 0.043935), whereas capital expenditure has a significant positive effect ($\beta = 9.105280$; p < 0.001). Capital expenditure does not significantly moderate debt or investment effects but positively moderates the tax revenue–growth relationship ($\beta = 0.056629$; p = 0.040994). These findings emphasize that fiscal resources alone cannot ensure economic growth; productive capital expenditure allocation and effective utilization are essential for supporting sustainable regional economic development.

Keywords: Capital Expenditure; Local Government Debt; Local Tax Revenue; Regional Economic Growth; Regional Investment

INTRODUCTION

Regional economic growth is a key indicator of development performance. It reflects a region's capacity to expand value added, stimulate economic activity, create employment, raise income levels, and strengthen local fiscal capacity. Under fiscal decentralization, local governments have broad authority to manage revenue, expenditure, financing, and investment through the Regional Revenue and Expenditure Budget. In this context, public-sector accounting reform is important for strengthening accountability, transparency, and the quality of financial information used in government fiscal decision-making (Mariana et al., 2025a). This authority positions regional fiscal policy as an important instrument for promoting productive and sustainable economic development.

Endogenous Growth Theory provides the theoretical foundation for this study. The theory emphasizes that growth is shaped not only by external factors but also by government policy, capital accumulation, investment, infrastructure, fiscal capacity, institutional quality, and productivity. Governments can foster growth through productive public spending, infrastructure provision, and fiscal policies that enhance private-sector productivity. Productive expenditure can expand economic capacity and support long-term growth (Barro, 1990), while public capital, particularly infrastructure, can improve economic productivity (Aschauer, 1989). However, the contribution of government spending depends on its composition and efficiency rather than its size alone (Devarajan et al., 1996). Accordingly, Endogenous Growth Theory is relevant for explaining the relationships among local government debt, regional investment, local tax revenue, capital expenditure, and regional economic growth.

Local government debt is a financing instrument that may help accelerate regional development. It can address funding constraints and finance strategic programs with long-term economic benefits. When managed prudently and directed toward infrastructure, basic services, and other productive activities, debt can expand regional economic capacity. Previous studies show that government debt can support growth when it is used for productive financing and managed within a sound fiscal framework (Chen & Li, 2019; Ouyang & Li, 2021).

Nevertheless, empirical evidence on the debt–growth relationship remains mixed. Debt may constrain growth when it increases fiscal burdens, reduces the space for productive expenditure, creates sustainability risks, or crowds out private investment. Some studies find that the relationship is not necessarily causal and may change once debt exceeds certain thresholds (Chudik et al., 2017; Panizza & Presbitero, 2014). Other evidence suggests that the effect may be nonlinear and contingent on fiscal capacity and governance quality (Zhao et al., 2019). These findings underscore the need to examine local government debt across regions with different fiscal characteristics.

Regional investment is another important determinant of economic growth. It can contribute to capital accumulation, expand production capacity, improve infrastructure, create employment, and generate multiplier effects. Prior studies have documented a positive relationship between investment and growth. Investment can promote technology transfer, productivity gains, and stronger production capacity, particularly where human capital is adequate (Borensztein et al., 1998). Its contribution may also be greater in regions supported by developed financial markets and strong institutions (Alfaro et al., 2004; Jude & Levieuge, 2017).

However, the benefits of investment are not automatic. They depend on regional readiness, institutional quality, technological absorptive capacity, policy stability, and the effectiveness of financial markets. Investment may have limited effects when it is weakly connected to local productive sectors or lacks a supportive economic environment (Alfaro et al., 2004). In some developing economies, investment may even have adverse consequences when it creates dependency, encourages profit repatriation, or generates limited spillovers to the domestic economy (Herzer, 2012). This variation suggests that the contribution of regional investment may depend on the public infrastructure and expenditure environment in which it operates.

Local tax revenue is a major component of Regional Own-Source Revenue and reflects the capacity of local governments to mobilize fiscal resources. Stronger local tax revenue can expand fiscal space, reduce dependence on central government transfers, and support the financing of development, public services, and infrastructure. Tax revenue can contribute to economic growth when it is managed efficiently and directed toward productive expenditure (Gemmell et al., 2011; Kneller et al., 1999). Long-run linkages among tax revenue, government expenditure, institutional quality, and growth have also been documented, particularly where fiscal resources are managed effectively (Arvin et al., 2021).

At the same time, local taxes may not translate directly into higher growth. An inefficient tax structure, disproportionate tax burdens, or limited returns in the form of productive public services and infrastructure can constrain households and businesses. Poorly designed tax policies may reduce investment incentives, hinder economic activity, and weaken regional competitiveness. The growth implications of taxation therefore depend on the tax structure, the allocation of government spending, and the efficiency with which fiscal revenue is utilized (Arnold et al., 2011; Kneller et al., 1999). Examining local tax revenue together with capital expenditure provides a more complete understanding of this relationship.

Regional capital expenditure plays a strategic role in linking fiscal instruments to economic growth. It supports the formation of local government fixed assets, including roads, bridges, irrigation systems, public service buildings, educational facilities, health facilities, and other economic infrastructure. Productive capital expenditure can enhance regional productivity, improve connectivity, reduce economic costs, expand access to public services, and increase investment attractiveness. From the perspective of Endogenous Growth Theory, capital expenditure contributes to public capital formation and can support long-term productivity (Aschauer, 1989; Barro, 1990).

However, the economic contribution of capital expenditure depends on planning, allocation, implementation, and alignment with regional development needs. Expenditure that is theoretically productive may yield limited benefits when it is poorly targeted or inefficiently implemented (Devarajan et al., 1996). Although public capital is generally productive, its contribution varies across infrastructure types, institutional settings, and regional characteristics (Bom & Ligthart, 2014). Capital expenditure may therefore influence not only growth directly but also the way in which other fiscal instruments are translated into regional economic outcomes.

Positioning capital expenditure as a moderating variable reflects the view that the effects of local government debt, regional investment, and local tax revenue depend partly on how fiscal resources are allocated to productive assets. Debt may generate greater benefits when it supports infrastructure and other long-term public assets. Regional investment may be more effective when supported by adequate public infrastructure and economic facilities. Likewise, local tax revenue may contribute more meaningfully to

regional development when it is allocated to assets that support economic activity. Thus, the level and utilization of capital expenditure may shape the effectiveness of regional fiscal instruments.

Previous studies have extensively examined the relationship between fiscal instruments and economic growth, yet their findings remain mixed. Debt, investment, taxation, and public spending may promote growth when managed productively (Alfaro et al., 2004; Aschauer, 1989; Barro, 1990; Borensztein et al., 1998; Chen & Li, 2019; Kneller et al., 1999). Conversely, their effects may be weak or negative when fiscal burdens increase, institutions are less effective, or resources are not directed toward productive uses (Arnold et al., 2011; Chudik et al., 2017; Devarajan et al., 1996; Herzer, 2012; Panizza & Presbitero, 2014; Zhao et al., 2019). This mixed evidence indicates that the effectiveness of regional fiscal instruments remains an important empirical question.

Existing studies generally examine debt, investment, taxation, and government spending in separate models. Relatively limited attention has been given to their simultaneous relationship with regional economic growth while treating capital expenditure as a moderating variable. Moreover, government spending is more often modeled as an independent variable than as a mechanism that may alter the relationship between fiscal instruments and growth. This study addresses that gap by examining whether capital expenditure shapes the effects of local government debt, regional investment, and local tax revenue on regional economic growth.

The contribution of this study lies in an empirical model that positions regional capital expenditure as a moderator of the relationships between local government debt, regional investment, local tax revenue, and regional economic growth. This approach enables the study to evaluate both the direct effects of fiscal instruments and the extent to which those effects vary with capital expenditure. The study therefore contributes to the literature on regional economics, public-sector financial management, and public-sector accounting by providing evidence on how regional fiscal policy is linked to economic growth. The study therefore contributes to the literature on regional economics, public-sector financial management, and public-sector accounting by providing evidence on how regional fiscal policy is linked to economic growth. This perspective is also consistent with the growing importance of environmental and social accounting in supporting sustainable public-sector finance and broader development objectives (Mariana et al., 2025b).

Accordingly, this study aims to analyze the effects of local government debt, regional investment, and local tax revenue on regional economic growth, with regional capital expenditure as a moderating variable. The findings are expected to enrich the literature on regional fiscal policy and economic growth and to provide practical insights for local governments in managing debt prudently, promoting productive investment, optimizing tax revenue, and directing capital expenditure toward public assets that support sustainable regional development.

LITERATURE REVIEW

Endogenous Growth Theory

Regional economic growth depends not only on the resources available to a region but also on the ability of local governments to manage fiscal policy, encourage investment, strengthen infrastructure, and improve productivity. This perspective is consistent with Endogenous Growth Theory, which identifies internal factors such as capital accumulation, government policy, fiscal capacity, infrastructure, innovation, institutional quality, and productivity as important drivers of long-term growth.

Endogenous Growth Theory emphasizes that government policy can support growth when public resources are directed toward productive activities. Expenditure that strengthens productivity, expands economic capacity, and supports private-sector activity can become a source of long-term growth (Barro, 1990). Public spending is particularly valuable when it provides infrastructure and services that lower economic costs and improve regional competitiveness.

Public capital, especially infrastructure, can raise economic productivity. Roads, bridges, irrigation systems, educational facilities, health facilities, and public service infrastructure can facilitate the movement of goods and services, reduce transaction costs, strengthen regional connectivity, and improve economic efficiency. Adequate infrastructure can also enhance regional investment attractiveness and expand access to basic services (Aschauer, 1989).

Nevertheless, the contribution of public spending is determined by more than its size. Expenditure may generate limited economic benefits when it is poorly planned, inadequately targeted, or misaligned with regional development needs. Its effect on growth therefore depends on the composition, allocation, and efficiency of spending (Devarajan et al., 1996).

Endogenous Growth Theory thus provides a relevant framework for explaining the relationships among local government debt, regional investment, local tax revenue, capital expenditure, and regional economic growth. Debt can provide development financing, investment can expand the capital stock, local tax revenue can strengthen fiscal capacity, and capital expenditure can create public assets that support productivity. In this framework, capital expenditure is expected to moderate the extent to which regional fiscal instruments contribute to economic growth.

Regional Economic Growth

Regional economic growth refers to an increase in the value of goods and services produced within a region over a given period. It is an important development indicator because it reflects expanding production, employment opportunities, income, and regional economic capacity. This study measures regional economic growth using the growth rate of Gross Regional Domestic Product (GRDP) at constant prices, which captures changes in real output without the influence of price movements.

Regional growth is closely connected to the capacity of local governments to manage fiscal policy. Through the Regional Revenue and Expenditure Budget, local governments manage revenue, expenditure, financing, and investment and can direct fiscal resources toward programs that enhance productivity and strengthen the regional economy.

Regional economic growth is influenced by infrastructure, investment, fiscal capacity, institutional quality, human resources, and the effectiveness of public expenditure. Productive public spending can support growth by providing infrastructure, lowering transaction costs, and increasing private-sector productivity (Aschauer, 1989; Barro, 1990). Its contribution, however, depends on how resources are allocated and the extent to which expenditure supports productive activities (Devarajan et al., 1996).

Regional fiscal instruments are therefore important to the analysis of economic growth because they determine the resources available for development and how those resources are deployed. Debt, investment, tax revenue, and capital expenditure can influence the direction and pace of regional development. When managed productively, these instruments can contribute to more sustainable economic growth.

Local Government Debt and Regional Economic Growth

Local government debt is a financing instrument that can support development when current regional revenue is insufficient to meet expenditure needs. It may enable local governments to finance infrastructure, public services, and strategic projects with long-term economic benefits. When directed toward productive activities, debt can expand regional economic capacity and accelerate development.

From a theoretical perspective, local government debt can promote growth when it is managed prudently and used to finance public investment. Infrastructure, basic services, and economic facilities financed through debt may generate long-term benefits for communities and businesses. Empirical studies likewise indicate that government debt can contribute to growth when it is directed toward productive purposes and supported by sound fiscal governance (Chen & Li, 2019; Ouyang & Li, 2021).

However, the debt–growth relationship remains debated. Debt may constrain growth when it increases fiscal burdens, narrows budgetary space, creates sustainability risks, or crowds out private investment (Panizza & Presbitero, 2014). A high repayment burden may also limit the ability of local governments to finance other productive development programs.

The effect of debt may also be nonlinear. Debt can support development at manageable levels, but excessive debt relative to fiscal capacity may constrain growth and increase regional fiscal risk (Chudik et al., 2017; Zhao et al., 2019). Its contribution therefore depends on fiscal capacity, debt management, institutional quality, and the use of borrowed funds. Based on this reasoning, the first hypothesis is formulated as follows.
H1: Local government debt affects regional economic growth.

Regional Investment and Regional Economic Growth

Regional investment is an important component of economic growth because it can expand capital accumulation, production capacity, infrastructure, employment, and multiplier effects throughout the economy. The greater the productive contribution of investment, the greater its potential to stimulate economic activity and strengthen regional competitiveness.

Previous studies generally support a positive relationship between investment and economic growth. Investment can enhance technology transfer, productivity, production capacity, and market expansion, particularly where the recipient economy has adequate human capital (Borensztein et al., 1998). Its growth contribution may also be stronger in the presence of developed financial markets and high-quality institutions (Alfaro et al., 2004; Jude & Levieuge, 2017).

Nevertheless, investment does not always generate positive growth outcomes. Its effectiveness depends on institutional quality, financial development, technological absorptive capacity, policy stability, and the ability of the local economy to connect investment with productive sectors. Investment may produce limited spillovers when its linkages with the local economy are weak. In some developing economies, adverse effects may arise from profit repatriation, economic dependency, or limited integration with domestic sectors (Herzer, 2012).

These varying findings indicate that regional investment should be assessed not only by its magnitude but also by its capacity to generate tangible benefits for the regional economy. Public infrastructure, supportive institutions, and effective governance can strengthen this contribution. Based on this reasoning, the second hypothesis is formulated as follows.

H2: Regional investment affects regional economic growth.

Local Tax Revenue and Regional Economic Growth

Local tax revenue is a principal component of Regional Own-Source Revenue and reflects the ability of local governments to mobilize fiscal resources. Strong local tax revenue can expand fiscal space, reduce dependence on central government transfers, and provide financing for infrastructure, public services, education, health, and other development programs.

Local taxes can support economic growth when revenue is managed efficiently and allocated to productive expenditure. Locally generated tax revenue provides governments with resources to finance development priorities. When used for infrastructure and public services, it can enhance productivity and strengthen regional economic activity (Gemmell et al., 2011; Kneller et al., 1999). Long-run relationships among tax revenue, government expenditure, institutional quality, and economic growth may also emerge where fiscal capacity is managed effectively (Arvin et al., 2021).

However, the growth implications of taxation depend on policy design and the use of revenue. Inefficient tax structures, disproportionate burdens, or limited public returns may constrain households and businesses. Poorly designed tax policies can reduce investment incentives, hinder economic activity, and weaken regional competitiveness. The effect of taxation on growth therefore depends on the tax structure, the allocation of government spending, and the efficiency of fiscal resource utilization (Arnold et al., 2011; Kneller et al., 1999).

Local tax revenue should therefore be viewed not only as a source of income but also as a fiscal instrument whose contribution depends on how the resulting fiscal capacity is utilized. Higher tax revenue may have a stronger growth contribution when it supports productive programs and public assets. Based on this reasoning, the third hypothesis is formulated as follows.

H3: Local tax revenue affects regional economic growth.

Regional Capital Expenditure as a Moderating Variable

Capital expenditure refers to local government spending used to acquire or construct fixed assets, including roads, bridges, irrigation systems, public service buildings, educational facilities, health facilities, and other economic infrastructure. It plays a strategic role in creating public assets that support productivity, improve connectivity, reduce economic costs, enhance public services, and attract investment.

Capital expenditure can support long-term growth by creating public capital that strengthens regional productivity and economic capacity. Infrastructure can facilitate the distribution of goods, while education and health facilities can improve human capital. Economic infrastructure can also increase regional attractiveness to investors (Aschauer, 1989; Barro, 1990).

The contribution of capital expenditure, however, depends on planning, allocation, implementation, and alignment with regional economic needs. Previous evidence also indicates that the relationship between financial performance and capital expenditure may be influenced by budget-ratcheting behavior, highlighting the importance of evaluating how past budget allocations and financial conditions shape capital expenditure decisions (Liza & Mariana, 2023). Spending that is potentially productive may yield limited benefits when it is poorly targeted or inefficiently implemented (Devarajan et al., 1996). The productivity of public capital may also vary by infrastructure type, institutional setting, and regional characteristics (Bom & Ligthart, 2014).

Capital expenditure is positioned as a moderating variable because it may shape the effects of local government debt, regional investment, and local tax revenue on economic growth. Debt may be more beneficial when it supports productive public assets, investment may be more effective when supported by adequate infrastructure, and tax revenue may generate greater economic benefits when directed toward assets that facilitate economic activity. Accordingly, capital expenditure may strengthen or weaken the contribution of regional fiscal instruments to growth.

Capital Expenditure, Local Government Debt, and Regional Economic Growth

Local government debt can support economic growth when it finances productive public investment. Borrowed funds may provide resources for infrastructure and public assets that generate long-term benefits. Conversely, debt may create fiscal pressure when it is not linked to activities that produce sufficient economic returns.

Capital expenditure may moderate the relationship between local government debt and regional economic growth by determining the extent to which debt financing is translated into infrastructure and productive public assets. When debt supports capital expenditure that improves infrastructure, connectivity, and public services, its contribution to economic growth may become stronger.

When capital expenditure is delayed, inefficiently implemented, or misaligned with regional needs, debt may increase fiscal burdens without generating commensurate economic benefits. The debt–growth relationship therefore depends on the allocation of public spending and the use of regional financing (Chudik et al., 2017; Panizza & Presbitero, 2014; Zhao et al., 2019). Based on this reasoning, the fourth hypothesis is formulated as follows.

H4: Regional capital expenditure moderates the effect of local government debt on regional economic growth.

Capital Expenditure, Regional Investment, and Regional Economic Growth

Regional investment can promote growth through capital accumulation, job creation, and productivity gains. Its economic contribution, however, depends partly on the availability of infrastructure and public facilities. Inadequate connectivity, high logistics costs, and limited supporting facilities can reduce the benefits generated by investment.

Capital expenditure can strengthen the contribution of investment to growth by financing roads, transportation networks, public facilities, and economic infrastructure. Such infrastructure can lower production costs, facilitate distribution, and increase regional attractiveness to investors. Capital expenditure may therefore provide an enabling environment for regional investment.

Previous studies show that investment has a stronger growth effect when supported by institutional quality, financial development, and absorptive capacity (Alfaro et al., 2004; Jude & Levieuge, 2017). Capital expenditure can form part of this enabling environment by improving infrastructure, lowering economic costs, and strengthening regional competitiveness. Based on this reasoning, the fifth hypothesis is formulated as follows.

H5: Regional capital expenditure moderates the effect of regional investment on regional economic growth.

Capital Expenditure, Local Tax Revenue, and Regional Economic Growth

Local tax revenue provides local governments with fiscal resources to finance development, improve infrastructure, enhance public services, and support economic activity. Its contribution to growth, however, depends on how the revenue is allocated and utilized.

Capital expenditure may strengthen the relationship between local tax revenue and regional economic growth when tax revenue is translated into productive public assets. Expenditure on roads, educational facilities, health facilities, and economic infrastructure can provide tangible benefits to communities and businesses. Through productive capital allocation, local tax revenue can function not only as a source of fiscal income but also as an instrument of regional development.

Previous studies show that tax revenue can support growth when accompanied by efficient and productive government expenditure (Gemmell et al., 2011; Kneller et al., 1999). Conversely, its growth contribution may be limited when revenue is not transformed into public goods that support productivity (Arnold et al., 2011). Capital expenditure is therefore expected to moderate the effect of local tax revenue on regional economic growth. Based on this reasoning, the sixth hypothesis is formulated as follows. H6: Regional capital expenditure moderates the effect of local tax revenue on regional economic growth.

Conceptual Framework

Based on Endogenous Growth Theory and previous empirical evidence, this study examines the effects of local government debt, regional investment, and local tax revenue on regional economic growth. Regional capital expenditure is positioned as a moderating variable that may alter these relationships.

The conceptual model proposes direct relationships between local government debt, regional investment, local tax revenue, and regional economic growth. It also proposes that regional capital expenditure moderates each of these relationships. The underlying premise is that fiscal instruments contribute more effectively to growth when supported by productive capital expenditure aligned with regional development needs. Figure 1 presents the conceptual framework.

Figure 1. Conceptual Framework

RESEARCH METHOD

Population and Sampling

The population comprises provincial, regency, and municipal governments in Indonesia. Local governments were selected as the units of analysis because the study examines the relationship between regional fiscal instruments and regional economic growth. Each government was observed annually, making the local government-year the unit of analysis. The observation period spans 2019–2022. Purposive sampling was applied using criteria aligned with the research objectives. Local government-year observations were included when complete data were available for regional economic growth, local government debt, regional investment, local tax revenue, and regional capital expenditure. During the data screening process, several observations were found to contain missing values or incomplete information for one or more research variables. These observations were excluded from the regression estimation to ensure data completeness and consistency. After excluding observations with missing or incomplete data, the final sample consisted of 1,758 local government-year observations with complete information for all research variables. These observations were subsequently used in the panel data regression analysis.

Data Collection

This study used secondary data obtained from official government publications and relevant public institutions. Regional economic growth data were derived from Gross Regional Domestic Product at constant prices. Financial data on local government debt, regional investment, local tax revenue, and regional capital expenditure were obtained

from local government financial reports and official regional financial publications. Data were compiled by matching economic and financial information by local government and year. The dataset was then checked for completeness, standardized for consistency in regional names and year formats, and organized as panel data. This process ensured consistency across the official data sources used in the analysis. Panel data regression was employed because the dataset combines cross-sectional and time-series observations. This approach is appropriate for analyzing local governments over multiple years because it captures both differences across regions and changes over time (Baltagi, 2021; Wooldridge, 2010). Data processing and model estimation were conducted using Stata.

Measures

Regional economic growth is the dependent variable, while local government debt, regional investment, and local tax revenue are the independent variables. Regional capital expenditure serves as the moderating variable because it may alter the relationships between the fiscal instruments and regional economic growth.

The selection of these variables is consistent with Endogenous Growth Theory, which emphasizes the roles of government policy, capital accumulation, infrastructure, fiscal capacity, and productivity in economic growth. Productive public spending can expand economic capacity and enhance productivity (Aschauer, 1989; Barro, 1990), although its contribution depends on the composition and efficiency of expenditure (Devarajan et al., 1996). Table 1 summarizes the operational definitions, measurements, and theoretical foundations of the variables.

Table 1. Measurement of Research Variables

No.	Variable	Operational Definition	Measurement	Theoretical Basis
1	Regional economic growth (REG)	An increase in real regional output that reflects changes in regional economic activity.	Growth rate of Gross Regional Domestic Product at constant prices.	Economic growth is influenced by capital accumulation, public spending, and productivity (Aschauer, 1989; Barro, 1990).
2	Local government debt (LGD)	Local government obligations that must be repaid and that serve as a source of regional financing.	Total local government debt divided by total regional expenditure.	Debt may promote growth when used productively but may constrain growth when it increases fiscal burdens (Chudik et al., 2017; Panizza & Presbitero, 2014).
3	Regional investment (RI)	Placement of local government funds intended to generate future economic benefits.	Total regional investment divided by total regional expenditure.	Investment can increase capital accumulation, productivity, and production capacity (Alfaro et al., 2004; Borensztein et al., 1998).
4	Local tax revenue (LTR)	Revenue generated from local taxes, reflecting local fiscal capacity.	Total local tax revenue divided by Regional Own-Source Revenue.	Taxes may support growth when managed efficiently and allocated to productive expenditure (Arnold et al., 2011; Kneller et al., 1999).
5	Regional capital expenditure (RCE)	Local government expenditure used to acquire or construct fixed assets that	Regional capital expenditure divided by total	Capital expenditure can create public capital and infrastructure that support

No.	Variable	Operational Definition	Measurement	Theoretical Basis
		provide benefits beyond one fiscal period.	regional expenditure.	productivity (Aschauer, 1989; Bom & Ligthart, 2014).

Source: Developed from the literature.

Analysis Model

Panel data regression was used to test the hypotheses. The model estimates the direct effects of local government debt, regional investment, and local tax revenue on regional economic growth and the moderating role of regional capital expenditure through interaction terms. The empirical model is specified as follows:

$$REG_{it} = \alpha + \beta_1 LGD_{it} + \beta_2 RI_{it} + \beta_3 LTR_{it} + \beta_4 RCE_{it} + \beta_5 (LGD_{it} \times RCE_{it}) + \beta_6 (RI_{it} \times RCE_{it}) + \beta_7 (LTR_{it} \times RCE_{it}) + \varepsilon_{it}$$

where:

REG	:	Regional economic growth
LGD	:	Local government debt
RI	:	Regional investment
LTR	:	Local tax revenue
RCE	:	Regional capital expenditure
LGD × RCE expenditure	:	Interaction between local government debt and regional capital expenditure
RI × RCE expenditure	:	Interaction between regional investment and regional capital expenditure
LTR × RCE expenditure	:	Interaction between local tax revenue and regional capital expenditure
i	:	Local government
t	:	Year of observation
α	:	Constant
β ₁ –β ₇	:	Regression coefficients
ε	:	Error term

The coefficients β_1 , β_2 , and β_3 represent the direct effects of local government debt, regional investment, and local tax revenue, respectively. The coefficients β_5 , β_6 , and β_7 capture the interaction effects between regional capital expenditure and each independent variable. A statistically significant interaction coefficient indicates that the relationship between the corresponding independent variable and regional economic growth varies with the level of regional capital expenditure.

Data Analysis Technique

Data analysis was conducted in three stages. First, descriptive statistics were used to summarize the characteristics of each variable. Second, correlation analysis was conducted to examine the initial relationships among the variables. Third, panel data regression was estimated using pooled ordinary least squares, fixed effects, and random effects. The Chow test was used to compare the pooled OLS and fixed-effects models, the Lagrange Multiplier test to compare the pooled OLS and random-effects models, and the Hausman test to compare the fixed-effects and random-effects models (Baltagi, 2021; Wooldridge, 2010).

Hypotheses H1–H3 were evaluated using the coefficients of the direct effects, while H4–H6 were evaluated using the interaction coefficients between regional capital expenditure and each independent variable. Statistical significance was assessed at the

5% level. A significant interaction term indicates that the relationship between an independent variable and regional economic growth changes with the level of capital expenditure (Baron & Kenny, 1986; Hayes, 2018).

RESULTS

Descriptive Statistics

Descriptive statistical analysis was used to summarize the distribution of the research variables. The panel dataset comprises 1,758 observations from 504 local governments over the 2019–2022 period.

Table 2. Descriptive Statistics

Variable	Obs.	Minimum	Maximum	Mean	Std. Dev.
Regional economic growth	1,758	-5.072886	10.756501	2.956365	2.820835
Local government debt	1,758	0.000008	12.857461	3.074259	2.878015
Regional investment	1,758	0.060092	52.676064	13.510865	11.779803
Local tax revenue	1,758	-0.006350	90.037455	32.475156	19.839222
Regional capital expenditure	1,758	26.673731	29.472274	27.889439	0.535744

Regional economic growth ranges from -5.072886 to 10.756501, with a mean of 2.956365 and a standard deviation of 2.820835. The distribution indicates substantial variation across local governments and years, including periods of negative growth in several regions.

Local government debt ranges from 0.000008 to 12.857461, with a mean of 3.074259 and a standard deviation of 2.878015. The dispersion indicates considerable differences in debt levels across regions. Regional investment ranges from 0.060092 to 52.676064, with a mean of 13.510865 and a standard deviation of 11.779803. The relatively large dispersion shows that investment levels vary markedly across local governments.

Local tax revenue ranges from -0.006350 to 90.037455, with a mean of 32.475156 and a standard deviation of 19.839222. This variation reflects differences in the fiscal capacity of local governments to generate revenue from local taxes. Regional capital expenditure ranges from 26.673731 to 29.472274, with a mean of 27.889439 and a standard deviation of 0.535744. Compared with the other variables, capital expenditure exhibits relatively limited variation across local governments.

Multicollinearity Assessment

Multicollinearity was assessed using the correlation matrix among the independent variables. Correlation coefficients below 0.80 indicate that the model is unlikely to be affected by serious multicollinearity.

Table 3. Correlation Matrix

Variable	Regional Economic Growth	Local Government Debt	Regional Investment	Local Tax Revenue	Regional Capital Expenditure
Regional economic growth	1.0000	0.0201	0.3152	0.0701	0.0659
Local government debt	0.0201	1.0000	0.0051	0.0736	0.1034
Regional investment	0.3152	0.0051	1.0000	-0.0469	-0.1265
Local tax revenue	0.0701	0.0736	-0.0469	1.0000	0.4892

Regional capital expenditure	0.0659	0.1034	-0.1265	0.4892	1.0000
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All correlations among the independent variables are below 0.80. The highest correlation is between local tax revenue and capital expenditure (0.4892), which remains below the commonly used threshold. These results indicate no serious multicollinearity among the explanatory variables.

Robust Standard Error Estimation

The fixed-effects model was estimated using standard errors clustered at the local-government level. This approach provides robust statistical inference in the presence of potential heteroscedasticity and within-cluster error correlation.

Accordingly, coefficient significance was evaluated using cluster-robust standard errors, t-statistics, and p-values. This specification provides a consistent basis for hypothesis testing across local governments.

Panel Model Selection

Panel model selection was conducted by comparing the pooled ordinary least squares, fixed-effects, and random-effects models. The Chow, Lagrange Multiplier, and Hausman tests were used to identify the most appropriate specification.

Table 4. Panel Model Selection Results

Test	Purpose	Statistic	df	p-value	Decision
Chow test	Pooled OLS vs. fixed-effects model	1.114065	503; 1247	0.071190	Pooled OLS
Lagrange Multiplier test	Pooled OLS vs. random-effects model	73.872873	1	<0.001	Random-effects model
Hausman test	Fixed-effects vs. random-effects model	351.379750	7	<0.001	Fixed-effects model

The Chow test yields a p-value of 0.071190. Because this value exceeds the 5% significance level, the pooled OLS model is preferred to the fixed-effects model at this stage. The Lagrange Multiplier test yields $p < 0.001$, indicating that the random-effects model is preferred to pooled OLS.

The Hausman test was then used to compare the fixed-effects and random-effects models. The test yields $p < 0.001$, supporting the fixed-effects specification. Accordingly, the fixed-effects model with cluster-robust standard errors was used for hypothesis testing.

Hypothesis Testing Results

Hypotheses were tested using the fixed-effects model with standard errors clustered at the local-government level. Table 5 presents the estimation results.

Table 5. Fixed-Effects Model Estimates with Cluster-Robust Standard Errors

Variable	Coefficient	Std. Error	t-statistic	p-value	Result
Local government debt	-2.012102	1.899993	-1.059005	0.290106	Not significant
Regional investment	-0.256702	0.316450	-0.811192	0.417639	Not significant

Variable	Coefficient	Std. Error	t-statistic	p-value	Result
Local tax revenue	-1.539717	0.762316	-2.019788	0.043935	Significant
Regional capital expenditure	9.105280	1.344356	6.772967	<0.001	Significant
Local government debt × Capital expenditure	0.071714	0.067888	1.056361	0.291311	Not significant
Regional investment × Capital expenditure	0.012801	0.011468	1.116227	0.264858	Not significant
Local tax revenue × Capital expenditure	0.056629	0.027639	2.048864	0.040994	Significant

Local government debt has a coefficient of -2.012102 and a p-value of 0.290106. Because the coefficient is not statistically significant, H1 is not supported. Regional investment has a coefficient of -0.256702 and a p-value of 0.417639; therefore, H2 is also not supported. The coefficient on local tax revenue is negative and statistically significant ($\beta = -1.539717$; $p = 0.043935$). This result supports H3. The coefficient on capital expenditure is positive and statistically significant ($\beta = 9.105280$; $p < 0.001$), indicating a positive relationship between capital expenditure and regional economic growth in the estimated model.

The interaction between local government debt and capital expenditure is positive but not statistically significant ($\beta = 0.071714$; $p = 0.291311$). Thus, capital expenditure does not significantly moderate the relationship between local government debt and regional economic growth, and H4 is not supported. The interaction between regional investment and capital expenditure is positive but not statistically significant ($\beta = 0.012801$; $p = 0.264858$). Thus, capital expenditure does not significantly moderate the relationship between regional investment and regional economic growth, and H5 is not supported. The interaction between local tax revenue and capital expenditure is positive and statistically significant ($\beta = 0.056629$; $p = 0.040994$). This result indicates that the relationship between local tax revenue and regional economic growth becomes more favorable as capital expenditure increases. Accordingly, H6 is supported.

Table 6. Summary of Hypothesis Testing Results

Hypothesis	Statement	Coefficient Direction	p-value	Result
H1	Local government debt affects regional economic growth	Negative	0.290106	Not supported
H2	Regional investment affects regional economic growth	Negative	0.417639	Not supported
H3	Local tax revenue affects regional economic growth	Negative	0.043935	Supported
H4	Capital expenditure moderates the effect of local government debt on regional economic growth	Positive	0.291311	Not supported
H5	Capital expenditure moderates the effect of regional investment on regional economic growth	Positive	0.264858	Not supported
H6	Capital expenditure moderates the effect of local	Positive	0.040994	Supported

Hypothesis	Statement	Coefficient Direction	p-value	Result
	tax revenue on regional economic growth			

Overall, local tax revenue and capital expenditure have statistically significant coefficients, whereas local government debt and regional investment do not. Among the interaction terms, only the interaction between local tax revenue and capital expenditure is statistically significant. Table 6 summarizes the hypothesis-testing results.

DISCUSSION

Local Government Debt and Regional Economic Growth

The results show that local government debt is not significantly related to regional economic growth ($\beta = -2.012102$; $p = 0.290106$). Although the coefficient is negative, the relationship is not statistically significant, indicating that differences in local government debt are not systematically associated with differences in regional economic growth in the estimated model.

Endogenous Growth Theory suggests that public financing can support growth when it is allocated to productive activities that expand economic capacity and long-term productivity (Barro, 1990). In this context, debt may contribute to growth when it finances infrastructure, basic services, and other productive development programs. The absence of a significant relationship in this study suggests that the economic contribution of local government debt may depend on how borrowed funds are allocated, implemented, and integrated with regional development priorities.

This finding differs from studies reporting a positive growth contribution from prudently managed and productively allocated government debt (Chen & Li, 2019; Ouyang & Li, 2021). It is, however, consistent with evidence that the debt–growth relationship may be weak or insignificant when fiscal burdens increase, fiscal space narrows, or governance conditions limit the productive use of financing (Chudik et al., 2017; Panizza & Presbitero, 2014; Zhao et al., 2019). The result highlights the importance of linking debt financing to projects with clear and sustainable economic benefits.

Regional Investment and Regional Economic Growth

Regional investment is not significantly related to regional economic growth ($\beta = -0.256702$; $p = 0.417639$). Although the coefficient is negative, it is not statistically significant, suggesting that differences in regional investment do not consistently correspond to changes in economic growth during the study period.

Endogenous Growth Theory identifies investment as a potential source of growth through capital accumulation, expanded production capacity, productivity gains, and broader economic activity (Barro, 1990). These benefits, however, depend on infrastructure, institutional support, and the capacity of the local economy to absorb and extend the effects of investment. The result indicates that regional investment may require stronger linkages with local production, infrastructure, and development priorities to generate measurable growth outcomes.

This finding differs from studies showing that investment can promote growth through technology transfer, productivity improvement, and expanded production capacity, particularly where human capital and institutional quality are strong (Alfaro et al., 2004; Borensztein et al., 1998; Jude & Leveuge, 2017). It is consistent with Herzer (2012), who shows that investment may have limited growth effects when spillovers are weak or

linkages with the domestic economy are insufficient. These results emphasize the importance of directing regional investment toward productive sectors with strong local economic connections.

Local Tax Revenue and Regional Economic Growth

The coefficient on local tax revenue is negative and statistically significant ($\beta = -1.539717$; $p = 0.043935$), indicating a negative direct coefficient in the estimated moderation model. From the perspective of Endogenous Growth Theory, fiscal capacity can support growth when public revenue finances productive expenditure, infrastructure, and public services that enhance productivity (Aschauer, 1989; Barro, 1990). The negative coefficient suggests that revenue mobilization alone may not be sufficient to generate stronger economic growth. The economic contribution of local taxation may depend on the extent to which revenue is returned to the economy through productive public expenditure.

This result differs from studies showing that tax revenue can support growth when it is managed efficiently and directed toward productive expenditure (Arvin et al., 2021; Gemmell et al., 2011; Kneller et al., 1999). At the same time, it is consistent with the view that taxation may constrain growth when it imposes economic burdens, weakens investment incentives, or is not accompanied by effective public spending (Arnold et al., 2011; Kneller et al., 1999). The finding underscores the importance of aligning local revenue mobilization with expenditure that supports economic activity.

Capital Expenditure, Local Government Debt, and Regional Economic Growth

The interaction between local government debt and capital expenditure is positive but not statistically significant ($\beta = 0.071714$; $p = 0.291311$). This result indicates that capital expenditure does not significantly alter the relationship between local government debt and regional economic growth during the study period. Endogenous Growth Theory suggests that capital expenditure can support growth by creating public capital, infrastructure, and productive assets that enhance efficiency and productivity (Aschauer, 1989; Barro, 1990). In principle, debt may contribute more strongly to growth when it is converted into productive capital expenditure. The insignificant interaction term indicates that this moderating pattern is not statistically evident in the current data.

This result differs from studies showing that debt can support growth when directed toward productive investment and infrastructure (Chen & Li, 2019; Ouyang & Li, 2021). It is nevertheless consistent with evidence that the contribution of debt depends on fiscal burdens, financing allocation, and governance effectiveness (Chudik et al., 2017; Panizza & Presbitero, 2014; Zhao et al., 2019). The result suggests that stronger alignment between debt financing and productive capital projects may be important for generating broader economic benefits.

Capital Expenditure, Regional Investment, and Regional Economic Growth

The interaction between regional investment and capital expenditure is positive but not statistically significant ($\beta = 0.012801$; $p = 0.264858$). Thus, capital expenditure does not significantly alter the relationship between regional investment and economic growth in the estimated model. Endogenous Growth Theory explains that investment and infrastructure can foster growth through capital accumulation, productivity gains, and greater economic efficiency (Aschauer, 1989; Barro, 1990). Capital expenditure may support investment by providing infrastructure, public facilities, and economic assets that facilitate production and distribution. The insignificant interaction term indicates that this complementary relationship is not statistically evident during the study period.

The result differs from studies showing that investment contributes more strongly to growth when supported by absorptive capacity, financial development, and institutional quality (Alfaro et al., 2004; Borensztein et al., 1998; Jude & Levieuge, 2017). It is consistent with Herzer (2012), who finds that investment may have limited growth effects when spillovers or local economic linkages are weak. Greater alignment between capital expenditure and investment-supporting infrastructure may therefore enhance regional competitiveness and the local benefits of investment.

Capital Expenditure, Local Tax Revenue, and Regional Economic Growth

The interaction between local tax revenue and capital expenditure is positive and statistically significant ($\beta = 0.056629$; $p = 0.040994$). This result indicates that capital expenditure significantly moderates the relationship between local tax revenue and regional economic growth in a positive direction. This finding is consistent with Endogenous Growth Theory, which emphasizes that fiscal policy can support growth when public resources are allocated to activities that expand long-term economic capacity and productivity (Barro, 1990). Capital expenditure provides a channel through which local tax revenue can be translated into public assets, infrastructure, and economic facilities. These investments can lower economic costs, improve connectivity, enhance public services, and strengthen regional productivity (Aschauer, 1989). The positive interaction suggests that the relationship between local tax revenue and growth becomes more favorable as capital expenditure increases.

The result supports previous studies showing that tax revenue can contribute to growth when it finances productive public expenditure and is managed efficiently (Arvin et al., 2021; Gemmell et al., 2011; Kneller et al., 1999). It also reinforces the argument that the contribution of government spending depends on its composition and efficiency, not merely its size (Devarajan et al., 1996). Capital expenditure therefore plays an important role in linking local fiscal capacity to regional economic outcomes.

Synthesis of Findings

Taken together, the findings show that regional fiscal instruments do not contribute to economic growth in the same way. Local government debt and regional investment have no statistically significant direct effects, while the coefficient on local tax revenue is negative and significant. Capital expenditure has a positive and significant coefficient and positively moderates the relationship between local tax revenue and regional economic growth.

These results are consistent with the central proposition of Endogenous Growth Theory that the economic contribution of fiscal resources depends on how they are deployed. Fiscal policy is more likely to support growth when public resources expand productive capacity, provide infrastructure, and improve productivity (Aschauer, 1989; Barro, 1990). Conversely, the contribution of public expenditure may be limited when its composition or implementation is not aligned with regional economic needs (Devarajan et al., 1996). The findings suggest that local fiscal policy should emphasize not only the mobilization of debt, investment, and tax revenue but also their connection to productive capital expenditure. In particular, allocating local tax revenue to infrastructure, public facilities, and productive regional assets may improve its contribution to economic growth.

CONCLUSION

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Local government debt does not have a statistically significant effect on regional economic growth. This result suggests that debt financing alone may not be sufficient to expand regional economic capacity. Its contribution is likely to depend on prudent

management and allocation to infrastructure and public assets that generate long-term productivity gains.

Regional investment also does not have a statistically significant effect on regional economic growth. The finding indicates that higher investment does not necessarily translate into stronger growth when linkages with productive regional sectors are limited. Local governments should therefore strengthen investment planning, improve the investment environment, and encourage activities that generate wider multiplier effects within the local economy.

The coefficient on local tax revenue is negative and statistically significant. This finding indicates that higher revenue mobilization does not automatically generate stronger economic growth. The contribution of local taxation depends on whether fiscal resources are accompanied by improved public services and productive development expenditure. Accordingly, tax optimization should be aligned with budget allocations that provide tangible benefits to economic activity.

Capital expenditure plays a strategic role in the model. Its coefficient is positive and statistically significant, and it positively moderates the relationship between local tax revenue and regional economic growth. This finding indicates that the relationship between local tax revenue and growth becomes more favorable when fiscal resources are accompanied by productive capital expenditure, including infrastructure, public facilities, and regional assets that support economic activity.

These findings highlight the importance of capital expenditure as a link between regional fiscal capacity and economic growth. Regional fiscal policy should therefore balance revenue mobilization, investment, and debt financing with the productive allocation and effective utilization of capital expenditure. Future research may extend the observation period and incorporate institutional quality, expenditure composition, fiscal dependence, and regional characteristics to provide a broader understanding of regional fiscal dynamics.

LIMITATION

This study should be interpreted in light of several considerations. First, it relies on secondary local government data, making the analysis dependent on the completeness and consistency of official records. Second, the four-year observation period may not fully capture longer-term regional fiscal dynamics. Third, institutional quality, governance, administrative capacity, and expenditure implementation are not included in the model, although these factors may provide additional insight into the relationship between fiscal instruments and economic growth.

Capital expenditure is represented by a quantitative measure, which does not capture differences in expenditure composition, implementation, or realized benefits across regions. Future studies may extend the panel period, incorporate more detailed indicators of capital expenditure and institutional capacity, and complement quantitative analysis with qualitative evidence to provide a more comprehensive account of how regional fiscal policy is translated into productive development outcomes.

ACKNOWLEDGMENT

The authors express gratitude to those who have had the pleasure of cooperating during this study or research.

DECLARATION OF CONFLICTING INTERESTS

The authors have declared no potential conflicts of interest concerning the study, authorship, and/or publication of this article.

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