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Government Expenditure and Economic Growth: A Case Study of Cities in Anhui Province

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Abstract

In the context of high-quality development, government expenditure, as a core tool of fiscal policy, significantly influences regional economic growth. Using panel data from 16 prefecture-level cities in Anhui Province from 2005 to 2023, this study constructs a fixed effects model to empirically examine the impact and mechanisms of government expenditure on economic growth. The findings are as follows: (1) Government expenditure significantly boosts economic growth, a conclusion that remains valid after robustness tests, including sample space reduction, tail trimming, and replacement of explanatory variables. (2) Government expenditure indirectly promotes economic growth by advancing industrial structure modernization and strengthening human capital. (3) Compared to northern Anhui, government expenditure has a more pronounced effect on the economic growth of southern cities. The research results provide a theoretical basis for optimizing the structure of government expenditure and enhancing the effectiveness of fiscal policies, offering policy insights for promoting high-quality regional economic development.

Keywords

High-quality development; Government expenditure; Economic growth; Industrial structure upgrading.

1. Introduction

Currently, China's economy is at a critical juncture of transitioning from high-speed growth to high-quality development. According to the State Council's Government Work Report, the GDP growth target of around 5% reflects both the government's expectation for stable economic development and the numerous challenges currently faced by the economy. In the context of profound adjustments in the global economic landscape and the transformation of domestic development models, China's economic development faces significant issues, including insufficient levels of independent innovation and external technological blockades that have led to 'bottlenecks' in key core technologies. These issues not only constrain the 'quantity' of economic growth but also impact its 'quality.' Against this backdrop, the Central Committee of the Communist Party of China has, for the first time, incorporated 'developing new quality productive forces' into the macroeconomic policy guidelines, clearly stating that fiscal spending should shift from 'scale expansion' to 'efficiency enhancement.'

Government expenditure, as the core vehicle for fiscal resource allocation, plays a dual role in driving economic growth through its structural optimization. On the demand side, government expenditure can effectively expand total social demand and stimulate consumer potential by providing public services. On the supply side, it directly supports technological innovation and enhances overall productivity. This dual effect aligns well with the current top-level directive to 'improve the quality and efficiency of fiscal policy.' In particular, in regional economic development, optimizing the structure of government expenditure to address economic

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challenges and promote high-quality economic growth has become an urgent issue that needs to be addressed both theoretically and practically.

Many scholars have focused on how to effectively boost economic growth, proposing strategies such as breaking technological lock-in[1], empowering technology finance[2], innovating artificial intelligence [3], and developing consumer finance[4]. In recent years, with the profound adjustments in the global economic landscape and the transformation of domestic development models, government spending has become a key tool for macroeconomic regulation. The strategic importance of stabilizing growth, adjusting the economic structure, and improving people's livelihood is becoming increasingly evident. The 14th Five-Year Plan explicitly states the need to' strengthen the coordination of fiscal resources and promote standardized fiscal expenditure. 'The report from the 20th National Congress of the Communist Party of China emphasizes the need to' enhance the coordination between fiscal and monetary policies.' The Central Economic Work Conference has also deployed an active fiscal policy to boost market confidence and expand domestic demand. Given this context, can government spending, through diversified channels such as infrastructure investment, science and technology innovation projects, and livelihood security initiatives, effectively coordinate with market mechanisms to inject new momentum into economic growth?

Research on government expenditure at this stage is broadly categorized into two types. In terms of methodology, most studies are empirical, employing econometric methods to examine the economic and social impacts of government expenditure using data at the provincial[5], municipal[6], or enterprise level [7]. Some studies focus on the theoretical mechanisms of government expenditure [8]. In terms of research themes, most studies concentrate on the efficiency of government expenditure and the optimization of its structure, such as whether the efficiency of government expenditure is related to the launch of new media for fiscal and tax administration[9], reforms in budget performance management[10], and fiscal and tax vertical imbalances[11]. The structure of government expenditure focuses on inter-provincial support[12], central government's balanced transfer payments[13], and fiscal decentralization[14]. Based on this, this paper uses 16 prefecture-level cities in Anhui Province from 2005 to 2023 as a research sample to explore the impact mechanism of government expenditure on economic growth. As an important part of the Yangtze River Delta, Anhui Province includes both Hefei, a highland of scientific and technological innovation, and underdeveloped areas like northern Anhui. This regional diversity provides an ideal sample for studying the impact of government expenditure. Studying the impact of government expenditure on economic growth not only enriches the theoretical framework of government expenditure and regional economic development but also provides empirical evidence for local governments to optimize fiscal resource allocation and enhance policy effectiveness, with significant theoretical and practical value.

2. Theoretical Analysis and Research Hypothesis

2.1. Direct impact of government expenditure on economic growth

According to Keynesian economic theory, government spending is a crucial policy tool for regulating macroeconomic operations. This theory highlights that during economic downturns, increasing government spending can compensate for the insufficient demand from the private sector, generating a significant multiplier effect. Specifically, government investment in infrastructure projects can directly create job opportunities, boost residents 'income levels, and stimulate consumer demand, thus forming a virtuous cycle of' investment-income-consumption.' In Anhui Province, recent sustained investments in transportation, water conservancy, and other sectors have indeed played a vital role in stabilizing and promoting regional economic growth. Modern endogenous growth theory further expands our

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understanding of the economic benefits of government spending. This theory suggests that by providing public goods and institutional guarantees, the government can significantly reduce market transaction costs and improve the business environment. In particular, in developing countries, government spending on education, healthcare, and other areas can effectively address market failures and create more favorable conditions for market entities. Based on this, this article proposes hypothesis 1: Government spending can boost economic growth.

2.2. Indirect effects of government spending on economic growth

Government expenditure promotes economic growth by advancing the sophistication of industrial structures. Firstly, productive investments by the government directly enhance the hardware environment for industrial development, such as improving transportation and energy infrastructure, which significantly reduces operational costs in both industry and services. Secondly, targeted industrial policies and fiscal subsidies can correct market failures, facilitating the reallocation of resources from inefficient traditional agricultural sectors to more efficient modern industrial and service sectors. This structural transformation not only leads to static resource optimization but also generates dynamic growth dividends through industrial linkages and technology spillovers. Notably, in the early stages of economic development, the government's strategic industrial policies can accelerate industrialization by fostering manufacturing sectors with comparative advantages. In more developed stages, increasing support for modern services can help the industrial structure evolve to a higher level. Thus, Hypothesis 2 is proposed: Government expenditure enhances economic growth by strengthening the human capital base.

Government spending boosts economic growth by strengthening the human capital base. By increasing the coverage of basic education, educational expenditure directly reduces illiteracy rates, and this 'quantitative accumulation' of human capital provides a qualified labor reserve for economic growth. Additionally, government investment in healthcare improves population health and extends the return on investment in human capital. More importantly, as the structure and quality of educational expenditure improve, the 'qualitative leap' in human capital significantly enhances the economy's innovation and technology absorption capabilities. This high-quality accumulation of human capital and industrial upgrading form a positive feedback loop: industrial upgrading creates demand for high-quality labor, while the improvement in human capital provides the necessary support for industrial upgrading. Thus, Hypothesis 3 is proposed: Government spending promotes economic growth by strengthening the human capital base.

3. Research Design

3.1. Model Settings

In order to test the specific impact of government expenditure on economic growth, the following benchmark regression model is set

$$Y_{it} = \partial_0 + \partial_1 Exp_{it} + \sum_j \partial_j Controls_{jit} + \lambda_i + \mu_t + \varepsilon_{it} \quad (1)$$

In this context, Y denotes the dependent variable representing economic growth; Exp represents the independent variable indicating government expenditure; Controls refers to a set of control variables influencing economic growth, where i stands for region and t for year; λ_i and μ_t are regional and time fixed effects, respectively; and ε_{it} represents the random error term.

3.2. Variable description

(1) Dependent variable. Economic growth (Gro). Measured using gross domestic product of urban areas and logarithmic processing.

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(2) Interpretation of variables. Government expenditure (Exp) is measured by the general financial expenditure of the city and logarithmic processing is carried out.

(3) Control variables. To control for other potential factors that might affect the robustness of the empirical results, this paper introduces the following city-level control variables: the level of urbanization (Inurb), measured by the logarithm of the ratio of urban population to the total resident population; the level of infrastructure (Ininfra), measured by the logarithm of the number of kilometers of roads in each city; and the level of openness to foreign investment (Inopen), measured by the logarithm of the ratio of the year's total import and export volume to the actual amount of foreign direct investment utilized.

3.3. Data sources

This paper takes 16 prefecture-level cities in Anhui Province from 2005 to 2023 as the research sample, and removes the sample data with missing data. The basic economic and social data at the city level used in this paper are derived from the statistical yearbooks of Anhui Province and cities over the years.

4. Empirical Results and Analysis

4.1. Baseline regression

The results of the test on the relationship between government expenditure and economic growth are shown in Table 1. Column (1) presents the results without control variables. Column (2) controls for individual and time fixed effects, while Column (3) adds control variables and controls for individual and time fixed effects. The regression results of the core explanatory variable Exp are all significantly positive at the 1% level, indicating that government expenditure can significantly boost economic growth, thus verifying Hypothesis 1. On the demand side, government expenditure directly increases total demand in the economy through the multiplier effect, driving production expansion and employment growth. Increased household income further boosts consumption, thereby promoting economic growth. On the supply side, government expenditure can enhance long-term supply capacity. Government construction of roads, ports, and power grids reduces logistics and operational costs for businesses, improving production efficiency. Increased government spending on education and healthcare enhances labor quality, promotes technological innovation and industrial upgrading, and thus drives economic growth.

Table 1. Baseline regression results

variable	(1)	(2)	(3)
Exp	0.530***	0.374***	0.408***
	(14.34)	(3.33)	(4.29)
Inurb			1.289***
			(11.84)
Ininfra			-0.268*** (-5.73)
Inopen			-0.016 (-0.50)
Region/year	deny	yes	yes
_ cons	2.721*** (5. 11)	4.969*** (3.08)	1.948 (1.54)
R2	0.40	0.96	0.98

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Note: ***, ** and * indicate significance at the level of 1%,5% and 10%, respectively. The t value is indicated in parentheses below, and the same applies below.

4.2. Endogeneity test

To control for potential endogeneity biases, such as omitted variables and reverse causality, this paper uses a one-period lag of government expenditure as a tool variable, employing two-stage least squares (2SLS) for model estimation. Government expenditure from the previous year influences the current year's expenditure, thus meeting the correlation requirement for a tool variable. Additionally, government expenditure from the previous year is exogenous relative to the current period variables in the regression model, meaning it is not influenced by these current period variables, thus meeting the exogeneity requirement for a tool variable. The first-stage results in Table 2 show that the regression coefficient of Iv is significantly positive, indicating a positive correlation between Iv and Exp. Both the identification weakness test (KP statistic value of 54.14) and the weak instrument variable test (WaldF statistic value of 157.49, greater than the 10% level critical value) confirm the validity of the tool variable. The second-stage results indicate that after excluding endogeneity interference, the regression coefficient of Exp is 0.979, positive at the 1% level, confirming that the baseline regression conclusion remains valid.

Table 2 Results of endogeneity test

variable	Instrumental variables	
	Phase one	phase two
Exp		0.979***
		(6.22)
Iv	0.591***	
	(9.53)	
Control variables	yes	yes
region/year	yes	yes
	4.596**	-0.663
_ cons	(6.30)	(-0.33)
Kleibergen - Paap rk LM	54. 14***	
Kleibergen - PaapWald rk F	90.76	
Cragg-Donald Wald F	157.49	
Stock: Yogo 16.38	16.38	

4.3. Robustness test

To further validate the reliability of the research findings, this paper conducts three robustness tests: ① Adjusting the sample space. Considering the impact of the global COVID-19 pandemic in 2020 on the economic indicators, this paper shortens the sample period to 2005-2019 and reperforms the regression analysis. The regression results are shown in column (1) of Table 3. The regression coefficient of the core Exp explanatory variable remains significantly positive, indicating that the conclusion that government spending promotes economic growth remains valid. ② Tail trimming. To eliminate the impact of outliers on the regression results, this paper applies tail trimming to all variables at the 5% and 95% quantiles. The regression results are shown in column (2) of Table 3. Compared with the baseline regression, the coefficients and significance levels of the core explanatory variables have not changed significantly, indicating that the previous research results are not due to outliers and are generally valid, thus proving

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the robustness of the previous research results. ③ Replacing the dependent variable. This paper uses regional per capita GDP as the dependent variable and reperforms the regression analysis. The regression results are shown in column (3) of Table 3. The regression coefficient of the core Exp explanatory variable remains significantly positive at the 5% level, confirming the robustness of the baseline results.

Table 3 Regression results of robustness test

	Adjust the sample space	Tail retraction treatment	Replace the dependent variable
	(1)	(2)	(3)
Exp	0.508***	0.613***	0.562**
	(4.82)	(7.33)	(5.39)
controlled variable	yes	yes	yes
Region/year	yes	yes	yes
_cons	-0.099*** (-2.72)	3.622*** (3.06)	4.624*** (3.33)
N	176	240	240
R2	0.98	0.97	0.97

4.4. Mechanism of action test

The theoretical analysis in the previous paper shows that government expenditure promotes economic growth through industrial structure and population education rate. This paper refers to Jiang Ting's suggestions on the analysis of mediation effect in causal inference research and adopts the two-step mediation method to test the mechanism of government expenditure's influence on economic growth:

$$M_{it} = y_0 + y_1 Exp_{it} + \sum_j Controls_{jit} + \lambda_i + \mu_t + \varepsilon_{it} \quad (2)$$

Among them, M is the mechanism variable, including other variables and model (1) are consistent.

The assessment of industrial structure upgrading. This paper measures the industrial structure by the ratio of the output value of the primary and secondary industries to the regional GDP. The regression results in column (1) of Table 4 show that the regression coefficient Exp of the core explanatory variable is significantly positive at the 1% level, indicating that government spending can promote industrial structure upgrading. Government productive investment can reduce the operating costs of industries and services, and through industrial linkages and technology spillovers, generate dynamic growth dividends, thereby promoting industrial structure upgrading and accelerating economic growth.

The examination of the human capital foundation mechanism. The human capital foundation is measured by the illiteracy rate of the total population in a region, with higher values indicating lower educational levels among the population. The regression results in column (2) of Table 4 show that the regression coefficient of the core explanatory variable is significantly negative at the 1% level. Education expenditure directly reduces the illiteracy rate by increasing the coverage of basic education. Furthermore, as the structure and quality of education expenditure improve, the 'qualitative leap' in human capital will significantly enhance the economy's innovation and technology absorption capabilities, thereby promoting economic growth.

The results of the mechanism test show that government expenditure can not only produce dynamic growth dividend and promote industrial structure upgrading, but also improve the

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education level of regional population. That is, the integration of digital and real technologies promotes economic growth through industrial structure upgrading and human resource base, and hypothesis 2 and 3 are verified.

Table 4 Mechanism test results

variable	Industrial structure is upgraded	Human capital base
	(1)	(2)
Exp	0.197***	-5.060***
	(8.24)	(-4.98)
controlled variable	yes	yes
Region/year	yes	yes
_cons	2.107***	66.113***
	(6.61)	(4.89)
R2	0.925	0.782

5. Heterogeneity Analysis

To investigate whether the impact of government expenditure on economic growth varies with the different levels of regional development

Based on the geographical differences of cities in Anhui Province along the Huai River, this paper divides the samples into Northern Anhui and Southern Anhui regions. The test results are shown in columns (1) and (2) of Table 5. In the Northern region, the regression coefficient of the core explanatory variable Exp is 0.273, which is significant at the 10% level; in the Southern region, the regression coefficient of the core explanatory variable Exp is 0.447, which is significant at the 1% level, and the regression of Exp is also observed in the Southern region.

The coefficient is significantly higher in the southern part of Anhui compared to the northern part, indicating that government spending has a more significant impact on economic growth in the southern region. This may be due to several factors: Firstly, the southern region of Anhui has a stronger economic foundation and a higher degree of marketization, enabling it to more efficiently utilize government resources. Through well-developed infrastructure and mature industrial chains, it can quickly transform these resources into economic growth momentum. In contrast, the northern region of Anhui has a weaker economic base and a slower marketization process, which may result in lagging or inefficient transmission mechanisms for government spending. Secondly, the southern region of Anhui has a more diversified industrial structure, with a higher proportion of modern service and high-tech industries. Government spending can have a greater multiplier effect by supporting technological innovation and industrial upgrading. In comparison, the northern region of Anhui is still dominated by traditional agriculture and primary industries, with a less diverse industrial structure, leading to relatively lower marginal benefits from government spending. Thirdly, the southern region of Anhui has a richer human capital reserve, with higher levels of education and a higher proportion of skilled labor, which can better absorb and utilize the technology spillover effects brought by government spending. The northern region of Anhui, however, has a relatively insufficient human capital base, which may limit the potential impact of government spending on economic growth.

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Table 5 Heterogeneity test results

variable	North Anhui	Southern Anhui
	(1)	(2)
Exp	0.273* (1.74)	0.447*** (3. 18)
controlled variable	yes	yes
Region/year	yes	yes
_cons	3.717* (1.84)	6. 114*** (3.28)
R2	0.98	0.97

6. Conclusions and Suggestions

6.1. Conclusions

This paper uses the 16 prefecture-level cities in Anhui Province from 2005 to 2023 as a research sample, exploring the impact and mechanisms of government expenditure on economic growth through theoretical analysis and empirical testing. The study concludes: (1) Government expenditure significantly boosts economic growth in Anhui Province, a finding that remains valid after a series of robustness tests, including narrowing the sample space, trimming the tails, handling extreme values, and replacing the dependent variable. The baseline regression results show that a 1% increase in government expenditure leads to an approximately 0.408% increase in regional GDP, indicating that fiscal policy plays a crucial role in driving regional economic development. (2) Mechanism tests reveal that government expenditure promotes economic growth through two pathways: advancing industrial and structural modernization and strengthening the human capital base. (3) Compared to northern Anhui, in the region, government expenditure has a more significant effect on the economic growth of cities in southern Anhui.

6.2. Suggestions

(1)To optimize the scale and structure of government spending, the government should focus on expanding effective investment in areas that enhance new production capabilities (such as the digital economy and green technology), while avoiding inefficient and redundant construction. Anhui Province can integrate the Yangtze River Delta integration strategy by increasing special expenditures on cross-regional infrastructure (like the Hefei-Xinjiang high-speed railway) and innovation corridors (such as the Hefei National Comprehensive Science Center). Additionally, a performance-based budgeting mechanism should be established to link spending to key indicators such as GDP growth and employment, ensuring that fiscal funds are used more efficiently and effectively. During economic downturns, the government can stabilize overall social demand through temporary tax cuts and spending on people's livelihoods (such as consumption vouchers and affordable housing). In times of economic overheating, non-essential administrative expenses should be cut to prevent debt risks.

(2) To ensure the smooth functioning of government expenditure channels and leverage its driving role. On one hand, the government should promote industrial upgrading by establishing an industrial transformation fund to support advanced manufacturing and modern services, guiding enterprises to upgrade their technology through tax incentives. A collaborative innovation platform involving the government, enterprises, and universities should be

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established, linking fiscal R&D investment with patent conversion rates and the number of industry-university-research cooperation projects. On the other hand, the government can increase its spending on education, particularly in vocational and rural basic education. It should also improve the regional balance of medical spending, using transfer payments to reduce the disparity in medical resources between southern and northern Anhui, thereby extending the health cycle of human capital. Additionally, for the less urbanized northern Anhui region, the government can increase spending on infrastructure and public services; for the more industrialized Anjiang city belt, it can focus on science and technology subsidies and environmental protection investments.

(3) Implement differentiated fiscal policies to promote balanced regional development in Anhui. Specifically, for the northern part of Anhui, the focus should be on enhancing infrastructure and public services to address the region's economic weaknesses. For example, increasing investment in transportation and water conservancy can reduce logistics costs and improve the business environment. Additionally, boosting investment in education and vocational training can enhance human capital and lay the groundwork for industrial upgrading. For the southern part of Anhui, the emphasis should be on technological innovation and industrial upgrading. This can be achieved through special fiscal subsidies and tax incentives to support the development of high-tech industries and modern services, further unlocking economic growth potential. Furthermore, a regional coordination mechanism can be established to encourage the southern part of Anhui to drive the northern part through technology transfer and industrial cooperation, fostering a new pattern of complementary strengths and coordinated development. Through the design of differentiated fiscal policies, the southern part of Anhui can lead the way, while the northern part can catch up, ultimately achieving balanced and high-quality economic development across the province.

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