

The Impact of Government Health Expenditure on Economic Growth

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Abstract

Based on panel data from 31 provinces in China during the period 2009–2024, this paper uses a two-way fixed effects model within the Cobb-Douglas production function framework to study and analyze the impact and transmission mechanism of government health expenditure on economic growth. Empirical results show that: First, government health expenditure has a significant positive effect on economic growth. Second, labor productivity plays a significant mediating role, meaning that health investment transforms improvements in micro-level efficiency into macroeconomic growth by accumulating healthy human capital. Third, the growth effect is moderated by regional medical resource endowment, and differences in per capita medical resources lead to heterogeneity in the marginal output of fiscal investment.

Keywords

government health expenditure, economic growth, labor productivity, per capita medical resources

1. Introduction

In recent years, the scale of China's public health investment has continued to expand. The financial medical and health expenditure has increased from 127.3 billion yuan in 2009 to about 2.2 trillion yuan in 2024, with an average annual growth rate of more than 15%, and the proportion of general public budget expenditure has also steadily increased to more than 7%. From the policy level, since the implementation of the "Healthy China 2030" strategy, the construction of the public health system has been placed in a prominent position. The 2026 Central Budget Report once again clearly states that we should continue to increase investment in public health and promote the equalization of basic medical and health services. However, at the same time, the aging of China's population continues to deepen. The proportion of the elderly population aged 60 and above has exceeded 21%. The rigid growth of medical demand coexists with the pressure of local fiscal income and expenditure, and the phenomenon of "a lot of investment and low efficiency" occurs in some areas. Whether government health expenditure is a simple expenditure on people's livelihood and welfare, or an effective investment that can drive economic growth, has been controversial at the actual level, and needs to be further clarified through empirical research.

From the perspective of academic research, the relationship between government health expenditure and economic growth has always been an important topic of concern in public economics and health economics. Scholars at home and abroad have carried out a lot of research on the impact effect, action path and regional

differences between the two. In general, most studies recognize the positive impact of government health expenditure on economic growth, but there is no unified conclusion in terms of effect intensity, transmission mechanism and constraints. Early studies focused more on the linear relationship between the two. Some authors confirmed the growth effect of health expenditure based on European transnational data [1]; With the improvement of research methods and data, more and more literatures have begun to pay attention to heterogeneous characteristics and endogeneity issues. However, some people pointed out that the systematic discussion of resource endowment, financial capacity and other constraints in existing studies is still insufficient [2]. On the whole, there is still room for further deepening of relevant research.

Based on the above realistic background and the shortcomings of existing research, this paper selects the panel data of 31 provinces in China from 2009 to 2024, and uses the two-way fixed effect model, intermediary effect model and instrumental variable method to systematically examine the impact and mechanism of government health expenditure on economic growth. The marginal contribution of this article is mainly reflected in three aspects: First, in terms of mechanism testing, this article clearly verifies the mediating role of total labor productivity, and clarifies the transmission path of government health expenditure to promote economic growth by improving healthy human capital and improving labor efficiency. At the same time, the robustness test is carried out by replacing core variables and eliminating out-of-group samples to further enhance the persuasiveness of the research conclusions [3]. Second, in the analysis of heterogeneity, group testing is carried out from two new perspectives: fiscal self-sufficiency and per capita medical resource endowment. Revealing the differences in the effects of government health expenditure under different financial capabilities and resource conditions, enriching the discussion of constraints in existing research; Third, in terms of endogenous treatment, this paper adopts the delayed first phase of government health expenditure as an instrumental variable, which has a strong economic significance, which can effectively alleviate the endogenous problems caused by two-way cause and effect and improve the reliability of the estimated results [4];

2. Literature Review

The relationship between government health expenditure and economic growth is a classic topic in the intersection of public economics and health economics. Through relevant research at home and abroad in recent years, it can be found that the literature has evolved through three stages of effect verification, mechanism analysis, heterogeneity and constraint exploration, and a large number of theoretical and empirical results have been accumulated. Early research mainly focuses on the linear causal relationship between the two, and most literatures confirm the positive correlation: Earlier transnational research shows that health expenditure can not only drive economic growth, but also mitigate economic fluctuations [1], Studies on Nigeria have also come to similar conclusions [5], indicating that the effect also exists in low-income countries, not unique to high-income economies. Subsequent studies on developing countries, the Middle East and African countries have further verified the universality of the conclusion [6-9].

At the domestic level, Jiang Ping measured the economic contribution of the government's investment in China's health industry [10], The classic research of Fan Bainai and Zhang Diandian systematically revealed the spatial and temporal heterogeneity law of the economic effect of medical and health financial expenditure in China for the first time [4], Song Yingjie and Cao Hongjie also reached a unanimous conclusion based on the single-provincial research in Shandong Province [11], Lan Xiangjie also added that there is a significant spatial spillover effect on government health expenditure [12]. With the deepening of research, scholars gradually found that the effect is not simple linear, but has obvious threshold characteristics: He Lingxiao and Pan Junyu pointed out that the degree of aging has a regulating effect [13, 14], and the growth effect will weaken or even turn negative after exceeding the critical value; Zhong Xiaomin and Yang Liumei believe that there is an optimal proportional interval between public and private health expenditure [15]; Tao Chunhai and Hu confirmed the existence of double threshold through the panel threshold model respectively [16, 17]. Regarding regional heterogeneity, the academic community has not yet formed a unified conclusion. Some studies believe that the catch-up effect in the western region is more significant [10], while the other points out that the transformation efficiency in the eastern region is higher [4]. Halıcı-Tülüçe's research provides an explanation for this, that the income level is the core factor affecting the effect [18]. Regarding the mechanism of government health expenditure affecting economic growth, existing studies have formed a relatively consistent consensus that it is mainly achieved through the two paths of health human capital accumulation on

the supply side and domestic demand release on the demand side. The health human capital effect on the supply side is the core transmission mechanism: Chen Sixia and Xue Gang analyzed from the perspective of technical efficiency and found that health expenditure has significantly improved the production efficiency and total factor productivity of enterprises by improving the health status of workers and reducing the absenteeism rate due to illness [3]; Zhu Minglai and Hu Qi further pointed out that the medical security system and health expenditure have a synergistic effect, and a perfect medical insurance system can amplify the effect of health capital accumulation [19]; Zhang Yijun revealed the complementary relationship between health and education. He believes that health expenditure can indirectly promote the accumulation of human capital in education and form a virtuous cycle of health promotion education and education feedback growth [20]. Yang and Maitra's transnational research also confirms that healthy human capital is the core driving force of long-term economic growth [21, 22]. The domestic demand release effect on the demand side has received more and more attention in recent years: Wang Yanping's research shows that the increase in health expenditure can reduce the burden of family medical care, reduce the motivation for preventive savings, and thus release the consumption potential [23]; From the perspective of industrial development, Xiao Weize pointed out that health investment can drive the development of biomedicine, health and elderly care and other related industries, and promote the upgrading of industrial structure [24]; In addition, Qian Jiaojiao and Xu Xiali found that increasing investment in rural health can narrow the income gap between urban and rural areas [25, 26], while Jiang Yang believes that financial expenditure on people's livelihood can enhance social stability and create a good external environment for economic development [27].

3. Research Design

3.1 Model Specification

The research design in this paper is based on the classic Cobb-Douglas production function. To examine the relationship between factor inputs and outputs, and in conjunction with the analytical characteristics of panel data, this paper sets the original production function in the following form:

$$Y = A K^{\alpha} L^{\beta} \quad (1)$$

Where Y represents the output level of each province in each year; A represents the overall level of technological progress or total factor productivity; K and L represent physical capital input and labor input, respectively; α and β represent the output elasticity of capital and labor, respectively. Taking the natural logarithm of both sides of the above equation, we obtain the linearized equation:

$$\ln Y = \ln A + \alpha \ln K + \beta \ln L \quad (2)$$

In this empirical study, we argue that total factor productivity ($\ln A$) is not an exogenous constant, but is driven by government health expenditures and a range of macroeconomic factors. According to growth accounting theory, the change in the logarithm of output is approximately equal to the economic growth rate. Based on the above theoretical analysis, the following empirical model is constructed to further explore the effect of government health expenditure on economic growth:

$$\text{Growth}_{it} = \alpha_0 + \beta_1 \text{Health}_{it} + \sum_j \beta_j \text{Control}_{it} + \mu_i + \varphi_t + \varepsilon_{it} \quad (3)$$

Where i and t represent the province and year, respectively; The dependent variable, Growth, represents the actual economic growth rate; Health represents government health expenditure; and Control represents a set of control variables that affect economic growth. The subscripts i and t represent the i -th province in the t -th year; μ_i and φ_t are used to control for regional fixed effects and time fixed effects, respectively; ε_{it} is a random disturbance term.

3.2 Variable Description

3.2.1 Dependent Variable

Economic growth rate (Growth). Economic growth reflects the fruits of the development of social productive forces and the efficiency of economic operations; it is a core indicator for measuring regional development. In academia, there are three primary methods for measuring economic growth and its quality: 1.

using Total Factor Productivity (TFP) as a proxy [2]; 2. Construct a comprehensive evaluation indicator system covering multiple dimensions to measure high-quality development; 3. Directly adopt the dynamic growth rate of total output [4]. Given that this study focuses on examining the direct driving effect of health expenditure on growth, and to enhance the intuitiveness and cross-comparability of the findings, the study adopts the real GDP growth rate as the measure of economic growth, drawing on the research of Fan Bainai and Zhang Diandian [4]. During the actual construction process, this paper uses the GDP deflator to adjust nominal output and converts the figures into an index with a base value of 100, thereby effectively eliminating the distorting effects of price fluctuations on the true scale of output.

3.2.2 Core Explanatory Variable

Government health expenditure (Health). It is a crucial lever for government investment in health capital and a driver of economic growth. The metrics used in the literature primarily include: 1. total health expenditure [2]; 2. per capita health expenditure [12]; and 3. final accounts of government fiscal expenditure on healthcare. Given that government expenditure is policy-oriented and possesses public attributes—thereby serving as a precise reflection of fiscal behavior—this study draws upon the research of Fan Bainai, Zhang Diandian, and Bian Xian Yue to select the final accounts of provincial fiscal expenditure on healthcare as the indicator [4, 15]. To mitigate heteroscedasticity and obtain output elasticity, the natural logarithm was applied, denoted as $\ln\text{Health}$.

3.2.3 Control Variables

Drawing on the research of Fan Bainai, Lan Xiangjie, Bian Xian Yue, and others, this study selects the following set of control variables to capture the effects of other macroeconomic factors and avoid omitted variable bias: 1. Resident income ($\ln\text{Income}$), measured by the natural logarithm of per capita disposable income, reflects the driving effect of regional consumption capacity on growth; 2. Urbanization level (Urban), calculated as the urban population divided by the total population; this reflects the resource optimization effect resulting from population agglomeration. 3. Population growth rate (Pop): reflects dynamic changes in labor supply; calculated as $(\text{total population of the current year} - \text{total population of the previous year}) / \text{total population of the previous year}$. 4. Industrial structure (Ind), measured by the share of value-added from the secondary sector in GDP, reflecting the contribution of the industrialization process; 5. Scale of fiscal expenditure (Fiscal): calculated as general public budget expenditure divided by GDP, this indicator reflects the government's capacity for resource allocation [4, 12, 28].

3.3 Sample and Data Sources

This study selects panel data from 31 provinces in China (excluding Hong Kong, Macao, and Taiwan) for the period 2009–2024 as the research sample. Data on core variables are primarily derived from the CSMAR database and successive editions of the *China Statistical Yearbook*. During the data processing stage, non-independent observations at the national aggregate level were first excluded, and a panel dataset comprising 496 observations was initially constructed. After data cleaning and the exclusion of missing values and outlier samples, the final number of valid observations for the baseline regression was 465. Furthermore, to eliminate the influence of extreme outliers on the results, two-way winsorization at the top and bottom 1% levels was applied to all continuous variables, ensuring the scientific validity and robustness of the empirical findings.

4. Empirical Analysis

4.1 Descriptive Statistics

Table 1 is the descriptive statistical results of the main variables. The average economic growth rate is 7.971, the median is 7.8, and the distribution is right-skewed, which means that the economic growth rate of most provinces is concentrated in about 7.8%, but a few high-growth provinces have raised the overall average; The minimum value is 0.2, the maximum value is 16.4, and the standard deviation is 3.463, indicating that there is a large gap in the growth rate of different provinces. The average value of government health expenditure is 14.978, the median is 15.077, and the distribution is left-skewed, which shows that the level of government health expenditure in most provinces is around 15.077, but some low-input provinces have

lowered the overall average, with a minimum value of 12.691, a maximum value of 16.605, and a standard deviation of 0.821, reflecting the regional imbalance in China's public health financial input.

Table 1: Descriptive Statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Median	Maximum
Growth	496	7.971	3.463	0.2	7.800	16.4
Health	496	14.978	0.821	12.691	15.077	16.605
Urban	472	0.58	0.136	0.238	0.570	0.893
Pop	471	3.874	3.69	-5.41	4.200	11.05
Income	496	10.008	0.519	8.878	10.048	11.285
Ind	496	0.422	0.089	0.162	0.428	0.573
Fiscal	496	0.273	0.197	0.107	0.222	1.289

4.2 Baseline Regression Results

Table 2 reports the results of the baseline regression. Column (1) is a group of uncontrolled variables, and column (2) is a group of controlled variables. Before and after controlling the relevant variables, government health expenditure (ln Health) significantly promotes economic growth. In the full specification, its coefficient is 1.678 and is significant at the 5% level, which means that when other variables remain unchanged, the economic growth rate increases by about 0.017 units for every 1% increase in health expenditure. From an economic perspective, the government's increased investment in health can not only improve the "productive effect" of human capital accumulation by improving the quality of the people, but also release the "demand effect" of residents' consumption potential by alleviating the worries of medical care.

Table 2: Baseline Regression Results

	(1)	(2)
Variables	Growth	Growth
Health	1.862***	1.678**
	(0.699)	(0.796)
Constant	-19.922*	27.973
	(10.457)	(31.077)
Control Variables	No	Yes
Province Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
N	496	465
R ²	0.856	0.868

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors clustered at the provincial level are reported in parentheses. The same applies to the following tables.

4.3 Mechanism Analysis

Table 3 shows the test results of the transmission mechanism of government health expenditure affecting the quality of economic growth.

Table 3: Mechanism Analysis

	(1)	(2)
Variables	Labor_prod	Growth
Health	5.604***	2.020*
	(1.500)	(1.060)
Labor_prod		0.077***
		(0.021)
Constant	201.830***	27.090
	(70.290)	(33.532)
Control Variables	Yes	Yes
Province Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
N	345	345
R ²	0.847	0.883

Referring to Cai Fang's research, this paper selects total labor productivity as a mediating variable to test the path of public health input to economic growth by improving the health status of workers [29]. The regression results show that the coefficient of government health expenditure on the labor productivity is significantly positive at the level of 1%, indicating that increasing public health investment can effectively improve the health status of workers, accumulate healthy human capital, and improve the efficiency of unit labor output. This efficiency advantage ultimately drives macroeconomic growth, which proves that government health expenditure can promote the improvement of the quality of economic growth through this transmission path. It also shows that public health investment is not just people's livelihood welfare expenditure, but also productive expenditure that can optimize the quality of labor factors and inject a stable source of endogenous growth into the economy.

4.4 Heterogeneity Analysis

1. The heterogeneity of the level of economic development. This article refers to the study of Bian Xian Yue, and divides the sample into high and low-income groups based on the median of per capita disposable income in each province [28]. High-income areas tend to have more mature industrial structures and market mechanisms, while low-income areas are mostly in the process of factor-driven industrialization. Table 4 shows that the health expenditure coefficient of the high-income group is significant at the level of 1%, while the results of the low-income group are not significant. This shows that the growth effect of health expenditure has "threshold characteristics". The perfect public support and high health base of high-income areas enable new health inputs to be converted into labor productivity more efficiently, while low-income areas are subject to resource conversion efficiency, and dividends have not been fully manifested.

Table 4: Heterogeneity Analysis: Income Level

	(1)	(2)
	High-Income Regions	Low-Income Regions
Variables	Growth	Growth
Health	3.277***	-1.031
	(1.046)	(1.517)
Constant	103.831**	28.668
	(43.387)	(42.624)
Control Variables	Yes	Yes
Province Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
N	224	240
R ²	0.885	0.885

2. Heterogeneity by Fiscal Self-Sufficiency. This article draws on the practice of Zhong Xiaomin and Bai Bailan. This article divides the samples into high and low financial groups according to the median financial self-sufficiency to examine the impact of local financial autonomy on the effect of policy implementation [15, 30]. Groups with high financial resources have stronger budget autonomy and resource scheduling ability, while groups with low financial resources often rely on central transfer payments. The results of Table 5 show that the coefficient of the high financial group is highly significant, while the low financial group is not significant. The reason is that areas with strong financial self-sustenance can more accurately allocate funds according to the characteristics of local actual patients and public health needs, so as to exert a stronger economic growth-driven effect. In contrast, the spillover effect of health investment in low-financial areas is relatively weak due to the limited use of funds.

Table 5: Heterogeneity Analysis: Fiscal Self-Sufficiency

	(1)	(2)
	High Fiscal Self-Sufficiency	Low Fiscal Self-Sufficiency
Variables	Growth	Growth
Health	2.578***	-0.473
	(0.951)	(1.640)
Constant	49.134	-24.036
	(44.127)	(44.699)
Control Variables	Yes	Yes
Province Fixed Effects	Yes	Yes

Year Fixed Effects	Yes	Yes
N	224	238
R ²	0.870	0.893

3. The heterogeneity of medical resource endowment. This article refers to the concern of Tang Lina, Huang Ni and Yu Jianxing with healthcare accessibility. This article selects the “number of primary medical institutions per 10,000 people” as the resource endowment indicator, and divides them into resource-rich groups and resource-scarce groups according to the median [2, 31]. The resource-rich group has a denser primary medical network and a smaller service radius. The results of Table 6 show that the regression coefficient of the resource-rich group is significant, while the resource-poor group is not significant. This shows that the density of medical resources plays a “multiplier effect”. In areas with dense grass-roots networks, government health expenditure can more quickly cover potential patients and improve the level of health human capital of the whole society, thus driving the expansion of output. In resource-scarce areas, the marginal driving efficiency of input is low due to the large coverage radius.

Table 6: Heterogeneity Analysis: Per Capita Medical Resources

	(1)	(2)
	High Per Capita Medical Resources	Low Per Capita Medical Resources
Variables	Growth	Growth
Health	2.202**	-0.147
	(0.880)	(1.853)
Constant	-30.417	-5.285
	(50.844)	(50.720)
Control Variables	Yes	Yes
Province Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
N	223	238
R ²	0.854	0.905

4.5 Instrumental Variable Analysis

Table 7 reports the regression results of instrumental variables. Drawing on the practice of scholars such as Fan Bainai and Zhang Diandian, this article adopts the one-period lagged health expenditure (L_Health) as a instrumental variable, aiming to alleviate the potential two-way causal endogenous nature [4]. This indicator is highly related to the current input in economic logic and satisfies the exclusion restriction as a predetermined variable. The empirical results show that the instrumental variables in the first stage are significantly positive at the 1% level and pass the weak instrumental variable test, which proves the validity of the selection; The estimated coefficient of the core explanatory variable in the second stage is significantly positive at the 5% level, and the regression direction is consistent with the benchmark results. This shows that after overcoming endogeneity bias, the role of government health expenditure on economic growth is still stable.

Table 7: Instrumental Variable Regression Results

	(1)	(2)
	First Stage	Second Stage
Variables	Health	Growth
L-Health	0.671***	
	(0.049)	
Health		3.550***
		(1.203)
Control Variables	Yes	Yes
Province Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
N	434	434
F		190.3

4.6 Robustness Tests

Table 8 reports the robustness test results and verifies the reliability of the conclusion from multiple dimensions. First, this article refers to the research of Fan Bainai and Zhang Diandian, and replaces the original

total amount indicator with pHealth per capita government health expenditure [4]. The regression coefficient is significantly positive at the level of 5%, which proves that the growth effect of health expenditure still exists after changing the measurement dimension; Second, drawing on the mainstream economic growth literature, the explanatory variable is replaced with the regional gross domestic product logarithm (ln GDP) to measure the scale of output. The results show that health expenditure has a significant positive driving effect on the output level; Third, considering the potential interference of special samples, the core variable coefficient is still significantly positive by eliminating Tibet and other sub-sample regression. In summary, the results of many robustness tests are highly consistent with the baseline regression, which fully proves the robustness of the research conclusions of this article.

Table 8: Robustness Tests

	(1)	(2)	(3)
	Alternative Explanatory Variable	Alternative Dependent Variable	Subsample Regression
Variables	Growth	ln GDP	Growth
Health		0.328***	1.801**
		(0.036)	(0.811)
pHealth	1.691*		
	(0.899)		
Constant	30.468	-1.859	34.318
	(30.030)	(1.939)	(31.218)
Control Variables	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
N	465	465	435
R ²	0.867	0.997	0.866

5. Conclusions and Policy Implications

5.1 Research Conclusions

Based on panel data from 31 provinces in China from 2009 to 2024, this study found that government health expenditure significantly drove economic growth. Mechanism analysis shows that health expenditures mainly drive output through two paths: improving the quality of human capital and unleashing residents' consumption potential. Even after employing instrumental variables to mitigate endogeneity and performing a series of robustness checks, such as replacing variables and removing subsamples, the core conclusions remain solid. Furthermore, this effect exhibits significant heterogeneity, being more pronounced in regions with higher income levels, stronger fiscal self-sufficiency, and denser medical resources, demonstrating resource dependence and threshold effects. The findings confirm that continuously optimizing the structure of health investment is a key support for achieving high-quality regional growth.

5.2 Policy Implications

Based on the findings of this study, the following suggestions are made to better leverage the role of Government Health Expenditure in driving economic growth: Public health investment should be clearly defined as an important component of productive fiscal expenditure, and a stable growth mechanism should be established that is commensurate with the level of local economic development and fiscal capacity. To avoid the bias of “emphasizing infrastructure construction while neglecting people's livelihood,” we must ensure a continuous and stable supply of health funds so that the accumulation of health human capital can be continuously transformed into a driving force for economic growth. We must optimize the regional allocation structure of health resources and increase financial support for underdeveloped areas in the central and western regions, rural areas, and remote areas. Not only should we invest funds in building medical institutions and updating medical equipment, but we should also address the shortage of medical personnel at the grassroots level, break down the growth barriers caused by resource endowment, and enable different regions to enjoy the development dividends brought about by health investment. We must simultaneously advance the reform of the medical security system, effectively reducing residents' personal medical burden, lowering households' precautionary savings motives, and unleashing residents' consumption potential by increasing the

reimbursement ratio and expanding the coverage. At the same time, relying on public health investment to drive the development of related industries such as biomedicine and elderly care, forming a virtuous cycle of health improvement, efficiency enhancement, consumption growth and industrial upgrading.

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Conflicts of Interest

The authors declare no conflict of interest.

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