

Impact of Medical and Health Expenditure on Local Government Debt: Evidence from China

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Abstract

This article aims to explore the impact mechanism, multidimensional effects, and heterogeneity characteristics of medical and health expenditure on local government debt in China. Following the methodology of quantitative research, China's provincial regions are selected as the research objects, and the balanced panel data of 31 provincial regions in China from 2016 to 2022 are used as the research materials. The two-way fixed effects model is used to analyze the proposed problems. The empirical findings are as follows. (1) During the observed development period, medical and health expenditure has a significant promoting effect on local government debt in China. (2) The impact of medical and health expenditure on local government debt in China exhibits significant regional heterogeneity, with a negative effect in developed areas such as the eastern region and a positive effect in underdeveloped areas such as the central, western, and northeastern regions of China. (3) The total dependency ratio and medical and health service capacity have a positive moderating effect on the impact of medical and health expenditure on local government debt in China. The improvement of the total dependency ratio and medical and health service capacity will exacerbate the local government debt pressure in China caused by medical and health expenditure. This research provides specific policy implications for balancing medical and health expenditure with local government debt management and promoting the sustainable development of the local economy and society.

1. Introduction

The causes of changes in local government debt could be analyzed as a heated issue. From existing experience, local government debt is closely related to factors such as economic level, regional differences, and development pattern, and the formation of local government debt in China is closely related to fiscal decentralization (Wang et al., 2023). The implementation of the above fiscal system has led to a mismatch between local governments' fiscal revenue and expenditure responsibilities. Although local governments bear the significant responsibility for the expenditure of public services, their sources of fiscal revenue are limited and difficult to fully cover the necessary expenditure (Li and Qi, 2023). This mismatched situation leads to local governments having to borrow to make up for the funding gap, especially in cases of prominent fiscal revenue and expenditure contradictions, where the demand and space for borrowing are more significant (Cao et al., 2023; Huo et al., 2023). Due to its large scale and fast growth rate,

local government debt in China has attracted much attention from relevant research. From 2016 to 2022, the local government debt in China increased from 15.3558 trillion yuan to 35.0653 trillion yuan, with a growth rate rising from 4.06% in 2016 to 15.08% in 2022, showing an overall upward trend. Facing the status of local government debt mentioned above, it is important to timely analyze the important factors that affect local government debt and combine them with China's development reality to figure out inner correlation effects and mechanisms.

Against the background of the expansion of local government debt in China, medical and health expenditure is also significantly increasing. Based on the current economic and demographic situation, there is a certain correlation mechanism between medical and health expenditure and local government debt. On the one hand, the increase in local medical and health expenditure can fully meet the welfare demands of the population represented by medical and health needs, thereby promoting the healthy operation of the social economy. On the other hand, the cyclical fluctuations in economic development lead to increased uncertainty in fiscal revenue, and the continuous growth of medical and health needs puts enormous pressure on government expenditure in this field, posing a great challenge to the design of local fiscal expenditure structure. To address this challenge, local governments may borrow to cope with the structural changes brought about by the increase in related expenditures. When local governments face funding gaps while assuming responsibility for medical and health expenditure, they can only support the construction and operation of related medical and health projects through borrowing. In addition to borrowing within the budget, local governments have also formed a large amount of implicit debt through financing platforms and other forms. Although these debts are not included in budget management, the ultimate debt repayment responsibility still lies with the local government, objectively increasing the government's debt burden and default risk (Fu et al., 2022; Wen et al., 2024). It can be seen that although the borrowing behavior of local governments in medical and health expenditures is a response to funding shortages, the long-term reliance on debt models not only increases the fiscal burden of local governments, but also poses a potential threat to the sustainable development of medical and health services, which urgently needs reform and regulation.

Therefore, it is crucial to study the impact of medical and health expenditure on local government debt in China. Only by analyzing the relationship between them can we effectively coordinate medical and health expenditure with government debt management strategies, thereby achieving stable and sustainable development of local fiscal status. This not only helps to improve the quality of local government public services and promote the implementation of the Healthy China strategy (Sun and Yu, 2023), but also promotes high-quality economic development (Wang, 2023).

The marginal contribution of this study is mainly reflected in the following three aspects. Firstly, it enriches the research perspective on the causes of local government debt and emphasizes the important role of local medical and health expenditure in the expansion of local government debt. Secondly, it reveals the regional heterogeneity of the impact of medical and health expenditure on local government debt, expanding the depth and breadth of related research. Thirdly, the moderating effects of the total dependency ratio and medical and health service capacity on the exploring impact of medical and health expenditure on local government debt, revealing the complexity of the influence mechanism.

2. Influence Mechanism and Research Hypotheses

2.1 Direct Influence

The specific influence mechanism of the increase in medical and health expenditure leading to the expansion of local government debt is comprehensive and complex. Firstly, from the perspective of fiscal revenue, an increase in medical and health expenditure will directly increase the burden of local government debt. On the one hand, the increase in medical and health expenditure may squeeze investments in infrastructure construction, education, and other areas that often bring greater economic benefits and fiscal revenue. When medical and health expenditure is too high, the fiscal revenue of local governments will fluctuate, and the situation where revenue cannot cover expenses will lead to an increase in the demand for borrowing (Joseph et al., 2024; Leach et al., 2020; Coccia and Benati, 2024). On the other hand, the increase in medical and health expenditure may also enhance the effectiveness of tax reduction policies in local government to attract more medical resources and talents. Although these tax reduction policies are beneficial to the development of the medical and health industry, they will also reduce the fiscal revenue of local government, thereby increasing the burden of local government. Secondly, from the perspective of debt structure and financing costs, the increase in medical and health expenditure will also expand the scale of local government debt. In order to raise more funds for medical and health expenditure, local governments may choose to issue more bonds or borrow from banks. Although these financing methods can temporarily alleviate financial pressure, they may also lead to the complexity of local government debt structure and increase debt risk (Lone and Lone, 2022). Meanwhile, the increase in medical and health expenditure may lead to a decrease in the credit rating of local government, thereby increasing financing costs, which may also encourage local government to rely more on debt financing to raise funds (Said and Morai, 2020). Thirdly, from the perspective of the fiscal sustainability and debt repayment ability of local governments, an increase in medical and health expenditure will expand the scale of local government debt. When the increase in medical and health expenditure exceeds a moderate level, the fiscal sustainability of local governments may be threatened (Christopoulos and Eleftheriou, 2020), leading to a decrease in debt repayment ability, which may raise investors' concerns about local government debt and thus increase the cost of debt financing. In order to maintain fiscal stability and debt repayment capacity, local governments may have to continue increasing their debt levels, thus falling into a vicious cycle (Yu et al., 2024; Zheng et al., 2020; Zhu et al., 2024).

H1: Medical and health expenditure has a positive impact on local government debt.

2.2 Regional Heterogeneity

There are significant differences in economic development level, distribution, and allocation efficiency of medical and health resources among regions in China (Yao et al., 2023; Zhao and Cai, 2024; Wang et al., 2024), which may lead to regional heterogeneity in the impact of medical and health expenditure on local government debt. Previous studies have shown that there are significant regional differences in the allocation of basic medical and health resources in China (Liu et al., 2024), and developed regions typically have higher fiscal revenue and more abundant medical and health resources, resulting in a relatively smaller impact of their medical and health expenditure on debt (Yang et al., 2022). For example, in the eastern coastal areas, due to their rapid economic development, local governments have relatively higher fiscal revenue and better conditions to cope with the growth of medical and health expenditure (Chen and Jin, 2022). Therefore, the impact of medical and health expenditure on local government debt in these areas is relatively limited (Tian et al., 2024). In underdeveloped areas represented by the western regions, efforts must still be made to meet the growing demand for medical and health services under the pressure of local social development goals and performance evaluation of relevant

personnel (Wang, 2024), resulting in higher government health investment although economic and social resources are relatively scarce and the level of economic development is relatively low. The solution to the funding gap is keeping debt financing under the background of fiscal decentralization. Developed regions often benefit from sufficient fiscal revenue, higher efficiency in medical and health expenditure, and less debt pressure, while underdeveloped regions rely on debt financing to meet medical and health needs due to resource scarcity.

H2: There is regional heterogeneity in the impact of medical and health expenditure on local government debt.

2.3 Moderating Effect

Firstly, the total dependency ratio has a certain moderating effect on the impact of medical and health expenditure on local government debt. Existing empirical evidence suggests that, on the one hand, a higher total dependency ratio means more social security and medical and health needs, leading to increased fiscal pressure, and the government may increase debt financing to meet expenditure needs (Kamiguchi and Tamai, 2019; Pan and Wang, 2012; Yang et al., 2022). At the same time, a higher dependency ratio may prompt the government to optimize resource allocation, improve the efficiency of fiscal expenditure through transfer payments and other means, thereby alleviating local government debt burden to a certain extent and maintaining sustainable government debt. Looking at the development reality of China, with the increase of the total dependency ratio, the corresponding demand for medical and health services is also constantly increasing, and it is an observable fact that local governments are continuously increasing their expenditures in the field of medical and health. These expenditures include multiple aspects, such as the purchase of medical equipment, the provision of medical and health services, and salaries for medical personnel (Lone et al., 2021). At present, although the fiscal revenue of local governments remains at a relatively high level, the corresponding funding gap is gradually increasing, which to some extent requires local governments to expand their debt to respond to corresponding medical and health demands.

Secondly, the medical and health service capacity also plays a certain moderating role in the impact of medical and health expenditure on local government debt. Existing empirical evidence shows that there is a certain positive correlation between medical and health service capacity and the efficiency and quality of medical and health services, and the improvement of the efficiency and quality of medical and health services can often effectively reduce the overall cost of medical and health services, thereby alleviating the financial pressure of local governments (Pilgrimienė, 2012; Ye and Tao, 2023). The current situation in China is that there are many obstacles in the construction of the medical and health service system. There is a certain disconnect between the improvement of medical and health service capacity and the improvement of medical and health service efficiency and quality. The correlation between the improvement of medical and health service capacity and the increase in medical and health expenditure is often closer. Therefore, the improvement of medical and health service capacity often leads to an increase in medical and health expenditure, resulting in an increase in local government debt.

H3: The total dependency ratio and medical and health service capacity play a positive moderating role in the impact of medical and health expenditure on local government debt.

Overall, the mechanism elucidation and related research results provide detailed support for the influence mechanism elucidation of this study. Next, empirical research will be conducted to verify the above hypotheses, thus forming a systematic understanding of the impact and differences of medical and health expenditure on local government debt.

3. Method

3.1 Model Setting

Based on previous literature (Wang et al., 2024), this study uses a two-way fixed effects model to explore the impact of medical and health expenditure on local government debt and constructs the following baseline regression model.

$$Debt_{it} = \alpha + \beta MHE_{it} + \rho_{it} Controls_{it} + \mu_i + \delta_t + \varepsilon_{it} \quad (1)$$

Among them, i represents province and t represents year. $Debt_{it}$ is the dependent variable that represents the i province's proportion of government debt on GDP for the i province in the t year. MHE_{it} is the independent variable that represents the proportion of i province's medical and health expenditure to GDP in the t year. $Controls_{it}$ represents the set of variables that need to be controlled. α represents the constant term, β represents the coefficient of the independent variable, and ρ_{it} represents the coefficient of the control variable. In addition, μ_i represents province fixed effects, δ_t represents time fixed effects, and ε_{it} represents random perturbation terms.

Based on theoretical assumptions, this study believes that economic and demographic indicators such as medical and health service capacity and the total dependency ratio will have a certain moderating effect on the impact of medical and health expenditure on local government debt. Therefore, this study further constructs the following model.

$$Debt_{it} = \beta_0 + \beta_1 MHE_{it} + \beta_2 MED_{it} + \beta_3 MHE_{it} * MED_{it} + \beta_{it} Controls_{it} + \mu_i + \delta_t + \varepsilon_{it} \quad (2)$$

Among them, i represents province and t represents year. $Debt_{it}$ is the dependent variable that represents the i province's proportion of government debt on GDP for the i province in the t year. MHE_{it} is the independent variable that represents the proportion of i province's medical and health expenditure to GDP in the t year. MED_{it} is the moderating variable that represents the total dependency ratio and medical and health service capacity of i province in the t year. $MHE_{it} * MED_{it}$ represents the product of the moderating variables and the independent variable. $Controls_{it}$ represents the set of variables that need to be controlled. β_0 represents the constant term, β_1 represents the coefficient of the independent variable, β_2 represents the coefficient of the moderating variables, β_3 represents the coefficient of the interaction term between the moderating variables and the independent variables, and β_{it} represents the coefficient of the control variable. In addition, μ_i represents province fixed effects, δ_t represents time fixed effects, and ε_{it} represents random perturbation terms.

3.2 Variable Selection

3.2.1 Dependent Variable

The dependent variable of this study is local government debt, which is measured by the proportion of local government debt balance to GDP. This indicator shows the total amount of debt accumulated by local governments over a certain period and reflects their financial situation and debt repayment capacity. In addition, starting from the comprehensiveness of the research design, this study also selected the proportion of local government general debt balance to GDP ($NDebt$) and local government debt balance ($LDebt$) as replacement variables for robustness testing, in order to ensure the reliability of the empirical results of this study.

3.2.2 Independent Variable

The independent variable of this study is local medical and health expenditure, using the proportion of local medical and health expenditure to GDP (MHE) as the measurement indicator. This indicator can reflect the investment of local governments in the field of medical and health. In theory, the higher the medical and health expenditure, the greater the fiscal pressure on local governments, and the corresponding borrowing demand will also increase to a certain extent, thereby expanding local government debt. In addition, starting from the comprehensiveness of the research design, this study used the local medical and health expenditure scale ($MHES$) as a

replacement variable for robustness testing, and the relevant data have been logarithmically processed.

3.2.3 Control Variable

In addition to medical and health expenditure, there are other factors that can have an impact on local government debt and need to be controlled. Based on theoretical analysis and previous research, this study intends to select the following influencing factors to be included in the control variables (*Controls*).

Fiscal support effectiveness (*Fiscal*). This study uses the growth rate of local fiscal expenditure as a measurement indicator to reflect the variation of local fiscal expenditure. This indicator can better reflect the trend of changes in local fiscal expenditure. In theory, the higher the local fiscal expenditure, the stronger the fiscal revenue capacity, the less dependence on local government debt, and the corresponding scale of government debt will decrease.

Macro investment in education (*Education*). This study uses the proportion of local education expenditure to GDP as a measurement indicator to reflect the investment of local governments in education. This indicator can reflect the degree to which local governments attach importance to the development of education. In theory, good education can optimize the comprehensive quality of the population, help local economic development, and create favorable conditions for reducing the debt burden of local governments.

Industry structure status (*Industry*). This study uses the proportion of the output value of the tertiary industry to GDP as a measurement indicator, reflecting the local economic structure and the development level of the service industry. This indicator is usually closely related to local fiscal revenue. In theory, optimizing the industrial structure can effectively alleviate the debt burden of local governments.

Infrastructure investment (*Infrastructure*). This study uses the total amount of fixed assets investment as a measurement indicator and conducts logarithmic processing. This indicator reflects the local infrastructure construction and economic investment situation. In theory, good infrastructure can improve service efficiency and fully attract investment, thereby increasing local fiscal revenue and reducing borrowing demand. Meanwhile, excessive infrastructure investment may lead to an increase in local government debt.

Accessibility of public health resources (*Resource*). This study uses the number of people covered by health checkups as a measurement indicator and performs logarithmic processing. This indicator can reflect the effectiveness of the region's population in obtaining the necessary public health services. In theory, the popularity of health checkups is linked to the efficiency of medical and health expenditure, which in turn affects the level of government debt.

3.2.4 Moderating Variable

The aging level of China's population is constantly improving, and the population structure has undergone changes that cannot be ignored. This study used the total dependency ratio (*Tdr*) as the moderating variable. This indicator reflects the dependency burden borne by the working-age population and can better evaluate the role of demographic changes in the impact of medical and health expenditure on local government debt.

At the same time, it is imperative to actively address the construction of an aging social system and resource allocation. This study used the number of hospital beds per 10000 people (*Mib*) as the moderating variable. This indicator reflects the level of medical and health service capacity in the regions, as well as the ability to respond to public health emergencies. The relevant data have been logarithmically processed.

3.3 Data Sources

The observation sample of this study is 31 provincial-level regions in China, and the research period is from 2016 to 2022. The dependent variable data are sourced from the Chinese Ministry of Finance, while the relevant data for the independent variable, control variables, and moderating variables are sourced from the National Bureau of Statistics of China, the China Statistical Yearbook, and provincial statistical yearbooks. The above data sources are all official data, with strong data continuity, consistent statistical caliber, and sufficient authority.

4. Empirical results

4.1 Descriptive Results

As shown in Table 1, there is a significant difference between medical and health expenditure and local government debt in China, which provides strong supporting materials for the development of research. In addition, to eliminate the estimation bias caused by multicollinearity, this study used the variance inflation factor (VIF) to test the linear correlation between variables. The results showed that the VIF values of all variables were less than 10, which basically ruled out the influence of multicollinearity, indicating the reliability of the regression results.

Table 1. Descriptive results

Variable Type	Variable	Mean	S.D	Min	Max
Dependent Variable	<i>Debt/%</i>	29.523	14.703	4.945	84.012
	<i>NDebt/%</i>	17.338	11.347	4.689	64.140
	<i>LDebt/logarithmization</i>	8.643	0.864	4.060	10.043
Independent Variable	<i>MHE/%</i>	2.325	1.239	0.910	8.830
	<i>MHES/logarithmization</i>	6.113	0.665	4.248	7.641
Control Variable	<i>Fiscal/%</i>	5.884	5.938	-13.410	27.92
	<i>Education/%</i>	4.323	2.347	2.130	16.840
	<i>Industry/%</i>	51.848	8.046	39.560	83.900
	<i>Infrastructure/logarithmization</i>	9.694	0.915	7.361	11.083
	<i>Resource/logarithmization</i>	6.962	0.880	4.957	9.047
Moderating Variable	<i>Tdr/%</i>	41.523	6.875	26.900	57.790
	<i>Mib/logarithmization</i>	4.113	0.161	3.741	4.435

4.2 Baseline Regression Results

The Hausman test results indicate that this study is suitable for analyzing fixed effects models. As shown in the baseline regression regression results of Table 2, the stepwise regression results of models (1) - (6) indicate that the significance of the impact coefficient of medical and health expenditure on local government debt remains at the 5% level or below, and the positive impact effect shows a sustained and robust characteristic. H1 is effectively supported by the data results. The above results indicate that, in the observed stage of development in China, the larger the local medical and health expenditure, the relatively higher the local government debt. The socio-economic reality reflected by the above baseline regression results is that with the change of China's population structure, local governments must meet the growing regional population's

health needs by increasing medical and health expenditure. However, it is often insufficient to rely solely on medical and health expenditure. Therefore, local governments may use more debt financing to fill the gap in meeting public health needs. This behavior will lead to the expansion of local government debt and increase fiscal pressure, thus affecting the government's fiscal stability. From a longer-term perspective of social development, the continuous expansion of government debt scale will have an undeniable impact on the sustainability of local economies. Therefore, optimizing the structure of medical and health expenditure and improving the efficiency of fund utilization at the current stage will help reduce fiscal risks for local governments while ensuring public health. The above analysis also suggests that relevant parties should pay attention to the sensitivity and diffusion effect of changes in medical and health expenditure on local fiscal development.

Table 2. Baseline regression results

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Debt</i>	2.225** (0.023)	2.811*** (0.006)	4.386*** (0.000)	4.040*** (0.000)	4.023*** (0.000)	4.067*** (0.000)
<i>Fiscal</i>		-0.104* (0.080)	-0.102* (0.078)	-0.105* (0.069)	-0.071 (0.226)	-0.098* (0.085)
<i>Education</i>			-3.191*** (0.001)	-2.558** (0.013)	-3.029*** (0.003)	-2.836*** (0.004)
<i>Infrastructure</i>				-4.270* (0.067)	-4.790** (0.038)	-4.368* (0.051)
<i>Industry</i>					0.316*** (0.010)	0.323*** (0.006)
<i>Resource</i>						-8.002*** (0.000)
<i>Cons</i>	9.387*** (0.000)	9.020*** (0.000)	17.494*** (0.000)	53.887*** (0.008)	35.025* (0.098)	83.739*** (0.001)
Time Effect	Yes	Yes	Yes	Yes	Yes	Yes
Province Effect	Yes	Yes	Yes	Yes	Yes	Yes
N	217	217	217	217	217	217
Adj- R^2	0.533	0.539	0.563	0.568	0.582	0.609

Notes: p-values in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, the below as same.

4.3 Robustness Test

Considering the possibility of randomness in the results of the baseline regression, this study conducts robustness tests on the baseline regression results from multiple perspectives. As shown in Table 3, firstly, replace the original dependent variable with the proportion of local government general debt balance to GDP (*NDebt*). The results of column (1) are consistent with the baseline regression results, indicating that the positive impact of medical and health expenditure on local government debt is robust. Secondly, replacing the original independent variable with local government medical and health expenditure (*MHES*) and replacing the dependent variable with local government debt balance (*LDebt*) is to explain the changes in specific numerical values. The results of column (2) are consistent with the baseline regression results, indicating that the positive impact of medical and health expenditure on local government debt is very robust. Thirdly, due to various factors such as history and geographical environment, the social and economic development level of each ethnic autonomous region is relatively backward, and medical and health services are also relatively lagging behind. At the same time, the central

government has different preferential support policies for various ethnic autonomous regions. Therefore, considering the particularity of ethnic autonomous regions, this study excludes relevant data from the sample and conducts regression analysis. The results of column (3) are consistent with the baseline regression results, indicating further evidence supporting the positive impact of medical and health expenditure on local government debt.

Table 3. Robustness test results

	(1) <i>NDebt</i>	(2) <i>LDebt</i>	(3) <i>Debt</i>
<i>MHE</i>	3.650*** (0.000)		6.476*** (0.000)
<i>MHES</i>		0.316*** (0.003)	
<i>Fiscal</i>	-0.045 (0.135)	-0.002 (0.286)	-0.205** (0.018)
<i>Education</i>	-2.383*** (0.000)	-0.081** (0.021)	-2.705** (0.023)
<i>Industry</i>	0.096 (0.126)	0.006 (0.170)	0.281** (0.034)
<i>Infrastructure</i>	-2.673** (0.025)	-0.009 (0.912)	-3.574 (0.152)
<i>Resource</i>	-2.909** (0.014)	-0.190** (0.026)	-12.440*** (0.001)
<i>Cons</i>	44.555*** (0.001)	7.458*** (0.000)	119.119*** (0.000)
Time Effect	Yes	Yes	Yes
Province Effect	Yes	Yes	Yes
N	217	217	147
Adj- <i>R</i> ²	0.159	0.848	0.614

4.4 Heterogeneity Analysis

The basic conditions of geographical space, resource endowment, and other aspects determine the significant regional differences in China. In the constantly evolving process of modernization, the eastern, central, western, and northeastern regions of China show significant differences in economic development and other aspects. Therefore, it can be inferred that there may also be certain differences in the level and internal impact effects of medical and health expenditure and local government debt. Therefore, based on the design of previous studies (Wang et al., 2025), this study divides China into the eastern region, central region, western region, and northeastern region, and analyzes the heterogeneous impact of medical and health expenditure on local government debt. The relevant regression results are shown in Table 4.

As shown in Table 4, the overall impact of medical and health expenditure on the local government debt is significant at the 1% level. By comparing the impact coefficients of columns (1) - (4), it can be found that the impact coefficient of medical and health expenditure on local government debt in the eastern regions is negative, while this impact coefficient is positive in the central, western, and northeastern regions. H2 is effectively supported by the data results. The reason for the above situation may be that the economic level in the eastern regions is relatively high, and the medical and health system is more complete. The increase in medical and health expenditure can fully meet the health needs of the regional population, improve the quality and

efficiency of medical and health services, thereby reducing unnecessary expenditure, reducing the probability of local government borrowing behavior, and ultimately alleviating the debt pressure on local governments. In addition, the impact coefficient of medical and health expenditure on local government debt in the northeastern regions is particularly prominent. One possible reason is that during the process of economic transformation, the growth of fiscal revenue in Northeastern regions has been relatively slow or even decreased, but the demand for public services such as medical and health is still high. Relying solely on medical and health expenditure cannot fully meet the health needs of the population. The funding gap for public medical and health needs ought to be filled by the government through borrowing, thereby further increasing the debt burden of local governments in the northeastern regions.

Table 4. Heterogeneity regression results

	(1) East	(2) Middle	(3) West	(4) Northeast
<i>Debt</i>	-3.542** (0.028)	3.212** (0.044)	5.834*** (0.001)	16.331*** (0.010)
<i>Fiscal</i>	0.017 (0.818)	-0.049 (0.497)	-0.263** (0.026)	-0.228 (0.399)
<i>Education</i>	-4.040* (0.081)	-2.671 (0.164)	-1.657 (0.270)	-32.695*** (0.000)
<i>Industry</i>	0.770*** (0.009)	0.313*** (0.000)	0.229 (0.340)	0.831 (0.219)
<i>Infrastructure</i>	-8.270 (0.104)	-0.955 (0.560)	-3.897 (0.275)	19.122 (0.620)
<i>Resource</i>	-4.061* (0.060)	-5.983*** (0.005)	-20.534*** (0.001)	24.899 (0.498)
<i>Cons</i>	71.304 (0.177)	0.000 (-)	0.000 (-)	0.000 (-)
Time Effect	Yes	Yes	Yes	Yes
Province Effect	Yes	Yes	Yes	Yes

4.5 Moderating Effect

In the macroeconomic environment, the influence between factors is often regulated by relevant factors. Therefore, it is necessary to conduct empirical analysis on the moderating effects of relevant factors after theoretical analysis. The results of the moderating effects are shown in Table 5. As shown in Table 5, the results of columns (1) - (2) indicate that the interaction terms between the total dependency ratio and medical and health expenditure, as well as the interaction terms between medical and health service capacity and medical and health expenditure, have passed the 1% significance level test. The total dependency ratio and medical and health service capacity have a positive moderating effect on the impact of medical and health expenditure on local government debt, and H3 is effectively supported by the data results. The socio-economic reality reflected by the above results is that, on the one hand, the effectiveness of current measures and strategies to address demographic changes is not yet evident enough. According to the theoretical framework, a larger population burden requires more medical and health expenditure to support it, thereby increasing the scale of government debt. The current situation is that changes in population structure and increased burden of population support are not a problem, but the lack of fiscal policies and timely expenditure adjustments that are in line with the development situation is the problem. At present, there are many policies actively addressing

aging and the burden of population support, but there is still a certain gap between the implementation effect and the ideal effect on people's livelihood. Therefore, the increase in the total dependency ratio is manifested in macroeconomic development as a failure to force a reasonable adjustment of the expenditure structure, with a bias towards relying on medical and health expenditures, leading to an expansion of government debt. On the other hand, there are still certain shortcomings in the overall construction of the local medical and health service system. According to the theoretical concept, a higher medical and health service capacity can effectively connect medical and health expenditure with population health needs, thereby reducing the scale of debt. However, the current situation is that there are various problems in medical and health services, such as resource waste and poor investment effectiveness. The improvement of medical and health service capacity has not achieved corresponding value transformation. Therefore, the improvement of medical and health service capacity is manifested in the lack of effective feedback on medical and health expenditure in macroeconomic development, and has increased the probability of government borrowing. The above results indicate that higher population support burden and medical and health service capacity will exacerbate the debt pressure on local government due to medical and health expenditure.

Table 5. Moderating effect results

Variable	(1) <i>Debt</i>	(2) <i>Debt</i>
<i>MHE</i>	3.142*** (0.005)	1.987* (0.080)
<i>Tdr</i>	0.139 (0.305)	
<i>Mib</i>		11.325** (0.041)
<i>MHE</i> × <i>Tdr</i>	0.252*** (0.000)	
<i>MHE</i> × <i>Mib</i>		15.094*** (0.000)
<i>Cons</i>	65.484*** (0.009)	49.782* (0.094)
Controls	Yes	Yes
Time Effect	Yes	Yes
Province Effect	Yes	Yes
<i>N</i>	217	217
Adj- <i>R</i> ²	0.613	0.656

5. Conclusions and Implications

5.1 Conclusions

Based on provincial panel data from 2016 to 2022 in China, this study uses a fixed effects model to systematically analyze the impact of medical and health expenditure on local government debt in China. The following research conclusions are drawn. Firstly, medical and health expenditure has a significant positive impact on local government debt, so improving medical and health expenditure efficiency and optimizing the healthcare expenditure structure are effective paths to maintain local debt within a reasonable range. The structural growth of medical

and health expenditure can drive the structural growth of local government debt. Under the existing fiscal system, most local governments will use borrowing behavior to meet the growing demand for medical and health services from the population, which to some extent increases the debt burden of local governments and leads to an increase in the scale of local government debt. Secondly, there are significant regional differences in the impact of medical and health expenditure on local government debt in China, and it is necessary to design fiscal policies tailored to local conditions to optimize the local debt model. The eastern regions benefit from strong economic strength and a relatively complete medical and health system, and medical and health expenditure can effectively meet the medical and health needs of the population, thereby reducing local government debt pressure. However, in the central, western, and northeastern regions, due to limited economic development and inadequate medical and health systems, medical and health expenditure cannot effectively meet the corresponding needs of the population, thereby increasing the burden of local government debt. Thirdly, the total dependency ratio and medical and health service capacity have a significant positive moderating effect on the impact of medical and health expenditure on local government debt. It is urgent to strengthen the scientific nature of fiscal policies and the rationality of expenditure, and optimize the allocation of medical and health resources.

5.2 Implications

Local governments need to seek a balance between meeting the growing demand for medical and health aspects and controlling debt risks.

Firstly, optimize the structure of fiscal expenditure and improve the efficiency of medical and health expenditure. Local governments should focus on supporting areas such as public health and primary healthcare, and reasonably design investments in large public hospitals to improve the efficiency of fund allocation. At the same time, improve the payment methods of medical insurance, strengthen the performance management of medical insurance fund budgets, and reduce excessive medical treatment and resource waste. By deepening the reform of the medical and health system, establishing a stable and reasonable mechanism for the formation of medical and health service prices, optimizing the expenditure structure on the basis of total quantity control, and creating conditions for sustainable development of local finances.

Secondly, formulate differentiated investment policies for healthcare. In more developed regions such as the eastern regions, the quality and efficiency of medical and health service supply can be moderately improved, while in underdeveloped regions such as the central and western regions, especially the northeast region, it is necessary to increase fiscal transfer payments and guide social capital to enter to alleviate the fiscal pressure on local governments.

Thirdly, cultivate diverse entities in the supply of medical and health services. If fiscal pressure increases, relying solely on government investment is no longer sufficient to meet medical and health needs. Therefore, it is necessary to further relax relevant access restrictions, create a fair competition market environment, and guide social capital to enter the medical and health field in an orderly manner. By forming a joint force between the government and the market, constructing a diversified participation pattern, innovative forms can become an important supplement to meet the needs of medical and health. Local government can support the diversified development of medical and health and alleviate fiscal pressure through government purchases of services and tax incentives (Zhao et al., 2026). In the long run, a diversified and collaborative medical and health development pattern can help improve the overall efficiency of the medical and health system and better meet the multi-level and diverse medical needs.

Fourth, strengthen the control of government debt, prevent and resolve debt risks. Local

governments should strengthen budget management of local government debt, strictly limit the scale of borrowing, and constrain borrowing behavior. Promote mechanism innovation in local government debt management, establish a scientific and reasonable local government debt risk warning mechanism and emergency response mechanism, and improve the foresight, pertinence, and effectiveness of debt risks. At the same time, it is necessary to deepen local fiscal reform, improve the local tax system, continuously expand the sources of local government revenue, enhance the debt repayment ability of local governments, and effectively ensure that the local government debt remains within a reasonable range.

Fifth, in response to the trend of population aging, we will improve the integrated medical and elderly care service system. Accelerate the construction of a multi-level medical and elderly care integrated service system, including families, communities, institutions, etc., to ensure that the elderly receive sufficient and continuous medical, health, and elderly care services. Strengthen the integration of medical, rehabilitation, nursing, and other resources, fully leverage their synergistic effects, improve service efficiency, and meet the medical and health needs of the elderly while alleviating the pressure of medical and health expenditure and promoting the sustainability of local government debt.

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