

Study on Local finance and government debt scale

Zhuoli Wen

School of Economics, Guangdong Ocean University, Zhanjiang, China

1095889074@qq.com

Abstract. Based on the scholar's research on the influencing factors of local government debt, this paper argues that the local government financial resources, degree of decentralization and local government investment enthusiasm in local finance are the significant factors that influence the form of local government debt. This paper also chooses the panel data of China's 31 provinces (cities) except Hong Kong, Macao and Taiwan from 2010 to 2019, to analyze the influencing factors of local government debt scale and the relationship of local government debt scale in different regions and demonstrates the correctness of the hypothesis proposed in this paper. The analyze result shows that the local government financial resources significantly inhibit the growth of local government debt. The degree of local decentralization is an essential factor to enlarge the scale of local government debt. There is a significant positive correlation between the enthusiasm of local government investment and the scale of local government debt.

Keyword: Local government debt scale; local government investment enthusiasm; Degree of decentralization; Local government financial resources.

1. Introduction

Local government debt refers to the obligation of the local government as the debtor to repay funds to the other part according to the conditions agreed in the agreement and contract. And it also refers to the debts that all level's local government agencies, institutions or collective organizations borrow or guarantee from domestic and foreign countries with the reputation of the government, and are directly or indirectly responsible for repayment. The development of local government debt in China shows various characteristics in different historical periods. It is influenced by national policies and social environment.

Whether the government raise loans has been discussed by different scholars. In the past, Adam Smith advocated free trade and opposed government intervention in the economy, arguing that government raise loans will reduce the capital used for production and increase people's tax burden, which is not conducive to economic development. However, Keynes emphasized the role of the "visible hand" and held a positive attitude towards government raising loans. By raising funds through borrowing money, the government will raise funds from people to develop the economy, which realize value-added the bring benefits.

However, there are different policies about government debt in different periods of our country. During the planned economy period, the government implemented the policy of unified revenue and expenditure, so that raising loans was strictly restricted. The government also did not take the initiative to borrow money. In the 1950s, the government raise loans twice: discounted bonds for production and construction in the northeast and local economic construction bonds, both to ensure the construction of key national projects. In the 1960s and 1970s, the government raised neither internal nor external debt. In the period of reform and opening up, local government was more independent as the main economic subject. China's local government debt policy was gradually liberalized and its scale gradually expanded. From the 1980s, capital construction funds changed from making an appropriation to raising a loan, and then gradually began to yield profits and delegate powers. Finally, in the 1990s, it was transformed into a tax system adapted to the socialist market economy. Although local government have been increased the autonomy in raising loans, which have promoted economic development, excessive loans which raised by some local governments in pursuit of economic construction has also brought out a series of problems such as increased non-performing assets, asymmetric authority and financial authority and financial disorder. In the twenty-first century,

China began to pay more attention to the management of local government debt, established and improved relevant laws and regulations as well [1]. After the 2008 financial crisis, under the background of national “four trillion yuan” investment policy, the investment demand of local government increased. The country began to expand financing channels, implement the loan of national debt, and establish local government financing platforms [2].

In the past decade, the state has sorted out local debt, and issued provincial-level government debt. In 2011, the Ministry of Finance issued documents to implement a pilot program which allowed local governments to issue bonds by themselves. And in the following years, the Ministry of Finance expanded the number of pilot areas and gradually established a credit rating system for local governments. In August 2014, National People’s Congress adopted the amendment to the budget law of the People’s Republic of China. In September 2014, the State Council issued On Strengthening the Opinions of the Local Government Debt Management, established the new framework of local government debt management. It points out that the goal of local government debt management is to establish a management mechanism which integrates “borrowing, using and repaying”, effectively making the government play the positive role of the government in regulating debt, effectively preventing and defusing fiscal and financial risks, and promoting the sustainable and healthy development of the national economy. The State Council adopted the method of “combining dredging and blocking” to rectify local debt and explicitly stripped the government financing functions from financing platform companies. In 2015, the new Budget Law came into effect, establishing a standardized financing mechanism about raising loans for local governments. It clearly classifies local government bonds into general bonds and special bonds based on the purpose of the debt and the source of repayment. Local governments can raise loans within the limit. Local government bonds need to be replaced to smooth interest costs. Relevant departments strictly control the new debt from financing platforms and ban illegal borrowing to improve the transparency of raising loans. Promoting the public-private partnerships mode to reduce the debt pressure of local governments [3]. In October 2016, the State Council promulgated the Emergency Response Plan for Local Government Debt Risks, stipulating the work related to debt risk assessment and early warning. In 2017, the state has successively promulgated Notice on Further Standardizing Local Government Debt Financing, Notice on Resolutely Stopping Illegal Local Financing in the Name of Government Purchase of Services and Notice on Standardizing the Management of the Project Database of the Comprehensive Information Platform for Cooperation between the Government and Private Capital. The state began to pay attention to the management of hidden debt, reformed the local government financing platform, developed the local government bond market, strictly controlled the increment of local government debt and tried to reduce the debt risk of some local governments [4].

In recent years, China has actively issued relevant policies to improve the debt management of local governments, but there are still many problems. In terms of debt risk issue, on the one hand, the central and western regions have few sources of debt payment funds, so that they suffer from high debt risk. On the other hand, some local government debt information is not transparent. The hidden debt problems are serious, which cause the existence of potential risks. In terms of financial issues, the scale of maturing debt gradually increases, so that the difficulty of repayment increases sharply and there are refinancing difficulties [5]. In terms of policy issues, the national incentive and constraint mechanism and budget performance management mechanism for local government are not sound, resulting in the mismatch between authority and financial authority, and low efficiency of fund utilization. The management system and mechanism of new debt has not been improved, and there is rare reasonable development plan for how to better promote government projects with new debt [6].

At present, China has begun to focus on the debt problem of local governments and constantly issued relevant policies to solve the problems of hidden debt and new debt management. The government hopes to promote the healthy development of local economy by controlling the scale of local government debt reasonably and base on it, this paper selects the topic which mainly studies the overall situation of local government debt scale in China, and finds out the factors influencing local government debt scale through empirical analysis. The study has certain theoretical and practical

significance: First of all, domestic studies have been carried out some studies which is about the influencing factors of local government debt scale and they have been made some achievements, but there are still many influencing factors that have been omitted or ignored. The paper uses econometric methods to test whether local government investment enthusiasm and local government and local government financial resources have an impact on the scale of local government debt, so as to enrich the theoretical content of local government debt problems and fill in the omission of previous scholars in this field. Secondly, this paper tries to use empirical analyze to study the scale of local government debt and its influencing factors. On the one hand, the analysis results are conducive to improving the national debt management of local government and improving the debt management level. On the other hand, it is beneficial for the country to control the debt risk, defuse the debt risk and maintain the stability of financial order.

The rest of this paper is arranged as follows: The second part is a review of relevant literature; the third part is an analysis of the current situation of local government debt scale in China; the fourth part includes the research design, variable description, empirical results and analysis of this paper; the fifth part is the conclusions and policy suggestions of this paper.

2. Theoretical analysis and research hypothesis

At present, many scholars have studied the factors which influence the formation and expansion of local government debt.

2.1 Analysis of influencing factors positively correlated with local government debt

Ji Yunyang, Fu Wenlin and Shu Lei (2019) [7] have found that the downward shift of expenditure responsibility, promotion competition among regions and competition of attracting investment caused the expansion of local government debt. Dai Shuangxing and Wu Qimian (2016) [8] have pointed out that the increase of land remise funds and real estate taxes is an important factor which causes the expansion of local government debt scale. Zhang Zenglian and Yan Qiusi (2018) [9] have observed that land finance is significantly positively correlated with the debt scale of local governments. Land finance will also affect soft budget constraints, and the increase of soft budget constraints will also expand the debt scale of local governments. Liu Hao and Chen Gong (2019) [10] have proposed that both general budget revenue and central subsidy revenue have a strong positive correlation with the scale of local government debt. Population age structure has little influence on the scale of local government debt. Zhong Huiyong and Lu Ming (2015) [11] have studied that the increase of central government transfer payment can increase local government debt. Ai Fei and Wang Wenfu (2021) [12] have observed that the increase of local government competition will increase the expansion of local government debt. Li Jianhua, Li Yanchao and Jiang Lina (2021) [13] have found that investment impulse is an important factor which affects the expansion of local debt.

2.2 Analysis of influencing factors negatively correlated with local government debt

Pan Jun, Yang Xinglong and Wang Yaxing (2016) [14] have found that fiscal transparency is negatively correlated with local government debt scale. Liu Liu and Qu Xiaoe (2019) [15] have observed that the uncertainty of economic policy will lead to the expansion of urban investment bonds. At the same time, under the premise of uncertainty of economic policy, financial pressure and development pressure are negatively correlated with the expansion of urban investment bonds. Although promotion pressure has a positive effect on the expansion of urban investment bond, its significance is weakened. Hou Shiyong and Song Liangrong (2021) [16] have pointed out that financial decentralization inhibits the expansion of local government debt.

In addition, some variables have different influences on the scale of local government debt under different conditions. Zheng Jie and Liu Danyu (2021) [17] have found that when the debt scale is at a low level, the incentive degree of officials, population size and urbanization rate have a significant negative impact on the debt scale of local governments. When the debt scale is at a high level, the

influence of the incentive degree of officials on the local debt scale becomes weak, but the population and urbanization rate have a positive impact on the local debt scale. Guo Ping and Jiang Shanshan (2017) [18] have proposed that although fiscal decentralization is positively correlated with the size of local governments, the increase of soft budget constraints will reduce the size of local government debt when the fiscal level is low. When the fiscal level is relatively high, the increase of soft budget constraints will expand the scale of local government debt. Wang Jieru (2016) [19] divided fiscal decentralization into expenditure decentralization, revenue decentralization and vertical fiscal imbalance, and have pointed out that expenditure decentralization and vertical fiscal imbalance had a positive effect on local government debt, while revenue decentralization had a negative effect on local government debt.

2.3 Analysis of the influence mechanism of local government debt scale

Fiscal transparency, incentive degree of officials, population size, urbanization rate, land finance, soft budget constraint, general budget revenue and central subsidy revenue, fiscal pressure and development pressure, financial decentralization and other factors have an impact on the scale of local government debt. Based on this, this paper will continue to explore the factors influencing the expansion of local government debt scale.

2.3.1 Mechanism analysis of the impact of local government financial resources on local government debt scale

Chen Wenyan and Wang Tingting (2021) [20] divided local financial resources into transfer revenue, debt revenue and fiscal budget revenue. In this paper, local government financial resources are mainly reflected by local government budget revenue. When a government investment plan is set, the greater the local government's financial resources will need the less debt which will use to complete the plan. Zheng Jie and Liu Danyu (2021) [17] have found that the increase of fiscal revenue and land remise fund can reduce the scale of local government debt. Zhou Yuanyuan (2022) [21] made an analysis of the current fiscal revenue of local governments: after the tax distribution reform, the financial focus will move up, and the focus of authority will move down, so that the tax revenue goes to the grass-roots level becoming less. The grassroots need to deal with pension, medical and other public services. However, the government lack of funds, only through debt to maintain rigid spending. At the same time, central government appropriations are mainly made up of special transfer payments. Although the amount of funds is huge, they can only be used for special purposes. Local governments cannot handle the complexity of their responsibilities flexibly, so they still need to raise loans. The local economy is developed with high fiscal revenue, and the demand for debt is low; Local economies are underdeveloped with low fiscal revenue and demand for debt is high. Based on this paper, the following hypotheses are proposed:

Hypothesis 1: Local government financial resources restrain the expansion of local government debt.

2.3.2 Mechanism analysis of the influence of decentralization degree on the scale of local government debt

The core of fiscal decentralization is to endow local governments with the right to make financial decisions freely to complete the tasks assigned by the central government. However, from the analysis of the influence of local governments' financial resources on the scale of local government debt, the financial power fails to move down. So the higher the degree of decentralization, the higher government the funds required to complete the work, need to meet the demands of funds through debt. Li Jianhua et al. (2021) [13] have observed that Chinese-style fiscal decentralization will drive local government officials to conduct investment behavior from two aspects of financial and political interests, thus forming large-scale investment activities. Hou Shiyong et al. (2021) [16] have found that fiscal decentralization will significantly promote the expansion of local government debt in the context of government competition. Based on this, the following hypotheses are proposed:

Hypothesis 2: The degree of decentralization promotes the expansion of local government debt.

2.3.3 Mechanism analysis of the impact of local government investment enthusiasm on local government debt scale

The purpose of local government raising loans is mainly to promote related infrastructure construction, and thus promote economic development. The amount of investment in fixed assets like infrastructure can be used to measure the investment enthusiasm of local governments. The golden rule for government borrowing states that all debt borrowed by the government over the course of the economic cycle is only for investment, and cash outlays are fully filled by taxes. This shows that the higher investment enthusiasm of local governments makes higher investment amount of fixed assets and the larger the debt scale of local governments. Han Xuan (2022) [22] have found that the financing channels of local governments are very limited, and the funds needed for the fixed asset investment can only be obtained through raising loans. Therefore, the investment enthusiasm of local governments is positively correlated with the debt scale of local governments. Jiang Hongqing and Zhang Yanhui (2022) [23] have observed that the increase in fixed asset investment will lead to the increase of government debt, but there is a significant time-varying feature, and there is a significant relationship in some periods, while there is no influence relationship in some periods. Based on this, the following hypotheses are proposed:

Hypothesis 3: Local government investment initiative promotes the expansion of local government debt.

3. Current situation analysis of urban investment bonds

In recent years, China has issued relevant laws and regulations about the debt management of local governments, which has curbed the excessive expansion of local government debt scale. However, the rapid economic development has increased the uncertain factors of market environment, and local government debt is still on the rise.

3.1 Analysis of the current situation of urban investment bonds in the whole nation

According to local government debt data from 2014 to 2018, Figure 1 is obtained. Figure 1 shows that after the implementation of the new Budget Law, with the acceleration of China's economic construction, the scale of local government debt keeps rising and the growth rate is stable. At the end of 2018, China's local government debt balance was 18.46187 trillion yuan, compared with 16.50998 trillion yuan at the end of 2017, an increase of 11.8% year on year.

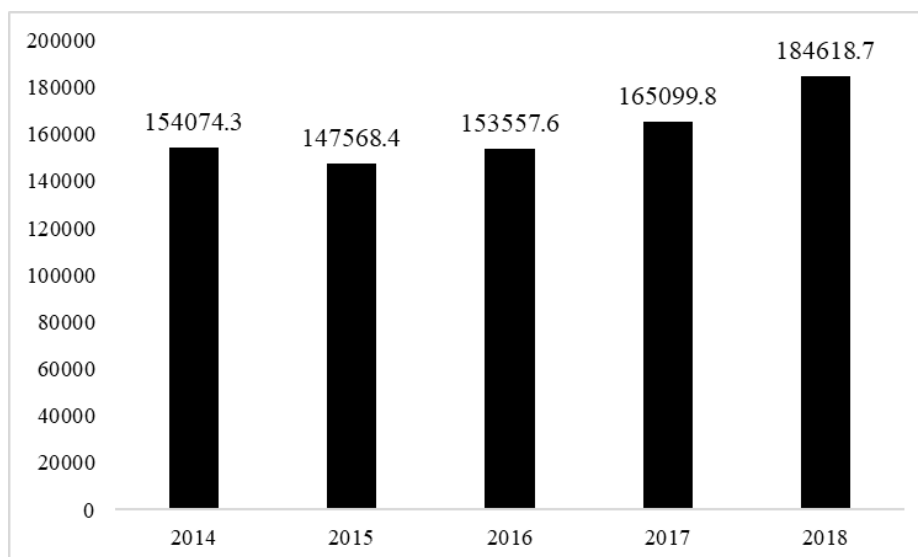


Figure 1. Balance of local government debt

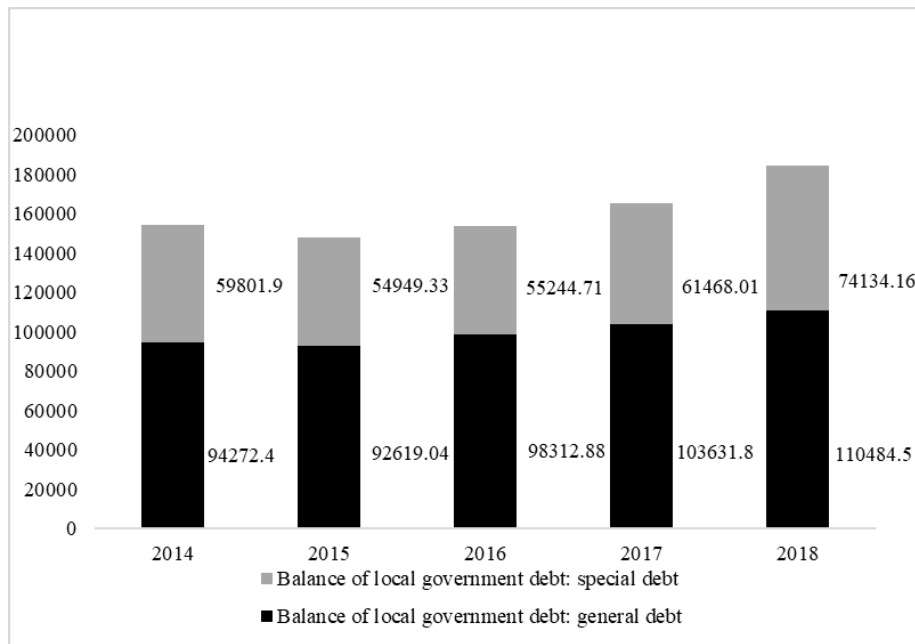


Figure 2. Balance of local government general debt and special debt

In Figure 2, local government debt is divided into general debt used to alleviate capital shortage and solve temporary shortage of funds and special debt issued for a specific project. The figure shows that although general debt is higher than special debt in recent years, the growth rate of special debt is increasing year by year. It can be seen that special debt plays an increasingly important role in national construction and is an important source of funds for economic development, which also reflects that the transparency of local government debt has improved.

At the end of 2018, the average utilization rate of China's local government debt ceiling was 86.8%, and the fiscal space of the fiscal ceiling after deducting the debt scale increased compared with 2017. The overall debt ratio of Local governments in China is about 20%, much lower than the international warning line of 60%, and the debt risk in China is under control [6].

3.2 Analysis of the current situation of urban investment bonds in each province

Figure 3 is drawn based on the stock data of urban investment bonds of provinces in 2021. Figure 3 shows that the scale of urban investment bonds in Jiangsu, Zhejiang, Shandong and Sichuan provinces is large, while that in Gansu, Hainan, Inner Mongolia autonomous Region, Ningxia Hui Autonomous Region and Qinghai province is relatively small.

The eastern and western regions are used as the basis for division to draw Figure 4, which shows the stock situation of urban investment bonds in 2013 and 2021 in the three regions. The eastern region includes: Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan; The central region includes: Shanxi, Inner Mongolia, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan; The western region includes: Sichuan, Chongqing, Guizhou, Yunnan, Tibet, Shaanxi, Qinghai, Ningxia, Xinjiang and Guangxi.

In Figure 4, whether in 2013 or 2021, the stock of urban investment bonds in the eastern region is larger than that in the central region. The stock of urban investment bonds in the central region is similar to that in the western region, but the stock in the central region is larger. This is consistent with the economic development trend which is the high level of economic development in the eastern part of China, the sub-developed region in the central part and the underdeveloped region in the western part. It can be seen from the comparison that eastern China has developed rapidly in recent years, with a big gap between eastern China and western China, which is also consistent with the development status of unbalanced regional economy in China.

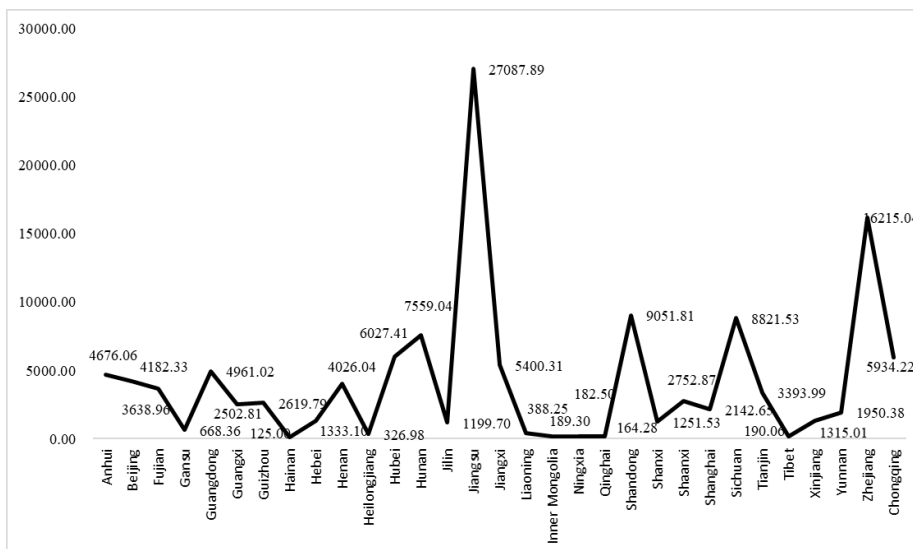


Figure 3. Stock of investment bonds in provincial cities in 2021

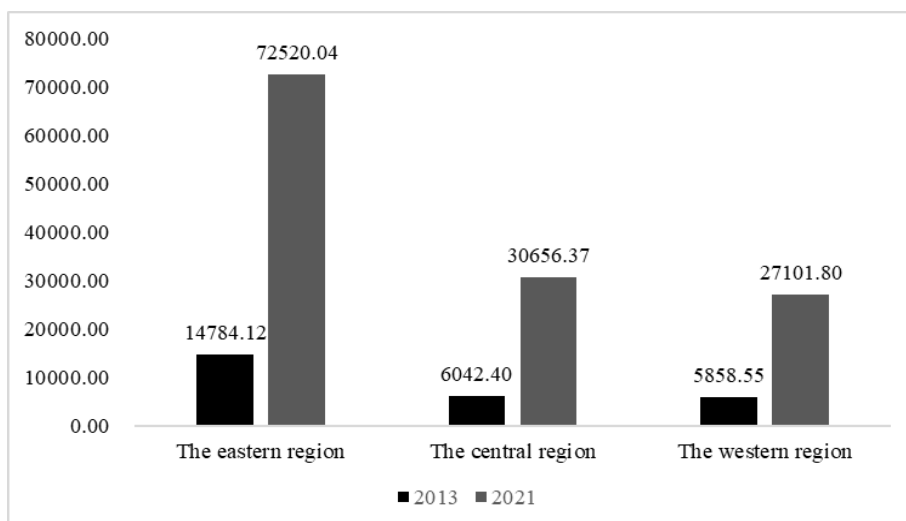


Figure 4. Differences of investment bond stock in eastern, central and western cities in 2021

4. Model design and variable selection

This paper aims to study the influence of local government financial resources, decentralization degree and investment enthusiasm on local government debt scale. Model setting and variable selection for empirical analysis are as follows:

4.1 Setting of econometric model

In order to study the influence of local government investment enthusiasm, local government financial resources and local government on local government debt scale, and effectively control individual effect and time effect, this paper adopts bidirectional fixed effects model to construct the following equation:

$$Y_{it} = \alpha_1 + \beta_1 I_{it} + \gamma_1 C_{it} + \mu_{it} + \varepsilon_{it} (1)$$

$$Y_{it} = \alpha_2 + \beta_2 F_{it} + \gamma_2 C_{it} + \mu_{it} + \varepsilon_{it} (2)$$

$$Y_{it} = \alpha_3 + \beta_3 D_{it} + \gamma_3 C_{it} + \mu_{it} + \varepsilon_{it} (3)$$

i indicates province and t indicates year. Y_{it} represents the explained variable, which is the scale of urban investment bonds; I_{it} represents the investment enthusiasm of local governments; F_{it} represents the financial resources of local governments; D_{it} represents the degree of decentralization; C_{it} represents a group of control variables which affect the scale of local government debt; μ_{it} represents the fixed effect of control; ε_{it} represents the random error term.

4.2 Variable selection

4.2.1 Explained variables

Urban investment bond scale: This paper studies the influencing factors of local debt scale, and measures government debt scale by the stock of provincial urban investment bond (logarithm). To ensure the stability of the sequence, make the residual of the model show random characteristics, and reflect the relationship between explained variables and explanatory variables more conveniently.

4.2.2 Explanatory variables

Local government debt indicates that its expenditure is more than its income, so local government financial resource is selected as the first explanatory variable, and local per capita financial income (log) is used to measure local government financial resources according to the research of Chen Wenyan and Wang Tingting [20]. On the one hand, per capita fiscal income can reflect the financial resources of local governments. On the other hand, it can eliminate the influence of regional population size difference on local fiscal income. According to China's relevant laws and regulations, the amount of debt that local governments can borrow is limited by the central government, and regions with a high degree of decentralization allow to raise a large amount of debt. Therefore, the decentralization of local governments is selected as the second explanatory variable, according to Pan Jun, Yang Xinglong and Wang Yaxing (2016) [7] study that they use the ratio of the financial expenditure of local governments to that of the central government to measure the decentralization of local governments. Factors such as provincial differences in population size and transfer payments from the central government are taken into account. The financial expenditure of local governments reflects the situation of local governments' direct participation in social activities. It also reflects the investment status and debt status. The central government's delegation of power to local governments can be reflected by the ratio of the financial expenditure of local governments to the financial expenditure of central government. With the higher degree of decentralization, the government's responsibility is higher, which includes carrying out the public services and promoting the infrastructure construction. The expenditure of infrastructure construction occupies quite large proportion. Therefore, we introduce the investment enthusiasm of local governments as the third explanatory variable. Referring to the research of Jiang Hongqing and Zhang Yanhui (2022) [21], this paper uses the ratio of fixed asset investment to GDP to express the enthusiasm of local governments. It can eliminate the influence of local differences on fixed asset investment and make the investment enthusiasm of local governments comparable.

4.2.3 Control variables

In order to analyze the influencing factors of local government debt scale more objectively, the following variables are controlled by referring to the studies of different scholars: (1) Population scale: the total registered population at the end of the year (logarithm) is selected as the measurement index. (2) Population growth rate: Select the natural population growth rate as the measurement index. (3) Financial self-sufficiency rate: select the ratio of current income and current expenditure to reflect. (4) Industrial structure: the proportion of the output value of the secondary industry in the gross regional product is selected as the measurement index. (5) GDP growth rate: measured by the current GDP minus the ratio of GDP in the previous period to GDP in the previous period. (6) Urbanization level: reflected by the ratio of urban population to China's total population. (7) Degree of opening to the outside world: the ratio of foreign direct investment to GDP is used as a measurement index. (8) Per capita infrastructure construction: it is measured by the ratio of total post and telecommunications services to the total population of China. (9) Proportion of fixed assets: it is reflected by the ratio of the total investment of fixed assets to GDP. (10) Consumption index: This paper selects the consumer price index with the price of 100 in 1979.

4.3 Data sources

This paper studies the scale of local government debt and its influencing factors, and selects relevant data from 31 provinces in China from 2010 to 2019. The statistical data about the stock of local urban investment bonds come from the Wind database, and the data of other variables come from the National Bureau of Statistics of China, the Ministry of Finance of China, the State Administration of Taxation of China and EPS database.

5. Analysis of empirical results

Based on the panel data of 31 provinces (municipalities) excluding Hong Kong, Macao and Taiwan from 2010 to 2019, this paper obtained the empirical analysis results of the impact of local government financial resources, degree of decentralization and enthusiasm of local government investment on local government debt scale:

5.1 Descriptive statistical analysis

Table 1 shows that the rank of urban investment bonds is large, indicating the existence of regional differences. The mean and median of the degree of decentralization are close to the maximum, indicating that the regions with large fiscal expenditure account for the majority. The mean and median of the investment enthusiasm of local governments are close to the minimum value, indicating that the amount of fixed asset investment in most cities is small. The financial resources of local governments are very poor, which reflects the imbalance of local economic development in China: Economically developed places have high financial resources, while economically underdeveloped and underdeveloped places have low financial resources.

Table 1. Descriptive statistics of relevant variables

	Variable	N	Mean	P50	SD	Min	Max
Explained variables	urban investment bond scale	215	7.060	7.283	1.231	2.303	9.751
Explanatory variables	local government financial resource	310	7.423	7.536	0.982	3.601	9.446
	the decentralization of local governments	279	1.892	1.910	0.060	1.726	1.929
	the investment enthusiasm of local governments	217	0.024	0.020	0.016	0.001	0.069
Control variables	population scale	279	8.127	8.253	0.844	5.733	9.433
	population growth rate	277	1.679	1.889	0.713	-1.897	2.523
	industrial structure	279	3.777	3.829	0.226	2.845	4.094
	GDP growth rate	155	2.500	2.700	0.612	1.500	3.300
	urbanization level	279	-0.596	-0.583	0.241	-1.504	-0.060
	degree of opening to the outside world	292	-5.247	-4.639	1.739	-12.24	-2.671
	proportion of fixed assets	310	-0.331	-0.319	0.111	-0.565	-0.204
	per capita infrastructure construction	279	0.234	0.144	0.188	0.060	0.937
	consumption index	124	4.636	4.635	0.005	4.631	4.643
	financial self-sufficiency rate	310	0.476	0.438	0.199	0.063	0.907

Data source: Calculated according to Stata17.0

5.2 Benchmark regression analysis

In this paper, the year fixed effect is controlled and the regression results in Table 2 are obtained. In Table 2, columns (1), (3) and (5) are the basic regression results. Columns (2), (4) and (6) add the control variables such as population size, natural population growth rate, per capita infrastructure construction, urbanization level, financial self-sufficiency rate, industrial structure and GDP growth rate, drawing an empirical conclusion.

Table 2. Empirical results of influencing factors of local government debt scale

	(1)	(2)	(3)	(4)	(5)	(6)
local government financial resource	0.637 (0.473)	-0.828** (0.401)				
the decentralization of local governments			170.433*** (19.210)	123.327** (50.670)		
the investment enthusiasm of local governments					16.407** (6.881)	16.987** (7.347)
population scale		6.334** (2.935)		42.604 (37.387)		-10.662 (21.032)
population growth rate		0.674*** (0.193)		0.237 (0.145)		0.154 (0.156)
industrial structure		0.799 (0.481)		1.734*** (0.618)		1.125* (0.572)
GDP growth rate		-2.436** (1.097)		-1.358** (0.609)		0.062 (0.067)
urbanization level		-0.711 (2.189)				10.116** (4.930)
degree of opening to the outside world		0.027 (0.063)				-1.231 (5.907)
proportion of fixed assets		-19.905** (8.796)		-15.601** (5.694)		
per capita infrastructure construction		-2.395* (1.244)		-0.870 (0.524)		-0.095 (1.144)
consumption index		-483.685** (222.245)				
financial self-sufficiency rate				-0.651 (0.492)		-1.058 (0.629)
_cons	1.640 (3.511)	2200.764** (1017.741)	-318.126*** (36.623)	-317.029** (148.574)	5.978*** (0.163)	21.628 (46.164)
Provincial fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effect	No	Yes	No	Yes	No	Yes
Observations	215	108	215	143	153	90
R-squared	0.623	0.435	0.607	0.469	0.831	0.659

Standard errors are in parentheses

** p<.01, ** p<.05, * p<.1

The results in column (1) are not significant and do not serve as a reference. However, the results obtained after the addition of control variables, namely Column (2), show that local government financial resources are negatively correlated with local government debt scale. This indicates that the higher the financial resources of local governments, the smaller the debt scale of local governments. The reason for this situation may be that local governments raise loans to meet the needs of local public services. If the local economy is developed and the tax revenue can meet the functions of local governments, there is no need to raise extra loans. Therefore, the higher the local financial resources are, the smaller the debt scale of local governments will be. Hypothesis 1 is proved.

The results of column (3) and column (4) after the introduction of control variables show that the higher the decentralization degree of local government is, the larger the scale of local government debt is. Those two variables show a significant positive correlation. The reason for this situation may be that: due to the irrationality of the relevant system of fiscal decentralization, the central government has delegated too much expenditure responsibility to the local governments. Although it has also granted some rights, the rights and responsibilities are still in a mismatched state, which stimulates the rapid expansion of local government debt. Hypothesis 2 is proved.

The results of column (5) and column (6) with the addition of control variables show that local government investment enthusiasm is positively correlated with local government debt scale. This shows that the higher the investment enthusiasm of local governments, the larger the debt scale of local governments will be. The reason for this situation may be that the enthusiasm of local government investment is mainly reflected in the amount of investment in fixed assets such as infrastructure construction, which usually costs a lot of money, and the flow of capital is slow. After the completion of the project, the value of capital is realized indirectly by driving the development of local economy which need a long time. It is difficult to push forward related projects only by relying on local taxes, and financing needs need to be met through raising loans. For areas with high investment enthusiasm of local governments, the scale of local government debt is relatively large. Hypothesis 3 is proved.

5.3 Heterogeneity analysis

In order to test whether there are differences between the above relationships at the regional level, this paper divides 31 provinces (municipalities) except Hong Kong, Macao and Taiwan into eastern regions and central and western regions for regression analysis. Table 3 is the empirical results. Columns (1), (3) and (5) in Table 3 are the regression results of eastern China, while columns (2), (4) and (6) are the regression results of central and western China. Table 3 shows that local government financial resources and decentralization degree have little influence on local government debt scale in different regions. According to the results reflected in Columns (1) and (2), there is a negative correlation between local government financial resources and local government debt scale in eastern China. The relationship between local government financial resources and local government debt scale in central and western regions is not significant, so it is not used as a basis for analysis. The reason for this situation may be that the east is an economically developed region, where government is able to meet the needs of public services through taxation and spending. Although the economy of central and western regions is less developed, the central government actively supports the infrastructure construction in central and western regions every year. Even though the financial resources of central and western regions are lower than those of eastern regions, related infrastructure construction projects are still carried out. As a result, insignificant results are shown in Table 3.

According to the results reflected in Columns (3) and (4), there is no significant relationship between the degree of decentralization and the scale of local government debt in eastern region, which is not used as a basis for analysis. However, in central and western regions, the greater the degree of decentralization, the larger the scale of local government. The reason for this situation may be that the central and western regions are economically underdeveloped, and if the responsibility is too much devolved to local governments, it will stimulate the expansion of local government debt scale. However, the situation in the eastern region is complicated, and the delegation of responsibility can stimulate the development of government public services in the eastern region and promote the construction of related infrastructure. Whether it will expand the scale of local government debt in the eastern region is affected by the specific situation of different regions, so Table 3 shows insignificant results.

Table 3 also shows that there are regional differences in the impact of local government investment enthusiasm on local government debt scale. According to the results of columns (5) and (6), the investment enthusiasm of local governments has a negative impact on eastern regions, and a significant positive impact on central and western regions. This indicates that in areas with good economic foundation and fast capital flow, the increase of government fixed asset investment will not increase the scale of local government debt, but can obtain profits through fixed asset investment and repay local government debt. For the relatively backward regions, the increase of investment enthusiasm of local governments will expand the debt of local governments, and their debt paying ability is relatively low.

Table 3. Analysis of influencing factors of regional differences in China's local government debt scale

	(1) The eastern region	(2) The central and western Regions	(3) The eastern region	(4) The central and western Regions	(5) The eastern region	(6) The central and western Regions
local government financial resource	-2.842** (1.008)	-0.461 (0.467)				
the decentralization of local governments			-70.838 (88.753)	225.647*** (46.626)		
the investment enthusiasm of local governments					-28.319* (15.472)	35.396** (12.724)
population scale	14.963* (6.763)	7.497** (2.679)	-9.241 (28.903)	68.609 (41.303)	57.860* (26.036)	-38.910 (28.093)
population growth rate	-0.085 (0.271)	0.513*** (0.076)	0.015 (0.090)	0.624** (0.236)	0.475* (0.222)	0.094 (0.300)
industrial structure	-2.266* (1.132)	0.774 (0.598)	0.672 (0.745)	1.479** (0.562)	3.687 (2.384)	1.676** (0.786)
GDP growth rate	2.041 (1.174)	-2.284** (1.054)	0.893 (1.018)	-2.583*** (0.547)	-0.020 (0.068)	0.168 (0.127)
urbanization level	2.872 (2.715)	3.001 (2.205)			4.603 (4.599)	7.435 (10.164)
degree of opening to the outside world	0.244** (0.087)	0.014 (0.054)			1.166 (4.980)	4.284 (24.439)
proportion of fixed assets	17.828* (9.06)	-18.948** (8.438)	5.195 (8.864)	-27.383*** (5.168)		
per capita infrastructure construction	3.603*** (1.015)	-3.387** (1.193)	0.589 (0.617)	-1.939*** (0.664)	1.512 (1.670)	-1.324 (1.193)
consumption index	426.289 (241.774)	-446.874* (214.864)				
financial self-sufficiency rate			-0.434 (0.618)	-0.979 (1.037)	0.354 (0.717)	-1.135 (1.108)
_cons	-2059.503* (1105.099)	2020.363* (980.516)	156.286 (197.177)	-559.629*** (131.324)	-137.786** (57.436)	82.370 (61.167)
Provincial fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	39	69	50	93	33	57
R-squared	0.735	0.647	0.546	0.572	0.746	0.743

Standard errors are in parentheses

*** p<.01, ** p<.05, * p<.1

6. Conclusions and Recommendations

With the rapid development of China's economy, controlling local government debt and preventing financial risks have become an important task for the government. Knowing the factors affecting the expansion of local government debt is the premise of controlling local government debt. Based on the panel data of 31 provinces (municipalities) except Hong Kong, Macao and Taiwan from 2010 to 2019, this paper analyzes the factors affecting the scale of local government debt and the relationship between the scale of local government debt in different regions, and finds that: First, the scale of local government debt in the economically developed eastern regions is larger than that in the economically

underdeveloped central and western regions, and the scale of local government debt between eastern and central and western regions is gradually increasing in recent years. Second, there is a significant positive relationship between the investment enthusiasm of local governments and the scale of local government debt, and between the degree of decentralization and the scale of local government debt. The scale of local government debt expands with the increase of local government fixed asset investment and decentralization degree. There is a significant negative relationship between local government financial resources and local government debt scale. The increased financial resources of local governments will restrain the expansion of local government debt. Third, population size, population growth, financial self-sufficiency, industrial structure, the GDP growth rate, urbanization level, the degree of opening to the outside world, the per capita of infrastructure construction, fixed assets are the important factors influencing the scale of local government. They indirectly affect the scale of local government debt by affecting the enthusiasm of local governments and the degree of decentralization. Fourthly, the investment enthusiasm of local governments in different regions has different influences on the scale of local government debt. The investment enthusiasm of local governments is positively correlated to the central and western regions, and negatively correlated to the eastern regions. However, the degree of decentralization and financial resources of local governments have little influence on the scale of local government debt.

Based on the research conclusions, this paper puts forward the following policy recommendations:

First, the central and western regions should actively reduce their outstanding debts and improve their ability to pay debts, so as to prepare for local governments to raise loans to develop the economy in the future. On the one hand, we will actively promote the reform of the taxation system and mechanism and work hard to resolve the mismatch between authority and financial authority in the central and western regions. We will increase the proportion of central government tax revenue retained by local governments and adjust tax types and rates to match economic development. On the other hand, the central government should actively promote the economic development of the central and western regions, strengthen infrastructure construction, so as to develop the economy and improve the debt paying ability of the central and western regions. Second, the eastern region should properly plan and manage incremental debt, improve the efficiency of capital use and reduce debt risks. Second, the eastern region should properly plan and manage incremental debt, improve the efficiency of capital use and reduce debt risks. Government need to improve the institutional management of borrowing process: before borrowing, the government does a good job of project planning and evaluation, and reasonably demonstrates the costs and benefits of the project; When borrowing, we should adhere to the principle of transparency, declare to the relevant departments, and then the relevant departments for publicity, reduce the new hidden debt; After borrowing, we should pay attention to the follow-up of the project, build a network platform, and monitor the use of funds to ensure that the use of project funds is legal and compliant. Third, the central government should take the actual economic development of each region as reference, formulate reasonable development strategies of debt financing, and defuse local debt risks in light of local conditions. The central government also need to pay attention to the development of key projects in each region, and ensure that the amount of debt borrowed by each region matches its ability to repay. The central government will provide assistance to regions with debt repayment difficulties to control debt risks and avoid their spread. Meanwhile, the government debt ceiling of local governments in such regions will be strictly controlled in the future. For areas with low debt risk, the debt ceiling of local governments can be gradually lifted, but the debt should be well monitored. Fourth, the central government should establish and improve the incentive and restraint mechanism for local government debt management and standardize local government debt behavior. We will standardize relevant laws and regulations and punish local governments for illegal borrowing. Establish and perfect local supervision mechanism, for unreasonable borrowing activities, through reporting forms, give play to the role of social supervision; As for the borrowing activities of major projects, timely publicity should be made to improve the transparency.

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