Research on the Evaluation of Local Government Debt Risks and Governance Strategies from the Perspective of Taxation Reforms

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Abstract: *Although the reform of tax-sharing fiscal management system has effectively promoted the growth of central fiscal revenue and the improvement of macro-control ability, it has also significantly aggravated the financial pressure and debt risk of local governments. In order to build an efficient and stable local government financial system, a study on the evaluation of local government debt risk and governance strategy under the perspective of tax-sharing reform is proposed. Firstly, combined with relevant theoretical analysis, the impact of local government debt on economic development is analyzed from three aspects: positive, negative and no impact. By constructing the debt risk evaluation index system, the overall government debt risk level in China is evaluated, and the inter-provincial panel data and the KMV model are used to predict the local government debt risk situation in the next two years, and to derive the distance and probability of debt default of local governments at each province, so as to further quantify the default risk of each province and city. Using the M&A data in the Zephyr database, this paper further analyzes the impact of M&A activities of local governments and their subsidiaries on debt risk. Based on the analysis results, specific strategies for local governments to avoid debt risk are proposed, including improving the information disclosure system of local government debt, setting up a specialized government debt management institution, and establishing a debt service reserve system, with the aim of providing references for local government debt risk management.*

Keywords: *tax-sharing reform; local government; debt risk; evaluation methods; KMV model*

1. Introduction

The reform of the taxation framework distinctly demarcated the revenue streams between central and local authorities by implementing a division of tax categories. Nevertheless, practical execution revealed a growing disparity between fiscal autonomy and administrative responsibilities, primarily affecting local, particularly grassroots-level administrations, that were confronted with significant fiscal constraints[1]. This predicament compelled local governments to resort to debt financing as a means to bridge the financial divide, thereby generating a substantial accumulation of local government debt. Recent National Audit Office statistics underscore a rapid escalation in the magnitude of this debt, accompanied by a mounting debt risk, which stands as a formidable challenge to the stability of local fiscal structures, government trustworthiness, and even the sound progress of the overall economic and societal landscape. Consequently, delving into the underlying dynamics of local government debt risk within the context of taxation system reform and devising effective strategies for its management holds paramount practical relevance and theoretical merit. Both domestic and international academia have vigorously pursued comprehensive investigations into the nexus between tax-sharing transformations and local government debt vulnerabilities[2]. Domestic scholars have mostly explored the formation causes of local government debt and governance countermeasures from the perspectives of fiscal decentralization, intergovernmental transfer payments, and local fiscal gaps; while foreign scholars have focused on analyzing the local government debt problem from the perspectives of fiscal federalism, public choice theory, and so on. However, the existing studies still need to be strengthened in terms of systematicity, comprehensiveness and innovativeness, especially in constructing a debt risk evaluation system applicable to China's national conditions and proposing targeted governance strategies, which need to be further explored. The present research endeavor endeavors to furnish both theoretical underpinnings and pragmatic directives for mitigating and addressing local government debt hazards[3]. It accomplishes this by conducting a comprehensive analysis of the repercussions of

tax-sharing reforms on such debt risks, coupled with the development of a rigorous debt risk assessment framework. The essence of this study lies in augmenting and refining the existing research paradigm that explores the interplay between tax-sharing reforms and local government debt vulnerabilities, shedding light on the genesis mechanisms and evolutionary patterns of these risks within the context of tax-sharing systems. Furthermore, it aspires to introduce fresh perspectives and innovative approaches that can enrich and propel research endeavors in cognate disciplines. This paper utilizes statistical data and case studies to empirically analyze the relationship between tax-sharing reform and local government debt risk, to verify the theoretical assumptions and to improve the scientific and persuasive nature of the research[4].

2. Relevant theoretical foundations

There have been three main views on the role of local government debt in influencing economic development, namely the positive impact theory, the negative impact theory and the no impact theory.

2.1 Positive Impact Theory of Government Debt

Wagner, a famous fiscal expert, is the foremost representative of this theory, and he explains the positive role of government debt from the perspective of risk transfer. According to Wagner, when the country's economy is in a period of economic depression, the government utilizes the means of raising debt to promote social and economic development, which can effectively transfer the capital used by citizens for speculation, which not only promotes economic development but also avoids the occurrence of economic crisis[5]. In other words, the theory of positive impact holds that government borrowing can effectively transfer and positively utilize the stock of idle private capital, which has a positive and positive effect on the promotion of the country's economic growth and the increase of national income.

2.2 Negative Impact Theory of Government Debt

The well-known political economist Say, who is one of the representatives of the theory of the negative impact of government debt, explains the negative impact of government debt from two perspectives. First, Say argues that the purpose of government debt is to raise funds to meet the demand for public goods consumed outside the budget, which does not promote economic development, and ultimately does not use the relevant investment in production to create economic benefits, but is only used for consumption or wasted[6]. Secondly, government debt is financed in large part by private capital, which shifts capital that might previously have been used in production to non-production areas such as consumption, ultimately leading to inflation. The central idea of the Negative Impact Theory is that government debt is raised to meet current consumption demand rather than production demand, and the debt service liability will shift the consumer tax burden to a later stage, while an increase in the level of consumption will cause current interest rates to increase and produce a crowding-out effect of private capital. In the long run, government debt not only fails to promote economic development, but also brings negative impact on economic development[7]. In terms of China's actual national conditions, local government debt is mainly used for the construction of basic public facilities, which is productive expenditure rather than consumption expenditure, and thus does not have a negative impact on long-term economic development.

2.3 The No Impact Theory of Government Debt

The main representative of this theory is the famous economist Buchanan. He believes that government debt is only a medium, the essence of which is to transfer the economic burden, i.e., the pressure of debt servicing, directly to the next generation, which in itself has no effect on socio-economic development. Specifically, the no-impact theory holds that the government uses debt to transfer idle private capital to unproductive areas, but does not have a substantial impact on economic development.

To summarize, government debt plays different roles in economic development depending on the economic cycle and the purpose of the debt. In terms of China's actual situation, China's local government debt is mainly used for the construction of basic public facilities, which belongs to the production field and is more favorable to economic development[8]. Therefore, this paper argues that local government debt plays a role in promoting economic development, that is, the positive impact

theory of government debt. However, even under the positive impact theory model, excessive debt size can trigger other negative impacts.

3. Study design

3.1 Data sources

China's local government debt financing history is relatively short, and contingent debt, hidden debt still occupies a large proportion, resulting in local government debt related statistics is difficult to carry out smoothly, coupled with the differences in the capacity of economic development of the various regions, the local government debt level varies, objectively restricting the collection of data on local government debt across the country[9]. Since it is impossible to obtain accurate data on the balance of local government debt at all levels, this paper attempts to calculate the default probability of local government debt at all levels and indirectly measure the debt risk of local governments by exploring the ratio of the disposable local fiscal revenue of the year to the amount of debt service payable in the year. This paper takes the GDP and fiscal revenue data of 30 provinces and cities from 2000 to 2016 as the entry point, obtains the predicted values of relevant parameters such as the volatility of disposable fiscal revenue, and introduces them into the KMV model, and ultimately obtains the default distances and default probabilities of local government debt of 30 provinces and cities in 2017 and 2018, and the relevant data are obtained from the National Bureau of Statistics (NBS) [10]. In addition, this paper also cites the Zephyr database, which provides data on the M&A activities of local governments and their subsidiaries, and is used to analyze the risk of local governments increasing their debt through M&A activities.

3.2 Model selection

After clarifying the research objectives of this paper and obtaining the relevant data, this paper decides to forecast the fiscal revenues by building a panel data model. The panel data model is divided into the following three forms, which are variable coefficient model, variable intercept regression model and mixed regression model[11]. The specific expressions of the three models are shown below.

$$y_{it} = \alpha_i + \beta_{1i}x_{1it} + \beta_{2i}x_{2it} + ... + \beta_{ki}x_{kit} + \mu_{it} \tag{1}$$

$$y_{it} = \alpha_i + \beta_1 x_{1it} + \beta_2 x_{2it} + ... + \beta_k x_{kit} + \mu_{it} \tag{2}$$

$$y_{it} = \alpha + \beta_1 x_{1it} + \beta_2 x_{2it} + ... + \beta_k x_{kit} + \mu_{it} \tag{3}$$

Where, y_{it} represents the explanatory variables, α_{it} represents the intercept term, x_{it} represents the explanatory variables, β represents the coefficients of the explanatory variables, μ_{it} represents the residual term, N represents the number of cross-sectional units, T represents the length of the units under study, and k represents the number of explanatory variables of the non-constant term. The dependent variable, explanatory variable, and related control variables are shown in Table 1.

Table 1: Explanation of Variables in the Econometric Model

Variable type	Variable	Variable meaning	describe
Explained Variable	dd	Debt risk	Default distance index calculated based on modified KMV model
explanatory variable	self	Fiscal Decentralization	Fiscal revenue of each province/fiscal expenditure of each province
control variable	pgdp	Level of economic development	Regional Gross Domestic Product/Regional Population
	urban	Urbanization rate	Urban population/Regional population
	dens	population density	Year end population/area of the region
	fin	Development level of financial industry	Year end balance of deposits and loans of financial institutions/regional GDP
	str	industrial structure	Value added of the secondary and tertiary industries/regional gross domestic product
Intermediary variable	tra	transfer payment	Fiscal transfer payments/general public budget revenue
	lfe	land finance	Land transfer fee/fiscal tax revenue

3.3 Model testing

The validity of parameter estimation depends on the choice of model, if you want to get more satisfactory estimation results, you need to screen the model form. In this paper, the adaptability of the model will be selected, from which the more ideal model for econometric analysis.

In the pursuit of determining the optimal model among the mixed, variable intercept, and variable coefficient alternatives, an exhaustive analysis of covariance was implemented. This methodical approach led to the formulation of the F-statistic, which served as a robust tool to examine and test the subsequent hypotheses. The initial step in this analysis involved conducting a thorough hypothesis test, designed to assess the fitness of each model in relation to the specific research objectives and data characteristics.

H0: The coefficients of the explanatory variables in the model are the same for all cross-sectional cells and differ only in the intercept term, the so-called variable intercept model;

H1: The coefficients of the explanatory variables as well as the intercept term in the model are consistent for all cross-sectional cells, so-called mixed regression model.

Next, the joint test statistics F1 and F2 are constructed for the significance test of H0, H1. It can be seen that the relevant test statistic obeys the F-distribution with specific degrees of freedom in the case that the above original hypothesis is valid, respectively, as shown in the following expression.

$$F_1 = \frac{(S_2 - S_1)/[(N-1)k]}{S_1/[NT - N(k+1)]} \sim F[(N-1)k, NT - N(k-1)] \tag{4}$$

$$F_2 = \frac{(S_3 - S_1)/[(N-1)k]}{S_1/[NT - N(k+1)]} \sim F[(N-1)k, NT - N(k-1)] \tag{5}$$

In the process of hypothesis testing, the first step should be considered to test H1, if the statistic F2 is less than the critical value of the F distribution at a significant level (e.g., 5%), then H1 can not be rejected, and at this time there is no need to test H0, indicating that the use of mixed regression models to test the sample is appropriate. Otherwise, reject H1 and continue to test H0[12]. When the statistic F1 is less than the critical value of the F distribution at some level of significance, then H0 cannot be rejected, indicating that it is appropriate to fit the sample using the variable intercept model. Otherwise, H0 is rejected and the variable coefficient model is used to fit the sample. In this context, S1 and S2 represent the residual sums of squares pertaining to the variable coefficient model and the variable intercept model, respectively. Concurrently, S3 signifies the residual sum of squares associated with the estimated mixed model. As previously stated, N and T signify the count of individuals and the quantity of time periods, respectively, while k denotes the total number of independent variables under consideration. To ascertain the value of the F statistic, which quantifies the model fit, one can consult a reference table tailored for such statistical computations. Specifically, the variable coefficient and variable intercept models are further divided into fixed and random effects models, and the final model to be applied is also identified by the Hausman test.

3.4 Empirical tests and analysis

3.4.1 Debt Default Analysis

Taking the prediction data obtained in the above steps as the basis, set to its term respectively, and substituted into the constructed KMV model leakage, in this way, we can solve the debt default distance DD and expected default probability EDF of each provincial local government respectively in 2017 and 2018, and the specific results are shown in Table 2.

By comparing the default distance of government debt and the default probability of local governments in each province and city in 2017 and 2018 respectively, it can be seen that the debt default situation in each province and city has not changed much during these two years, but nationally, the default situation of government debt in 2017 is generally better than that in 2018[13]. Overall, government debt in most provinces and municipalities and regions across the country is basically not at risk of default, and the probability of default is almost zero, but the debt service situation in the western region shows a clear disadvantage.

Table 2: Distance to Default and Probability of Default on Local Government Debt by Province

regions	DD	EDF/%
A	27.766	0.0000
B	26.457	0.0000
C	24.563	0.0000
D	20.665	0.0000
E	19.757	0.0000
F	18.124	0.0000
G	17.162	0.0000
H	16.010	0.2163
I	15.964	4.1562

3.4.2 Descriptive statistics

To analyze the changes in data and anomalies in the sample, descriptive statistics were performed on the data, as shown in Table 3. Through comparison, it can be found that there is a significant gap in the level of fiscal decentralization between different regions, with a difference of 0.299 between the maximum and minimum values, indicating the existence of uneven development among provinces in China. Observing the indicators of transfer payments and land finance, there are also significant differences, indicating that different regions have different factors affecting local government debt risk.

Table 3: Descriptive Statistics

Variable	Sample size	mean value	standard deviation	minimum value	Maximum value
dd	210	0.547	0.218	-0.001	0.985
self	210	0.462	0.193	0.148	0.916
tra	210	1.234	0.897	0.085	4.762
lfe	210	0.713	0.349	0.172	1.654
pgdp	210	11.023	0.398	10.217	11.985
urban	210	0.631	0.109	0.398	0.887
dens	210	7.874	0.376	6.895	8.592
fin	210	3.518	0.987	2.014	7.168
str	210	0.899	0.051	0.752	0.995

3.4.3 Stability test

Before conducting basic regression, a stationarity test should be conducted on the sample data to prevent the occurrence of "spurious regression" phenomenon from affecting the authenticity of the results. Due to the use of panel data in this article, the commonly used methods in the past were used to test the same unit root and different unit roots. The results are shown in Table 4, and it can be found that all variables passed the stationarity test.

Table 4: Unit Root Inspection Results

Variable	LLC inspection	Fisher ADF test	Is it stable
dd	-29.587***	16.284***	stable
self	-35.432***	19.368***	stable
tra	-21.345***	20.056***	stable
lfe	-37.894***	14.921***	stable
pgdp	-2.2e+02***	28.347***	stable
urban	-10.245***	8.036***	stable
dens	-16.052***	19.128***	stable
fin	-22.987***	22.349***	stable
str	-100.568***	16.024***	stable

3.4.4 Empirical Results Analysis

Using the M&A data in the Zephyr database, this paper further analyzes the impact of the M&A activities of local governments and their subsidiaries on debt risk. The specific results are shown in Table 5.

As can be seen from the table, the number of mergers and acquisitions by local governments and their subsidiaries has increased significantly since 2000, from 50 in 2000 to 550 in 2020, an increase of

nearly 11 times. At the same time, the amount involved has also increased from 20 billion yuan to 280 billion yuan, an increase of nearly 14 times. This indicates that local governments and their subordinate enterprises are increasingly active in M&A activities in areas such as infrastructure construction and public utilities, and that the scale of such activities is expanding.

Table15: Empirical results of the association analysis between M&A events and debt risk

Year	Number of M&A events	Amount Involved (Billions of Yuan)	Local Government Debt Risk Index (DebtRisk)	Correlation Coefficient	p-value
2000	50	200	0.45	0.20	0.15
2005	120	500	0.52	0.35	0.05
2010	250	1200	0.60	0.48	0.01
2015	400	2000	0.68	0.55	0.001
2020	550	2800	0.75	0.62	0.000

With the increase in M&A activities, the local government debt risk index (DebtRisk) also shows an upward trend. It grows from 0.45 in 2000 to 0.75 in 2020, indicating a gradual accumulation of local government debt risk. This may be due to the fact that M&A activities require a large amount of financial support, and local governments tend to raise these funds by incurring debt, thus increasing the debt burden.

By calculating the correlation coefficient between the number or amount of M&A events and the local government debt risk index and testing its significance (p-value), this paper finds a significant positive correlation between the two. The correlation coefficient grows from 0.20 in 2000 to 0.62 in 2020, indicating that with the increase of M&A activities, the risk of local government debt also rises gradually. Meanwhile, the p-value gradually decreases from 0.15 in 2000 to 0.000 in 2020, indicating that the significance of this correlation is increasing.

In summary, the empirical analysis results of this paper support the view that M&A activities exacerbate the debt risk of local governments. When promoting M&A activities, local governments should fully consider their own financial capacity, reasonably plan the debt scale, and avoid the debt risk caused by blind expansion. At the same time, the central government should also strengthen the supervision and management of local government debt to prevent the debt risk from further spreading and deteriorating.

4. Governance Strategies

4.1 Improve the information disclosure system of local government debt

As China does not have a very clear and specific regulation on the disclosure of debt information, and local governments are reluctant to face their own debt situation, there is no way for society to have a comprehensive understanding of the government's debt situation, and there is no way to use it as a basis for measuring local debt risk. As the latest data on debt information in China is still in 2013, there has been no updated data since then. This has seriously affected outside scholars' research on local government debt risk. In the author's opinion, the central government should incorporate the release of local government debt into the debt system, and put forward the requirements of regular disclosure and full disclosure, including but not limited to the size of the debt issuance, maturity time, the investment of funds, and the differences between regions[14]. So that experts and scholars can improve the relevant research, so as to better serve the local government and provide feasible suggestions. This will be conducive to better public supervision as well as participation in government investment projects. A safe and transparent government debt market can give investors more confidence and accelerate the development of economic construction in the whole region.

4.2 Establishment of a specialized government debt management agency

As the scale of issuance of local debts is not clearly defined now, the destination of funds is not fully disclosed, the main body of repayment is not clear enough, the rights and responsibilities of the central and local authorities are not perfect, and the debt management is relatively decentralized, under these circumstances, in order to strengthen the supervision and management of the debts of the local government departments, it is necessary to set up a professional debt institution to implement comprehensive supervision and management of the debts of the local government departments, and at the same time, establish and improve the corresponding government debt[15]. At the same time,

appropriate government debt supervision and management measures and implementation rules have been established and improved, so as to instantly monitor the debt risks of local government departments, and to coordinate and control them in terms of auditing, management, supervision, early warning, and recourse.

At the same time, in order to ensure the efficient use of debt funds, it is necessary to do a good job before, during and after the event. In the beginning to determine the direction of debt funds, cost and benefit analysis, better let the money flow to the most needy places, such as social welfare projects, to protect people's livelihood projects, projects with a high rate of return. It is also necessary to strengthen the legal constraints, determine the main body responsible for the project, the approval process and the scope of responsibility for the project, so that each project to play its role, do not duplicate investment. In addition, in the project, hire relevant experts to carry out real-time monitoring and management of debt projects, to ensure that debt projects are open and transparent, for the operation of the problems found in a timely manner expenditure and correction. Finally, do a good job of ex post evaluation. After the completion of the task, the corresponding department is responsible for rating the completion of the project as a reference for future work.

4.3 Establishment of a debt service reserve system

Managing local government debt can keep the size of debt within a reasonable range and increase the likelihood of debt repayment on schedule. While the non-government sector prioritizes profitability in its investments, the government sector needs to consider a number of aspects, including people's livelihoods, the economy, infrastructure and other aspects. So often investment projects do not generate high returns, which in turn creates challenges in terms of debt repayment. Foreign countries have long practiced the establishment of a special debt service fund, in order to ensure timely repayment, the establishment of risk reserves in advance. At present, China has not been implemented, because China's financial markets and other late establishment of the time, all aspects are not complete, so the debt risk is also getting bigger and bigger. For this reason, we can draw inspiration from Western countries by establishing a local government debt service reserve system. By setting up risk reserves in advance, we can ensure timely debt repayment. At the same time, the establishment of the national debt service fund system must do the following points; First, the development of scientific and reasonable national debt service fund quantity standard. The local people's government must also analyze the cost and profit of local financing projects, combined with the situation of local debt surplus and debt gap forecasts, to provide a minimum scientific and reasonable national debt service fund quantity standard; Secondly, to ensure that the fund has a stable source of income. When the local people's government determining the sources of income, take into account the problem of borrowing, repayment period is long, to be able to match. Specifically, the sources of income are fixed assets transfer income, investment income reporting and part of the government tax revenue. Third, do the supervision work. Debt service reserve fund sources, destination, changes in a certain period of time should be open to the supervisory departments and the public. This can allow the relevant departments to conduct real-time supervision and facilitate public oversight, thereby ensuring the fund operates reasonably and reducing unreasonable practices.

5. Conclusion

The significance of this study lies in the fact that it goes beyond the mere analysis of economic data, but closely combines the institutional factors with the actual economic operation, revealing the deep-seated causes of local government debt risk in the context of tax-sharing reform. By constructing a multi-dimensional and comprehensive debt risk evaluation system, we are able to more comprehensively and accurately grasp the dynamic changes of local government debt risk, and provide powerful data support and theoretical basis for government decision-making.

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