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Original Paper

The Impact of Local Debt on the High-Quality Development of the Local Economy

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Abstract

China has entered a new stage of economic development, with the economic growth model transforming from the pursuit of "quantity" to an emphasis on "quality". The economic structure undergoing a continuous process of optimization and adjustment, and the pace of transformation of the economic growth rate accelerating significantly. As an important way of local government financing, local debt is facing a serious imbalance between revenue and expenditure, which poses a substantial challenge to the realization of high-quality economic development in China. This paper adopts a panel data regression analysis framework for the relationship between local debt and high-quality economic development in 30 provinces and cities nationwide during the period from 2017 to 2023. The findings show that the expansion of local government debt scale hinders the process of scientific and technological innovation to a certain extent, which in turn weakens its positive effect on the high-quality development of the economy. In addition, local debt also indirectly contributes to the level of high-quality economic development by profoundly affecting the degree of openness to the outside world. Based on this, this paper puts forward a series of targeted policy recommendations for the current situation of local debt.

Keywords

Local debt, Local economy, High-quality development

1. Introduction

The new era of economic development places new demands on us, and the level of economic development no longer emphasizes "quantity", but pays more attention to "quality". On January 18, 2019, the State Council promulgated the *Opinions on Comprehensively Deepening the Reform of the Fiscal and Tax System*, which requires that all localities should strictly control and conscientiously implement the requirements of the higher level, and guard against the risk of resolving the hidden debt.

By the end of 2023, China's local debt balance was RMB 40.63 trillion, of which RMB 15.84 trillion was general debt and RMB 24.79 trillion was special debt. According to the 14th Five-Year Plan, "new infrastructure" will become the cornerstone of future domestic economic growth, and local governments will launch more major projects and new investments. Such a huge local debt not only affects the macroeconomic stability, but also threatens the smooth operation of China's economy as a major hidden danger. Therefore, how to efficiently manage and limit the growth in the size of local debt and improve the efficiency of its use is a major issue facing China at present. It has far-reaching

implications to study the influence of local debt on the quality of economic development and its mechanism, so as to provide a solid theoretical basis and policy suggestions for societies to improve the local debt problem.

Academics currently have a generalised view of how local debt affects economic development, and their impacts are grouped into three broad categories. Local debt can be both a driver and a hindrance to economic growth, suggesting a complex, non-linear correlation between local debt and economic growth. Keynes argued that for the state of the economy, the use of borrowing can directly help the economy to improve its status quo and promote economic growth. Victor and Christopher's (2016) study on Ghana's relevant economic data showed that there is a clear positive trend between economic growth and government debt. Panizza (2018) argued that at any given time, local debt contributes to economic growth. Another view is that government debt inhibits economic growth. On the topic of analysing the relationship between government debt and economic growth in Nigeria, Vincent (2017) offered his insights, he found a significant negative correlation. Domestic scholars Chen Shiyi (2015), based on a comparative analysis of the theoretical model of three-sector abandonment, the results of the study show an "inverted U-shaped" pattern of association between local government debt and economic growth. Huang Chuangxia (2017) found that the relationship between local debt and economic growth is a quadratic function model with a downward opening on the function curve, and that regions with better economic development have higher debt thresholds and higher acceptance of debt compared with other regions.

There are fewer studies on the relationship between local government debt and high-quality economic development, mainly focusing on the relationship between local government debt and economic growth, and some scholars believe that local debt has a positive impact on economic growth, such as He Jian and Zhang Hongmei (2020). Some scholars believe that local debt may adverse effects on economic expansion, such as Chen Yalin (2018). This may be due to the different times and different models, so the analysis of the relationship between local debt and economic development shows large differences. In general, there are relatively few articles studying the two subjects of local debt and high-quality economic development in China, while there are some different views in the articles about local debt research. Therefore, this paper frames the two subjects of local debt and high-quality economic development, analyzes the intermediate mechanism of local debt affecting high-quality economic growth, and then studies the specific impact of local debt on high-quality development of local economy by using the benchmark regression model and intermediary effect model, and finally puts forward the relevant conclusions and insights.

2. Impact Mechanisms and Research Hypotheses

2.1 Transmission Mechanisms of Local Debt Affecting Innovation

The role of local bonds in a high-quality economy through innovation is demonstrated by the fact that local debt invested in infrastructure, improved regional development and innovation environment, accompanied by a decline in transaction costs and improved efficiency of factor flows, will naturally increase innovation outputs or reduce inputs, which has a positive effect on regional innovation efficiency. Excessive local government debt, on the other hand, may create innovation factor crowding out and have a dampening effect on regional innovation efficiency.

A lot of literature has addressed the relationship between local debt size and innovation in some depth. At present, there are four different views prevailing in the academic community. First, local debt has a positive role in promoting domestic technological innovation. Second, domestic investment has been "crowded out" to some extent by local debt. Third, the impact of local bonds on China's technological innovation is not obvious. The last view is that the impact of local debt on innovation in China is characterised by significant variability, the expressive power of innovation capacity is different in different regions.

The pressure on local governments to service local debts may weaken their efforts to subsidize R&D activities of enterprises, which in turn may weaken their R&D incentives. Numerous empirical studies have shown that increased financial support for corporate innovation can effectively enhance R&D outcomes. However, excessively high levels of local debt can drastically shrink the financial resources of local governments. When a large amount of fiscal funds are used to subsidize financing platforms, it will naturally have a negative impact on R&D subsidies for enterprises.

The amount of R&D subsidies received by local listed companies shows a clear downward trend as local debt levels continue to rise. In a context where most of the funds needed for R&D activities by enterprises usually rely on multiple external sources of financing, commercial banks tend to cut back on the supply of loans to manufacturing firms in the same region, which in turn prompts firms to cut back on their investment in innovation. This paper constructs the following hypothesis.

H_1: Local government debt affects high-quality economic development by affecting science, technology and innovation.

2.2 The Transmission Mechanism of Local Debt Affecting the Degree of Openness to the Outside World

International infrastructure connectivity will accelerate the cross-border flow of products and services, reduce related costs, and open up a broader consumer market and scale for regional economic development, thereby injecting a more powerful driving force of consumer demand into the high-quality development of regional economies. In international trade, the exchange of products and services constitutes the core part of import and export. Generally speaking, a region with a high level of openness to the outside world., the scale of international trade in goods and services is also correspondingly larger, which has a prominent role in promoting the local economy. At the same time, this also provides a way for local governments to solve the debt problem more effectively, through the play of comparative advantages, improve the level of professional division of labor, as well as enhance the efficiency of the use of local bonds, thus bringing a greater scale of import and export demand driving force for the high-quality development of the regional economy. FDI is not only a key component of investment, it is also usually accompanied by the introduction of advanced enterprise management wisdom and cutting-edge production technology. These key factors provide strong impetus and supply support for the regional economy to achieve high-quality development in the field of institutional innovation, technological innovation and optimal allocation of production factors, which in turn directly contributes to the improvement of the efficiency of the use of local bonds and the leap in the level of high-quality development of the economy. Based on the above principles, the following hypotheses are proposed in this paper:

H_2: By affecting the degree of openness to the outside world, local government debt in turn affects the level of high-quality economic development.

3. Methodology

3.1 Sample and Data

The article utilizes panel data of 30 provinces and cities (except Tibet) from 2017-2023 to explore the non-linear effects of local bonds on high-quality economic growth. The data used in this article are mainly from *China Statistical Yearbook*, *China Science and Technology Statistical Yearbook*, *China Environmental Statistical Yearbook*, and the official websites of local governments.

3.2 Explained Variable

The explained variable in this article is the level of high-quality economic development. The evaluation system for high-quality economic development is shown in Table 1:

Table 1. Indicators for Measuring High-Quality Economic Development

Primary indicators	Secondary indicators	Indicator measurement methodology	Attributes
Economic development	Economic growth	Economic output for the year-Economic output of the previous year	+
Innovative Development	Research level	Patent grants	+
Coordinated development	Urban-rural consumption gap	Rural residents' consumption/Urban resident consumption	+
	Urbanization level	Town population/Permanent residents	+
	Quality of economic growth	CPI	-
Green Development	Pollution control level	Pollution Control Investment/GDP	+
	Per capita green space area	Per capita green space area in parks	+
	Greening level	Green coverage rate of built-up areas	+
Open Development	Openness to the outside world	Foreign Direct Investment/GDP	+
	Import and export	Total import and export volume/GDP	+
Shared Development	Level of medical inclusiveness	Number of health personnel per 10,000 people	+
	Level of educational inclusiveness	Educational funding/Permanent residents	+

For the purpose of more accurately measure the changes in the quality of China's economy, this article uses the entropy value means to comprehensively assess the level of high-quality economic development. The higher the value of the comprehensive score obtained, the more significant the degree of high-quality economic development. The steps are as follows:

Positive indicator: $X_{\theta ij} = \frac{x_{\theta ij} - x_{\min}}{x_{\max} - x_{\min}}$

Reverse indicator: $X_{\theta ij} = \frac{x_{\max} - x_{\theta ij}}{x_{\max} - x_{\min}}$

In the above model, θ represents year, i represents province, j represents indicator. The $x_{\theta ij}$ is the index value before standardization, $X_{\theta ij}$ is the standardized indicator value. The x_{max} and x_{min} are the maximum and minimum values of $x_{\theta ij}$.

The proportion of the indicator values for each province: $p_{\theta ij} = \frac{x_{\theta ij}}{\sum_{\theta=1}^{m}\sum_{i=1}^{k} x_{\theta ij}}$

Calculate information entropy: $E_j = -\frac{1}{\ln(m \times k)}\sum_{\theta=1}^{m}\sum_{i=1}^{k} p_{\theta ij}$

Calculate the difference coefficient: $D_j = 1 - E_j$

Calculate the weights of each indicator: $W_j = -\frac{D_j}{\sum_{j=1}^{n} D_j}$

Finally, calculate the composite index: $Z = \sum_{i=1}^{m} W_j x_{ij}$

3.3 Explanatory Variable

This article selects the balance of local bonds as the core explanatory variable, aiming to comprehensively reflect the effect of local bonds on high-quality economic development. In view of the large differences in the absolute value of local government debt among provinces and cities, which is not conducive to horizontal comparative analysis, the natural logarithm of the balance of local debt is used to reduce its volatility so as to make more accurate comparisons.

Intermediate variables: technological innovation, level of opening up. Scientific and technological innovation is expressed in terms of domestic patent applications, which are derived from the *China Science and Technology Statistical Yearbook*, and the level of openness to the outside world is expressed in terms of foreign direct investment divided by GDP, which is derived from the *China Statistical Yearbook*.

Control variables: The control variables selected in this paper are urbanization level, opening-up level, scientific and technological innovation, and wage level. Among them, the urbanization level and wage level are from *China Statistical Yearbook*.

3.4 Empirical Model

In order to verify the impact of local debt on the high-quality development of the local economy, this paper constructs a linear regression model for the high-quality development of the current economy.

$$\ln sq_{it} = \beta_0 + \beta_1 \ln debt_{it} + \sum_{j=2}^{n} \beta_j control_{jit} + \lambda_i + \varepsilon_{it} \quad (1)$$

In the above model, i represents the province, t represents the year, ε_{it} represents the error term, sq_{it} represents the quality of economic development. The $\mathrm{debt_{it}}$ represents the local debt balance as the core explanatory variable. In this text, $control_{it}$ is the control variable, β_0 is the intercept term, and β_1 is the parameter to be estimated.

To test hypothesis H1 and hypothesis H2 using stepwise regression, the following regression model needs to be constructed:

$$\ln sq_{it} = \alpha + \beta_1 \ln debt_{it} + \beta_2 control_{it} + \varepsilon_{it} \quad (2)$$

$$\ln patent_{it} = \alpha + \gamma_1 \ln debt_{it} + \lambda_2 control_{it} + \varepsilon_{it} \quad (3)$$

$$\ln sq_{it} = \alpha + \lambda_1 \ln debt_{it} + \lambda_2 \ln patent_{it} + \lambda_3 control_{it} + \varepsilon_{it} \quad (4)$$

In the above model, $\ln sq$ is the explained variable, $\ln debt$ is the core explanatory variable, $\ln patent$ is a mediating variable.

4. Empirical Results

4.1 Baseline Results

Benchmark regression tests were conducted using the software stata. Fixed effects model regressions were conducted because panel data may have differences that do not vary over time. Table 2 shows the results of the benchmark regression. Analysing the regression results, it was found that the coefficient of local government debt was positively significant at 1% significance level. When the local debt level is raised by 1 percent, the level of high-quality economic development is raised by about 16.86 percent, indicating that local debt promotes high-quality economic development. The results of adding control variables all show that the regression coefficients of urbanization level, wage level, opening up level, and the number of patent applications are obviously positive, indicating that the increase in the level of regional urbanization, the increase in the wage level, the introduction of foreign investment, and the improvement of innovation provide a strong support for the high-quality development of the economy; and the regression coefficient of the wage level is significantly negative at -0.7947968, indicating that the increase in the wage level has a certain inhibitory effect on the high-quality development of the economy. High-quality development has a certain inhibitory effect.

Table 2. Baseline Regression Results

variant	（1）	（2）	(3)	(4)
lndebt	0.168643***	0.124653*	0.161765**	0.189786*
	(3.03)	(1.95)	(2.70)	(3.12)
lnur		1.226786***	1.077634**	0.952436*
		(2.89)	(2.03)	(1.82)

lnw		-0.225434	-0.618675***	-0.794675***
		(-1.58)	(-2.97)	(-3.60)
lnfdi			0.192643***	0.174037***
			(4.04)	(3.73)
lnpatent				0.143852**
				(2.24)
Cons	-2.929567***	-1.902434***	-2.797540***	-3.057547***
	(-5.90)	(-3.50)	(-5.66)	(-5.85)
Time Fixed Effects	YES	YES	YES	YES
Regional fixed effects	YES	YES	YES	YES
N	210	210	210	210
R^2	0.0804	0.1475	0.2030	0.2354

Note. ( ) are robust standard errors clustered by; ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively. The same applies below.

4.2 Robustness Checks

4.2.1 Alternative Instrumental Variable

Total factor productivity was selected as a proxy indicator for measuring the level of high-quality development and conducting robustness tests, even with the substitution of explanatory variables, the results of the study show that the positive impact of local government debt on high quality economic development remains significant and unchanged.

4.2.2 Data Smoothing Processing

For the purpose of ensure the accuracy of the empirical test results, this article implements a 1% tail truncation treatment for all variables in order to eliminate the possible interference from outliers. The results of the treatment are shown in Table 3, indicating that the data are unaffected and relatively robust.

Table 3. Replace the Explained Variable and Data Truncation Processing Regression Results

variant	Replace the explained variable	Data truncation processing
lndebt	1.226578***	0.134694*
	(3.45)	(1.98)
fdi	0.005969*	
	(1.78)	
patent	0.251068*	
	(1.73)	
lnur		0.529842
		(1.13)
lnw		-0.544569***
		(-2.93)
lnfdi		0.165487***
		(3.87)
lnpatent		0.085957
		(1.38)
Cons	-10.348445***	-2.690243***
	(-3.70)	(-4.32)
Time Fixed Effects	YES	YES
Regional fixed effects	YES	YES
N	210	210
R^2	0.2278	0.1780

4.3 Mechanism Testing

According to the regression results presented in Table 4, the coefficient of equation (2) is significant, with a specific value of 0.124485, which indicates that the total effect is characterised as positive and statistically significant, which proves that hypothesis H_1 is valid. The coefficient of formula (3) is -0.342478 and significantly negative, which indicates that local debt has a certain inhibitory effect on science and technology innovation. The coefficient of formula (4) is 0.174856 and significant, which demonstrates that increasing local debt inhibits scientific and technological innovation, which in turn attenuates the proactive influence of government debt on the high-quality development of the economy. This indicates that scientific and technological innovation in the process of government debt affects high-quality development there is part of the "masking effect". Based on this, hypothesis H_1 is verified.

Table 4. Testing the Mechanism of Local Debt Influencing High-Quality Economic Development through Technological Innovation

variant	（2）	（3）	(4)
lndebt	0.124485***	-0.342478*	0.174856**
	(1.95)	(-2.65)	(2.72)
lnpatent			0.154265**
			(2.45)
Cons	-1.895421***	-1.902434***	-2.413524***
	(-3.61)	(2.94)	(-4.35)
Control variables	YES	YES	YES
Time Fixed Effects	YES	YES	YES
Regional fixed effects	YES	YES	YES
N	210	210	210
R^2	0.1469	0.7920	0.1896

Explore the mechanisms of how local debt influences high-quality economic development through openness to the outside world.

Replacing science and technology innovation with the level of openness to the outside world for the regression, Table 5 reflects the corresponding results. The coefficient of formula (2) is 0.142569 and significant, that is, the total effect is positive and significant, which proves that the hypothesis H_2 is valid. The coefficient of formula (3) is 1.213612 and significantly positive, which means that local government debt promotes opening up to the outside world. The coefficient of formula (4) is 0.032451, which demonstrates that increasing local debt promotes the level of openness to the outside world,

which in turn enhances the positive impact of local bonds on high-quality economic development. Based on this, hypothesis H_2 is verified.

Table 5. Testing the Mechanism of How Local Debt Affects High-Quality Economic Development through the Level of Opening Up

variant	（2）	（3）	(4)
lndebt	0.142569***	1.213612***	0.032451
	(2.7)	(4.21)	(0.46)
lnfdi			0.085914***
			(3.15)
Cons	-2.645451***	-8.645128***	-1.821548***
	(-6.07)	(-3.62)	(-3.21)
Control variables	YES	YES	YES
Time Fixed Effects	YES	YES	YES
Regional fixed effects	YES	YES	YES
N	210	210	210
R^2	0.0949	0.4521	0.1163

5. Conclusions and Recommendations

5.1 Conclusion

This article conducts an empirical analysis based on panel data from 30 provinces in China from 2017 to 2023, measures the comprehensive score of high-quality economic development using the entropy method, and further constructs a panel data model with individual fixed effects. The results of the empirical analysis show that the coefficient of local debt is markedly positive. A 1% increase in the level of local debt is associated with an increase in the quality of economic development of about 16.86%, which indicates that local government debt has a positive influence on the quality of economic development. Further exploration shows that the expansion of local debt leads to the weakening of science and technology innovation capacity. At the same time, increasing the level of openness to the outside world will help the positive effect of local debt on high-quality economic development to emerge. Local government debt has a “masking effect” on S&T innovation, which is manifested in the fact that the growth of debt inhibits the vitality of S&T innovation, thus weakening the positive influence of debt on the promotion of high-quality economic development. The level of local debt has a direct impact on the level of openness to the outside world, and consequently has a profound effect on the quality of economic development.

5.2 Recommendations

5.2.1 To Enhance the Independent Innovation Ability as the Core, Strengthen the R & D Capital Investment Efforts

Local governments should optimize the composition of their debt and design debt investment strategies that focus on science, technology and innovation, so as to reduce the obscuring effect of local debt on science, technology and innovation. In particular, in order to respond to the digital economy and the change of government functions, it is vital to increase investment in human capital and in science and technology and digital infrastructure, and to utilize the leverage intervene of local debt, using debt funds as a catalyst to attract more social capital to flow into key areas, such as digital infrastructure, in order to build a strategic high ground for the future economy. At the same time, the government ought to play an important role in the regional innovation system, incentivize the private sector to increase its investment in technological research and development, accelerate the formation and flow of innovation capital, and enhance the efficiency of capital allocation.

5.2.2 Continuously Promoting the Process of Opening Up To the Outside World and Upgrading Its Level of Openness

For developed regions, establishment of a new systematic framework for promoting high-quality development should be accelerated, and efforts should be made to promote the construction of a high-level opening system. They should optimize the structure of foreign trade and expand the scope of trade in knowledge-intensive services, high-end productive services and services for daily living, and create a market-led business ecosystem that follows the rule of law and is internationally competitive in order to attract and converge more secure and convenient flows of high-end innovative factors. In the meantime, it will increase financial support for relatively lagging cities and establish a mechanism for developed cities to provide precise assistance to less developed cities, so as to help the latter enhance their degree of openness to the outside world. Combining global value demand and local characteristic resources, it will promote the development of characteristic industries in less developed regions, deeply integrate them into the global value chain, and shape local core competitiveness, so as to further attract global innovative technologies and talents.

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