

The Impact of Local Government Debt Scale on High-quality Economic Development

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Abstract

High-quality development is one of the important topics in the new stage, and a profound understanding of the impact of local government debt is an important reference for improving the mechanism of preventing and resolving major risks in China. However, there are still controversies about how local government debt affects High-quality economic growth. This paper analyzes the impact mechanism of local government debt on High-quality economic development. Based on the panel data of 30 provinces from 2011 to 2018, an evaluation system for High-quality economic development is constructed, and the comprehensive scores of each province are calculated by principal component analysis. A panel model is established to measure the effect of local government debt scale on High-quality economic growth. It is found that the quality of economic development in 30 provinces is not balanced and the development is not sufficient. The scale of local government debt plays an important role in the quality growth of regional economy from three aspects: increasing the capital stock, improving the level of scientific and technological innovation and affecting the regional economic structure.

Keywords

Local Government Debt; High-quality Development; Panel Regression Model; Principal Component Analysis.

1. Introduction

"High quality" will become a key and important indicator of China's economic development, as well as a key path to deal with social contradictions and changes (Gao Peiyong, 2019) [1]. The concept of High-quality economic development requires us to strictly control the scale of debt and guard against debt risks. In order to achieve the goal of "stable growth," local governments have taken a series of measures, including expanding infrastructure investment, and government spending has continued to expand, leading to rising debt. The fluctuation of economic growth is not conducive to High-quality economic development. As a very important policy tool in China, government debt can promote High-quality economic development. Most scholars have found that there is a non-linear relationship between the scale of local government debt and economic growth (Baumetal., 2013; Eberhardt&Presbitero, 2015; MAO Jie and Huang Chunyuan, 2018) [2] However, few scholars have explored the relationship between the scale of local government debt and the level of High-quality economic development. From the overall point of view, it is of theoretical and practical significance to explore the reasons behind how local debt plays a role in High-quality economic development, especially in the current era when we require High-quality economic development. Therefore, in order to effectively resolve the local debt risk, get out of the local debt dilemma, and provide policy suggestions for High-quality economic development. Based on this background, this paper

studies the effect of local government debt on High-quality development of regional economy, which is conducive to controlling the growth scale of local government debt and promoting High-quality development of economy.

2. Literature Review

First, government debt can boost economic growth. Keynes believed that in a depressed economy, borrowing can directly help the economy improve its current situation and achieve economic growth. According to Lerner, government debt can reasonably guide the liquidity in the market and efficiently solve the problem of resource allocation. It has a positive effect. Victor N (2018) [3] This paper studies the economic data of Ghana and proves that there is a significant positive correlation between economic growth and government debt. Li Guanqing (2019) [4] Research on external debt has a positive contribution to a country's economic growth, and the growth of capital can be achieved by providing additional funds to the country from outside.

Second, there is an irregular linear relationship between government debt and economic growth. The relationship between government debt and economic growth is geometrically a downward binary function with negative quadratic coefficients, Fischer [5], In the long run, government debt has a negative effect on economic development. However, in the short term, whether the returns obtained by local governments' borrowing to spend can offset the economic downturn brought by it, or even play a positive role in the economy depends on whether the spending is efficient. Petach (2020) [6] Using debt data of more than 170 countries in the world and related economic growth data, using individual fixed effect model and individual random effect model to compare and analyze, it is concluded that in the short term, increasing debt scale will promote economic development; In the long run, the expansion of debt scale will restrain economic growth.

Based on our country at present is still a developing country's basic national conditions, this article through the principal component analysis (pca) to evaluate the development of high quality all over the country provinces and cities, specific points of the provinces is calculated, and the development in high quality scores and leverage to dig deeper into China's local government debt scale on the basis of the relationship with high quality and economic development, and puts forward related Suggestions.

3. Mechanism Analysis of the Impact of Local Debt on High-quality Economic Development

Based on the development principle of economics and the principle of economic growth from the perspective of endogenous, it can be concluded that two key factors, capital and technology, determine the total output of society. The specific formula is as follows:

$$Y=KA$$

Where Y is the total social output, K is the capital stock, and A is the technological level. Local debt can promote economic growth by affecting capital and technology. Specific analysis is as follows:

3.1. Government Borrowing to Increase the Capital Stock

By borrowing debt, local governments at all levels have attracted a large amount of idle funds from the society, some from the private sector, some from banks or units. With the funds obtained, the government has carried out large-scale construction in education, medical care,

transportation, environment and other fields. From this perspective, the growth of the capital stock has indeed promoted High-quality economic development.

3.2. Government Borrowing to Promote the Development of Science and Technology

Local governments borrow to raise the money needed for economic development and invest the money in various industries for development and construction. In recent years, China has done a lot to cultivate and retain talents. Such as providing various subsidies, building talent apartments, preferential policies for house purchase, convenient medical treatment and so on. Talent is the core force of the development of science and technology, stable talent can develop science and technology, thus promoting economic growth.

3.3. Government Debt Affects Regional Economic Structure

The purpose of local governments at all levels is to better build and develop the local economy, which can be reflected in the promotion mechanism of officials in the past. For all these reasons, local governments have become wary of using the money they have borrowed. Especially now that accountability and accountability mechanisms have been established, the government's vision for development is not limited to the present, but to achieve sustainable development.

4. Evaluation of High Quality Development of Regional Economy

4.1. High-quality Development Evaluation System Construction and Method Selection

Based on the above description of High-quality development, as well as extensive reference and reference to existing relevant literature, 5 first-level indicators and 17 second-level indicators are constructed based on the theoretical methods of statistics and economics and guided by the five new development concepts. For details, see Table 1.

Table 1. High quality development evaluation index system

Level	symbol	The secondary indicators	unit	efficacy
	X1	Internal spending on R&D as a percentage	%	+
innovation	X2	Number of patent applications granted	a	+
	X3	Technical contract turnover	One hundred million yuan	+
	X4	Number of high-tech enterprises	home	+
	X5	Urban-rural consumption ratio	-	-
coordinate	X6	The proportion of secondary industry in	%	+
	X7	The proportion of tertiary industry in GDP	%	+
	X8	Energy consumption per unit of GDP	Tons of standard coal / 100	-
green	X9	Wastewater discharge per unit of GDP	Tons/one hundred million	-
	X10	Forest coverage	%	+
	X11	Foreign trade openness	%	+
open	X12	Foreign openness	%	+
	X13	Domestic trade dependence	%	+
	X14	Per capita disposable income	yuan	+
Shared	X15	Registered urban unemployment rate	%	-
	X16	Number of beds in health institutions per	Zhang/one thousand	+
	X17	Per capita housing floor area	Square meters	+

The data in this paper mainly come from China Statistical Yearbook, China Torch Statistical Yearbook, China Environmental Statistical Yearbook and WIND database. The original data obtained are calculated twice and the missing data are filled in with scientific methods.

4.2. Evaluation Process

(1) Establish the global data table

The panel data of 30 provinces and 17 indicators from 2011 to 2018 were first sorted into the global data table of High-quality economic development in Excel. At the same time, SPSS26.0 software was used to carry out the forward and standardized data processing.

(2) KMO and Bartlett sphericity test

According to the KMO test and Bartlett's sphericity test results of SPSS26.0 principal component analysis method, KMO=0.778, greater than 0.5, suitable for principal component analysis. As shown in Table 2, Sig value is less than 0.05, indicating that the obtained data has passed the sphericity test of KMO and Bartlett and is suitable for principal component analysis.

Table 2. Sphericity tests of KMO and Bartlett

KMO sampling suitability quantity.		778.
	The approximate chi-square	2798.943
Bartlett sphericity test	Degrees of freedom	136
	significant	000.

(3) Calculate the Principal Component Score

Principal component expressions are as follows:

$$Q_1 = 0.121 X_1 + 0.039 X_2 + 0.133 X_3 + \dots + 0.045 X_{17}$$

$$Q_2 = 0.018 X_1 + 0.151 X_2 + 0.149 X_3 + \dots + 0.355 X_{17}$$

$$Q_3 = 0.087 X_1 + 0.83 X_2 + 0.079 X_3 + \dots + 0.11 X_{17}$$

$$Q_4 = 0.118 X_1 + 0.017 X_2 + 0.019 X_3 + \dots + 0.011 X_{17}$$

$$Q_5 = 0.065 X_1 + 0.503 X_2 + 0.186 X_3 + \dots + 0.074 X_{17}$$

The weight value of each main component is obtained through calculation. Table 3 lists the parameters.

Table 3. Weight table

ω	ω_1	ω_2	ω_3	ω_4	ω_5
The weight	0.37265	0.11167	0.09983	0.08063	0.06574

Therefore, the final comprehensive score is published as follows:

$$Q = 0.36473 Q_1 + 0.11167 Q_2 + 0.09983 Q_3 + 0.08063 Q_4 + 0.06574 Q_5$$

4.3. Analysis of Results

Through the above calculation, the comprehensive score of High-quality economic development of each province can be obtained, as shown in the following table:

According to the distribution of scores listed in the table above, it can be found that the overall score of High-quality development in China is low, with tier 2 and tier 3 provinces and cities accounting for an astonishing 80%. Table 5 describes echelon distribution.

Table 4. Comprehensive score of High-quality economic development of Various Provinces in China from 2011 to 2018

	2018	2017	2016	2015	2014	2013	2012	2011	The average score
Beijing	1.6285	1.4636	1.2129	1.1710	0.9449	0.6953	0.6070	0.4383	1.0202
tianjin	0.4833	0.4788	0.4422	0.4227	0.3573	0.2680	0.1651	0.0871	0.3381
hebei	0.1976	0.0481	0.0955	0.1753	0.2616	0.3178	0.3925	0.4310	0.1785
shanxi	0.0534	0.1204	0.1543	0.2228	0.2668	0.2638	0.3270	0.3531	0.2202
Inner Mongolia	0.0394	0.0129	0.0710	0.1536	0.1860	0.3454	0.4194	0.4492	0.1998
liaoning	0.2232	0.1046	0.0069	0.0173	0.0049	0.0291	0.1275	0.1912	0.0018
Ji Lin	0.0777	0.0505	0.0243	0.0630	0.1392	0.2602	0.3349	0.3435	0.1235
heilongjiang	0.1467	0.0891	0.0148	0.0527	0.1021	0.2751	0.3692	0.3824	0.1164
Shanghai	0.9035	0.7274	0.5780	0.5089	0.4484	0.6119	0.5515	0.4554	0.5981
jiangsu	1.6404	0.7607	0.6172	0.5124	0.4199	0.4839	0.3966	0.2926	0.6405
zhejiang	0.8190	0.6955	0.6164	0.5018	0.3771	0.4865	0.4493	0.2821	0.5285
anhui	0.2478	0.1103	0.0664	0.0333	0.1163	0.2151	0.2993	0.3119	0.0689
fujian	0.5059	0.4137	0.2974	0.2184	0.0973	0.1432	0.0736	0.0197	0.2162
jiangxi	1.0225	0.2838	0.1799	0.0239	0.0546	0.0786	0.1410	0.1934	0.1303
shandong	0.4760	0.3496	0.2176	0.1270	0.0636	0.0510	0.0472	0.1332	0.1380
henan	0.1693	0.0761	0.4067	0.1224	0.1847	0.2490	0.3341	0.3653	0.0754
hubei	0.4735	0.4183	0.2891	0.1589	0.0493	0.0110	0.1493	0.2116	0.1271
hunan	0.3586	0.2631	0.1551	0.0515	0.0943	0.1002	0.2067	0.2458	0.0226
guangdong	0.8288	0.5926	1.1702	0.2525	0.1661	0.0355	0.0474	0.1030	0.3619
guangxi	0.0490	0.1363	0.1968	0.2723	0.3527	0.4255	0.4914	0.5086	0.3041
hainan	0.3224	0.3315	0.3560	0.3934	0.2878	0.3467	0.4591	0.4924	0.3736
chongqing	0.2082	0.1388	0.0489	0.0046	0.0310	0.1868	0.2579	0.3278	0.0504
sichuan	0.4588	0.3201	0.2047	0.1105	0.0045	0.1148	0.1834	0.2496	0.0688
guizhou	0.1619	0.2142	0.2703	0.3767	0.4484	0.5028	0.6171	0.6269	0.4023
yunnan	0.1919	0.2532	0.3186	0.3353	0.3981	0.4631	0.4831	0.5032	0.3683
shaanxi	0.0342	0.0253	0.0823	0.1784	0.2268	0.1668	0.2768	0.3216	0.1555
gansu	0.2674	0.2394	0.3090	0.3552	0.4229	0.5353	0.5930	0.6124	0.4168
qinghai	0.0826	0.1470	0.2450	0.2927	0.3699	0.4046	0.4586	0.5381	0.3173
ningxia	0.2008	0.2539	0.3488	0.4209	0.4220	0.5348	0.6354	0.6827	0.4374
xinjiang	0.1777	0.2221	0.2649	0.3371	0.3912	0.5161	0.5640	0.5686	0.3802

Table 5. Provincial distribution of High-quality development of the three types of regional economy

	The first tier	The second tier	The third tier
city	Jiangsu, Beijing, Shanghai, Zhejiang, Guangxi, Guangdong	Fujian, Tianjin, Shandong, Hubei, Sichuan, Hunan, Anhui, Liaoning, Chongqing, Hebei, Henan, Heilongjiang, Jilin	Inner Mongolia, Shaanxi, Guangxi, Shanxi, Qinghai, Guizhou, Xinjiang, Yunnan, Ningxia, Gansu, Hainan

5. Empirical Analysis of the Impact of Local Government Debt on High-quality Development

5.1. Variable Selection and Model Construction

Checherita(2012) used the model in the form of quadratic function in the empirical analysis, taking economic growth as the dependent variable and local debt as the independent variable to study the functional relationship between the two. With reference to this, we use this method to test the nonlinear impact of local government debt on High-quality economic development.

This article selects the high quality index score (score) is as explained variable, debt ratio as the explained variable, leverage for the local government debt as a share of GDP, local government debt includes two parts of explicit and implicit liabilities, explicit debt data available in the local statistical yearbook and financial yearbook, reference to previous research at the same time, add the relevant control variables, The estimation bias can be better avoided, including natural population growth rate (POP), urbanization rate (Urban), proportion of foreign investment in GDP (Open) and proportion of tertiary industry value in GDP (TP).

Therefore, the empirical model of this paper is:

$$\text{score} = \beta_0 + \beta_1 + \text{deibt} + \beta_2 + \text{d2eibt} + \beta_i X_t + \mu_i + \eta_t$$

5.2. Data Sources

Except for the lack of data in Tibet, the data of other parts are all from statistical yearbooks, torch yearbooks, fiscal yearbooks and WIND database of provinces and cities. The calculation method and selection basis of each variable are shown in Table 6.

Table 6. Index system of influencing factors

category	The variable name	Variable descriptor taste	Variable definition and calculation method	Variable selection basis
Explained variable	High quality index	score	Principal component analysis	Research on the measurement and path of China's High-quality opening in the new era (Ren Baoping,2020) 1621
Explanatory variables	Debt ratio	debt	Debt balance /GDP	The threshold effect of local government debt scale on economic growth and its regional differences (Han Jian, Cheng Yudan,2018) "31
Control variables	Natural population growth rate	pop	Birth rate - death rate	Research on the impact of local government debt on regional economic growth (Jin Ziyi, Huang Chuangxia, Wen Fenghua,2017) 59
	Urbanization rate	urban	Urban population/total urban and rural population	Local Debt, Regional disparities and Economic Growth: A Validation Based on The Data of Prefecture-level cities in China (MAO Jie, Huang Chunyuan,2018)
	Proportion of foreign investment in GDP	open	Foreign investment /GDP	Local Debt and Regional Economic Growth in China (Chen Shiyi, Wang Li, 2016)
	The proportion of tertiary industry in GDP	tp	Total value of tertiary industry /GDP	Analysis of the impact of local debt on High-quality economic development (Liu Weijiang, 2018) 1661

5.3. Empirical Results and Analysis

(1) Stationarity test

Firstly, the stationarity test of each variable is required. In this paper, ADF unit root test is adopted, and the specific results are shown in Table 7.

Table 7. ADF unit root test results

variable	score	debt	P ° P	tax	urban	open	tp
P values	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T statistic	16.761	15.133	12.359	14.759	12.559	19.746	15.222

According to THE ADF test, the p-value of the High-quality development index is 0, so the null hypothesis is rejected and the unit root does not exist, indicating that the series is stationary.

(2) Panel data regression model construction and Hausman test

Hausman test was conducted to compare whether the individual fixed effect model or individual random effect model was more appropriate. The test results are shown in Table 8.

Table 8. Hausman test table

TestSummary	Chi-Sq.Statistic	Chi-Sq.d.f.	Prob.
Cross-sectionrandom	51.226578	7	0.0000

Table 9. Empirical results of the impact of local government debt on High-quality economic development

	The national area	The second and third echelons
debt	0.8900 *** (4.25)	0.5207 *** (3.52)
	1.4595 ***	A *** 0.8996
LvCLJL	(5.83)	(4.82)
	0.0251	0.0409
pop	(0.41)	(0.94)
	0.9846 ***	0.5774 **
tp	(3.72)	(2.12)
urban	1.4496 *** (6.34)	1.0221 *** (6.08)
open	0.029 *** (2.43)	0.0381 *** (4.32)
constant	A *** 1.0045 (8.62)	0.2657 ** (2.1)
N	240	192
R ²	0.6732	0.3831

Note: ***, **, and * represent $P < 0.01$, $P < 0.05$, $P < 0.1$ respectively; The second line in parentheses is the corresponding t value

According to the test results in the table above, P value is 0, the null hypothesis is rejected, and the individual fixed effect model is established. Establish nationwide panel data regression and

panel regression models for second and third echelons. Table 9 is the result of empirical analysis of the national and mediocre and third-tier data from 2011 to 2018.

From the chart of empirical results, we can make the following analysis. Firstly, we observe that the coefficient of the primary term of the debt ratio is positive 0.89 and the coefficient of the secondary term is negative 1.4595. By calculating the maximum value of the regional high quality comprehensive score and the corresponding debt ratio at this time, we call the value of the debt ratio at this time the inflection point of the function. In economics we like to call this inflection point of the function the debt threshold. When the national regional debt ratio is lower than the debt threshold, the debt at this time promotes High-quality economic development; With the increase of debt ratio, once the debt threshold is exceeded, the excessive debt at this time not only has no positive effect on the High-quality development of economy, but also produces debt risk and inhibits economic development.

6. Conclusions and Suggestions

6.1. Research Conclusions

Based on the empirical results, we draw the following conclusions:

(1) The 2018 High-quality Development Index of China's economy shows that the score of High-quality development ranges from -0.3242 to 1.6403, with an average score of 0.3145. The overall score is low. The 30 provinces can be divided into the first tier, the second tier and the third tier. At the same time, the scores of High-quality economic development in eastern China are generally different, while the scores of the second and third tier provinces and cities located in central and western China are obviously insufficient, the quality of economic development is relatively backward, and the relaxation of economic development needs to be improved.

(2) In the individual fixed effect model, the debt ratio has a significant effect on High-quality economic development, indicating that increasing debt to a certain extent can promote High-quality economic development; The local debt of the mediocre and backward regions in China has a non-linear influence on the High-quality economic development, showing an inverted "U" shaped relationship. By observing the control variables, it can be concluded that the urbanization rate, openness to the outside world and the proportion of tertiary industry in GDP all show significant significance at the national level or in mediocre and backward provinces and cities.

6.2. Policy Suggestions

(1) We Will Standardize the Financing Mechanism for Local Governments to Borrow Money

The central government has decided not to help local governments repay debts, and local governments at all levels must repay the loans independently. At the same time, we will improve and supervise local governments at all levels by means of backward checking of debts and lifelong accountability. Local governments should take the market as the leading role and should not interfere in the operation of the market economy. They should ensure the reasonable operation of private capital and form a sound debt financing mechanism.

(2) Deepen the Reform of Fiscal Decentralization

The central government should ensure a reasonable match of power and financial resources between the central and western regions and avoid irrational expansion of reliance on local government debt to promote growth and use of risks and debt levels related to the cost of social and economic operation quality. The central government should focus on monitoring the quality of local government spending budgets and policy implementation, and pay more attention to economic development and the quality of public services.

Acknowledgments

Undergraduate Scientific Research And Innovation Fund of Anhui University of Finance and Economics (XSKY22044ZD);

Student Innovation and Entrepreneurship Training Program of Anhui University of Finance and Economics (202110378027).

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