Procyclicality of Local Government Debt Financing and Its Theoretical Explanation

Haiping Si, Xiaoge Liu, Jian Wei*

This paper aims to examine the dynamic characteristics of local government debt in the economic cycle and to explore the reasons. Using the provincial panel data from 2002 to 2014 and system GMM, this paper finds that the accumulation rate of local debt is characterized by procyclicality. With each additional percentage of the output gap, the implicit debt growth rate may increase by 5.92% and 3.97% respectively during the boom and recession. Even with controlled the market financing environment, this feature is still evident. Further empirical analysis finds that officials' promotion pressure aggravates the pro-cyclical nature of local debt. Local debt is not only an important financing tool for local governments to ease capital constraints and stimulate economic growth, but also threatens economic stability because of its risk attributes. This paper argues that local governments have different emphasis on their goals at different stages of the economic cycle which may be an important reason for the pro-cyclical characteristics of local debts.

Keywords: local debt, economic cycle, promotion pressure

1. Introduction

Local debt is not only an important financing instrument for local governments to ease financial constraints and stimulate economic growth, but also affects economic stability because of its natural risk attributes. Under the incentive of finance and promotion, local governments bear the dual goals of "promoting growth" and "preventing risks", and may make different debt financing decisions according to different objectives of different macroeconomic stages. Then, what are the characteristics of local debt in the economic cycle? The importance of clarifying the dynamic characteristics of local debt in the economic cycle and explore the underlying formation mechanism is two-fold. On the one hand, it is helpful to comprehensively

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grasp the internal logic of local debt changes, deepen the understanding of official governance system behind the behavior pattern of local officials; on the other hand, it has important practical guiding significance to prevent the risk of local government debt and promote stable and healthy economic development.

Facing rapidly expanding scale of local government debt, it is important for scholars and policymakers to explore the reasons behind it in depth. From the view of the existing official governance system in China, promotion pressure encourages local officials to promote local economic development through debt financing (Wang, 2014; Aikman, 2015), which has become the subjective cause of large-scale local government debt initiative (Chen and Li, 2015; Pu and Wang, 2014).

When the local financing environment changes with economic situation, it will not only affect the real situation of financing impulse under promotion pressure, but also change the direction of local governments' debt decision-making. Changes of macroeconomic situation may lead officials to pay more attention to objectives other than economic growth, thus changing debt decision-making. Debt financing itself has the characteristics of risk accumulation, so excessive debt scale may bring economic risks and cause negative social problems. During the term of office, one of the fundamental principles of the government's behavior is "peace". Because once there are various problems caused by debt risk, it is likely that the office will lose its right to enter the promotion qualification competition. Therefore, especially in recession, officials may be cautious about debt under promotion pressure due to increased economic uncertainty and concerns about solvency.

This paper examines the dynamic characteristics of local government debt in the economic cycle, and discusses the underlying causes. The results are: (1) Local debt accumulation rate presents a pro-cyclical feature. The more prosperous the economy is, the faster the debt accumulates. The more serious the recession is, the slower the debt accumulates. For every percentage point increase in the output gap, local implicit debt increased by 5.92% and 3.97% respectively in boom and recession. The performances of different types of debt are different. The accumulation rate of implicit debt is always pro-cyclical, while that of explicit debt is only pro-cyclical in recession. (2) Further empirical tests show that promotion pressure of local officials aggravates the pro-cyclical degree of implicit debt. Promotion pressure is an important factor driving officials to make debt decisions according to the economic situation. Local governments at different stages of the economic cycle have different emphasis on the dual objectives of "promoting growth" and "preventing risks", which leads to the pro-cyclical phenomenon of local debt in the economic cycle.

This paper may contribute to the following aspects. Firstly, this paper examines the characteristics of local debt in the economic cycle, discusses its underlying causes, broadens previous literature's understanding of government debt issuance under macro-static framework, and deepens our understanding of the inherent logic of debt growth

changes. Secondly, from the perspective of promotion pressure, this paper considers the impact of the dual objectives of "growth" and "stability" on the local governments' debt decision-making at different economic stages, which helps to deepen the understanding of the governance model of the central government and the motivation of local governments' behavior. Meanwhile, from the new perspective of the relationship between the government and the market, this paper provide empirical facts for government debt management recommendations in China. Thirdly, this paper deepens the understanding of the relationship between promotion pressure and local debt. As the existing studies have suggested, this paper finds that the greater the promotion pressure, the more debt issuance in boom, and the more promotion pressure, the less debt issuance in recession.

2. Local Government Debt Financing Behavior in the Economic Cycle: Characteristical Facts

What is the performance of local government's debt financing in the economic cycle? Next, we describe the dynamic characteristics of local debt financing in the economic cycle by examining the relationship between the scale of local debt and the output gap.

2.1. Research Design

Local debt may show different changing rules in boom and recession, and sub-sample regression can not use all the information of the sample, so the whole sample is needed to examine in one equation. Referring to the periodic policy response function of local government set by Alesina *et al*. (2008), Jaimovich and Paniza (2007) and Fang and Zhang (2009), this paper constructs the following model to estimate the asymmetric response of government debt in different periods.

$$Debt_{it} = \alpha + \beta_1 Gap_{it} \times Boom_{it} + \beta_2 Gap_{it} \times Recession_{it} + \gamma X_{it} + \mu_i + \varepsilon_{it} \quad (1)$$

Among them, *Debt* represents local debt, using the logarithm of local debt balance. *Gap* is the output gap, estimating the economic cycle. We use the HP filtering method to estimate the output gap.[1] *Boom* represents economic prosperity, if *Gap*>0, then *Boom*=1, otherwise it equals 0. *Recession* represents recession, if *Gap*<0, then *Recession*=1, otherwise it equals 0. Since the dependent variable is debt balance in logarithmic form, the estimated coefficient β_1 indicates the semi-elastic effect of output gap on the scale of local debt in boom, i.e., local debt increases by β_1 percentage for one percent increase of output gap in boom. β_2 can be explained accordingly.

[1] Output Gap=(Real GDP–Potential GDP)/Potential GDP.

X are the other control variables. It is assumed that if there are enough control variables, even if there is a debt cycle phenomenon, they will be absorbed completely by the control variables. Because the model focuses on the dynamic characteristics of local debt in the economic cycle, the selection of control variables serves the purpose of this study. Referring to Fang and Zhang (2009), we include external shocks in the control variables, and select the conditional standard deviation of trade dependence as the proxy variable of external shocks. In the control variables, we also add two annual dummy variables to control the impact of important events during the sample period, they are the year 2004[1] which is affected by the adjustment of government income tax reform, and the year 2009 when the government's 4 trillion investment in the financial crisis is implemented. μ_i is a provincial effect, ε_{it} is an error term. There may be endogenous problems in the model setting. In order to ensure that the result is more robust, we use the system GMM method to estimate it.

2.2 Data Description

Because the data of local government debt is not easy to obtain, and there is no systematic statistics before 2013, there are few empirical studies on local debt. However, some scholars have estimated the local government debt in their researches.

Referring to the existing literature, this paper divides local government debt into explicit debt and implicit debt. Consistent with the existing literature, explicit debt includes the national debt lending, the net income of local government bonds, the net income of marketable securities, and the income of local government borrowing from foreign countries. Since securities income and local government borrowing income from foreign countries are no longer counted respectively after 1998 and 2001, in order to avoid the problem of inconsistency in the calculation of debt balance, this paper will select the sample from 2002 to 2014. Local government bonds lending and local government bonds income are obtained from *Finance Yearbook of China*.

There is much ambiguity in implicit debt, so far there has been no consensus on its measurement. Implicit debt mainly refers to the debt of individual local government illegally or disguisedly borrowing from financing platform companies, government and social capital cooperation (PPP). Due to the limitation of data availability, we first refer to Huang and Mao (2015) to take the total scale of regional urban investment debt balance and the total debt of state-owned-enterprises as the proxy variable of implicit debt. We have counted all urban investment bonds from 2002 to 2014, including corporate bonds

[1] The income tax reform was adjusted in 2003, and the effect may show up in 2004. Thus we didn't include the dummy year 2003, only inclode the dummy year 2004.

and enterprise bonds issued by provincial, prefectural and lower local financing platform companies in the bond market. Specifically, we merged the urban investment bonds issued by prefectural and county levels into provincial debt, then add them to the number of urban investment bonds issued by provincial urban investment companies. Urban investment debt data are from the Wind database. The specific composition of local debt is shown in Figure 1.

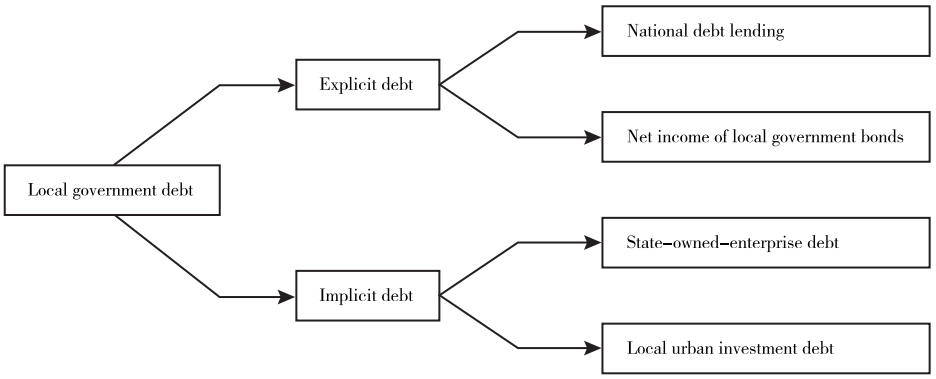

Figure 1. Data Structure of Local Government Debt

The statistical description of main variables is shown in Table 1.

Table 1. The Statistical Description of Main Variables

Variables	Connotation	Oberserved value	Mean	Standard deviation	Minimum	Maximum
Debt	Debt balance	390	2.889	2.513	–0.0034	8.097
Exdebt	Explicit debt balance	389	2.643	2.224	–0.0034	6.350
Hidebt	Implicit debt balance	390	1.931	2.386	0	7.934
Gap	Output gap	390	–11.74	19.74	–53.13	24.65
Press	Promotion pressure	390	1.585	0.885	0	3
Credit	Loan balance of regional financial institutions	390	8.973	1.046	6.094	11.35
Land	Land transfer income	390	5.396	1.739	–1.609	8.718
lrengdp	GDP per capita	390	9.980	0.741	8.056	11.564
linvest	Investment in fixed assets	390	8.452	1.297	5.418	13.146
quekou	Fiscal gap	377	–0.105	0.081	–0.517	–0.008

Notes: Local debt, explicit debt, implicit debt, loan balance of regional financial institutions and land transfer income are all in logarithmic form after adding 1. Output gap = (real GDP–potential GDP) / potential GDP. The paper eliminates the data of Tibet. Per capita GDP and fixed asset investment are in logarithmic form, fiscal gap = (revenue–revenue expenditure) /GDP.

2.3. Result Analysis

2.3.1. Basic Results

As can be seen from Figure 2, the output gap and the scale of local debt are positively correlated in both boom and recession. This means that the larger the output gap, the greater the scale of local debt. In the boom period, the larger the positive output gap, the larger the scale of local debt. In the recession period, the larger the negative output gap, that is, the farther away from the origin, the smaller the scale of local debt. The local debt is positively related to the output gap, showing a pro-cyclical feature.

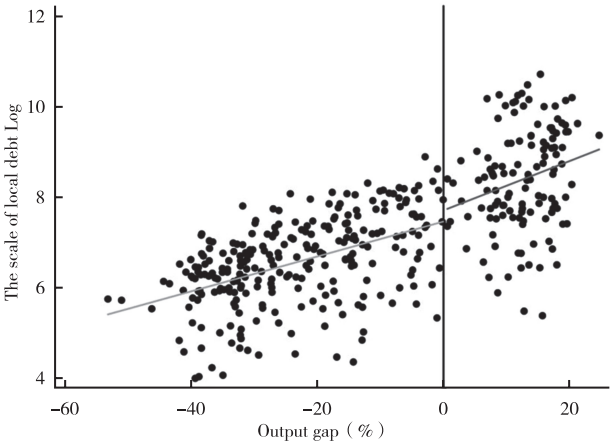

Figure 2. Output Gap and Local Debt Scale

Next, we use the panel data of 30 provinces from 2002 to 2014 to make a further study of the local debt changes in the economic cycle. The results are shown in Table 2. Since the validity of tool variables and the second-order sequence correlation should be paid attention to in GMM estimation, we list Hansen test and sequence correlation test at the end of the Table when reporting model results. Arellano-Bond first-order and second-order sequence correlation tests show that the difference of perturbation terms has first-order autocorrelation, but there is no second-order autocorrelation. Therefore, the original assumption that the perturbation terms have no autocorrelation can be accepted and the system GMM can be used. Because these three models use many tool variables, overrecognition tests are needed. The results show that at the 5% significant level, it is impossible to reject the hypothesis that all tool variables are valid. Therefore, there is no over recognition problem in these three models. In order to make the result more robust, robust standard deviation is adopted in the GMM model.

Table 2. Local Government Debt Financing in the Economic Cycle

	(1)	(2)	(3)	(4)	(5)
	Debt	*Exdebt*	*Hidebt*	*Exdebt*	*Hidebt*
Gap×Boom	0.0142**	0.0004	0.0592***	–0.0024	0.0595***
	(0.0069)	(0.0068)	(0.011)	(0.0063)	(0.0119)
Gap×Recession	0.0148***	0.0088**	0.0397***	0.0101**	0.0386***
	(0.0047)	(0.0042)	(0.0082)	(0.0046)	(0.0092)
Credit				–0.1441**	0.1242
				(0.0733)	(0.1885)
Land				0.0698	0.0647
				(0.0488)	(0.1051)
L.*Debt*	1.0086***				
	(0.0334)				
L.*Exdebt*		1.0427***		1.0570***	
		(0.0409)		(0.0414)	
L.*Hidebt*			0.7303***		0.6748***
			(0.0804)		(0.0896)
ExShock	–0.2996*	–0.1947	–0.7943	–0.2307	–0.977
	(0.1679)	(0.1298)	(0.4871)	(0.1445)	(0.6181)
Year2004	–0.0327	–0.0812	0.2149***	–0.0819	0.2401***
	(0.1052)	(0.1062)	(0.0542)	(0.101)	(0.0568)
Year2009	3.9648***	3.6557***	2.2159***	3.6756***	2.0823***
	(0.1372)	(0.1378)	(0.3517)	(0.143)	(0.3987)
Constant	0.2724**	0.0749	1.1657***	0.9608**	–0.2333
	(0.1257)	(0.136)	(0.2271)	(0.4403)	(1.2378)
AR(1)	0	0.002	0.001	0.002	0.001
AR(2)	0.532	0.176	0.140	0.278	0.155
Hansen检验	0.167	0.159	0.808	0.179	0.831

Notes: Numbers in the brackets are robust standard errors. *** p<0.01, ** p<0.05, * p<0.1. In order to make the number of tool variables no greater than the number of sections and to ensure the effectiveness of tool variables, we use lag two periods in column (1) - (3) and collapse for endogenovs variables, while in column (4) - (5), we use collapse without restricting the number of lag periods.

It can be seen from Table 2 (1) that the scale of local debt shows a pro-cyclical feature. The bigger the positive output gap is in boom period, the faster the debt accumulation is, while the bigger the negative output gap is in recession period, the slower the debt accumulation is. The magnitude of the coefficient shows that for every percentage point increase of the output gap, the growth rate of local debt scale increases by 1.42% and 1.48% respectively in boom and recession. The above results are tested at significance level of 5%

and 1% respectively. In addition, the income tax sharing reform introduced in 2003 has not been able to reduce the scale of local debt, while the 4 trillion yuan stimulus in 2008 has significantly promoted the accumulation of local debt. Besides, external shocks reduce the scale of local debt. Controlling these years also controls the effect of the election years to a certain extent and avoids the impact of political and economic cycle. In addition, the debt coefficient of the first lag period is very close to 1, which indicates that there is a serious lag in the accumulation of local debt in China.

2.3.2. Different Debt Types

During the financial crisis in 2008, the central government launched a 4 trillion yuan plan to stimulate the economy, during which the debt financing function of local government financing platform was relaxed. Because of its invisibility, the local government financing platform is not easy to be controlled by the central government, the implicit debt of local governments is expanding sharply. In contrast, local government bonds issued by the central government are subject to strict supervision, and the scale growth is relatively stable. Because the degree of information asymmetry between the central and local governments is different in different types of local debt (the effect of resulation varies aross different type of local debt), the impulse of local government debt financing will be heterogeneous in different types of debt.

Local government debt is divided into explicit and implicit debts. The explicit debt is a clear local government debt which is easier for the central government to control and be actively regulated by the central government compared with the implicit debt. Although local governments at all levels are not directly liable for the repayment of implicit debts, nor are they liable for any legal repayment, when the debtor is in difficulty in repaying the debts, the government has the ultimate responsibility (or the government may need to give some aid). For example, the issuer of urban investment bonds is the local financing platform which enjoys the implicit guarantee credit of the local government, but it is also a part of the local debt that needs to be paid attention to in general. In short, implicit debt may show stronger cyclical fluctuation because of its invisibility. Therefore, it is necessary to further analyze the heterogeneity of local debt from the perspective of explicit debt and implicit debt.

From the regression results of sub-sample, the accumulation rate of explicit debt slows down with the increase of the degree of economic recession, but it is no longer obvious in boom period, as shown in Table 2 (2). Local implicit debt is the same as debt on the whole, showing strong pro-cyclical characteristics throughout the economic cycle, as shown in Table 2 (3). For every percentage point increase in output gap, the growth rate of local implicit debt in boom and recession increases by 5.92% and 3.97% respectively. It can be seen that implicit debt in local debt has a strong cyclical nature, and its response to the economic cycle is more sensitive than that of explicit debt.

So far, through data analysis, we find that: (1) The overall debt scale of local governments presents pro-cyclical characteristics. The more prosperous the economy is, the bigger the debt scale is, and the more serious the recession is, the smaller the debt scale is. (2) The performance of different types of local debt is different in the economic cycle. The explicit debt only shows pro-cyclical characteristics in the recession period, while the impilicit debt shows pro-cyclical response in both boom and recession period. The phenomenon that the scale of explicit and implicit debt in recession decreases may be constrained by the financing environment or the official's initiative to slow down the debt accumulation. Therefore, it is necessary to discuss the causes of the pro-cyclical characteristics of local debt.

2.3.3. Further Control of Market Constraint

Different market constraints will affect the realization of debt financing, so the dynamic characteristics of local debt in the economic cycle may only be constrained by external financing environment.

Firstly, from the perspective of credit supply, the changes of bank loan supply in the economic cycle may affect the scale of local government borrowing. There is a pro-cyclical phenomenon in bank credit in many countries, that is, the scale of credit increases during the boom period and decreases during the recession period (Bikker and Hu, 2003; Kollintzas, 2011). This is mainly due to the difference between default rate and risk management of enterprises in different economic situations. Especially when the economy is in the downward phase, the higher default rate of the lending target makes the bank credit policy conservative (Borio *et al*., 2001). Secondly, the government credit at the demand side will also affect the possibility of local government debt financing. Local governments mainly obtain loans from banks through land mortgage (Fan and Mao, 2014). Land income and real estate tax will obviously affect the situation of local governments borrowing debt. Land revenue is the constraint factor of local government borrowing (Ji, 2015). In a good economic situation, rising land income increases banks' good expectations of future local solvency and may increase lending to local governments. In the recession period, the decline of land income may lead banks to be cautious about credit investment, and lower expectations of land income and local fiscal revenue on which local governments rely for repayment of loans by state-owned enterprises and financing platforms. As a result, state-owned enterprises or financing platforms will get smaller loans from banks. So land revenue can partly reflect the loan credit of the local government. Therefore, we use the growth rate of loan balance of financial institutions to measure the credit cycle (Wang *et al*., 2015), and the income of state-owned land to measure the government credit at the demand side. When we control market-oriented factors such as credit environment and government credit, local debt still shows pro-cyclical characteristics, as shown in Table 2 (4) and (5). This

means that factors outside the market environment lead to the formation of pro-cyclical dynamic characteristics of debt.

2.3.4. Robustness Test

However, there are some problems in the measurement of implicit debt: (1)State-owned enterprise debt includes a large number of corporate bonds, enterprise bonds and bank loans issued by market-oriented state-owned enterprises, and most of them are not controlled by local governments and should not be included in local government implicit debt. (2) Urban investment platforms are mostly state-owned. There may be a problem of double-counting when the sum of state-owned enterprise debt and local urban investment debt is used to measure the implicit debt of local government. (3) Because the data of urban investment bonds only count the debt issuance of financing platforms, the existence of bank loans, trust projects and other financing modes in the liabilities of urban investment companies will be neglected.

Therefore, we refer to Wen and Feng (2017) to re-measure the implicit debt as a robustness test method. The liabilities of city investment companies (platforms) include not only public bonds (city investment bonds), but also bank credit, trust financing, etc. It is a more comprehensive measure of the debt situation of city investment platforms, and a more accurate inspection of implicit ways of borrowing by local governments. According to the balance sheet of the local financing platform company, we take the total liabilities of the local financing platform company located in the same province as the total liabilities of the local financing platform company in the region. The debt situation of all the urban investment companies in the region is taken as the proxy variable of impilict debt of local government (*Hidebt*), the measurement of explict debt is unchanged, and the measurement of local governments' debt (*Debt)* is changed accordingly. The new composition of local debt is shown in Figure 3.

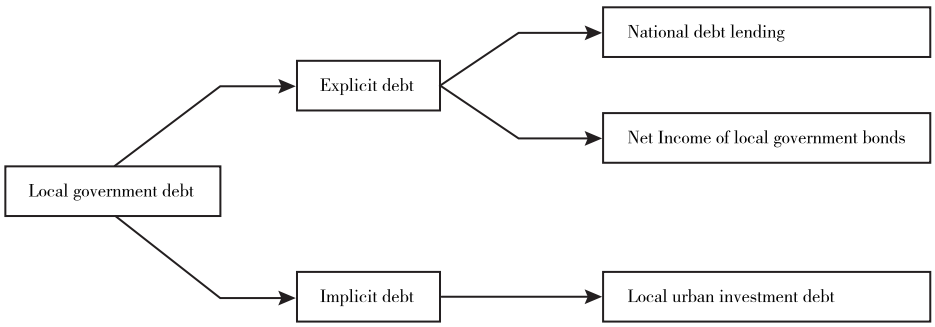

Figure 3. Data Structure of Local Government Debt: Robustness Test

Using the new data of local implicit debt and local debt, we re-examine the cyclical characteristics of local debt. The result is consistent with above, and local debt still presents a pro-cyclical feature.[1]

3. Research Hypothesis and Model Setting.

The previous empirical study finds that the local debt financing behavior in our country is pro-cyclical, and this dynamic feature is still evident even when the external financing environment is controlled from both the supply and demand side of debt. Why do local debts exhibit such dynamic characteristics in the economic cycle? On the basis of theoretical analysis, this part explains from the angle of the promotion pressure of local officials.

3.1. Theoretical Analysis and Research Hypothesis

The change of local borrowing behavior is the result of local government's active choice under the restriction of financing environment, especially for implicit debt. The pro-cyclical characteristics of local debt are not entirely due to the restriction of passive market factors, but may also be the result of local government officials' active choice. Local government borrowing is restricted by two aspects: the market environment and the motivation of issuing bonds. Among them, the lower limit of debt scale is the local government's demand for financing, while the upper limit is market-oriented financing constraints which are subject to the supervision and control of the central government. Local governments will choose debt financing within this scope.

3.1.1. Local Debt Financing in the Business Cycle: Promotion Pressure

On the one hand, under the fiscal decentralization system, the fiscal revenue of local governments is often unable to increase in proportion to fiscal expenditure. The unbalanced pattern of power and financial power leads to the deficit pressure and financing pressure of local governments. Local governments relieve financial constraints in the implementation of fiscal policies through debt financing (Fang and Zhang, 2009). In addition, soft budget constraints and financial transfer payments reduce the binding force of the credit market on local government financing, resulting in local debt risk (Wang *et al*., 2016). Local governments often cover up risks by expanding implicit debt under soft budget constraints, which further exacerbates fiscal instability (Gong *et al*., 2011).

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[1] The empirical results have not been displayed but reserved for reference because of the length of this paper.

On the other hand, in the context of the existing official governance system, competition to promote has become the natural choice of local officials. Promotion plays the most critical incentive role in the behavior logic of officials (Zhou, 2007). Promotion incentives are the direct reasons for local officials' debt financing. Since the reform and opening up, China has shifted its main objective to "economic construction as the center", forming a competitive pattern among local officials around GDP growth. Promotion pressure encourages local government officials to promote local economic development through debt financing (Wang, 2014; Aikman *et al*., 2015). Due to the motivation of officials' political promotion, local government competition has gradually shifted from competing for financial resources to competing for financial debt resources to develop local economy (Liu and Li, 2013). Chen and Li (2015) found that promotion incentives have a significant expansive impact on the scale of local city investment debt in China; Pu and Wang (2014) showed that the greater the incentive intensity of promotion for local officials, the faster the growth rate of local government investment and financing platform debt, and the greater the debt risk.

However, if the local government simply takes GDP as the goal of local economic and social development, then when the local economy falls into recession, the local government will inevitably issue more debts for growth stability, but this is contrary to the pro-cyclical fact of debt found earlier in the paper. Especially when the local economy is in recession, the empirical results show that the more serious the local economic recession is, the lower the growth rate of debt. Even if the deterioration of external financing environment is controlled, this phenomenon is still obvious. This means that in the recession, local governments are actively slowing down their debt growth.

In fact, local governments have multiple objectives in regional development. According to the Constitution of China, "Local governments at or above the county level shall, within the limits of their powers prescribed by law, administer the economic, educational, scientific, cultural, health, sports, urban and rural construction, finance, civil affairs, public security, ethnic affairs, judicial administration, supervision and family planning in their respective administrative areas. They shall issue decisions and orders, appoint, remove, train, assess and reward administrative personnel". In addition, the economic growth is not the only concern of central government, and government performance appraisal is increasingly diversified at present. In fact, the promotion of officials is an overall and comprehensive investigation, which implements a systematic and complex index system. Therefore, in the goal of local officials, the economic performance represented by GDP growth rate is not the only pursuit. Local governments have multi-dimensional promotion incentives. In the case of diversified central assessment objectives, the promotion pressure faced by local officials not only comes from the

comparison of regional growth, but also is affected by regional economic stability and other factors.

Various forms of government debt are external manifestations of financial risks (Guo, 2011). Specifically, there are a large number of implicit debts of Chinese governments at all levels. Once the lower governments have difficulties in repaying their debts, they will transfer or transfer the pressure of repayment to the higher governments. That is, the higher governments often aid the lower governments by canceling their debts or increasing financial transfer payments. It may eventually lead to financial risks gathering to the central government and threatening the financial safety of the central government. Debt risk not only affects financial sustainability, but also may bring about economic risks and trigger a variety of negative social problems. Thus debt risk completely deviates from the central goal of stable development. In particular, the central government has repeatedly stressed that the concept of "GDP-only" performance appraisal should be shifted and a correct appraisal orientation should be established, which shows that the criteria for selecting local officials by the central government are not only emphasizing economic growth. Regional economic stability may be a qualifying condition for officials to be promoted, and only after entering the qualifying competition can they be allowed to participate in the championship of GDP growth. Therefore, one of the fundamental principles that dominate government behavior during officials' tenure is "uneventful". Because once there are various problems caused by debt risk, it is likely that the goverment will lose their right to enter the promotion qualifying competition. Thus officials have formed a prudent behavior model of borrowing. Especially in recent years, the central government has paid more and more attention to preventing debt risks. In October 2014, the State Council issued *The Decision of the State Council on Deepening the Reform of Budget Management System,* proposing that government debt should be included as a hard indicator in the performance appraisal. Local governments will undoubtedly take the control of debt risk into consideration under the goal of preventing debt risk by the central government. Horizontally, under different economic cycles, the central government may focus on different objectives, so local governments will adjust the scale of financing debt according to the central objectives to maximize the possibility of promotion.

Jia *et al*. (2017) examined the impact of multi-dimensional promotion incentives on local governments' debt borrowing behavior from the perspectives of growth performance promotion incentives, fiscal sustainable promotion incentives, and promotion incentives for people's livelihood public services. Then, the change of macroeconomic situation may cause officials to have different focuses on multiple objectives. Therefore, the influence of promotion pressure on local officials' borrowing behavior is not linear or single, but will show different performance under different pressures. Especially in recession period,

when the risk prevention requirements are more prominent, the more promotion pressure, the more cautious actions local officials are likely to take. Thus, the conclusion the existing literature draws from a static perspective that "the greater the promotion pressure, the greater the debt issuance" is not reliable.

3.1.2. Research Hypothesis

In this section, a simple theoretical analysis framework is proposed to discuss how the promotion pressure faced by local officials will affect debt financing decisions of local governments under multi-dimensional promotion incentives. Assuming that local governments are facing dual assessment objectives of "growth" and "risk", and that the issuance of implicit debt is decided by local governments autonomously,[1] and has dual consequences of stimulating economic growth and increasing economic risks.[2]

During the boom period, the economic situation is stable, and local officials focus on the "growth" target. Moreover, the more prosperous the economy is, the more fierce the competition for economic growth among officials will be. Because there are no worries about economic risks, government officials will increase the issuance of local debt. Meanwhile, the greater the promotion pressure, the more likely local officials are to take radical actions, and the more debt issuance. In the recession, "stability" has become a more objective consideration for local officials. Considering the possible risks of local debt or the target regulation of the central government on the amount of local debt, local governments will take the initiative to slow down the issuance of debt during the recession. The higher the promotion pressure, the higher the demand for risk prevention, the more likely local officials are to take cautious actions, and the faster debt issuance may slow down.

If the above analysis is valid, then we should see that promotion pressure will aggravate the pro-cyclical performance of local debt in the economic cycle. That is, in the boom period, the greater the promotion pressure, the higher the demand for economic growth, the faster the growth rate of debt; in the recession period, the greater

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[1] On the one hand, the transparency of implicit debt is low, which is not easy to be supervised by the central authorities, and the autonomy of local governments is high. On the other hand, local governments have a strong influence on financial institutions, especially city commercial banks. They control the actual allocation right of financial institutions to a large extent and exert administrative intervention on credit allocation of financial institutions through various invisible ways (Qian *et al*., 2011) to weaken market factors' binding effect on local debt financing. This also provides a guarantee for local governments to increase their debt issuance at a faster pace than the market.

[2] The logic of local government behavior behind explicit debt and implicit debt is quite different. The transparency of explicit debt is relatively high, which is strictly supervised and regulated by the central government, and the autonomy of local governments is low. Therefore, this paper mainly analyzes local implicit debt.

the promotion pressure, the higher the demand for risk prevention, the faster the debt issuance rate may slow down. Later, we use local debt data to test the promotion pressure of local officials.

3.2. Model Setting

3.2.1. Model Design

In order to test the above two hypotheses, referring to Fang and Zhang (2009), we introduce the interaction term between promotion pressure and output gap of local officials, and construct the following model:

$$\begin{aligned} Debt_{it} = {} & \alpha + \beta_1 Gap_{it} \times Boom_{it} \times Press_{it-1} + \beta_2 Gap_{it} \times Recession_{it} \times Press_{it-1} \\ & + \varphi Market_{it} + \gamma X_{it} + \mu_i + \varepsilon_{it} \end{aligned} \tag{2}$$

Among them, *Press* indicates the promotion pressure faced by local officials. *Market* is a market constraint which is measured by credit environment and local land income. The remaining variables are the same as those in model (1). If $\beta_1>0$, it means that promotion pressure aggravates the pro-cyclical characteristics of debt in boom period, that is, the higher the promotion pressure is, the faster the accumulative speed of debt accelerates with the increase of output gap, and vice versa, if $\beta_1<0$, it means that promotion pressure weakens the pro-cyclical characteristics of debt in boom period. If $\beta_1=0$, it shows that there is no significant difference in debt financing behavior among regions with different promotion pressures, that is, promotion pressures do not affect debt financing behavior of local governments. Similarly, the positive and negative signs of β_2 describe the effect of promotion pressure on the characteristics of local debt financing cycles during the recession.

3.2.2. Constructing Promotion Pressure Index

The measurement of promotion pressure has not been agreed yet. In this regard, we divide the sample cities into three categories: autonomous regions, municipalities and ordinary provinces. For the first two categories (autonomous regions and municipalities), the weighted average of the indicators of the areas in which they belong is compared, and for the ordinary provinces, the weighted average of the indicators of all the adjacent provinces is compared. When GDP growth rate and fiscal surplus are less than the calculated weighted average, they should be assigned 1, otherwise 0; when unemployment rate is greater than the corresponding weighted average, they should be assigned 1, otherwise 0; and then the promotion pressure index of local officials can be obtained by adding the scores. The variable value range

is [0, 3]. In order to avoid endogeneity, we will lag the first stage of the promotion pressure index.

4. Empirical Analysis

4.1. Empirical Results

The empirical results show that the regression coefficients of the cross terms of boom and recession (*Gap*×*Boom*×*Press* and *Gap*×*Recession*×*Press*) are significantly positive, as shown in Table 3 (1). When we further control the credit cycle and land income, the conclusion remains unchanged, as shown in Table 3 (2)~(4). Based on the regression results in Table 3 (4), for every percentage point increase in output gap during boom period, the growth rate of government implicit debt increased by 2.21% for those with promotion pressure of 1, and 4.42% for those with promotion pressure of 2. Where the output gap (negative) decreases by one percentage point during the recession, the growth rate of government implicit debt decreases by only 0.83% where the promotion pressure is 1; whereas the growth rate of government implicit debt decreases by 1.66% where the promotion pressure is 2. This means that the pressure of promotion exacerbates the degree of debt accumulation speed to the output gap. That is, in the boom period, the greater the pressure of promotion of local officials, the faster the increase of government implicit debt; in the recession period, the greater the pressure of promotion, the greater the slowdown of the accumulation of government implicit debt. Thus the hypothesis is verified.

4.2. Further Analysis

In analysis above, we confirmed that promotion pressure strengthens the pro-cyclical behavior of local debt (implicit debt), and when controlling the market environment, the aggravating effect is still significant. It shows that promotion pressure is an important factor in the pro-cyclical borrowing of local governments, and that the pro-cyclical borrowing is the result of local government officials' active choice for their own interests. Why do we have such a result? It is necessary to further investigate the influence of promotion pressure on local government debt decision-making from the perspective of government debt demand. The ironing of fluctuating demand, economic development demand, investment demand and actual financial expenditure demand are the most basic requirement for local governments to maintain stability and ensure development. As the leader of borrowing, local officials must first achieve these basic goals in order to obtain promotion. Therefore, we start with many more detailed objectives to examine the pressures faced by officials will aggravate the pro-cyclical changes in local debt.

Table 3. Promotion Pressure and Local Debt Cycle

	(1)	(2)	(3)	(4)
	Hidebt	*Hidebt*	*Hidebt*	*Hidebt*
Gap×Boom×Press	0.0214***	0.0237***	0.0223***	0.0221***
	(0.0053)	(0.0067)	(0.0066)	(0.0067)
Gap×Recession×Press	0.0106***	0.0089**	0.0092**	0.0083*
	(0.0034)	(0.0044)	(0.0042)	(0.0044)
Credit		0.1659*		0.0500
		(0.0962)		(0.2168)
Land			0.1144	0.0643
			(0.0742)	(0.2052)
Control varibales	Yes	Yes	Yes	Yes
AR(1)	0.001	0.001	0.001	0.001
AR(2)	0.077	0.078	0.077	0.081
HansenTest	0.763	0.577	0.671	0.678

Note: Control variables are *ExShock*, *Year2004*, *Year2009*, L.*Hidebt* and *Constant* (Constant).

According to the existing literature, this paper divides the factors affecting the change of debt scale into the following aspects: internal promotion pressure (ironing fluctuating economic demand, economic development demand, investment demand, actual financial demand), external market financing environment (credit environment, land income) and external impact of economic system (foreign trade volatility, income tax reform, and financial crisis in 2008). Previous analysis has controlled the external market financing environment and external shocks of the economic system. In order to further investigate the impact of promotion pressure on local government debt decision-making, we have increased the consideration of economic development demand, investment demand and actual financial demand, that is, we have increased the control variables: per capita GDP, fixed assets investment and financial gap (representing economic development demand, investment demand and actual financial expenditure demand respectively). The results show that after controlling per capita GDP, fixed asset investment and financial gap, promotion pressure no longer aggravates the pro-cyclical behavior of local debt (implicit debt).[1] This means that economic development demand, investment demand and actual financial expenditure demand are the ways that promotion pressures affect the pro-cyclical characteristics of local debt. That is to say, the influence of officials' promotion pressure on local debt borrowing behavior is actually realized through economic development demand, investment demand and financial expenditure demand.

[1] The empirical results have not been displayed and reserved because of the length of this paper.

4.3. Robustness Test

A variety of econometric methods have been used in order to ensure the robustness of the results. In order to make this conclusion more credible, we will further carry out robustness test. First, considering the unique position of the municipalities in China, we have eliminated the four municipalities from the sample. Second, we only build the promotion pressure index on the basis of GDP growth rate. Third, we re-tested the second debt measurement methods. The results of robustness test further show that the conclusions obtained in this paper are quite robust.[1]

5. Conclusions and Implications

This paper examines the dynamic characteristics of local government debt in the economic cycle, and explores the internal causes of local government debt accumulation from the perspective of economic cycle. Due to the lack of local debt data, this paper first estimates and collates provincial debt data in China from 2002 to 2014 based on the existing literature, and uses the system GMM model to examine the asymmetric changes of the scale of local government debt in the macroeconomic cycle of China, and discusses the underlying causes.

This paper finds that: (1) Local debt accumulation speed presents a pro-cyclical feature. Whether it is recession or boom, debt accumulation speed is positively related to output gap. For every percentage point increase in the output gap, the growth rates of local implicit debt in boom and recession increased by 5.92% and 3.97% respectively. The more prosperous the economy is, the faster the debt accumulation will take place. The more serious the recession is, the slower the debt accumulation will be. The performance of different types of debt is different. The accumulation rate of implicit debt is always pro-cyclical, while that of explicit debt is only pro-cyclical in recession. Even if we control the market financing environment, this pro-cyclical feature is still obvious. (2) Local governments have different emphasis on the dual objectives of "growth" and "risk" at different stages of the economic cycle, which leads to the pro-cyclical phenomenon of local debt in the economic cycle. Empirical test of explanatory inference shows that promotion pressure is an important factor driving officials to make debt decisions according to the economic situation, which aggravates the pro-cyclical degree of implicit debt. The game between the local government, the central government and the market has been fully reflected in the local debt problem. Under the GDP promotion championship, promotion pressure is an important driving force for local governments to develop their economy. However, whether promotion pressure will

[1] The same as above.

inevitably increase the scale of local debt, or whether the impulse to borrow can be realized, is not only affected by the type of debt and the market environment, but also related to the macroeconomic environment.

The implications of the conclusion are as follows. On the one hand, in recent years, the central government requires all regions to actively promote structural adjustment and the transformation of old to new momentum in order to maintain the healthy development of the economy. In this context, regulated local government investment and financing system is an important guarantee for achieving this goal. The decision-making of debt financing is influenced by the promotion pressure of local officials. In order to make the debt funds more reasonably applied to the big goal of the transformation of old to new momentum, the criteria for the promotion of officials need to be gradually changed from taking high-speed economic growth as the core to taking high-quality economic development as the core. In this way, local officials will pay more attention to the efficiency of economic development, promote local governments to change the "extensive" development model, promote debt funds to innovative subsidies and other high-efficiency areas, and ultimately enable local governments to improve total factor productivity to ensure that economic development into a virtuous circle. On the other hand, the impact of promotion pressure on the scale of local debt is closely related to the macroeconomic environment. While maintaining the stability of macro-policy, the government should pay attention to the control of debt management. In the recession, local governments will take the initiative to slow down the issuance of debt under the demand of risk prevention. Since debt financing can be used as financial guarantee for local governments to promote regional development, the central government should not overemphasize local debt crisis or even cancel local debt financing in a "one-size-fits-all" manner. However, in the boom period, local governments may accelerate the issuance of debt across the market constraints. The central authorities should strengthen the supervision of implicit debt increments so as to prevent excessive expansion of local debts.

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