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Article

The Scale Logic of Government Debt for Overall Development and Security—From the Perspective of Dual Scale Economy of Explicit and Implicit Debt

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Abstract

Government debt can potentially enhance high-quality economic development, yet its effects and risks diverge substantially under the interplay of scale economies and diseconomies. Against the backdrop of the 20th CPC Central Committee's Third Plenary Session, which emphasized coordinated development-security integration and local debt risk resolution, this study investigates the debt-development nexus through the lens of dual-scale economies in explicit/implicit local government debt. We innovatively incorporate resource allocation efficiency and investment levels as mediating factors. Empirical results demonstrate the following: (1) An inverted U-shaped relationship between local debt scale and economic development quality during two debt rectification periods, with implicit debt exhibiting a more pronounced curvilinear pattern; (2) Both resource allocation efficiency and investment levels significantly moderate the scale economies of explicit/implicit debt, yet paradoxically constrain development quality. Key obstacles include short-term adjustment costs, income disparity, and innovation suppression. Notably, while government debt currently operates within scale economies, implicit debt possesses greater borrowing capacity than explicit debt. Debt-driven economies of scale exhibit significant regional heterogeneity. In coastal areas, these effects are more sustainable, whereas in inland areas it is relatively weak. Policy implications suggest the following: (1) Recognizing debt's nonlinear developmental impacts; (2) Optimizing resource allocation to improve investment quality; (3) Clarifying central-local fiscal responsibility demarcation; (4) A regionally differentiated collaborative strategy is needed for coordinating debt, investment, and resource allocation.

Keywords: high-quality development; government borrowing; economies of scale; resource allocation efficiency; investment level



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1. Introduction

Coordinated development and security are crucial for political stability, national rejuvenation, and world peace in the world's largest developing country. The central government's 2024 report clearly stated that we should prioritize high-quality development to promote high-level security, align high-quality development with high-level security, address both the symptoms and root causes of local debt and other risks, and maintain overall economic and financial stability. Since the outbreak of the global financial crisis in 2008, major economies around the world have generally adopted debt financing and expanded spending to drive short-term economic growth. [U.S. Department of the Treasury \(2023\)](#)

wrote to Congress that the size of the U.S. federal government debt has reached the debt ceiling of \$31.4 trillion. If the debt ceiling is not raised or suspended, the United States will face the risk of debt default. Since the reform and opening up, China has constantly prioritized economic construction as the central focus, which has somewhat alleviated the downward pressure on the economy (Y. L. Zhu et al., 2024). However, the high level of local government debt has become a “gray rhinoceros,” threatening China’s financial stability. The scale economy and uneconomical disputes over local government’s explicit debt and implicit debt continue, which makes obligations raising drive economic development and may undermine the realization of the goal of economic development security (S. J. Li & Tian, 2022). With the combination of multiple pressures such as weak global economic recovery, prevailing unilateralism, the far-reaching impact of the epidemic, over-capacity and insufficient effective demand, China advocates a moderately aggressive fiscal policy (Mao & Ren, 2024). What is the impact of the debt scale on high-quality economic development? What is its internal logic? The answers to a series of questions not only help the government to achieve high-quality development tasks, but also clarify the future trend of government debt scale.

In theory, it is believed that local government debt not only has a direct effect on economic growth but also has an impact on high-quality development. The classical economic school believes that increasing capital investment can stimulate production activities and promote economic growth. However, in reality, government borrowing will lead private funds to enter the financial sector, lead to the rise in market interest rates, squeeze the space for private investment activities, and ultimately hinder the development of the market economy (Blanchard, 1984; Xie et al., 2024; Demirci et al., 2019). Therefore, although the debt growth alleviates the fiscal deficit and development pressure, it is contrary to the Schumpeter growth model of innovation-driven development and generally inhibits the realization of high-quality development goals such as innovation, investment and welfare (Y. X. Zhang & Zhao, 2023). Moreover, auctions or placement typically sell government bonds. Once individual investors hold a risk-averse attitude or the demand for money liquidity is large, the central bank will take over a large number of bonds. If the bond financing investment fails, the central bank will be forced to start the money printing machine to repay the debt. Both of these situations lead to a serious inflation crisis (Woo & Kumar, 2015), which not only affects economic stability and sustainability but also exacerbates social inequality and political instability. European sovereign debt crisis on the Italian unemployment rate as well as the intensity of the economic recovery in the years after 2015 (Lucio et al., 2024). Keynesians are optimistic about government debt. They believe that the economic stimulus plan based on government debt, regardless of the short-term or long-term debt of local governments, will inevitably promote economic growth through the expansion of effective social demand (Owusu-Nantwi & Erickson, 2016). There is a general consensus on the nonlinear impact of the generalized scale of local debt on high-quality development (W. J. Liu & Wang, 2018; Z. L. Zhang & Fang, 2021). Local government debt plays a key role in promoting business credit financing by intensifying the financing constraints faced by enterprises (Yu et al., 2024). Especially in areas with high investment preference and low level of financial development, government debt can better ensure high-quality development through fiscal efficiency (Zhao & He, 2024). However, the presence of good governance practices and widespread diffusion of information and communication technologies (ICTs) serves as crucial conditional factors (Sana et al., 2024). Some scholars believe that explicit and implicit debt ratios have threshold effects on high-quality development. Once the threshold is exceeded, the imbalance between supply and demand in the credit market under government intervention will lead to a low-speed impact mechanism of government debt on high-quality development (Huang et al., 2020).

Some scholars also believe that under different debt stock sizes, local borrowing has a nonlinear impact on high-quality development, and there is an “appropriate range” of debt stock size (G. J. Li et al., 2023). However, the rapid increase in the local debt ratio distorts the industrial structure, inhibits total factor productivity, and weakens the scientific and technological innovation of enterprises, which ultimately has a resource curse effect on high-quality development.

There has been a failure in distinguishing the heterogeneity and connection of government debt scale economies at the explicit level and the implicit level to explore the explicit scale economy and the implicit regulation.

The similarities and differences among the economic sources of the model may be one of the reasons for the great controversy in the current research. At the same time, based on the heterogeneity of China’s resource allocation efficiency in different periods, the government’s explicit debt financing usually needs to undergo strict evaluation and supervision, which helps to ensure the rational use of funds and the effective implementation of projects, improve the efficiency of resource allocation, and encourage the growth economies of scale. The implicit debt may lead to the distortion of the government in resource allocation (capital allocation efficiency), such as over-committing to social security expenditure and ignoring the demand for productive investment, affecting the realization of economies of scale. Therefore, the efficiency of resource allocation is undoubtedly an important factor affecting the economies of scale of explicit and implicit debt. Additionally, the government can use the explicit debt funds it raises through bond issuance to invest in infrastructure, education, scientific research and other fields. These investments help to improve production efficiency and expand production scale, so as to promote the development of economies of scale; Implicit debt may include the government’s commitment to future social security, public services and other aspects, which may limit the government’s disposable financial resources, reduce the allocation of funds for productive investment, and affect capital accumulation and the realization of economies of scale. Therefore, the investment level must be an important factor affecting the economies of scale of explicit and implicit debt.

While government debt expansion often entails a trade-off between investment levels and resource allocation efficiency, the latter cannot fully substitute for the former. As evidenced by China’s recent economic development trajectory, a synergistic model has emerged one that concurrently enhances both resource allocation efficiency and investment levels. This dynamic is shaped by several institutional factors: (1) the maturity of the business environment (which influences resource waste and corruption), (2) the development of the social security system (which determines the domains of debt investment) and (3) the modernization of the industrial chain (which governs the returns on debt investment). Additionally, the degree of economic openness affects the attractiveness of debt to foreign capital. Collectively, these institutional dimensions exert significant influence on both explicit and implicit debt scale economies, as illustrated in the analytical framework (Figure 1).

A mature business environment characterized by sound property rights protection, fair market competition and low transaction costs can reduce resource misallocation and allow debt funds to flow more precisely to high-productivity sectors. The research of Ji et al. (2021) indicates that in regions with a high degree of marketization, the negative impact of government debt expansion on resource allocation efficiency is relatively weak. When the business environment is mature, the positive effect of resource allocation efficiency on high-quality development becomes more sustainable, as institutional public goods such as the rule of law and transparency enhance the productive use of debt funds, thereby avoiding the suppression of growth by inefficient investment.

Social security also indirectly improves resource allocation efficiency by reducing residents’ precautionary savings and lowering investment risks of enterprises. Research

by Cui et al. (2024) shows that reducing the contribution rate for endowment insurance has significantly enhanced resource allocation efficiency and promoted macro-level total factor productivity growth. This effect is particularly pronounced in the central and eastern regions, where social security systems are more developed.

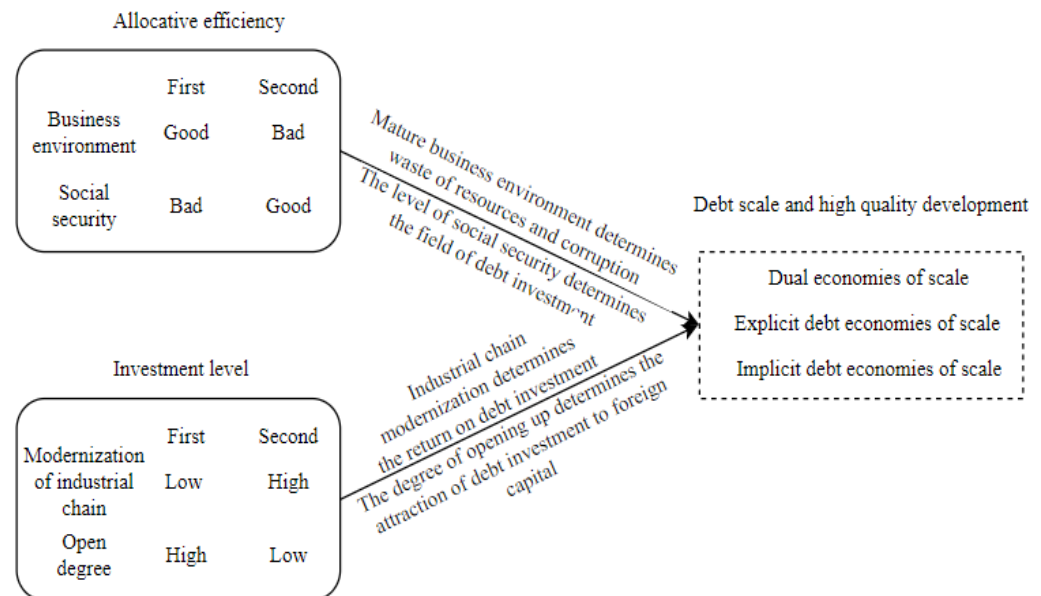


Figure 1. The logic of how resource allocation efficiency and investment level affect both explicit and implicit government debt economies of scale.

Furthermore, Cai (2013) pointed out that insufficient social security leads to rapidly rising labor costs, triggering the “reverse Kuznetization” phenomenon, where excessive capital replaces labor. In contrast, robust social security systems support innovation-driven growth by lowering employment risks for firms and enhancing the efficiency of resource allocation.

Therefore, it is argued that improvement in the maturity of the business environment and the expansion of social security will significantly strengthen the contribution of resource allocation efficiency to high-quality economic development.

The modernization of the industrial chain enhances the return on debt investment through technological upgrading and full-chain collaboration. Zhan and Liang (2024) argue that the integrity and advancement of the industrial chain can reduce the transaction costs of intermediate goods and increase the marginal output of capital invested capital through debt. Moreover, industrial chain modernization can amplify the multiplier effect of debt funds via economies of scale, forming a positive cycle of “debt leverage—industrial upgrading—growth acceleration”.

Opening up to the outside world alleviates the constraints of debt financing through the introduction of foreign capital and technology spillover. Z. X. Li and Chen (2019) argue that in provinces with a relatively high proportion of foreign capital, the crowding-out effect of debt expansion on private investment is reduced, as foreign capital can fill the credit gap and bring advanced management expertise. Furthermore, regions with a high degree of openness are more likely to absorb international technology spillover and improve the efficiency of debt fund utilization.

Chai (2013) also verified that a higher penetration rate of foreign capital coincides with increased total factor productivity, thereby enhancing the sustainability of debt investment. Therefore, it is believed that the modernization of the industrial chain enhances returns on debt investment through technological synergy, while openness to the outside world alleviates financing constraints by supplementing domestic capital with foreign inflows.

Together, these factors reinforce the positive effect of investment levels on the economies of scale of debt in debt utilization.

The existing literature predominantly adopts an inverted U-shaped framework to describe the relationship between local government debt and economic growth (Sun & Tai, 2019). This framework emphasizes that debt expansion initially promotes growth, but once a certain threshold is exceeded, investment efficiency declines due to debt accumulation (Mao & Ma, 2022). This study advances beyond the explanatory limitations of a single nonlinear relationship by introducing the mediating mechanisms namely dual-scale economies, resource allocation efficiency, and investment level threshold effect, and identifies the compound mediating pathway that extends beyond the traditional inverted U-shaped model.

(1) Dual-scale economies linkage effect: This effect compensates for the limitations of the traditional “scale-efficiency” linear assumption. In this study’s framework, the debt square term is introduced to capture the inflection point of debt efficiency.

(2) Resource allocation efficiency as a mediator: This mediating reflects the “quality differentiation” in the direction of debt fund allocation. J. Zhu and Xu (2023) found that local government debt exhibits an inverted U-shaped impact on the efficiency of financial resource allocation. Building on this, the current study constructs a composite regression model in which resource allocation efficiency mediates the effect of local government debt economies of scale on high-quality economic development. The aim is to further explore the direction and mechanism by which resource allocation efficiency influences the inflection point in the scale effect of local government debt.

(3) Investment-level threshold effect: This addition address ongoing debates regarding fiscal multiplier variation. L. Liu and Wang (2025) estimated that China’s local fiscal multiplier is approximately 2.071 based on implicit debt replacement policies since 2015. The present study identifies both direct and indirect effects of debt on high-quality development via investment related intermediaries, and introduces an investment square term to explore potential threshold effect of investment levels.

(4) Governance of implicit debt: Risk such as concealment and maturity mismatches in China’s implicit debt structure have been widely discussed (Feng & Liu, 2025). In developing economies, implicit debt is often driven by fiscal decentralization and growth pressure. Excessive decentralization amplifies the incentive to borrow (L. Xu et al., 2022). However, China’s approach to managing local debt combines “market-based replacement with central government transfer payments, underscoring the importance of further exploring the underlying mediating mechanism.

The 18th CPC National Congress Document No. 43 of The State Council (Guo Fa [2014]) first established a framework for local government borrowing, clearly defining the boundaries of responsibilities between the government and enterprises. This marked a shift in management from extensive to standardized practices. Beginning in 2013, the policy went through brewing and pilot stages, and by 2017, the targeted inclusion of explicit debt within budgetary management had been achieved. In 2017, Document No. 88 of the General Office of the State Council focused on risk mitigation and established an emergency response mechanism. Since 2018, this has been coordinated with the policy goal of “curbing the increase of hidden debt”. By 2022, although the scale of hidden debt exceeded its previous peak, phased progress had been made in achieving the risk mitigation targets. The of each stage differ significantly: the first phase of rectification focused on “rule establishment,” while implicit debt continued to expand. The second round emphasized “risk prevention,” during which the growth rate of hidden debt fell below 5%, and the number of default incidents declined. This reflects both internal consistency and cross-phase differentiation. This classification also aligns with international practices and mirrors the typical stages in sovereign debt governance worldwide: “Rule establishment—risk disposal”. The observed

policy lag of 3 to 5 years is also consistent with international experience. This paper divides the research into two stages: the first rectification (2013–2017) and the second rectification (2018–2022). Based on the full consideration of the relationship between the scale of government debt and high-quality development, this paper deeply analyzes its theoretical mechanism, bridging the differences between previous studies on government debt and high-quality economic development, and expanding new understanding for the integration of interdisciplinary systems such as finance, and macroeconomics.

2. Data Sources and Methods

2.1. Data

The data in this paper are macro data from the 2014–2023 China Science and Technology Statistics Yearbook, China Population and Employment Statistics Yearbook, China Statistics Yearbook, China Environment Statistics Yearbook, China Information Yearbook, the official website of the National Bureau of Statistics, wind information platform and Zhongli data network. The government's explicit and implicit debts draw on the debt boundary divided by the financial risk matrix of Wu et al. (2023), the business environment draws on the business environment index system constructed by R. F. Yang and Wei (2021), and the industrial chain modernization draws on the evaluation index system of China's industrial chain modernization level constructed by H. Zhang et al. (2022). At the same time, high-quality economic development encompassed five key dimensions: innovative development, coordinated development, green development, open development and shared development. The evaluation index system for high-quality economic development is presented in Table 1:

Table 1. Evaluation index system for high-quality economic development.

Overall Goal	Criterion Layer	First-Level Indicator	Secondary Indicators
High-quality economic development	Innovative	GDP Growth Rate	Regional GDP Growth Rate
		Intensity of R&D Investment	R&D expenditure of industrial enterprises above designated size/regional GDP
		Investment Efficiency	Incremental Capital Output Ratio (ICOR) = Investment rate/regional GDP growth rate
		Technical Trading Activity	Technology transaction volume/regional GDP
	Coordination	Demand Structure	Total retail sales of consumer goods/regional GDP
		Urban-Rural Structure	Urbanization rate
		Industrial Structure	The increase in the proportion of the tertiary industry in regional GDP
		Government Debt Burden	Government debt balance/regional GDP
	Green	Energy Consumption Elasticity Coefficient	Energy consumption growth rate/regional GDP growth rate
		Wastewater Output Per Unit	Total wastewater discharge/regional GDP
		Waste Gas Output Per Unit	Sulfur oxide emissions/regional GDP
	Open	Degree of Dependence on Foreign Trade	Total import and export volume/Region GDP
		Proportion of Foreign Investment	Actual utilization of foreign investment/regional GDP
		Degree of Marketization	Regional marketization index
	Share	Proportion of Labor Remuneration	Labor remuneration/regional GDP
		The Elasticity of Residents' Income Growth	The growth rate of per capita disposable income of residents/the growth rate of regional GDP
		The Consumption Gap between Urban and Rural Areas	Per capita consumption expenditure of urban residents/Per capita consumption expenditure of rural residents
		The Proportion of Fiscal Expenditure related to People's Livelihood	The proportion of local fiscal expenditures on education, medical and health care, housing security, social disability and employment in local fiscal budget expenditures

2.2. Methodology

The classification of “explicit debt” and “implicit debt” stems from the differentiated research on the legal attributes and risk transmission mechanisms of government liabilities. Explicit debt refers to liabilities that are clearly defined under regulations such as the Budget Law and publicly disclosed through contractual instruments such as national bonds or local government bonds. Their scale and repayment obligations are directly reflected in the government’s balance sheet (Y. Y. Yang & Jia, 2025). Implicit debts by contrast, are concealed due to the absence of legally binding repayment commitments and mainly include three categories: (1) Contingent liabilities incurred by local governments through off-the books borrowing mechanisms, such as financing platforms and public–private partnership (PPP) projects. (2) Future funding shortfalls for social security expenditures, including pensions and medical insurance. (3) Non-performing assets of financial institutions for which the government provides passive guarantees to maintain economic stability (Yi et al., 2022). This paper draws on Brixi’s (1998) fiscal risk matrix, to classify and calculate debt. Explicit and implicit debts are, respectively, represented by the balance of government bonds. The essential difference between the two lies in the risk pricing mechanism: explicit debt is constrained by market interest rates, and the cost of default is quantifiable; in contrast, implicit debts, backed by government credit creates moral hazard and is more likely to trigger regional financial systemic risks (T. Wang & Gao, 2019).

This study employs the Generalized Method of Moments (GMM) to analyze the relationship between local government debt in China and high-quality economic development. The model is particularly applicable due to the unique characteristics of the Chinese context. On one hand, explicit and implicit local government debts are deeply intertwined, and there are significant bidirectional causality and omitted variable biases between debt levels and factors such as resource allocation efficiency and investment levels. GMM effectively addresses these issues through the use of instrumental variables and dynamic settings. On the other hand, the nonlinear effects of debt on high-quality economic development such as threshold effects captured by the square terms and the dynamic nature of mediating mechanism align well with GMM’s flexibility in incorporating both dynamic and nonlinear variables. This makes the model especially suitable for analyzing the complex and evolving features of China’s economic transformation. For other countries, the applicability of GMM depends on whether similar characteristics are present such as complex debt formation mechanisms, pronounced endogeneity, and dynamic effects. In such cases, the model offers transferable analytical value.

2.2.1. Identification of the Relationship Between Government Explicit and Implicit Debt Scale and High-Quality Economic Development

The System GMM model has excellent adaptability in dealing with the endogenous problem of lag dependent variables and explanatory variables, especially for short panel data, so this paper selects the System GMM model for regression fitting. Additionally, Zhang and Zhao used the squared of the government’s total debt to test the nonlinear effect of government debt on high-quality economic development. They also took into account the general law of diminishing returns to scale (Y. X. Zhang & Zhao, 2023). To figure out the economies of scale of explicit debt and implicit debt, the nonlinear econometric model of the square term of the size of explicit debt and implicit debt is used. The introduction of a squared term not only enables accurate identification of the inflection point in the debt-growth relationship, but also helps mitigate endogeneity bias more effectively than a linear model. Moreover, the resulting output can directly inform the determination of a prudent debt threshold. The model is specified as follows:

$$Y_{it} = \alpha + \alpha_1 do_debt_{it} + \alpha_2 do_debt_{it}^2 + \alpha_3 re_debt_{it} + \alpha_4 re_debt_{it}^2 + \alpha_5 X_{it} + \varepsilon_i \quad (1)$$

Among them, Y_{it} is the high-quality economic development level of i province in t , do_debt_{it} and re_debt_{it} are the government explicit and implicit debt of i province in t , respectively, and X_{it} is the control variable (learn from some control variables selected by [Y. X. Zhang and Zhao \(2023\)](#), including economic development level, population size, central to local transfer payment, and foreign direct investment).

The level of economic development is a core regulatory factor for debt sustainability. According to tax smoothing theory, regions with high economic growth can alleviate debt pressure by expanding their tax base, whereas debt accumulation in low-growth regions is more likely to trigger a fiscal crowding-out effect ([Barro, 1979](#)). Population size also has a regionally differentiated impact on local government debt, particularly through the effects of population aging, and the relationship exhibits a significant nonlinear pattern ([C. L. Wang et al., 2025](#)). Transfer payments from the central government to local governments function as a risk compensation mechanism under fiscal decentralization. In the Chinese context, such transfer payments help curb the disorderly expansion of local debts through a combination of “special-purpose bonds and general fiscal transfers” ([Chen et al., 2020](#)). Moreover, the technology spillover effects of foreign direct investment (FDI) can enhance total factor productivity, thereby indirectly strengthening a region’s debt-servicing capacity. Overall, these four types of control variables systematically capture the heterogeneous impact of government debt through the transmission chain of “economic fundamentals—fiscal structure—external capital”.

2.2.2. A Model of the Impact of Debt Scale on Resource Allocation Efficiency and Investment Level

Referring to the treatment method of [Z. G. Xu et al. \(2024\)](#), the influence of government explicit and implicit debt scales on the efficiency of resource allocation and investment level on high-quality economic development in Formula (1), although it is described in the introduction, it still needs to be empirically verified whether it exists or not, and the specific role of the two debt scales on intermediate variables needs to be determined. Furthermore, we exclude the square term of debt, as there is no evidence to suggest that an increase in government debt will result in a decrease in resource allocation efficiency and investment.

$$Y_{it} = \beta + \beta_1 do_debt_{it} + \beta_2 re_debt_{it} + \beta_3 Z_{it} + \varepsilon_i \quad (2)$$

where Y_{it} , also known as the resource allocation efficiency or investment level, represents the capital allocation efficiency or investment of i Province in t years, and Z_{it} serves as the control variable in Formula (1). This variable includes factors such as the business environment, social security level, industrial chain modernization and the degree of opening-up.

2.2.3. An Extended Model of the Relationship Between Government Explicit and Implicit Debt Scale and High-Quality Economic Development

To test the impact of resource allocation efficiency and investment level on dual economies of scale, we decompose the impact of resource allocation efficiency and investment level of government debt scale agency in Equation (1), resulting in the following extended model:

$$Y_{it} = \gamma + \gamma_1 do_debt_{it} + \gamma_2 do_debt_{it}^2 + \gamma_3 re_debt_{it} + \gamma_4 re_debt_{it}^2 + \gamma_5 rae_{it} + \gamma_6 invest_{it} + \gamma_7 invest_{it}^2 + \gamma_8 X_{it} + \varepsilon_i \quad (3)$$

The law of diminishing marginal return of investment on high-quality economic development adds the square term of investment. However, there is no reason to believe that the efficiency of resource allocation has a nonlinear relationship with high-quality

economic development. Therefore, the square term of resource allocation efficiency remains absent, and the other variables follow Formula (1).

3. Results and Discussion

3.1. Descriptive Statistics of Variables

Table 2 shows the descriptive statistics of the main variables during the first and second rectification of government debt. In the two periods, high-quality economic development has made progress, and foreign direct investment, business environment, the level of opening up and the efficiency of capital allocation have declined, indicating that private investment, foreign investment and trade have played a less important role in promoting high-quality economic development in China. The scale of explicit and implicit debt and the expansion of central transfer payments, on the one hand, show that local governments rely on debt to develop the economic path; on the other hand, it shows that government investment has become the main option for the current high-quality development of China's economy, and the rising level of investment verifies that its source is mainly government investment, which is consistent with the idea of alleviating the economic crisis in the United States during the 1933–1938 Roosevelt New Deal period. The numerical superscript 2 for all variables in the table denotes squared terms.

Table 2. Descriptive statistics of variables.

Variable	Symbol	First Rectification			Second Rectification		
		Average	Standard Deviation	Observation	Average	Standard Deviation	Observation
Economy	Y	0.23	0.10	150	0.26	0.10	150
High-Quality							
Explicit Debt	Do_debt	1925.49	2360.84	150	8622.75	4682.91	150
Explicit Debt ²	Do_debt ²	9,281,078.19	18,282,458.11	150	96,281,436.89	105,976,484.01	150
Implicit Debt	Re_debt	1719.87	1715.80	150	3708.92	4780.69	150
Implicit Debt ²	Re_debt ²	5,901,922.37	18,056,719.97	150	36,611,087.79	120,555,117.53	150
Economy	Economic	24,422.98	18,466.49	150	34,955.10	27,315.12	150
Population	Human Scale	4592.73	2814.80	150	4682.42	2943.69	150
Central Transfer							
Payment	Transpay	18,657,995.33	8,702,635.60	150	25,242,108.67	12,179,495.77	150
FDI	FDI	5,472,101.33	5,042,822.21	150	4,990,053.48	5,506,194.71	150
Business							
Environment	BUSINESSENV	0.16	0.09	150	0.157	0.08	150
Social Security							
Level	SOCIALSECURITY	0.13	0.03	150	0.15	0.04	150
Modernization							
of Industrial	INDUSTRYMODERN	0.20	0.06	150	0.23	0.08	150
Chain							
Opening up							
Degree	OPENLEVEL	2.72	2.80	150	2.46	2.29	150
Capital							
Allocation	CAPITALEFFI	0.66	0.38	150	0.61	0.49	150
Efficiency							
Investment							
level	INVESTLEVEL	18,220.88	11,870.15	150	24,769.84	17,374.95	150

3.2. Systematic GMM Regression of Two Kinds of Government Debt Economies of Scale

Table 3 summarizes the relationship between local government's explicit and implicit debt scale and high-quality economic development during the full sample period, the first and second rectification periods. Controlling both the explicit and implicit local government debt scale and their square terms simultaneously results in a positive generalized government debt coefficient and a negative square term coefficient. This suggests an inverted U-shaped nonlinear relationship between the government debt scale and the high-quality level of the economy, aligning with the existing literature's conclusion of a

nonlinear relationship between the two. Simultaneously, the model sets up an inverted U-shaped relationship that aligns with the theoretical analysis of the law of diminishing marginal return of government debt. The difference lies in the varying economies of scale for different components of the government debt structure over different periods. The relationship between the scale of local government explicit and implicit debt and the level of high-quality economic development in the full sample period shows an inverted U-shaped relationship, indicating that both explicit and implicit debt inhibit high-quality economic development when their scale reaches a certain threshold. During the first rectification of government debt by the central government in 2014, although the explicit debt aligned with the inverted U-shaped relationship between scale and high-quality economy, the coefficient did not reach statistical significance. The scale of implicit debt significantly experienced the stage from economies of scale to diseconomies of scale. In this period, implicit debt had a greater impact on high-quality economic development than explicit debt. During the second rectification of government debt by the central government in 2017, both explicit and implicit debt showed an inverted U-shaped relationship with high-quality economic development, but the implicit debt scale coefficient was 0, indicating that the current scale of local government implicit debt is in the stage of diseconomies of scale, and increasing the ability to alleviate implicit debt is conducive to high-quality economic development. In addition, with the continuous improvement of the high-quality economic development level in different consolidation periods, the explicit debt economies of scale have emerged from nothing, indicating that the explicit government debt with the characteristics of low financing cost and high transparency is a macroeconomic regulation tool more in line with the high-quality economic development than the implicit debt. The scale of implicit debt after two rounds of government debt consolidation has become an important factor to curb high-quality development with the promotion of high-quality economic development.

Table 3. Systematic GMM regression results of two kinds of government debt economies of scale.

	Variable	Full Sample Period	First Rectification (2013–2017)	Second Rectification (2018–2022)
Core Explanatory Variable	Do_debt	$6.88 \times 10^{-6} *$	5.04×10^{-6}	$1.68 \times 10^{-5} **$
	Do_debt ²	$-2.39 \times 10^{-10} *$	-6.85×10^{-10}	$-5.96 \times 10^{-10} ***$
	Re_debt	$7.80 \times 10^{-6} **$	$2.80 \times 10^{-5} ***$	4.95×10^{-6}
	Re_debt ²	$-5.29 \times 10^{-10} ***$	$-2.73 \times 10^{-9} ***$	$-4.18 \times 10^{-10} ***$
	Economy	$2.60 \times 10^{-6} ***$	$2.35 \times 10^{-6} *$	$3.48 \times 10^{-6} ***$
Control Variable	Humanscale	$-3.07 \times 10^{-5} ***$	$-2.23 \times 10^{-5} ***$	$-3.60 \times 10^{-5} ***$
	Transpay	$-1.63 \times 10^{-9} *$	$-3.03 \times 10^{-9} **$	-1.78×10^{-9}
	FDI	$1.09 \times 10^{-8} ***$	$9.87 \times 10^{-9} ***$	$7.80 \times 10^{-9} **$
	Constant	$2.50 \times 10^{-1} ***$	$2.42 \times 10^{-1} ***$	$2.18 \times 10^{-1} ***$
	Do_debt turning Point	1.44×10^4		1.41×10^4
	Re_debt Turning Point	7.37×10^3	5.13×10^3	
	Observation	240	120	120
	Goodness of Fit	0.58	0.71	0.55
	Theoretical Consistency	Yes	yes	yes

Note: ***, **, * represent passing the test at the significance levels of 1%, 5% and 10% respectively.

3.3. An Empirical Analysis of the Relationship Between Two Kinds of Government Debt Scale and Resource Allocation Efficiency, Investment Level

Table 4 shows the impact of local governments' explicit and implicit debt scales on resource allocation efficiency and investment levels during the two government debt

consolidation periods. When controlling the explicit debt simultaneously the implicit debt coefficients of local governments show significant results at the significant level of 10%, accompanied by positive regression coefficients, while the explicit debt scale coefficients show no significant results. The expansion of the implicit debt scale in local government will enhance the efficiency of resource allocation. In terms of social investment, both the explicit and implicit debt scales can enhance the level of investment, with the implicit debt scale significantly contributing to this improvement. The difference is that during the two rectifications, the impact of local government's debt scale on the investment level was greater than the impact on the efficiency of resource allocation, and as time passed, the impact of the implicit debt scale on the improvement of the investment level increased, while the impact on the improvement of resource allocation efficiency decreased.

Table 4. Presents a test of the relationship between two types of government debt scale, resource allocation efficiency, and investment level.

Time		First Rectification (2013–2017)		Second Rectification (2018–2022)	
Dependent Variable		CAPITALEFFI	INVESTLEVEL	CAPITALEFFI	INVESTLEVEL
Core Explanatory Variable	Do_debt	-1.64×10^{-5}	3.16×10^{-1}	1.27×10^{-5}	3.16×10^{-1}
	Re_debt	$8.38 \times 10^{-5} ***$	$3.93 \times 10^{-1} *$	$2.87 \times 10^{-5} **$	$6.96 \times 10^{-1} ***$
	BUSINESSENV	$-1.07 **$	$-2.68 \times 10^4 ***$	$-1.58 ***$	$-3.86 \times 10^4 ***$
	SOCIALSECURITY	1.42	$-4.63 \times 10^4 ***$	1.96 **	$-5.35 \times 10^4 ***$
	INDUSTRYMODERN	$-2.42 *$	$-3.00 \times 10^4 *$	-1.24	-3.82×10^4
Control Variable	OPENLEVEL	$-7.98 \times 10^{-2} ***$	$-1.94 \times 10^3 ***$	$-2.03 \times 10^{-1} ***$	-6.08×10^2
	Economic	4.29×10^{-6}	$4.04 \times 10^{-1} ***$	-3.29×10^{-6}	-2.06×10^{-2}
	Humanscale	1.91×10^{-5}	8.52×10^{-2}	$8.12 \times 10^{-5} *$	2.67 ***
	Transpay	-1.03×10^{-8}	9.95×10^{-5}	$-2.41 \times 10^{-8} ***$	$1.91 \times 10^{-4} *$
	FDI	-1.45×10^{-8}	$7.43 \times 10^{-4} ***$	-8.33×10^{-9}	$9.97 \times 10^{-4} ***$
	Constant	1.30 ***	$2.25 \times 10^4 ***$	$1.50 \times 10^{+00} ***$	$2.31 \times 10^4 ***$
	Observation	120	120	120	120
	Goodness of Fit	0.55	0.94	0.57	0.92
	Theoretical Consistency	yes	yes	yes	yes

Note: ***, **, * represent passing the test at the significance levels of 1%, 5% and 10% respectively.

3.4. Empirical Analysis of the Influence of Resource Allocation Efficiency and Investment Level on Two Kinds of Government Debt Scale—High-Quality Economic Development

Columns (1), (2), (4) and (5) are the results of controlling the scale of explicit or implicit debt separately, and columns (3) and (6) are the results of controlling the scale of explicit and implicit debt at the same time. When controlled separately, the square coefficient of both explicit and implicit debt scales is significantly negative, indicating that there is an obvious inverted U-shaped trend in the explicit and implicit debt of local governments, that is, there is a range of economies of scale and diseconomies of scale between government debt and high-quality economic development. The difference is that during the first government debt consolidation, the inflection point of economies of scale of explicit debt is ahead of that of implicit debt, while during the second debt consolidation, the inflection point of economies of scale of implicit debt is against that of explicit debt. In addition, by comparing the average value of local government debt in different periods, it is found that the scale of both explicit and implicit debt is in the stage of economies of scale, and there is still enough room for local governments to borrow reasonably to promote high-quality economic development. Simultaneously, both the explicit and implicit square terms of government debt remain negative, suggesting that government debt represents a critical juncture where economics of scale for high-quality economic development are achieved. The difference is that during a rectification period, the economies of scale of explicit debt

are not significant. In addition, in different periods of consolidation, the inflection point of economies of scale of explicit debt is ahead of the inflection point of economies of scale of implicit debt. The government possesses ample borrowing capacity to foster high-quality economic development, while the borrowing capacity of implicit debt is comparatively more ample.

This paper examines the impact of resource allocation efficiency and investment level on high-quality economic development, compares the implicit or explicit debt coefficient in Table 3 during the two rectifications, and compares the explicit or implicit debt scale coefficient in Table 5 when controlling the resource allocation efficiency and investment level at the same time, and finds that the coefficient has changed significantly, indicating that the role of resource allocation and investment level in the relationship between government debt scale and high-quality economic development is obvious. In addition, with the control of resource allocation efficiency and investment level, the inflection point of an implicit debt-scale economy changes much more than the inflection point of an explicit debt scale economy. During the first rectification, the inflection point of the implicit and explicit debt scale economies is significantly advanced, while during the second rectification, the inflection point of the implicit debt scale economies is significantly shifted to the right, and the inflection point of the explicit debt scale economies is almost unchanged. Taking the second rectification of implicit debt as an example, local government financing platforms may invest funds in projects with low returns and high risks rather than areas that really promote high-quality economic development. With the expansion of the scale of implicit debt, the problem of resource mismatch may intensify, shifting the turning point of the economy from debt-driven growth mode to high-quality development to the right, which is also significantly negative to the coefficient of resource allocation efficiency and investment level in Table 5.

Table 5. The impact of the resource allocation efficiency and investment level on the scale of government debt and high-quality economic development.

Variable	First Rectification (2013–2017)			Second Rectification (2018–2022)		
	(1)	(2)	(3)	(4)	(5)	(6)
Do_debt	$1.46 \times 10^{-5} **$		2.61×10^{-7}	$2.35 \times 10^{-5} ***$		$2.04 \times 10^{-5} ***$
Do_debt ²	$-1.58 \times 10^{-9} *$		-3.14×10^{-10}	$-7.32 \times 10^{-10} ***$		$-7.07 \times 10^{-10} ***$
Re_debt		$4.32 \times 10^{-5} ***$	$4.56 \times 10^{-5} ***$		$2.08 \times 10^{-5} ***$	$1.81 \times 10^{-5} ***$
Re_debt ²		$-3.50 \times 10^{-9} ***$	$-3.56 \times 10^{-9} ***$		$-6.84 \times 10^{-10} ***$	$-6.05 \times 10^{-10} ***$
CAPITALEFFI	1.51×10^{-2}	-8.97×10^{-3}	-1.15×10^{-2}	$-5.49 \times 10^{-2} ***$	$-5.89 \times 10^{-2} ***$	$-5.47 \times 10^{-2} ***$
INVESTLEVEL	$-5.40 \times 10^{-6} **$	$-7.47 \times 10^{-6} ***$	$-7.75 \times 10^{-6} ***$	-1.65×10^{-6}	-2.57×10^{-6}	$-5.32 \times 10^{-6} ***$
INVESTLEVEL ²	-5.60×10^{-13}	3.95×10^{-11}	4.56×10^{-11}	-1.68×10^{-11}	-2.43×10^{-11}	2.38×10^{-11}
Control Variable	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Constant	$2.40 \times 10^{-1} ***$	$2.45 \times 10^{-1} ***$	$1.24 ***$	$2.25 \times 10^{-1} ***$	$2.66 \times 10^{-1} ***$	$1.23 ***$
Do_debt turning point	4.62×10^3			1.61×10^4		1.44×10^4
Re_debt Turning point		6.17×10^3	6.41×10^3		1.52×10^4	1.50×10^4
Observation	120	120	120	120	120	120
Goodness of Fit	0.74	0.78	0.78	0.60	0.63	0.66
Theoretical Consistency	Yes	Yes	Yes	Yes	Yes	Yes

Note: ***, **, * represent passing the test at the significance levels of 1%, 5% and 10% respectively.

The regional heterogeneity of debt-driven economies of scale warrants in-depth exploration. Research findings at the national level may obscure significant differences between coastal and inland regions or between economically developed and underdeveloped regions which arise from variations in institutional environments, market maturity, and fiscal capabilities across regions.

From the perspective of capital allocation efficiency, national data shows that its negative coefficient further diminished during the period from 2018 to 2022 compared to

2013–2014. However, regional disparities may be substantial. Coastal areas, characterized by a high degree of marketization, may experience relatively mild deterioration in capital allocation efficiency. Their market-oriented resource allocation mechanisms may help alleviate the distorting effects of debt expansion and reduce government-led resource misallocation. In contrast, in inland regions, where economies are more dependent on government-led investment and constrained by worker market mechanisms negative fluctuations in capital allocation efficiency may be more pronounced. Debt expansion, particularly implicit debt, may intensify the crowding-out effect on productive private investment or result in capital flowing into low-return projects, thereby amplifying efficiency losses.

In terms of investment levels, the trend of narrowing negative coefficients at the national level may also vary across regions. Coastal areas, with their more diverse economic structures, may experience a more pronounced narrowing of the negative investment coefficient. This suggests that debt-driven investment in these regions is more likely to flow into high-productivity sectors, aligning more closely with the objectives of high-quality economic development. In contrast, the narrowing of the negative coefficient in inland regions may be more limited, as investment in these areas often remains concentrated in traditional industries or infrastructure sectors with diminishing marginal returns. As a result, even with debt expansion, the contribution of such investment to high-quality development remains constrained.

It is also worth noting that the expansion of the implicit debt threshold at the national level defined as the increase in the “safe space” before losses emerge may differ significantly across regions. Coastal areas typically possess stronger fiscal capacity, easier access to capital markets, and higher asset return rates. Consequently, the threshold for implicit debt may expand more substantially, indicating that moderate levels of implicit debt can still support efficient resource allocation, and the resulting economies of scale may remain stable. In contrast, the implicit debt threshold in inland areas may expand only marginally, if at all, due to weaker fiscal sustainability. In such regions, implicit debt may reach its efficiency inflection point at a much smaller scale, and the constraints imposed by limited economies of scale become more prominent. These regional disparities collectively highlight that the effectiveness of debt-driven economies of scale is highly context-dependent. In coastal areas, improved investment efficiency and expanded implicit debt thresholds suggest that both explicit and implicit debt can contribute more sustainably to high-quality development. Meanwhile, the deterioration of capital allocation efficiency and the tighter threshold constraints observed in inland areas indicate that the effect of debt-driven economies of scale may be weak or even counterproductive.

3.5. Robustness Test

This section verifies the robustness of the results by conducting a re-regression using the full sample period. As shown in Table 3, the economies of scale associated with both explicit and implicit government debt remain statistically significant, indicating that the core conclusions are not sensitive to time segmentation. A full-sample regression was also performed for all indicators listed in Table 5. Both explicit and implicit debts continued to exhibit clear economies of scale, with their squared term coefficients being -2.13×10^{-10} and -6.13×10^{-10} , respectively. The coefficients for resource allocation efficiency and investment level remained negative, at -3.41×10^{-2} and -3.55×10^{-6} , respectively. These results confirm the stability of the model across the time series dimension. Overall, the regression results using the full sample are largely consistent with those presented in Tables 3 and 5, further validating the significant relationship between resource allocation efficiency, investment level, government debt scale, and high-quality economic development.

4. Conclusions and Recommendation

4.1. Conclusions

The global economic recovery is weak, and government debt has become one of the inevitable choices for China's high-quality economic development. It is particularly important to answer the questions whether and how to improve the high-quality economic development of local governments' debt expansion. This paper sets up a research framework for studying explicit and implicit debt economies of scale from the point of view of how efficiently resources are used and how much money is invested. It then compares the two periods of government debt consolidation that have happened since the 18th National Congress of the Communist Party of China. It also looks at how resource allocation efficiency and investment level affect the link between local government debt and high-quality economic development. Finally, it does an empirical study using macro data from 30 provinces in mainland China (excluding Tibet) from 2013 to 2022.

The following are the key conclusions based on the results above:

- There was an obvious inverted U-shaped trend between the scale of local government debt and high-quality economic development. The difference lay in the significant inverted U-shaped relationship between the scale of implicit debt and high-quality economic development.
- The efficiency of resource allocation and the level of investment significantly affect the government's explicit and implicit debt economies of scale with high-quality economic development, and both inhibit high-quality economic development.
- Local government debt is currently in the stage of scale economy, where there is still a significant borrowing space for economic development. Furthermore, the borrowing space for implicit debt is significantly larger than that for explicit debt.
- Debt-driven economies of scale exhibit significant regional heterogeneity. In coastal areas, these effects are more sustainable, whereas in inland areas it is relatively weak.

4.2. Recommendations

The following suggestions are put forward:

- Give proper play to the nonlinear effect of government debt on high-quality economic development. Government borrowing to promote high-quality economic development has become an inevitable trend for a long time now and in the future. Under the security constraints of preventing and resolving systemic financial risks, from the perspective of scale, scientifically assess and set debt limits to avoid excessive borrowing. Structure-wise, we should set up the debt maturity and capital use structure in a way that makes sense. This will help avoid the risk of maturity mismatch and direct capital flow to areas that will have positive externalities and long-term economic growth drivers. From the perspective of cost, we should use the fluctuation of interest rates and other financial markets to choose the right time to borrow, and diversify financing channels to reduce the comprehensive financing cost.
- Optimize the resource allocation mechanism and improve the quality and efficiency of investment. Further clarify the boundaries of government functions, focus on providing public services, maintaining market order, ensuring fair competition and other promising areas of government macro-control, and reduce direct government intervention in resource allocation; give full play to the decisive role of effective markets in the flow and allocation of resources, and guide the concentration of resources in areas with high efficiency and high added value by accelerating the process of national unified markets and the reform of price mechanisms. Optimize the investment structure, pay attention to strategic emerging industries, and use the factor endowment structure to rationalize the regional investment layout, so as to promote the transformation

of comparative advantage into competitive advantage; In addition, according to the project investment paradigm of market research—seeing the essence through the phenomenon of qualitative change caused by quantitative change, the comprehensive factors of market demand, technical feasibility, economic rationality and impact on the social environment are integrated to ensure that the project conforms to the market development direction and has the most value potential.

- Clarify the division of powers and responsibilities between the central and local governments. Given that implicit debt has both issuance potential and potential damage characteristics, while liberalizing the right of local governments to borrow money, we should reasonably divide the financial powers and responsibilities between the central and local governments through such financial system reforms as clarifying the principles of division of powers (legal, efficiency, benefit and financial matching principles), optimizing the distribution of fiscal revenue (adjusting the proportion of tax distribution and improving the transfer payment system), clearly pointing out responsibilities (central and local expenditure responsibilities), and establishing incentive and constraint mechanisms (performance evaluation, hard budget constraints). Give reasonable tax autonomy to local governments, promote the steady localization of consumption tax, innovate tax design and fee tax reform related to resources and environment, steadily promote the creation of taxes in water resources, real estate and new business forms, and further improve the scope of local management authority.
- A regionally differentiated collaborative strategy is needed for coordinating debt, investment, and resource allocation. Coastal regions should leverage their relatively mild negative investment effects by channeling debt funds into high-tech and high value-added sectors to improve investment quality. At the same time, they should enhance capital allocation efficiency through market-oriented reforms, enabling debt expansion to synergize with efficient investment and optimized resource allocation. In contrast, inland regions should prioritize improving capital allocation efficiency and strictly limit the scale of low-quality investments to mitigate their negative impact. Investment effectiveness can be strengthened through industrial upgrading and institutional innovation, thereby promoting a more adaptive debt-driven development model and achieving dual improvements in both investment quality and allocation efficiency.

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