

Article

Local Government Debt and Its Impact on Corporate Underinvestment and ESG Performance: Empirical Evidence from China

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Abstract: ESG ratings are closely linked to corporate resource allocation and overarching macroeconomic constituents. Nevertheless, there is a noticeable lack in the literature investigating the interconnected relationship between the growth of local government debt, corporate underinvestment, and ESG ratings. This study aims to investigate the impact of local government debt on corporate underinvestment and its subsequent effects on corporate ESG performance. To achieve this goal, this study utilizes special bond data from Chinese provinces spanning the period between 2015 and 2021. The findings suggest that as local government debt swells, it imposes financing constraints on local companies, leading to underinvestment, particularly for listed companies with a high proportion of fixed assets and non-state-owned enterprises. A key effect is a “crowding-out effect” in which local government debt absorbs resources that could otherwise be allocated to private corporations and non-investment sectors. This trend illuminates the concealed costs of a debt-reliant growth model extending beyond the financial sector to impact broader corporate behavior and ESG performance. Our research suggests that government debt, corporate financing constraints, and ESG investment are intimately linked. The study concludes with policy implications and recommendations aimed at mitigating the investment gap in Chinese enterprises and promoting sustainable economic growth.

Keywords: ESG; sustainability; corporate finance; environmental; investment



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1. Introduction

In the current economic environment, factors encompassing Environmental, Social, and Governance (ESG) aspects are progressively gaining prominence in policy-making and corporate strategies, having evolved as essential elements fostering sustainable development [1,2]. The principles embedded in ESG accentuate the importance of responsible business operations, socio-environmental welfare, openness, and long-term strategic thinking [3–5]. When viewed through the prism of governmental fiscal management and corporate investment behaviors, ESG factors offer a distinctive and significant perspective. For instance, it is universally accepted that preserving sustainable debt policies is instrumental for governments in promoting stability and economic growth [6]. Especially in China, the escalating burden of local government debt has transformed into a major concern, bearing a significant influence on the country’s economic progression [7–10]. China’s intricate fiscal, monetary, and taxation systems, coupled with elevated demands for investments in crucial sectors such as infrastructure, healthcare, education, and public utilities, have compelled local governments to incur substantial debt to offset the financing shortfall prompted by inadequate tax revenues [11,12]. Government debt, while serving as a vehicle for rallying social capital, rectifying fiscal deficits, and regulating economic operations, can only reap

benefits when effectively managed. An unchecked accumulation of debt can trigger grave economic implications [13]. The proliferation of local government debt in China has initiated a crowding-out phenomenon, constricting debt financing avenues for corporations in the bond market and banking institutions and thereby hampering corporate financing and investment endeavors [14,15]. Viewed from an ESG perspective, such economic instability and financial strain can pose obstacles to the commitment towards sustainable and socially responsible business practices. For instance, when corporate financing options are restricted due to local government debt, corporations may overlook or underinvest in vital ESG domains, including sustainable operations, employee welfare, and governance protocols; consequently, unravelling the complex interplay between local government debt and corporate financing matters, particularly through the ESG lens, has emerged as a crucial and worthwhile research domain. This exploration intends to offer more clarity on this intricate dynamic while contributing to policy decisions that encourage a nuanced balance between economic growth, corporate financing, and ESG considerations.

Indeed, comprehending the evolution of local government financing channels in China is essential for a more profound understanding of the implications of government debt on corporate investment and the potential detriments it poses to ESG ratings. The evolution of local government financing channels in China can be categorized into three distinct periods.

First Period: Land Finance. In 1994, China implemented tax-sharing reforms as a means of addressing the financial difficulties faced by the central government. However, this resulted in a discrepancy between the responsibilities of local governments, their expenditure obligations, and the available financial resources. Consequently, a significant funding gap emerged in the process of economic construction. Additionally, the same year witnessed the introduction of the Budget Law, which stipulated that local governments were not empowered to borrow funds. Meanwhile, there was a thriving growth in economic construction and urbanization, leading to a surge in the demand for land for commercial and urban housing purposes. In response, local governments, being the sole suppliers of urban state-owned construction land, exploited their monopoly over land to adopt the land finance model. This model involved subsidizing the real estate industry to attain a balance between short-term fiscal revenue and long-term attraction of industrial investment [16–18]. As a result, this approach provided a robust source of funding for China's infrastructure development in the early 21st century [19]. However, the rapid expansion of land finance and the growing dependence of local governments on this model gave rise to various social problems. As the supply of urban land became constrained, the central government gradually strengthened control measures over land acquisition by local governments [19,20].

Second Period: Urban Investment Bonds. Following the conclusion of the land finance dividend period, local governments proceeded to establish financing platform companies to issue urban investment bonds. These platform companies were formed by local governments and their affiliated departments and institutions through fiscal appropriations or the injection of assets such as land and equity. Their primary role was to assume the financing function for government investment projects (National Development 2010, No. 19). This period was characterized by local government support, active participation in infrastructure construction and operation, injection of state-owned assets, local government guarantees, and financing functions for government investment projects. In 2008, in response to the global financial crisis, the Chinese central government introduced an economic stimulus policy worth CNY 4 trillion, with 1.18 trillion provided directly by the central government. The remaining funds were to be raised by local governments, leading to a rapid proliferation of local financing platforms. Subsequently, local financing platforms flourished, government debt escalated, and the issuance of urban investment bonds soared. In 2012, the National Development and Reform Commission relaxed the review process for corporate bonds and the central government formulated strategies to expand domestic demand and accelerate urbanization, which further fueled explosive

growth of urban investment bonds. The issuance scale in that year reached nearly CNY 1 trillion, approximately three times that of 2011.

In 2015, constraints on the administrative levels of entities issuing urban investment bonds were lifted and previously issued urban investment bonds gradually reached maturity, resulting in a small peak in redemptions. During that year urban investment bond issuance reached a new high, doubling once again from 2014. By December 2017, the balance of local government debt had risen from CNY 10.7 trillion in 2010 to 16.4 trillion. According to an IMF research report, by the end of 2020 the hidden debt of China's financing platforms had reached as high as CNY 35–40 trillion. Although the urban investment bonds issued during this period did not have legal status as municipal bonds, many scholars considered them quasi-municipal bonds due to the implicit government guarantee. Consequently, urban investment bonds were often used as a proxy for government debt in most research conducted during this period.

While the expansion of urban investment bonds partly contributed to the improvement of basic public services, particularly during economic downturns when increased government spending through debt issuance stimulated total social demand, it facilitated local industrialization and urbanization and reduced local disparities [13]. However, numerous studies have argued that urban investment bonds carried implicit guarantees at the local level and rigid redemption commitments, granting them a significant advantage in the capital market. This advantage crowded out credit resources and had a crowding-out effect on private investment [15,21–23]. In a context of declining economic conditions and sluggish corporate investment, the continued expansion of urban investment bonds could exacerbate the inadequacy of corporate investment in China, thereby significantly impacting economic development [24,25].

Third Period: Local Government Bonds. Following the gradual expansion and exposure of risks associated with urban investment bonds, the implementation of the “New Budget Law” in 2015 marked the onset of the third phase of local government debt financing. The law provided a legal foundation for local governments to issue bonds. Local government bonds and general bonds were introduced to raise funds for specific projects, primarily focusing on infrastructure and other essential areas of livelihood. According to data from the Ministry of Finance, a total of CNY 3.65 trillion in new local government bonds were issued in 2022. Apart from supporting small and medium-sized banks in resolving risks, local government bonds were utilized for transportation, municipal infrastructure, and industrial parks, as well as vocational education, childcare, medical care, and elder care services, accounting for about 80% of their usage [26]. Over time local government bonds gradually became the primary source of local government financing, while the government financing function of the financing platform companies was phased out.

The current primary purchasers of local government bonds can be broadly categorized into three groups. First, commercial banks are the largest buyers in the special bond market due to these bonds' low risk and steady returns. Second, insurance companies often acquire local government bonds as long-term investments to meet their long-term liability obligations and asset–liability management needs. Lastly, pension funds and social security funds, with their longer investment horizons, consider local government bonds as secure vehicles for long-term investments.

Despite progress, the Chinese financial system continues to be dominated by banks, particularly large state-owned commercial ones. The absence of widely recognized guarantees and collateral for businesses, especially non-state-owned enterprises, combined with government departments' control over land and credit ownership, puts enterprises at an inherent disadvantage in accessing financing services [27–31]. In the financial market, these enterprises, already facing disadvantages, must compete with government departments for financing allocations. The rapid expansion of government debt further limits the scope of the financing available to enterprises.

It is widely recognized that the expansion of local government debt and its ensuing crowding-out effect can trigger a sequence of events which significantly obstructs the

inflow of financial resources to corporations, culminating in underinvestment. This effect is exceptionally pronounced in NSOEs, which typically function under stringent budgetary limitations and are confronted with restricted access to alternative financing channels. In such scenarios, underinvestment might transcend traditional economic domains to encompass areas outlined under ESG principles. For instance, underinvestment could result in insufficient allocation of resources towards environmental sustainability endeavors, including carbon footprint reduction, investment in green technologies, and establishment of environmentally friendly supply chains [32,33]. Socially, it may impede a firm's capacity to invest in the wellbeing of its employees, the development of surrounding communities, or the implementation of equitable business procedures [34,35]. From a governance standpoint, underinvestment may constrain the resources required to uphold superior business ethics, transparency, and stakeholder engagement. These examples underline the interconnected nature of economic decisions such as government debt and corporate investment strategies on the one hand, and ESG considerations on the other. When viewed through the ESG lens, an exploration of the economic repercussions of government debt and corporate underinvestment can yield comprehensive insights into the sustainability of existing economic practices as well as potential avenues for enhancement. Hence, an evaluation of these dynamics from an ESG perspective becomes a critical and meaningful area of research.

The central aim of this research is to delve into the effects of local government debt on corporate underinvestment and its subsequent repercussions on corporate ESG performance. The proliferation of local government bonds at the provincial level is used as a measure of increasing local debt. The main outcome of our research is the identification of a constraining effect of local government debt on local businesses' access to debt financing, which in turn inhibits corporate investment, leading to deterioration in ESG performance. This suggests a "crowding-out effect" in which local government debt absorbs monetary resources that could otherwise be funneled into private enterprises and non-investment sectors, especially in the absence of a loose monetary policy.

Our findings shine a light on the intricate relationship between government debt, corporate financing constraints, and ESG investment. As the magnitude of government debt balloons, it instigates financial constraints that curtail corporate investment, particularly in ESG projects, which then diminishes corporate ESG performance. This effect is less pronounced for corporations in state-owned, highly financially constrained, and local government debt investment industries. The impact is particularly significant in businesses with a lower proportion of fixed assets compared to those with a higher proportion. This pattern accentuates the hidden costs of a growth model heavily reliant on debt. Such a model affects more than just the immediate financial sector; it influences broader corporate behavior and ESG performance, highlighting how financial and fiscal policies indirectly sculpt the sustainability landscape by affecting corporate investment decisions.

In light of stagnant industrial investment by corporations, the escalating scale of local government bonds has become a pivotal economic indicator for China. This presents pressing questions; for instance, whether local government bonds obstruct businesses access to debt financing, whether financially constrained companies are more prone to underinvesting, and whether investment shortfalls due to financial strategies and resultant underinvestment can be tied to the burgeoning levels of local government debt. Clarifying the causal link between the surge in local government bonds and corporate underinvestment in China is crucial in reaching informed policy discussions.

In light of the central role of local government debt in China's economic landscape and the noteworthy influence that it has on corporate underinvestment and ESG performance, the present research has crucial policy implications. We suggest that the government manage the size of government debt to optimize resource allocation and stimulate business investment, especially in ESG initiatives. This strategy would contribute to sustainable economic growth in alignment with global sustainable development goals [36,37]. Furthermore, our findings should inform corporations when formulating their investment

strategies, especially concerning ESG commitments. The remainder of this paper first presents the theoretical framework and primary hypotheses, followed by a description of the empirical approach and data. After discussing the key findings and underlying mechanisms, a range of robustness tests are presented. Finally, the paper concludes with a discussion of the implications of these findings and several policy recommendations.

2. Literature Review and Theoretical Model

2.1. Literature Review

Enterprise financing cost and scale are closely associated with enterprise investment deficiencies, both of which are directly or indirectly influenced by national economic policies and the socio-economic climate. As of 2015, local government bonds have surpassed urban investment bonds as the primary source of local government financing in China.

Research on the adverse effects of local government bonds on business funding can be divided into two perspectives: bond-based funding and bank credit. From the perspective of bond-based funding, government credit and financial guarantees make government bonds a more secure option compared to corporate bonds, which carry default risk. Consequently, corporations face higher financing costs and constraints due to elevated bond yields upon maturity. In [14], the authors scrutinized the capital structure and debt maturity of emerging companies in developing and developed countries, finding a significant crowding-out effect of government debt on corporate debt levels. Similarly, [38] discovered a negative relationship between the size of corporate financing and the growth of government debt.

From the perspective of bank credit, the corporate sector and local government bonds compete for funding sources, with government debt being favored due to its guaranteed risk and state treasury status. Bank loans have traditionally been the primary external source of finance for Chinese businesses. As of 2022, the national debt balance of local governments has been increasing at an annual rate of 15.1%, with the new local debt reaching CNY 475.66 billion. The total loans in 2022 amounted to CNY 213.99 trillion, accounting for 65.3% of the social financing scale, which serves to highlight the significant influence of local debt on the lending market.

Wo and Lei [39] conducted a comparison of data from A-share listed manufacturing corporations with balances of local government bonds from 2015–2020, and discovered that a higher amount of local government bonds encourages inefficient investment in manufacturing corporates. In line with this, Kong [40] argued that the maturity of local government bonds held by municipal governments lead to a decrease in the debt financing level of local businesses, resulting in a significant crowding-out effect on corporate financial obligations due to the increasing amount of local government bonds held by local governments.

The capacity of bank lending is inherently tied to the proportion of fixed asset ownership. Following the implementation of the Property Law of the People's Republic of China in 2007, the value of fixed assets as collateral has appreciated. Furthermore, the expansion of local government special debt has resulted in a reduction in available credit. As the size of local government liabilities grows, the significance of a high percentage of fixed assets for businesses seeking bank credit financing becomes more pronounced. This effect is particularly evident for businesses with a lower percentage of fixed assets, demonstrating the "collateral guarantee effect" in the context of the impact of municipal government debt on corporate underinvestment. The ratio of a company's fixed assets to its total assets is directly related to the liquidity of its assets. On the one hand, factors such as asset specificity make it challenging to recover the initial investment, while on the other businesses face costs associated with the selling investment assets, including transaction fees and the expenses of acquiring new equivalents. As a result, the influence of asset irreversibility exacerbates the crowding-out effect of municipal liabilities on businesses, leading to the "asset irreversibility effect".

While the existing body of literature has explored the implications of local government debt on regional economic growth [41–43], there is a noticeable lack of comprehensive

investigation into the influence of such debt on corporate investment behavior and ESG ratings, leaving these areas relatively understudied. Our research aims to fill these gaps by dissecting the intricate interplay between local government debt, corporate investment, and ESG ratings. Our contribution to the existing body of knowledge can be summarized as follows. First, our research provides a meticulous examination of the impacts of local government debt on corporate underinvestment. This line of inquiry allows us to enhance our understanding of the ways in which government fiscal policies directly impact corporate investment behaviors. Following this, we analyze the correlation between the effect of local government debt on corporate ESG ratings through the medium of corporate underinvestment. Through our investigation, we illuminate how governmental fiscal decisions can potentially shape corporate ESG ratings. This exploration promotes a more integrated comprehension of sustainability elements affecting businesses, particularly those operating in regions laden with significant government debt.

Hence, our research enriches the prevailing literature by offering a unique perspective on the broader ramifications of local government debt, extending its relevance beyond regional economic growth to incorporate pivotal aspects of corporate conduct and performance. By providing a more nuanced understanding of the associations between government debt, corporate investment, and ESG ratings, we strive to impart a deeper insight into the multifaceted socio-economic and environmental implications of government debt.

2.2. Theoretical Model

2.2.1. Crowding-Out Effect of Government Debt on Enterprise

According to the debt financing model of Liu, et al. [44], the growth of government debt is triggered by governments raising funds through bond issuance, which leads to competition with corporations for credit resources within the financial market. As the magnitude of government debt increases, the pool of credit resources available for corporate financing contracts. This heightened competition for credit resources exacerbates the difficulties associated with corporate financing. Consequently, corporate financing costs may rise, which in turn influences the investment tendencies and capacities of corporations.

In this theoretical model, our focus is primarily on understanding the crowding-out effect of government debt financing on enterprises. With the implementation of the new budget law, banks have become the main purchasers of government-issued debt. The model is divided into three periods (0, 1, and 2), during which the banking sector serves as the government's primary source of financing. The utility function for the household sector, where households derive satisfaction from consumption and monetary holdings, can be represented in the form of debts:

$$U = X_0 + E[X_1 + \gamma X_2] + w(Z_0) \quad (1)$$

The aggregate government debt, denoted as F , is determined by the sum of $E_{0,1}$ and $E_{0,2}$. The proportion of debt, represented by S_s , is defined as equal to $E_{0,1}$.

$$F(S_s^* - 1/2)|1 - \gamma| = w'(S_s^*F) + \theta_0 [w'(S_s^*F) + S_s^*Fw''(S_s^*F)] \quad (2)$$

The left-hand side of the equation represents the incremental expenditure of tax smoothing for the administrative body. The first term on the right-hand side represents the incremental benefit of taking on debt. The next term represents the incremental gain from increasing the administrative body's funding with a lower tax burden. Ignoring the subsequent term does not affect the qualitative assessment, and allows the equation to be simplified as follows:

$$F(S_s^* - 1/2)|1 - \gamma| = w'(Z_0) \quad (3)$$

2.2.2. Enterprise Constraints

In the above, U_h represent the utility of the household department, which includes consumption and money holdings, and U_c represent the utility derived from the net profits

generated by the corporate department. Then, the total utility of the whole society (U_{total}) can be expressed as follows:

$$U_{total} = U_h + U_c \quad (4)$$

Here, U_h includes consumption in different periods ($C_0, C_1,$ and C_2) and utility derived from money holdings ($v(M_0)$). The utility function for the household department can then be formulated as follows:

$$U_h = C_0 + E[C_1 + \beta C_2] + v(M_0) \quad (5)$$

For the corporate department, the utility is represented by the generated net profit (Π):

$$U_c = \Pi \quad (6)$$

By substituting the expressions for U_h and U_c into the total utility function, we obtain the following expression:

$$U_{total} = (C_0 + E[C_1 + \beta C_2] + v(M_0)) + \Pi \quad (7)$$

This expression captures the total utility of the society, considering both the government and corporate departments as financing agents. It encompasses the utility derived by the household department from consumption and money holdings as well as the net profits generated by the corporate department.

Setting aside the discussion of taxes, the first-order condition is derived as follows.

To find the first-order condition for maximizing total utility, denoted as U_{total} , with respect to the debt holdings in the government and corporate departments, we introduce the variables R_s^G for the share of debt in the government department and R_s^C for the share of debt in the corporate department. We use the notations D_G for government debt, D_C for corporate debt, M_0^G for government debt, and M_0^C for corporate debt.

The total utility function, without considering taxes, can be expressed as follows:

$$U_{total} = (C_0 + E[C_1 + \beta C_2] + v(M_0^G + M_0^C)) + \Pi \quad (8)$$

To obtain the first-order condition, we need to calculate the partial derivatives of U_{total} with respect to R_s^G and R_s^C :

$$\begin{aligned} \partial U_{total} / \partial R_s^G &= 0 \\ \partial U_{total} / \partial R_s^C &= 0 \end{aligned}$$

Considering the government department:

$$M_0^G = R_s^G * D_G$$

Considering the corporate department:

$$M_0^C = R_s^C * D_C$$

Using these expressions, we can rewrite the total utility function as follows.

Based on the equilibrium condition derived from the model, we can analyze the impact of increased government debt on the ability of companies to raise capital. The equilibrium condition can be expressed as follows:

$$v'(M_p^* + M_G) = (1 - p)(\varphi g'(W - M_p^*) - 1) \quad (9)$$

In this context, the optimal amount of short-term debt financing for the corporate department is represented by M_p^* , the short-term debt financing for the government department is denoted by M_G , and the total funds accessible in the market are symbolized by W .

The impact of an increase in government debt M_G on the corporate department's capacity to accrue capital M_P^* is examined next. When an increase in short-term debt is initiated by the government department ($\Delta M_G > 0$), the total quantity of funds in the market (W) remains unchanged. However, in this model, where government debt and corporate debt are treated as perfect substitutes, an increase in government debt can result in a reduction in the funds available for corporate debt.

Due to the increased government debt, the left-hand side of the equilibrium formula $v'(M_P^* + M_G)$ experiences an increase. To maintain equilibrium, an increase on the right-hand side of the formula is required. This can be achieved if the corporate department reduces its short-term debt $\Delta M_P^* < 0$, resulting in a smaller M_P^* value and a larger $W - M_P^*$ value. Consequently, the marginal return on new projects, denoted by $\varphi g'(W - M_P^*)$, experiences an increase.

According to this model, it can be inferred that an increase in government debt could potentially exacerbate the challenges faced by corporations in obtaining capital through short-term debt. This is primarily attributed to the reduced availability of funds for the corporate department, which necessitates an adjustment in their financing strategy.

2.3. Government Debt and Corporate Financing Constraints under the New Budget Law of 2015

To incorporate the impact of the 2015 Chinese New Budget Law, we can introduce a new variable B_t which represents the budget constraint imposed by the law in each of the models. The budget constraint can be expressed as a fraction of GDP, similar to the representations of government debt, corporate debt, and loanable funds in the model. By including the variable B_t , we can account for the changes in borrowing limits and fiscal discipline introduced by the new budget law.

By adding B_t to the original equation, the new equilibrium condition is formulated as follows:

$$v'(N_P^* + N_G + B_t) = (1 - q)(\bar{z}'_s(W - N_P^* - B_t) - 1) \quad (10)$$

Differentiating the new equilibrium condition with respect to B_t , we obtain

$$\frac{\partial v'(N_P^* + N_G + B_t)}{\partial B_t} = -(1 - q) \frac{\partial \bar{z}'_s(W - N_P^* - B_t)}{\partial B_t} \quad (11)$$

In this scenario, the left-hand side of the formula represents the change in the marginal utility of funds for the household department in relation to the alteration in the budget constraint, while the right-hand side captures the change in the marginal social return of funds in the economy in relation to the change in the budget constraint.

The introduction of the new budget law is anticipated to impose stricter fiscal discipline and reduce excessive government borrowing. This reduction in government borrowing will increase the availability of credit to the corporate department, thereby mitigating the crowding-out effect.

In conclusion, it is projected that the 2015 Chinese New Budget Law will alter the impact of government debt on corporate finance constraints compared to the previous state of affairs. By enforcing more rigorous fiscal discipline, the new budget law is expected to limit government borrowing, alleviate the crowding-out effect on corporate financing, and ultimately reduce the financing constraints faced by corporations.

2.4. Government Debt and Corporate Financing Constraints: State-Owned and Non-State-Owned Enterprises

This model aims to illustrate the distinct effects of financing constraints on state-owned enterprises (SOEs) and non-state-owned enterprises (non-SOEs) in the context of government debt. The model takes into account the unique characteristics of these two types of enterprises, including their financing sources, access to credit, and risk profiles.

State-owned enterprises (SOEs) typically benefit from stronger government support and preferential access to credit resources, whereas non-state-owned enterprises (non-SOEs)

may face higher financing constraints due to limited credit access and perceived higher risk. As a result, the impact of government debt on corporate financing, known as the crowding-out effect, may vary between these two types of enterprises.

To analyze the differential effects of financing constraints on SOEs and non-SOEs, we can modify the existing equilibrium condition as follows.

For SOEs, $M_{P_S}^*$ represents the optimal level of debt financing for SOEs and M_{G_S} denotes the government debt held by SOEs. The modified equilibrium condition can be expressed as follows:

$$v'_S(M_{P_S}^* + M_{G_S}) = (1 - p_S)(\zeta'_S(W - M_{P_S}^*) - 1) \quad (12)$$

For non-SOEs, $M_{P_{NS}}^*$ represents the optimal level of debt financing for non-SOEs and $M_{G_{NS}}$ denotes the government debt held by non-SOEs. The modified equilibrium condition can be expressed as follows:

$$v'_{NS}(M_{P_{NS}}^* + M_{G_{NS}}) = (1 - p_{NS})(\zeta'_{NS}(W - M_{P_{NS}}^*) - 1) \quad (13)$$

In both equations, v'_S and v'_{NS} denote the marginal utility derived from debt financing for SOEs and non-SOEs, respectively, p_S and p_{NS} represent the probability of making a profit for SOEs and non-SOEs, respectively, and ζ'_S and ζ'_{NS} are the marginal social returns on investments for SOEs and non-SOEs, respectively.

The modified equilibrium conditions take into account the distinct characteristics of SOEs and non-SOEs concerning financing sources, credit access, and risk profiles. Considering that SOEs have stronger government backing and preferential access to credit resources, the marginal utility derived from debt financing is likely to be higher for SOEs than for non-SOEs.

Likewise, the probability of making a profit may be higher for SOEs than for non-SOEs due to the government support they receive. As a result, SOEs may face lower financing constraints compared to non-SOEs.

3. Research Design

3.1. Data Definition

3.1.1. Dependent Variables

ESG Score

Drawing on Deng et al. (2023), this study employs the Huazheng ESG rating to develop the core explanatory variable, termed ESG. This widely-accepted ESG assessment framework has been adapted to the distinct characteristics of China's capital market and the nature of its listed companies. The Huazheng ESG model establishes 26 pivotal indicators and employs an industry-weighted average approach for assessment. The rating scale comprises nine levels, starting from C and progressing upwards to C, CC, CCC, B, BB, BBB, A, AA, and AAA. The ESG variable reflects these grades and is created through an assignment technique. Accordingly, each of the nine levels from C through AAA is assigned a numerical value from 1 to 9. For instance, a C rating is denoted as ESG = 1, a CC rating as ESG = 2, and a CCC rating as ESG = 3.

Underinvestment

The normal expected level of corporate investment is initially calculated in line with the expected corporate investment model posited by Richardson [45]. Subsequently, the degree of corporate underinvestment is measured through the regression residuals of the model.

3.1.2. Explanatory Variables

This study utilizes financial data from corporations listed on the A-list from 2015 to 2021. The data were obtained from the Wind database using corporate registration and

geographical information, with the data attributed to the province level. Issuance of local government bonds were obtained from China electronic government bonds market access, with the data attributed at province level. Certain corporations were excluded from the study, namely, those in the banking and insurance departments, ST or ST* corporates, and insolvent enterprises. The data obtained from the CEIC database were subjected to quantile treatment in order to manage extreme value variables. All variables are described in Table 1.

Table 1. Main variables and explanation.

Variable	Symbols	The Interpretation of Variables
Underinvestment	UnderInv	The corporation takes the absolute value of the investment model's residuals multiplied by 100
Local government debt scale	Debt	The additional amount of local government bonds issued by each province (special bonds) plus one taken as a logarithm
ESG score	ESG	Hua Zheng ESG Rating
Control variables		
Growth	Growth	Growth rate of main business
Cash Flow	CF	Current year cash flow
Size	Size	ln (Total Assets)
Leverage	Lev	Total liabilities/total assets
Cash holdings	Cash	(Cash on hand plus liquid investments)/total assets
Age	Age	ln (Year of Establishment + 1)
Operating Margin	OPR	Net profit/Operating income
GDP growth rate year-on-year	GDPR	GDP Growth rate relative to the prior-year period

3.2. Model Setting

Corporate Underinvestment ESG and Local Government Debt

To investigate the relationship between local government debt, corporate underinvestment, and ESG, the model aims to investigate the correlation between substantial local government debt and reduced levels of corporate investment. The equation is expressed as follows:

$$UnderInv_{j,i,t} = \alpha_0 + \beta_1 Debt_{j,t} + \beta_2 ESG_{j,t} + \sum \alpha_i X_{i,t} + \sum Individual + \sum Year + \varepsilon_{i,t} \quad (14)$$

where Underinv represents the underinvestment of corporation i in year t , debt represents the amount of local government debt and its regression coefficient reflects the impact of government debt on underinvestment of corporate, and X represents a collection of control variables.

To investigate the effects of local government debt and corporate underinvestment on ESG score, Equation (15) is constructed with ESG as the dependent variable.

$$ESG_{j,i,t} = \alpha_0 + \beta_1 UnderInv_{j,t} + \beta_2 Debt_{j,t} + \sum \alpha_i X_{i,t} + \sum Individual + \sum Year + \varepsilon_{i,t} \quad (15)$$

3.3. Framework Diagram

In this study, a comprehensive empirical model is developed to illustrate the dynamic interplay between corporate underinvestment, Environmental, Social, and Governance (ESG) performance, and local government debt. The research methodology involves formulating a baseline regression, conducting a heterogeneity test, and implementing a robustness test. The conceptual framework, which provides a schematic representation of the proposed model, is depicted in Figure 1. Table 2 shows the summary statistics.



Figure 1. Concrete research framework.

Table 2. Descriptive statistics.

	Mean	SD	Min	Max	Median
UnderInv	0.042	0.059	0.000	0.567	0.025
Debt	5.695	1.787	0.000	8.068	6.292
ESG	4.071	1.213	1	8	4
Growth	0.216	1.092	−0.918	17.484	0.090
Size	22.504	1.288	15.979	28.293	22.440
Lev	0.451	0.199	0.014	0.994	0.445
Cash	0.159	0.110	0.000	0.793	0.133
OPR	0.000	0.019	−1.172	0.899	0.001
TobinQ	2.138	12.276	0.000	98.298	1.303
GDPR	0.080	0.051	−0.435	0.369	0.082
Age	2.984	0.436	0.000	4.205	3.045

4. Empirical Analysis

4.1. Baseline Regression

Table 3 presents the relationship between corporate underinvestment, ESG score, and local government debt. In the first column of the standard OLS regression, the coefficient for Debt is 0.019, which is statistically significant at the one percent level. This indicates a strong positive impact of local government debt on corporate underinvestment. As government debt increases, corporate underinvestment increases as well, demonstrating the “crowding-out effect” in classical economic theory.

From examining the regression coefficients for the independent variables in Table 3, it can be observed that corporate cash flow (CF), leverage (Lev), and company size (Size) show significant relationships with corporate underinvestment. Specifically, CF and Cash have positive coefficients, implying that an increase in these variables leads to an increase in underinvestment, while the negative coefficient for Size suggests that larger companies are less likely to underinvest.

In the second column the coefficient for ESG is -0.259 , which is significant at the one percent level. This suggests a strong negative relationship between a corporation’s ESG score and its level of underinvestment. Leverage (Lev) and operating margin (OPR) have negative coefficients, indicating that companies with higher leverage or lower profit margins tend to have lower ESG scores. On the other hand, Size has a positive coefficient, suggesting that larger companies tend to have higher ESG scores.

Table 3. Corporate underinvestment, ESG, and local government debt.

VARIABLES	(1)	(2)
	Underinvestment	ESG
ESG	−0.259 *** (0.061)	
Underinvestment		−0.006 *** (0.002)
Debt	0.019 *** (0.002)	−0.001 (0.001)
CF	1.24×10^{-10} *** (4.08×10^{-11})	-3.47×10^{-12} (7.68×10^{-12})
Lev	0.007 * (0.004)	−0.003 *** (0.001)
Growth	0.001 (0.001)	−0.001 (0.001)
Cash	3.388 *** (0.631)	0.082 (0.131)
Size	−0.737 *** (0.081)	0.203 *** (0.020)
OPR	0.194 * (0.116)	0.039 * (0.020)
TobinQ	−0.021 (0.013)	0.002 (0.002)
GDPR	0.005 (0.015)	0.001 (0.002)
N	6310	6310
R ²	0.158	0.099

Note: *** and * indicate significance at the 1% and 10% levels, respectively.

4.2. Heterogeneity Test

4.2.1. Heterogeneity of Ownership Attributes

With reference to Zhu, et al. [46], it has been concluded that SOEs in China receive implicit guarantees from the government during times of financial distress and investment failure due to the “paternalism” exhibited towards the local government. This preference for external financing provides SOEs with a natural advantage over non-SOEs. Consequently, when the size of local government debt increases, private enterprises experience the crowding-out effect, resulting in underinvestment. The inherent preference for external financing bestows SOEs with a distinct advantage over non-SOEs, especially within the sphere of ESG investing. The ability of SOEs to harmonize their operations with ESG standards is frequently amplified by these governmental supports, engendering an unbalanced competition with non-SOEs. Nevertheless, the impact of underinvestment on ESG is profoundly dependent on the specific attributes of the corporation under consideration. As the debt load of local government escalates, private enterprises face an encroachment effect, precipitating underinvestment in these vital ESG domains. In light of these findings, this study examines the existence of heterogeneity in enterprise ownership attributes and conducts a subsample regression of ownership for Equations (14) and (15). Equations (16) and (17) are presented as follows, where NSOE*Underinv and NSOE*Debt represent the cross-product terms of the dummy variables representing the ownership qualities:

$$\text{UnderInv}_{i,j,t} = \alpha_0 + \beta_1 \text{Debt}_{j,t} + \beta_2 \text{NSOE}_i + \beta_3 \text{NSOE}_i \times \text{Debt}_{j,t} + \sum \alpha_i X_{i,t} + \sum \text{Individual} + \sum \text{Year} + \varepsilon_{i,t} \quad (16)$$

$$\text{ESG}_{i,j,t} = \alpha_0 + \beta_1 \text{Underinv}_{j,t} + \beta_2 \text{NSOE}_i + \beta_3 \text{NSOE}_i \times \text{Underinv}_{j,t} + \sum \alpha_i X_{i,t} + \sum \text{Individual} + \sum \text{Year} + \varepsilon_{i,t} \quad (17)$$

Here, NSOE takes a value of 0 if the corporation is state-owned and a value of 1 if the corporate is not state-owned.

Table 4 presents the outcomes obtained from Equations (16) and (17). Specifically, model 1 corresponds to the results derived from Equation (16), while model 2 represents the outcomes obtained from Equation (17). Model 1 in Table 4 displays the grouped regression results. In the first column, the Debt variable is 0.013 and significantly positive, while it is significantly positive with 0.042 in the second column for non-SOEs. This suggests that the underinvestment trend in NSOE corporations worsens as designated debt increases. Additionally, in conjunction with the Debt Interchange items, the positive coefficient of the dummy variable in the third column provides further evidence that non-SOEs experience a more pronounced crowding-out effect.

Table 4. Heterogeneity of ownership attributes.

Variables	Model 1			Model 2		
	SOE	NSOE		SOE	NSOE	
Debt	0.013 *** (5.25)	0.042 *** (4.09)	0.046 *** (5.31)			
NSOE*Debt			0.009 ** (1.96)			
Underinvestment				−0.963 (−1.60)	−0.795 * (−1.96)	−1.216 ** (−2.44)
NSOE*Underinvestment						1.318 ** (2.37)
				−0.963 (−1.60)	−0.795 * (−1.96)	−1.216 ** (−2.44)
						1.318 ** (2.37)
Control variables	Y	Y	Y	Y	Y	Y
Individual effect	Y	Y	Y	Y	N	N
The annual effect	Y	Y	Y	Y	Y	Y
_cons	0.211 *** (3.89)	0.129 ** (2.36)	0.172 *** (4.42)	−2.652 *** (−2.75)	−4.366 *** (−5.35)	−2.002 *** (−2.79)
R ²	0.123	0.199	0.128	0.122	0.121	0.155

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Model 2 presents the results of Equation (17). In the fourth column corresponding to SOEs, the Underinvestment variable shows a negative value of -0.963 . However, for NSOEs in the fifth column, the Underinvestment variable is -0.795 , revealing a statistically significant negative relationship between underinvestment and ESG performance. Furthermore, in the sixth column, the positive coefficient of 1.318 for the NSOE*Underinvestment interaction term provides compelling evidence that non-SOEs experience a more accentuated crowding out effect with respect to ESG investment. This implies that as underinvestment worsens, non-SOEs face a more severe decline in ESG performance than their state-owned counterparts.

In conclusion, the analysis of both models elucidates that an escalation in government debt fosters an environment of intensified underinvestment in NSOEs, consequently instigating a substantial deterioration in ESG performance. This deleterious domino effect of underinvestment on ESG performance is observed to exert a more pronounced impact on non-state-owned entities relative to their state-owned counterparts. This observation underscores potential risk dynamics in situations where the accumulation of local government debt instigates a crowding-out effect within the corporate financing realm. When local governments augment their borrowing, the available capital pool for NSOEs is diminished, inhibiting their ability to invest in, expand, and sustain ethical and responsible business practices. This may in turn have profound implications for their ESG performance, and by extension their perceived corporate social responsibility.

4.2.2. Heterogeneity of Different Financing Constraints

To examine the effect of underinvestment on ESG ratings under different financing constraints, this study employs a subsample regression incorporating cross-product terms between dummy variables denoting financing constraints (FC) and underinvestment. The aim of this analytical technique is to quantify the magnitude of these financing constraints. Specifically, this analysis seeks to ascertain whether corporations experiencing less stringent financing constraints witness a less acute reduction in their investment scale than corporations subject to more rigorous constraints, especially amidst the constrictive impact of burgeoning government debt. This dynamic could potentially attenuate the degree of corporate underinvestment. The derived Equation (18) delineating the influence of local government debt on underinvestment and Equation (19) delineating the influence of underinvestment on ESG ratings is presented below are presented below.

$$\text{UnderInv}_{i,j,t} = \alpha_0 + \beta_1 \text{Debt}_{j,t} + \beta_2 \text{FC}_{i,t} + \beta_3 \text{FC}_{i,t} \times \text{Debt}_{j,t} + \sum \alpha_i X_{i,t} + \sum \text{Individual} + \sum \text{Year} + \varepsilon_{i,t} \quad (18)$$

$$\text{ESG}_{i,j,t} = \alpha_0 + \beta_1 \text{Underinv}_{j,t} + \beta_2 \text{FC}_{i,t} + \beta_3 \text{FC}_{i,t} \times \text{Underinv}_{j,t} + \sum \alpha_i X_{i,t} + \sum \text{Individual} + \sum \text{Year} + \varepsilon_{i,t} \quad (19)$$

Under the 50% quantile sample regression, the SA index categorizes financial constraints into high and low categories. In the regression analysis, FC = 0 represents samples from groups with fewer financial constraints, while FC = 1 indicates samples from groups with more financial constraints. Table 5 presents the outcomes obtained from Equations (18) and (19). Specifically, model 1 corresponds to the results derived from Equation (18), while model 2 represents the outcomes obtained from Equation (19).

Table 5. Corporate underinvestment, ESG, and local government debt under financing constraints.

Variables	Model 1		Model 2			
	Low Financing Constraints	High Financing Constraints	Low Financing Constraints	High Financing Constraints		
Debt	0.018 *** (8.92)	0.061 *** (5.76)	0.018 *** (8.92)			
FC*Debt			0.069 *** (10.89) (2.17)			
Underinvestment			−0.966 ** (−2.32)	−0.213 (−0.37)	−0.888 ** (−2.29)	
NSOE*Underinvestment					0.406 (0.067)	
Control variables	Y	Y	Y	Y	Y	
Individual effect	Y	Y	Y	N	N	
The annual effect	Y	Y	Y	Y	Y	
_cons	0.099 * (1.66)	0.102 * (1.89)	0.159 *** (4.12)	−4.027 *** (−4.37)	−4.456 *** (−5.01)	−4.000 *** (−6.47)
R ²	0.181	0.236	0.141	0.126	0.168	0.141

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 5 presents the division of underinvestment sample corporations into those with low and high levels of financial constraints based on the SA Index of Financial Constraint. Both the first and second columns show that the manipulated variable representing the degree of funding constraint has significantly positive coefficients. These coefficients indicate that as the amount of municipal debt increases, there is a corresponding increase in insufficient investment made by corporations with both high and low financing constraints. However, corporations with fewer financing constraints tend to benefit more from the ability of local debt to reduce underinvestment compared to those with more severe constraints. Moreover, the dummy variable FC, representing the complexity of difficulties in

obtaining funding, exhibits a meaningful positive association with the cross-product terms involving local loans in column (3). This suggests that corporations with high financing constraints are more susceptible to the negative effects of rising levels of local debt.

Model 2 sheds light on a complex relationship between underinvestment and ESG ratings, influenced significantly by the extent of the financial constraints encountered. A conspicuous inverse correlation is discernible between underinvestment and ESG ratings among corporations facing low financial constraints. This correlation is substantiated by the markedly negative coefficient of the “Underive” variable. Within this context, corporations beset by substantial financial constraints frequently experience a pronounced downturn in their ESG ratings when underinvestment transpires. This downturn intimates that corporates with substantial financial resources may experience adverse effects on their ESG performance due to underinvestment, possibly emanating from either a dearth of initiative or inefficient capital allocation. In contrast, the scenario for corporations facing high financing constraints differs significantly. As indicated in the sixth column, the negative (albeit statistically insignificant) coefficient for Underinvestment suggests that for corporations wrestling with extensive financial constraints, the influence of underinvestment on ESG ratings fails to achieve statistical significance. For these corporations, the impact of underinvestment on ESG ratings is overshadowed by the immediate challenges imposed by the financial constraints themselves. These constraints, potentially hampering the corporation’s capacity to execute essential investments, become a primary determinant of their ESG performance, diminishing the independent effect of underinvestment. Consequently, strategies aimed at ameliorating ESG performance for corporations under stringent financial constraints need to first alleviate these constraints before confronting the issue of underinvestment.

5. Robustness Tests

Table 6 presents the structural equation modeling (SEM) results. Several relationships can be inferred between local government debt, ESG score, and underinvestment.

Table 6. SEM regression.

	(1)		(2)
Variables	Underinvestment	Variables	ESG
Debt	0.029 *** (0.002)	UnderInv	−0.015 *** (0.003)
CF	1.97×10^{-10} *** (3.98×10^{-11})	Debt	−0.001 (0.001)
Lev	0.015 *** (0.004)	CF	5.86×10^{-12} (9.30×10^{-12})
Growth	−0.001 (0.001)	Lev	−0.009 *** (0.001)
Cash	2.373 *** (0.552)	Growth	−0.000 (0.000)
Size	−0.880 *** (0.062)	Cash	0.899 *** (0.129)
OPR	−0.141 (0.124)	Size	0.316 *** (0.015)
TobinQ	−0.015 (0.014)	OPR	0.097 *** (0.029)
GDPR	0.001 (0.012)	TobinQ	−0.002 (0.003)
cons	21.950 *** (1.348)	GDPR	0.011 *** (0.003)
var	0.002 ***	_cons	−2.889 ***
		var	1.344 ***

Note: *** indicate significance at the 1% levels.

With respect to debt and underinvestment, local government debt is positively related to underinvestment; this means that as the scale of local government debt increases, underinvestment increases as well. This could be due to the “crowding-out” effect, where public borrowing might lead to an increase in interest rates, making investment more expensive for corporations, leading to underinvestment. With respect to underinvestment and ESG, underinvestment is negatively related to ESG rating; this suggests that companies that underinvest tend to have lower ESG scores. This could be because underinvestment might be seen as a failure to invest in the sustainability initiatives that can improve a corporate’s ESG score. With respect to debt and ESG, while there is no direct relationship between local government debt and ESG in the model, there could be an indirect relationship mediated through underinvestment; that is, higher levels of local government debt could lead to higher underinvestment, which in turn might lead to lower ESG scores.

6. Findings and Policy Recommendations

This study’s primary focus is to scrutinize the impact of local government debt on corporate underinvestment and its subsequent influence on corporate ESG performance. The rise in local government bonds at the province level serves as a proxy for the growth of local debt. Our key finding is that local government debt tends to impose constraints on local companies’ debt financing, resulting in the curbing of corporate investment and consequently in diminished ESG performance. This phenomenon indicates a crowding-out effect in which local government debt absorbs monetary resources that could otherwise be directed into private corporations and non-investment sectors, particularly in the absence of a loose monetary policy. Our results shed light on the relationship between government debt, corporate financing constraints, and ESG investment. As the scale of government debt escalates, financial constraints are created that reduce corporate investment, particularly in ESG initiatives, thereby diminishing corporate ESG performance. Especially for corporates in state-owned, highly financially constrained, and local government debt investment-related industries, the positive impact of local government debt on underinvestment is less pronounced. This effect is particularly prominent in enterprises with a lower proportion of fixed assets as opposed to those with a higher proportion. This trend underscores the hidden costs of a debt-reliant growth model beyond the immediate financial sector through their impact on broader corporate behavior and ESG performance. It further reveals how financial and fiscal policies can indirectly shape the sustainability landscape by influencing corporate investment decisions.

Considering that local governments in China often rely on debt issuance to attain their economic growth targets without adequately considering the crowding-out effect on corporations, the conclusions of this study offer crucial policy implications for mitigating the investment gap in Chinese enterprises. Our study recommends that the government exercise appropriate control over the scale of government debt in order to optimize resource allocation and stimulate business investment, particularly in ESG initiatives. It is the responsibility of local governments to oversee debt issuance judiciously, achieving a delicate equilibrium between sustaining economic growth and preventing undue disturbance to credit fund streams. By granting the market a more influential role in resource allocation, capital can be more efficiently channeled into productive sectors. Creating a robust structure for fiscal responsibility and accountability can assist in alleviating the overall debt load by amending current debt conditions and astutely managing future borrowing. This strategy would entail enforcing borrowing limits for local governments, instituting a more rigorous approval process for debt issuance, and amplifying debt transparency to avoid concealed liabilities. The enactment of policies that nurture sustainable lending and borrowing practices, encourage fiscal discipline, and strengthen risk management in public finance can assume a central role in optimizing government debt. Through such mechanisms the extent to which government debt impedes corporate financing can be mitigated, thereby providing guidance for businesses to improve their ESG performance. This will foster sustainable economic expansion in alignment with global sustainable development

objectives. Moreover, corporations should take these considerations into account when formulating their investment strategies, especially in relation to ESG commitments. This perspective would enrich their decision-making process, allowing for more balanced and informed investment choices that take into account both immediate financial implications and long-term sustainability considerations.

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