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Bond default of super-large real estate company and government debt risk

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ABSTRACT

This paper investigates risk spillover from the real estate sector to local government debt in China. Using Chinese real estate giant Evergrande's bond default as a shock and data on the issuances of urban investment bonds (UIBs), we find that super-large real estate company' default significantly increases the risk premium of UIBs, which typically represents the risk associated with local governments' implicit debts. The risk spillover is more pronounced in less developed regions, for local government financing vehicles (LGFVs) with lower credit ratings, and for debt instruments with inadequate guarantee measures. Further analysis reveals that the spillover effect is related to land asset values and triggered by two mechanisms: "land finance by local governments" and "the debt burden of LGFVs". This study enriches our understanding of the risk interconnectedness between the real estate sector and local government debt.

1. Introduction

Local governments worldwide often rely on borrowing to expand infrastructure and provide public services. The academic literature on local government debt primarily focuses on two areas. One strand of research addresses the role and utility of municipal bonds, a well-established financial instrument. Studies by various economists highlight the significance of municipal bonds both in the United States and in emerging market economies. For example, Hildreth and Zorn (2005) conducted an in-depth study on the development of municipal bonds in the United States over the past 25 years, demonstrating their effectiveness in financing infrastructure and public services, and their widespread acceptance across U.S. states. Leigland (2012) examined municipal bond issues in emerging markets, arguing that these bonds can be effective when countries implement policies tailored to their specific contexts. The second strand of research explores local government debt, particularly focusing on financing pressures and credit risks. Notable studies include Leigland (1997), who studied municipal bonds in emerging markets like the Philippines and Poland, and Harris and Piwowar (2006), who analyzed the impact of trading costs on credit risk in U.S. municipal bonds. Ang and Longstaff (2013) systematically examined the risks of local government bonds in both the U.S. and Europe.

Globally, four main types of government debt are widely recognized: direct explicit debt, direct implicit debt, contingent explicit debt, and contingent implicit debt (Polackova, 1999). While research on local government debt risk has often centered on explicit debt (Brixi, 2001; Ardagna, 2004), recent studies have shifted attention to implicit debt, especially in emerging economies. Implicit debt arises from government promises to make future payments, and is often unmonitored, making it more likely to contribute to debt risk. In many emerging markets, budget statements may only reflect a portion of local governments' explicit debt, while large fiscal deficits may be converted into implicit liabilities, which are not subject to rigorous budget oversight. This phenomenon exacerbates the risk of fiscal crises (Daniel et al., 1997; Talvi and Végh, 2005).

In China, local governments play a central role in driving economic and social growth (Walder, 1995), but the issue of local debt risk remains a serious concern. This risk stems from China's unique fiscal decentralization system (Qian & Roland, 1998) and the performance-based promotion of local officials (Li & Zhou, 2005). Frequent transfers of local officials have led to short-term policy orientations, with a strong incentive to issue bonds during their tenure. Local government financing vehicles (LGFVs) have become the primary means for local governments to bypass debt issuance restrictions under the Budget Law. These bonds, often described as "quasi-municipal bonds," serve as a bridge to standardize local government debt. However, LGFVs represent a form of quasi-fiscal behavior and implicit debt, as the financing companies are essentially local government entities operating under the guise of corporate legal persons. While LGFV bonds have facilitated

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infrastructure development (Weltbank, 2012), their rapid expansion has raised concerns about their long-term risks. Following the 2008 financial crisis, a 4 trillion yuan investment plan further incentivized local governments to use these financing platforms, leading to a significant increase in LGFV bond issuance. Between 2013 and 2022, the total volume of LGFV bonds grew at an average annual rate of 21 %, reaching 13.78 trillion yuan by mid-2022, making them the third-largest bond category after government and policy bank bonds. This growth has attracted increasing academic attention to local government debt risks.

The fiscal health of local governments is crucial for ensuring debt sustainability (Annicchiarico & Giammarioli, 2005; Moraga & Vidal, 2010. However, due to China's fiscal decentralization, local government debt repayment is heavily dependent on land transfer fees rather than tax revenues (He et al., 2016). The use of land capitalization for infrastructure and industrial park investments has become central to the "land-driven growth" model (He et al., 2016; Peterson & Kaganova, 2010). Consequently, much of the literature on local government debt risks in China focuses on real estate-related issues. One category explores the causes and solutions for local government debt, including the impact of real estate price fluctuations on debt risk and the role of land finance in creating implicit debt. Another category examines the potential for local government implicit debt to spill over into the financial system, leading to broader financial risks. Shih (2004), for example, analyzed how local government debt risks could affect the financial sector by estimating the scale of local government bank loans.

Overall, the existing literature has two main shortcomings: it tends to focus on partial rather than systematic analyses, failing to integrate land finance, LGFV bonds, and the real estate market into a unified framework. Apart from that, the literature predominantly emphasizes macro-level issues such as house prices and the scale of local debt, neglecting the impact of real estate enterprise defaults on the micro-mechanisms of local implicit debt risk.

This paper makes two main contributions: first, while existing studies largely focus on the scale expansion or overdue local debt risks (fiscal risks), few address the cross-sectoral spillover effects on local implicit debt. This paper develops an analytical framework that links "real estate enterprise debt defaults," "urban investment bond price fluctuations," "changes in local government financing costs and scales," and "increased local implicit debt risks." This framework offers a new perspective on understanding local implicit debt risks. Second, while traditional contagion theory rarely considers fiscal risk spillovers, the analysis in this paper expands the scope of contagion theory to include fiscal risks, providing a valuable addition to existing research.

Using the "Evergrande bond default" as a case study, this paper systematically examines the relationship between real estate enterprise defaults (financial risks) and local implicit debt risks under a unified framework. The Evergrande default on December 3, 2021—where it failed to meet its $260 million bond repayment obligations—marked a significant moment in China's financial history. The default triggered a wave of market reactions: the Hang Seng Mainland Property Index (HSMPI) dropped by 1.72 %, and stocks of major real estate developers, such as Shimao Group (00813.HK) and Sunac China (01918.HK), plummeted by 14 % and 7.79 %, respectively. The default also disrupted financing channels for other real estate companies, leading to a series of unfinished construction projects known as "rotten tail buildings," involving major developers like Evergrande and Sunac China. Furthermore, Evergrande's default dampened the real estate industry's demand for land, contributing to a 14.2 % decline in land transaction volumes in 2021, the lowest in a decade. This event not only marked a significant turning point for the real estate sector but also posed serious implications for China's "land finance" model (Liang et al., 2017). As such, the Evergrande default provides an effective market shock for studying the contagion mechanism of real estate risk.

In this paper, we provide evidence at the micro-market level supporting a finding of risk spillover from the real estate sector to local government debt in China. We establish empirical models, which employ the cost of UIBs as the dependent variables, to study the impact of super-large real estate company's debt default on the risk premium of bonds. We find that Evergrande's default indeed pushed up the issuance premium of UIBs, indicating that the default increases the risks of Chinese local governments' implicit debts. Specifically, as the window for the event lengthens from (−15, +15) to (−50, +50), the size of the spillover effect first increases and then decreases and forms an inverted U shape, which can be explained by investors' "wait and see" and the approval process required by investors (primarily banks) before they can adjust their positions in response to the default. Our conclusions remain robust under various robustness tests, including the use of twin samples to control for potential endogeneity. Further, we employ multiple subsamples to assess whether these effects are heterogeneous. We find that the risk spillover effect is stronger in less developed areas, for LGFVs with lower credit ratings, and for bonds that are unsecured. In addition, we find that the risk spillover effect is related to land asset values and triggered by two mechanisms: "land finance by local governments" and "the debt burden of LGFVs".

The paper is organized as follows. Section 2 includes institutional background. Section 3 provides a literature review. Section 4 explains the data and sample. Section 5 explains our empirical results. Section 6 provides a further analysis, and Section 7 concludes.

2. Institutional background and literature review

2.1. Background of Evergrande default event

China Evergrande Group, established in 1997, is an international enterprise specializes in real estate design, development, construction, and property management. The company successfully listed on the Hong Kong Stock Exchange in November 2009 and was subsequently included in the Fortune Global 500 list, establishing itself as one of China's largest real estate companies. Since 2007, Evergrande has strategically diversified its business portfolio, venturing into various sectors such as culture, tourism, health, new energy and so on. However, this rapid expansion was accompanied by a substantial accumulation of debt, resulting in significant financial strain and repayment obligations. As of June 30, 2021, Evergrande's total assets amounted to 2.38 trillion yuan (US$369 billion), while its total liabilities stood at 1.97 trillion yuan (US $306 billion), resulting in an alarming debt-to-asset ratio of 82.8 %. Since 2021, Evergrande encountered several liquidity risk events, including delayed payments of commercial notes, share transfers, asset freezes, regulatory discussions, and defaults on wealth management products, which raised concerns about the company's overall financial stability. Despite efforts to raise funds through asset sales, on December 3, 2021, Evergrande issued an official statement acknowledging its failure to meet repayment obligations for a U.S. dollar-denominated bond valued at US$260 million. This event, which marked Evergrande's first material default, led to the decision by international credit rating agencies such as Standard & Poor's (S&P) and Fitch Ratings to downgrade the ratings for Evergrande's principal and related bonds and garnered significant attention from investors, exerting a considerable influence on the entire market.

The default of Evergrande holds profound implications for the country's economy and provides a unique lens through which to examine the potential impact of super-large real estate companies' defaults on the risks associated with local governments' implicit debt. On one hand, Evergrande's default, dubbed China's "Lehman Moment," marks the first public bond default by a nationally leading real estate enterprise in China. This event challenged the prevailing market sentiment of "too big to fail" and significantly influenced investors' asset allocation strategies pertaining to real estate. Specifically, Evergrande's rapid expansion heavily relied on debt financing, leading to a continuous increase in the company's leverage levels. As of June 30, 2021, Evergrande's total liabilities reached 1.97 trillion yuan (approximately US$306 billion, equivalent to the annual GDP of a small to medium-

sized country), with an alarming debt-to-asset ratio of 82.8 %. The potential collapse of such a substantial debt burden could send shockwaves through the real estate industry and possibly trigger systemic financial risks. Consequently, investors widely held the belief that in the event of a crisis faced by a company of Evergrande's size and market influence, the government would intervene with policy support and financial assistance to prevent default. However, Evergrande's public default eroded this expectation and prompted investors to reassess their risk perception and investment strategies concerning real estate-related financial assets, including local government debt assets.

On the other hand, Evergrande serves as a microcosm of the shifting dynamics within China's real estate industry, which has far-reaching consequences for the land market. In China, land assets constitute the primary source of debt repayment for local governments. Firstly, as one of China's most prominent real estate companies, Evergrande possessed 778 land development projects spanning 233 Chinese cities, with a construction area of 214 million m^2 as of June 2021, accounting for nearly 10 % of the total land transaction area in China in 2021. Evergrande's default has raised market concerns that the company might sell off its land assets to repay debts, leading to a decline in land asset prices. Secondly, the land held by Evergrande is primarily distributed in second- and third-tier cities, where local governments are more dependent on land revenue, thus putting greater pressure on local government debt. Finally, Evergrande's default demonstrates that the business model relying on high debt for rapid expansion brings enormous debt and liquidity pressures. This has changed the long-standing business model of Chinese real estate companies, which involves " borrowing first to acquire land, then selling real estate to repay debt," affecting real estate companies' willingness to purchase land and thus land asset prices. In fact, since the Evergrande event, many Chinese real estate developers have experienced a breakdown in their capital chains, leading to the suspension of development projects and the emergence of "unfinished buildings". In response, the Chinese government published the "guaranteed delivery of pre-sold housing" policy in July 2022. However, despite these interventions, China's land auction data reveals a worrying trend. According to China's land auction data, the scale of land transactions in China experienced a significant year-on-year decline of 14.2 % in 2021, reaching the lowest level in a decade. This development raises concerns about the potential impact of credit risk within the real estate sector on the sustainability of local government debt, particularly for those with a high dependence on "land finance" and are particularly vulnerable to the adverse effects of this downturn.

2.2. Literature review

2.2.1. The characteristics of government debt

Around the world it is common for local governments to expand infrastructure and provide public services by debt financing. Many economists have demonstrated the universal importance of municipal bonds to effectively expanding infrastructure and delivering public services (Leisland, 2004; Hildreth, 2005; Hildreth & Zorn, 2005). In China, due to the decentralized fiscal system (Qian & Roland, 1998; Qian et al., 1999) and the official promotion and assessment mechanism (Li & Zhou, 2005), local governments are incentivized to raise funds and actively engage in infrastructure construction. As a result, local government debt plays a more vital role in promoting social and economic growth in China than in other countries (Khan, 2012; Walder, 1995).

Research on government debt classification is primarily based on the four-category framework proposed by Polackova (1999): direct explicit debt, direct implicit debt, contingent explicit debt, and contingent implicit debt. The early literature primarily focuses on explicit debt, such as municipal bonds, in developed countries (Chalmers, 1998; Brixi, 2001; Silvia 2003; Harris & Piwowar, 2006; Moraga & Vidal, 2010). Recently, the issue of implicit debt, especially in emerging market economies, has attracted academic attention. Implicit debt stems from the government's future payment commitment and is often outside the budgetary oversight system (Daniel et al., 1997; Talvi and Végh, 2005), further exacerbating financial debt risks.

China's UIBs, which are issued by local government financing vehicles to fund public infrastructure projects, are a typical form of implicit government debt and perceived as quasi-municipal debts. The 2008 financial crisis and China's 4 trillion-yuan (US$559 billion) stimulus plan incentivized local governments to use LGFVs for debt financing. UIBs, used for long-term, low-return projects, often struggle to secure repayment sources and rely on local government support through land-use-right transfers and capital injections. Therefore, despite nominally being corporate bonds, UIBs have implicit government guarantees, distinguishing them from bonds issued by firms exposed to company-specific risks. From 2013 to 2022, UIBs grew by 21 % annually, with outstanding debt reaching 13.78 trillion yuan (US$2 trillion) in June 2022, making them China's third-largest bond category and potentially leading to local government debt risks.

2.2.2. The influencing factors of government debt

Many studies have focused on the pricing issues of government bonds (Ang & Longstaff, 2013; Gospodinov et al., 2014). In contrast to U.S. municipal bonds, China's LGFV bonds are issued by private corporations but are implicitly guaranteed by local and central governments. They are the main manifestation of the flow of funds in the shadow banking sector (Chen et al., 2018; Cong et al., 2017), and their pricing issues are more complex and interesting. There are some papers providing economic analysis on China's local government implicit debt and LGFV bonds, covering issues such as their origin, economic effects, and risks. Tsui (2011) traced the root of China's local debt overhang to a protracted debt-financed infrastructure investment boom in which several key institutions (the cadre evaluation system, the land management regime, and the banking sector) have created an environment that draws local governments into a land-infrastructure-leverage trap. Chen et al. (2023) believed that the introduction of LGFV bonds has made up for the sparse trading of national bonds, improved the efficient frontier and price discovery ability, enabling investors, the entire bond market, and non-financial institutions to benefit from it. Huang et al. (2020) found that local public debt crowded out the investment of private firms by tightening their funding constraints.

There are very few papers focusing on the relationship between the real estate industry and local implicit debt. Ang et al. (2023) paid attention to the interaction between real estate and political risk in determining the local government financing cost. They found that, conditional on the political risk measured by the proportion of real estate value in the local GDP, it would lead to higher LGFV bond yields. Gao et al. (2022) examined the crowding-out effect of local government debt and real estate investment on corporate investment by raising corporate costs and reducing corporate financing.

The expansion of local government debt in China is largely due to land-collateralized finance (Liang et al., 2017). The literature has extensively analyzed collateral in the corporate financing process (Benmelech & Bergman, 2008). Specifically, some studies have noted that rising real estate values, resulting in increased corporate collateral, can have a significant impact on corporate investment. Gan (2007) investigates the impact of the Japanese real estate bubble on corporate investments through collateral channels. Similarly, Chaney et al. (2012) uses data from listed companies in the United States to discuss the impact of rising housing prices on corporate investment through collateral channels. China's local government debt risks can also be understood from the perspective of land collateral, as a large proportion of UIBs and loans are issued with land assets as collateral. High land prices will bring a large expected liquidation value of mortgaged land, thus increasing the possibility of future repayment of local government debt and reducing the associated credit risks.

It is precisely due to the collateral mechanism that land and real estate prices are closely interrelated and have promoted the expansion of local government debt (Davis & Heathcote, 2007). High housing

prices motivate real estate companies to purchase land use rights, resulting in high land prices (Muth, 1969; Ooi & Lee, 2004; Oikarinen & Peltola, 2006). As land value increases, local governments find it easier to secure debt income (Ang et al., 2023), which subsequently leads to an expansion of local government debt. This, in turn, contributes to the development of convenient infrastructure and further fuels the rise in housing prices, thus creating a self-reinforcing cycle. However, few studies have explored the risk of local governments' debt from the perspective of the real estate sector. Our study focuses on examining the impact of real estate companies' bond defaults on the financing of UIBs and local government debt risk through the land collateral related mechanism.

2.2.3. The impact of local government debt on financial risk

Traditional financial risk contagion theory primarily focuses on the spread of risks within the financial system, encompassing risk across financial institutions, financial markets, and even traversing national boundaries, such as the contagion within the stock market (Ewing et al., 2003), the spillover from the loan market to the stock market (Longstaff, 2010), and the transmission among financial markets of different countries (Bekaert et al., 2014). The risk contagion mechanism is mainly studied from two perspectives: direct connections and indirect connections. On the one hand, cross-market investments by financial institutions, international hedge funds, and other factors create a linkage and risk contagion mechanism among banks and financial markets (Allen & Gale, 2000; Davis & Lo, 2001; Herbertsson & Rootzen, 2007). On the other hand, even in the absence of direct asset correlation between banks, common market expectations and information spillovers resulting from cross-market hedging can also facilitate risk contagion within the financial system and potentially lead to systemic risks (Kodres & Pritsker, 2002; Chiang et al., 2007; Allen et al., 2009; Beirne & Fratzscher, 2013). Davis and Lo (2001) introduced a contagious model to explain the concentration risk of large portfolios of defaulted securities. Leitner (2005) studied and constructed a financial network model, in which there is not only crisis contagion but also bailout funds that can support banks with insufficient liquidity.

Since the 2009 European debt crisis and the 2013 "fiscal cliff" in the United States, the relationship between sovereign debt and financial sector risks has garnered increasing attention from scholars (Beirne & Fratzscher, 2013). By incorporating sovereign debt default into general equilibrium models that include the financial sector, studies have explored the vicious cycle formed by the mutual contagion of risks between sovereign debt and the financial sector (Broner et al., 2014; Farhi & Tirole, 2018; Morelli et al., 2022). These studies have also examined the impact of sovereign debt defaults on the real economy through the balance sheets of financial institutions (Bocola, 2016; Gennaioli et al., 2014). Empirical analyses have further demonstrated that sovereign debt defaults can significantly increase bank certificate of deposit interest rates, credit default swap spreads, and risk-bearing levels (Cooper & Nikolov, 2018; Keddad & Schalck, 2020; Li & Zinna, 2018). These findings underscore the substantial spillover effects that sovereign debt crises can have on the stability and performance of financial sectors. In terms of cross-border contagion, Gerlach and Smets (1995) conducted research on this issue by establishing a currency crisis model between two countries. The results showed that speculative attacks would lead to the depreciation of a country's currency, increase its export competitiveness, and then cause a trade deficit in its trading partner countries, and the foreign exchange reserves of the trading partner countries would begin to decline. In addition, financial connections among economies are also important reasons for risk contagion (Goldstein, 1998; Hernández & Valdés, 2001).

Studies on China mainly focus on the financial risks caused by the contagion of local government implicit debt risks (fiscal risks) to the financial system. In China, the holders of local governments' implicit debt are mainly financial institutions such as banks, and the issuance and transaction of UIBs are carried out in the financial market. Therefore, fiscal debt and financial risks are closely connected. Lu and Sun (2013) investigate the role of LGFVs in China's credit expansion and further analyze the impact of local government implicit debt risks on the banking system. Gao et al. (2021) recently suggest a politics-finance nexus through which governments usually choose to default on banks with weaker political power, and such default selections are driven by banks' influence over politicians' promotions. However, there are few studies that analyze government debt, especially the implicit debt risks of local governments, from the perspective of financial risk, that is, risk contagion from the financial market (bond default in our study) to fiscal sector.

2.2.4. Discussion on current literature

We believe that the current research has the following four aspects that need to be improved. First, the existing literature mainly studies the transmission mechanism of government debt risk to financial institutions or financial markets. However, the phenomenon of rising government debt risk caused by financial market risks has received limited attention. Second, most of the literatures on the sources of government debt risk study government expenditure, and few analyze from the perspective of the sharp contraction of government fiscal revenue and debt financing. Third, the current research does not include land finance, urban investment bonds and real estate market into a unified analytical framework, and only focuses on the relationship between land finance and urban investment bonds, or the impact of real estate market on land prices, lacking a holistic analysis. Fourth, the existing literature tends to use macro-level data or models to study the risk transmission effect between housing prices and local debt, and pays little attention to the impact of major debt default events of real estate enterprises on the micro-mechanism of local hidden debt risk.

3. Data and model

3.1. Sample selection

We use the day of Evergrande's official statement of failure to meet repayment obligations for the U.S. dollar-denominated bond, which is December 3, 2021, as the cut-off point for pre- and post-default periods to investigate the issuing premium performance of UIBs. We use five samples, each corresponding to a different event window: (−15, +15), (−25, +25), (−35, +35), (−45, +45), and (−50, +50). Among these, the sample with window (−n, +n) refers to using the data of UIBs issued during the period of n days before the default date and n days after.

We use data from three levels: UIBs, LGFVs, and regional economies. At the bond level, we choose UIBs issued within a window before and after the event as the initial sample. At the firm level, we collect information on the issuers of UIBs including debt-to-asset ratio, return on asset (ROA), and cash ratio. At the city level, we collect economic and fiscal data on 371 cities around the country, including GDP, fiscal self-sufficiency rate, revenue from selling land use rights, and revenue from public budgets. We match data at the three levels and delete those UIBs with missing data. All data come from Wind or CEI data. We have 1534 observations on UIBs, involving 896 LGFVs and 27 cities.

3.2. Definitions of variables

Our dependent variable is the risk premium of UIBs (*RiskPremium)*, which is calculated by the difference between the issuing rates of the UIBs and the benchmark interest rate, which is represented by the yield-to-maturity of the Treasury bond with the same maturity and in the same period. This approach helps eliminate the effects of bond maturity and the market environment. Our independent variable, *Default*, is a dummy variable for default. It takes a value of 1 when the issuing dates of UIBs fall after the default date, and 0 otherwise.

We choose the following control variables. For bond characteristics, we use: (i) bond size (*Size*), measured by natural logarithm of bond

issuance size; (ii) maturity (*Maturity*); (iii) credit rating of issuer (*Rating*), 4 for AAA, 3 for AA+, 2 for AA and 1 for AA-and below. For corporate characteristics, we use: (i) return on asset (*ROA*); (ii) debt-to-asset ratio (*Leverage*); (iii) cash-to-debt ratio *(CashRatio*), measured by the proportion of monetary capital, trading financial assets, and notes receivable relative to total current liabilities, serving as a key indicator of a company's liquidity risk. For city characteristics, we use: (i) economic development (*GDP*), measured by natural logarithm of gross regional product; (ii) tax revenue (*Tax*), measured by natural logarithm of regional tax revenue; (iii) financial self-sufficiency rate (*Fiscal_SF*), measured by the ratio of local governments' public budget revenue to public budget expenditure (Table 1).

3.3. Baseline model

To test the impact of Evergrande's debt default on the premium of UIBs, we set the model as follows:

$$\begin{aligned} \text{RiskPremium}_{ijkt} = {} & \alpha + \beta^{*}\text{Defualt}_{t} + \text{Ctr}_{\text{Bond}\,it} + \text{Ctr}_{\text{LGFV}jt} + \text{Ctr}_{\text{Region}_{kt}} \\ & + \sum \text{City} + \sum \text{Day} + \varepsilon_{ijkt}, \end{aligned} \tag{1}$$

where the dependent variable, $\text{RiskPremium}_{ijkt}$, indicates the premium of bond i issued by company j in city k on the t-th trading day before and after the default event. The main independent variable, Defualt_{t} is a dummy variable that takes the value 1 when the UIBs are issued after the event date, and 0 otherwise. $\text{Ctr}_{\text{Bond}\,it}$ represents the bond-level control variables, $\text{Ctr}_{\text{LGFV}jt}$ represents the company-level control variables, and $\text{Ctr}_{\text{Region}_{kt}}$ represents the city-level control variables. Moreover, $\varepsilon_{ijkt}$is the error term. In addition, $\sum$ City and $\sum$ Day are dummies for the cities and issuing days, which we use to control for the unobservable fixed effects of city and time. Standard errors are clustered at the city level. β represents the parameter with which we are concerned.

4. Empirical results

4.1. Descriptive statistics

Table 2 describes all variables. The descriptive statistics reveal that the mean of the UIBs' issuance premium is 1.969 %, the maximum is 5.475 % and the minimum is −0.010 %. This shows the risk premium varies across UIBs, which was necessary to estimate the treatment effect.

Table 1
Definition of variables.

Name		Definition
Dependent variable	*RiskPremium*	Difference between bond rate and yield of Treasury bond with the same maturity and in the same period
Independent variable	*Default*	Dummy for default, which takes the value 1 if the issuing date of bond falls after the event, and 0 otherwise
Bond characteristics	*Size*	Natural log of bond issuance size
	Maturity	Maturity, in years
	Rating	Credit rating of issuer, 4 for AAA, 3 for AA+, 2 for AA and 1 for AA-and below
LGFV characteristics	*ROA*	Return on Assets, used to measure firms' profitability
	Leverage	Debt-to-asset ratio, used to measure corporates' debt burden
	CashRatio	measured by the proportion of monetary capital, trading financial assets, and notes receivable relative to total current liabilities, an indicator of a company's liquidity risk
City characteristics	*GDP*	Natural log of gross regional product
	Tax	Natural log of regional tax revenue
	Fiscal_SF	Fiscal self-sufficiency ratio, measured by the ratio of local governments' public budget revenue to public budget expenditure

Table 2
Descriptive statistics.

Variable	Obs	Mean	Std.Dev.	Min	Max
RiskPremium	1534	1.914	1.272	−0.010	5.475
Default	1534	0.425	0.494	0.000	1.000
Size	1534	4.771	0.268	3.699	5.602
Maturity	1534	3.252	2.169	0.083	21.000
Rating	1534	2.914	0.742	2.000	4.000
ROA	1534	0.234	0.464	−2.036	4.702
Leverage	1534	0.608	0.099	0.112	0.925
CashRatio	1534	0.438	0.312	0.015	5.758
GDP	1534	8.197	1.820	−2.100	16.800
Tax	1534	2.626	0.450	1.255	3.538
Fiscal_SF	1534	0.658	0.214	0.153	0.998

We also provide summary statistics for the bond-level control variables (*Size, Maturity, Rating*), firm-level control variables (*ROA, Leverage, CashRatio*), and city-level control variables (*GDP, Tax, Fiscal_SF*).

4.2. Results of baseline model

Table 3 reports regression results on how the Evergrande default impacted the risk premium of UIBs. Column (2) shows that coefficients of *Default* are positive and statistically significant at the 5 % level. It indicates the Evergrande default pushed up UIBs' issuance premium; the findings support the hypothesis that the default has a negative spillover effect on local governments' implicit debt.

Moreover, when examining the spillover effect across different sample windows, ranging from (−15, +15) to (−50, +50), we observe an inverse U-shaped pattern indicating a time lag in the impact. There are two possible reasons for this. First, immediately after the default, investors adopted a wait-and-see approach by refraining from making immediate adjustments to their asset allocation, resulting in a lack of market reaction. Second, the primary investors in UIBs are financial institutions, such as banks, who typically must go through an approval process before adjusting their positions. In conclusion, the credit risk

Table 3
Main regression result.

	(1)	(2)	(3)	(4)	(5)
	(−15, 15)	(−25, 25)	(35, 35)	(−45, 45)	(−50, 50)
Default	0.0639	0.145**	0.0978*	0.0752*	0.0682*
	(0.72)	(2.04)	(1.94)	(1.87)	(1.70)
Scale	−0.145	−0.260**	−0.354***	−0.361***	−0.383***
	(−0.79)	(−2.30)	(−3.28)	(−3.19)	(−3.21)
Maturity	0.0593**	0.0658***	0.0763***	0.0697***	0.0654***
	(2.28)	(3.90)	(5.20)	(5.76)	(5.46)
Rating	−0.831***	−0.803***	−0.761***	−0.762***	−0.752***
	(−7.57)	(−8.75)	(−8.83)	(−9.20)	(−9.08)
ROA	−0.0682	−0.187**	−0.213***	−0.173***	−0.166***
	(−0.69)	(−2.19)	(−2.68)	(−2.95)	(−3.01)
Leverage	0.565	0.600	0.478	0.495	0.583
	(0.95)	(1.43)	(1.21)	(1.39)	(1.61)
Cash	−0.278*	−0.344**	−0.403***	−0.431***	−0.414***
	(−1.75)	(−2.28)	(−2.67)	(−3.28)	(−3.29)
GDP	0.0711	0.0564	0.0215	0.0210	0.0214
	(0.77)	(0.77)	(0.33)	(0.35)	(0.36)
Tax	−0.488	−0.493	−0.585*	−0.544	−0.504
	(−1.12)	(−1.32)	(−1.67)	(−1.61)	(−1.50)
Fiscal_SF	−1.119	−0.877	−0.807	−0.887	−0.909
	(−1.06)	(−0.96)	(−0.92)	(−1.02)	(−1.05)
Regional Effect	√	√	√	√	√
Time Effect	√	√	√	√	√
R^2	0.5471	0.5451	0.5480	0.5485	0.5482
N	467	754	993	1404	1534

Note: t-statistics for the coefficients in parentheses. Statistical significance at the 10 %, 5 %, and 1 % levels is denoted by *, **, and *** respectively. The following tables remain the same.

associated with a real estate company can indeed spill over to local governments' implicit debt, subsequently increasing the risk premium of their UIBs.

4.3. Robustness checks

4.3.1. Alternative measures of issuance premium of UIBs

We use a different method to calculate the issuance premium of UIBs. We replaced the risk-free interest rate of the treasury bond yield with the deposit benchmark interest rate set by the central bank. In Table 4, the regression coefficient of Default is positive and statistically significant at the 5 % level, and the effect remains an inverse U-shaped pattern. These results confirm the robustness of our estimations with the baseline model.

4.3.2. Considering extreme values

To ensure extreme values do no drive our results, we winsorize the continuous variables first by 2 % and 98 % and then by 5 % and 95 %. The regression results, which reveal no substantial changes, are tabulated in Tables 5 and 6, respectively.

4.3.3. Endogeneity

To address endogeneity concerns, baseline model (1) controls for variables that reflect urban economic development (e.g., *GDP* and *Tax*) and add city dummy variables to further control for unobservable urban fixed effects. While these efforts may have helped somewhat in eliminating endogeneity concerns, we remain concerned that some omitted variables and measurement errors may contribute to endogeneity problems.

We construct a twin sample by selecting LGFVs that issued UIBs both before and after the default. The event window, ranging from 15 to 50 days, is so short that there would have been almost no substantial changes in the fundamentals of LGFVs and regions. Consequently, the disparity in risk premium between twin bonds issued by the same LGFVs before and after the event provides an accurate measurement of the spillover effect of the Evergrande default on local government debt risk. Table 7 confirms the conclusion remains robust.

5. Heterogeneity

5.1. Varying levels of economic development

While our findings confirm the risk spillover effect of the real estate industry on the implicit debt of local governments, the magnitude of this impact is constrained by the level of economic development across regions. GDP growth reflects local economic and fiscal strength, which forms the fundamental basis and thus the "implicit guarantees" (Chen et al., 2020) for the local government's repayment of debts incurred by LGFVs. A lower GDP growth value indicates weaker financial support for LGFVs, a diminished capacity to bear risks, and thus a heightened impact of real estate enterprise defaults on UIBs' risk premium. We therefore divide the whole sample into two subsamples based on the economic development level of the region in which the local government and LGFVs is located: economically developed areas and economically underdeveloped areas. We then repeat the estimations of Eq. (1). Table 8 reports these estimation results.

Comparing the sign of the *Default* coefficients in Columns (1) and (2), we find that the impact of real estate enterprises default on local governments' implicit debt differs significantly between regions with high GDP growth and those with low GDP growth. The results suggest the presence of a "risk spillover effect" in less developed areas that leads to an increase in the risk premium of UIBs. Conversely, developed areas tend to attract more risk-averse investments, resulting in a "safety island effect" that reduces the risk premium of UIBS (although not significant). In Columns (3) and (4), the conclusion holds when we use the twin samples.

5.2. Varying levels of quality across LGFVs

Another type of heterogeneity may result from varying levels of overall quality across LGFVs. Lower-qualified LGFVs are more susceptible to the impact of real estate enterprise defaults, and therefore may incur a greater increase in the risk premium of UIBs. We examine this type of heterogeneity based on the credit ratings of the bond-issuing LGFVs and divide the whole sample into two subsamples—high rating

Table 4
Changing dependent variable.

	(1)	(2)	(3)	(4)	(5)
	(−15, 15)	(−25, 25)	(35, 35)	(−45, 45)	(−50, 50)
Default	0.0513	0.150**	0.105**	0.0892**	0.0876**
	(0.57)	(2.08)	(2.02)	(2.19)	(2.16)
Bond Controls	√	√	√	√	√
LGFV Controls	√	√	√	√	√
City Controls	√	√	√	√	√
Regional Effect	√	√	√	√	√
Time Effect	√	√	√	√	√
Obs	471	758	998	1410	1540
R^2	0.5509	0.5452	0.5479	0.5481	0.5495

Table 5
Winsorize by 2 % and 98 %.

	(1)	(2)	(3)	(4)	(5)
	(−15, 15)	(−25, 25)	(35, 35)	(−45, 45)	(−50, 50)
Default	0.0835	0.153**	0.0992*	0.0717	0.0640
	(0.94)	(2.16)	(1.70)	(1.53)	(1.43)
Bond Controls	√	√	√	√	√
LGFV Controls	√	√	√	√	√
City Controls	√	√	√	√	√
Regional Effect	√	√	√	√	√
Time Effect	√	√	√	√	√
Obs	467	754	993	1404	1534
R^2	0.5575	0.5550	0.5586	0.5575	0.5557

Table 6
Winsorize by 5 % and 95 %.

	(1)	(2)	(3)	(4)	(5)
	(−15, 15)	(−25, 25)	(35, 35)	(−45, 45)	(−50, 50)
Default	0.0924	0.152**	0.0985*	0.0682	0.0602
	(1.05)	(2.16)	(1.69)	(1.45)	(1.34)
Bond Controls	√	√	√	√	√
LGFV Controls	√	√	√	√	√
City Controls	√	√	√	√	√
Regional Effect	√	√	√	√	√
Time Effect	√	√	√	√	√
Obs	467	754	993	1404	1534
R^2	0.5606	0.5570	0.5591	0.5584	0.5562

Table 7
Twin samples.

	(1)	(2)	(3)	(4)	(5)
	(−15, 15)	(−25, 25)	(35, 35)	(−45, 45)	(−50, 50)
Default	0.170	0.173*	0.0932**	0.0684*	0.0545
	(1.41)	(1.74)	(2.08)	(1.86)	(1.53)
Bond Controls	√	√	√	√	√
LGFV Controls	√	√	√	√	√
City Controls	√	√	√	√	√
Regional Effect	√	√	√	√	√
Time Effect	√	√	√	√	√
Obs	228	364	555	773	845
R^2	0.5880	0.5764	0.7777	0.5343	0.5394

Table 8
Heterogeneity: varying levels of economic development.

	Full sample		Twin sample	
	(1)	(2)	(3)	(4)
	Developed Regions	Less Developed Regions	Developed Regions	Less Developed Regions
Default	−0.107	0.443**	−0.0486	0.505***
	(−0.44)	(2.74)	(−0.37)	(3.07)
Bond Controls	√	√	√	√
LGFV Controls	√	√	√	√
City Controls	√	√	√	√
Regional Effect	√	√	√	√
Time Effect	√	√	√	√
Obs	384	370	160	184
R^2	0.5700	0.6580	0.6614	0.7609

Note: Developed Regions are the samples above the median of GDP growth and Less Developed Regions are below the median.

LGFVs (AAA) and low rating LGFVs (AA+ and below)—and repeat the estimations of Eq. (1). Table 9 reports these estimation results.

Comparing the absolute values of the coefficients of *Default* in Columns (1) and (2), we find that the spillover effect of real estate enterprise defaults on local governments' debts are greater in LGFVs with lower credit ratings. In Columns (3) and (4), the conclusion holds when we use the twin samples, further confirming the findings in Columns (1) and (2).

5.3. Bond guarantee

In extreme market conditions, investors tend to become more risk-averse, and safe assets can demonstrate a "haven effect" (Longstaff & Schwartz, 1995). This effect leads to a greater increase in demand for secured UIBs compared to unsecured ones, thus restraining the rise in risk premium for secured bonds. We examine this type of heterogeneity based on whether the UIBs are secured and divide the whole sample into two subsamples—unsecured bonds and secured bonds—and repeat the estimations of Eq. (1). Table 10 reports these estimation results.

Comparing the absolute values of the coefficients of *Default* in Columns (1) and (2), we find that the spillover effect of real estate enterprise defaults on local governments' debts is lower in secured bonds. In Columns (3) and (4), the conclusion holds when we use the twin samples, further confirming the findings in Columns (1) and (2).

Table 9
Heterogeneity: varying levels of quality across LGFVs.

	Full sample		Twin sample	
	(1)	(2)	(1)	(2)
	Low rating LGFVs	High rating LGFVs	Low rating LGFVs	High rating LGFVs
Default	0.152*	0.100	0.257*	0.212
	(1.68)	(1.18)	(1.70)	(1.13)
Bond Controls	√	√	√	√
LGFV Controls	√	√	√	√
City Controls	√	√	√	√
Regional Effect	√	√	√	√
Time Effect	√	√	√	√
Obs	582	172	246	118
R^2	0.4661	0.6402	0.3651	0.4074

Table 10
Heterogeneity: bond guarantee.

	Full sample		Twin sample	
	(1)	(2)	(3)	(4)
	Unsecured Bonds	Secured Bonds	Unsecured Bonds	Secured Bonds
Default	0.169**	0.0819	0.178*	−0.239
	(2.29)	(0.36)	(1.86)	(−0.36)
Bond Controls	√	√	√	√
LGFV Controls	√	√	√	√
City Controls	√	√	√	√
Regional Effect	√	√	√	√
Time Effect	√	√	√	√
Obs	640	114	332	32
R^2	0.5659	0.4655	0.5662	0.7923

6. Mechanism

The previous sections investigated the spillover effect of Evergrande's debt default on local governments' implicit debt. In this section, we attempt to explain the mechanism by which these effects operate. In other words, we aim to discuss the mechanisms through which risk is transmitted from real estate companies' debt defaults to local government debt.

6.1. Land finance mechanism

Land is the most important asset that local governments control and the income obtained through land transfers and mortgage is the primary source of fiscal revenue and debt repayment. Many existing studies report that local governments utilize land as collateral to raise funds (through LGFVs) for infrastructure development, which is known as China's unique "land finance" model (Liang et al., 2017) and has resulted in the accumulation of huge implicit debts for local governments. In 2021, China's land mortgage financing was estimated to exceed 30 trillion yuan, which is several times the land transfer revenue (8.7 trillion).[1]

As land revenue is closely tied to the health of the real estate sector, any promotion or distress among real estate enterprises can influence the local governments' ability to provide the necessary fiscal backing to these LGFVs. On one hand, when the real estate market develops rapidly, land prices will show a trend of constant growth driven by the rising housing prices. Through the "housing price-land price" feedback, the land transfer revenue of local governments increases, which also enhances the local governments' ability to use land as collateral for financing, leading to a continuous expansion of local governments' debt. In the context of rising housing prices, increasing land prices, and credit expansion, local governments continuously invest borrowed funds into urban construction. The improved infrastructure further enhances the attractiveness of the local real estate and pushes up housing prices, thereby creating "housing and land price-governments' financing ability-public investment " feedback mechanism.

On the other hand, when negative shocks trigger downward fluctuations in housing prices, real estate companies' demand for land use declines, resulting in a decrease in local governments' land transfer revenue and a shrinkage in the value of land collateral. This weakens the ability of local governments to obtain financing from the financial sector

[1] In 2015 (the latest year for which publicly available data is known), the amount of land mortgage loans in China's 84 key cities was 3.6 times the land transfer revenue. It can be inferred that the land mortgage loan amount in 2021 will exceed 30 trillion yuan.

and their debt repayment capacity, leading to a gradually increasing default risk of local government debt. That is, in the event of a decline of land assets value, the risk of local government debt, including UIBs, will indeed increase. In our study, Evergrande's debt default led to a drop in the stock and bond prices of other real estate companies, impacting the financing ability of the whole real estate sector. This, in turn, may further influence the willingness and capacity of real estate firms to acquire land, potentially reducing land asset values and elevating the credit risk associated with UIBs. Therefore, we argue that in cities with a higher degree of land finance, the risk spillover effect of Evergrande's debt default on local government debt will be more significant. Hence, our prediction is as follows:

Hypothesis 1. Regions with a higher dependence on land finance, where local government debt is more closely tied to the value of land assets, exhibit a more pronounced increase in the risk premium of UIBs in response to real estate enterprise defaults.

6.2. Debt burden mechanism

In practice, LGFVs primarily undertake public service functions such as infrastructure construction, which are characterized by low or even no profits, slow capital recovery, low rates of return, and poor externalities (Croix & Delavallade, 2009). Consequently, their inherent profitability is quite limited, making fiscal support from local governments crucial for debt repayment. A substantial body of literature has demonstrated that LGFVs, due to their role in undertaking public service functions, possess political affiliations which provide them with an implicit guarantee from local governments and thus establish connections with state-owned commercial banks. As a result, LGFVs with an implicit guarantee from local governments are more likely to obtain financial support from creditors, especially commercial banks (Khwaja & Mian, 2005), thereby accumulating more debt. This phenomenon is a significant driver of the accumulation of implicit local government debt in China.

In this context, the default of Evergrande negatively impacts the willingness and ability of local governments to provide implicit guarantees to LGFVs by affecting local fiscal revenue. This leads to an increase in the debt risk of LGFVs, indicating that implicit guarantees act as a risk amplifier in the impact of real estate enterprise defaults on local government debt. If the above mechanism holds, LGFVs with heavier debt burdens tend to rely more heavily on implicit guarantee and fiscal support from local governments, and may face greater challenges in meeting their debt obligations, especially during times of financial stress or market uncertainty. Therefore, when real estate enterprises default, the risk premium of UIBs issued by LGFVs with heavier debt burdens are likely to experience a more pronounced increase compared to those with lower debt levels. Hence, our prediction is as follows:

Hypothesis 2. LGFVs with heavier debt burdens, which are more sensitive to shocks, exhibit a more pronounced increase in the risk premium of UIBs in response to real estate enterprise defaults.

To summarize, the default of real estate enterprises has a spillover effect on local government debt through two mechanisms: the land finance mechanism, which highlights the dependence of local fiscal revenue on land assets, and the debt burden mechanism, which emphasizes the reliance of LGFVs on local fiscal support for debt repayment (Fig. 1).

To test the above mechanism, we set Models (2) and (3) as follows:

$$\mathrm{RiskPremium}_{ijkt} = \gamma_1 * \mathrm{Defualt}_t + \gamma_2 * \mathrm{LandFin}_{kt} * \mathrm{Defualt}_t + \gamma_3 * \mathrm{LandFin}_{kt} + \sum \mathrm{Ctr} + \mathrm{FEs} + \varepsilon_{ijkt} \quad (2)$$

$$\mathrm{RiskPremium}_{ijkt} = \delta_1 * \mathrm{Defualt}_t + \delta_2 * \mathrm{DebtBur}_{jt} * \mathrm{Defualt}_t + \delta_3 * \mathrm{DebtBur}_{jt} + \sum \mathrm{Ctr} + \mathrm{FEs} + \varepsilon_{ijkt} \quad (3)$$

In Model (2), $\mathrm{LandFin}_{kt}$ represents the degree of local governments' reliance on land finance and we use the following two variables to measure it: (1) fiscal self-sufficiency rate, which denotes the ratio of general public budget revenue to general public budget expenditure,[2] and (2) land revenue ratio, which is calculated as the ratio of land revenue to general public budget revenue. A local government with a higher fiscal self-sufficiency rate and a lower land revenue ratio is expected to have a more sustainable fiscal position and be less likely to resort to land finance and thus be less effected by the real estate enterprise defaults.

In Model (3), $\mathrm{DebtBur}_{jt}$ represents the debt burden level of LGFVs, and we use the following two variables to measure it: (1) the debt-to-asset ratio, which is calculated as the ratio of total liabilities to total assets, and (2) cash ratio, which is computed as the ratio of cash and cash equivalents to current liabilities and reflects the short-term debt pressure faced by LGFVs. LGFVs with lower debt-to-asset ratios and a higher cash ratios are expected to be better positioned to meet their financial obligations and are less vulnerable to liquidity shocks. The remaining variables retain their meanings from Eq. (1). γ_2 and δ_2 are the parameters with which we are concerned.

6.3. Results

Table 11 reports the results of land finance mechanism. The coefficients of *Fiscal_SF*Default* are significant negative, meaning that regions with higher fiscal self-sufficiency experience a smaller increase in the risk premium of their UIBs in response to real estate enterprise defaults. Conversely, the coefficients of *Land_REV*Default* are significant positive, suggesting that regions more reliant on land revenue in their fiscal budget face a larger increase in the risk premium of their UIBs. Twin sample results confirm the robustness of our estimations. The results indicate that while risk spills over from real estate enterprise defaults to local government debt, the effect is more pronounced on regions dependent on land finance, thus supporting the land finance mechanism hypothesis.

Table 12 reports the results for the debt burden mechanism. The coefficients of *Leverage*Default* are significantly positive, meaning that LGFVs with higher leverage experience a greater increase in the risk premium of their UIBs following real estate enterprise defaults. Conversely, the coefficients of *Cash*Default* are significant negative, suggesting that LGFVs with greater liquidity to cover current liabilities face smaller increases in the risk premium of their UIBs. Twin sample results confirm the robustness of our estimations. These findings suggest that while risk spills over from estate real estate enterprise defaults to local government debt, the impact is more substantial for LGFVs with heavier debt burdens, thus supporting the debt burden mechanism hypothesis.

7. Conclusion and policy implications

Sovereign debt risk has been a crucial research topic in academia. This paper uses the debt default of Evergrande, which is one of China's largest real estate companies, as a starting point and investigates how does the default of super-large real estate company affect government debt. Based on urban investment bond issuance data, which is typically representative of China's local government implicit debt, we find that

[2] Here, general public budget revenue mainly includes locally retained portion of taxes and transfer payments from higher-level governments, while excluding land revenue.

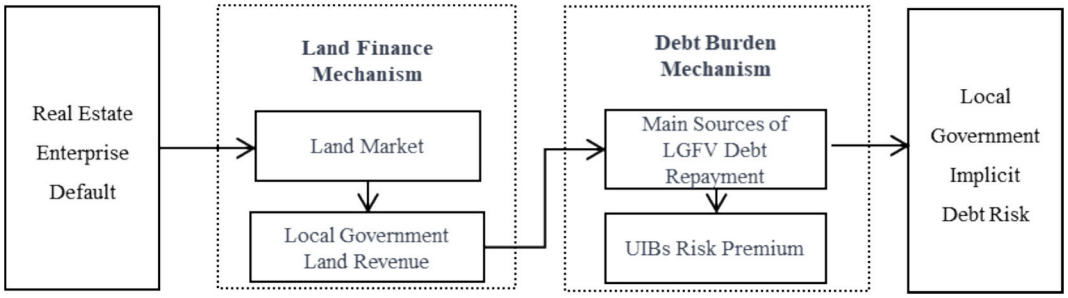

Fig. 1. Risk spillover mechanism of real estate enterprise defaults to local governments' implicit debt.

Table 11
Land finance mechanism.

	Full sample		Twin samples	
	(1)	(2)	(3)	(4)
*Fiscal_SF*Default*	−1.565***		−0.921*	
	(−3.22)		(−1.93)	
*Land_REV*Default*		0.569*		0.908**
		(1.77)		(2.65)
Bond Controls	√	√	√	√
LGFV Controls	√	√	√	√
City Controls	√	√	√	√
Regional Effect	√	√	√	√
Time Effect	√	√	√	√
Obs	754	570	364	273
R^2	0.5436	0.5774	0.2692	0.7989

Table 12
Debt burden mechanism.

	Full sample		Twin sample	
	(1)	(2)	(3)	(4)
*Leverage*Default*	1.357*		1.499*	
	(1.78)		(1.95)	
*Cash*Default*		−1.112*		−0.453**
		(−1.73)		(−2.51)
Bond Controls	√	√	√	√
LGFV Controls	√	√	√	√
City Controls	√	√	√	√
Regional Effect	√	√	√	√
Time Effect	√	√	√	√
Obs	754	754	364	352
R^2	0.5412	0.4959	0.2930	0.7815

defaults of super-large real estate companies have a risk spillover effect on local governments' implicit debt, as evidenced by increased issuance premium of UIBs. Furthermore, risk spillover effects are much stronger for less developed regions, LGFVs with lower credit ratings, and UIBs without guarantee measures. In addition, real estate enterprise defaults can affect land asset values, thereby spilling over risks to local government implicit debt through two main mechanisms: land finance and debt burden. That is, regions with a higher dependence on land finance and LGFVs with heavier debt burdens exhibit a more pronounced increase in the risk premium of UIBs in response to real estate enterprise defaults.

Based on the findings, we propose three key policy recommendations. First, the central government should implement measures to manage defaults in the real estate sector, particularly in less developed regions and for lower-qualified LGFVs, to prevent risk spillover to local government implicit debt. In managing defaults in the real estate sector, a risk assessment framework should be established to identify and prioritize high-risk projects, LGFVs, and regions. A dedicated fund or resource allocation should be set up to support the orderly resolution of defaults. Coordination among local governments, regulators, and financial institutions should be strengthened to contain risk spillovers. Targeted support measures, such as extending loan maturities or facilitating debt restructuring, should be implemented for viable but distressed projects and LGFVs.

Second, the central government should also strengthen the monitoring and early warning of local government debt risks. The comprehensiveness, timeliness, and transparency of government debt data (including implicit liabilities) should be improved to enhance risk monitoring and assessment. The development of a mature municipal bond market should be fostered to provide a sustainable financing channel for local governments. Fiscal and financial regulations should be strengthened to prevent the resurgence of off-balance sheet borrowing and implicit guarantees. Coordination and information sharing among government agencies, regulators, and market participants should be enhanced to ensure timely identification and mitigation of emerging risks.

Third, LGFVs must actively pursue the market-oriented transformation to fundamentally mitigate the risk of local government implicit debt. This would involve gradually transitioning these platforms from government financing vehicles to commercially operated, self-sustaining companies, with clear delineation between their debts and those of the local governments. To achieve this goal, the scope of local government support and guarantees for LGFV debts should be clearly defined and limited to promote market discipline. Clear criteria and guidelines should be developed to assess the viability and strategic importance of existing platforms. A phased approach should be adopted to orderly exit or restructure non-viable platforms and support the market-oriented transformation of strategic ones. Private sector participation and investment in commercially viable projects and assets currently under LGFV management should be encouraged. Corporate governance, financial disclosure, and risk management practices of LGFVs should be strengthened to align with market-oriented principles.

Fourth, it is crucial for the government to accelerate the reform of the tax system to reduce local governments' excessive dependence on land finance. This would require a rational reallocation of fiscal powers and responsibilities between the central and local governments, ensuring that local governments have sufficient and stable revenue sources to meet their expenditure responsibilities. The share of direct taxes, such as property tax and personal income tax, in local government revenues should be gradually increased while reducing reliance on land sales. The transfer payment system should be improved to ensure sufficient and stable funding for less developed regions. Local governments should be given greater autonomy in managing tax rates and expenditures, under the premise of enhanced fiscal transparency and accountability.

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Declaration of competing interest

The author declares that the research was conducted in the absence of any financial support or relationships that may pose conflict of interest.

Data availability

Data will be made available on request.

References

Allen, F., Babus, A., & Carletti, E. (2009). Financial crises: Theory and evidence. *Annual Review of Financial Economics, 1*(1), 97–116.

Allen, F., & Gale, D. (2000). Financial Contagion. *Journal of Political Economy, 108*(1), 1–33.

Ang, A., Bai, J., & Zhou, H. (2023). The great wall of debt: Real estate, political risk, and Chinese local government financing cost. *The Journal of Finance and Data Science, 9*, Article 100098.

Ang, A., & Longstaff, F. (2013). Systemic sovereign credit risk: Lessons from the U.S. and Europe. *Journal of Monetary Economics, 60*(5), 493–510.

Annicchiarico, B., & Giammarioli, N. (2005). Fiscal rules and sustainability of public finances in an endogenous growth model. *European Central Bank Working Paper* (p. 0381).

Ardagna, S. (2004). Fiscal Stabilizations: When Do they Work and Why. *European Economic Review, 48*(5), 1047–1074.

Beirne, J., & Fratzscher, M. (2013). The pricing of sovereign risk and contagion during the European sovereign debt crisis. *Journal of International Money and Finance, 34*, 60–82.

Bekaert, G., Ehrmann, M., Fratzscher, M., & Mehl, A. (2014). The global crisis and equity market contagion. *The Journal of Finance, 69*(6), 2597–2649.

Benmelech, E., & Bergman, N. K. (2008). Liquidation values and the credibility of financial contract renegotiation: Evidence from US airlines. *The Quarterly Journal of Economics, 123*(4), 1635–1677.

Bocola, L. (2016). The pass-through of sovereign risk. *Journal of Political Economy, 124*(4), 879–926.

Brixi, H. P. (2001). Government contingent liabilities: A hidden risk for fiscal stability. *Journal of Public Budgeting, Accounting & Financial Management, 13*(4), 582.

Broner, F., Erce, A., Martin, A., & Ventura, J. (2014). Sovereign debt markets in turbulent times: Creditor discrimination and crowding-out effects. *Journal of Monetary Economics, 61*, 114–142.

Chalmers, J. M. R. (1998). Default risk cannot explain the muni puzzle: Evidence from municipal bonds that are secured by U.S. treasury obligations. *Review of Financial Studies, 2*, 281–308.

Chaney, T., Sraer, D., & Thesmar, D. (2012). The collateral channel: How real estate shocks affect corporate investment. *American Economic Review, 102*(6), 2381–2409.

Chen, H., Chen, Z., He, Z., Liu, J., & Xie, R. (2023). Pledgeability and asset prices: Evidence from the Chinese corporate bond markets. *The Journal of Finance, 78*(5), 2563–2620.

Chen, K., Huang, Y., Yuan, K., & Zhou, H. (2020). *How does local government financing affect bond market in China: Evidence from municipal corporate bond*. Working Paper.

Chen, K., Ren, J., & Zha, T. (2018). The nexus of monetary policy and shadow banking in China. *American Economic Review, 108*(12), 3891–3936.

Chiang, T. C., Jeon, B. N., & Li, H. (2007). Dynamic correlation analysis of financial contagion: Evidence from Asian markets. *Journal of International Money and Finance, 26*(7), 1206–1228.

Cong, L., Gao, H., Ponticelli, J., & Yang, X. (2017). *Credit allocation under economic stimulus: Evidence from China. Working paper*. The University of Chicago.

Cooper, R., & Nikolov, K. (2018). Government debt and banking fragility: The spreading of strategic uncertainty. *International Economic Review, 59*(4), 1905–1925.

Croix, D., & Delavallade, C. (2009). Public investment and corruption with failing institutions. *Economics of Governance, 10*(3), 187–219.

Daniel, J., Davis, J. M., & Wolfe, A. M. (1997). *Fiscal accounting of bank restructuring*. IMF Policy Discussion Papers.

Davis, M., & Lo, V. (2001). Infectious defaults. *Quantitative Finance, 1*(4), 382–387.

Davis, M. A., & Heathcote, J. (2007). The Price and quantity of residential land in the United States. *Journal of Monetary Economics, 54*(8), 2595–2620.

Ewing, B. T., Forbes, S. M., & Payne, J. E. (2003). The effects of macroeconomic shocks on sector-specific returns. *Applied Economics, 35*(2), 201–207.

Farhi, E., & Tirole, J. (2018). Deadly embrace: Sovereign and financial balance sheets doom loops. *The Review of Economic Studies, 85*(3), 1781–1823.

Gan, J. (2007). Collateral, debt capacity, and corporate investment: Evidence from a natural experiment. *Journal of Financial Economics, 85*(3), 709–734.

Gao, G., Dong, J., & Li, X. (2022). Local government debt, real estate investment and corporate investment: Evidence from China. *Sustainability, 14*(19), 12353.

Gao, H., Ru, H., & Tang, D. Y. (2021). Subnational debt of China: The politics-finance nexus. *Journal of Financial Economics, 141*(3), 881–895.

Gennaioli, N., Martin, A., & Rossi, S. (2014). Sovereign default, domestic banks, and financial institutions. *The Journal of Finance, 69*(2), 819–866.

Gerlach, S., & Smets, F. (1995). Contagious speculative attacks. *European Journal of Political Economy, 11*(1), 45–63.

Goldstein, M. (1998). *The Asian financial crisis: Causes, cures, and systemic implications*. Institute for International Economics.

Gospodinov, N., Robertson, B., & Tkac, P. (2014). *Do municipal bonds pose a systemic Risk? Evidence from the Detroit bankruptcy. Working paper*. The Federal Reserve Bank of Atlanta.

Harris, L. E., & Piwowar, M. S. (2006). Secondary trading costs in the municipal bond market. *Journal of Finance, 61*(3), 1361–1397.

He, C., Zhou, Y., & Huang, Z. (2016). Fiscal decentralization, political centralization, and land urbanization in China. *Urban Geography, 37*(3), 436–457.

He, Z., Nelson, S. T., Su, Y., Zhang, A. L., & Zhang, F. (2022). *Zoning for profits: How public finance shapes land supply in China*. National Bureau of Economic Research.

Herbertsson, A., & Rootzen, H. (2007). *Pricing kth-to-default swaps under default contagion: The matrix-analytic approach*. Available at SSRN 962381.

Hernández, L. F., & Valdés, R. O. (2001). What drives contagion: trade, neighborhood, or financial links? *International Review of Financial Analysis, 10*(3), 203–218.

Hildreth, W. B., & Zorn, C. K. (2005). The evolution of the state and local government municipal debt market over the past quarter century. *Public Budgeting & Finance, 25*(4s), 127–153.

Huang, Y., Pagano, M., & Panizza, U. (2020). Local crowding-out in China. *The Journal of Finance, 75*(6), 2855–2898.

Keddad, B., & Schalck, C. (2020). Evaluating sovereign risk spillovers on domestic banks during the European debt crisis. *Economic Modelling, 88*, 356–375.

Khan, K. (2012). *The urban development investment corporations in Chongqing*. China: World Bank Group.

Khwaja, A. I., & Mian, A. (2005). Do lenders favor politically connected firms? Rent provision in an emerging financial market. *Quarterly Journal of Economics, 120*(4), 1371–1411.

Kodres, L. E., & Pritsker, M. (2002). A rational expectations model of financial contagion. *The Journal of Finance, 57*(2), 769–799.

Leigland, J. (1997). Accelerating municipal bond market development in emerging economies: an assessment of strategies and progress. *Public Budgeting & Finance, 17*(2), 57–79.

Leigland, J. (2012). *Municipal future-flow bonds in Mexico: Lessons for emerging economies* (pp. 309–320).

Leitner, Y. (2005). Financial networks: Contagion, commitment, and private sector bailouts. *The Journal of Finance, 60*(6), 2925–2953.

Li, H., & Zhou, L. (2005). Political turnover and economic performance: The incentive role of personnel control in China. *Journal of Public Economics, 89*(9–10), 1743–1762.

Li, J., & Zinna, G. (2018). How much of bank credit risk is sovereign risk? Evidence from Europe. *Journal of Money, Credit and Banking, 50*(6), 1225–1269.

Liang, Y., Shi, K., Wang, L., & Xu, J. (2017). Local government debt and firm leverage: Evidence from China. *Asian Economic Policy Review, 12*(2), 210–232.

Longstaff, F. A. (2010). The subprime credit crisis and contagion in financial markets. *Journal of Financial Economics, 97*(3), 436–450.

Longstaff, F. A., & Schwartz, E. S. (1995). A simple approach to valuing risky fixed and floating rate debt. *The Journal of Finance, 50*(3), 789–819.

Lu, Y., & Sun, T. (2013). *Local government financing platforms in China: A fortune or misfortune? (No. 1475599676)*. International Monetary Fund.

Moraga, J. F., & Vidal, J. (2010). Fiscal sustainability and public debt in an endogenous growth model. *Journal of Pension Economics & Finance, 9*(2), 277–302.

Morelli, J. M., Ottonello, P., & Perez, D. J. (2022). Global banks and systemic debt crises. *Econometrica, 90*(2), 749–798.

Muth, R. F. (1969). *Cities and housing*. Chicago, IL: University of Chicago Press.

Oikarinen, E., & Peltola, R. (2006). *Dynamic linkages between prices of vacant land and housing–Empirical evidence from Helsinki* (Paper presented at the ENHR international conference Ljubljana).

Ooi, J., & Lee, S. (2004). Price discovery between residential land & housing markets. *Journal of Housing Research, 15*(2), 95–112.

Peterson, G. E., & Kaganova, O. (2010). Integrating land financing into subnational fiscal management. *World Bank Policy Research Working Paper, 5409*.

Polackova, H. (1999). Contingent government liabilities: A hidden fiscal risk. *Finance and Development, 36*(1), 46.

Qian, Y., & Roland, G. (1998). Federalism and the soft budget constraint. *The American Economic Review, 88*(5), 1143–1162.

Qian, Y., Roland, G., & Xu, C. (1999). Why is China different from Eastern Europe? Perspectives from organization theory. *European Economic Review, 43*(4), 1085–1094.

Shih, V. (2004). Factions matter: Personal networks and the distribution of bank loans in China. *Journal of Contemporary China, 13*(38), 3–19.

Talvi, E., & Végh, C. A. (2005). Tax base variability and procyclical fiscal policy in developing countries. *Journal of Development Economics, 78*(1), 156–190.

Tsui, K. Y. (2011). China's infrastructure investment boom and local debt crisis. *Eurasian Geography and Economics, 52*(5), 686–711.

Walder, A. G. (1995). Local governments as industrial firms: An organizational analysis of China's transitional economy. *American Journal of Sociology, 101*(2), 263–301.

Weltbank. (2012). *The urban development investment corporations (UDICs) in Chongqing, China*. World Bank.