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Government subsidies and municipal bond pricing: Unveiling the impact of explicit guarantees in China

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Abstract

The Chinese municipal corporate bond market is currently facing growing risk accumulation, underscoring the need for a critical review of its pricing mechanisms and competitiveness. Using daily data from 2019 to 2023, we obtained 6,693 samples and employed a regression model to analyze the influence of explicit government guarantees, as reflected by government subsidy indicators, on the pricing of municipal corporate bonds. These findings indicate that investors interpret such subsidies as indicators of operational risk for municipal companies, resulting in widened credit spreads for these bonds and affecting their market competitiveness. This study further categorizes the effects of these explicit guarantees across varying levels of regional economic development and administrative hierarchy, revealing notable heterogeneity in their impact on bond pricing. This finding suggests that the economic landscape and administrative status of regions play crucial roles in shaping the influence of government subsidies on bond pricing and, by extension, the competitiveness of these bonds in the market. Additionally, this paper uses a double interaction term to explore the interplay between explicit and implicit government guarantees through the lens of the "Yongmei" incident. We discovered that the diminished market anticipation of implicit government backing significantly amplifies the effect of explicit government guarantees on the pricing of municipal corporate bonds, further impacting their competitiveness. To reduce risks within the municipal corporate bond market and foster the stable functioning of municipal entities, governments should minimize their interference in the market, thereby allowing market forces to operate more efficiently.

Keywords: *Municipal Corporate Bonds, Government Subsidy, Credit Spread, Market Competitiveness, Government Implicit Guarantee*

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1 INTRODUCTION

In China's administrative structure, local governments are instrumental in delivering key services including social security, public utility development, and urban construction. These responsibilities require considerable financial resources to execute their roles effectively. Within this framework, municipal corporate bonds, known colloquially as "chengtou" bonds, have emerged as an innovative financial instrument. Issued by local government financing vehicles (LGFVs), these bonds are underpinned by local government support and directed towards funding projects vital for regional development, public welfare, and social well-being (Wan et al., 2024). LGFVs, which embody both market dynamics and government objectives, are

inherently intertwined with local governments' fiscal policies. (Liang et al., 2017; Fan et al., 2022).

The launch of the "Four Trillion" economic stimulus plan in response to the 2008 global financial crisis marked a pivotal moment for the municipal corporate bond market in China. It catalyzed a surge in the volume and scale of these bonds alongside a swift increase in local government debt (Chen et al., 2020; Huang et al., 2020; Walker et al., 2021). Despite their integral contributions to China's economic and infrastructural progress, the expansion of municipal corporate bonds and the attendant risks have necessitated heightened regulatory scrutiny. (Hercowitz & Strawczynski, 2004; Huang & Du, 2018).

Post the introduction of "Document No. 43" in 2014, a cascade of policies has mandated the disentanglement of local governments from LGFVs, imposing a strict ban on government guarantees. This has prompted local governments to expose concealed debts and has driven LGFVs towards market-oriented reforms, necessitating self-accountability for their financial outcomes. However, the advent of the revised "Budget Law" in 2015 has seen governments inject assets like land and operational rights into LGFVs, creating alternative fiscal channels beyond the traditional budget. This has fueled rapid growth among LGFVs. Yet, the substantial volume of outstanding municipal corporate bonds, coupled with the non-market-oriented operations of LGFVs, has eroded their competitiveness and hampered their capacity to manage the existing bond inventories. The persistent growth in bond issuance, driven by developmental imperatives and fiscal pressures on local governments, has further amplified the market risks. Consequently, an examination of the municipal corporate bond pricing mechanism is of paramount importance to mitigate the debt burdens faced by LGFVs (Borisova et al., 2015).

Municipal corporate bonds in China, shaped by the nation's fiscal policies, represent a unique aspect of the country's tax-sharing and fiscal decentralization framework. These instruments, issued by LGFVs, serve as critical funding mechanisms for local governments to undertake public welfare projects (Wei et al., 2023). Chinese municipal corporate bonds, while distinct, share functional parallels with municipal bonds in other jurisdictions given their role as a vital financial channel for local infrastructure and service development. Empirical research on municipal bond pricing identifies a spectrum of formal factors that influence credit spreads. Notably, the credit rating of these bonds is a pivotal determinant, with higher ratings correlating to reduced credit spreads, thereby lowering borrowing costs (Charles et al., 1981). The scale of bond issuances also has an impact, as larger issues tend to result in lower spreads because of economies of scale and enhanced market liquidity (Capeci, 1994). Moreover, we use the operational metrics of issuing municipal entities, such as default and liquidity risks, to assess credit spreads (Ang et al., 2010; Schwert, 2017; Wang et al., 2008). Moreover, Brabenec et al., (2020) found that market preference influences the bond prices. Valaskova et al. (2021) also found that the pricing of bonds will be affected by the financial stability of bond insurance enterprises. Jaskowski and Rettl (2023) found that the information cost will also influence the pricing of bonds.

Fiscal policies at the regional level have been shown to significantly influence municipal bond credit spreads by sculpting market expectations (Poterba, 1999). The financial robustness and budgetary prudence of local governments, including their debt levels, are found to have a direct bearing on credit spreads, reflecting the market's assessment of the issuer creditworthiness (Sola et al., 2016). Besides the government's influence, researchers also analyzed other factors like macroeconomic variables (Wang et al., 2022) and the financial status of municipal corporations (Schwert, 2017). These studies found that municipal corporate bonds possess attributes of both corporate and municipal bonds. It is essential to consider both conventional and unconventional channels of impact on their pricing.

Informal factors, particularly the perceived implicit guarantee from local governments, also play a significant role in shaping investor perceptions and bond pricing. The underlying assumption is that these bonds, being instrumental in financing public welfare projects, enjoy a level of government support (Wan et al., 2024). Empirical evidence suggests that such government guarantees have a substantial impact on municipal bond pricing, with direct guarantees from local governments carrying more weight than those from private insurers (Bland et al., 1987). Negative sentiment surrounding local governments, stemming from issues like governance deficiencies or corruption, can lead to increased issuance spreads (Duyvesteyn et al., 2016). Furthermore, the operational transparency of local governments, as reflected in their public reports, is noted to significantly influence credit spreads, with greater transparency correlating with lower spreads (Ren et al., 2024). As the markets confidence in the strength of these implicit guarantees grows, so does the demand for municipal corporate bonds, subsequently suppressing prices and reducing the cost of borrowing (Allen et al., 2023; Zhang, 2023).

Scholars have recognized that government affiliations influence the pricing of corporate bonds beyond the municipal bond market. For example, Borisova et al. (2011) demonstrated that the proportion of government ownership in companies significantly affects the credit spread of corporate bonds, highlighting the market's sensitivity to the level of government investment. Beck et al. (2017) have also shown that local government guarantees are instrumental in reducing the credit spread of issuer bonds, underscoring the effect of government-backed assurance on bond pricing. Ngo and Susnjara (2020) have added a layer of complexity by revealing that the provision of implicit guarantees by local governments is contingent upon the enterprise's importance and its degree of affiliation with the government. This affiliation can be quantified by the volume of services the enterprise provides to the government, thereby directly impacting the pricing of municipal corporate bonds.

As entities entrusted with long-term policy projects, LGFVs may encounter operational challenges if they are rapidly detached from local government support and are expected to compete in the market. The potential inability to manage the existing inventory of municipal corporate bonds could lead to bankruptcy and collapse of the LGFV system. To mitigate this risk, government subsidies are essential for the smooth decoupling of LGFVs and control of municipal corporate bond risks. These subsidies not only support the operational sustainability of LGFVs, but also act as explicit guarantees to enhance the creditworthiness of new municipal bond issuances. The existing literature presents a nuanced view of the impact of government subsidies

on company operations and external financing (Luo et al., 2021; Amezcua et al., 2013; Czarnitzki et al., 2011; Mao & Xu, 2015). On one hand, subsidies can effectively ease short-term financial constraints and attract human and financial capital, signaling legitimacy and quality (Amezcua et al., 2013; Söderblom et al., 2015). On the other hand, they may fail to yield satisfactory outcomes and could lead to rent-seeking behavior and reduced investment efficiency (Frye & Shleifer, 1997; Guo et al., 2014; Claessens et al., 2008; Du et al., 2017).

In the context of corporate innovation, government subsidies have been shown to reduce costs, improve efficiency, and stimulate innovation (Shao & Wang, 2023; Zúñiga-Vicente et al., 2014; Ostapenko, 2016). However, the relationship between subsidies and innovation efficiency is not linear, with some studies suggesting a U-shaped relationship in which an optimal reduction in subsidies could enhance innovation efficiency (Wu et al., 2022; Xu et al., 2023). In some developing countries, government subsidies may have a crowding-out effect, thereby diminishing innovation efficiency (Wadho & Chaudhry, 2018; Wang et al., 2023). The impact of government subsidies on corporate financing, particularly their influence on stock prices, is a topic of limited research and divergent views. Some studies propose a negative correlation between subsidies and stock prices (Chen & Wu, 2016; Teng et al., 2019), while others suggest the opposite (Li et al., 2022). whereas others suggest the opposite. Government subsidies are anticipated to exert a significant influence on the pricing of municipal corporate bonds issued by LGFVs, which is a subject worthy of further investigation.

This study introduces a novel methodology for quantifying the impact of government subsidy income on the credit spread of municipal corporate bonds while also evaluating the extent of implicit government guarantees. Using a comprehensive dataset of daily municipal corporate bond issuances from 2019 to 2023, we constructed indicators that reflect the influence of subsidies on bond spreads. Our analysis was further enhanced by grouping the samples for regression analysis, which allowed us to delve into regional and administrative level heterogeneities that may affect these relationships. Moreover, we leveraged exogenous shock events to examine the shifts in the association between government subsidies and municipal corporate bond credit spreads after a decline in the market expectations for implicit government guarantees.

The findings are threefold. First, a positive correlation is identified between government subsidies and the credit spreads of municipal corporate bonds. An increment in the ratio of government subsidy income or the subsidy amount relative to assets is correlated with wider credit spreads, potentially owing to the perception of subsidies as an indicator of financial distress for LGFVs. Second, this study uncovers regional and administrative level heterogeneities in the relationship between government subsidies and municipal corporate bond credit spreads, suggesting that economic development and the administrative stature of LGFVs modulate the impact of subsidies on credit spreads. Third, a diminution in market anticipations of implicit government guarantees intensifies the influence of explicit government subsidies on municipal corporate bond pricing.

Our study makes three principal contributions to the existing body of knowledge. First, it broadens the scope of research on municipal corporate bond pricing by examining the role of explicit government guarantees, as indicated by government subsidies, in addition to the implicit guarantees typically associated with government affiliations. Second, it extends the research on government subsidies beyond their impact on corporate operations to include their direct linkage to bond market pricing mechanisms, thereby offering a fresh perspective on the subsidy-pricing relationship in the context of municipal corporate bonds. Finally, it augments our understanding of how implicit government guarantees intersect with explicit ones in shaping municipal corporate bond pricing, thereby providing new insights into the complex dynamics of government-backed financial instruments.

The remainder of this paper is organized as follows. Section 2 outlines the theoretical hypotheses. Section 3 describes the variables and presents the empirical design of our study. Section 4 provides the descriptive statistics, empirical results, and the results of the robustness test. The paper concludes with a final section summarizing the findings and their implications.

2 THEORETICAL ANALYSIS AND RESEARCH HYPOTHESES

Based on the existing literature, this paper posits that LGFVs, owing to their governmental background and role in infrastructure financing, inherently benefit from implicit government guarantees. Externally, the receipt of government subsidies by LGFVs reflects their importance and the local governments willingness to provide support, which influences the market pricing of municipal corporate bonds. Higher subsidies suggest a stronger economic capacity of local governments to offer stable guarantees. Internally, government subsidies, as part of LGFVs' non-operating income, boost revenue and net profits, signaling stronger repayment capabilities and healthier operational conditions. These factors are critical in credit rating assessments, thus indirectly affecting the pricing of municipal corporate bonds.

LGFVs, as a special type of state-owned enterprise (SOE), were created to fulfill local government functions through market-oriented means, focusing on infrastructure and public welfare projects. These projects often have lower returns, longer payback periods, and higher risks, impacting the market competitiveness of LGFVs. Their operations are subject to local government decisions, which can increase risks and investor concerns, necessitating higher credit spreads to attract investment. Government subsidies can act as a signaling mechanism for the operational status of LGFVs. While subsidies may indicate operational difficulties and the need for external support, they can also be interpreted by investors as a sign of increased risk, potentially leading to higher credit spreads for municipal corporate bonds. The paper explores the dual impact of government subsidies on credit spreads, considering both the potential for subsidies to stabilize LGFVs and the market's risk perception due to perceived operational challenges.

Based on the analysis of the dual impact pathways of government subsidies on LGFVs, we formulate Hypothesis 1, which is further divided into two contrasting sub-hypotheses, H1a and H1b:

H1a: An increase in government subsidies will lead to a decrease in the credit spread of municipal corporate bonds.

H1b: An increase in government subsidies will lead to an increase in the credit spread of municipal corporate bonds.

The municipal corporate bond market is subject to formal and informal institutional influences. Formal factors include regional economic conditions, issuer characteristics, and bond-specific attributes, whereas informal factors include implicit government guarantees and regional trust (Cao et al., 2024). The market is particularly influenced by the fiscal capacity of local governments, which are responsible for the repayment of municipal corporate bonds often used to finance public welfare projects.

Economically advanced regions, with their stronger fiscal positions, can offer more substantial guarantees for municipal bonds, potentially reducing investor risk and credit spreads. Additionally, these regions often have more developed financial markets and regulatory frameworks, which can improve investor confidence and market efficiency, further influencing the pricing of municipal corporate bonds. This study also considers the role of financial intermediaries in enhancing market transparency and reducing information asymmetry, which can lower transaction costs and influence how government guarantees influence bond pricing. The interaction between government subsidies and the economic development level of a region is expected to significantly influence the credit spreads of municipal corporate bonds, reflecting the complex relationship between government support and the market perception of risk. Given that LGFVs are backed by local governments, the characteristics of these governments, particularly their administrative level, can significantly influence the credit spread of municipal corporate bonds. Higher administrative levels are associated with greater fiscal strength, more effective guarantees, and greater policy influence. This distinction leads to differentiation between local and central platforms in terms of how government subsidies affect credit spreads.

Based on these perspectives, we propose Hypothesis 2.

H2a: The higher the regional economic development level, the greater the impact of government subsidies on the credit spread of municipal corporate bonds.

H2b: The impact of government subsidies on the issuance of municipal corporate bonds differs significantly between local platforms and national platforms.

Furthermore, this study considers the interconnectedness of municipal corporate bonds within the same region and the potential for a default in one bond to affect investors' perceptions of others, a phenomenon known as the spillover effect. The "Yongmei" event in 2020, which challenged the assumption of "rigid repayment" for high-rated state-owned enterprise bonds, is posited to alter investors' expectations of implicit government guarantees. In this situation, investors will regard government subsidies as an explicit guarantee, and higher subsidies will lower the default risks of municipal corporate bonds. Thus, after the "Yongmei" event, the

correlation between government subsidies and municipal corporate bond pricing will become the opposite. This leads to the proposal of Hypothesis 3.

H3: After the "Yongmei" event, the impact of government subsidies on the credit spread of municipal corporate bond issuances will significantly change.

3 VARIABLE DESCRIPTION AND MODEL DESIGN

3.1 DATA SOURCE

This paper utilizes a comprehensive dataset of municipal corporate bonds for the period from January 1, 2019, to December 31, 2023, extracted from the WIND database, forming the basis of our sample. The study specifically examines 6,693 municipal corporate bonds after the exclusion of records with missing data. Company-level details of LGFVs are derived from their annual financial statements available within the WIND database. Additionally, provincial-level macroeconomic data are procured from the WIND databases regional macroeconomic dataset. To assess market conditions, concurrent treasury bond data and the 7-day reverse repurchase rate published by the People's Bank of China are sourced from the WIND databases market benchmark interest rate collection. The interbank rates are from the dataset Shanghai Interbank Offered Rate.

3.2 VARIABLE DESCRIPTION

The dependent variable in this study is the credit spread of municipal corporate bonds. According to its definition, the credit spread of a bond equals the difference between the bond yield and the risk-free rate (Bai et al., 2020). Therefore, we use the coupon rate of municipal corporate bonds as the yield to maturity and the yield of treasury bonds with the same term as the risk-free rate. The credit spread of municipal corporate bonds is computed as the difference between the coupon rate of municipal corporate bonds and the yield of treasury bonds.

As for the explanatory variables, the core variable is the government subsidy income received by LGFVs. Due to the significant heterogeneity in the size and financial conditions of LGFVs, the absolute amount of government subsidy income may not adequately represent its impact. Hence, two explanatory variables are constructed for study: the ratio of government subsidy income and the subsidy amount per 10,000 yuan of assets received by LGFVs. The ratio of government subsidy income is measured as the amount of government subsidy income received by LGFVs divided by their total income in the current year. The subsidy amount per 10,000 yuan of assets is measured as the amount of government subsidy income received by LGFVs divided by LGFVs' total assets in the current year. As the typically large scale of LGFVs' total assets, this variable is defined as a subsidy amount per 10,000 yuan of assets to account for. As the bond pricing is influenced by government subsidy, but on the other hand, there may be a two-way causal relationship between government subsidies and credit spreads of municipal corporate bonds, thus, the decision-making of government subsidies may be affected by the change in bond credit spreads. To control the potential two-way relationship, we match the dependent variable with the previous year's data of explanatory variables.

Macroeconomic variables: including 10-year government bond yield (GCNY), 7-day reverse repurchase rate (DR), Shanghai Interbank Offered Rate (SHIBOR), GDP growth rate (GDP), local government implicit guarantee willingness (SECW), local government fiscal self-sufficiency rate (FSR), and local government debt rate. The GCNY represents the medium to long-term interest rate level in China, while DR reflects the short-term market demand for funds and monetary policy intentions of the People's Bank of China. SHIBOR is the rate of interbank lending, which is determined by the demand for credit and will affect the rate of the credit market. We use the one-month and one-year SHIBOR of municipal corporate bonds' insurance day to control the influence of the credit market's short-term and long-term yield. These indicators provide a general market expectation of bond interest rates and credit rates. The GDP growth rate indicates economic prosperity; better economic conditions imply lower default risk and lower credit spreads. The implicit guarantee willingness of local governments uses the approach from existing studies, calculating the ratio of provincial municipal corporate bond financing amount to the sum of PPP financing amount, local bond financing amount, and municipal corporate bond financing amount, the higher ratio indicates greater importance of municipal corporate bonds in local government financing tools and higher costs of non-rescue, leading the stronger local government willingness to intervene and greater implicit guarantee willingness. The FSR is calculated by dividing a local government's general budget revenue by its general budget expenditure. A higher FSR suggests that the local government has more fiscal resources available to repay its debts. The debt ratio of a local government is determined by dividing total government debt by general fiscal revenue. A higher debt ratio can hinder the local government's ability to satisfy its fiscal repayment obligations. In addition to the implicit guarantee, investors consider the government's capacity for fiscal repayment. By analyzing the FSR and debt ratio of the local government, we can assess investors' confidence in the government's repayment capabilities.

3.3 MODEL DESIGN

The dependent variable in our analysis is the credit spread of municipal corporate bonds at issuance, with all variables considered predetermined. Given the distinct nature of empirical analysis and design in this context, the sample data are approached as a mixed cross-sectional dataset. Acknowledging the unique attributes embodied by the two principal explanatory variables, we have constructed separate ordinary least squares (OLS) models to conduct our regression analyses, as illustrated below:

$$spread_{i,t} = \alpha + \beta\ ratio_{i,t} + controls_i + \mu_t + \theta_i + \delta_i + \varepsilon \quad (1)$$

$$spread_{i,t} = \alpha + \beta\ subsidy_{i,t} + controls_i + \mu_t + \theta_i + \delta_i + \varepsilon \quad (2)$$

where $spread_{i,t}$ is the credit spread of municipal corporate bond *i* at the insurance day *t*, defined as the difference between the coupon rate of municipal corporate bond *i* and the yield of treasury bonds with the same term at the same time. $ratio_{i,t}$ represents the ratio of government subsidy income received by LGFV *i* relative to total income in the same year *t*. $subsidy_{i,t}$ represents the subsidy amount received per 10,000 yuan of assets by LGFV *i* in the same year *t*. $controls_i$

denote the control variables. α is the intercept capturing the effects of other variables on the regression results. μ_t represents time-fixed effects, using year t as the time-fixed effect. θ_i represents issuer fixed effects, using LGFV i's credit rating as the enterprise fixed effect. δ_i represents province fixed effects, using the postal code of the province where LGFV i locate as the province fixed effect. ε is the error term.

To examine the moderating effects of regional economic levels and administrative levels on the relationship between government subsidies and municipal corporate bonds' credit spreads, we stratify the sample accordingly. Utilizing model (1), we conduct regression tests to compare the β coefficients among different groups, thereby revealing variations in the relationship across strata.

Furthermore, to investigate the impact of regional trust shock events on the relationship between government subsidies and municipal corporate bonds' issuance spreads, we introduce a double interaction term into model (1) for Hypothesis 3:

$$spread_{i,t} = \alpha + \beta_1 ratio_{i,t} * post + \beta_2 ratio_{i,t} + \beta_3 post + controls_i + \mu_t + \theta_i + \delta_i + \varepsilon \quad (3)$$

$$spread_{i,t} = \alpha + \beta_1 subsidy_{i,t} * post + \beta_2 subsidy_{i,t} + \beta_3 post + controls_i + \mu_t + \theta_i + \delta_i + \varepsilon \quad (4)$$

Post is a time dummy variable. The "Yongmei" event occurred on November 10, 2020; thus, November 10, 2020, is used as the time node. Municipal corporate bonds issued on that day and thereafter have *post*=1; otherwise, *post*=0. β_1 measures the change in the impact of government subsidies on municipal corporate bonds' credit spreads after the "Yongmei" event. Variable names and definitions are presented in Tab.1.

Tab. 1 –Variable definitions. Source: own research

	Variable Name	**Variable Definition**
Explained variable	*spread*	Municipal corporate bond coupon rate-yield of the same maturity term treasury bond.
Explanatory variable	*ratio*	Government subsidy income / total income of the year×100%
	subsidy	Government subsidy income /(total assets of the year in yuan /10000)
	area	Value the eastern area, central area and western area to 3，2，1.
	post	Municipal corporate bonds issued at or after November 10, 2020, $post$=1, before November 10, 2020, $post$=0.
Control variable	*size*	Absolute value of the issuance scale of municipal corporate bonds, in hundred million yuan.
	term	Municipal corporate bonds' maturity term.

rating	AAA=4、AA+=3、AA=2、AA-=1
asset liability ratio	Total liabilities / total assets × 100%
CR	Total cash / total assets × 100%.
EBITDAICR	ln(EBITDA/ Interest expense)
ROE	Net profit / average shareholder's equity × 100%
operating duration	The year of municipal corporate bond issuance-year of company establishment.
grade	Assigned values from 1 to 4 based on administrative level, from low to high.
SECW	scale of municipal corporate bonds /(scale of municipal corporate bonds+local bond financing amount+PPP financing amount)
FSR	(local government's general budget revenue / general budget expenditure) × 100%
Debt ratio	(total government debt / the general fiscal revenue) × 100%
GDP	The growth rate of GDP of the province where LGFV is located.
GCNY	Yield of 10-year treasury bonds on the day of municipal corporate bond issuance.
DR	7-day pledge repurchase rate for interbank deposit-taking institutions.
SHIBOR-1M	One-month interbank rate
SHIBOR-1Y	One-year interbank rate

4 DESCRIPTIVE STATISTICS AND EMPIRICAL TESTING

4.1 DESCRIPTIVE STATISTICS

Table 2 presents the descriptive statistics for the sample data, encompassing variables such as sample size, mean, standard deviation, minimum, and maximum values. The average credit spread for municipal corporate bonds, which serves as the dependent variable in this study, is 1.86%. This figure signifies the risk premium inherent to these bonds. Notably, the presence of negative minimum values indicates scenarios where the issuance yield of municipal corporate bonds falls below that of comparable treasury bonds. The occurrence of zero values in the government subsidy income ratio (ratio) and the subsidy amount per 10,000 yuan of assets (subsidy) is attributed to some LGFVs reporting subsidy income without receiving actual subsidies. The mean value of the post variable, approximately 0.9, reflects that the majority of the municipal corporate bonds in the sample were issued after November 10, 2020. Examining the bond issuer ratings (rating), the standard deviation of 0.742 and an average value of 2.964 suggest a high concentration of credit ratings around AA+, indicating relatively uniform credit quality among the LGFVs.

Tab. 2 – Descriptive statistics. Source: own research

Variable	Observed value	Mean	Standard deviation	Minimum value	Maximum value
spread	6693	1.715	1.226	-1.198	5.204
ratio	6693	1.948	5.925	0	52.132
subsidy	6693	9.536	28.207	0	165.582
area	6693	2.468	0.638	1	4
post	6693	0.888	0.315	0	1
size	6693	7.289	4.154	0.300	30.000
term	6693	3.423	2.137	0.082	20.000
rating	6693	2.913	0.719	1.000	4.000
asset liability ratio	6693	60.373	9.251	15.287	91.363
CR	6693	0.358	0.284	0.002	6.215
EBITDAICR	6693	20.142	1.053	13.943	23.275
ROE	6693	1.628	1.424	-10.008	17.758
operating duration	6693	16.476	6.986	1	38
grade	6693	1.731	0.595	1	4
SECW	6693	0.234	0.153	0.009	0.509
FSR	6693	54.135	14.093	15.145	76.960
Debt ratio	6693	93.938	42.890	43.251	230.760
GDP	6693	5.205	2.831	-5.000	12.853
GCNY	6693	2.872	0.199	2.544	3.403
DR	6693	2.082	0.159	1.800	2.550
SHIBOR-1M	6693	2.242	0.312	1.342	3.200
SHIBOR-1Y	6693	2.625	0.321	1.723	3.511

4.2 MAIN EFFECT TESTS

This study employs model (1) and model (2) to investigate the effects of government subsidies on the credit spreads of municipal corporate bonds. Utilizing ordinary least squares (OLS) regression analysis, we analyze daily issuance data spanning the period from 2019 to 2023. The outcomes of this regression are detailed in Table 3.

Tab. 3 – Relationship between government subsidies and credit spread of LGFV bond issuance. Source: own research

	(1)	(2)	(3)	(4)	(5)	(6)
	subsidy			**ratio**		
	spread	spread	spread	spread	spread	spread
ratio				0.023***	0.001	0.008***
				(9.217)	(0.585)	(3.436)
subsidy	0.004***	-0.001	0.001***			
	(8.070)	(-1.393)	(3.005)			

GCNY		-0.237	0.040		-0.236	0.044
		(-1.439)	(0.277)		(-1.435)	(0.303)
DR		1.122***	2.253***		1.114***	2.252***
		(7.768)	(10.597)		(7.714)	(10.592)
SHIBOR-1M		0.206	0.011		0.210	0.015
		(1.242)	(0.071)		(1.264)	(0.104)
SHIBOR-1Y		-0.156	-0.201		-0.158	-0.205
		(-0.745)	(-1.090)		(-0.754)	(-1.115)
size		-0.042***	-0.015***		-0.043***	-0.015***
		(-12.243)	(-4.860)		(-12.321)	(-4.880)
operating		0.009	0.022***		0.009	0.022***
duration		(1.410)	(3.743)		(1.404)	(3.767)
asset liability		-0.009***	-0.006***		-0.009***	-0.006***
ratio		(-6.034)	(-4.236)		(-6.000)	(-4.303)
CR		-0.828***	-0.368***		-0.830***	-0.368***
		(-16.382)	(-8.031)		(-16.413)	(-8.038)
ROE		0.080***	0.053***		0.074***	0.055***
		(7.791)	(5.677)		(7.398)	(6.092)
EBITDA		-0.191***	0.047***		-0.185***	0.050***
		(-13.595)	(3.356)		(-13.056)	(3.534)
term		-0.006***	-0.002		-0.007***	-0.002
		(-3.128)	(-1.181)		(-3.305)	(-1.281)
GDP		-0.000	0.002		0.000	0.001
		(-0.022)	(0.184)		(0.003)	(0.139)
FSR		-0.017***	0.005		-0.017***	0.006
		(-11.919)	(0.639)		(-11.744)	(0.679)
debt ratio		0.004***	0.003***		0.004***	0.003***
		(8.810)	(5.655)		(8.794)	(5.653)
SECW		-0.240*	-1.557***		-0.227*	-1.566***
		(-1.760)	(-2.845)		(-1.662)	(-2.862)
cons	1.674***	5.564***	-3.274***	1.670***	5.451***	-3.346***
	(106.304)	(12.901)	(-4.584)	(106.473)	(12.591)	(-4.678)
R-squared	0.0096	0.2070	0.4203	0.0125	0.2068	0.4206
Control	No	Yes	Yes	No	Yes	Yes
YearFE	No	No	Yes	No	No	Yes
CreditFE	No	No	Yes	No	No	Yes
ProvinceFE	No	No	Yes	No	No	Yes
N	6693	6693	6693	6693	6693	6693

Note: The robust t-statistic in parentheses. *p<0.10, **p<0.05, ***p<0.01.

As shown in Table 3, incorporating control variables and fixed effects, the coefficients for both the ratio and the subsidy display a markedly positive association with credit spreads at the 1% significance threshold. To be specific, an increment of 1 yuan in subsidies per 10,000 yuan of

assets is linked to a 1 basis point rise in credit spreads, whereas a one-percentage-point escalation in the subsidy income ratio is correlated with an 8 basis point expansion in credit spreads. These results suggest that an upsurge in subsidies to LGFVs is construed by investors as an indicator of deteriorating operational efficiency. The belief is that an increased undertaking of inefficient policy-driven projects by LGFVs leads to a decline in profitability and a weakening of financial positions, thereby necessitating greater subsidies to maintain operations. Consequently, investors elevate their risk expectations for bonds issued by LGFVs, demanding a higher risk premium and consequently driving up the credit spreads of municipal corporate bonds.

Moreover, the regression outcomes for control variables shed light on their impact on municipal corporate bond credit spreads. Economically, a substantial positive correlation exists between the risk-free interest rate (DR) and credit spreads, indicating that an increase in the risk-free rate prompts investors to curtail their investments in riskier assets, intensifying the overall quest for risk premiums and resulting in wider credit spreads. Given that credit spreads are calculated as the difference between the coupon rate of municipal corporate bonds and the yield on comparable maturity benchmark treasury bonds, an inversely significant relationship exists between the GCNY and municipal corporate bond credit spreads.

From a regional economic vantage point, both the GDP growth rate of the province where the LGFVs are based and the SECW exhibit significant negative correlations with credit spreads. This implies that as regional economic conditions improve, the likelihood of financial distress for LGFVs decreases, leading to a reduced default risk for municipal corporate bonds and subsequently lower credit spreads. Furthermore, an enhanced perception of the government's implicit guarantee willingness can lead investors to favor municipal corporate bonds, anticipating support from local governments. This preference can mitigate investors' risk expectations, consequently resulting in narrower credit spreads. Regarding the fiscal repayment capacity of local governments, as the debt ratio of local governments increases, the credit spreads of municipal corporate bonds also rise. This indicates that when the fiscal repayment capacity of the government diminishes, investors' willingness to default on municipal corporate bonds grows, leading to higher credit spreads. At the corporate level, LGFVs' financial indicators, such as the asset liability ratio, EBITDAICR, CR, and ROE, show significant correlations with municipal corporate bond credit spreads. This highlights that investors closely monitor the operational metrics of LGFVs to assess their risk profiles, which in turn influences the credit spreads of their issued bonds.

Lastly, from a bond-specific standpoint, there is an inverse relationship between bond size and credit spreads. This is largely because the model may have overlooked liquidity risk premiums, which are instead embedded within the credit risk premiums, thereby affecting credit spreads. Additionally, the term shows a significant negative correlation with credit spreads due to the relatively weaker sensitivity of municipal corporate bond rates to term in comparison to treasury bond rates, causing a more pronounced increase in treasury bond rates as term lengthens, which in turn diminishes the credit spreads of municipal corporate bonds.

In essence, the findings confirm that an increase in government subsidies is perceived by investors as a sign of declining operational performance by LGFVs, leading to heightened risk perceptions and increased credit spreads for municipal corporate bonds, thus validating Hypothesis 1b.

4.3HETEROGENEITY ANALYSIS

Given the pronounced variation in economic development and the maturity of financial markets across different regions in China, it is hypothesized that the influence of government subsidies on the credit spreads of municipal corporate bonds will differ accordingly. To test this, Hypothesis 2 is subjected to empirical scrutiny. Aligning with the conventional regional economic division in China, the study sample is segmented into three distinct groups: the eastern, central, and western areas, with the northeastern area excluded from the analysis. Regression analysis is performed using model (1) and model (2), and the results are delineated in Table 4 and Table 5. Table 4 concentrates on the ratio of government subsidies to income, while Table 5 examines the subsidy amount per 10,000 yuan of assets.

Tab. 4 – Regional heterogeneity in the relationship between government subsidy income ratio and credit spread of municipal corporate bonds. Source: own research

	(1)	(2)	(3)
	Western area	**Central area**	**Eastern area**
	spread	spread	spread
ratio	0.002	0.006*	0.012***
	(0.281)	(1.673)	(2.990)
GCNY	-0.049	0.257	-0.047
	(-0.091)	(1.006)	(-0.258)
DR	2.276**	2.757***	1.949***
	(2.366)	(7.516)	(7.397)
SHIBOR-1M	0.817	0.024	-0.098
	(1.509)	(0.088)	(-0.533)
SHIBOR-1Y	-0.897	-0.481	0.050
	(-1.480)	(-1.401)	(0.219)
size	0.006	-0.014**	-0.017***
	(0.472)	(-2.574)	(-4.255)
operating	0.065***	-0.005	0.039***
duration	(2.632)	(-0.539)	(5.263)
asset liability	0.014**	-0.007***	-0.010***
ratio	(2.144)	(-2.659)	(-5.353)
CR	-1.001***	-0.385***	-0.254***
	(-4.028)	(-5.666)	(-3.900)
ROE	0.033	0.047***	0.064***
	(0.612)	(3.034)	(5.477)
EBITDA	-0.151**	0.106***	0.038**
	(-2.211)	(4.209)	(2.203)
term	-0.010	-0.007**	0.000
	(-0.979)	(-1.978)	(0.212)

GDP	0.130	-0.002	0.242***
	(0.860)	(-0.124)	(2.808)
FSR	-0.049	-0.008	0.010
	(-1.165)	(-0.577)	(0.519)
Debt ratio	-0.004	0.002***	-0.004
	(-0.410)	(3.008)	(-0.553)
SECW	-2.332	-6.396***	-3.320**
	(-0.290)	(-3.249)	(-2.150)
cons	2.828	-3.917***	-3.144**
	(1.029)	(-3.482)	(-2.148)
R-squared	0.4820	0.3493	0.3378
Control	Yes	Yes	Yes
YearFE	Yes	Yes	Yes
CreditFE	Yes	Yes	Yes
ProvinceFE	Yes	Yes	Yes
N	515	2484	3358

Note: The robust t-statistic in parentheses. *p<0.10, **p<0.05, ***p<0.01.

Tab. 5 – Regional heterogeneity in the relationship between subsidy amount per 10,000 yuan of assets and credit spread of municipal corporate bonds. Source: own research

	(1)	(2)	(3)
	Western area	**Central area**	**Eastern area**
	spread	spread	spread
subsidy	-0.000	0.001	0.004***
	(-0.169)	(1.421)	(3.821)
GCNY	-0.057	0.254	-0.047
	(-0.106)	(0.993)	(-0.258)
DR	2.281**	2.759***	1.947***
	(2.371)	(7.519)	(7.397)
SHIBOR-1M	0.811	0.021	-0.099
	(1.499)	(0.077)	(-0.540)
SHIBOR-1Y	-0.885	-0.476	0.050
	(-1.463)	(-1.388)	(0.218)
size	0.006	-0.014**	-0.016***
	(0.483)	(-2.546)	(-4.191)
operating	0.065***	-0.005	0.038***
duration	(2.623)	(-0.556)	(5.242)
asset liability	0.014**	-0.007***	-0.009***
ratio	(2.206)	(-2.669)	(-5.235)
CR	-1.007***	-0.381***	-0.254***
	(-4.054)	(-5.602)	(-3.920)
ROE	0.035	0.045***	0.062***
	(0.646)	(2.766)	(5.295)
EBITDA	-0.162**	0.105***	0.040**
	(-2.377)	(4.173)	(2.319)
term	-0.009	-0.007*	0.001
	(-0.944)	(-1.904)	(0.277)

GDP	0.134	-0.002	0.244***
	(0.888)	(-0.116)	(2.825)
FSR	-0.051	-0.008	0.010
	(-1.214)	(-0.564)	(0.535)
Debt ratio	-0.004	0.002***	-0.004
	(-0.368)	(2.998)	(-0.563)
SECW	-2.427	-6.453***	-3.273**
	(-0.302)	(-3.278)	(-2.123)
cons	3.041	-3.904***	-3.224**
	(1.106)	(-3.469)	(-2.206)
R-squared	0.4821	0.3491	0.3389
Control	Yes	Yes	Yes
YearFE	Yes	Yes	Yes
CreditFE	Yes	Yes	Yes
ProvinceFE	Yes	Yes	Yes
N	515	2484	3588

Note: The robust t-statistic in parentheses. *p<0.10, **p<0.05, ***p<0.01.

A review of the data presented in Tables 4 and 5 reveals that, from western to eastern area, the correlation between government subsidies and the credit spread of municipal corporate bonds changes from insignificant to significant. This suggests that with the economic development degree increase, investors may place greater importance on government subsidies to LGFVs, thus strengthening the correlation between government subsidies and the credit spreads of municipal corporate bonds.

When it comes to control variables, regional economic development will also influence the correlation between the credit spreads of municipal corporate bonds and control variables. For example, only in the eastern area, the GDP growth rate of the province housing the LGFVs and LGFVs' operating duration significantly affects the credit spread of municipal corporate bonds. From the western to the eastern area, the correlation between the credit spread of municipal corporate bonds and control variables becomes more significant. These findings point out that with the economic development degree increase, investors will place greater importance on the LGFV's operation and macroeconomic development, making these variables influence the credit spread of municipal corporate bonds.

In terms of government implicit guarantee willingness, a significant negative correlation between the SECW and the credit spread of municipal corporate bonds is observed, with the absolute value of the correlation coefficients decreasing as one moves from west to east. This trend implies that as regional economic conditions improve, investors' expectations of implicit government guarantees diminish, leading to a reduced impact of such guarantees on credit spreads. Concurrently, this shift results in a heightened influence of explicit government subsidies on municipal corporate bond pricing.

The findings underscore the regional heterogeneity in the impact of government subsidies on municipal corporate bond credit spreads, attributable to differences in regional economic development.

As entities with strong government affiliations, LGFVs are intricately linked to local governments, rendering fluctuations in indicators related to local governance potentially influential on the credit spreads of municipal corporate bonds. The administrative level of these local governments, serving as a comprehensive measure, reveals notable divergences in fiscal capacity, the potency of guarantees, and the scope of policy influence across various tiers of administration. It is thus posited that the administrative levels of governments associated with LGFVs could engender variability in the way government subsidies influence the pricing of municipal corporate bonds. To empirically verify this hypothesis, LGFVs are classified into four distinct administrative levels, and a regression analysis is executed using model (1) and model (2). The outcomes are detailed in Tables 6 and 7, with Table 6 highlighting the ratio of government subsidy income and Table 7 spotlighting the subsidy amount per 10,000 yuan of assets.

Tab. 6 – Administrative heterogeneity in the relationship between government subsidy income proportion and credit spread of LGFV bonds. Source: own research

	(1) **Country-level**	(2) **City-level**	(3) **Provincial-level**	(4) **National-level**
	spread	spread	spread	spread
ratio	0.012***	0.006**	0.263	0.384
	(2.701)	(2.364)	(0.123)	(1.125)
GCNY	-0.245	0.159	-1.134	0.591
	(-0.922)	(0.917)	(-1.252)	(0.797)
DR	2.545***	2.212***	-0.562	1.757*
	(6.505)	(8.665)	(-0.422)	(1.768)
SHIBOR-1M	0.139	-0.025	-0.404	2.230**
	(0.507)	(-0.140)	(-0.436)	(2.599)
SHIBOR-1Y	-0.221	-0.219	0.543	-2.847***
	(-0.647)	(-1.000)	(0.440)	(-2.690)
size	-0.020***	-0.013***	0.038	0.018
	(-3.038)	(-3.743)	(1.148)	(1.352)
operating	0.021*	0.019***	-0.001	-0.053
duration	(1.823)	(2.883)	(-0.014)	(-1.536)
asset liability	-0.009***	-0.005**	-0.124	0.067**
ratio	(-3.410)	(-2.532)	(-0.090)	(2.343)
CR	-0.185**	-0.444***	4.651	-0.069
	(-2.113)	(-8.085)	(0.324)	(-0.079)
ROE	0.029*	0.076***	0.819	0.142
	(1.775)	(6.662)	(0.295)	(0.854)
EBITDA	0.179***	0.008	-1.514	-0.399*
	(6.475)	(0.442)	(-0.241)	(-1.950)
term	-0.007**	-0.004*	0.000	0.019
	(-2.158)	(-1.781)	(.)	(1.587)

GDP	-0.000	0.004	0.151	0.245
	(-0.000)	(0.327)	(0.032)	(0.475)
FSR	0.020	-0.001	-0.620	-0.050
	(0.962)	(-0.075)	(-0.139)	(-0.329)
Debt ratio	0.000	0.004***	0.009	0.004
	(0.232)	(6.462)	(0.039)	(0.420)
SECW	-2.006	-1.734***	-7.855	-0.721
	(-1.641)	(-2.647)	(-0.702)	(-0.087)
cons	-6.063***	-2.485***	66.515	3.302
	(-3.517)	(-3.094)	(0.165)	(0.302)
R-squared	0.3904	0.4629	0.9064	0.6969
Control	Yes	Yes	Yes	Yes
YearFE	Yes	Yes	Yes	Yes
CreditFE	Yes	Yes	Yes	Yes
ProvinceFE	Yes	Yes	Yes	Yes
N	2157	4217	175	144

Note: The robust t-statistic in parentheses. *p<0.10, **p<0.05, ***p<0.01.

Tab. 7 – Administrative heterogeneity in the relationship between subsidy amount per 10,000 yuan of assets and credit spread of LGFV bonds. Source: own research

	(1)	(2)	(3)	(4)
	Country-level	**City-level**	**Provincial-level**	**National-level**
	spread	spread	spread	spread
subsidy	0.002*	0.001*	0.012	0.028
	(1.856)	(1.870)	(0.106)	(1.014)
GCNY	-0.246	0.155	-1.134	0.615
	(-0.926)	(0.894)	(-1.252)	(0.825)
DR	2.546***	2.213***	-0.564	1.754*
	(6.501)	(8.668)	(-0.423)	(1.763)
SHIBOR-1M	0.138	-0.031	-0.405	2.254***
	(0.502)	(-0.175)	(-0.437)	(2.627)
SHIBOR-1Y	-0.228	-0.212	0.544	-2.878***
	(-0.667)	(-0.966)	(0.441)	(-2.719)
size	-0.020***	-0.013***	0.038	0.017
	(-3.041)	(-3.726)	(1.147)	(1.330)
operating	0.021*	0.019***	-0.001	-0.052
duration	(1.771)	(2.875)	(-0.019)	(-1.517)
asset liability	-0.009***	-0.005**	-0.022	0.067**
ratio	(-3.347)	(-2.508)	(-0.035)	(2.337)
CR	-0.193**	-0.441***	5.719	-0.029
	(-2.202)	(-8.021)	(0.840)	(-0.033)
ROE	0.027*	0.075***	0.690	0.177
	(1.680)	(6.282)	(0.338)	(1.089)
EBITDA	0.168***	0.006	-1.140	-0.384*
	(6.183)	(0.366)	(-0.296)	(-1.891)

term	-0.007**	-0.004*	0.000	0.018
	(-2.028)	(-1.711)	(.)	(1.543)
GDP	0.000	0.004	0.499	0.301
	(0.005)	(0.388)	(0.234)	(0.579)
FSR	0.019	-0.001	-0.332	-0.072
	(0.887)	(-0.110)	(-0.134)	(-0.473)
Debt ratio	0.000	0.004***	-0.007	0.006
	(0.287)	(6.458)	(-0.067)	(0.571)
SECW	-1.995	-1.719***	-8.802	-2.290
	(-1.630)	(-2.624)	(-0.999)	(-0.277)
cons	-5.741***	-2.449***	40.021	4.353
	(-3.341)	(-3.049)	(0.180)	(0.394)
R-squared	0.3893	0.4626	0.9064	0.6963
Control	Yes	Yes	Yes	Yes
YearFE	Yes	Yes	Yes	Yes
CreditFE	Yes	Yes	Yes	Yes
ProvinceFE	Yes	Yes	Yes	Yes
N	2157	4217	175	144

Note: The robust t-statistic in parentheses. *p<0.10, **p<0.05, ***p<0.01.

A review of Tables 6 and 7 uncovers markedly contrasting relationships between government subsidies and the credit spread of municipal corporate bonds between central and local platforms. This contrast underscores the fact that the administrative level of LGFVs can shape investors' interpretations of government subsidies. Within the group of country-level and city-level LGFV platforms, characterized by more limited fiscal resources, guarantee efficacy, and policy influence, investors are prone to interpret government subsidies as indicators of declining operational standards of LGFVs. Conversely, at the provincial-level and national-level, as the government owns more fiscal sources, it decreases the default risk of municipal corporate bonds, reducing the effect of government subsidies on the credit spread of municipal corporate bonds. Thus, in the provincial-level and national-level LGFV platform groups, investors will ignore the signal mechanism of government subsidies, making a correlation between government subsidies and the credit spread of municipal corporate bonds insignificant.

Furthermore, within the local groups, it is observed that the influence of the governments implicit guarantee propensity on the credit spread of municipal corporate bonds diminishes with an increase in the administrative level. This outcome points to a heightened investor anticipation of default risk for municipal corporate bonds at lower administrative levels, thus amplifying concerns regarding potential local government intervention in the event of bond issues. Moreover, only in national-level LGFV group, the SHIBOR will significantly influence the credit spread of municipal corporate bonds. These results show that the administrative level of LGFVs not only shape investors' interpretations of government subsidies, but also shape investors' interpretations of other variables.

These findings corroborate that the influence of government subsidies on the credit spread of municipal corporate bonds is subject to variation based on the administrative levels of LGFVs,

thereby highlighting administrative heterogeneity. Ultimately, the impact of government subsidies on the credit spreads of municipal corporate bonds is found to be significantly modulated not only by regional economic development but also by the administrative level disparities among LGFVs, thereby validating Hypothesis 2.

4.4 THE IMPACT OF DEFAULT EVENTS ON GOVERNMENT SUBSIDY PRICING MECHANISM

On November 10, 2020, the "Yongmei" default, involving Yongcheng Coal and Electricity Holding Group Co., Ltd., a state-owned enterprise with a AAA credit rating, had a profound impact on China's credit bond market. The company's failure to repay 1 billion yuan in principal and interest on the "20 Yongmei SCP003" note upon maturity signaled a significant breach of the expected "rigid repayment" norm for high-rated corporate bonds. This event shattered investors' traditional assumptions about the infallibility of AAA ratings and recalibrated their expectations concerning the implicit guarantees provided by governments. In the aftermath of the "Yongmei" default, the municipal corporate bond market witnessed a shift in the perception of "municipal corporate bond faith" which was previously underpinned by the guarantees of local governments. The event led to a weakening of the pricing mechanism associated with these implicit government guarantees, while simultaneously amplifying the influence of explicit measures, such as government subsidies, on the credit spreads of municipal corporate bonds.

To empirically assess the effects of the "Yongmei" default on the subsidy pricing mechanism, the study employs model (3), model (4) and model (5) to perform a regression analysis on the complete dataset. A time dummy variable, labeled as post, is introduced to represent the impact of the event, using November 10, 2020, as the pivotal date. The variable post is set to 1 for municipal corporate bonds issued on or after this date, and 0 for those issued prior. The regression outcomes are detailed in Table 8, which delineates the alterations in the influence of government subsidy income ratio, subsidy amount per 10,000 yuan of assets, and the total quantity of government subsidies on municipal corporate bond credit spreads following the default event. The results in Table 8 are organized to reflect the specific changes in impact as follows: column (1) captures the modification in the effect of the government subsidy income ratio on credit spreads, column (2) illustrates the change in impact stemming from the subsidy amount relative to asset value, and column (3) measures the shift in influence attributable to the overall amount of government subsidies post-default event.

Tab. 8 – The impact of default events on government subsidy pricing mechanism. Source: own research

	(1) **ratio**	(2) **subsidy**
	spread	spread
ratio×post	-0.013***	—
	(-5.186)	—
subsidy×post	—	-0.004***
	—	(-7.380)
post	-0.059	-0.057

	(-0.723)	(-0.695)
ratio	0.011***	—
	(5.216)	—
subsidy	—	0.004***
	—	(8.460)
GCNY	0.065	0.062
	(0.446)	(0.426)
DR	2.219***	2.221***
	(10.287)	(10.293)
SHIBOR-1M	0.016	0.012
	(0.110)	(0.083)
SHIBOR-1Y	-0.197	-0.194
	(-1.069)	(-1.052)
size	-0.015***	-0.015***
	(-4.891)	(-4.875)
operating duration	0.022***	0.022***
	(3.780)	(3.763)
asset liability ratio	-0.006***	-0.006***
	(-4.343)	(-4.261)
CR	-0.371***	-0.371***
	(-8.096)	(-8.089)
ROE	0.055***	0.053***
	(6.121)	(5.692)
EBITDA	0.050***	0.047***
	(3.575)	(3.386)
term	-0.002	-0.002
	(-1.290)	(-1.197)
GDP	0.001	0.002
	(0.115)	(0.153)
FSR	0.006	0.005
	(0.657)	(0.604)
Debt ratio	0.003***	0.003***
	(5.708)	(5.728)
SECW	-1.610***	-1.609***
	(-2.932)	(-2.926)
cons	-3.300***	-3.222***
	(-4.604)	(-4.501)
R-squared	0.4207	0.4205
Control	Yes	Yes
YearFE	Yes	Yes
CreditFE	Yes	Yes
ProvinceFE	Yes	Yes
N	6693	6693

Note: The robust t-statistic in parentheses. *p<0.10, **p<0.05, ***p<0.01.

By observing columns (1) and columns (2), the analysis reveals that following the “Yongmei” event, there was a significantly change in the influence of the government subsidy on the credit

spreads of municipal corporate bonds, the correlation between government subsidy and credit spreads of municipal corporate bonds from positive to negative. This change means that after the "Yongmei" event, with the increase of government subsidy to LGFV, investors may lower the default risk expectation of the municipal corporate bonds issued by LGFV, making the credit spread of municipal corporate bonds decrease.

This suggests that the "Yongmei" event not only has diluted the effect of government implicit guarantees on credit spreads, but also has an impact on the influence of government explicit guarantee. Consequently, this changes the role of government subsidies in shaping these spreads. When the government increases the subsidy to LGFV, investors will view the government subsidy as an explicit guarantee, which will reduce the default risk of municipal corporate bonds. As a result, the correlation between the government subsidy and municipal corporate bonds' credit spreads changes significantly. The findings underscore that the occurrence of bond default events akin to "Yongmei" diminishes the sway of government implicit guarantees in municipal corporate bond pricing mechanisms, while simultaneously changing the influence of government subsidies on the credit spreads of local government financing vehicle (LGFV) bonds, thereby proving Hypothesis 3.

4.5 ROBUSTNESS TEST

To affirm the reliability of our findings, we execute a robustness test on the baseline regression outcomes. This test entails substituting the dependent variable to assess the stability of our model.

The primary dependent variable in this study is the credit spread at issuance of municipal corporate bonds, determined by the disparity between the bonds coupon rate at issuance and the yield of equivalent maturity treasury bonds. While this calculation may overlook the potential impact of liquidity spreads, factors impacting municipal bond credit spreads could concurrently influence the risk-free yield of treasury bonds. These elements exert a substantial influence on the coupon rate of municipal corporate bonds during issuance. To verify the robustness of our results, we employ model (1) and model (2), keeping all other variables constant while substituting the dependent variable with the issuance coupon rate of municipal corporate bonds. The outcomes of this regression analysis are detailed in Table 9. Column (1) delineates the relationship between the ratio of government subsidy income and the coupon rate of municipal corporate bonds, whereas column (2) illustrates the link between the subsidy amount received per 10,000 yuan of assets and the coupon rate of municipal corporate bonds.

Tab. 9 – Robustness test results. Source: own research

	coupon rate	
	(1)	(2)
ratio	0.008***	—
	(3.507)	—
subsidy	—	0.002***
	—	(3.221)
GCNY	0.707***	0.703***
	(4.728)	(4.701)

DR	1.717***	1.718***
	(7.786)	(7.793)
SHIBOR-1M	0.007	0.002
	(0.045)	(0.012)
SHIBOR-1Y	0.114	0.119
	(0.599)	(0.624)
size	-0.014***	-0.014***
	(-4.241)	(-4.224)
operating duration	0.124***	0.124***
	(20.767)	(20.740)
asset liability ratio	-0.006***	-0.006***
	(-4.247)	(-4.173)
CR	-0.365***	-0.364***
	(-7.687)	(-7.677)
ROE	0.057***	0.054***
	(6.108)	(5.638)
EBITDA	0.044***	0.042***
	(3.037)	(2.880)
term	-0.002	-0.002
	(-1.289)	(-1.201)
GDP	0.003	0.003
	(0.254)	(0.297)
FSR	0.007	0.007
	(0.854)	(0.816)
Debt ratio	0.003***	0.003***
	(5.364)	(5.367)
SECW	-1.596***	-1.588***
	(-2.813)	(-2.797)
cons	-2.788***	-2.721***
	(-3.758)	(-3.674)
R-squared	0.4489	0.4487
Control	Yes	Yes
YearFE	Yes	Yes
CreditFE	Yes	Yes
ProvinceFE	Yes	Yes
N	6693	6693

Note: The robust t-statistic in parentheses. *p<0.10, **p<0.05, ***p<0.01.

Upon reviewing the regression outcomes, a significant positive correlation persists between government subsidies and the coupon rate of municipal corporate bonds when the coupon rate is employed as the dependent variable, at the 1% significance level. This correlation suggests that augmented government subsidies are associated with a broadening of the credit spread at issuance for municipal corporate bonds. These results are in alignment with Hypothesis 1b and corroborate the regression findings presented in Table 3, thereby substantiating the robustness of the initial conclusions.

As there may exist a two-way causal relationship between government subsidies and credit spreads of municipal corporate bonds, to control the potential two-way relationship we match the dependent variable with the previous data of explanatory variables. To prevent the problem of sample selection bias, we employ model (1) and model (2), using the same year's data as explanatory variables to test the robustness of our results. The outcomes of this regression analysis are detailed in Tables 10 to 14. Table 10 shows the result of basic regression robustness test. Tables 11 and 12 show results of the regional heterogeneity in the impact of government subsidies on municipal corporate bond credit spreads. Tables 13 and 14 show results of LGFVs' administrative level heterogeneity in the impact of government subsidies on municipal corporate bond credit spreads.

Tab. 10 – Basic regression robustness test results. Source: own research

	(1) **subsidy**	(2) **ratio**
	spread	spread
ratio		0.005***
		(2.661)
subsidy	0.001***	
	(2.601)	
GCNY	-0.695***	-0.693***
	(-3.744)	(-3.731)
DR	-1.157**	-1.156**
	(-2.305)	(-2.304)
SHIBOR-1M	0.480**	0.486***
	(2.568)	(2.600)
SHIBOR-1Y	-0.027	-0.032
	(-0.119)	(-0.146)
size	-0.014***	-0.014***
	(-3.495)	(-3.497)
operating	0.029***	0.029***
duration	(3.982)	(3.978)
asset liability	-0.006***	-0.006***
ratio	(-3.021)	(-3.078)
CR	-0.366***	-0.368***
	(-6.329)	(-6.366)
ROE	0.056***	0.058***
	(4.913)	(5.284)
EBITDA	0.041**	0.042**
	(2.288)	(2.333)
term	-0.004*	-0.005*
	(-1.827)	(-1.869)
GDP	0.003	0.002
	(0.199)	(0.140)
FSR	-0.012	-0.011
	(-0.808)	(-0.764)
debt ratio	-0.013***	-0.013***

	(-2.694)	(-2.717)
SECW	-4.127***	-4.117***
	(-4.234)	(-4.225)
cons	7.435***	7.388***
	(4.700)	(4.666)
R-squared	0.4075	0.4076
Control	No	Yes
YearFE	No	No
CreditFE	No	No
ProvinceFE	No	No
N	6693	6693

Note: The robust t-statistic in parentheses. *p<0.10, **p<0.05, ***p<0.01.

Upon reviewing the results in Table 10, we find a significant positive association between government subsidies and the coupon rate of municipal corporate bonds when the coupon rate is used as the dependent variable. This correlation suggests that increased government subsidies are associated with a broadening of the credit spread at issuance for municipal corporate bonds. These results are in alignment with Hypothesis 1b and corroborate the regression findings presented in Table 3, thereby substantiating the robustness of the initial conclusions.

Tab. 11 – Robustness test of regional heterogeneity in the relationship between government subsidy income ratio and credit spread of municipal corporate bonds. Source: own research

	(1)	(2)	(3)
	Western area	**Central area**	**Eastern area**
	spread	spread	spread
ratio	0.013	0.002**	0.009*
	(1.383)	(2.473)	(1.875)
GCNY	-0.825	-0.477	-0.829***
	(-1.250)	(-1.463)	(-3.463)
DR	-1.346	-0.956	-1.194*
	(-0.667)	(-1.083)	(-1.899)
SHIBOR-1M	0.950	0.633*	0.426*
	(1.488)	(1.858)	(1.805)
SHIBOR-1Y	-0.422	-0.371	0.183
	(-0.630)	(-0.887)	(0.650)
size	0.004	-0.006	-0.019***
	(0.252)	(-0.898)	(-3.616)
operating	0.042	0.003	0.048***
duration	(1.456)	(0.259)	(4.944)
asset liability	0.013*	-0.004	-0.010***
ratio	(1.672)	(-1.337)	(-4.209)
CR	-1.000***	-0.312***	-0.315***
	(-3.494)	(-3.769)	(-3.511)
ROE	0.056	0.068***	0.049***
	(0.958)	(3.558)	(3.431)

EBITDA	-0.165**	0.051	0.066***
	(-2.076)	(1.532)	(2.955)
term	-0.017	-0.016***	0.001
	(-1.380)	(-3.191)	(0.408)
GDP	0.210	-0.035*	-0.119
	(1.158)	(-1.791)	(-0.571)
FSR	-0.057	0.021	-0.064
	(-0.716)	(0.973)	(-1.377)
Debt ratio	0.021	-0.027***	-0.016
	(0.704)	(-2.658)	(-1.098)
SECW	-0.053	-9.138***	-7.834***
	(-0.005)	(-2.783)	(-2.977)
cons	8.915	7.229***	12.978***
	(1.156)	(3.007)	(3.139)
R-squared	0.5293	0.3257	0.3340
Control	Yes	Yes	Yes
YearFE	Yes	Yes	Yes
CreditFE	Yes	Yes	Yes
ProvinceFE	Yes	Yes	Yes
N	515	2484	3358

Note: The robust t-statistic in parentheses. *p<0.10, **p<0.05, ***p<0.01.

Tab. 12 – Robustness test of regional heterogeneity in the relationship between subsidy amount per 10,000 yuan of assets and credit spread of municipal corporate bonds. Source: own research

	(1)	(2)	(3)
	Western area	**Central area**	**Eastern area**
	spread	spread	spread
subsidy	0.003	0.000	0.003**
	(1.197)	(0.433)	(2.396)
GCNY	-0.824	-0.473	-0.823***
	(-1.245)	(-1.447)	(-3.442)
DR	-1.244	-0.949	-1.180*
	(-0.615)	(-1.076)	(-1.877)
SHIBOR-1M	0.925	0.639*	0.431*
	(1.449)	(1.873)	(1.828)
SHIBOR-1Y	-0.394	-0.379	0.172
	(-0.589)	(-0.907)	(0.611)
size	0.004	-0.006	-0.019***
	(0.253)	(-0.909)	(-3.607)
operating	0.043	0.003	0.048***
duration	(1.476)	(0.263)	(4.950)
asset liability	0.013	-0.005	-0.010***
ratio	(1.618)	(-1.341)	(-4.151)
CR	-1.018***	-0.314***	-0.315***
	(-3.562)	(-3.788)	(-3.505)
ROE	0.061	0.069***	0.048***
	(1.043)	(3.337)	(3.327)

EBITDA	-0.175**	0.051	0.067***
	(-2.232)	(1.527)	(3.036)
term	-0.018	-0.016***	0.001
	(-1.451)	(-3.243)	(0.452)
GDP	0.216	-0.035*	-0.123
	(1.190)	(-1.807)	(-0.591)
FSR	-0.061	0.021	-0.066
	(-0.766)	(0.987)	(-1.427)
Debt ratio	0.020	-0.028***	-0.016
	(0.686)	(-2.664)	(-1.110)
SECW	-0.385	-9.152***	-7.868***
	(-0.038)	(-2.787)	(-2.994)
cons	9.088	7.215***	13.088***
	(1.177)	(3.002)	(3.173)
R-squared	0.5285	0.3249	0.3348
Control	Yes	Yes	Yes
YearFE	Yes	Yes	Yes
CreditFE	Yes	Yes	Yes
ProvinceFE	Yes	Yes	Yes
N	515	2484	3588

Note: The robust t-statistic in parentheses. *p<0.10, **p<0.05, ***p<0.01.

From the results in Tables 11 and 12, we find that from the western to the eastern area, the correlation between government subsidies and the credit spread of municipal corporate bonds shifts from insignificant to significant. The findings underscore the regional heterogeneity in the impact of government subsidies on municipal corporate bond credit spreads, attributable to differences in regional economic development. These results are in alignment with Hypothesis 2 and corroborate the regression findings presented in Tables 4 and 5, thereby substantiating the robustness of the initial conclusions.

Tab. 13 – Robustness test of administrative heterogeneity in the relationship between government subsidy income proportion and credit spread of LGFV bonds. Source: own research

	(1) **Country-level**	(2) **City-level**	(3) **Provincial-level**	(4) **National-level**
	spread	spread	spread	spread
ratio	0.006**	0.001***	0.253	-1.226
	(2.123)	(3.378)	(0.418)	(-0.841)
GCNY	-1.364***	-0.364*	-2.975*	-1.491*
	(-3.883)	(-1.646)	(-1.977)	(-1.825)
DR	-1.254	-1.089*	-6.807**	-5.746*
	(-1.394)	(-1.786)	(-2.278)	(-1.772)
SHIBOR-1M	0.421	0.582***	0.342	2.912***
	(1.199)	(2.625)	(0.300)	(3.200)
SHIBOR-1Y	0.323	-0.264	0.958	-1.822*
	(0.774)	(-1.001)	(0.624)	(-1.688)

size	-0.024***	-0.009*	0.049	-0.024
	(-2.669)	(-1.906)	(0.987)	(-1.522)
operating	0.038**	0.026***	-0.058	-0.114***
duration	(2.362)	(3.095)	(-0.701)	(-3.232)
asset liability	-0.011***	-0.003	0.032	-0.287
ratio	(-3.048)	(-1.165)	(0.196)	(-1.057)
CR	-0.227*	-0.396***	-1.324	-6.129
	(-1.884)	(-5.814)	(-0.069)	(-1.249)
ROE	0.016	0.093***	0.314	-1.874
	(0.804)	(6.716)	(0.393)	(-1.304)
EBITDA	0.142***	-0.001	-0.941	0.239
	(4.060)	(-0.060)	(-0.656)	(0.281)
term	-0.003	-0.009***	0.000	-0.073
	(-0.583)	(-2.878)	(.)	(-1.136)
GDP	-0.013	0.001	0.175	0.053
	(-0.391)	(0.098)	(0.332)	(0.063)
FSR	-0.018	-0.007	-0.640	0.273
	(-0.561)	(-0.418)	(-0.234)	(1.224)
Debt ratio	-0.014	-0.014**	0.008	-0.096
	(-1.121)	(-2.531)	(0.069)	(-1.143)
SECW	-6.597***	-2.932***	-7.855	-0.826
	(-2.584)	(-2.714)	(-0.702)	(-0.104)
cons	8.698**	6.771***	38.562	29.565
	(2.490)	(3.764)	(0.759)	(1.567)
R-squared	0.3937	0.4448	0.8079	0.7646
Control	Yes	Yes	Yes	Yes
YearFE	Yes	Yes	Yes	Yes
CreditFE	Yes	Yes	Yes	Yes
ProvinceFE	Yes	Yes	Yes	Yes
N	2157	4217	175	144

Note: The robust t-statistic in parentheses. *p<0.10, **p<0.05, ***p<0.01.

Tab. 14 – Robustness test of administrative heterogeneity in the relationship between subsidy amount per 10,000 yuan of assets and credit spread of LGFV bonds. Source: own research

	(1)	(2)	(3)	(4)
	Country-level	**City-level**	**Provincial-level**	**National-level**
	spread	spread	spread	spread
subsidy	0.001**	0.001**	0.031	-0.145
	(2.519)	(2.176)	(0.418)	(-0.931)
GCNY	-1.365***	-0.365*	-2.975*	-1.504*
	(-3.884)	(-1.651)	(-1.977)	(-1.845)
DR	-1.269	-1.093*	-6.807**	-5.756*
	(-1.406)	(-1.792)	(-2.278)	(-1.778)
SHIBOR-1M	0.412	0.580***	0.342	2.908***
	(1.172)	(2.617)	(0.300)	(3.201)

SHIBOR-1Y	0.327	-0.262	0.958	-1.817*
	(0.783)	(-0.991)	(0.624)	(-1.685)
size	-0.024***	-0.009*	0.049	-0.024
	(-2.682)	(-1.892)	(0.987)	(-1.536)
operating	0.037**	0.026***	-0.058	-0.115***
duration	(2.325)	(3.095)	(-0.701)	(-3.249)
asset liability	-0.010***	-0.003	0.033	-0.306
ratio	(-3.029)	(-1.167)	(0.206)	(-1.145)
CR	-0.231*	-0.395***	-1.490	-6.510
	(-1.915)	(-5.797)	(-0.076)	(-1.331)
ROE	0.015	0.094***	0.316	-1.956
	(0.749)	(6.394)	(0.395)	(-1.399)
EBITDA	0.136***	-0.002	-0.924	0.367
	(3.914)	(-0.097)	(-0.659)	(0.404)
term	-0.002	-0.009***	0.000	-0.076
	(-0.499)	(-2.856)	(.)	(-1.221)
GDP	-0.011	0.002	0.131	0.080
	(-0.343)	(0.114)	(0.091)	(0.096)
FSR	-0.019	-0.007	-0.879	0.287
	(-0.614)	(-0.431)	(-1.134)	(1.302)
Debt ratio	-0.014	-0.014**	-0.008	-0.095
	(-1.083)	(-2.524)	(-0.267)	(-1.179)
SECW	-6.538**	-2.931***	-7.952	-1.890
	(-2.559)	(-2.714)	(-0.799)	(-0.314)
cons	8.916**	6.799***	38.274	27.613
	(2.544)	(3.782)	(0.762)	(1.455)
R-squared	0.3932	0.4442	0.8079	0.7638
Control	Yes	Yes	Yes	Yes
YearFE	Yes	Yes	Yes	Yes
CreditFE	Yes	Yes	Yes	Yes
ProvinceFE	Yes	Yes	Yes	Yes
N	2157	4217	175	144

Note: The robust t-statistic in parentheses. *p<0.10, **p<0.05, ***p<0.01.

A review of Tables 13 and 14 uncovers markedly contrasting relationships between government subsidies and the credit spread of municipal corporate bonds between central and local platforms. These findings confirm that the influence of government subsidies on the credit spread of municipal corporate bonds varies based on the administrative levels of LGFVs. These results are in alignment with Hypothesis 2 and corroborate the regression findings presented in Tables 6 and 7, thereby substantiating the robustness of the initial conclusions.

Finally, to test the robustness of the results in Table 8, we created a time-series graph to describe the change in the credit spread of municipal corporate bonds. Since the “Yongmei” event occurred at the end of 2020, we used the data from 2020 as the baseline. We kept the control variables constant and observed the change in the credit spread of municipal corporate bonds over time. The results are shown in Figure 1.

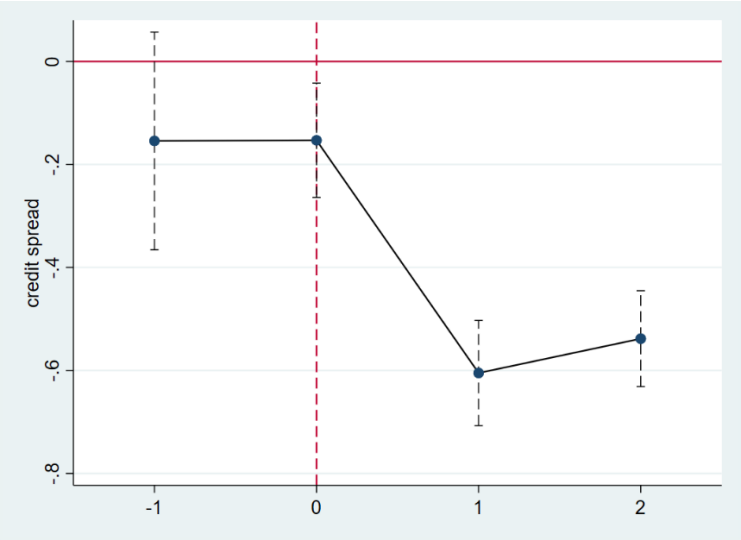

Fig. 1- Time series change of municipal corporate bonds credit spread. Source: own research

By observing Figure 1, we find that compared to the credit spreads of municipal corporate bonds before the "Yongmei" event, the credit spreads of municipal corporate bonds have significantly decreased from 2021 onwards. This confirms the depiction in Table 8 that after the "Yongmei" event, the role of government subsidies changed, shifting the relationship between government subsidies and municipal corporate bond credit spreads from positive to negative. When other variables are controlled, the credit spreads of municipal corporate bonds will significantly decline. The results in Table 8 are robust.

5 CONCLUSION AND DISCUSSION

Studies about the relationship between government subsidies and municipal bond pricing show that government subsidies will impact the company operations and external financing. On one hand, subsidies can effectively ease short-term financial constraints and attract human and financial capital, signaling legitimacy and quality. On the other hand, they may fail to yield satisfactory outcomes and could lead to rent-seeking behavior and reduced investment efficiency.

Existing research found government subsidies could reduce costs, improve efficiency, and stimulate innovation. However, the relationship between subsidies and innovation efficiency is not linear, with some studies suggesting a U-shaped relationship, where an optimal reduction in subsidies could enhance innovation efficiency. In some developing countries, government subsidies might have a crowding-out effect, diminishing innovation efficiency. About the impact of government subsidies on market pricing, particularly their influence on stock prices, some studies propose a negative relationship between subsidies and stock prices, while others suggest the opposite. The anticipation is that government subsidies will exert a significant influence on the pricing of municipal corporate bonds issued by LGFVs, a subject worthy of further investigation.

LGFVs, as a special type of SOE, were created to fulfill local government functions through market-oriented means, focusing on infrastructure and public welfare projects. These projects often have lower returns, longer payback periods, and higher risks, impacting the market competitiveness of LGFVs, which increase investors' concerns about default risk, necessitating higher credit spreads to attract investment. Thus, government subsidies will act as a signaling mechanism for the operational status of LGFVs. While subsidies may indicate operational difficulties and the need for external support, they can also be interpreted by investors as a sign of increased risk, potentially leading to higher credit spreads for municipal corporate bonds. The municipal corporate bond market is particularly influenced by the fiscal capacity of local governments, which are responsible for the repayment of municipal corporate bonds, often used to finance public welfare projects. In economically developed regions, with their stronger fiscal positions, more developed financial markets and regulatory frameworks, which can improve investor confidence and market efficiency, further influencing the pricing of municipal corporate bonds. Thus, the interaction between government subsidies and the economic development level of a region is expected to significantly influence the credit spreads of municipal corporate bonds. Moreover, as LGFVs are backed by local governments, the characteristics of these governments, particularly their administrative level, can significantly influence the credit spreads of municipal corporate bonds. Higher administrative levels are associated with stronger fiscal strength, more effective guarantees, and greater policy influence. This distinction leads to the differentiation between platforms' administrative level in terms of how government subsidies affect credit spreads.

Our study makes three contributions to the existing research. Firstly, it broadens the research scope of municipal corporate bond pricing by testing the influence of explicit government guarantees on municipal corporate bond credit spread. Secondly, it extends the research on government subsidies by offering a fresh perspective on the subsidy-pricing relationship in the context of municipal corporate bonds. Lastly, it augments the understanding of how implicit government guarantees intersect with explicit guarantees in shaping municipal corporate bond pricing.

Building upon the existing body of research on municipal corporate bond pricing mechanisms, this paper utilizes daily issuance data of municipal corporate bonds from January 1, 2019, to December 31, 2023, encompassing five years as the basis for its analysis. The study focuses on the credit spread of these bonds as the dependent variable. Central to the analysis are the impacts of government subsidy income, from which two key explanatory variables are derived: the ratio of government subsidy income and the subsidy amount received per 10,000 yuan of assets for LGFVs. Through an examination of the interplay between government subsidies and municipal corporate bond credit spreads, the paper reaches several key conclusions.

Firstly, a positive correlation is identified between government subsidies and the credit spreads of municipal corporate bonds. An increase in government subsidies, whether measured by the income ratio or the per-asset subsidy amount, is associated with a broadening of the credit spread. This result means, in investors' opinion, an increased undertaking of inefficient policy-driven projects by LGFVs leads to a decline in profitability and a weakening of financial positions,

thereby necessitating greater subsidies to maintain operations. Therefore, investors elevate their risk expectations for bonds issued by LGFVs, demanding a higher risk premium and consequently driving up the credit spreads of municipal corporate bonds. This correlation is largely attributed to the perception of government subsidies as an indicator of the need for financial support by LGFVs, which in turn escalates investor risk expectations and expands the credit spread.

Secondly, the study uncovers regional and administrative level heterogeneities in the relationship between government subsidies and municipal corporate bond credit spreads. By segmenting the sample data based on these criteria and conducting regression analyses, significant variations in the influence of government subsidies on credit spreads are observed. From the western to the eastern areas, the correlation between government subsidies and the credit spread of municipal corporate bonds changed from insignificantly to significantly. Within the group of country-level and city-level LGFV platforms, investors are prone to interpret government subsidies as indicators of declining operational standards of LGFVs. Conversely, at the provincial-level and national-level, the correlation between government subsidies and credit spread of municipal corporate bonds becomes insignificant. These outcomes point to a heightened investor anticipation of default risk for municipal corporate bonds at lower administrative levels, thus amplifying concerns regarding potential local government intervention in the event of bond issues. These discrepancies are not only ascribed to the disparities in regional economic development but also to the varying administrative levels of the LGFVs.

Lastly, the paper highlights that the relationship between government subsidies and credit spreads is also subject to the influence of government implicit guarantees. The efficacy of these guarantees on credit spreads is further contingent upon the level of regional economic development and the sophistication of the financial market. Following the “Yongmei” event, there was a significant change in the influence of the government subsidy on the credit spreads of municipal corporate bonds, the correlation between government subsidy and credit spreads of municipal corporate bonds changed from positive to negative. When expectations of implicit government guarantees are compromised, with the increase of government subsidy to LGFV, investors may lower the default risk expectation of the municipal corporate bonds issued by LGFV, making the credit spread of municipal corporate bonds decrease. Thus, the influence of government subsidies on municipal corporate bonds credit spreads will significantly change.

Although we analyze the relationship between government subsidies and credit spreads, and discuss the regional and administrative level heterogeneities, there is still room for improvement in the analysis of specific paths and mechanisms. Limited by data source, in this study, we still could not recognize the specific path about how government subsidies influence municipal corporate bonds credit spreads. In future studies, we can focus on the transmission paths between government subsidies and municipal corporate bonds credit spreads, studying the channels that lead government subsidies to change municipal corporate bond pricing.

In light of these findings, the paper recommends that local governments should incrementally reduce subsidies to LGFVs with the aim of narrowing the issuance spreads of municipal

corporate bonds. Concurrently, it advocates for a reduction in governmental intervention within financial markets, an adherence to market dynamics, and the dissolution of market mechanism impediments, such as implicit guarantees, to ensure the optimal functioning of market-based resource allocation. These measures are posited as strategies to alleviate local debt pressures and mitigate associated financial risks. However, reducing the short-term volatility that government intervention may trigger, creates uncertainty and potential risks. Thus, in the implementation process, we should consider the resistance from local governments, and analyze the difficulty of policy implementation. Besides, in a special period like the "Yongmei" event, government subsidies could increase investors' confidence and reduce the financing cost of LGFV. As a result, we should also consider the positive effect of government subsidies.

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