The Information Effect of Policy Announcement

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March 21, 2023

Abstract

This paper examines the impact of a policy targeting firms with implicit government guarantees (IGGs). We focus on the debt management policy (DMP) proposed for state-owned enterprises in China. Our analysis shows that the DMP lowered the average yield of SOE bonds by 6.6 basis points. However, when accounting for the information effect of the policy announcement, the DMP's impact ranged from 6.6 to 32.1 basis points. Our findings reveal that the information effect weakened the intended effect of the DMP and increased the average bond yields of both private-owned enterprises. We emphasize the need for policymakers to carefully design their policy communication to mitigate the information effect and consider the response of the financial market.

Keywords: debt management policy, information effect, implicit government guarantees, state-owned enterprises

JEL classification: G15 G18 G38 H7 O16

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1 Introduction

Firms that benefit from implicit government guarantees (IGG) have an advantage in obtaining credit in the financial market. When inefficient firms receive more credit and invest more, it can exacerbate capital misallocation and increase default risks. Assessing policies aimed at controlling IGG and improving credit allocation in the financial market is essential, yet there is limited research on this topic. To address this gap, we examine how the bond market responds to a debt management policy (DMP) that targets state-owned enterprises (SOEs) in China. By analyzing the immediate yield responses to the policy announcement, we can evaluate how market perceives the policy's effectiveness.

However, policy changes can stem from various motivations. If the policymakers deem the DMP necessary, it may be because their private signal indicates a poor economic state and a potential high default rate of SOE bonds, which requires policy intervention. This information channel of policy announcement can revise the market's beliefs and confound the effect of the DMP.

To disentangle the policy's impact from the information effect of the policy announcement, we constructed a straightforward bond pricing model. Our model demonstrates that if the DMP can lower the default probability of SOE bonds, it will decrease their yields and reduce the IGG premium, while the yields of private-owned enterprise (POE) bonds, not targeted by the policy, will remain unchanged. This is the intended effect of the DMP. Conversely, the information effect will increase the belief of default rates for both SOE and POE bonds, leading to a rise in their yields. Therefore, the increase in the POE yield indicates the existence of the information effect, which creates an opposite effect to the DMP's desired effect on the SOE yield.

Empirically, we conduct a difference-in-difference (DID) regression over a 5-day event window and find that the average yield of AAA-rated SOE bonds decreased by 6.6 basis points (bps) after the policy announcement, while the average yield of AAA-rated POE bonds increased by 25.5 bps. The observed increase in the POE yield suggests the presence of an information effect, and the decrease of the SOE yield indicates that the DMP's effect dominates the information effect.

Our model further demonstrates that the absolute change in the POE-SOE yield gap provides an upper bound for the DMP's effect when there exists an information effect. Empirically, we estimate that the DMP lowered the average yield of SOE bonds by an amount ranging from 6.6 to 32.1 basis points.

These results suggest that the information effect of policy announcements is empirically significant. It weakened the intended effects of the policy since the average yield of SOEs declined less. It even worsens the capital allocation in the short run by pushing up the average yield of POEs. Thus, policymakers need to carefully design the announcement of the policy and communicate with the market skillfully to limit unintended information effects. One potential solution involves scheduling policy announcements based on the calendar, thereby reducing their connection to the current economic state.

Since the fiscal burden of local government is closely related with the IGGs, we also examine empirically how the effect of DMP and information effect vary across regions with different fiscal burdens. After taking into account the information effect, we find that the DMP and the information effect were larger in the low fiscal burden regions.

Lastly, we provide additional evidence of the existence of the information channel in the bond market. We explore an unexpected SOE default event that occurred three months before the DMP announcement. In accordance with our model's predictions, the default event increased the average yield of SOE. Crucially, the financial market adjusted its perception of the economic situation, resulting in a rise in POE yield following the default, consistent with the informational channel. In addition, we find that the bailout belief were revised down more in the high fiscal burden regions.

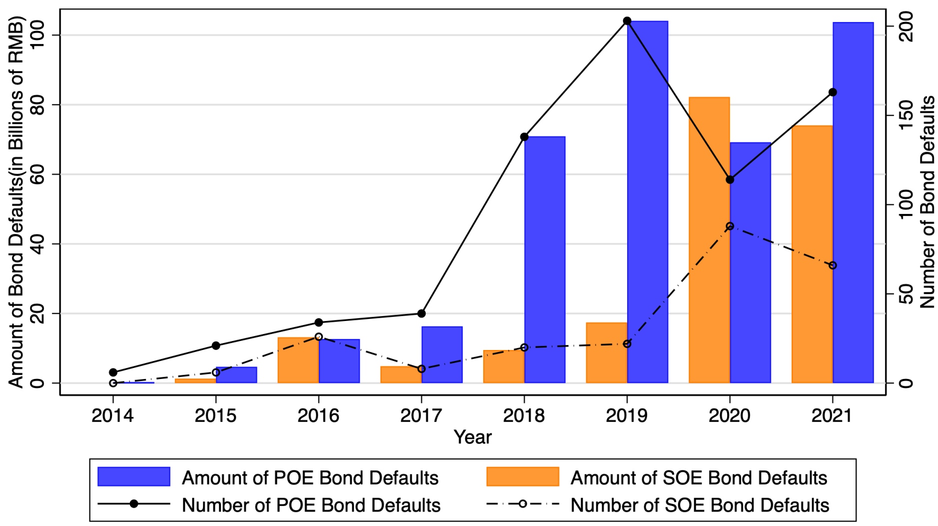
Our research adds to the empirical literature on IGG. Prior research focused on estimating the IGG premium in the bond yields (Geng and Pan, 2019; Walker, Zhang, Zhang, and Wang, 2021; Zhang, Li, and Tian, 2022; Tsafack, Li, and Beliaeva, 2021), examining the effects of SOE bond defaults on corporate investment (Jin, Wang, and Zhang, 2022) and bond ratings (Mo, Gao, and Zhou, 2021). We investigate the impact of government policy on firms with IGGs and the information channel present in the policy announcement. Our paper also sheds light on how such policy affects credit allocation in the short run and how its impact varies across regions with varying fiscal burdens.

Our study also contributes to the literature on financial market responses to government policy. Brunnermeier, Sockin, and Xiong (2017) highlight the potential for the financial market to anticipate and undermine gradualistic policy changes. Our study complements their study, emphasizing that when financial markets revise their beliefs based on policy announcements, the ensuing information effect can weaken the intended policy outcomes and create unintended market pressures.

2 Institutional setting

In the early 1980s, China initiated its economic reform while there were a significant number of inefficient firms within the state sector. The dual-track reform, which allowed both SOEs and POEs to coexist, drove sustained growth by reallocating resources across firms and promoting new entries in the private sector (Song, Storesletten, and Zilibotti, 2011; Brandt, Van Biesebroeck, and Zhang, 2012). Despite these advances, the IGGs continued to distort resource allocation through financial markets and the banking system. The resulting low financing costs support inefficient SOEs and incentivize them to take more debt (Song and Xiong, 2018). To promote more efficient allocation and curb financial risk arising from high SOE leverage, the Chinese government began to challenge the long-standing belief in IGGs in the corporate bond market since 2015[1].

Figure 1: Amount and numbers of POE and SOE bond defaults from 2014 to 2021



As depicted in Figure 1, POEs were the primary defaulters in terms of both number and amount prior 2020. However, SOEs experienced a surge of defaults in 2020, surpassing POEs in default amount for the first time. Although this trend has gradually altered market perceptions of IGGs, the belief in government bailouts remains. In our paper, we analyze the default event of Yongmei Group Co. Ltd., a local SOE whose controlling shareholder is Henan Energy Chemical Group Co. Ltd. On November 10th, 2020, Yongmei unexpectedly declared that it was unable to fulfill its obligation of the AAA-rating bond ”20 Yongmei SCP003,” which surprised the bond market and triggered rapid responses in the bond yields.

The unprecedented wave of SOE defaults heightened concerns over the repayment of the SOE bonds. Yields on existing SOE bonds increased, and numerous SOEs postponed or canceled their bond issuance. On February 28th, 2021, the State-owned Assets Supervision and Administration Commission of the State Council, a crucial organization that formulates regulations and rules for SOEs, announced the regula-

[1]The first defaults in the corporate bond market happened in March 2014 with the POE bond of Shanghai Chaori, followed by the SOE bond of Baoding Tianwei in April 2015.

tion policy, Document 18. This document set forth principles and detailed methods at the firm level to manage SOEs' debt levels. For example, local governments were required to apply both size and ratio constraints on the liability side of SOEs, control their investment activities, and employ financial instruments to manage firm leverages. These corporate policies aimed to enhance firm performance, lower default probability, and reduce the SOE yields. Consequently, we regard Document 18 as a Debt Management Policy (DMP).

3 Theoretical analysis

In this section, we will introduce a straightforward two-period model and derive the bond yield equations. Our analysis will examine the impact of the DMP on bond yields and analyze the information effect contained in the policy announcements. We will also apply the same model to study the information effect in the event of SOE bond default. Our comparative analysis will guide the empirical study later.

3.1 The DMP announcement

Let us consider a risk-averse representative investor who purchases one-period zero-coupon bonds in the first period. In the second period, there are two states of the world - a low state with probability p and a high state with probability $1-p$. For each state $k \in h, l$, a corresponding stochastic discount factor (SDF) denoted as m_k exists. We assume that the low state represents low aggregate resources, and hence $m_l > m_h > 0$.

In the first period, firms issue risky zero-coupon bonds, which fully repay in the high state but default with a certain probability in the low state. Let V_i be the payment of bond i next period. If it fully repays, $V_i = 1$, but if it defaults, $V_i = D$ and $D \in [0, 1)$. We use the subscript $i = n$ for non-SOEs and $i = s$ for SOEs.

The probability of default for each type of bond varies when the low state occurs.

Given the realization of the low state, we assume that bonds default with probability qp_i for $i \in n, s$, where $q \in [0,1]$ and $p_i \in [0,1]$. Here, q captures the common factors affecting the default probabilities of SOE and POE bonds, while p_i summarizes type-specific default factors. Unlike POE bonds, when an SOE fails to repay in the low state, the market believes that the local government will intervene and bail it out with probability b.

We can easily derive the yields of POE and SOE bonds with the current settings. To facilitate comparative statics analysis, we make some approximations and express the yields as the sum of a risk-free rate, denoted by r_f, and a risk premium. This approximation is valid as long as the conditional default probability qp_i is small, which is the case for the AAA-rated POE and SOE bonds in our empirical research. Using these assumptions, we can derive the POE and SOE bond yields as follows:

$$r_n \approx r_f + pqp_n\kappa \tag{1}$$

$$r_s \approx r_f + (1-b)pqp_s\kappa \tag{2}$$

Here, $\kappa \equiv (1-D)\left[(1+r_f)m_l - 1\right] > 0$, and $1 + r_f = 1/(pm_l + (1-p)m_h)$ is the yield for a risk-free bond that pays $V = 1$ for both states. The risk premium is positive because the investor is risk-averse and $\kappa > 0$. The IGG premium, defined as $-bp_sqp\kappa$, is negative because the IGG effectively acts as insurance against default, which lowers the SOE bond yield. When the conditional default probability of POE is greater than the IGG-adjusted default probability for SOE, $qp_n > (1-b)qp_s$, a positive spread between POE and SOE bond yields emerges, $r_n - r_s > 0$.

We next take total differentials to determine the effect of DMP and the information effect of policy announcement on bond yields. We assume that SDFs m_h, m_l, and the risk-free rate r_f are constant in the event as they are determined by the aggregate economy. Therefore, the expression of the risk-free rate implies that the low state probability p is also constant in our comparative statics analysis. Using these assumptions, we can derive the following equations for yield changes:

$$dr_n = pp_n(\kappa dq + qd\kappa) + pq\kappa dp_n \tag{3}$$

$$dr_s = (1-b)pp_s(\kappa dq + qd\kappa) + (1-b)pq\kappa dp_s - pqp_s\kappa db \tag{4}$$

The DMP aims to improve the corporation management of SOEs. We interpret it as lowering the type-specific default probability, that is, $dp_s < 0$. We define the effect on the yield of SOE as $DMP \equiv (1-b)qp\kappa dp_s$. It is crucial to note that DMP only affects the yield of SOEs and leaves the yield of POE unchanged. We do not interpret DMP as a policy that is designed to change the government bailout probability directly since there are no descriptions of the conditions of bailout in Document 18. Therefore, we treat $db = 0$ in the event of DMP.

Aside from the effect of DMP, the announcement of DMP can bring private information of policymakers to the market. It can be interpreted as a bad signal of the economy. In the current setting, the market revises its belief on the common factor and lowers the expectation of the default payment, i.e., $dq > 0$ or $dD < 0$ (and raising $d\kappa > 0$). Both revisions increase the risk premium in bond yields. We can link the information effect of the announcement with the term $\kappa dq + qd\kappa$ in equations (3) and (4). When the information effect occurs, both yields will increase.

The yield gap between POE and SOE is influenced by both the information effect and the effect of DMP. By subtracting equations (3) and (4) and reorganizing the result in terms of the effect of DMP, we obtain equation (5):

$$DMP = -(dr_n - dr_s) + [p_n - (1-b)p_s]\, p(\kappa dq + qd\kappa). \tag{5}$$

If there is no information effect, represented by $dq = d\kappa = 0$, or if the IGG-adjusted default probability of SOE equals the default probability of POE, $qp_n = (1-b)qp_s$, then the second term disappears. In such cases, we can approximate the effect of

DMP as the negative change in the yield gap, i.e., $DMP = -(dr_n - dr_s)$. However, if there is an information effect, it enters the POE-SOE yield gap.

Empirically, we observe a significant average positive yield gap. From the expression of yield gap, $r_n - r_s = pqp_n\kappa - (1-b)pqp_s\kappa > 0$, we have $p_n > (1-b)p_s$. This means that the second term in equation (5) is positive. Since DMP is negative, we conclude that $DMP > -(dr_n - dr_s)$. Therefore, the change in the yield gap provides a lower bound for the effect of DMP. Additionally, the first term in equation (5) is also positive, so we have $DMP < dr_s$. As a result, when an information effect and a positive SOE-POE yield gap exist, we can estimate the effect of DMP on the SOE yield using the following bound:

$$-(dr_n - dr_s) \leq DMP \leq dr_s \tag{6}$$

To summarize, the change in the POE yield reflects the information effect of policy, while the change in the SOE yield is the net result of DMP and the information effect. The change in yield gap provides a bound for the maximal effect of DMP.

Different local governments bear different fiscal burdens, which are closely related to the IGG. It would be interesting to explore the effect of DMP and the information effect across regions with varying fiscal burdens. To extend the model to two regions, we use $j \in H, L$ to denote two different regions and $i \in n, s$ to denote the bond types. Given the realization of the economy-wide low state, we assume that the probability of bond default for region j is $q_j p_{i,j}$, where $q_j \in [0,1]$ is the regional common factor and $p_{i,j} \in [0,1]$ is the type specific factor. Similarly, we denote b_j as the conditional probability of local government j bailing out the SOE bond in region j. Our previous yield equations remain valid, with minor modifications[2]. The equations for the total

[2]For more details about the extension of the model, please refer to the appendix.

differentials are expressed as follows:

$$r_{n,j} \approx r_f + pq_j p_{n,j} \kappa \tag{7}$$

$$r_{s,j} \approx r_f + (1 - b_j) pq_j p_{s,j} \kappa \tag{8}$$

$$dr_{n,j} = pp_{n,j}(\kappa dq_j + q_j d\kappa) + pq_j \kappa dp_{n,j} \tag{9}$$

$$dr_{s,j} = (1 - b_j) pp_{s,j}(\kappa dq_j + q_j d\kappa) + (1 - b_j) pq_j \kappa dp_{s,j} - pq_j p_{s,j} \kappa db_j \tag{10}$$

As in the baseline model, we assume that the SOE bailout belief and the POE specific default probability remain unchanged in the event of DMP announcement, so $db_j = 0$ and $dp_{n,j} = 0$ for $j \in H, L$. The DMP will reduce the SOE specific default probability $dp_{s,j} < 0$, but leave the POE yield unchanged. The information effect from belief updating of the fundamentals will increase the yields of both POE and SOE bonds.

By taking the difference of the yield change and defining $DMP_j \equiv (1 - b_j) pq_j \kappa dp_{s,j}$, we can approximate the regional DMP effect using similar arguments to the benchmark model: $-(dr_{n,j} - dr_{s,j}) \leq DMP_j \leq dr_{s,j}$.

3.2 The SOE bond default

We now use equations (3) and (4) from the baseline model to investigate the default event of an SOE bond. The SOE yield is affected by two factors: an increase in the SOE default probability $dp_s > 0$ and a decrease in the probability of government bailout $db < 0$. These factors will increase the SOE yield while leaving the POE yield unchanged.

Additionally, the default event can also impact the bond market through the information channel. Investors may reassess the economic status by lowering the default repayment $dD < 0$ (and raising $d\kappa > 0$) and increasing the common factor in default $dq > 0$. This information effect raises the yields of both SOE and POE bonds.

It is common to use the change in the POE-SOE yield gap as an approximation of the change in the IGG. However, the yield gap is also affected by the information channel, as seen in the equation (11).

$$dr_n - dr_s = (p_n - (1-b)p_s)p(\kappa dq + qd\kappa) - (1-b)qp\kappa dp_s + p_s p\kappa db \tag{11}$$

In fact, besides the decrease in the belief of IGG ($db < 0$), the type-specific default probability $dp_s > 0$ will shrink the POE-SOE gap, while the information effect will widen the gap. Hence, the change in the yield gap is the net effect of those three forces. It is challenging to estimate the change in the IGG in the event of a default when there are non-zero positive yield gaps ($p_n - (1-b)p_s > 0$) and revisions in type-specific default probability.

4 Data and summary statistics

We collected daily yield-to-maturity data for SOE and POE bonds traded in the Shanghai Stock Exchange, Shenzhen Stock Exchange, and Inter-bank bond market from the WIND Database. The daily yields were reported by the China Central Depository & Clearing Co. Ltd, an authorized financial institution that registers bond issues and clears bond tradings. Our sample includes corporate bonds, enterprise bonds, medium-term notes, and short-term bonds, excluding private placement, convertible bonds, commercial paper, and bonds with unknown types. We also excluded bonds issued by financial institutions and previously defaulted firms. We also eliminated bonds without financial or rating information during the sample period. To ensure data comparability, we only kept bonds from provinces that issue both POE and SOE bonds. We used the current rating on November 5th, 2020, five days before Yongmei's default, for rating information.

We constructed two event samples, the DMP announcement and Yongmei's default. We truncate the pre-event yield observations by 1% on the right tail to avoid extreme observations. Our control variables include bond characteristics, issuer characteristics, and macro factors, following Collin-Dufresn, Goldstein, and Martin (2002) and Campbell and Taksler (2003). We use the interest rate of a 7-day pledged repo (DR007) as a measure of monetary policy response within the window period. Details on the variables are summarized in Table A1 in the Appendix.

We collected provincial fiscal data from the National Bureau of Statistics of China and the provincial fiscal annual reports in 2019. We constructed the fiscal burden for local governments as the ratio of the fiscal deficit gap over local government revenue. The fiscal deficit gap is the difference between local government expenditure and revenue. An increase in the index indicates a larger fiscal burden for local governments. Our results remain robust when we use the ratio of fiscal deficit gap over local real GDP.

Table 1 presents summary statistics of key variables for our two event samples, which are restricted to AAA-rated POE and SOE bonds. The event window is defined as 5 days before and after the event date, which is March 1st, 2021, for the DMP announcement and November 10th, 2020, for Yongmei's default. The sample consists of 4542 bonds for the DMP announcement and 4000 bonds for the SOE default.

5 Identification strategy

To identify the effect of DMP and the information effect, we employ difference-in-difference (DID) regressions for the announcement of DMP. We also check the information channel in the SOE default event with the DID regressions. Last, we verify the effect across regions with high and low fiscal burdens.

Table 1: Summary Statistics

	(1) N	(2) mean	(3) std.	(4) min	(5) p50	(6) max
Panel A: DMP						
Yield	45420	4.11	1.18	2.04	3.92	34.57
ROA	4542	1.36	1.42	-9.90	1.17	15.28
LiquidityRatio	4542	1.74	9.76	0.21	1.30	652.92
AssetTurnover	4542	0.15	0.22	0.00	0.07	2.25
Listed	4542	0.12	0.32	0.00	0.00	1.00
DebtRatio	4542	64.20	11.49	12.96	66.50	90.74
lnAsset	4542	7.49	0.91	4.38	7.51	10.34
Maturity	4542	4.49	3.07	0.08	5.00	20.00
Guarantor	4542	0.03	0.17	0.00	0.00	1.00
lnIssueSize	4542	2.43	0.60	0.00	2.30	4.87
Repo7d	10	2.12	0.12	1.84	2.14	2.28
Panel B: Yongmei						
Yield	44000	4.17	4.90	2.28	3.91	305.82
ROA	4000	1.53	1.47	-6.07	1.29	13.69
LiquidityRatio	4000	1.62	10.36	0.21	1.20	652.92
AssetTurnover	4000	0.18	0.24	0.00	0.10	2.25
Listed	4000	0.15	0.35	0.00	0.00	1.00
DebtRatio	4000	64.94	11.32	12.96	66.77	92.15
lnAsset	4000	7.49	0.91	4.38	7.52	10.34
Maturity	4000	4.61	3.13	0.08	5.00	20.00
Guarantor	4000	0.03	0.18	0.00	0.00	1.00
lnIssueSize	4000	2.43	0.60	0.10	2.30	4.38
Repo7d	10	2.29	0.20	2.01	2.30	2.61
Panel C: Provincial						
Fiscal Burden	26	0.93	0.74	0.12	0.76	3.17

Notes: The sample only contains firms that issue AAA-rated POE bonds or AAA-rated SOE bonds. The event window is 5 days before and 5 days after the event. The date 0 is March 1st, 2021 for Document 18 and Nov. 10th, 2020 for Yongmei's default. The pre-event yield observations are truncated by 1% on the right tail. There are 4000 bonds for Yongmei's default and 4542 bonds for the DMP announcement. Repo7d is the interest rate of a 7-day pledged repo (DR007) as a measure of monetary policy response within the window period. The fiscal burden index exists for 26 provinces.

5.1 Baseline regression

We estimate the impact of the event on bond yields using the following DID regression equation:

$$r_{it} = \eta POE_i + \alpha Post_t + \alpha_1 POE_i \times Post_t + \theta X_i + c_1 Ind_i + c_2 Prov_i + \varepsilon_{it} \tag{12}$$

where r_{it} is the yield of SOE or POE bond i at time t. POE_i is a dummy variable that equals one if the bond is a POE bond and zero otherwise. $Post_t$ is a time dummy variable that equals one for dates after the event occurs. The variable X_i includes firm-level controls, while Ind_i and $Prov_i$ are industry and province dummies, respectively.

The coefficient η identifies the average yield gap between POE bonds and SOE bonds before the event. If there exist IGG for the SOE bonds, we expect $\eta > 0$. The coefficients α and α_1 identify the changes in the SOE bond yield and the yield gap, respectively, after the event. The change in the POE yield after the event is the sum of α and α_1.

The DMP announcement The DMP aims to lower the default probabilities of SOEs and reduce the yields of SOE bonds while leaving POE yields unchanged. The coefficient α in equation (12) is expected to be negative and reflects the effect of DMP on the yield of SOE bonds. However, if the market interprets the policy announcement as a signal of weaker economic fundamentals, then the information effect could drive up the yield of SOE bonds. In this case, α would capture the net effect of DMP and the information effect.

When the information effect occurs, the yield of POE bonds will increase, i.e., $\alpha + \alpha_1 > 0$. Based on our previous analysis, the maximal effect of DMP can be estimated by the average change in the yield gap, which is captured by α_1.

The SOE default In the event of an SOE default, we expect the yield of SOE bonds to increase after the default, i.e., $\alpha > 0$. When there is no information effect, the yield gap between POE and SOE bonds will shrink ($\alpha_1 < 0$), and the yield of POE bonds will not change ($\alpha + \alpha_1 = 0$). However, when an information effect is present, we would expect the yield of POE bonds to increase, i.e., $\alpha + \alpha_1 > 0$. Consequently, the sign of α_1 is undetermined and depends on the relative sizes of the default effect and the information effect.

5.2 Cross-region regression

Our second DID regression investigates the heterogeneity of the information effect across regions. We interact the time dummy $Post_t$ with the regional dummy variable $Burden_i$, which equals one if the local government fiscal burden ratio is above the median. The regression is specified as:

$$r_{it} = \gamma Burden_i + \beta Post_t + \beta_1 Burden_i \times Post_t + \theta X_i + c_1 Ind_i + c_2 Prov_i + \varepsilon_{it} \quad (13)$$

Here, r_{it} is the bond yield i at time t, and $Burden_i$ is the fiscal indicator of the province where firm i is registered. The variables X_i, Ind_i, and $Prov_i$ are firm-level controls, industry, and province dummies as before. We run the regression for SOE and POE bonds separately.

The coefficient γ identifies the difference in yield across different regions before the event within the SOE group or POE group. In contrast, the coefficients β and β_1 identify the change in the type-specific bond yield in the low fiscal burden region and the yield difference across the region after the event.

The DMP announcement When the dependent variable is the POE yield, the presence of information effect can be identified if either of the coefficients β or β_1 is statistically significant. Furthermore, our model does not take a stance on whether the information effect is more pronounced in high fiscal burden regions, making the significance and sign of the β_1 coefficient an empirical question.

When the SOE yield is the dependent variable, both coefficients β and β_1 capture the net effect of DMP and information channel. By computing the change in the yield gap across regions, we can obtain an range estimate of the DMP effect across regions.

The SOE default Similar to the DMP event, we test the information effect by using the POE yield in the regression. If neither the β nor the β_1 coefficients in the POE regression are significant, there is no information effect.

We can further test if the default event change the bailout beliefs more in the regions with high fiscal burden. As these regions may have less capacity to bail out SOE bonds, the yield would increase more. However, complications may arise if the information effect differs across regions. Therefore, if we observe that (1) the information effect is the same across regions, i.e., the β_1 coefficient is not significant for the POE regression; and (2) the SOE yields increase more in high fiscal regions, i.e., the β_1 coefficient is significant and positive in the SOE regression, then it would support the hypothesis of a greater drop in the IGG in regions with high fiscal burden.

6 Empirical results

6.1 The DMP announcement

Prior to the announcement of DMP, the yields for both POE and SOE remained stable. Following the announcement, a decline in SOE yields and an increase in POE yields were observed, as shown in Figure A2 in the appendix.

Table 2 columns (1) - (2) present the results of DID regression (12) for the DMP announcement. Controlling for fixed effects, macro factors, bond, and issuer features in column (2), we find that AAA-rated SOE yields dropped by 6.6 bps following the announcement. Without considering the information effect, one might conclude that the DMP lowered the SOE yield by 6.6 bps.

However, POE yields increased by 25.5 bps (32.1-6.6), which indicates a strong information effect. Based on our theoretical section analysis, the information effect confounded the estimation of the effect of DMP. The estimated 6.6 bps drop represents the net effect of the DMP and the information effect.

Table 2: Responses of AAA-rated bond yields

	DMP		SOE Default	
	(1) AAA	(2) AAA	(3) AAA	(4) AAA
POE×Post	0.321***	0.321***	-0.321***	-0.321***
	(0.091)	(0.087)	(0.074)	(0.076)
Post	-0.064***	-0.066***	0.462***	0.502***
	(0.009)	(0.012)	(0.056)	(0.085)
POE	1.262***	1.404***	0.820***	0.945***
	(0.046)	(0.045)	(0.034)	(0.043)
Bond controls		Y		Y
Issuer controls		Y		Y
Macro factor		Y		Y
Industry		Y		Y
Province		Y		Y
R^2	0.095	0.374	0.003	0.060
N	45,420	45,420	40,000	40,000

Notes: Columns (1) and (3) only include the POE bond dummy, the time dummy variable, and the interaction term. Columns (2) and (4) control other variables that may affect bond yields, including industry dummy, province dummy, bond characteristics, issuer characteristics, and macro factors. The event window is 5 days before and 5 days after the event. * , **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

According to equation (6), given the presence of an information effect and a non-zero yield gap of 1.40% existed before the announcement, the POE-SOE yield gap and the decline in the SOE yield establish the range for the DMP effect. Based on our estimation, the DMP effect lies between -32.1 bps and -6.6 bps.

Table A2 in the appendix reports DID results for a larger sample of both AAA-rated and AA-rated bonds. When AA-rated bonds are included, the SOE yield drop was smaller (4.7 bps), and the POE yield increased less (8.1 bps). Hence, the information effect is robust in the larger sample and the DMP is more effective for AAA-rated bonds. Consequently, we restrict our sample to AAA-rated bonds.

Table 3: Responses of yields across regions

	DPM				SOE Default			
	(1) POE	(2) POE	(3) SOE	(4) SOE	(5) POE	(6) POE	(7) SOE	(8) SOE
Post×Burden	-0.329**	-0.329**	0.028	0.028*	-0.006	-0.006	0.836***	0.836***
	(0.156)	(0.160)	(0.019)	(0.016)	(0.103)	(0.075)	(0.136)	(0.113)
Post	0.345***	0.354***	-0.076***	-0.078***	0.142**	0.180***	0.119***	0.159*
	(0.118)	(0.114)	(0.008)	(0.013)	(0.058)	(0.056)	(0.007)	(0.093)
Burden	0.206**	0.643***	0.703***	0.484***	0.136*	0.298***	0.395***	-0.128
	(0.091)	(0.128)	(0.013)	(0.012)	(0.073)	(0.059)	(0.011)	(0.085)
Bond controls		Y		Y		Y		Y
Issuer controls		Y		Y		Y		Y
Macro factor		Y		Y		Y		Y
Industry		Y		Y		Y		Y
Province		Y		Y		Y		Y
R^2	0.003	0.384	0.142	0.296	0.004	0.481	0.009	0.025
N	3,140	3,140	42,280	42,280	3,570	3,570	36,430	36,430

Notes: The dependent variables are yields of AAA-rated POE and AAA-rated SOE, respectively. Columns in odd numbers only include the POE bond dummy, the time dummy variable, and the interaction term. Columns in even number control other variables that may affect bond yields, including industry dummy, province dummy, bond characteristics, issuer characteristics, and macro factors. The event window is 5 days before and 5 days after the event. * , **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

We investigate the regional impact of the DMP by analyzing regression specification (13) separately for POE and SOE bonds. The results for POE yields are reported in columns (1) and (2). After controlling for firm-level characteristics and fixed effects, POE yields increased by 35.4 bps in low fiscal regions and by 2.5 bps (35.4-32.9) in high fiscal regions. These findings confirm the presence of an information channel and suggest that the information effect is stronger in low fiscal regions and weaker in high fiscal regions.

The results for SOE yields are reported in columns (3) and (4). Before the

DMP announcement, there was a positive gap of 48.4 bps between SOE yields across regions, indicating that SOEs in high fiscal burden regions faced higher financing costs. After the announcement, SOE yields dropped by 7.8 bps in low fiscal regions and by 5 bps (7.8-2.8) in high fiscal regions.

At first glance, the DMP effects appear similar across regions. However, as we have previously emphasized, the estimates represent the net impact of the DMP and the information effect. From the responses of POE yields, it is clear that the information effect was considerably larger in low fiscal regions. Therefore, if we assume that the information effect works similarly for SOE bonds, it would also raise the SOE yield more in the low fiscal region. Considering this, we conclude that the DMP effect not only dominated the information effect in both regions but was also stronger in low fiscal regions. This could be because local governments with lower fiscal burdens can better implement the DMP, while at the same time, the announcement surprised the market and caused more significant belief revisions for these regions.

6.2 The SOE default

Before the default, the average yield spread between SOE and POE bonds remained stable at approximately 1.3%, as depicted in Figure A1 in the appendix. Following the default on November 10, 2020, the average bond yields of both SOEs and POEs increased, with the former experiencing a more significant rise.

In Table 2, the last two columns show the effects of the default on the yield spread for AAA-rated bonds during the 5-day event window. In Column (4), we controlled for industry and province fixed effects, macro factors, and various bond and issuer characteristics. We found that the average yield gap between POE and SOE bonds was 94.5 bps before Yongmei's default, indicating the presence of IGG. Following the default, both yields saw significant increases: 50.2 bps for SOEs and 18.1 bps (50.2-32.1) for POEs. The rise in SOE yield aligns with the reduced government bailout belief after the default. Importantly, the market updated its beliefs about economic fundamentals following the default, leading to increases in both SOE and POE bond yields. These results are robust to the sample including AAA- and AA-rated bonds, shown in Table A2 in the appendix.

To examine the default's cross-regional effects, we performed the DID regression across different fiscal burden regions. Table 3's right panel presents the results for AAA-rated bonds during the default event. In column (6), the interaction term's coefficient, β_1, is insignificant, so the POE yield increased by 18.0 bps for both high and low regions. Thus, the information effect is identical across regions.

The SOE bonds responded, however, differently. In column (8), the SOE yield rose by 15.9 bps in low fiscal regions and by an additional 83.6 bps in high fiscal regions. Excluding the information effect, the substantial difference likely results from the changes in IGG beliefs across regions. High fiscal burden implies a lower bailout capacity, so the downward revision in bailout beliefs would be more significant for high fiscal burden regions after the default. Therefore, we conclude that IGG beliefs were severely impacted in high fiscal regions during the default event.

7 Conclusion

Our paper studies one policy on firms with implicit government guarantees. Specifically, we examines the debt management policy (DMP) in China, which aim to lower the default probability and reduce the IGG in the SOE bond.

Our pricing model allows us to distinguish the effects of DMP and the information effect from the policy announcement. We find that while the DMP worked to reduce the average yield of SOE bonds, the information effect moved the yield in the opposite direction, leading to an underestimation of the DMP's impact if it is ignored.

To estimate the effect of DMP, we use the change in the SOE-POE yield gap as a lower bound, suggested by the model. Our empirical results show that DMP reduced SOE bond yields by 6.6 bps to 32.1 bps, with the effect being larger in low fiscal burden regions.

Our analysis also highlights the existence of the information channel in the financial market. We use the event of SOE bond default as additional evidence, in which the information effect raised the yields of both POE and SOE bonds.

Broadly speaking, the information channel of policy exists as long as the policymaker has private information and the financial markets update information and revise their belief. In the case of DMP, the information effect weakened the intended goal of DMP and even made the POEs worse in the short run. Hence, our study emphasizes the importance of policymakers carefully designing policy communication and taking actions to limit the information effect, particularly in times of financial distress when the financial markets pay close attention to policy announcements.

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8 Appendix

8.1 Model derivation

By standard asset pricing theory, the POE bond price B_n at period one is the expected present discounted value of payment, that is, $B_n = pm_l(qp_nD + 1 - qp_n) + (1 - p)m_h$. The bond yield is defined as the ratio of expected value of cash flow over the bond price, $1 + r_n = \frac{EV_n}{B_n}$, where $EV_n = p(qp_nD + 1 - qp_n) + 1 - p$.

In contrast to the POE bonds, when the SOE cannot repay in the low state, the market believes that the local government will bail out the SOE with a probability b. The expected payoff from the low state for SOE bond is $bqp_s + (1 - b)qp_sD + 1 - qp_s$, where p_s stands for the conditional default probability of SOE without government bailout. Therefore, the yield of SOE bond can be expressed as

$$1 + r_s = \frac{EV_s}{B_s} = \frac{p(bqp_s + (1 - b)qp_sD + 1 - qp_s) + 1 - p}{p(bqp_s + (1 - b)qp_sD + 1 - qp_s)m_l + (1 - p)m_h}$$

Take a natural log and arrange the terms, we have

$$\ln(1 + r_s) = \ln[1 - pqp_s(1 - b)(1 - D)] - \ln[pm_l + (1 - p)m_h - pqp_s(1 - b)(1 - D)]$$

The first term can be approximated as $\ln[1 - pqp_s(1 - b)(1 - D)] \approx -pqp_s(1 - b)(1 - D)$ when the latter is very small. We use the first-order approximation of Taylor expansion for the second term. $\ln[pm_l + (1 - p)m_h - pqp_s(1 - b)(1 - D)] \approx \ln(pm_l + (1 - p)m_h) - \frac{pqp_s(1-b)(1-D)m_l}{pm_l+(1-p)m_h}$, where we expand the value at the point $pm_l + (1 - p)m_h$. Combining the two approximations and use $1 + r^f = (pm_l + (1 - p)m_h)^{-1}$, we have

$$\begin{aligned}\ln(1 + r_s) &= -pqp_s(1 - b)(1 - D) + \ln(1 + r^f) + (1 + r^f)(pqp_s(1 - b)(1 - D))m_l \\ &= \ln(1 + r^f) + (1 - b)p_spq(1 - D)\left[(1 + r^f)m_l - 1\right]\end{aligned}$$

Approximate $\ln(1+r_s) - \ln(1+r^f) \approx r_s - r_f$, we get the SOE yield pricing equation (2) in the paper. By setting $b = 0$ and change the subscript s into n, we get the POE yield pricing equation (1).

When the model is extended to the regional case, we recompute the expected value of the payment and the bond price for each region j. Take the SOE yield as an example. We have $EV_{s,j} = 1 - p + p\left(q_j p_{s,j}[(1-b_j)D + b_j] + 1 - q_j p_{s,j}\right)$ and $B_{s,j} = p\left(q_j p_{s,j}[(1-b_j)D + b_j] + (1 - q_j p_{s,j})\right) m_l + (1-p)m_h$. Take some simplification, we get

$$1 + r_{s,i} = \frac{1 - pq_j p_{s,j}(1-b_j)(1-D)}{pm_l + (1-p)m_h - pq_j p_{s,j}(1-b_j)(1-D)m_l}$$

Take the approximation as before,

$$\begin{aligned}\ln(1+r_{s,j}) &\approx -pq_j p_{s,j}(1-b_j)(1-D) - \left[\ln(pm_l + (1-p)m_h) - \frac{pq_j p_{s,j}(1-b_j)(1-D)m_l}{pm_l + (1-p)m_h}\right] \\ &= \ln(1+r_f) + pq_j p_{s,j}(1-b_j)(1-D)\left[(1+r_f)m_l - 1\right]\end{aligned}$$

Take an approximation of the difference, $\ln(1+r_{s,j}) - \ln(1+r_f)$, we have $r_{s,j} \approx r_f + (1-b_j)pq_j p_{s,j}\kappa$, which is the equation (8) in the paper. Taking total differential to get equation (10) is straight forward.

8.2 Data and regressions

We list the controlled variables with detailed explanations in Table (A2). We present the trends of yields for the DMP announcement in Figure (A1) and the SOE default in Figure (A2).

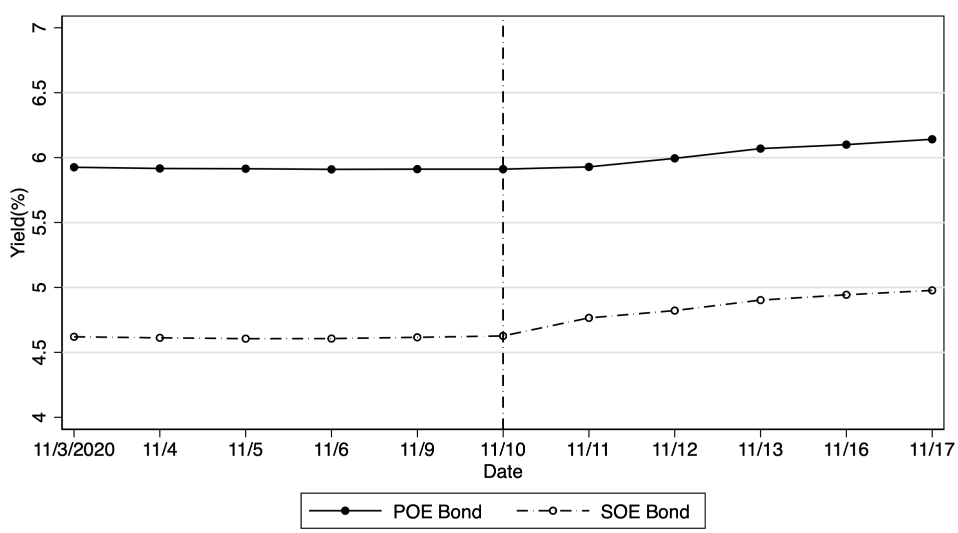
For our study, we have excluded bonds issued by two firms, Red Star Macalline Group Corporation Ltd and Jizhong Energy Resources Co., Ltd. The issuer credit rating of the first firm had been downgraded from BB+ to BB on February 11th, 2021, before the SOE default event. The second firm failed to reach a debt reconstruction

Table A1: The detailed definitions of control variables

Variable Type	Variable Name	Variable Definition
Bond controls	Maturity	The maturity of a bond, in years
	lnIssueSize	ln(the bond issue size), in 100 million yuan
Issuer controls	Industry	Industry dummy
	Province	Province dummy
	Issuer Rating	Issuer's current credit rating
	ROA	Return to asset
	Asset-Liability Ratio	Asset liability ratio
	Listed	Listed company or not
	lnAsset	Log of asset, in 100 million yuan
	Asset Turnover	Asset turnover rate
Macro Factor	DR007	The interest rate of 7-day repo

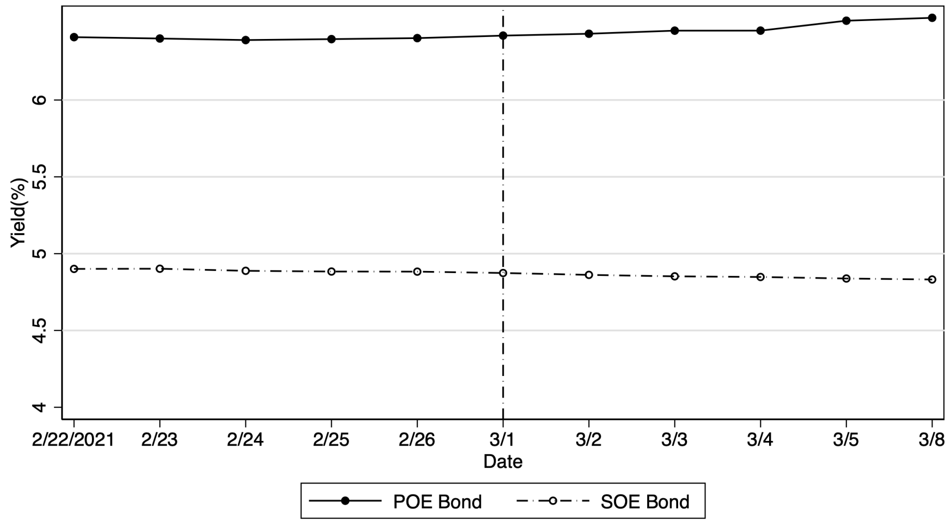
Notes: We use semi-annual financial data of issuers to keep our sample large. In addition, after the occurrence of Yongmei's default on November 10, 2020, the People's Bank of China issued 250 billion yuan of the 7-day reverse repo on November 12 and 13, 2020, and extended an additional 800 billion yuan of the medium-term lending facility on November 16, 2020. We use the interest rate of the 7-day pledged repo (DR007) as a measure of monetary policy liquidity within the window period.

Figure A1: The trend of average bond yields of SOEs and POEs before and after Yongmei's default event



Note: The vertical line indicates the date of Yongmei's default. In the DID regressions, we use the data in the first and last 5 days.

Figure A2: The trend of average bond yields of SOEs and POEs before and after Document 18



Note: We take March 1st (Monday), the date with the vertical line, as the event day for Document 18. In the DID regressions, we use data from the first and last 5 days.

with banks on February 23rd, 2021. The bond yield of these two companies surged quickly before the DMP announcement. In order to accurately examine the impact of DMP on the bond market on February 28th, 2021, we excluded bonds issued by Red Star Macalline Group Corporation Ltd. and Jizhong Energy Resources Co., Ltd. from our sample.

Table (A2) reports the DID results with AAA- and AA-rated bonds in the DMP announcement and the SOE default event.

Table A2: Responses of bond yields

	DMP		Yongmei's Default	
	(1)	(2)	(3)	(4)
	AAA&AA	AAA&AA	AAA&AA	AAA&AA
Post×POE	0.128**	0.128**	-0.143***	-0.143***
	(0.054)	(0.051)	(0.048)	(0.045)
Post	-0.047***	-0.047***	0.275***	0.316***
	(0.009)	(0.010)	(0.025)	(0.037)
POE	1.550***	2.324***	1.309***	1.966***
	(0.034)	(0.033)	(0.030)	(0.029)
Bond controls		Y		Y
Issuer controls		Y		Y
Macro factor		Y		Y
Industry		Y		Y
Province		Y		Y
R^2	0.065	0.417	0.012	0.082
N	118,180	118,180	94,690	94,690

Notes: The dependent variables are yields of POE and SOE, whose ratings are above AA. Columns (1) and (3) only include the POE bond dummy, the time dummy variable, and the interaction term. Columns (2) and (4) control other variables that may affect bond yields, including industry dummy, province dummy, bond characteristics, issuer characteristics, and macro factors. The event window is 5 days before and 5 days after the event. * , **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.