TRADE CREDIT AND IMPLICIT GOVERNMENT GUARANTEE: EVIDENCE FROM CHINESE STATE-OWNED ENTERPRISE DEFAULTS

Abstract. This paper exploits China's first default of state-owned enterprises to study the implicit government guarantee's effect on SOEs' trade credit financing. It finds that SOEs increase trade credit by 2.3% of total liabilities, on average, relative to non-SOEs after the first SOE default in China's bond markets in 2015. The additional reliance on suppliers' credit is more prominent among SOEs with higher information opacity. It is consistent with the literature where trade credit advantage lies in the suppliers' superior information, as they can observe their clients through daily transactions. The current paper also finds that trade credits positively affect SOEs when IGG weakens. Overall, the results suggest that the reduction in IGG significantly affects Chinese firms' financing decisions, highlighting the trade credit advantage against the backdrop of imperfect market institutions.

Keywords.

Trade Credit, Implicit Government Guarantee, State Ownership

1. Introduction

Trade credit benefits firms with limited access to formal finance (Petersen and Rajan, 1997). Suppliers lend to constrained firms because they know these firms better (Smith, 1987; Lee and Stowe, 1993; Wilner, 2000). As a result, trade credit is widely used across the world. Chen et al. (2021), in an international sample of publicly listed industrial firms from 64 countries, find that total trade credit reached nearly 4.7 trillion US dollars in 2013, with approximately 20% (16%) of the average firm's sales (assets) in trade receivables. However, evidence of trade credit advantage concentrates on advanced economies. For example, Petersen and Rajan (1997), Ng et al. (1999), Giannetti et al. (2011), and Fontaine and Zhao (2021) discuss trade credit usage by United States companies, while Cuñat (2007) studies that of the United Kingdoms.

This paper exploits the unique institutional background of China and builds on the financing advantage theory of trade credit (Petersen and Rajan, 1997; Nilsen, 2002). The supplier may enjoy an advantage over traditional lenders in understanding the client's creditworthiness and a superior monitoring capability toward collecting repayment. Nam and Uchida (2019) highlight the institution's role and government ownership in trade credit usage. The current paper promotes our understanding of the interaction between trade credit and state ownership. A state-owned enterprise (SOE), according to the soft budget constraint view, is financially protected by the government through easy access to finance, tax discounts, and other forms of support (Megginson and Netter, 2001). In this case, state ownership endows the firm with an implicit government guarantee (IGG). Faccio et al. (2006) defines it as the phenomenon that "...borrowers or lenders will be bailed out should they encounter financial difficulties."

China provides a unique context for this discussion. First, Chinese SOEs assume significant political responsibility and enjoy strong state protection against insolvency (Zhu, 2016). SOEs are the dominant borrowers in the debt market and the balance sheets of state-owned banks. Private firms without IGG in China have to rely more on the informal financial channel of

trade credit (Ge and Qiu, 2007). Second, China's unique legal institutions, financial reforms, and deepening markets provide a rare opportunity to study the implications of IGG on corporate financing decisions. In April 2015, the first-ever SOE defaulted on its bond, Baoding Tianwei Group Co., Ltd. (Tianwei), and failed to service its 11 Tianwei MTN2. Credit rating agencies (Mo et al., 2021; Dong et al., 2021) and other market participants (Jin et al., 2022) interpreted this event as an explicit statement of government reduction or removal of IGG. A series of SOE defaults soon followed.

Jin et al. (2022) exploit the Tianwei event to uncover the real effects of IGG. They find that, relative to non-SOEs, SOEs reduce investment by 2.4% of book assets post-event. The decline is more prominent for SOEs afflicted by financial constraints and agency problems. They provide evidence of a formal credit channel at work where new bond issuance falls alongside rising yield. Financial constraints became more palpable as investors demanded extra protections against default loss. As a result, SOEs relying on market-based financing suffered more than those protected by connection to (state-owned) banks. Mo et al. (2021) and Dong et al. (2021) further explicate the bond credit channel. Post Tianwei default, credit ratings become less connected to IGG proxies. Rating's positive associations with firm size and state ownership weaken (Dong et al., 2021). Meanwhile, daily yields of outstanding SOE bonds experience a large and immediate increase of 13 basis points (Mo et al., 2021). The spread between the lowest rating bonds (AA-) and others widens, which indicates that investors became more cautious with risk and required more compensation. Offering yields of new AA and AA- bonds also increase for the next three years. It shows that the implications of IGG reduction (removal) are long-lasting.

This paper contributes evidence of how IGG changes trade credit usage in China. This event and subsequent SOE failures serve as a quasi-natural experiment to study the impact of IGG reduction on corporate financing decisions. Reducing or removing IGG would change SOEs' funding cost in the bond market (Jin et al., 2022). When bank credits are not immediately available (Yang and Birge, 2018), SOEs must lean on more trade credits. Furthermore,

The current work also contributes to the literature on trade credit advantage. In the unique context of the Chinese financial market, formal finance is often rationed. Therefore, trade credit can be vital to breach any emergent gap in the capital. A comprehensive set of robustness tests confirms that the baseline results are not driven by an unobserved heterogeneity of SOEs and non-SOEs or other government reforms that may have affected them differently.

The literature on trade credit advantage emphasizes the suppliers' knowledge of their customers. Suppliers use their better insights into the business and lend to constrained firms (Petersen and Rajan, 1997). They update information on their customer at a low cost through day-to-day transactions. The comparative advantage of suppliers also lies in their ability to salvage value and an implicit stake in their customers. Smith (1987) argues for trade credit when information about buyers' default risk is asymmetrically held. Lee and Stowe (1993) demonstrate a balance between risk-sharing and asymmetric information about product quality. Wilner (2000) ties the phenomenon to long-term trade-creditor relationships. Yang and Birge (2018) find that suppliers take an active role in sharing their customers' risk. More recent literature emphasizes the helping hand of suppliers when firms suffer exogenous shocks. Cuñat (2007) models a liquidity shock that breaks or delays production. The supplier bails the customer out by paying for the surprise, and this insurance provision depends on the connection between buyers and sellers. Fontaine and Zhao (2021) find that suppliers offer vital bridge finance to temporarily undervalued firms. In China's rapidly developing financial market, Ge and Qiu (2007) and Wu et al. (2014) confirm suppliers' crucial role for non-SOEs when social trust is essential and bank funds are limited.

The current paper contributes by showing that the informational advantage of suppliers plays a crucial role. A positive reaction exists in trade credit financing among SOEs with less information transparency. The results substantiate the argument that information asymmetry makes the firm more reliant on its suppliers for finance. As IGG protection weakens, it is reasonable for less transparent SOEs to take up more trade credit.

In addition, this work shows that trade credit creates value for SOEs. Nam and Uchida (2019), in a cross-country study, formulate that institutional and cultural contexts determine the value of account payables. Investors in countries with low regulatory protection benefit from information asymmetry reduction. Findings in the current work show that trade credit generates more value when information asymmetry harms investors.

The rest of the paper proceeds as follows. Section 2 describes the institutional background and the main hypotheses. Section 3 introduces the sample and empirical design. Section 4 presents the main results. Section 5 provides further empirical tests. Section 6 concludes the paper.

2. Institutional Background and Hypotheses Development

The concept of implicit government guarantee (IGG) originates from soft budget constraints in Socialist or mixed economies. A soft budget describes the situation when an organization is protected (by such as the state government) even when its budget constraint is constantly tested (Megginson et al., 2014). IGG often comes hand in hand with state ownership. Governments bail out struggling SOEs and protect SOEs from defaulting with unconditional funds, such as bank loans or government subsidies.

IGG is observed across the world. During the 2008–09 mortgage crisis, the United States government supported large financial institutions, including Citigroup and AIG, and industrial firms, such as auto manufacturers (Bond and Goldstein, 2015). Firms in several Asian and European countries also enjoy IGG through political connections (Faccio et al., 2006). In China, the ubiquity of state ownership leads to IGG of broader scopes and greater levels (Megginson et al., 2014; Zhu, 2016). Chinese SOEs are endowed with IGG for a handful of considerations. First, a "too big to fail" consideration (Dong et al., 2021) encompasses their role in job creation, tax payment, and protecting strategic resources. Second, the "accountability problem" (Jin et al., 2022) holds the state responsible for the failure of SOEs. Hence,

more generous protection covers firms with higher (Borisova and Megginson, 2011; Borisova et al., 2015) or central government ownership (Cong et al., 2019).

Since the 1990s, the Chinese government had consistently bailed out any potential default until 2014 (Mo et al., 2021). It has orchestrated bailouts for delinquent or defaulting SOEs through the following support – direct cash injection and subsidy, debt maturity extension, payment waivers from state-owned banks, and forced mergers with stronger peers (Yang and Birge, 2018). Many local governments might direct state-owned banks to make new or extend existing loans to firms in financial distress or swap their loans into equity (Zhu, 2016; Mo et al., 2021). Chinese rating agencies have incorporated these considerations and given SOEs higher credit ratings before the first SOE default event (Dong et al., 2021).

2.1. **First SOE Bond Default and IGG in China.** Chinese investors and firms have long believed domestic SOE bonds enjoy IGG protection. As many Chinese SOEs without strong bank support tapped into this market, the corporate bond market grew tenfold from 2008 to 2014. However, there was never an SOE bond default. In April 2015, the first-ever default of SOE - Baoding Tianwei Group Co., Ltd. (Tianwei) - shook the market. It served as an explicit statement of government reduction or removal of IGG. A series of SOE defaults soon followed.

Baoding Tianwei Group Co., Ltd. (Tianwei), a wholly-owned subsidiary of a central SOE, the China South Industries Group, was a manufacturer of power transformers and invested aggressively in the photovoltaic industry. Tianwei suffered financial distress and consequent credit rating downgrades from 2011 to 2014, and they needed cash to pay back loans and bond interest. On April 21, 2015, unable to secure a government bailout, Tianwei officially announced the default on its payments of 11 Tianwei MTN2. Five months later, Tianwei and three business units declared bankruptcy. The default by Tianwei surprised the markets and constituted the first default by an SOE in China.

In the second half of 2015, there were four more defaults on domestic SOE bonds, followed by many more. These SOEs operated in different industries and geographical locations. A

series of SOE default events, beginning with Tianwei, reflected governments' decreasing tolerance for corporate failures and an attempt to empower the market during economic restructuring. This shift became official when China's State Council issued formal guidelines on re-organizing SOEs in July 2016.

Jin et al. (2022) exploit this event and record the effects of IGG removal on investment. In response to IGG removal, SOEs reduced their investments by 2.4% of book assets more than non-SOEs. A formal credit channel is driving this response as financial constraints become stringent. Jin et al. (2022) find that the issuance of new bonds accompanies rising yields. Mo et al. (2021) observe that the spread between SOE bonds with the lowest rating (AA-) and others widens. The consequence is long-lasting as the offering yields of AA- and AA bonds stay high over three years.

2.2. **Trade Credit of SOEs.** The literature has discussed the usage of trade credit in China. Chinese debt market features market segment (Ge and Qiu, 2007; Ding et al., 2022) and credit rationing (Chen et al., 2020), among other imperfect institutions. In this context, trade credit should help firms with limited access to state-owned banks or bond markets. Ge and Qiu (2007) provide evidence that private firms without IGG must rely more on the informal financial channel of trade credit. Wu et al. (2014) further find that private firms in regions with higher social trust use more trade credit from suppliers and give more trade credit to customers. Yano and Shiraishi (2015) find that trust for ethnic groups also regulates trade credit availability.

2.3. **Hypotheses Development.** China's corporate bond sector initiated from its banking sector (Amstad and He, 2020). SOEs are the essential issuers in the market (Zhu, 2016). Because of their ties to governments and state-owned banks, SOEs were assumed to enjoy IGG protection against bond defaults. However, in April 2015, Tianwei's failure reflected a removal or reduction of IGG. Jin et al. (2022) find that after the Tianwei default, the decline in investment is more pronounced in SOEs, who suffer financial constraints and agency problems, than non-SOEs. Evidence points to a credit channel. These results suggest that reducing IGG

restricts the availability of market-based funding, and as a result, they should boost account payables usage. The current paper formulates Hypothesis 1 as follows.

H1: Reduction in the IGG provision leads to more account payable financing from SOEs than non-SOEs.

Moreover, this paper also draws on the literature on suppliers' information advantages. Suppliers play an active role in providing trade credit when client firms experience temporary liquidity shocks. They extend credit based on sharper insight into their clients' default risk (Smith, 1987). Suppliers also share the risk of their customers (Yang and Birge, 2018).

The current study proposes that SOE trade credit financing expansion is proportional to information asymmetry after the SOE default event. When IGG is absent, higher information asymmetry obstructs accurate estimation of the default risk. The increase in trade credit finance should be more pronounced among SOEs with less information transparency. These SOEs face more severe financial constraints as investors demand extra compensation over default risk (Dong et al., 2021) or shun their debt vehicles. On the other hand, suppliers are capable of helping because of their informational advantage and implicit stakes in the companies. Suppliers offer vital bridge financing to SOEs in plight (Nam and Uchida, 2019; Fontaine and Zhao, 2021). SOEs with less information transparency should benefit more from suppliers' information advantage. These SOEs would receive more trade credit financing after the Tianwei default event. Hypothesis 2 tests this argument.

H2: After the first SOE default event, the expansion in trade credit financing of SOEs is more pronounced among those with lower information transparency.

3. Sample Selection and Empirical Design

The 2008-2009 global financial crisis caused an unprecedented fiscal response in China of a four-trillion-RMB stimulus package. A sudden spike in bank-financed investment was visible in 2009 (Chen et al., 2020). Hence, the current analysis sets the sample starting in 2010 to ensure a tranquil pre-event credit market condition. The data are of listed Chinese firms from

the CSMAR database. The sample of the current work collects firm characteristics, including their ownership structure and the identity of the controlling shareholders (individuals, central SOEs, local SOEs, private firms, or foreign firms). The final sample contains 13,499 firm-year observations from 2010 – 2018 for the baseline analysis. Following the literature, this study excludes firms in the financial industry and firms with missing information. All continuous variables are also winsorized at the 1st and 99th percentiles to mitigate outliner impact. Definitions of all variables are in Table 1.

Table 2 reports summary statistics for the baseline sample. 29.7% are post-event observations (the mean of *Post*). The sample average of AP is 0.41., which means the sum of account payables, note payables, and unearned revenue makes up 41% of total liabilities. The means of the two alternative specifications, $APa1$, the sum of account payables and note payables, and $APa2$, the account payables alone, arrive at 32% and 24% of total liabilities.

3.1. **Empirical Design.** To empirically examine the Tianwei event's impact on SOEs' trade credit financing, the primary assumption of identification is that the first SOE default generates an exogenous variation in the perceived government's provision of IGG for SOEs. A difference-in-differences (DiD) model captures the impacts of IGG reduction (removal) on trade credit financing. The regression controls determinants of trade credits following previous studies (Love et al., 2007; Duchin et al., 2010; Garcia-Appendini and Montoriol-Garriga, 2013; Dass et al., 2015; Gonçalves et al., 2018) and specifies as follows.

$$AP_{i,t} = \alpha + \beta Post_t \cdot SOE_i + \Gamma Controls_{i,t} + Firm_i + Year_t + \varepsilon_{i,t} \tag{1}$$

Dependent variable $AP_{i,t}$ represents the trade credit of firm i in Year t. It equals account payables, note payables, and unearned revenue divided by total liabilities. SOE_i is a dummy variable that equals one if the firm is an SOE and zero otherwise. $Post_t$ is a dummy variable that equals one for the periods after the Tianwei event (2015 - 2018) and zero for the periods beforehand (2010 - 2014). $Controls_{i,t}$ represents a vector of firm characteristics that may affect

trade credit. They include the natural log of total assets ($SIZE$), liquid assets to total assets (LIQ), Market-to-Book ratio (MTB), return on asset (ROA), operational cash flow scaled by total assets (OCF), fixed asset to total asset ($FIXAT$), annual sales growth rate ($GROWTH$), number of years since first IPO (AGE), and the sum of long-term loans and short-term loans, divided by total assets ($BANK$). $Firm_i$ represents firm-fixed effects that capture firm-level, unobservable, time-invariant factors. $Year_t$ is year dummies that control for year-fixed effects. Standard errors are clustered at the firm level. The interaction term $Post_t \cdot SOE_i$ is included in the regressions but not the two dummy variables separately because firm- and time-fixed effects should absorb them. The coefficient of interest is β, which captures the causal impact of Chinese SOE defaults on the treatment group relative to the counterfactual control group (non-SOEs).

4. Empirical Analysis and Results

4.1. **Baseline Results.** This section reports trade credit's response to the shock in IGG per Equation (1). The results are in Table 3. Column (1) includes $Post_t \cdot SOE_i$, company fixed effects, and Year fixed effects. A complete set of control variables is added in column (2). Coefficient estimates for $Post_t \cdot SOE_i$ are positive in both specifications, suggesting additional reliance on trade credit financing after reducing or removing IGG. The results are also of economic significance. For example, in column (2), the AP of an average SOE increases by 2.3% after the Tianwei default, about 5.6% of the sample mean. The baseline results support Hypothesis 1. As the IGG weakens, SOEs upweight payables in their debt financing structure.

4.2. **Propensity Score Matching.** The differences in firm-level characteristics between SOEs and non-SOEs could confound the causal interpretation of the main results. A propensity-score matching (PSM) is performed to account for this selection bias. This approach facilitates the comparison of trade credit policy between two groups of firms that closely resemble each other except for their ownership. Within the two groups, a logit regression is estimated with regard to the principal equity holder. The dependent variable is a dummy, which equals one

if the observation is in the treatment group (SOEs) and zero if in the control group (non-SOEs). The logit regression includes all control variables from Equation (1) and industry and year-fixed effects. Each SOE firm is matched to a non-SOE firm with the closest propensity score (within 0.01 and without replacement).

Re-estimation of the logit model using the PSMatched sample is performed per Lemmon and Roberts (2010) to ensure the credibility of the matching method. The results are in column (2), Panel A of Table 4, and the coefficients on all control variables are insignificant. It indicates that the PSM process eliminates observable differences in characteristics between the treatment and control groups. The final step is re-estimating the baseline model in Equation (1) with the matched sample. The dependent variable is $AP_{i,t}$, with the primary explanatory variable still the interaction term $Post_t \cdot SOE_i$. The results in Panel B are similar to those in Table 5, which confirms that the main findings are not driven by variations in firm characteristics between the SOEs and non-SOEs.

4.3. **Time-Series Dynamics.** This section investigates the time-series dynamics of trade credit financing around the event. First, it verifies the parallel trend assumption, i.e., the outcome variable of non-SOEs is similar to that of SOEs before the Tianwei default. Second, It deals with the reverse causality concern. The primary assumption of this paper is that the Tianwei default event generates a plausibly exogenous shock to the IGG of SOEs. However, government policy modification may arise from a potential downturn in the SOE sector. This analysis also disentangles this concern by investigating the time-series dynamics of trade credit financing around the event.

To document the dynamics of trade credit financing surrounding the Tianwei event, dummy variables for each annual period are interacted with the SOE dummy.

$$\begin{aligned} AP_{i,t} = \alpha &+ \beta_1 Year_{-2} \cdot SOE_i + \beta_2 Year_{-1} \cdot SOE_i + \beta_3 Year_0 \cdot SOE_i \\ &+ \beta_4 Year_1 \cdot SOE_i + \beta_5 Year_{\geq 2} \cdot SOE_i + \Gamma Controls_{i,t} + Firm_i + Year_t + \varepsilon_{i,t} \end{aligned} \tag{2}$$

$Year_{-2}$, $Year_{-1}$, $Year_0$, $Year_1$, and $Year_{\geq 2}$ are dummy variables that equal one for the years 2013, 2014, 2015, and 2016, 2017 and after, respectively, and zero otherwise. The estimation results for Equation (2) are in columns (3) in Table 3. They suggest that the trade credit financing of SOEs and non-SOEs are not substantially different, as no significant coefficients for the pre-treatment periods are observed. These results ensure that the parallel trend assumption holds in this study. Notably, the spike in the use of trade credit financing occurred during the Year of the Tianwei event.

4.4. **Alternative Specification.**

4.4.1. *Staggered Local Defaults.* This section adopts a different empirical strategy to rule out the alternative explanation concerning the coincidence of the Tianwei default and other central government policies that may affect SOEs and non-SOEs heterogeneously. According to the Central Economic Working Conference, the central government implemented its large-scale de-capacity policy after 2013 and its de-leverage policy after 2016. These policies should hit SOEs across China all at once. In other words, these central government policies can not be contemporaneous with the first SOE default cases across regions. Therefore, this alternative empirical design exploits staggered local SOE defaults across provinces from 2015 to 2018.[1] This analysis helps disentangle the effect of IGG from other non-IGG-related forces that would affect SOEs.

Provincial governments may hold heterogeneous attitudes toward local SOEs' bankruptcy. Their motivation and capacity to back up local SOEs vary as well, leading to staggered local SOE defaults across provinces (Wang and Wu, 2023). The following regressional design capitalizes on the notion that the first local SOE default reflects regional variation in the provision of IGG. Thus, a staggered DiDs model can be estimated:

$$AP_{i,t} = \beta Post_{t,p} \cdot LocalSOE_i + \Gamma Controls_{i,t} + Firm_i + Year_t + \varepsilon_{i,t} \tag{3}$$

[1]The provinces that experienced a first local-SOE default and the respective dates are as follows: Jilin (July 31, 2015), Shanghai (February 29, 2016), Guangxi (March 9, 2016), Liaoning (March 28, 2016), Guangdong (December 16, 2016), Xinjiang (May 17, 2018), and Beijing (September 30, 2018). The sample period spans from 2010 to 2018.

i stands for firm, p for province, and t for year. The dummy variable $LocalSOE_i$ equals one if the local government owns a firm and zero otherwise. *Post* equals one if a province has experienced its first local SOE default and zero otherwise.

The results are in Table 6. Column (1) estimates the staggered DiDs per Equation (3) using the whole sample. Such an empirical setup, in essence, compares local SOEs in the treated provinces with central SOEs and non-SOEs in the same province and all firms in all other provinces. In order to isolate the impact of the first local SOE default from other confounding factors that may affect SOEs and non-SOEs, the current analysis restricts the sample to local SOEs only in column (2), i.e., comparison of only local SOEs of the treated province versus local SOEs elsewhere. It is still possible that the timings of the staggered defaults coincide with unobserved shocks across provinces, affecting local SOEs' financial decisions. Column (3) mitigates this concern by further restricting the sample to treated provinces and their adjacent provinces, i.e., each treated province is matched with a neighboring province with the nearest GDP per capita, and provinces-pair fixed effects are also included. Positive and significant estimations are observed for $Post \cdot SOE_i$ in columns (1), (2), and (3), and the magnitude of the coefficients is genuinely close to that of the baseline regression.

4.4.2. *Inventory Management or Financial Management.* Account payables increase may come from inventory management needs. Addressing this confounding factor requires adding another control variable, INV_i, which is the net amount of inventory divided by total assets. The triple interactive term $Post_t \cdot SOE_i \cdot INV_i$ captures the incremental impact of goods stock on payables among SOEs after the Tianwei default. The results are in Table 5. The triple interaction, $Post_t \cdot SOE_i \cdot INV_i$, is negatively significant. At the same time, $Post_t \cdot SOE_i$ is still positive and significant, thus confirming that the main results are because of financial management rather than inventory management of SOEs after the Tianwei Default.

4.4.3. *Subsample Analysis and Alternative Settings.* According to the Central Economic Working Conference, the central government implemented the de-capacity policy after 2013[2] and the de-leverage policy after 2016. Thus, the current analysis excludes firms likely to be directly affected by these government interventions. The de-capacity and de-leverage policies mainly targeted firms in overcapacity industries[3] and those with leverage higher than the industry average. Thus, Equation (1) is re-estimated with those firms removed from the sample. If the Tianwei default is primarily a result of the de-capacity or de-leverage policies, one would observe a different set of results from the baseline. Columns (1) and (2) of Panel A, Table 6, show that the baseline results remain robust.

The primary argument of this study extends Jin et al. (2022) 's conjecture that a shock in IGG signaled by a focal event raises the cost of bond issuance. As a result, trade credit financing should become more favorable for SOEs. Therefore, excluding firms with no bond issuance (either they do not rely on the bond market or have no access, i.e., inherently high cost associated with bond issuance regardless of the level of IGG) during the sample period would sharpen the main argument of this paper. The results in column (3) Panel A, Table 6 confirm this conjecture.

Furthermore, regressions are re-run with alternative measures of trade credit financing or replace year-fixed effects with industry-year-fixed effects to account for unobserved time-varying industry characteristics. The results are in Panel B, Table 6. Using an alternative dependent variable or including high dimensional fixed effects does not alter the main results' sign or statistical significance.

5. Further Evidence and Discussion

5.1. **Information Opacity Channel.** This section provides further evidence that trade credit financing became more favorable for SOEs as the cost of other financing instruments went

[2]Please refer to "Guiding opinions of the State Council on resolving the conflicts of severe overcapacity," Document No. 41 (2013), China State Council.
[3]i.e., coal mining, steel, and construction.

up post-event (Jin et al., 2022). The financing advantage theory claims suppliers have a monitoring advantage over financial institutions in acquiring private information on borrowers' credit risk (Biais and Gollier, 1997; Petersen and Rajan, 1997). Thus, this advantage should be more prominent for borrowers with information opacity (Dong et al., 2021). SOEs with higher information opacity may rely more on trade credit financing after the Tianwei event, as opacity drives up bond issuance costs.

This section investigates the mechanism of information asymmetry and follows Chen and Lin (2017) to measure information opacity with analyst coverage. It counts the total number of analysts covering the firm within a year. The level of information opacity splits the sample into two groups. A firm is assigned to the 'High Transparency' (i.e., low opacity) if its analyst coverage is above the sample median and to 'Low Transparency' (i.e., high opacity) if otherwise. An alternative measure for opacity is whether a firm's external auditor is one of the 'Big 4' (Chen and Lin, 2017; Kerr, 2018).[4] The regressional results are in Table 9.

The coefficient estimation of $Post_t \cdot SOE_i$ is positive and significant at the 1% level in column (2) but not statistically significant in column (1). Payables accumulate among SOEs with less analyst coverage. This supports this paper's conjecture that SOEs with higher information opacity must seek more trade credit financing when IGG reduces. As the Chinese debt market features imperfect institutions and market segmentation (for example, Ge and Qiu, 2007; Ding et al., 2022), IGG could help SOEs overcome these market weaknesses (Megginson and Netter, 2001). With a sudden reduction or removal of IGG, investors fail to evaluate the risk of opaque SOEs and, thus, demand extra compensation (Dong et al., 2021). Therefore, these SOEs have to rely more on the informal financing resource of trade credit. Similar results are in columns (3) and (4), where one only observes a positive impact on trade credit financing among SOEs whose external auditor is not one of the 'Big 4.'

5.2. **Value Effect of Trade Credit.** Previous studies suggest that trade credit may benefit the borrowing firm through information production and insurance, especially when exposed to

[4]They are Deloitte, Ernst & Young (EY), Price Waterhouse Coopers (PwC), and Klynveld Peat Marwick Goerdeler (KPMG).

liquidity shocks (Nilsen, 2002; Kim, 2005; Cuñat, 2007). Nam and Uchida (2019) examine the value effect of trade credit and find a positive association between account payables and firm value during the global financial crisis. This section provides evidence of trade credit value creation for SOEs when IGG weakens. Tobin's Q measures the value effect (Nam and Uchida, 2019) and is regressed onto a battery of variables.

$$\begin{aligned} TobinQ_{i,t} = \beta_1 Post_t \cdot SOE_i \cdot AP_{i,t} + \beta_2 Post_t \cdot SOE_i + \beta_3 AP_{i,t} \\ + \Gamma Controls_{i,t} + Firm_i + Year_t + \varepsilon_{i,t} \end{aligned} \tag{4}$$

AP is the trade credit proxy used as the dependent variable in the previous regression. All other control variables and fixed effects follow the baseline regression in Equation (1). The coefficient of interest β_1 captures the marginal value creation effect of trade credit for SOEs after the Tianwei default event.

The results are in columns (1) and (2) of Table 10. Column (1) does not include the triple interaction term or $AP_{i,t}$. The coefficient of $Post_t \cdot SOE_i$ is negative and significant at the 1% level, and it suggests a reduction in firm value among SOEs when IGG fades. In column (2), the $Post_t \cdot SOE_i$ coefficient is still negative and significant. However, the triple interactive $Post_t \cdot SOE_i \cdot AP_{i,t}$ coefficient is positive and substantial at 1%. It demonstrates the value creation of trade credit for SOEs when IGG reduces.

Moreover, Jin et al. (2022) show that IGG removal demotes SOE investment. The value creation of trade credit might come from its ability to attenuate the response in investment. Three aspects of investments are tested to validate this mechanism of value creation: (1) research and development investments ($R\&D$); (2) capital expenditures ($Capex$); and (3) inventory investment (INV). Columns (3) and (4) replace Tobin's Q with $R\&D$; columns (5) and (6) with $Capex$; and columns (7) and (8) with INV. The results show that the value creation effect of account payables is mainly driven by investment in $R\&D$ and $Capex$. In other words, account

payables keep SOEs from cutting *R&D* and capital expenditures when a reduction in IGG causes liquidity constraints.[5]

6. Conclusion

This paper exploits the first bond default by a large SOE in China—Baoding Tianwei Group—to study the implications of IGG on corporate trade credit in the unique context of China's China's financial institutions. This event and subsequent SOE defaults serve as a quasi-natural experiment to test the trade credit advantage.

The DiD regressions show that SOEs' reliance on suppliers increases more than non-SOEs when their IGG protection weakens. A comprehensive set of robustness tests, including alternative identification strategies, show that the results of the current paper are not driven by unobserved heterogeneity of SOEs and non-SOEs or other government reforms that might affect SOEs and non-SOEs differently. The current paper finds that the information advantage of suppliers is driving the heavier usage of trade credit. In addition, trade credit creates value for SOEs by preserving vital investment expenditures.

The study sheds light on how IGGs operate through the informal credit channel and the consequences of their removal. It substantiates trade credit's importance for SOEs when information asymmetry hinders other financing options. Firms must value their connection with long-term suppliers, for their helping hand may carry firms through adverse shocks. Given these observations, the government should carefully consider the policies on IGG's provision (or reduction) and promote market institutions to reduce information opacity.

[5]Based on our results, the negative impact of the Tianwei default on investment documented in Jin et al. (2022) may be driven by the reduction in investment in others rather than *R&D* and capital expenditure (e.g., inventory, employment, financial acquisitions).

TABLE 1. Variable Definitions

Variable name	Definition
AP	the sum of accounts payable, notes payable, and unearned revenue, divided by total liabilities
$APa1$	the sum of accounts payable, notes payable, divided by total liabilities
$APa2$	accounts payable divided by total liabilities
SOE	dummy variable that equals 1 if the firm is a state-owned enterprise, and 0 otherwise
$Post$	dummy variable that equals 1 for the periods after April 21, 2015, and 0 for the periods before
$BANK$	The sum of long-term loan and short-term loan, divided by total assets
ROA	Net income divided by total assets
$SIZE$	Log of total assets
LIQ	Current assets divided by total assets
OCF	Cash flow from operating activities divided by total assets
MTB	Market value of equity divided by book value of equity
$Growth$	Percentage change in revenue
$FIXAT$	Fixed assets divided by total assets
AGE	The number of years since the ffrm is publicly listed

Table 2. Summary Statistics

This table reports summary statistics of all variables used in our empirical tests. The sample consists of 13,499 firm-year observations of Chinese listed firms over 2010–2018. Detailed definitions of all variables are described in Table 1.

Stats	N	S.D.	Mean	p25	p50	p75
AP	13499	0.225	0.41	0.382	0.23	0.568
APa1	13499	0.2	0.319	0.288	0.16	0.444
APa2	13499	0.164	0.242	0.206	0.117	0.334
SIZE	13499	1.308	22.17	22	21.21	22.93
LIQ	13499	0.2	0.577	0.587	0.436	0.731
MTB	13499	3.136	3.627	2.691	1.776	4.326
ROA	13499	0.049	0.038	0.034	0.013	0.062
OCF	13499	0.07	0.037	0.036	-0.001	0.078
FIXAT	13499	0.159	0.223	0.192	0.099	0.318
GROWTH	13499	0.482	0.21	0.125	-0.009	0.298
AGE	13499	5.24	15.62	16	12	19
BANK	13499	0.134	0.157	0.139	0.035	0.247

TABLE 3. Baseline Result: The effects of IGG on trade credit financing

This table presents the results from DID regressions of firm trade credit of SOEs and non-SOEs around the Tianwei default. The dependent variable is AP, defined as the sum of accounts payable, notes payable, and unearned revenue divided by total liabilities. SOE is a dummy variable that equals one if the firm is a state-owned enterprise and 0 otherwise. Post is a dummy variable that equals 1 for the periods after April 21, 2015, and 0 for the periods before. $Year_{-2}$, $Year_{-1}$, $Year_0$, $Year_1$, and $Year_{>=2}$ are dummy variables that equal 1 for the years 2013, 2014, 2015, and 2016, 2017, and afterward, respectively, and 0 otherwise. Detailed definitions of all variables are described in Table 1. Standard errors are adjusted for firm-level clustering and reported in parentheses. $***$, $**$, $*$ denote significance levels at 1%, 5%, and 10%, respectively.

Dependent Variable: AP			
	[1]	[2]	[3]
$SOE \times POST$	0.053***	0.023***	
	(0.007)	(0.006)	
$SOE \times Year_{-2}$			0.002
			(0.005)
$SOE \times Year_{-1}$			0.009
			(0.006)
$SOE \times Year_0$			0.019***
			(0.007)
$SOE \times Year_1$			0.025***
			(0.008)
$SOE \times Year_{\geq 2}$			0.034***
			(0.008)
$SIZE$		-0.002	-0.002
		(0.006)	(0.006)
LIQ		0.287***	0.285***
		(0.024)	(0.024)
MTB		-0.001	-0.002*
		(0.001)	(0.001)
ROA		-0.086**	-0.087**
		(0.039)	(0.039)
OCF		0.145***	0.147***
		(0.022)	(0.022)
$FIXAT$		0.082***	0.082***
		(0.026)	(0.026)
$GROWTH$		0.013***	0.013***
		(0.003)	(0.003)
AGE		-0.002	-0.001
		(0.004)	(0.004)
$BANK$		-0.697***	-0.696***
		(0.025)	(0.024)
Constant	0.404***	0.408***	0.392**
	(0.001)	(0.157)	(0.159)
Observations	13,499	13,499	13,499
R-squared	0.043	0.313	0.314
Firm FE	YES	YES	YES
Year FE	YES	YES	YES
Cluster S.E by	Firm	Firm	Firm

Table 4. Propensity Score Matching

These two tables present statistics of post-match differences in propensity score matching. Observations are split into SOEs and non-SOEs. Firms in these two groups are then matched based on the control variables from the baseline estimation as well as year and industry. SOE is a dummy variable that equals one if the firm is a state-owned enterprise and 0 otherwise. Panel A presents parameter estimates from the logistic model used to estimate propensity scores for firms in the treatment and control groups. Panel B presents an estimation based on the propensity-score-matched sample and includes the same control variables as in Table 2; coefficients are suppressed for brevity. Detailed definitions of all variables are described in Table 1. Robust standard errors clustered at the firm level are underneath the coefficient estimates. $***$, $**$, $*$ denote significance levels at 1%, 5%, and 10%, respectively.

Panel A: Pre-match regression and post-match diagnostic regression

Dependent Variable: SOE		
	Pre-Match	Post Match
	[1]	[2]
SIZE	0.670***	-0.012
	(0.070)	(0.066)
LIQ	0.138	-0.026
	(0.353)	(0.308)
MTB	0.035**	-0.002
	(0.016)	(0.018)
ROA	-7.256***	0.243
	(1.081)	(1.118)
OCF	0.241	-0.14
	(0.486)	(0.636)
FIXAT	1.387**	-0.048
	(0.651)	(0.748)
GROWTH	-0.353***	0.004
	(0.048)	(0.049)
AGE	0.090***	-0.01
	(0.013)	(0.012)
BANK	-0.935**	0.071
	(0.457)	(0.454)
Constant	-14.026***	0.149
	(1.630)	(1.490)
Observations	13,340	6,654
Pseudo R2	0.225	0.003
Industry FE	YES	YES
Year FE	YES	YES

TABLE 5. Propensity Score Matching (Cont.)

Panel B: Estimation based on the propensity-score-matched sample		
Dependent Variable: AP		
	[1]	[2]
$SOE \times POST$	0.015**	
	(0.007)	
$SOE \times Year_{-2}$		0.006
		(0.007)
$SOE \times Year_{-1}$		0.003
		(0.008)
$SOE \times Year_{0}$		0.011
		(0.009)
$SOE \times Year_{1}$		0.011
		(0.011)
$SOE \times Year_{\geq 2}$		0.028**
		(0.012)
Observations	6,654	6,654
R-squared	0.307	0.307
Controls	YES	YES
Firm FE	YES	YES
Year FE	YES	YES

TABLE 6. Staggered Local SOE Defaults and trade credit financing

This table presents the effect of staggered local SOE defaults on firm trade credit financing. The sample period is 2010-2018. Staggered defaults refer to each province's first local-SOE default, including defaults in Jilin (July 31, 2015), Shanghai (February 29, 2016), Guangxi (March 9, 2016), Liaoning (March 28, 2016), Guangdong (December 16, 2016), Xinjiang (May 17, 2018), and Beijing (September 30, 2018), and not including central-SOE defaults. Post equals one if a province has experienced a local-SOE default and zero otherwise. Column (1) uses the whole sample. Column (2) excludes central SOEs and non-SOEs from the sample. Column (3) further restricts the local SOE sample to defaulting provinces and their adjacent provinces. We match each defaulting province with a neighboring province by selecting an adjacent province with the nearest GDP per capita. All regressions include the same control variables as in Table 3; coefficients are suppressed for brevity. Detailed definitions of all variables are in Table A1. Robust standard errors clustered at the firm level are underneath the coefficient estimates. $***$, $**$, $*$ denote significance levels at 1%, 5%, and 10%, respectively.

Dependent Variable: AP			
	Full Sample	Local SOEs Only	Local SOEs; Adjacent-province matching
	[1]	[2]	[3]
LocalSOE × *POST*	0.035***	0.021*	0.023*
	(0.01)	(0.012)	(0.013)
Observations	13,499	4,724	2,403
R-squared	0.313	0.261	0.286
Controls	YES	YES	YES
Firm FE	YES	YES	YES
Year FE	YES	YES	YES
Province-Pair FE	NO	NO	YES

Table 7. Robustness Tests

This table presents robustness tests for DID regressions of trade credit financing. Panel A shows the results of subsamples: column (1) excludes overcapacity industries, column (2) excludes high-leverage firms (firms with a leverage ratio higher than the industry average in 2014), and column (3) excludes firms that have no bond issuance during the sample period. Panel B presents the results using alternative AP in columns (1) and (2) and alternative model settings in column (3). APa1 and APa2 are the accounts payable and notes payable divided by total liabilities and accounts payable divided by total liabilities, respectively. All regressions include the same control variables as in Table 3; coefficients are suppressed for brevity. Detailed definitions of all variables are in Table A1. Robust standard errors clustered at the firm level are underneath the coefficient estimates. $***$, $**$, $*$ denote significance levels at 1%, 5%, and 10%, respectively.

Panel A: Subsample

Dependent Variable: AP			
	Excl. Overcapacity	Excl. High-leverage	Excl. Bond-issuers
	[1]	[2]	[3]
SOE × *POST*	0.022***	0.022**	0.033***
	(0.006)	(0.010)	(0.008)
Observations	12,397	6,841	8,547
R-squared	0.328	0.305	0.334
Controls	YES	YES	YES
Firm FE	YES	YES	YES
Year FE	YES	YES	YES

Panel B: Alternative Settings

	Alter. Dependent		Alter. FE
Dependent Variable:	APa1	APa2	AP
	[1]	[2]	[3]
SOE × *POST*	0.027***	0.023***	0.022***
	(0.005)	(0.004)	(0.006)
Observations	13,499	13,499	13,499
R-squared	0.216	0.197	0.219
Controls	YES	YES	YES
Firm FE	YES	YES	YES
Year FE	YES	YES	NO
Industry*Year FE	NO	NO	YES

TABLE 8. Inventory Management

This table presents robustness tests for DID regressions of trade credit financing by considering the confounding effects of inventory management. The inventory level is measured by INV, defined as the net amount of inventory divided by total assets. All regressions include the same control variables as in Table 3; coefficients are suppressed for brevity. Detailed definitions of all variables are in Table A1. Robust standard errors clustered at the firm level are underneath the coefficient estimates. $***$, $**$, $*$ denote significance levels at 1%, 5%, and 10%, respectively.

Dependent Variable: AP		
	[1]	[2]
$SOE \times POST$	0.069***	0.037***
	(0.010)	(0.009)
$INV \times SOE \times POST$	-0.113**	-0.090**
	(0.05)	(0.04)
$INV \times SOE$	0.031	0.02
	(0.061)	(0.046)
$INV \times POST$	0.184***	0.080**
	(0.035)	(0.032)
INV	0.108**	0.148***
	(0.042)	(0.037)
Observations	13,499	13,499
R-squared	0.053	0.321
Controls	NO	YES
Firm FE	YES	YES
Year FE	YES	YES

TABLE 9. IGG, internal information transparency and trade credit

This table shows cross-sectional analyses that study the impact of the Tianwei default on trade credit financing for firms with high and low internal information transparency. A firm is assigned to the 'High Transparency' group if its analyst coverage is above the median of the sample, the firm's external auditor is one of the 'Big 4,' and the 'Low Transparency' group is otherwise. All regressions include the same control variables as in Table 3; coefficients are suppressed for brevity. Detailed definitions of all variables are in Table A1. Robust standard errors clustered at the firm level are underneath the coefficient estimates. $***$, $**$, $*$ denote significance levels at 1%, 5%, and 10%, respectively.

Dependent Variable: AP				
	Analyst Coverage		BIG4	
	High Transparency	Low Transparency	High Transparency	Low Transparency
	[1]	[2]	[3]	[4]
$SOE \times POST$	0.008	0.027***	-0.026**	0.025***
	(0.009)	(0.008)	(0.012)	(0.006)
Chow-Test	t = -2.02		t = -2.99	
	Prob>|t|= 0.044		Prob>|t|= 0.003	
Observations	5,089	5,570	719	12,780
R-squared	0.347	0.335	0.278	0.319
Controls	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

TABLE 10. Value creation

This table examines the value effect of trade credit financing for SOEs after the Tianwei default. Tobin's Q is the market value of equity divided by total assets. Capital expenditure (Capex) is the change in property, plant, and equipment, plus depreciation expenses scaled by the total asset. R&D expenditure is R&D expenses divided by total assets. All regressions include the same control variables as in Table 3; coefficients are suppressed for brevity. Detailed definitions of all variables are in Table A1. Robust standard errors clustered at the firm level are underneath the coefficient estimates. $***$, $**$, $*$ denote significance levels at 1%, 5%, and 10%, respectively.

Dependent Variable:	Tobin's Q		R&D		Capex	
	[1]	[2]	[3]	[4]	[5]	[6]
$SOE \times POST$	-0.305***	-0.455***	0.003***	-0.001	0.012***	0.001
	(0.034)	(0.056)	(0.001)	(0.002)	(0.002)	(0.003)
$SOE \times POST \times AP$		0.382***		0.009***		0.025***
		(0.102)		(0.003)		(0.005)
AP		-0.218***		-0.004		0.023***
		(0.083)		(0.002)		(0.005)
Observations	13,499	13,499	13,499	13,499	13,498	13,498
R-squared	0.675	0.676	0.181	0.182	0.195	0.201
Controls	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

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