China's No-bailout Reform: Impact on Bond Yields and Rating Standards

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Abstract

The Chinese government broke its long-standing practice of bond bailouts in March 2014. The number and value of bond defaults increased substantially in the following years. We investigate bond defaults in China from 2014 to 2019 and examine the impact of the no-bailout reform. We find significantly higher yield spreads on lower-rated bonds over AAA bonds after the policy change. Furthermore, we document much lower default rates for SOE bonds than non-SOE bonds and an increased funding advantage of SOEs after March 2014. Surprisingly, credit rating agencies loosened rating standards in response to the policy change, suggesting their caving into issuer demands for higher ratings.

There had been no domestic bond default in China prior to 2014, thanks to third-party guarantees and government bailouts. To wean the market off government support and enforce market discipline, the Chinese government broke its long-standing practice of bond bailouts and allowed a non-state-owned-enterprise (non-SOE) corporate bond to default in March 2014 (Zhu, 2016).[1] The first bond default by an SOE occurred in the following year. The number and par value of bond defaults has increased substantially since 2014. The market-oriented reform was intended to foster healthy growth of the Chinese bond market, promote risk-based bond pricing, and enhance the efficient allocation of capital, as Economist (2014) pointed out:

'*By removing the perception of state guarantees and allowing failing companies to fail, the authorities could force the banks and investors to allocate their capitals much more carefully*.'

We examine the Chinese bond defaults from 2014 to 2019 and the impact of the no-bailout reform on bond yields and rating standards. In the first part of the paper, we provide a bird's-eye view of bond defaults in China. We find that the first default in March 2014 was not a one-off and thorough policy change. Instead, it was one step forward in a cautious and incremental process to slowly expose investors to default risks and let the market pick winners and losers. The number and size of bond defaults increased gradually but considerably from 2014 to 2019, suggesting that the Chinese government became increasingly more confident in its financial system to absorb larger shocks. However, the process is far from complete. While SOEs issued approximately 80% of all public bonds, they accounted for only about 15% of defaults, likely due to continued, though more selective, government support, direct or indirect (S&P, 2018). Furthermore, there has been

[1] There had been no written policy on bailout or explicit government guarantee. Rather, the central and local governments had consistently bailed out bond investors prior to March 2014. Government bailouts can take on several different forms, as discussed later. The ultimate result of government bailouts is the avoidance of investment losses by bond investors.

no bond default by financial institutions by the end of 2019. Anecdotal evidence suggests that the Chinese government continues to bail out financial institutions out of concern for financial contagions and systemic risks.

In the second part, we focus on the credit rating agencies' (CRAs) and investors' responses to the no-bailout reform. It is well documented that Chinese CRAs assigned AA or higher ratings to over 80% of Chinese domestic bonds (Jiang and Packer, 2019). Critics often dismiss Chinese bond ratings as inflated and irrelevant due to their overoptimism (Lee, 2006, Kenney, 2008). Others suggest, however, that high ratings were justified by implicit government guarantees prior to 2014 (Lin and Milhaupt, 2017). Following the no-bailout reform, the threat of default becomes credible, and consequently, we expect the CRAs to tighten their rating standards and assign lower ratings if the high average ratings prior to 2014 were a result of implicit government guarantees.

On the other hand, however, if the yield spreads between lower-rated and AAA bonds increased significantly after the no-bailout reform, issuing firms were likely to put more pressure on CRAs to assign AAA ratings on their bonds to lower funding costs. If CRAs, to win business, caved into demands for AAA ratings, we expect the CRAs to loosen their rating standards and hand out more AAA ratings.

Prior to the first bond default, investors were generally less concerned about default risks and, as observed by Bird (2019), '*differences in pricing based on credit quality have been historically rare in China's interbank market, due to the perception that the government would ultimately guarantee creditors are made whole*.' The removal or weakening of implicit government guarantees significantly increased the default risk of Chinese bonds.[2] Consequently, investors are expected to demand higher yields on risky bond investments.

[2] Implicit government guarantees are not limited to the Chinese bond market but permeate the Chinese economy. Zhu (2016) examines implicit government guarantees in China and the resulting economic distortions.

Thus, we hypothesize that the risk premium on riskier bonds widened following the first bond default.

We test the hypotheses with data on newly issued public corporate bonds from 2009 to 2019. First, we find that Chinese CRAs loosened rating standards and assigned AAA ratings to a much higher proportion of bonds issued after March 2014. Approximately 38% of bonds in our sample from 2009 to March 2014 were rated AAA, and 8% were rated AA- at their initial issuance. The proportion of AAA bonds increased to 56% and the percentage of AA- bonds decreased to 1% from March 2014 to 2019. The higher average ratings after March 2014 were not driven by higher credit quality issuers. Holding rating constant, bond issuers after March 2014, on average, had lower interest coverage ratios, higher total and long-term debt ratios, lower returns on equity, and higher equity betas. Furthermore, empirical results from ordered probit models of bond ratings show that the deteriorations in rating standards did not occur immediately after the first bond default. Rather, it took about three years for CRAs to significantly loosen their rating standards. This lagged response is consistent with the hypothesis that bond issuers, after observing increased yield spreads between lower-rated and AAA bonds, put more pressure on CRAs to assign higher ratings on their bonds to lower funding costs.

Second, we find that average offering yields on AA and AA- bonds increased substantially following the first bond default and the average offering yield spreads between AA (AA-) bonds and AAA bonds increased from 1.23% (2.15%) to 1.67% (3.00%) after the no-bailout reform, indicating that investors became more cautious with risky bonds and required higher compensation for increased credit risks.

As noted earlier, the very low or zero default rates by the SOEs and Chinese financial institutions suggest continued government support of the state and financial sectors. Consequently, we find that the no-bailout reform had much weaker or no impact on the yield

spreads between lower-rated and AAA SOE bonds and Financial Bonds in two difference-in-difference-in-difference analyses.[3] While the no-bailout reform moved the Chinese bond market closer to a true credit market, the continued direct and indirect government support for SOEs extended and expanded the well-documented funding advantages enjoyed by Chinese SOEs in the public bond market. Prior to the first bond default, the offering yields on non-SOE bonds were, on average, 0.35% higher than those on bonds issued by SOEs of the Chinese central government, holding rating constant. After March 2014, the average yield differences between non-SOE bonds and central government SOE bonds more than doubled to 0.85%. The preferential treatments of SOEs further disadvantage the more productive and profitable private sectors in the Chinese public bond market.

Given the long sample period, it is conceivable that other institutional developments, policy changes, and evolving market and economic conditions might drive or contribute to the empirical findings on bond yields. In addition, changes in rating standards in the latter sample period could further complicate the interpretation of the empirical results on bond yields. To address those issues, we conduct two robustness checks. First, we use a subsample of newly issued bonds from a much narrower sample period from 2013 to 2015, a period without significant rating standard change. The empirical results are essentially identical to those of the whole sample period, alleviating concerns for confounding factors outside the shorter sample period and complications from rating standard changes. Second, we examine bond yield changes of a sample of 1,366 outstanding bonds from 60 days prior to the first default event on March 4, 2014 to 60 days afterwards. We find a significant increase in the average daily bond yields after the no-bailout reform. More importantly, the yield difference between the lowest rated bonds (AA-) and other bonds widened sharply after March 4, 2014 and the effect was more pronounced for non-SOE bonds. Thus, the

[3] Financial Bonds are issued by banks and other financial institutions in China.

empirical results on the yield changes of outstanding bonds provide further corroborating evidence for the main findings from the offering yields on newly issued bonds over the longer sample period.

To our knowledge, this paper presents the first assessment of the market-oriented no-bailout reform by the Chinese government and contributes to the debate on the 'gradualist' vs. 'big-bang' approaches to reform centrally planned economies. Since the fall of the former communist governments in Eastern European countries in the early 1990s, there has been an academic debate on the best approach to economic reform and transition to a market economy. Proponents of gradual and incremental reforms emphasize the optimal sequencing and sustainability of gradual reforms (McKinnon, 1991, Dewatripond and Roland, 1995, Wei, 1997). The success story of the Chinese economic reform lends support to the gradualist camp. On the other hand, the advocates for the 'big-bang' approach argue for a fast and simultaneous reform package on the grounds of the complementarity of various reform measures (Berg and Sachs, 1992, Woo, 1994). They contend that incremental reforms could create unintended and new economic distortions while eliminating existing ones (Murphy et al., 1992, Young, 2000, Brunnermeier et al., 2017).

Overall, we find that the incremental no-bailout reform measure is effective in moving the Chinese domestic bond market closer to a true credit market and enhancing risk-based bond pricing. However, the cautious and gradual approach has its drawbacks. Previous studies show that Chinese private sectors are more productive and profitable than the SOEs but suffer from a funding disadvantage in the Chinese domestic capital market (Zhou and Wang, 2000, Song et al., 2011). The incremental no-bailout reform and continued government support, direct or indirect, for SOEs prolong and exacerbate the

private sector's funding disadvantages and capital misallocation.[4] The finding supports Young's (2000) criticism of incremental reform:

"*While some distortions are eliminated, moving the ''train'' of the economy to market, others are added, drawing it off on unexpected tangents.*"

Empirical findings in the paper shed some light on the cause of extremely high average credit ratings on Chinese domestic bonds. Some critics argue that Chinese bond ratings are seriously inflated due to conflicts of interest, while others suggest that the high ratings were justified by implicit government guarantees prior to 2014 (Baglole, 2004, Lee, 2006, Lin and Milhaupt, 2017). The finding of loosening rating standards after the removal or weakening of implicit government guarantees does not support the view of justifiably high ratings. Instead, the evidence suggests that CRAs yielded to demand for higher ratings by issuing firms to lower their borrowing costs, consistent with the rating inflation view.

Worsening rating inflation is troubling and hinders the development of a well-functioning bond market in China. Livingston et al. (2018) find that the Chinese rating scales were already very crude and coarse prior to 2015, pooling bonds of significantly different default risk into one rating category. The no-bailout reform inadvertently exacerbated rating inflation, making the Chinese bond rating even less informative. In the long run, persistent rating inflation is not sustainable and will make the bond ratings completely uninformative and irrelevant to investors. Reforms of the Chinese credit rating industry and its regulations are urgently needed to tackle rating inflation.

As Chinese capital markets are increasingly open to foreign investors, it is important for international investors to better understand the default risks of the Chinese bond market and properly interpret the ratings on Chinese domestic bonds (Bird, 2019). For investors

[4] As discussed later, the Chinese government has adopted a very cautious and gradual process to develop its domestic bond market since 1980s. This approach has proven successful over the last four decades in growing the market from virtually nonexistent to the second largest in the world. Any weakness of the gradual reform should be balanced with its advantages, such as fast market growth and social stability.

and practitioners, the findings in the paper highlight the non-comparability between Chinese rating scales and those of Moody's and S&P, first identified by Livingston et al. (2018). This paper also provides a bird's eye view of the Chinese bond market and defaults in recent years.

On the theoretical front, the paper also adds to a long extant literature on the effect of market discipline, i.e., potential bond defaults, on the behaviors of market participants (Bayoumi et al., 1995, Flannery and Sorescu, 1996, Balasubramnian and Cyree, 2011, 2014).

The paper is related to several recent and contemporary studies on implicit Chinese government guarantees. Liu et al. (2017) study Chinese semi-municipal bonds, or Chengtou bonds, and find that the yields on Chengtou bonds are significantly correlated with the fiscal strength of local governments, implying investors pricing the quality of implicit guarantee. Tsafack et al. (2020) find the value of implicit government guarantee is higher for Chinese SOEs than non-SOEs. The study does not, however, examine the impact of the no-bailout reform on the value of implicit government guarantee.

Jin et al. (2018) examine the first Chinese SOE bond default in 2015. Using an event study methodology, Jin et al. (2018) find more negative abnormal returns on SOE bonds to the default event than on non-SOE bonds, suggesting valuable implicit government guarantees on SOE bonds prior to 2015. Li et al. (2020) estimate the value of implicit government guarantees by comparing the yields on SOE bonds and non-SOE bonds. They find that the value of implicit government guarantees is larger for poorly rated bonds. Jin et al. (2018) and Li et al. (2020) base their estimation of the value of government guarantees on the differences between SOE and non-SOE bonds, implicitly assuming no government guarantees on non-SOE bonds. We differ from those two studies and show that the no-bailout reform had an impact on non-SOE bonds, suggesting that investors perceived and priced government implicit guarantees on non-SOE bonds before 2014 as well. This finding

is consistent with the observation and argument of Lin and Milhaupt (2017) that government bailouts extended to non-SOE debt issuers prior to 2014, particularly those non-SOEs with strong political connections. Lin and Milhaupt (2017) report several instances of government bailout of non-SOE bonds prior to 2014 and conclude that:

'*SOEs are not alone in enjoying implicit backing from the state. Private enterprises that are important to the government also enjoy protection from default.*'

The rest of the paper is organized as follows. Section I briefly summarizes the development of the Chinese bond market, government bailout practices and the no-bailout reform. Section II presents an overview of the Chinese bond defaults from 2014 to 2019. Section III develops our hypotheses and Section IV describes the sample. Section V examines the impact of the no-bailout reform on bond rating standards and Section VI reports the empirical findings on the impact on bond yields. Section VII concludes the paper.

I. Background

Since the launch of its economic reform program in 1979, the Chinese government has gradually but steadily developed and fostered a domestic bond market, which has grown to the second largest in the world today (Lin and Milhaupt, 2017). We briefly trace the market developments and describe the Chinese government bond bailout practices and the no-bailout reform in this section.

A. Market Development

To finance its reforms and decentralization efforts in the early 1980s, the Chinese central government issued government bonds, or Chinese Treasuries. In the following decades, the government built and developed necessary market infrastructure and the size of the Chinese Treasury market took off rapidly (Zhen, 2013, Huang and Zhu, 2009).

Because of investors' unfamiliarity with credit risks and the government's concerns for potential social unrest due to bond defaults, the Chinese government has taken a much

slower and more cautious approach to the development of the corporate bond market. Competitions between various regulatory bodies have resulted in several market segments with different regulations. As of 2019, the Chinese public corporate bond market consists of four main types of bonds: Enterprise Bonds, Corporate Bonds, Medium-term-notes (MTN), and Financial Bonds.[5] Enterprise Bonds, mostly issued by SOEs, are regulated by the China National Development and Reform Commission (NDRC). Corporate Bonds are under the regulation of the China Securities Regulatory Commission (CSRC) and typical issuers are listed firms. MTNs are regulated by the Chinese central bank, the People's Bank of China (PBoC). Financial Bonds are also regulated by the PBoC but issued by financial institutions. Lin and Milhaupt (2017) and Livingston et al. (2018) provide institutional and regulatory details of the four market segments.

Prior to 2000, the issuance of Enterprise Bonds was effectively limited to large SOEs. In addition, to alleviate concerns for defaults and avoid social unrest, all bonds must be guaranteed by a third party, mostly state-owned banks and coupon rates were dictated by the government. In 2006, the first Enterprise Bond (Three Gorge Bond) without a third-party guarantee was issued, moving the Chinese corporate bond market closer to a real credit market.

To widen access to the public bond market by non-SOEs, the Chinese government launched the Corporate Bond market, where listed corporations (and non-listed corporations in recent years) can issue bonds with permission from the CSRC in 2007. MTNs were introduced in 2008 under the supervision of the PBoC. Different from the Enterprise and Corporate Bonds, which require permissions for issuance from their respective regulators, MTNs only need to be registered with the PBoC. Following the Chinese government's

[5] We use the term 'corporate bond' to refer to all four types of non-governmental bonds and 'Corporate Bond' refers to bonds issued under the regulation of the CSRC.

RMB 4 trillion stimulus packages in response to the 2008-2009 global financial crisis, the Chinese corporate bond market experienced significant growth (Livingston et al., 2018).

B. Chinese Credit Rating Industry

To support the development of the Chinese corporate bond market, the PBoC required all Enterprise Bonds to be rated by its approved CRAs in 1997 (PBoC, 1997). Since then, the Chinese credit rating industry has experienced significant growth.[6] Vast majority of Chinese corporate bonds are rated at AA or higher, resulting in a widely held perception of serious rating inflation (Baglole, 2004, Kennedy, 2008, Livingston et al., 2018). Livingston et al. (2018) find that the Chinese rating scales are very crude and non-comparable to those of the international CRAs.

Several unique features of the Chinese bond market and credit rating industry make the CRAs more susceptible to rating inflation. First, Chinese credit rating industry is very competitive with about eight significant players (Livingston et al., 2018). Several theoretical and empirical studies suggest that fierce competition might motivate CRAs to provide unjustifiably high ratings to increase or maintain their market shares and offer issuing firms more opportunities for rating shopping (Skreta and Veldkamp 2009; Becker and Milbourn 2011; Bolton et al., 2012; Opp et al., 2013). Second, to protect the nascent credit rating industry, the Chinese government effectively prohibited reputable international CRAs from rating domestic bonds until recently.[7] The industry is thus dominated by CRAs with short history and little reputational capital to protect. Third, the Chinese economy is booming, and the bond market is expanding rapidly. Extant literature demonstrates that CRAs are more likely to issue inflated ratings when the economy is strong and rating

[6] See Kennedy (2008) for an overview of the early development of the Chinese credit rating industry. Livingston et al. (2018) survey the landscape of the industry in more recent years.

[7] To gain access to the Chinese market, several international CRAs formed partnership with domestic CRAs (Livingston et al., 2018). In May 2017, the Chinese government committed to open the domestic credit rating market to international CRAs. As of the end of 2020, however, no international CRA has established significant presence in China.

revenues are high (Bar-Isaac and Shapiro, 2013, Opp et al., 2013). Finally, five Chinese CRAs are state-owned and sixty percent of all corporate bonds are rated by those state-owned CRAs (Lin and Milhaupt, 2017). The state-ownership of major CRAs raises concerns about the objectivity of their ratings, particularly ratings on SOEs. Indeed, previous studies show that Chinese SOEs receive more preferential ratings than non-SOEs (Livingston et al, 2018).

C. Bailouts

As discussed above, the Chinese government took a very gradual and incremental approach to the development of the bond market. It first established the risk-free Treasuries market and the necessary market infrastructure. For the corporate bond market, it initially put several guardrails against credit risks and defaults. First, only large SOEs, supported by the government, could access the bond market. Second, third-party guarantees were required. Third, issuers needed permissions for bond issuance. As the market developed, the Chinese government gradually eliminated these measures completely or partially, moving the Chinese corporate bond market closer to a true credit market.

One final barrier was the practice of bond bailouts and the resulting widely perceived implicit guarantees by both central and local governments. Since the 1990s, the Chinese governments consistently bailed out any potential bond default until 2014. For example, in 2012, a local government in Shandong Province bailed out Shandong Helon, a local SOE (Zhen, 2013). Bailout was not limited to SOEs. LDK Solar, a non-SOE manufacturer of solar panels, was bailed out by a local government in Jiangxi Province in 2012 (Lin and Milhaupt, 2017).[8]

Lin and Milhaupt (2017) outlined three motivations/reasons for government bailouts: too big to fail (TBTF), too connected to fail (TCTF), and too many to fail (TMTF). Under

[8] Lin and Milhaupt (2017) report and analyze several additional government bailouts.

TBTF, the government, particularly the central government, bails out potential default of large bond issues out of concern for systemic risks and financial contagions. TCTF refers to cases where the issuing firms' or owners' strong political connections and influences enable government bailouts. When a bond is widely held by many investors, particularly retail investors, government bailouts are generally motivated by the concern for potential social unrest that could be triggered by bond default (TMTF).

Government bailouts can take on several different forms. Central or local governments can provide direct fiscal support, particularly for SOEs in trouble. In some other cases, distressed firms were merged with stronger peers through government intermediation. Many local governments may also direct state-owned banks to make new or extend existing loans to firms in financial distress or swap their loans into equity. Alternatively, government can help troubled firms by providing them with government orders or foregoing local government taxes (Moody's, 2016, Zhu, 2016, Lin and Milhaupt, 2017).

D. No-Bailout Reform

While the measures to insulate investors from default risks helped to foster the growth of the Chinese corporate bond market in early years, they led investors to disregard credit risk, as one bond analyst noted (Robinovitch, 2012):

> "*There have been no defaults, so everyone thinks that bonds cannot default. Investors are far too relaxed about credit risk*."

To wean the market off government support and enforce market discipline, the Chinese government broke its long-standing practice of bailouts and allowed a non-SOE corporate bond (Shanghai Chaori) to default in March 2014 (Wei, 2014). In April 2015, Baoding Tianwei became the first SOE to default on its domestic bond issue (see Jin et al., 2018, for a detailed discussion of the Baoding Tianwei default). The number and size of bond defaults increased significantly in the following years, as we will show in the next

section. The no-bailout reform led the Chinese corporate bond market into a new era where default risk is a real and credible threat.

However, the Chinese governments at all levels have not given up bailout completely. During the reorganization process, Shanghai Chaori bondholders were made whole, courtesy of private equity investors controlled by SOEs. In June 2016, the local government in Sichuan Province bailed out investors of a commercial paper by the Sichuan Coal Industry Group (Moody's, 2016, Zhang, 2016). Indeed, industry observers forecast that the Chinese government will continue to support SOEs selectively (S&P, 2018). As we will show in the next section, SOE bonds accounted for a much smaller proportion of bond defaults from 2014 to 2019, likely the results of continued government support, direct or indirect, for SOEs to avoid defaults.

II. Bond Defaults from 2014 to 2019

This section examines the Chinese bond defaults from 2014 to 2019. Data on bond defaults are obtained from WIND Data Service (WIND), a leading Chinese financial data provider. There are 427 bond defaults from 2014 to 2019 in the WIND database, which reports detailed bond information and default events. We exclude 16 defaults due to missing information on bond par value.[9]

Figure 1 depicts the annual numbers and par values of defaulted bonds from 2014 to 2019. There were four bond defaults with a total par value of RMB 0.16 billion in 2014. Both the number and par value of defaults increased substantially in the following years. By 2019, the number (total par value) of defaults ballooned to 151 (RMB 131 billion). The increase in bond defaults suggests that the Chinese government is increasingly letting the capital market pick winners and losers and gradually exposing investors to default risks.

[9] Fourteen of the excluded defaults were by one issuer in 2016, and the other two occurred in 2014.

Table 1 reports the statistics for default size in par value. The mean (median) par value of all defaulted bonds is RMB 0.822 (0.69) billion. The smallest (largest) default has a par value of RMB 0.005 (6) billion. Interestingly, the size of defaults increased steadily over the sample period. The mean (median) par value of defaults increased from RMB 0.04 (0.033) billion in 2014 to RMB 0.866 (0.7) billion in 2019. The increase in average default size indicates that the Chinese government became more confident in its financial market and investors' ability to handle default risks and absorb larger shocks to the financial system.

Table 2 reports the bond default distributions, in terms of the number and the total par value of defaults by A) issuer ownership types, B) bond types, C) at-issuance ratings, D) bond trading venues, and E) issuing firm equity listing statuses. The last column reports the average par value of defaults in each category. The number in parentheses is the number (par value) of defaults in each category as a percentage of the total number (par value) of defaults.

There are 20 and 41 bond defaults by SOEs of the central and local governments, accounting for 4.87% and 9.98% of the total number of defaults, respectively. In contrast, non-SOEs account for almost 84% of the defaults. The percentage of SOE bond defaults is strikingly low compared to their market shares. Livingston et al. (2018) report that SOEs issued more than 85% of public bonds in their sample from 2009-2015. The disproportionally low default rate by SOEs, particularly central government SOEs, is probably a result of continued strong government support for the state sector. As noted earlier, anecdotal evidence suggests that the Chinese government continues to selectively bail out SOE bonds after 2014. In addition, the debt-to-equity swap program, introduced in 2016 to help reduce corporate debt burdens, mainly benefited SOEs (Li, 2017, Huang, 2019).

Panel B of Table 2 reports the default distribution by bond type. Private Placements account for 34% (27%) of the number (par value) of bond defaults. Commercial Papers,

Corporate Bonds, and MTNs each account for between 16% and 25% of defaults. Enterprise Bonds have a relatively low share of defaults at less than 5%. This is not surprising because most Enterprise Bonds are issued by SOEs. Interestingly, none of the defaulted bonds is a Financial Bond, suggesting that the Chinese government has yet to break the implicit guarantees of financial institutions. Defaults by financial institutions are likely contagious and may trigger a credit crush, making the Chinese government more reluctant to allow financial institutions to fail. For example, the takeover of Baoshang Bank by the PBoC in May 2019 led to a spike in the repo rates and freeze-up of the negotiable CD market (Hong, 2019, Taplin, 2019a). In the following month, when Bank of Jinzhou was in apparent trouble, it was effectively bailed out by the largest state-owned bank, Industry and Commerce Bank of China, and two other state-owned financial institutions (Taplin, 2019b).

Panel C reports the distribution of defaults by at-issuance bond ratings. AAA bonds account for 2.68% (6.11%) of the number (par value) of defaults. In contrast, the share of defaults by AA bonds is more than 36% in both the number and par value of defaults. Unrated bonds account for a high proportion of defaults as well.[10] The low share of defaults by AA- bonds is likely because very few Chinese bonds are rated AA-. Livingston et al. (2018) report that about 3% of all rated public bonds in their sample from 2009 to 2015 are rated AA-. A-1 rated instruments are all Commercial Papers and they account for about 8% of the defaults.

Panel D reports the default distribution by bond trading venues. Slightly more than half of defaulted bonds were traded in the exchange market and the rest in the interbank market. Interestingly, the average size of defaulted exchange-traded bonds is about 25% smaller than those of interbank-traded bonds. Finally, Panel F reports the default distribution by issuing firm equity listing status. About 21% of the defaulted bonds were

[10] Unrated bonds in the default sample include Private Placements and Commercial Papers. All Enterprise Bonds, Corporate Bonds and MTNs in the default sample have at-issuance ratings.

issued by listed firms and the remainder by non-listed firms. The default distribution between listed and non-listed firms is similar to their respective shares of the bond market. As shown in Table 4, about 21% of bonds issued between 2009 and March 2014 were by listed firms. The average default sizes by list and non-listed firms are not significantly different from each other.

III. Hypotheses

It is well documented that most Chinese domestic bonds are rated AA or above by Chinese CRAs (Livingston et al., 2018). It was rational and appropriate for CRAs to assign very high ratings when government bailouts were common and widely assumed (Lin and Milhaupt, 2017). With the break of the bailout practice by the Chinese government, CRAs are expected to tighten their rating standards and assign lower credit ratings to reflect the higher default risk:

Hypothesis 1a. Chinese CRAs tightened their bond rating standards following the first bond default in 2014.

Extant research has shown that weakening perceived government guarantees makes investors more careful in pricing default risk (Flannery and Sorescu, 1996). If the yield differences between AAA and lower-rated bonds increased significantly after the no-bailout reform, CRAs would have been under greater pressure from bond issuers to assign even higher, and ideally, AAA ratings to lower their funding costs. Previous research has shown that the pressure for rating inflation can be exacerbated by a booming bond market (Bolton et al., 2012). Given the rapidly growing Chinese domestic bond market and possibly increasing pressure for higher ratings, we hypothesize alternatively that:

Hypothesis 1b. Chinese CRAs loosened their bond rating standards following the first bond default in 2014 and assigned AAA ratings to a higher proportion of bonds.

The real and credible threat of bond defaults is expected to force investors to discriminate bonds based on credit quality and demand higher yields on riskier bonds. Thus, our next hypothesis is as follows:

Hypothesis 2a. The risk premium of high-risk bonds over low-risk bonds widened following the first bond default in 2014.

The first defaulted bond, Shanghai Chaori, is a non-SOE bond. Some researchers argue that the implicit government guarantee did not extend to non-SOE bonds prior to 2014 (Jin et al., 2018). In addition, Chinese government had repeatedly warned about bond default risk and urged investors to take credit risk seriously before March 2014 (see, for example, State Council, 2013). Therefore, it is plausible that the first non-SOE bond default did not signal a major policy change, or investors had already anticipated fully the removal of any implicit government guarantee before March 2014. Thus, we hypothesize alternatively that:

Hypothesis 2b. The risk premium of high-risk bonds over low-risk bonds did not change following the first bond default in 2014.

Bond ratings are designed to measure default risk and higher (lower) rated bonds are less (more) risky according to CRAs. Thus, we empirically test Hypotheses 2a and 2b by examining the changes in yield spreads between lower rated and AAA rated bonds, or rating-based yield spreads, after the policy change. One complication, however, is that bond ratings are not perfect measures of default risk. When ratings are inflated, i.e., some riskier bonds receive high bond ratings, the rating-based yield spreads are biased estimates of risk premium on risky bonds, as we illustrate in a simple model in Appendix A.[11] Indeed, with rating inflation, the rating-based yield spreads are lower than the underlying risk premium.

[11] The model assumes that investors price bonds based on the inherent risk rather than bond ratings. If investors blindly trust bond ratings for default risk and rely solely on ratings for bond pricing, rating inflation does not cause distortion and rating-based yield spread is an unbiased estimate of risk premium. In addition, potential

More importantly, changes in rating standard could lead to changes in rating-based yield spreads without any change in risk premium, as demonstrated by the model in Appendix A. When rating standard remains unchanged or loosens, an increase in rating-based yield spreads unambiguously implies widening risk premiums after the policy change. On the other hand, if rating standard tightens, an increase in rating-based yield spreads could be driven by tightening rating standard and does not necessarily indicate increasing risk premium. Thus, we need to take great caution in interpreting empirical results on rating-based yield spreads if there is evidence of changing rating standards. Further, as shown later, we conduct robustness checks with samples not affected by potential rating standard changes.

In addition, we test Hypotheses 2a and 2b by studying the yield difference between non-SOE and SOEs bonds. As noted earlier, less than 20% of all defaulted bonds between 2014 and 2019 were issued by SOEs, disproportionately low given that over 80% of public bonds issued between 2009 and 2015 were SOE bonds (Livingston et al., 2018). This suggests that SOEs are more likely to be supported by Chinese governments at all levels and have lower default risk than non-SOEs. As a result, we use the issuer ownership status, i.e., non-SOE vs. SOE, as a proxy for risk and test if the yield differences between non-SOE and SOE bonds increased in response to the no-bailout reform.

IV. Data and Descriptive Statistics

Our sample consists of 4,711 newly issued non-financial public Chinese bonds with fixed coupon rates between 2009 and 2019.[12] We apply several data filters and exclude the following bonds. 1) Bonds with third-party guarantees. 2) Unrated bonds or bonds rated by

changes in rating standard have no impact on rating-based yield spreads. For brevity, we do not present the mathematical proof, which is fairly straightforward.

[12] We start with 2009 because the Chinese corporate bond market was very small prior to 2009 but has experienced significant growth since then. In addition, almost all non-governmental bonds had third-party guarantees and coupon rates were set by the government prior to 2008.

unknown CRAs. 3) Semi-municipal bonds, commonly known as Chengtou bonds.[13] 4) Short-term bonds and commercial papers with maturity less than one year. 5) Convertible bonds. Data on at-issuance yields and ratings are obtained from WIND. WIND reports both issue ratings assigned to newly issued bonds as well as issuer ratings by various CRAs.[14] We use the bond issue rating in the study. Appendix B defines the variables used in the study.

Panel A of Table 3 reports the descriptive statistics of the sample. The mean (median) *Coupon Rate* is 5.10% (4.98%) and the mean (median) *Treasury Spread* is 1.96% (1.72%). The average *Rating* (=1 for AAA, =2 for AA+, =3 for AA, and =4 for AA-) is 1.79, or slightly higher than AA+.[15] The median *Rating* of 1 indicates that more than half of the bonds are rated AAA. The mean (median) *Maturity* is 4.18 (3) years and the longest *Maturity* is 20 years. The average issue amount is RMB 1.74 billion, or about 249 million US dollars. The mean (median) issuer age is 17.73 (17) years.

Panel B breaks the sample into two subsamples: Prior-default and Post-default. The Prior-default (Post-default) subsample consists of 1,348 (3,363) bonds issued prior to (after) the first Chinese bond default on March 4, 2014. The average *Coupon Rate* and *Treasury Spread* are significantly lower for the Post-default subsample, consistent with its significantly better average *Rating* (1.67) than that of the Prior-default subsample (2.11). Bonds issued after the first default in 2014 are also significantly smaller and shorter in maturities.

Table 4 reports the numbers and percentages of bonds in our sample by A) at-issuance rating, B) issuer ownership, C) bond type, D) trading venue, E) issuer type, and F) issuing

[13] Chengtou bonds are Enterprise Bonds issued by Chinese local government financing vehicles (LGFVs) to finance infrastructure projects. See Ang et al. (2015) and Liu et al. (2017) for more details on Chengtou bonds.
[14] A unique feature of the Chinese bond market is that almost all bonds and issuing firms are rated by one CRA. In contrast, most bonds and issuing firms in the US are rated by two or more CRAs.
[15] No bond in the sample is rated below AA-.

year. The first column reports the statistics for the whole sample and the second (third) column reports the statistics for the Prior-default (Post-default) subsample.

More than half of the bonds in the sample are rated AAA and almost 75% are rated AA+ or higher. AA- bonds account for 3% of the whole sample. Livingston et al. (2018) report similarly high concentrations of AAA and AA+ ratings and argue that the Chinese credit rating scales are not comparable with those of international CRAs. Further, there is a dramatic increase in average bond ratings after March 2014. The number of AAA bonds more than triples and their market share increases from 38% to 56%. On the other hand, the percentage of AA bonds decreases from 33% to 20%, and the number of AA- bonds decreases by more than 50% after the no-bailout reform. The finding supports Hypothesis 1b: CRAs, under pressure from issuing firms, loosened their rating standards and handed out more AAA ratings after the policy change. Alternatively, the significantly higher average bond ratings after March 2014 might suggest a flight to quality and difficulty for riskier firms to access the public bond market after the threat of default becomes credible and real. We will further investigate this issue later.

In terms of issuer ownership type, bonds issued by SOEs of the Chinese central government (*Central SOEs*) and local governments (*Local SOEs*) account for about 33% and 44% of the sample, respectively, and the non-SOEs have a market share of 22%. The percentage of non-SOE bonds increases slightly in the latter period.

Panel C shows a breakdown of the sample by bond type. Most bonds in the sample are MTNs. Corporate Bonds and Enterprise Bonds account for 15.60% and 5.60% of the sample, respectively.[16] The number of Corporate Bonds increases significantly in the latter sample period, resulting in a much higher market share of 20.61% than the 3.12% before March 2014.

[16] The percentage of Enterprise Bonds is lower than that reported in prior studies because we exclude the semi-municipal bonds, or Chentgou bonds.

Panels D and E report the sample distributions by trading venue and issuer equity listing status. More than 80% of bonds are traded in the Chinese interbank market and the remainder in the exchange market. Approximately one-quarter of the bond issuers have publicly listed equities. Finally, panel F reports annual numbers of bond issues over the sample period. The number of bond issues increases from 153 in 2009 to 856 in 2019 at an annual growth rate of 18.79%.

As mentioned earlier, a unique feature of Chinese credit rating industry is the large number of CRAs. While no international CRAs were permitted to issue bond ratings domestically, several of them formed partnership with local CRAs (Livingston et al., 2018). Chengxin_Moody is a joint venture with Moody's and Lianhe_Fitch is a joint venture with Fitch. Shanghai Brilliance has a technical partnership with S&P. The other five CRAs, Chengxin, Lianhe, Dagong, Pengyuan, and Jinchen are domestic CRAs without international partnership.[17]

Table 5 reports the statistics of at-issuance ratings of bonds in the sample by CRAs. Panel A (Panel B) reports the statistics for the five domestic CRAs (three global-partnered CRAs). The last two columns report the mean at-issuance bond ratings before and after the first default event on March 4, 2014 by CRAs.

Chengxin_Moody and Lianhe_Fitch are two largest competitors in the industry, while Chengxin and Pengyuan have the smallest market share. In aggregate, the global-partnered CRAs account for about three-fourths of the market. The average at-issuance bond ratings range from 1.443 to 2.819. In terms of rating dispersion, most CRAs with 300 ratings or more have rating standard deviations at about 0.90. The average ratings are significantly better in the Post-default period for five CRAs. Interestingly, the average rating for global-

[17] We adopt the CRAs' English names used by Livingston et al. (2018).

partnered CRAs improves by more than half a notch, while that of the domestic CRAs increases by only about one-fifth of a notch.

V. Empirical Findings on Rating Standards

This section tests Hypotheses 1a and 1b on the impact of the no-bailout reform on Chinese bond rating standards with a sample of publicly issued non-financial corporate bonds by listed firms from 2009 to 2019. Since the extant literature suggests that accounting ratios and market-based variables are important determinants of credit ratings, we limit the sample to 1,041 bonds issued by listed firms with 3 years of financial accounting and 2 years of stock return data prior to the bond issuance.[18] Out of the 1,041 bond issues, 234 (807) are issued prior to (after) the no-bailout reform.

Panel A of Figure 2 depicts the distributions of the 1,041 bonds by at-issuance ratings prior to and after the no-bailout reform. The percentage of AAA bonds more than doubles from approximately 16% in the Prior-default period to almost 38% during the Post-default period. On the other hand, the percentages of AA and AA- bonds decrease dramatically. The pattern is consistent with findings in Table 4 and supports Hypothesis 1b: Chinese CRAs yielded to issuer demands for rating inflation and assigned AAA ratings to a higher proportion of bonds issued after the no-bailout reform.

There are two alternative explanations for the significantly higher proportion of AAA ratings after March 2014. First, AAA-rated firms issue more bonds after March 2014. Second, more AAA-rated firms tap the bond market after March 2014. To address these two concerns, we examine 104 firms that issue bonds during both subsample periods. For each issuing firm, we identify its highest bond rating during each subsample period. Panel

[18] To maximize sample size, we include non-fixed coupon bonds in the analysis of bond ratings. While coupon structure affects bond yields, it is not expected to affect default risk and, consequently, bond ratings. In a robustness check, we control for coupon structure in the ordered probit model of ratings. The empirical results remain virtually the same.

B of Figure 2 shows the distribution of the 104 repeated issuers by their highest bond ratings during the two subsample periods. Before March 2014, 22 issuing firms have AAA ratings on their highest rated bonds. The number of firms with AAA ratings almost doubles to 43 in the second half of the sample period. On the other hand, the number of firms with the highest rating at AA (AA-) decreases from 41 to 27 (from 7 to 1). The findings indicate that the higher proportion of AAA bonds after March 2014 is not, at least solely, driven by an increase in AAA rated issuers or more frequent bond issuance by AAA firms.[19]

Consequently, the significantly higher average ratings in the second half of the sample period could be a result of 1) improving and higher credit quality of bond issues in the latter half of the sample period, or 2) loosening rating standards and rating inflation. To investigate the potential change in rating standards, we follow Blume et al. (1998) and Livingston et al. (2018) to build an ordered probit model of bond ratings as follows.

$$Rating_i = \alpha + \sum \lambda_k * Issuer\ Characters_{k,i} + \beta_1 * POST_i + control\ variables + \varepsilon_i \quad (1)$$

The dependent variable is the ordinal variable of *Rating*, from 1 for AAA ratings to 4 for AA- ratings. The explanatory variables include nine financial ratios and market-based variables: *Log of Coverage Ratio*, *Log of Market Cap*, *Market to Book Ratio*, *Operating Profit Margin*, *Return on Equity*, *Total Debt Ratio*, *Long Term Debt Ratio*, *Equity Beta*, and *Market Model Errors*. Appendix B defines these variables and describes their estimation methodologies. Prior research shows that these accounting ratios and market-based variables can explain up to 80% of the variations in bond ratings (Kaplan and Urwitz, 1979, Livingston et al., 2018). In addition, we control for the issuing firm ownership types (*Local SOE*, *NonSOE*) and CRA

[19] It is plausible that the 104 issuing firms lowered their credit risks and their higher bond ratings in the post-reform period are justified in the absence of rating inflation. To check this possibility, we examine the nine accounting and market-based ratios of the 104 issuing firms before and after the no-bailout reform. We find that those issuers have significantly lower interest coverage ratio, higher long-term debt ratio, lower ROE and higher equity beta in the post-reform period. The results, mirroring those of the full sample reported in Table 6, do not indicate that the repeated issuers have lowered their riskiness in the post-reform period. For brevity, we do not report the results, which are available upon request.

types (*GP_CRA*). *GP_CRA* is a dummy variable, equal to 1 for bonds rated by three global-partnered CRAs (Brilliance, Lianhe_Fitch, and Chengxin_Moody) and 0 for bonds rated by five domestic CRAs (Dagong, Pengyuan, Jincheng, Chengxin and Lianhe). Livingston et al. (2018) find that CRAs assign lower ratings to non-SOE bonds and global-partnered CRAs have more stringent rating standards.

POST is the test variable, equal to 1 for bonds issued after March 4, 2014 and 0 otherwise. If CRAs tightened (loosened) rating standards following the first bond default, we expect the coefficient on *POST* to be significantly positive (negative) after 2014. This methodology is well established in the extant literature. For example, Jiang et al. (2012) use the methodology to study the S&P rating standard changes after it switched from investor-pay to issuer-pay model in 1974. Blume et al. (1998) and Baghai et al. (2014) utilize a similar methodology to examine changes in rating standards of US corporate bonds over time. Becker and Milbourn (2011) apply the same approach to control for potential intertemporal variations in rating standards.

Table 6 reports the average accounting ratios and market-based variables of bond issuers before and after March 4, 2014. To minimize the effect of possibly spurious outliers, we winsorize all continuous variables at the 1% and 99% levels.[20] The average rating on bonds after March 2014 (1.974) is more than half of a notch higher than that of bonds before March 2014 (2.530) and the difference is statistically significant at the 1% level. However, bond issuers in the Post-default period have significantly lower *Log of Coverage Ratio*, higher *Total Debt Ratio*, higher *Long-term Debt Ratio*, lower *Return on Equity*, and higher *Equity Beta* than those before March 2014, suggesting that bonds issuers in the latter sample period are more leveraged, less profitable, have lower ability to service their debts and higher systematic risk. On the other hand, bond issuers in the Post-default period have higher *Log*

[20] The empirical results are similar without winsorization.

of Market Cap and lower *Market Model Error*, or unsystematic risk. Similar patterns emerge within each rating category. Overall, the univariate analysis results are inconsistent with the conjecture that issuing firms in the latter sample period have better credit quality and support Hypothesis 1b, i.e., Chinese CRAs loosened their bond rating standards following the first bond default in 2014.

Table 7 reports the results of the ordered probit models of bond ratings. The first two columns report the results of the base model of Equation 1 without the test variable *POST*. Consistent with Livingston et al. (2018), we find that *Log of Market Cap*, *Market to Book Ratios*, *Total Debt Ratio*, *Return on Equity*, *Equity Beta* and *Market Model Errors* are significant determinants of Chinese bond ratings. Furthermore, the significantly positive coefficient on *NonSOE* indicates that Chinese CRAs assign lower ratings to non-SOE bonds. Finally, the significantly positive coefficient on *GP_CRA* is consistent with the finding in Livingston et al. (2018) that global-partnered CRAs have more stringent rating standards.

Model 2 includes the test variable *POST*. The coefficient on *POST* is negative and significant at the 10% level, suggesting that CRAs loosened their rating standards after the first bond default in March 2014. This is consistent with the univariate results that issuers of bonds with the same ratings after March 2014 are more leveraged, less profitable, have lower ability to service their debt and higher systematic risk.

The impact of the incremental no-bailout reform on rating standards might take some time to manifest itself. The rating process generally takes several months to complete. In addition, it takes some time for issuing firms to observe any change in yield spreads between AAA and lowly-rated bonds and put pressure on CRAs to loosen their rating standards. To account for the potential lagged response of CRAs to the reform measure, we use a series of year dummies with 2009 as the base case in Model 3 to replace the *POST* dummy variable. We expect any change in rating standards to emerge gradually after 2014.

The empirical findings reported in Table 7 confirm this conjecture. The coefficients on the year dummies prior to 2015 are not significant. They are not significant for 2015 and 2016 either but become significantly negative after 2016. Both the magnitudes and significance levels of the coefficients increase steadily from 2016 to 2019. This lagged response is consistent with the hypothesis that bond issuers put pressure on CRAs to assign higher ratings to their bonds to lower funding costs, possibly after observing increased yield spreads between lower-rated and AAA bonds.

Finally, we examine if the global-partnered and domestic CRAs responded to the no-bailout reform differently by including an interaction term between *POST* and *GP_CRA* in the probit model. The empirical results are reported in the last two columns of Table 7. Interestingly, the coefficient on the *POST* dummy becomes significantly positive, suggesting that domestic CRAs actually tightened their rating standards. On the other hand, the coefficient on the *POST* and *GP_CRA* interaction is significantly negative, indicating that the finding of loosening rating standards after the no-bailout reform is mainly driven by the global-partnered CRAs, which accounted for about 75% of bonds rated. Indeed, we find the rating standards of the domestic and global-partnered CRAs converge and are indistinguishable after March 2014 in a subsample period analysis.[21]

Overall, the empirical findings provide evidence in support of Hypothesis 1b. Instead of tightening rating standards to account for higher default risk after the no-bailout reform, Chinese CRAs seem to loosen the rating standards, possibly caving in to pressure from issuing firms to hand out more inflated credit ratings.

[21] For brevity, we do not report the subsample probit regression results, which are available upon request.

VI. Empirical Findings on Bond Yields

In this section, we test Hypotheses 2a and 2b of the impact of no-bailout reform on bond risk premium by examining changes in bond yields. As discussed earlier, complications arise when bond rating standards also change in response to the reform. We demonstrate in Appendix A that an increase in rating-based yield spreads implies an increase in risk premium if rating standards become less stringent or remains unchanged. On the other hand, if CRAs tighten rating standards, an increase in rating-based yield spreads could be driven by more stringent rating standards and does not necessarily suggest an increase in risk premium. Given the previous empirical findings of loosening rating standards, we can interpret any increase in rating-based yield spreads as evidence of widening risk premium. Nevertheless, we will conduct two robustness checks with samples not affected by rating standard changes later.

A. Univariate Analysis

This subsection provides univariate analysis on the impact of the no-bailout reform on bond yields. Panel A of Table 8 reports the average *Treasury Spread* for different rating categories. The average *Treasury Spread* is 1.32% for AAA bonds, and it increases monotonically to 3.87% for AA- bonds. The pattern of higher *Treasury Spread* for lower-rated bonds is also obvious in both the Prior-default and Post-default subsamples. This is consistent with findings in Livingston et al. (2018).

While lower-rated bonds have higher *Treasury Spread* in both subsamples, their yield premiums over AAA bonds are much larger in the Post-default period. The average *Treasury Spread* of AAA bonds decreases by 31 basis points to 1.25% from the Prior-default to the Post-default period, suggesting a flight to quality after the no-bailout reform. In sharp contrast, the average *Treasury Spread* of AA (AA-) bonds increases by 13 (54) basis points to 2.92% (4.25%) after the first bond default in 2014. As a result, the yield difference between

AA (AA-) bonds and AAA bonds jumps from 1.23% (2.15%) to 1.67% (3%), an increase of 44 (85) basis points. This pattern supports Hypothesis 2a that bond risk premium widened after the no-bailout reform.

Panel B of Table 8 reports the average *Treasury Spread* of bonds issued by central government SOEs, local government SOEs and non-SOEs. For the whole sample, non-SOE bonds have an average *Treasury Spread* of 2.84%, higher than the 1.34% (1.98%) of the central government SOE (local government SOE) bonds. Livingston et al. (2018) and Li et al. (2020) document a similar funding advantage of SOEs in the Chinese public bond market. This funding advantage widens after the no-bailout reform. Prior to March 2014, the difference in the average *Treasury Spread* between non-SOE and central government SOE (local government SOE) bonds is 1.31% (0.68%). The difference increases to 1.59% (0.96%) after 2014.

B. Impact of the No-bailout Reform on Bond Treasury Spreads

In this subsection, we examine the impact of the no-bailout reform on bond yields with multivariate regression models. We first build an ordinary least squared (OLS) regression of bond *Treasury Spread* as follows:

$$Treasury\ Spread_i = \alpha + \sum_j \gamma_j * R_{j,i} + \beta_1 * LocalSOE_i + \beta_2 * NonSOE_i + controls + \varepsilon_i \quad (2)$$

R_j is a series of rating dummy variables with AAA as the base case. The coefficients on R_j measure the differences in *Treasury Spread* between R_j-rated and AAA bonds, or what we call rating-based yield spreads. *LocalSOE* (*NonSOE*) is a dummy variable, equal to 1 for bonds issued by local government SOEs (non-SOEs) and 0 otherwise. The base case is bonds issued by central government SOEs. Prior studies document a funding advantage of Chinese SOEs, particularly central government SOEs, over non-SOEs (Livingston et al. 2018). Thus, we expect the coefficients on the two ownership dummies to be significantly positive. *Controls* include bond features (maturity, issue size, etc.) and issuer characteristics

(type of issuers, firm age, etc.) that are expected to determine bond yields. Following Livingston et al. (2018), we also include the *GP_CRA* dummy variable in the regression. Livingston et al. (2018) find that Chinese bonds rated by the three global-partnered CRAs have lower yields, and as a result, we expect the coefficient on *GP_CRA* to be significantly negative. All explanatory variables are defined in Appendix B.

Column 1 of Table 9 reports the regression results of the base model. Most explanatory variables have expected signs and the regression model has an adjusted R-squared of 0.66. The coefficients on the rating dummy variables are all significantly positive, indicating that AA+, AA and AA- bonds have yield premiums over AAA bonds of 0.66%, 1.23% and 2.16%, respectively. *NonSOE* (*LocalSOE*) has a statistically significant coefficient of 0.732 (0.133), implying a funding disadvantage of 0.73% (0.13%) by the non-SOEs (local government SOEs) over the central government SOEs. The significantly negative coefficient on *GP_CRA* suggests that the average *Treasury Spread* on bonds rated by the global-partnered CRAs is approximately 0.18% lower than bonds rated by domestic CRAs. Overall, the results are very similar to those of Livingston et al. (2018).

To test if bond *Treasury Spread* changes in response to the no-bailout reform, we include the dummy variable, *POST*, in the regression and interact it with 1) the rating dummies, R_j, 2) *LocalSOE*, and 3) *NonSOE*. The coefficients on the interaction terms between *POST* and R_j measure the changes in rating-based yield spreads after the first bond default in 2014. The coefficients on the interaction terms between *POST* and the two ownership dummies assess the changes in the funding advantage of central government SOEs following the no-bailout reform.

Model 2 of Table 9 reports the regression results with the interaction terms. First, note that the coefficients on the rating interaction terms are all significantly positive, indicating that the rating-based yield spreads increased after the no-bailout reform. The

coefficients increase monotonically as rating decreases, consistent with the univariate analysis. Prior to the first default in March 2014, the average *Treasury Spreads* of AA+, AA, and AA- bonds are 0.420%, 0.981%, and 1.894% higher than AAA bonds, respectively. After the no-bailout reform, the yield premiums of AA+, AA, and AA- bonds over AAA bonds are, on average, 0.286%, 0.371%, and 0.757% higher, respectively. The finding supports Hypothesis 2a that bond risk premium increased after the policy change.

The coefficient on the interaction term between *NonSOE* and *POST* dummy is positive and significant at 1%, suggesting that the yield premiums on non-SOE bonds over central government SOE bonds widened in the Post-default period. Prior to the policy change, the average *Treasury Spread* of non-SOE bonds is 0.347% higher than that of central government SOE bonds. Following the policy change, the *Treasury Spread* difference more than doubles to 0.85% (0.347+0.504). While the market-oriented reform moves the Chinese bond market closer to a true credit market, it is incomplete. The continued support of SOEs and the disproportionally lower defaults of SOE bonds make them more appealing to investors. This preferential treatment of SOEs further disadvantages the generally more productive and profitable private sector in the Chinese public bond market, resulting in increased capital misallocation.

Model 3 excludes 130 bond issues with sinking fund provisions, call or put options. The empirical results are not materially different after excluding bonds with embedded options.

C. Difference-in-Difference-in-Difference (DDD) Analyses

The sample period covers an 11-year span. It is conceivable that other institutional developments, policy changes, and evolving market and economic conditions over the long sample period might drive or contribute to the empirical findings. In this section, we take advantage of the fact that there were far fewer defaults by SOEs and no default by Chinese

financial institutions during the 2009-2019 sample period to conduct two difference-in-difference-in-difference (DDD) heterogeneity tests to alleviate concerns of confounding factors.[22] Economy-wide factors, such as slowing economy or increased investor risk-aversion, are expected to have similar impact on bonds issued by SOEs, non-SOEs and financial institutions. On the other hand, if the empirical results are driven by the incremental and differential no-bailout reform, we expect its effects to be strongest on non-SOE bonds, muted on SOE bonds, and non-existent on Financial Bonds. When investors believe that the default threats on Financial Bonds and SOE bonds are not credible or less plausible, they will continue to price the implicit government guarantee.

To conduct the DDD analyses, we collect data on Financial Bonds issued between 2009 and 2019. After applying the same filters, we have a sample of 1,418 bonds issued by Chinese financial institutions and rated at AA- or above. Table 10 reports the average at-issuance *Treasury Spreads* by ratings before and after the first bond default in March 2014 for three types of bonds: Non-SOE bonds, SOE bonds, and Financial Bonds.

First, note that the average *Treasury Spreads* of AAA bonds decrease significantly for all three bond types, consistent with a flight to quality following the break of the bailout practice by the Chinese government. Second, for the AA+, AA and AA- non-SOE bonds, the average *Treasury Spreads* increase significantly after the first bond default, suggesting investors demand higher yields on lower rated bonds to compensate for the heightened default risk. Interestingly, for SOEs, the average *Treasury Spreads* on AA+ and AA bonds decrease significantly instead. Only AA- SOE bonds experience a significant increase in their average *Treasury Spread* during the second half of the sample period. In sharp contrast to non-SOE bonds, the average *Treasury Spreads* of Financial Bonds decrease in all

[22] The DDD methodology is increasingly used in finance and economics literature (see, for example, Seru, 2014 and Morse, 2011). Imbens and Wooldridge (2007) and Olden and Moen (2020) provide excellent discussions on the methodology and technical details.

rating categories and the decrease is statistically significant for AA- bonds. This suggests that investors do not perceive or price increased default risk on Financial Bonds after March 2014, even the lowest rated ones.

The first DDD model examines the differential impact of the no-bailout reform on the *Treasury Spreads* of non-SOE and SOE bonds, as in the following regression:

$$\begin{aligned} Treasury\ Spread_i = \alpha + \sum_j \gamma_j * R_{j,i} + \beta_1 * POST_i + \beta_2 * NonSOE_i + \beta_3 * POST_i * NonSOE_i + \\ \sum_j \delta_j * R_{j,i} * POST_i * NonSOE_i + \sum_j \eta_j * R_{j,i} * POST_i * SOE_i + controls + \varepsilon_i \end{aligned} \quad (3)$$

SOE is a dummy variable, equal to 1 for bonds issued by local and central government SOEs, and 0 otherwise. Given the continued governmental support for SOEs, we expect the impact of the no-bailout reform is more salient on non-SOE bonds than SOE bonds, or $\delta_j > \eta_j$, that is, the increases in rating-based yield spreads are larger for non-SOE bonds after the reform measure.[23]

The second DDD model, as shown in the equation below, investigates potential heterogenous responses of Financial Bonds and non-financial bonds to the reform measure.

$$\begin{aligned} Treasury\ Spread_i = \alpha + \sum_j \gamma_j * R_{j,i} + \beta_1 * POST_i + \beta_2 * NonSOE_i + \beta_3 * NonFIN_i + \\ \beta_4 * POST_i * NonFIN_i + \beta_5 * POST_i * NonSOE_i * NonFIN_i + \\ \beta_6 * POST_i * NonSOE_i * FIN_i + \sum_j \delta_j * R_{j,i} * POST_i * NonFIN_i + \\ \sum_j \eta_j * R_{j,i} * POST_i * FIN_i + controls + \varepsilon_i \end{aligned} \quad (4)$$

NonFIN is a dummy variable, equal to 1 for non-financial bonds (Corporate Bonds, Enterprise Bonds, and MTN) and 0 for Financial Bonds. *FIN* is a dummy variable, equal to 1 for Financial Bonds and 0 otherwise.

Since the no-bailout reform does not seem to apply to Financial Bonds, we expect that the rating-based yield spreads of Financial Bonds do not increase, or η_j is not significantly positive. On the other hand, we expect δ_j to be significantly positive. In addition, we

[23] We use a DDD setup similar to that of Seru (2014). It is slightly different from the setup in Imbens and Wooldridge (2007). The different models are mathematically equivalent but have different interpretations of the interaction term coefficients.

expect $\beta_5 > \beta_6$, that is, the reform measure has a bigger impact on Treasury spreads of non-SOE corporate bonds than the non-SOE Financial Bonds.

Table 11 reports the empirical results of the non-SOE vs. SOE bonds DDD analysis in the first two columns and the Financial vs. non-financial bonds DDD analysis in the last two columns. In the non-SOE vs. SOE bonds model, the coefficients on *AA*POST*NonSOE* and *AA+*POST*NonSOE* are two or three times as large as those on *AA*POST*SOE* and *AA+*POST*SOE*. The coefficient on *AA-*POST*NonSOE* is also larger than the coefficient on *AA-*POST*SOE.* These results indicate that the reform measure has a much larger impact on the rating-based yield spreads of non-SOE bonds than those of SOE bonds.[24]

In the Financial versus non-financial bonds DDD model, the coefficients on the interaction terms, rating dummies**POST***NonFIN*, are all significantly positive, consistent with the findings in Table 9 that rating-based yield spreads increased significantly after the reform measure. Indeed, the magnitude of the coefficients are similar to those of the rating dummies**POST* in Table 9. On the other hand, the coefficients on rating dummies**POST***FIN* are all significantly negative, indicating that rating-based yield spreads of Financial Bonds decreased after March 4, 2014. Further, the coefficient on *POST*NonSOE*NonFIN* is significantly positive while the coefficient on *POST*NonSOE*FIN* is significantly negative. The finding suggests that the widening funding advantage of SOEs over non-SOEs after the no-bailout reform is limited to non-financial corporate bonds.

Overall, the empirical findings are consistent with the fact that the incremental no-bailout reform mainly increases the default risk of non-SOE bonds but has minimal or no impact on the default risk of SOE bonds and Financial Bonds. Consequently, investors

[24] We have performed a placebo SOE versus non-SOE bonds DDD test on Financial Bonds. Interestingly, none of the coefficients on *rating dummy*POST*SOE* and *rating dummy*POST*nonSOE* is statistically significant. The results are available upon request.

react rationally to the policy shift by demanding significantly higher yields on lower-rated non-SOE bonds while largely ignoring it for the Financial Bonds. The DDD analyses provide further evidence that the first default event on March 4, 2014 is not a one-off and thorough policy change. Rather, it represents one step forward in a gradual reform program to make the Chinese bond market a true credit market and slowly expose investors to default risk. Finally, the evidence also suggests that the main empirical results are driven by the Chinese government's incremental no-bailout policy change rather than some other contemporaneous economy-wide confounding factors.

D. Robustness Checks

We test Hypotheses 2a and 2b of the impact of the no-bailout reform on bond default risk premium by examining the rating-based yield spreads. As discussed earlier and shown in Appendix A, rating-based yield spreads are not perfect measure of default risk and, more importantly, changing rating standards could complicate the interpretation of empirical results based on rating-based yield spreads. To address this concern and remove the effect of rating standard changes on rating-based yield spreads, we perform two robustness checks with samples not influenced by rating standard changes.

First, we use a much narrower sample period around the first default event from 2013 to 2015. As shown in Section V, there was no significant change in rating standards prior to 2016. As a result, the empirical results from this narrower sample period are less likely to be complicated by potential rating standard changes. The first two columns of Table 12 report the *Treasury Spread* regression results from the narrower sample period. The coefficients on the interaction terms with the *POST* dummy variable are similar in both significance and magnitude to those of the whole sample except for *LocalSOE*POST*.[25]

[25] The insignificant coefficient on *Local SOE*POST* is consistent with the fact that first SOE bond default did not occur until April 2015, very late in this narrower sample period.

Thus, the empirical results are robust to potential rating standard changes and other confounding factors outside this narrower sample period.

In our second robustness test, we examine a sample of 1,366 outstanding corporate bonds and investigate their yield changes from 60 days prior to the first default event in March 2014 to 60 days after the event.[26] It is highly unlikely that CRAs significantly changed their rating standards 60 days after the first default event.

For each bond, we calculate the daily average *Treasury Spreads* 60 days prior to and 60 days after the event date and the change in daily average *Treasury Spreads* between the two periods. The first (second) column of Table 13 reports the mean daily *Treasury Spreads* of the sample 60 days prior to (after) March 4, 2014, and the third column gives the changes in mean daily *Treasury Spread*. Panel A reports the statistics for the whole sample by outstanding ratings at the event date. The average mean daily *Treasury Spreads* prior to March 4, 2014 is 2.57%. It increases to 2.70% afterwards. The 13-basis-point increase is statistically significant at the 1% level. The increase is about 10 basis points for bonds rated AAA to AA, but dramatically higher at 42 basis points for the lowest rated bonds, resulting in larger spreads between AA- and higher rated bonds.

Panel B (C) reports the statistics for the non-SOE (SOE) bonds. The average increase in mean daily *Treasury Spreads* for non-SOE bonds is 23 basis points, significantly higher than the 8-basis-point increase for SOE bonds. In addition, the increases in mean daily *Treasury Spreads* for non-SOE bonds are monotonically higher as rating decreases, leading to widening spreads between all lower rated bonds (AA+, AA, and AA-) and AAA bonds. On the other hand, for SOE bonds, only the spread between AA- and AAA bonds increases. Finally, panel D reports the differences in the average mean daily *Treasury*

[26] We apply the same data filter as the main sample of newly issued bonds. In addition, we exclude 4 bond issues whose ratings have been upgraded or downgraded during the 120-day window. We choose the 120-day window to accommodate infrequent bond trading.

Spreads between SOE and non-SOE bonds. The yield premium of non-SOE bonds over SOE bonds increases from 1.20% before March 2014 to 1.35% afterwards, indicating a larger funding advantage for SOE bonds after the first default event. The effect is mostly concentrated in AA+ and AA rating categories, at which 86% of non-SOE bonds are rated.[27]

Overall, the empirical results from this robustness test are largely consistent with the main findings; rating-based yield spreads widened after the no-bailout reform and the impact of the reform on non-SOE bonds was more pronounced. This event-study-like approach has another advantage in that each bond serves as its own control, effectively accounting for all other risk factors and bond features. Thus, the empirical results also alleviate another concern that our main results from the long sample period are driven by potential changes in issuer characteristics over the 11-year period.[28]

The Chinese corporate bond market consists of three types of bonds with different regulatory rules and unique features. To test if the main empirical findings are limited to certain types of bonds, we estimate the regression model for MTNs, Corporate Bonds, and Enterprise Bonds separately and report the results in Table 12. The coefficients on the interaction terms between *POST* and the rating dummies are all positive for the three types of bonds and only two of them are insignificant, probably due to the small numbers of Corporate and Enterprise Bonds. Thus, the main empirical findings are not solely driven by certain types of corporate bonds.

[27] Interestingly Jin et al. (2018) find abnormal returns of Chinese bonds, both SOE and non-SOE bonds, are not statistically significant in response to the Chaori default in March 2014. Different methodologies might explain the conflicting empirical findings. To calculate abnormal returns, Jin et al. (2018) rely on some bond pricing model, while our approach is model-free. Second, the sample of Jin et al. (2018) is limited to exchange-traded bonds, effectively excluding MTNs and resulting in a smaller sample size.

[28] We have also limited the new bond sample to 2,490 bonds issued by firms who accessed the Chinese corporate bond market both before and after the first default and rerun the regression model in Table 9. The empirical results are similar to the full sample, further alleviating the concern of changing nature of bond issuers after the reform measure. For brevity, we do not report the results, but they are available upon request.

As discussed earlier, the no-bailout reform was implemented in two steps. First, a non-SOE bond default occurred in March 2014. More than a year later, Baoding Tianwei became the first SOE to default on its bond in April 2015. This gradual implementation might have resulted in a perception before April 2015 that only non-SOE bonds had lost implicit government guarantees. Indeed, Jin et al. (2018) find that SOE bond prices react negatively to the Baoding Tianwei default in April 2015, suggesting investors continued pricing implicit government guarantees on SOE bonds before April 2015. As a result, there is a concern that the widening yield spreads between SOE and non-SOE bonds are the result of the two-step implementation of the no-bailout reform. To address this issue, we exclude 460 bonds issued between March 4, 2014 and April 21, 2015 and rerun the regression model. The empirical results are essentially the same as those based on the whole sample.[29] Thus, the main empirical findings are robust to the two-stage implementation of the no-bailout reform.

As there are many different CRAs, it is plausible that bond investors distinguish bond ratings from different CRAs and the empirical results on the bond yields could be complicated by the potential non-comparability of ratings by different CRAs. To address this issue, we run the *Treasury Spread* regression for four largest CRAs separately and the empirical findings are consistent with the main findings.[30]

VII. Conclusion

The Chinese government broke its long-standing practice of bond bailout by allowing the first corporate bond default in March 2014. In the following years, the number and par value of bond defaults increased substantially. We investigate Chinese domestic bond defaults from 2014 to 2019 and examine the impact of the incremental no-bailout reform on

[29] For brevity, we do not report the results, which are available upon request.
[30] The four smaller CRAs rated fewer than 250 bonds each, as shown in Table 5, making reliable statistical inference difficult. For brevity, we do not report the results, which are available upon request.

Chinese bond yields and rating standards. In response to the policy change and increased default risk, investors demanded higher yields on lower-rated bonds after March 2014. The yield spreads between AA (AA-) and AAA bonds widened from 1.23% (2.15%) to 1.67% (3.00%). These findings suggest the reform measure is successful in moving the Chinese public bond market closer to a true credit market where credit risk is priced, and capital is allocated more efficiently. However, the reform is incremental and far from complete. We document that the default rates are much lower for SOE bonds than non-SOE bonds, possibly due to continued government support of the state sector. Consistent with the large difference in default rates between the public and private sectors, we find that the market response to policy change is much more muted for SOE bonds, and consequently, the funding advantage of SOEs, particularly SOEs of the Chinese central government, over non-SOEs widened significantly after March 2014.

Instead of tightening rating standards to reflect the removal or weakening of implicit government guarantees, Chinese CRAs loosened rating standards and assigned AAA ratings to a much higher proportion of bonds issued after March 2014. Holding rating constant, bond issuers are more leveraged, less profitable, have lower ability to service their debts and higher systematic risk after March 2014. These findings suggest that Chinese CRAs caved into demands from issuers to hand out higher ratings to lower their borrowing costs after the sharp increase in yield spreads between AAA and lower-rated bonds. In the long run, persistent rating inflation is not sustainable and will make the bond ratings completely uninformative and irrelevant to investors. Reforms of the Chinese credit rating industry and its regulations are urgently needed to mitigate rating inflation.

Appendix A

We develop a simple model of the relationships among rating standards, risk premium and rating-based yield spreads in this appendix.

Assumptions.

1) There are two types of bonds, *L* and *H*. *L* has low risk and *H* has high risk.
2) A CRA assigns two ratings, *A* and *B*. All *B*-rated bonds have high risk (*H*-type). All low-risk bonds (*L*-type) are rated *A*. However, a fraction of *A*-rated bonds, M_H, have high risk (*H*-type). Thus, M_H measures the degree of rating inflation, i.e., fraction of higher-rated bonds that are riskier.
3) Investors distinguish between the two types of bonds and do not rely on ratings for bond pricing. In other words, required bond yield depends on risk rather than bond rating.
4) Let Y_L be the required yield on bond type *L* and Y_H be the required yield on bond type *H*. Define $(Y_H - Y_L)$ as risk premium and $(Y_H - Y_L) \geq 0$.

Model Setup and Implications

Let Y_B be the average yield on *B*-rated bonds and Y_A be the average yield on *A*-rated bonds. Since all *B*-rated bonds are *H*-type, it follows that $Y_B = Y_H$. The average yield on *A*-rated bonds, however, is the weighted average of the required yields on *H*-type and *L*-type bonds as follows:

$$Y_A = (1 - M_H) * Y_L + M_H * Y_H \quad \text{(A1)}$$

The yield spread of *B*-rated bonds over *A*-rated bonds, *S*, is then:

$$S = Y_B - Y_A = Y_H - [(1 - M_H) * Y_L + M_H * Y_H]$$
$$S = (1 - M_H) * (Y_H - Y_L) \quad \text{(A2)}$$

We call *S* rating-based yield spread. Equation (A2) indicates that the rating-based yield spread is determined by two factors: rating inflation and risk premium. Risk premium can be

perfectly measured by rating-based yield spread *only* when there is no rating inflation, or $M_H = 0$. A high degree of rating inflation results in rating-based yield spread lower than risk premium.

Impact of the No-bailout Reform

The removal of government guarantee can affect both the risk premium and rating inflation, or bond rating standard. Let $\hat{Y}_L$ ($\hat{Y}_H$) be the required yield on bond type *L* (*H*) and ($\hat{Y}_H - \hat{Y}_L$) be the risk premium after the policy change. $\hat{Y}_H - \hat{Y}_L \geq 0$. Furthermore, let $\widehat{M}_H$ be the fraction of *A*-rated bonds that are high risk (*H*-type) after the policy change. If rating standard remains unchanged after the no-bailout reform, $\widehat{M}_H = M_H$. If rating standard tightens in response to the policy change and rating inflation decreases, $\widehat{M}_H < M_H$. If rating standard loosens, $\widehat{M}_H > M_H$.

The rating-based yield spread after the policy change, $\hat{S}$, can be expressed in the following equation:

$$\hat{S} = \left(1 - \widehat{M}_H\right) * \left(\hat{Y}_H - \hat{Y}_L\right) \quad \text{(A3)}$$

A comparison of equations (A2) and (A3) indicates that the change in rating-based yield spread ($\hat{S} - S$) in response to the policy change depends on a) potential change in rating standard, and b) potential change in risk premium. If risk premium increases and rating standard remains unchanged or becomes more stringent, then rating-based yield spread increases as well. However, an increasing risk premium does not inevitably lead to widening rating-based yield spread if rating inflation becomes more severe, or $\widehat{M}_H > M_H$. In the meantime, an increasing rating-based yield spread could be driven by tightening rating standard and does not necessarily imply larger risk premium.

Empirical Test Inferences

We are interested in how risk premium reacts to the policy change but can only observe rating-based yield spread and its response to the policy change. Nonetheless, the model shows that we can infer the *direction* of change in risk premium in most cases from the changes in rating-based yield spread and rating standard as shown in Table A1.

Table columns represent rating-based yield spread changes and rows correspond to rating standard changes in response to the no-bailout reform. Each cell in the table indicates the inferred direction of risk premium change: Increase ($\hat{Y}_H - \hat{Y}_L > Y_H - Y_L$), Decrease ($\hat{Y}_H - \hat{Y}_L < Y_H - Y_L$), No Change ($\hat{Y}_H - \hat{Y}_L = Y_H - Y_L$), or Uncertain.

Note that when rating standard does not change, we can unambiguously deduce the direction of risk premium change from the change in rating-based yield spread. A combination of loosening rating standard and an increase or no change in rating-based yield spread must imply an increasing risk premium. The opposite is true for the combination of tightening rating standard and a decrease or no change in rating-based yield spread.

However, the direction of risk premium change cannot be determined under two cases: 1) a combination of increasing rating-based yield spread and tightening rating standard, 2) a combination of decreasing rating-based yield spread and loosening rating standards. In the first case, an increase in rating-based yield spread could be driven by tightening rating standard in the absence of any increase in risk premium. In the second case, the decreasing rating-based yield spread might be a result of loosening rating standard and does not automatically imply a decrease in risk premium.

Table A1. Inferred Directions of Risk Premium Change

This table lists the directions of risk premium changes, inferred from the rating-based yield spread and rating standard changes. Columns represent directions of rating-based yield spread change and rows correspond to rating standard changes in response to the no-bailout reform. Each cell indicates the direction of risk premium change: Increase ($\hat{Y}_H - \hat{Y}_L > Y_H - Y_L$), Decrease ($\hat{Y}_H - \hat{Y}_L < Y_H - Y_L$), No Change ($\hat{Y}_H - \hat{Y}_L = Y_H - Y_L$), or Uncertain.

	Rating-based Yield Spread		
	Increases ($\hat{S} > S$)	*No Change* ($\hat{S} = S$)	*Decreases* ($\hat{S} < S$)
Rating Standard Unchanged ($\widehat{\boldsymbol{M}}_{\boldsymbol{H}} = \boldsymbol{M}_{\boldsymbol{H}}$)	Increase	No Change	Decrease
Rating Standard Tightens ($\widehat{\boldsymbol{M}}_{\boldsymbol{H}} < \boldsymbol{M}_{\boldsymbol{H}}$)	Uncertain	Decrease	Decrease
Rating Standard Loosens ($\widehat{\boldsymbol{M}}_{\boldsymbol{H}} > \boldsymbol{M}_{\boldsymbol{H}}$)	Increase	Increase	Uncertain

Appendix B

Variable Name	Definition
Issue Amount	Gross amount of bond issue in billions of RMB
Maturity	Years to bond maturity
Coupon Rate	Coupon rate in percentage of bonds with fixed coupons
Treasury Spreads	Difference (in %) between the bond at-issuance yield and Chinese Treasury yield of similar maturity
Callable	=1 for callable bonds and 0 otherwise
Putable	=1 for putable bonds and 0 otherwise
Senior	=1 for senior bonds and 0 otherwise
Sinking Fund	=1 for bonds with sinking fund provision and 0 otherwise
Enterprise	=1 if WIND classifies as Enterprise Bond issues and 0 otherwise
MTN	=1 if WIND classifies as Medium-term Notes and 0 otherwise
Corporate	=1 if WIND classifies as Corporate Bond issues and 0 otherwise
Exchange	=1 if the bond is traded in Shanghai or Shenzhen Stock Exchange and 0 otherwise
Interbank	=1 if the bond is traded in the interbank market and 0 otherwise
Rating	An ordinal variable from 1 for AAA rating to 4 for AA- rating
GP_CRA	=1 for the three CRAs with global partnership (Lianhe_Fitch, Chengxin_Moody and Brilliance)
Central SOE	=1 if WIND classifies the issuer as a state-owned enterprise (SOE) by Chinese central government
LocalSOE	=1 if WIND classifies the issuer as a SOE by a Chinese local government and 0 otherwise
NonSOE	=1 if WIND classifies the issuer as an entity other than SOE and 0 otherwise
Log Issuer Age	Natural log of the age (in years) of the issuer at the time of bond issuance
Listed	=1 if the issuer has public traded equity and 0 otherwise
POST	=1 for bonds issued after March 4, 2014 and 0 otherwise
Equity Beta	Market model equity beta estimated with daily stock returns from two years prior to the bond issuance
Market Model Error	Market model residual standard error estimated with daily stock returns two years prior to the bond issuance
Log of Coverage Ratio	Natural log of the three-year average interest coverage ratio prior to the bond issuance
Log of Market Cap	Natural log of the market capitalization (in billion RMB) at the calendar year-end prior to the bond issuance
Long-term Debt Ratio	Three-year average total long-term debt to total asset ratio prior to the bond issuance
Total Debt Ratio	Three-year average total debt to total asset ratio prior to bond issuance
Market to Book Ratio	Market to book ratio at the end of calendar year prior to bond issuance
Operating Profit Margin	Three-year average operating profit margin (EBIT/Revenue) prior to bond issuance
Return on Equity	Three-year average return on equity (net income/total equity) prior to bond issuance

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Table 1. Number and Par Value of Bond Defaults

This table reports the statistics of the number and par value of defaulted Chinese corporate bonds (in billions of RMB) from 2014 to 2019. The last column reports the annual number of bond defaults. We exclude 16 defaults due to missing information on bond par value: 2 in 2014 and 14 in 2016.

Year	Mean	Median	Std.	Min.	P10	P90	Max.	Number
2014	0.040	0.033	0.031	0.015	0.015	0.080	0.080	4
2015	0.483	0.250	0.552	0.010	0.080	1.500	2.000	29
2016	0.624	0.500	0.567	0.005	0.020	1.000	3.000	62
2017	0.762	0.700	0.467	0.005	0.150	1.500	1.800	36
2018	0.984	0.800	0.783	0.100	0.300	2.000	6.000	129
2019	0.866	0.700	0.675	0.100	0.300	1.600	5.000	151
Total	0.822	0.690	0.689	0.005	0.200	1.600	6.000	411

Table 2. Bond Default Distributions

This table reports the distributions of the Chinese corporate bond defaults from 2014-2019, in the number and total par value of defaults by A) issuer ownership type, B) bond type, C) at-issuance rating, D) trading venue, and E) issuer equity listing status. The last column reports the average par value of defaulted bonds in each category. The number in parentheses is the number (par value) of defaults in each category as a percentage of the total number (par value) of defaults.

	Number of Defaults	Total Par Value of Defaults (Billions of RMB)	Mean Par Value of Default (Billions of RMB)
Panel A. By Issuer Ownership Type			
Central SOE	20 (4.87%)	20.150 (5.96%)	1.007
Local SOE	41 (9.98%)	36.455 (10.79%)	0.889
Non-SOE	345 (83.94%)	280.689 (83.08%)	0.813
Unknown	5 (1.22%)	0.564 (0.17%)	0.113
Panel B. By Bond Type			
Private Placement	140 (34.06%)	90.345 (26.74%)	0.645
Commercial Paper	67 (16.30%)	56.670 (16.77%)	0.846
Corporate Bond	88 (21.41%)	85.230 (25.23%)	0.969
Enterprise Bond	20 (4.87%)	16.180 (4.79%)	0.809
MTN	70 (17.03%)	79.720 (23.60%)	1.139
Unknown/Others	26 (6.33%)	9.713 (2.88%)	0.374
Panel C. By At-issuance Rating			
AAA	11 (2.68%)	20.635 (6.11%)	1.876
AA+	51 (12.41%)	65.890 (19.50%)	1.292
AA	167 (40.63%)	124.443 (36.83%)	0.745
AA-	8 (1.95%)	4.991 (1.48%)	0.624
A-1	34 (8.27%)	22.860 (6.77%)	0.672
Unrated	140 (34.06%)	99.039 (29.31%)	0.707
Panel D. By Trading Venue			
Exchange	221(53.77%)	156.278 (46.29%)	0.707
Interbank	190 (46.23%)	181.580 (53.74%)	0.956
Panel E. By Issuer Type			
Listed	87 (21.17%)	73.451 (21.74%)	0.816
Non-listed	324 (78.83%)	264.407 (78.26%)	0.844
Total	411 (100%)	337.858 (100%)	0.822

Table 3. Descriptive Statistics

This table reports the sample descriptive statistics. The sample includes 4,711 publicly issued, fixed coupon Chinese Corporate Bonds, Enterprise Bonds and Medium-term Notes (MTNs) issued between 2009 and 2019. The following issues are excluded from the sample: unrated bonds, semi-municipal bonds, commercial papers, Financial Bonds, convertible bonds, and bonds with third-party guarantees. Rating =1 for AAA, 2 for AA+, 3 for AA and 4 for AA-. Treasury Spread is the offering yield minus the yield on Chinese Treasury of similar maturities. Panel A reports the variable statistics of the whole sample. Panel B breaks the sample into two subsamples: Prior-default (2009 to March 4, 2014) and Post-default (March 5, 2014 to 2019) and reports the variable means for the two subsamples.

Panel A. Variable Statistics

	Coupon Rate (in %)	Treasury Spread (in %)	Rating	Maturity (in years)	Issue Amount (in million RMB)	Firm Age (in years)
Mean	5.10	1.96	1.79	4.18	1,743.08	17.73
Median	4.98	1.72	1.00	3.00	1,000.00	17.00
Std. Deviation	1.21	1.02	0.91	1.88	2,403.12	8.84
Minimum	2.25	0.14	1.00	2.00	30.00	0.00
Maximum	9.50	6.36	4.00	20.00	30,000.00	132.00
No. of Obs.	4,711	4,711	4,711	4,711	4,711	4,711

Panel B. Subsample Variable Means

	Coupon Rate (in %)	Treasury Spread (in %)	Rating	Maturity (in years)	Issue Amount (in million RMB)	Firm Age (in years)	No. of Obs.
Prior-default	5.44	2.26	2.11	4.55	2,194.05	15.04	1,348
Post-default	4.96 ***	1.84 ***	1.67***	4.03***	1,562.31***	18.81***	3,363

***,**,* indicate that the variable means are significantly different between the two subsamples at the 1%, 5% and 10% levels, respectively.

Table 4. Sample Distributions

This table reports the numbers and percentages of bond issues in the sample by A) at-issuance rating, B) issuer ownership, C) bond type, D) trading venue, E) issuer type, and F) issuing year. The first column reports the statistics for the whole sample and the second (third) column reports the statistics for the Prior-default (Post-default) subsamples.

	Whole Sample (% of Total)	Prior-default (% of Total)	Post-default (% of Total)
Panel A: By At-issuance Rating			
AAA	2,388 (50.69%)	506 (37.54%)	1,882 (55.96%)
AA+	1,060 (22.50%)	292 (21.66%)	768 (22.84%)
AA	1,117 (23.71%)	447 (33.16%)	670 (19.92%)
AA-	146 (3.10%)	103 (7.64%)	43 (1.28%)
Panel B: By Issuer Ownership			
Central SOE	1,556 (33.03%)	448 (33.23%)	1,108 (32.95%)
Local SOE	2,096 (44.49%)	620 (45.99%)	1,476 (43.89%)
Non-SOE	1,059 (22.48%)	280 (20.77%)	779 (23.16%)
Panel C: By Bond Type			
Corporate	735 (15.60%)	42 (3.12%)	693 (20.61%)
Enterprise	264 (5.60%)	112 (8.31%)	152 (4.52%)
MTN	3,712 (78.79%)	1,194 (88.58%)	2,518 (74.87%)
Panel D: By Trading Venue			
Interbank	3,861 (81.96%)	1,262 (93.62%)	2,599 (77.28%)
Exchange	850 (18.04%)	86 (6.38%)	764 (22.72%)
Panel E: By Issuer Type			
Listed	1,146 (24.33%)	285 (21.14%)	861 (25.60%)
Non-Listed	3,565 (75.67%)	1,063 (78.86%)	2,502 (74.40%)
Panel F: By Year			
2009	153 (3.25%)		
2010	112 (2.38%)		
2011	269 (5.71%)		
2012	404 (8.58%)		
2013	374 (7.94%)		
2014	405 (8.60%)		
2015	513 (10.89%)		
2016	570 (12.10%)		
2017	388 (8.24%)		
2018	667 (14.16%)		
2019	856 (18.17%)		
Total	4,711 (100%)	1,348 (100%)	3,363 (100%)

Table 5. At-issuance Bond Ratings by CRAs

This Table reports the mean and standard deviation of at-issue bond ratings by CRAs. Rating =1 for AAA, 2 for AA+, 3 for AA and 4 for AA-. Panel A (Panel B) reports the statistics for the five domestic CRAs (three global-partnered CRAs). We adopt the CRAs' English names in Livingston et al. (2018). The last two columns report the mean at-issuance bond ratings before and after the first default event on March 4, 2014 by CRAs.

	Number of Ratings	Mean Ratings	Rating Std. Deviation	Prior-default Mean Ratings	Post-default Mean Ratings
Panel A: Domestic CRAs					
Chengxin	41	1.927	0.848	2.071	1.852
Dagong	730	1.891	0.942	1.934	1.865
Jincheng	124	1.839	0.820	3.000	1.820**
Lianhe	228	1.443	0.734	2.111	1.415**
Pengyuan	61	2.819	0.500	2.783	2.842
Total	1,184	1.850	0.916	2.009	1.787***
Panel B: Global-Partnered CRAs					
Brilliance	624	2.220	0.916	2.585	2.056***
Chengxin_Moody	1,797	1.589	0.842	2.009	1.453***
Lianhe_Fitch	1,106	1.821	0.905	2.070	1.689***
Total	3,527	1.773	0.905	2.142	1.624***

***,**,* indicates that the variable means of the two subsamples are significantly different from each other at the 1%, 5% and 10% levels respectively.

Table 6. Issuer Characteristics Before and After the No-bailout Reform

This table reports average accounting and market-based ratios of bond issuers before and after March 4, 2014. The ratios are defined in Appendix B.

	All Bonds		**AAA**		**AA+**		**AA**		**AA-**	
	Prior-default	*Post-Default*	*Prior-default*	*Post-Default*	*Prior-Default*	*Post-Default*	*Prior-Default*	*Post-Default*	*Prior-Default*	*Post-Default*
Bond Ratings	2.530	1.974***								
	(0.870)	(0.869)								
Log of Coverage Ratio	2.063	1.896***	2.433	1.883***	2.206	1.964**	1.975	1.864	1.526	1.609
	(0.794)	(0.760)	(0.926)	(0.721)	(0.751)	(0.794)	(0.745)	(0.777)	(0.524)	(0.554)
Log of Market Cap	2.350	3.047***	3.600	3.811	2.599	2.898***	1.975	2.342***	1.577	1.841
	(0.922)	(0.977)	(0.967)	(0.874)	(0.586)	(0.653)	(0.653)	(0.648)	(0.456)	(0.488)
Market to Book Ratio	2.247	1.831***	1.341	1.208	2.134	1.770*	2.538	2.576	2.522	2.744
	(1.419)	(1.203)	(0.632)	(0.686)	(1.410)	(1.121)	(1.486)	(1.327)	(1.433)	(0.870)
Total Debt Ratio	0.542	0.621***	0.542	0.649***	0.519	0.614***	0.549	0.595***	0.577	0.603
	(0.138)	(0.141)	(0.179)	(0.125)	(0.137)	(0.155)	(0.128)	(0.143)	(0.111)	(0.098)
Long Term Debt Ratio	0.135	0.178***	0.163	0.214***	0.154	0.176	0.116	0.139**	0.147	0.160
	(0.102)	(0.108)	(0.098)	(0.109)	(0.105)	(0.106)	(0.095)	(0.094)	(0.116)	(0.089)
Operating Profit Margin	0.176	0.168	0.199	0.177	0.214	0.176	0.153	0.149	0.164	0.200
	(0.151)	(0.132)	(0.161)	(0.153)	(0.177)	(0.131)	(0.127)	(0.103)	(0.160)	(0.117)
Return on Equity	0.111	0.092***	0.123	0.096***	0.120	0.093***	0.109	0.087***	0.0782	0.088
	(0.051)	(0.045)	(0.051)	(0.045)	(0.051)	(0.042)	(0.051)	(0.048)	(0.047)	(0.070)
Equity Beta	1.108	1.183***	1.007	1.161***	1.105	1.220***	1.132	1.175*	1.153	1.234
	(0.195)	(0.235)	(0.196)	(0.228)	(0.180)	(0.222)	(0.203)	(0.249)	(0.133)	(0.245)
Market Model Error	0.024	0.021***	0.018	0.019	0.025	0.022***	0.026	0.024***	0.025	0.025
	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.003)
No. of Obs.	234	807	37	303	58	234	117	258	22	12

***,**,* indicate that the variable means of the two subsamples are significantly different from each other at the 1%, 5% and 10% levels, respectively.

Table 7. Ordered Probit Models of Bond Ratings

This table reports the results of ordered probit models of bond ratings. The dependent variable is an ordinal variable, Bond Rating, from 1 (for AAA) to 4 (for AA-). The explanatory variables are defined in Appendix B. The first two columns report the results of the base model. Model 2 includes the test variable, POST, equal to 1 for bonds issued after March 4, 2014 and 0 otherwise. Model 3 replaces the POST variable with a series of year dummies with 2009 as the base case. Model 4 includes an interaction term between POST and GP_CRA.

	Model 1		**Model 2**		**Model 3**		**Model 4**	
	Estimate	*P-value*	*Estimate*	*P-value*	*Estimate*	*P-value*	*Estimate*	*P-value*
POST			-0.209	0.078			0.567	0.001
Log of Coverage	0.039	0.637	0.035	0.679	0.023	0.791	0.016	0.849
Total Debt Ratio	1.890	<0.001	1.952	<0.001	1.912	<0.001	1.907	<0.001
Long Term Debt Ratio	-0.576	0.316	-0.628	0.275	-0.836	0.152	-0.691	0.235
Operating Profit Margin	0.542	0.258	0.562	0.242	0.548	0.263	0.595	0.223
Return on Equity	-4.092	0.002	-4.540	0.001	-4.671	0.001	-4.802	<0.001
Log of Market Cap	-1.915	<0.001	-1.881	<0.001	-1.888	<0.001	-1.995	<0.001
Market to Book Ratio	0.757	<0.001	0.762	<0.001	0.685	<0.001	0.810	<0.001
Equity Beta	0.383	0.078	0.460	0.038	0.561	0.024	0.454	0.044
Market Model Error	32.442	<0.001	29.779	<0.001	48.514	<0.001	29.239	<0.001
LocalSOE	0.177	0.211	0.180	0.203	0.181	0.214	0.234	0.101
NonSOE	1.152	<0.001	1.852	<0.001	1.245	<0.001	1.286	<0.001
GP_CRA	0.313	<0.001	0.309	<0.001	0.310	<0.001	1.394	<0.001
POST*GP_CRA							-1.405	<0.001
2010					-0.111	0.818		
2011					-0.499	0.237		
2012					-0.607	0.140		
2013					-0.408	0.348		
2014					-0.301	0.486		

	Model 1		Model 2		Model 3		Model 4	
	Estimate	*P-value*	*Estimate*	*P-value*	*Estimate*	*P-value*	*Estimate*	*P-value*
2015					-0.095	0.821		
2016					-0.434	0.299		
2017					-0.915	0.026		
2018					-1.053	0.009		
2019					-1.196	0.005		
Intercepts	Yes		Yes		Yes		Yes	
Industry Dummies	Yes		Yes		Yes		Yes	
Pseudo R-squared	0.78		0.78		0.80		0.78	
No. of Obs.	1,041		1,041		1,041		1,041	

Table 8. Mean Treasury Spread

This table reports the mean Treasury spread by at-issuance ratings and issuer ownership types for the whole sample and two subsamples: Prior-default and Post-default. Prior-default (Post-default) subsample includes bond issued before (after) the first bond default on March 4, 2014.

	Whole Sample	Prior-default	Post-default	Difference
Panel A. By At-issuance Ratings				
AAA	1.32%	1.56%	1.25%	-0.31%***
AA+	2.19%	2.15%	2.21%	0.06%
AA	2.87%	2.79%	2.92%	0.13%***
AA-	3.87%	3.71%	4.25%	0.54%***
Panel B. By Issuer Ownership				
Central SOE	1.34%	1.70%	1.20%	-0.50%***
Local SOE	1.98%	2.33%	1.83%	-0.50%***
Non-SOE	2.84%	3.01%	2.79%	-0.22%***

***,**,* indicate that the difference in the variable means between the Prior-default and the Post-default subsamples is significantly different from 0 at the 1%, 5% and 10% levels, respectively.

Table 9. Treasury Spread Regressions

This table reports the Treasury Spread regression results. The dependent variable is the bond offering yield spread (in percentage) over Chinese Treasury of similar maturity. The explanatory variables include the following. 1) Categorical rating variables with AAA as the base case. 2) Bond feature variables (Bond Maturity, Issue Amount, Callable Dummy, Putable Dummy, and Sinking Fund Dummy). 3) Types of bond dummy variables (Corporate, Enterprise, and MTN) with Enterprise bonds as the base case. 4) Issuer ownership dummies (Central SOE, Local SOE and Non-SOE) with Central SOE bonds as the base case. 5) Issuer characteristics variables (Listed and Log Issuer Age). 6) Trading venue variable (Interbank and Exchange) with exchange-listed bonds as the base case. 7) Type of CRAs. GP_CRA equals to 1 for three of the global-partnered CRAs and 0 otherwise. Also included are year dummies and industry dummies. Model 1 is the base model. Model 2 includes a POST dummy variable, equal to 1 for bonds issued after the first bond default on March 4, 2014 and 0 otherwise, and its interaction terms with several explanatory variables. Model 3 excludes bonds with sinking fund provisions, callable and putable options. The p-values are based on cluster-robust standard errors.

	Model 1		***Model 2***		***Model 3***	
Parameter	*Estimate*	*P-Value*	*Estimate*	*P-Value*	*Estimate*	*P-Value*
Intercept	1.431	<.0001	1.559	<.0001	1.512	<.0001
POST			-0.817	<.0001	-0.872	<.0001
AA+	0.656	<.0001	0.420	<.0001	0.431	<.0001
AA+*POST			0.286	<.0001	0.273	<.0001
AA	1.228	<.0001	0.981	<.0001	0.962	<.0001
AA*POST			0.371	<.0001	0.378	<.0001
AA-	2.162	<.0001	1.894	<.0001	1.893	<.0001
AA-*POST			0.757	<.0001	0.750	<.0001
LocalSOE	0.133	<.0001	0.048	0.2520	0.047	0.1745
LocalSOE*POST			0.111	0.0198	0.116	0.0183
NonSOE	0.732	<.0001	0.347	<.0001	0.384	<.0001
NonSOE*POST			0.504	<.0001	0.508	<.0001
GP_CRA	-0.183	<.0001	-0.162	<.0001	-0.159	<.0001
Maturity	0.023	<.0001	0.025	<.0001	0.025	<.0001
Issue Amount	-0.019	<.0001	-0.026	<.0001	-0.026	<.0001
Corporate	-0.080	0.2601	-0.018	0.7915	0.011	0.8800
MTN	0.065	0.2923	0.108	0.0727	0.111	0.0991
Sinking Fund	0.716	<.0001	0.724	<.0001		
Callable Bond	0.251	0.1577	0.301	0.0816		
Putable Bond	-0.243	0.1433	-0.247	0.1269		
Listed	-0.114	<.0001	-0.120	<.0001	-0.124	<.0001
Interbank	-0.007	0.9287	-0.018	0.8068	0.008	0.7335
Log Issuer Age	-0.043	0.1099	-0.048	0.0699	-0.040	0.1282
Industry Dummies	Yes		Yes		Yes	
Year Dummies	Yes		Yes		Yes	
Adj. R-squared	0.66		0.68		0.67	
OBS	4,711		4,711		4,581	

Table 10. Mean Treasury Spread by Issuer Ownership and Bond Types

This table reports the mean Treasury Spread by at-issuance ratings for three types of issuers/bonds before and after the first bond default on March 4, 2014. Panel A(B) reports the statistics for bonds issued by non-SOEs (SOEs). Panel C reports the statistics for Financial Bonds issued by Chinese financial institutions. Prior-default (Post-default) subsample includes bond issued before (after) the first bond default on March 4, 2014. The number in the parentheses is the number of bonds in each rating category.

	AAA	AA+	AA	AA-
Panel A. Non-SOE Bonds				
Prior-default	2.40% (5)	2.28% (35)	2.89% (186)	3.95% (54)
Post-default	1.58% (159)	2.78% (274)	3.26% (323)	4.50% (23)
Difference	-0.82% **	0.50% ***	0.37% ***	0.55% ***
Panel B. SOE Bonds				
Prior-default	1.55% (501)	2.14% (257)	2.72% (261)	3.45% (49)
Post-default	1.22% (1,723)	1.89% (494)	2.61% (347)	3.96% (20)
Difference	-0.33% ***	-0.25% ***	-0.11% *	0.51% **
Panel C. Financial Bonds				
Prior-default	1.38% (57)	1.60% (21)	1.91% (13)	2.20% (22)
Post-default	1.14% (620)	1.52% (330)	1.82% (216)	1.87% (139)
Difference	-0.24% ***	-0.08%	-0.09%	-0.33% ***

***,**,* indicate that the difference in mean Treasury Spread between the Prior-default and the Post-default subsamples is significantly different from 0 at the 1%, 5% and 10% levels, respectively.

Table 11. Difference-in-Difference-in-Difference (DDD) Analyses

This Table reports the empirical results of two difference-in-difference-in-difference (DDD) analyses. The first DDD model, as in equation (3), examines the differential impact of the no-bailout reform on the Treasury Spreads of non-SOE and SOE bonds. The results of the first DDD model are reported in the first two columns. The second DDD model, as in equation (4), investigates potential heterogenous responses of Financial Bonds and non-financial bonds to the no-bailout reform measure. The results are reported in the last two columns. *SOE* is a dummy variable, equal to 1 for local government SOE and central government SOE bonds, and 0 otherwise. *FIN* is a dummy variable, equal to 1 for Financial Bonds, and 0 otherwise. *NonFIN* is a dummy variable, equal to 1 for MTN, Enterprise Bonds, and Corporate Bonds, and 0 for Financial Bonds. Both models include the same control variables as those in Table 9. The p-values are based on cluster-robust standard errors.

	SOE vs. Non-SOE Bonds		***Financial vs. Non-Financial Bonds***	
Parameter	*Estimate*	*P-Value*	*Estimate*	*P-Value*
Intercept	1.650	<.0001	1.503	<.0001
POST	-0.748	<.0001	-0.158	0.1528
AA+	0.411	<.0001	0.426	<.0001
AA	0.971	<.0001	0.973	<.0001
AA-	1.884	<.0001	1.760	<.0001
NonSOE	0.313	<.0001	0.313	<.0001
POST*NonSOE	0.109	.0977		
AA+*POST*SOE	0.237	<.0001		
AA*POST*SOE	0.323	<.0001		
AA-*POST*SOE	0.880	<.0001		
AA+*POST*NonSOE	0.724	<.0001		
AA*POST*NonSOE	0.759	<.0001		
AA-*POST*NonSOE	1.000	<.0001		
NonFIN			0.442	<.0001
POST*NonFIN			-0.538	<.0001
AA+*POST*NonFIN			0.360	<.0001
AA*POST*NonFIN			0.386	<.0001
AA-*POST*NonFIN			0.876	<.0001
AA+*POST*FIN			-0.208	.0004
AA*POST*FIN			-0.462	<.0001
AA-*POST*FIN			-1.119	<.0001
POST*NonSOE*NonFIN			0.419	<.0001
POST*NonSOE*FIN			-0.291	<.0001
Control Variables	Yes		Yes	
Industry Dummies	Yes		Yes	
Year Dummies	Yes		Yes	
Adj. R-squared	0.66		0.67	
OBS	4,711		6,129	

Table 12. Subsample Analyses

This table reports the Treasury Spread regression results for four subsamples: 2013-2015 subsample, Medium-term Notes (MTNs), Corporate Bond and Enterprise Bond subsamples. The dependent variable is the bond offering yield spread (in percentage) over Chinese Treasury of similar maturity. The explanatory variables are the same as those in Table 9. The p-values are based on cluster-robust standard errors.

	2013-2015		**MTN**		**Corporate Bonds**		**Enterprise Bonds**	
Parameter	*Estimate*	*P-Value*	*Estimate*	*P-Value*	*Estimate*	*P-Value*	*Estimate*	*P-Value*
Intercept	2.173	<.001	1.503	<.001	2.442	<.001	2.220	<.001
POST	-0.806	<.001	-0.831	<.001	-1.001	0.100	-0.449	0.129
AA+	0.161	0.074	0.425	<.001	0.538	0.024	0.703	0.002
AA+*POST	0.241	0.019	0.255	<.001	0.336	0.171	0.216	0.479
AA	0.787	<.001	0.977	<.001	1.102	<.001	1.628	<.001
AA*POST	0.435	<.001	0.322	<.001	0.618	0.009	0.463	0.041
AA-	1.578	<.001	1.914	<.001	2.328	<.001	1.967	<.001
AA-*POST	0.913	<.001	0.532	<.001	1.869	0.004	-	-
LocalSOE	0.131	0.094	-0.008	0.848	0.166	0.553	0.360	0.031
LocalSOE*POST	0.039	0.664	0.180	<.001	-0.043	0.879	-0.175	0.398
NonSOE	0.424	<.001	0.248	<.001	0.658	0.005	-0.166	0.626
NonSOE*POST	0.346	0.002	0.610	<.001	0.220	0.386	0.298	0.616
GP_CRA	-0.168	<.001	-0.159	<.001	-0.194	<.001	-0.152	0.033
Maturity	0.034	<0.001	0.025	0.001	0.058	<.001	0.006	0.627
Issue Amount	-0.027	<0.001	-0.025	<.001	0.013	0.425	-0.029	0.045
Corporate	-0.267	0.023	-	-	-	-	-	-
MTN	0.092	0.345	-	-	-	-	-	-
Sinking Fund	0.497	<.001	0.758	0.067	-0.243	0.467	0.133	0.416
Callable Bond	0.011	0.963	0.238	0.255	0.547	0.155	0.233	0.622
Putable Bond	-0.189	0.428	-0.459	0.082	-0.380	0.256	-0.348	0.243
Listed	-0.150	<.001	-0.143	<.001	-0.074	0.102	0.284	0.331
Interbank	-0.020	0.852	-	-	-	-	-0.023	0.693
Log Issuer Age	-0.070	0.027	-0.031	0.106	-0.095	0.029	-0.249	<.001
Industry Dummies	Yes		Yes		Yes		Yes	
Year Dummies	Yes		Yes		Yes		Yes	
Adj. R-squared	0.70		0.66		0.72		0.83	
OBS	1,291		3,712		735		264	

Table 13. Treasury Spread Changes Around First Default Event

This table reports the mean daily Treasury Spreads of 1,366 outstanding corporate bonds 60 days prior to (Prior-default) and 60 days after (Post-default) the first bond default on March 4, 2014 in the first two columns. The third column reports the changes in the mean daily Treasury Spreads after the first bond default. The corporate bonds in the sample are 1) rated at AA- or above during the sample period, 2) not guaranteed by a third party, 3) issued before 2014 and expected to mature after 2014. Panel A reports the mean daily *Treasury Spread* by outstanding ratings for the whole sample. Panel B(C) reports the mean daily Treasury Spread by ratings for non-SOE bonds (SOE bonds). Panel D reports the differences in mean daily Treasury Spread between non-SOE and SOE bonds.

	Prior-default	Post-default	Change	No. of Obs.
Panel A. Whole Sample				
AAA	1.64%	1.74%	0.10%***	432
AA+	2.46%	2.53%	0.07%***	340
AA	3.20%	3.33%	0.13%***	512
AA-	4.10%	4.52%	0.42%***	82
All Rating Categories	2.57%	2.70%	0.13%***	1,366
Panel B. Non-SOE Bonds				
AAA	1.86%	1.95%	0.09%	9
AA+	2.66%	2.80%	0.14%**	84
AA	3.58%	3.82%	0.24%***	243
AA-	4.43%	4.83%	0.40%***	46
All Rating Categories	3.44%	3.67%	0.23%***	382
Panel C. SOE Bonds				
AAA	1.63%	1.74%	0.11% ***	423
AA+	2.39%	2.44%	0.05% *	256
AA	2.86%	2.90%	0.04%	269
AA-	3.68%	4.13%	0.45% ***	36
All Rating Categories	2.24%	2.32%	0.08%	984
Panel D. Non-SOE Bonds minus SOE Bonds				
AAA	0.23%	0.21%	-0.02%	
AA+	0.27%	0.36%	0.09% *	
AA	0.72%	0.92%	0.20% ***	
AA-	0.75%	0.70%	-0.05%	
All Rating Categories	1.20%	1.35%	0.15% ***	

***,**,* indicate that the difference in the variable means between the Prior-default and the Post-default subsamples is significantly different from 0 at the 1%, 5% and 10% levels, respectively.

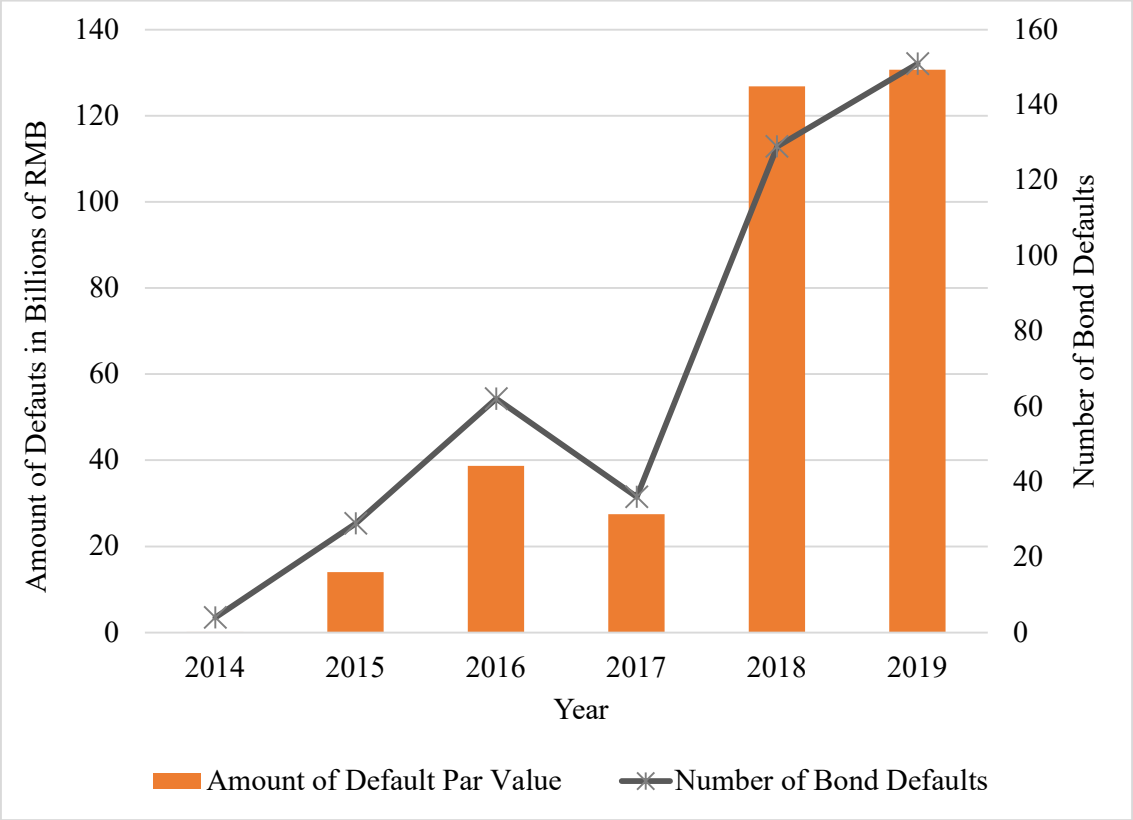
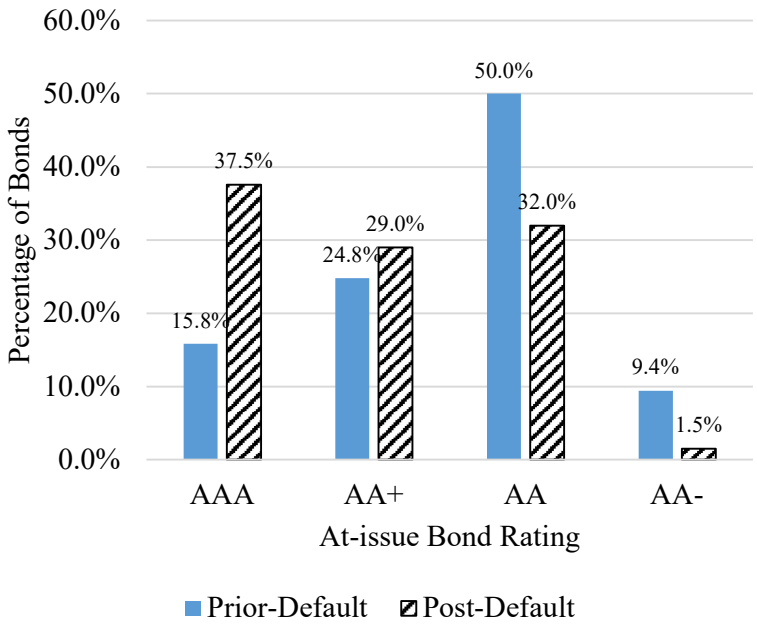
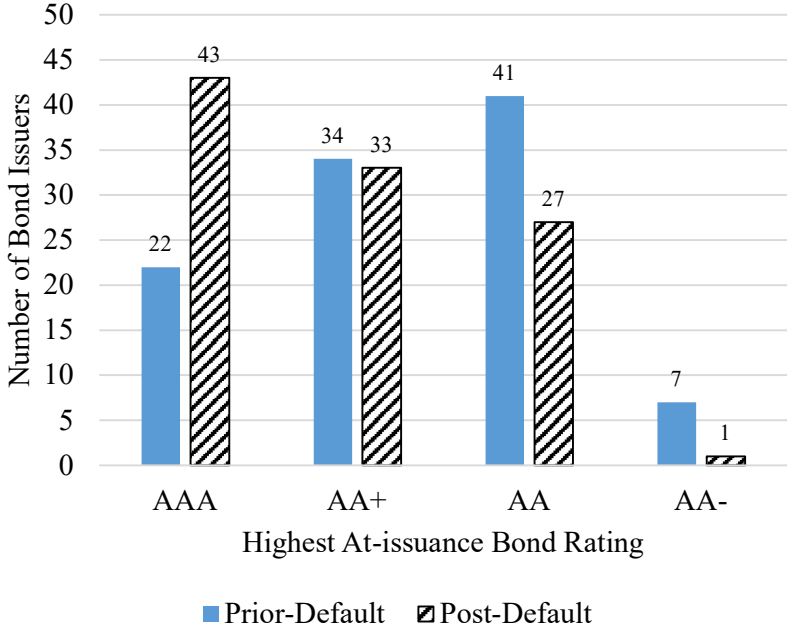


Figure 1. Numbers and Par Values of Bond Defaults from 2014-2019.



Panel A. Percentages of Bond Issues by At-issuance Ratings



Panel B. Number of Repeated Bond Issuers by the Highest At-issuance Ratings

Figure 2. At-issuance Rating Distribution of the Rating Standard Sample.