The SOE Premium and Government Support in China’s Credit Market

Jun Pan

Shanghai Advanced Institute of Finance (SAIF)
Shanghai Jiao Tong University

January 7, 2022

Joint work with Zhe Geng from SAIF
Motivations and Research Questions

Credit misallocation with respect to state-owned enterprises (SOE):


Existing empirical evidences on credit allocation in China:

- Widely cited: SOEs' preferential access to bank loans.
- Not well documented: the actual magnitudes, especially in pricing.

Challenges and opportunities:

- Interconnected debt financing channels: loans, bonds, and shadow banking.
- Changing government policies and credit conditions.

Our paper:

- Use bond pricing to uncover the extent of credit misallocation in China.
- The SOE premium: difference in credit spreads between non-SOEs and SOEs.
- Time-varying SOE premium and emerging importance of government support.
- Impact of government support on price discovery.
- Impact of allocational inefficiency on firm fundamentals.

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Bonds: transparent, driven by concerns over credit risk.
Bank Loans: opaque, relational, and clouded by other factors.
Shadow Banking: more opaque.
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Background on China’s Credit Market

Two landmark events: March 4, 2014 and Apr 27, 2018.

Debt Securities by Non-Financial Corporations (Trillion USD)

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$0.1$ trillion in 2008, $4.5$ trillion in 2020, second only to the US ($7.3$ trillion).
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Debt Securities by Non-Financial Corporations (Trillion USD)

- First Default
- New Regulation

Default Amount: Non-SOE
Default Amount: SOE

China
USA

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The Time-Varying SOE Premium

CreditSpread_{i,t} = a + b \text{NSOE}_{i,t} + c \text{Rating}_{i,t} + \sum_k \text{Controls}_{i,t}^k + \epsilon_{i,t}

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Contributions to the Literature

- The macro literature on credit misallocations and their impact on China’s growth:
  - Our paper: Use credit market to uncover the opaque credit allocation, and document the severe segmentation in pricing post 2018Q2 and its real impact.

- The asset-pricing literature studying the information content of credit spreads:
  - Evidence from the US: Collin-Dufresne, Goldstein and Martin (2001), Campbell and Taksler (2003), Bao (2009), Bao, Pan, and Wang (2011), and others.
  - Our paper: The information content of credit spreads in China.

- Government support and credit spreads:
  - Berndt, Duffie, and Zhu (2019): Bailout probability and banks’ credit spreads.
  - Our paper: Government support and credit spreads in China.
Growing Literature on China’s Credit Market

- Government guarantee in
- Other topics:
  - Mo and Subrahmanyam (2019) on liquidity.
  - Chen, He, and Liu (2020) on the growth of Chengtou bonds.
  - Ding, Xiong, and Zhang (2020) on issuance overpricing.
  - Gao, Huang, and Mo (2020) on credit enhancement.
## Summary Statistics: Bond-Level Data

<table>
<thead>
<tr>
<th></th>
<th>Non-SOE Listed</th>
<th>SOE Listed</th>
<th>Non-SOE Unlisted</th>
<th>SOE Unlisted</th>
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<tbody>
<tr>
<td></td>
<td>mean</td>
<td>med</td>
<td>std</td>
<td>mean</td>
</tr>
<tr>
<td>NumIssuers</td>
<td>367</td>
<td></td>
<td></td>
<td>403</td>
</tr>
<tr>
<td>NumBonds</td>
<td>923</td>
<td></td>
<td></td>
<td>1,477</td>
</tr>
<tr>
<td>CreditSpread (%)</td>
<td>2.47</td>
<td>1.94</td>
<td>2.39</td>
<td>1.39</td>
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<tr>
<td>Rating</td>
<td>2.43</td>
<td>3.00</td>
<td>0.85</td>
<td>1.69</td>
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<tr>
<td>Maturity (yr)</td>
<td>2.97</td>
<td>2.79</td>
<td>1.25</td>
<td>3.33</td>
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<tr>
<td>IssueSize (billion)</td>
<td>1.03</td>
<td>0.80</td>
<td>0.89</td>
<td>2.00</td>
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<tr>
<td>Age (yr)</td>
<td>1.75</td>
<td>1.53</td>
<td>1.26</td>
<td>2.01</td>
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<tr>
<td>Coupon (%)</td>
<td>5.91</td>
<td>5.90</td>
<td>1.24</td>
<td>5.13</td>
</tr>
<tr>
<td>Embed</td>
<td>0.63</td>
<td>1.00</td>
<td>0.48</td>
<td>0.39</td>
</tr>
<tr>
<td>Exch</td>
<td>0.69</td>
<td>1.00</td>
<td>0.46</td>
<td>0.53</td>
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<tr>
<td>ZeroDays (%)</td>
<td>77</td>
<td>88</td>
<td>26</td>
<td>86</td>
</tr>
<tr>
<td>Turnover (%)</td>
<td>31</td>
<td>13</td>
<td>62</td>
<td>35</td>
</tr>
<tr>
<td>TradingDays (day)</td>
<td>15</td>
<td>8</td>
<td>18</td>
<td>10</td>
</tr>
</tbody>
</table>
# Measuring the SOE Premium

Quarterly panel regressions with quarter and industry fixed effects:

\[
\text{CreditSpread}_{i,t} = a + b \text{NSOE}_{i,t} + c \text{Rating}_{i,t} + \sum_k \text{Controls}_{i,t}^k + \epsilon_{i,t}
\]

<table>
<thead>
<tr>
<th></th>
<th>Listed Firms</th>
<th>Unlisted Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Phase I</td>
<td>Phase II</td>
</tr>
<tr>
<td><strong>NSOE</strong></td>
<td>0.20***</td>
<td>0.21***</td>
</tr>
<tr>
<td></td>
<td>[3.08]</td>
<td>[3.58]</td>
</tr>
<tr>
<td><strong>Rating</strong></td>
<td>0.51***</td>
<td>0.53***</td>
</tr>
<tr>
<td></td>
<td>[6.39]</td>
<td>[10.96]</td>
</tr>
<tr>
<td>Observations</td>
<td>4,344</td>
<td>10,072</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.543</td>
<td>0.468</td>
</tr>
</tbody>
</table>
2014Q1: First default.
2014-16: Credit boom.
2016-17: Deleveraging campaigns.
2018Q2: New regulations on asset management.
Since Nov 2018: Efforts to reassure the private sector.
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2018Q2: 资管新规 New regulations on asset management.
Since Nov 2018: Efforts to reassure the private sector.
Behind the Exploding SOE Premium

- Government-led credit tightening policies:
  - Severely weakened the demand from the asset-management industry in China.
  - Shrunk the financing and re-financing channels of corporate issuers.

- Competing explanations:
  - **Government support:** Lacking government support, non-SOEs are more vulnerable than SOEs. Akin to a run on non-SOEs, investors seek safety in SOE bonds and shun non-SOE bonds.
  - **Credit quality:** Due to over-borrowing and over-expanding, non-SOEs are weak in fundamental strength and ill prepared for the credit contraction.
Key Measures: Credit Quality and Government Support
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- **Default Measure (DM)**: inverse of Merton’s distance to default (DD).
Key Measures: Credit Quality and Government Support

\[ dV_t = \mu V_t \, dt + \sigma_A V_t \, dZ_t \]

Distance-to-Default (DD):

\[ \left( \mu - \frac{1}{2} \sigma_A^2 \right) T - \ln \left( \frac{K}{V_0} \right) \]

\[ \frac{\sigma_A \sqrt{T}}{\sigma_A \sqrt{T}} \]

- Asset volatility: \( \sigma_A \)
- Firm leverage: \( K/V_0 \)
- Asset growth: \( \mu \)
Key Measures: Credit Quality and Government Support

Quarterly Calibration

- Default boundary $K$: current liabilities plus one half of long-term debt.
- Asset value $V$ and volatility $\sigma_A$:
  - Equity: a call option on asset:
    \[
    E_t = V_t N(d_1) - e^{rT} KN(d_2)
    \]
  - $E_t$: market cap by quarter end.
  - $\sigma_E$: estimated using daily stock returns within the quarter.
Key Measures: Credit Quality and Government Support

- **Default Measure (DM)**: inverse of Merton’s distance to default (DD).
  - Measured quarterly, using firms’ equity and balance-sheet information:
    
    $$\text{DM}_t = \text{DD}_t^{-1}$$  and  $$\text{DD} = \frac{\left( \mu - \frac{1}{2} \sigma^2_A \right) T - \ln \left( \frac{K}{V_0} \right)}{\sigma_A \sqrt{T}}$$
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  - Issuers with higher DM: lower credit quality and more likely to default.
Default Measure (DM): inverse of Merton’s distance to default (DD).

Default Measure: NSOE – SOE

Num of Observations

 Issuers with higher DM: lower credit quality and more likely to default.

SOE Premium and Government Support

Jun Pan 12 / 22

DM_{i,t} = a + b \text{NSOE}_{i,t} + c \text{Rating}_{i,t} + \sum_k \text{Controls}_{i,t}^k + \epsilon_{i,t}

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<th>Phase I</th>
<th>Phase II</th>
<th>Phase III</th>
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<tr>
<td>NSOE</td>
<td>-1.50***</td>
<td>-3.08***</td>
<td>-0.55</td>
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<tr>
<td></td>
<td>[-2.95]</td>
<td>[-4.23]</td>
<td>[-0.91]</td>
</tr>
<tr>
<td>Rating</td>
<td>0.79*</td>
<td>-0.18</td>
<td>1.60***</td>
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<tr>
<td></td>
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<td>10,072</td>
<td>5,350</td>
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<td>0.331</td>
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- **The Non-SOE Dummy (NSOE):** divides firms into two solid blocks.
  - Defined by the affiliation, state or non-state, of the end-controller of the firm.
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Key Measures: Credit Quality and Government Support

**Bond × Quarter Distribution**

**Quarterly Variation**

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</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2,500</td>
</tr>
<tr>
<td>10</td>
<td>2,000</td>
</tr>
<tr>
<td>20</td>
<td>1,500</td>
</tr>
<tr>
<td>30</td>
<td>1,000</td>
</tr>
<tr>
<td>40</td>
<td>500</td>
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<tr>
<td>50</td>
<td>0</td>
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<td>CSOE</td>
<td></td>
</tr>
<tr>
<td>LSOE</td>
<td></td>
</tr>
<tr>
<td>Other NSOE</td>
<td></td>
</tr>
<tr>
<td>POE</td>
<td></td>
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**SOE Premium and Government Support**

- Measured quarterly, using firms' equity and balance-sheet information:
  - Government's equity ownership of a firm, measured at quarterly frequency.
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- Issuers with higher DM: lower credit quality and more likely to default.

- Quarterly Variation

- Difference in Default Measure (%)
- Difference in Government Holdings (%)

- Log of Asset Value

- DM

- Quarterly Default Amount (Billion RMB)

- Adj R

- Obs

- Rating

- Controls

- Asset value $V_t$ plus one half of long-term debt.

- Asset growth:

- Firm leverage: $K_t$

- Asset volatility:

- Default boundary

- Distance-to-Default (DD):

- Returns within the quarter.

- Market cap by quarter end: $E_{t,2}$

- Estimated using daily stock returns.

- $E_t$: market cap by quarter end.

- Controls

- $A = \frac{V_t}{K_t}$

- $\ln r_T$
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- **Default Measure (DM)**: inverse of Merton’s distance to default (DD).
  - Measured quarterly, using firms’ equity and balance-sheet information:
    \[ DM_t = DD_t^{-1} \quad \text{and} \quad DD = \frac{\left( \mu - \frac{1}{2}\sigma_A^2 \right) T - \ln \left( \frac{K}{V_0} \right)}{\sigma_A \sqrt{T}} \]
  - Issuers with higher DM: lower credit quality and more likely to default.

- **The Non-SOE Dummy (NSOE)**: divides firms into two solid blocks.
  - Defined by the affiliation, state or non-state, of the end-controller of the firm.
  - Government: central or local SASAC, government institutions, and SOEs.

- **Government Holdings (GovtHoldings)**: a continuous measure.
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  - Government’s equity ownership of a firm, measured at quarterly frequency.
  - Built from the ground up and has not been studied for credit pricing.
  - Informative both across and within the samples of SOEs and non-SOEs.
## Summary Statistics: Equity-Level Data

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Explaining the SOE Premium: Credit Quality vs Government Support

CreditSpread\(_{i,t}\) = \(a + b \times \text{NSOE}_{i,t} + c \times \text{DM}_{i,t} + d \times \text{GovtHoldings}_{i,t} + e \times \text{Rating}_{i,t} + \sum_k \text{Controls}^k_{i,t} + \epsilon_{i,t}\)

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<td><strong>Obs</strong></td>
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<td>10,072</td>
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<td><strong>Adjusted R(^2)</strong></td>
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<td>0.468</td>
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Credit Spread $i,t = a + b \text{NSOE}_{i,t} + c \text{DM}_{i,t} + d \text{GovtHoldings}_{i,t} + e \text{Rating}_{i,t} + \sum_k \text{Controls}_k^{i,t} + \epsilon_{i,t}$

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<td>Adjusted $R^2$</td>
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* * * indicate significance levels: **p < 0.01, *p < 0.05, p < 0.1
Explaining the SOE Premium: Credit Quality vs Government Support

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SOE Premium and Government Support

Jun Pan
\[
\text{CreditSpread}_{i,t} = a + b \text{DM}_{i,t} + c \text{GovtHoldings}_{i,t} + d \text{Rating}_{i,t} + \sum_k \text{Controls}_k + \epsilon_{i,t}
\]

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### Evolving Contents of Price Discovery

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### Government Holdings, Incremental R²

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Evolving Contents of Price Discovery

Default Measure, Incremental R2

Finance Seminar at Tsinghua SEM

SOE Premium and Government Support

Jun Pan
Evolving Contents of Price Discovery

Default Measure, Incremental R2

Government Holdings, Incremental R2

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SOE Premium and Government Support

Jun Pan
The Real Impact

- The differentiation between SOEs and non-SOEs is among the most important friction in China’s economy.

- Widely documented:
  - The inefficiency of China’s SOEs and their preferential access to debt financing.
  - The importance of the private sector: 60% of GDP, 70% of innovation, 80% of urban employment, and 90% of new jobs.

- How has the severe credit segmentation since 2018Q2 affected the non-SOEs?
The Real Impact

Return on Assets

\[ \text{Quarterly ROA} = a + b_{\text{NSOE}} + c_{\text{EquitySize}} + \epsilon \]

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<th>18,533</th>
<th>10,868</th>
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<tr>
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<td>0.063</td>
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Finance Seminar at Tsinghua SEM

SOE Premium and Government Support

Jun Pan
The Real Impact

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<td>[8.83]</td>
<td>[1.07]</td>
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<tr>
<td>EquitySize</td>
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<td>0.19***</td>
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SOE Premium and Government Support

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<tr>
<th>Quarterly ROA (%)</th>
<th>Phase I</th>
<th>Phase II</th>
<th>Phase III</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NSOE</strong></td>
<td>0.56***</td>
<td>0.52***</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>[7.76]</td>
<td>[8.83]</td>
<td>[1.07]</td>
</tr>
<tr>
<td><strong>EquitySize</strong></td>
<td>0.18***</td>
<td>0.19***</td>
<td>0.35***</td>
</tr>
<tr>
<td></td>
<td>[6.00]</td>
<td>[6.33]</td>
<td>[8.69]</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>-3.54***</td>
<td>-4.33***</td>
<td>-7.40***</td>
</tr>
<tr>
<td><strong>Obs</strong></td>
<td>15,724</td>
<td>18,533</td>
<td>10,868</td>
</tr>
<tr>
<td><strong>Adj R^2</strong></td>
<td>0.065</td>
<td>0.063</td>
<td>0.095</td>
</tr>
</tbody>
</table>

Finance Seminar at Tsinghua SEM

SOE Premium and Government Support

Jun Pan
The Real Impact: “Good” and “Bad” Firms by Default Measures

Sorting by DM: “Good”
- Avg=1.7%
- Avg=0.78%
- Avg=1.2%
- Avg=0.82%

10Q1 11Q1 12Q1 13Q1 14Q1 15Q1 16Q1 17Q1 18Q1 19Q1...

Quarterly ROA (%)

Quarterly Default Amount (Billion RMB)

Good NSOE Listed
Good SOE Listed

Sorting by DM: “Bad”
- Avg=0.89%
- Avg=0.44%

10Q1 11Q1 12Q1 13Q1 14Q1 15Q1 16Q1 17Q1 18Q1 19Q1...

Quarterly ROA (%)

Quarterly Default Amount (Billion RMB)

Bad NSOE Listed
Bad SOE Listed

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SOE Premium and Government Support

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The Real Impact: “Good” and “Bad” Firms by Interest Coverage

**Sorting by Debt-To-EBIT: “Good”**

- Avg = 1.64%
- Avg = 0.96%
- Avg = 0.99%
- Avg = 0.82%

**Sorting by Debt-To-EBIT: “Bad”**

- Avg = 0.98%
- Avg = 0.25%
- Avg = 0.63%
- Avg = 0.47%
The Real Impact: US-China Trade War

Trade-War-Less-Affected Industries
Avg=1.33%
Avg=0.66%
Avg=0.80%
Avg=0.69%

Trade-War-Affected Industries
Avg=1.26%
Avg=0.59%
Avg=0.82%
Avg=0.61%

Quarterly ROA (%)
Quarterly Default Amount (Billion RMB)
NSOE Listed
SOE Listed

Finance Seminar at Tsinghua SEM
SOE Premium and Government Support
Jun Pan
Conclusions

- From 2010-2020, we find a market of evolving and improving price discovery:

  - Post 2014Q1, credit quality becomes important in credit pricing.
  - Post 2018Q2, the extent of government support becomes more important.
  - The main driver behind the explosive SOE premium.
  - The beginning of the end: “faith” in the SOE label.
  - Distortions to price discovery with respect to credit quality.
  - The real impact of the allocational inefficiency.
  - Post 2018Q2, non-SOEs lost their advantage over SOEs in profitability.
  - The explosive SOE premium is a reflection, not the unique cause.
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