Class 5: Chinese Credit Market 中国信用债市场

Financial Markets, Spring 2021, SAIF

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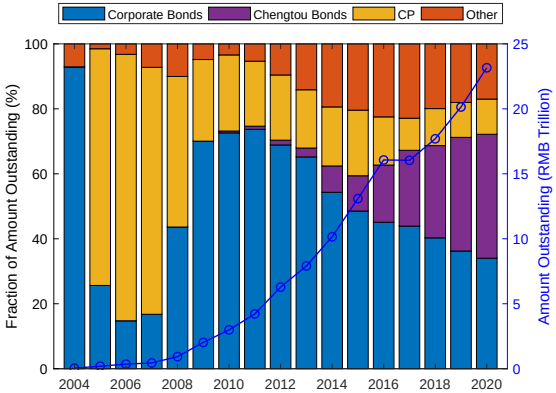
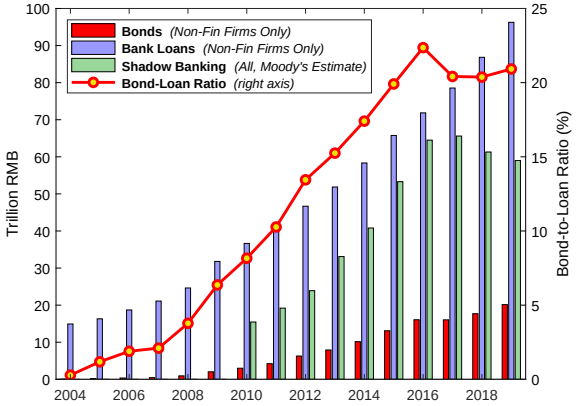
China's Onshore Credit Market for Non-Financial Firms



- RMB 24 trillion, second only to the US.
- Global share: 3% in 2008; 25% in 2019.
- Past three decades:
  rapid growth of China's economy.
- Coming decades:
  global integration of China's markets.

Debt Financing Channels in China



- **Credit market:** transparent, driven exclusively by concerns over credit risk.
- **Bank loans:** opaque, relational, and clouded by other factors.
- **Shadow banking:** even more opaque.

Absent of pricing data on bank loans and shadow banking, our paper uncovers the otherwise opaque credit allocation in China.

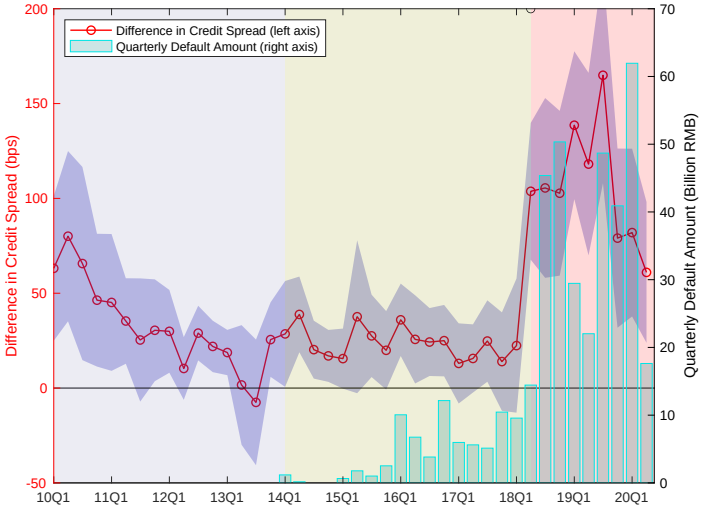
Measuring the SOE Premium

Quarterly panel regressions with quarter and industry fixed effects:

$$\text{CreditSpread}_{i,t} = a + \mathbf{b}\,\text{NSOE}_{i,t} + c\,\text{Rating}_{i,t} + \sum_k \text{Controls}^k_{i,t} + \epsilon_{i,t}$$

	Credit Spreads (%)					
	Listed Firms			Unlisted Firms		
	Phase I	Phase II	Phase III	Phase I	Phase II	Phase III
NSOE	0.20***	0.21***	1.06***	0.16***	0.79***	1.54***
	[3.08]	[3.58]	[7.78]	[3.47]	[12.92]	[17.28]
Rating	0.51***	0.53***	1.24***	0.54***	0.41***	0.46***
	[6.39]	[10.96]	[4.84]	[14.11]	[16.89]	[14.58]
Observations	4,344	10,072	5,348	21,525	45,315	16,999
Adjusted R-squared	0.543	0.468	0.385	0.544	0.382	0.457

The Time-Varying SOE Premium



- 2014Q1: First default.
- 2014-2016: Credit boom.
- 2016-2017: 降杠杆 Deleveraging campaigns.
- 2018Q2: 资管新规 New Regulations on Asset Management.
- Since November 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.

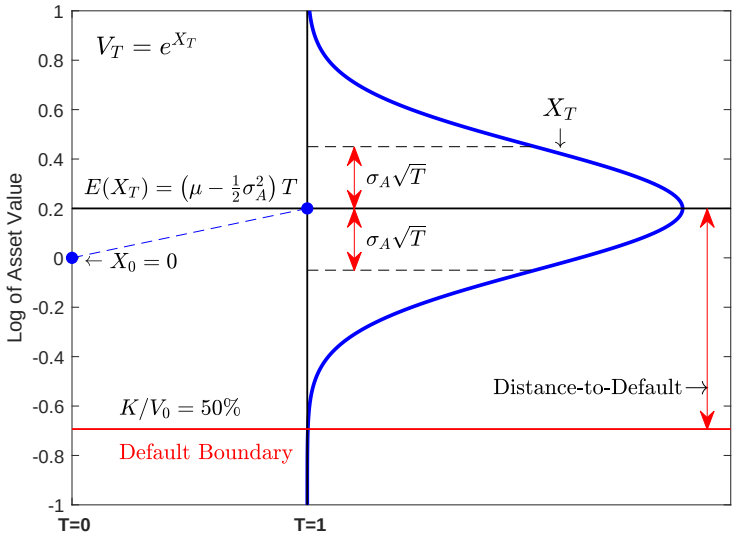
Proxy for Credit Quality: Default Measure

- We use the inverse of Merton's distance to default (DD):

$$\text{DM}_t = \text{DD}_t^{-1} \quad \text{and} \quad \text{DD}_t = \frac{\left(\mu - \frac{1}{2}\sigma_A^2\right) T - \ln\left(K/V_0\right)}{\sigma_A \sqrt{T}}$$

- Issuers with higher DM: lower credit quality and more likely to default.
- Our default measure is similar in spirit to:
  - Merton's probability of default $N(-\text{DD})$: Its reliance on normal distribution predicts low levels of defaults and flattens out the cross-issuer variation in DD.
  - Moody's KMV EDF (expected default frequency): This construction of empirical distribution requires a large database of historical defaults, infeasible for the Chinese market.

Merton's Model of Default, $dV_t = \mu V_t\, dt + \sigma_A V_t\, dZ_t$



Distance-to-Default (DD):

$$\frac{\left(\mu - \frac{1}{2}\sigma_A^2\right) T - \ln(K/V_0)}{\sigma_A \sqrt{T}}$$

- Asset volatility: σ_A
- Firm leverage: K/V_0
- Asset growth: μ

Model Calibration

- For a fixed horizon T, we estimate the firm's asset value V_t and volatility σ_A via

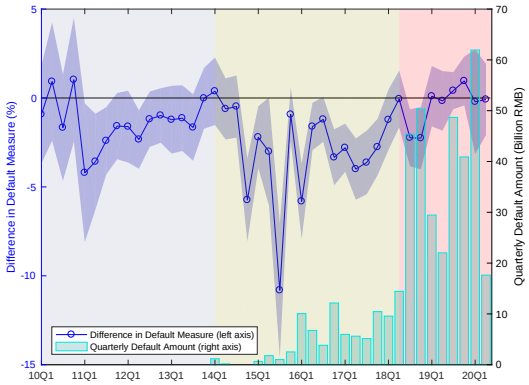
$$E_t = V_t\, N(d_1) - e^{r\,T}\, K N(d_2) \quad \text{and} \quad \sigma_E = \frac{V_t}{E_t}\frac{\partial E_t}{\partial A_t}\,\sigma_A\,,$$

  where E_t is the firm's equity value and σ_E is the equity volatility, and

$$d_2 = \frac{\ln(V_t/K) + (r - \sigma_A^2/2)\,T}{\sigma_A\sqrt{T}} \quad \text{and} \quad d_1 = d_2 + \sigma_A\sqrt{T}\,.$$

- Quarterly calibration using quarterly-updated model inputs:
  - Default Boundary K: current liabilities plus one half of long-term debt.
  - Equity Value E_t: the total market cap by quarter end.
  - Equity volatility σ_E: estimated using daily stock returns within the quarter.
  - Riskfree rate r: one-year bank deposit rate.

Difference in Default Measure, SOEs vs Non-SOEs



Difference in Default Measure

Quarterly panel regressions with quarter and industry fixed effects:

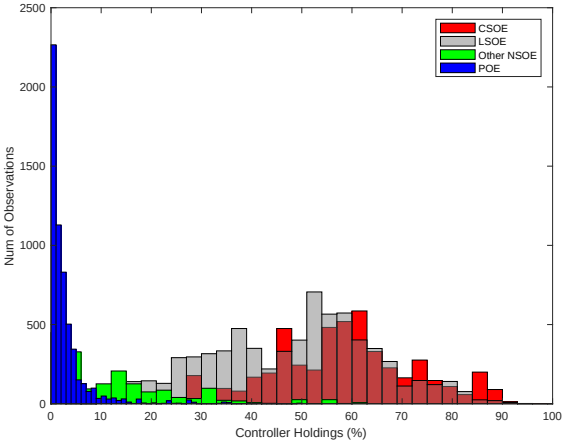
$$\text{DM}_{i,t} = a + \mathbf{b}\,\text{NSOE}_{i,t} + c\,\text{Rating}_{i,t} + \sum_k \text{Controls}^k_{i,t} + \epsilon_{i,t}$$

	DM (%)		
	Phase I	Phase II	Phase III
NSOE	-1.50***	-3.08***	-0.55
	[-2.95]	[-4.23]	[-0.91]
Rating	0.79*	-0.18	1.60***
	[1.94]	[-0.51]	[3.13]
Obs	4,344	10,072	5,350
Adj R^2	0.151	0.660	0.331

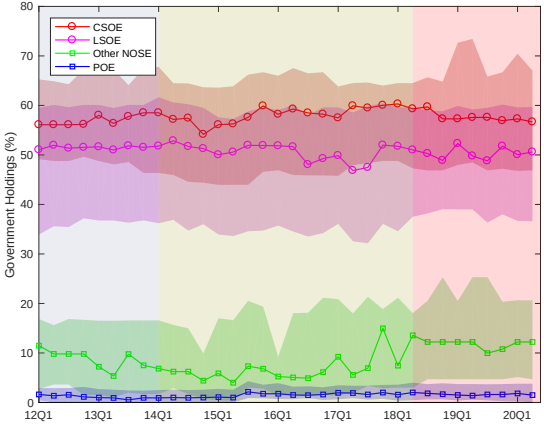
Proxies for Government Support

- **The Non-SOE Dummy:**
  - Defined by the affiliation, state or non-state, of the end-controller of the firm.
  - Government: central or local SASAC, central or local government institutions, and central or local SOEs.
- **Government Holdings:**
  - Government's equity ownership of a firm, measured at quarterly frequency.
  - Built from the ground up and has not been studied for credit pricing:
    - ⋆ Start with quarterly information of the top-ten shareholders of a firm.
    - ⋆ Merge with other datasets to identify the shareholders' affiliations.
    - ⋆ Further refined by using similar datasets from Wind and CSMAR.
  - A continuous measure, informative for both SOEs and non-SOEs.
  - We further use government end-controller holdings as a robust measure.

Government Holdings



Bond×Quarter Distribution



Quarterly Distribution

Explaining the SOE Premium

$$\text{CreditSpread}_{i,t} = a + \mathbf{b}\,\text{NSOE}_{i,t} + \mathbf{c}\,\text{DM}_{i,t} + \mathbf{d}\,\text{GovtHoldings}_{i,t} + e\,\text{Rating}_{i,t} + \sum_k \text{Controls}_{i,t}^k + \epsilon_{i,t}$$

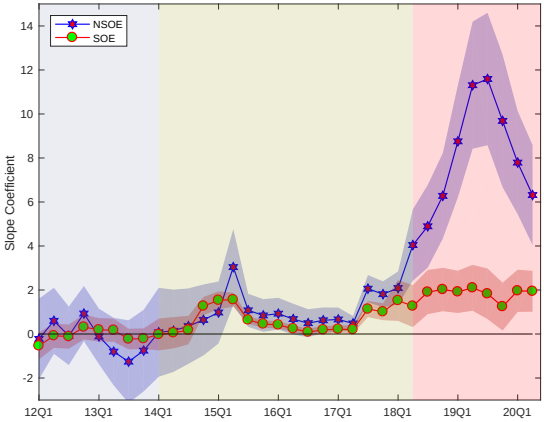
	Phase I			Phase II			Phase III		
NSOE	0.20***	0.20***	0.20**	0.21***	0.25***	0.18*	1.06***	1.09***	-0.09
	[3.08]	[2.95]	[2.46]	[3.58]	[4.32]	[1.68]	[7.78]	[7.76]	[-0.48]
DM		-0.13			1.26***			4.78***	
		[-0.40]			[4.52]			[5.24]	
GovtHoldings			0.00			-0.08			-2.81***
			[0.01]			[-0.37]			[-7.82]
Rating	0.51***	0.51***	0.51***	0.53***	0.53***	0.52***	1.24***	1.16***	1.20***
	[6.39]	[6.29]	[6.23]	[10.96]	[11.23]	[11.01]	[4.84]	[4.73]	[4.66]
Obs	4,344	4,344	4,344	10,072	10,072	10,072	5,348	5,348	5,348
Adjusted R^2	0.543	0.543	0.543	0.468	0.476	0.468	0.385	0.402	0.398

Price Discovery

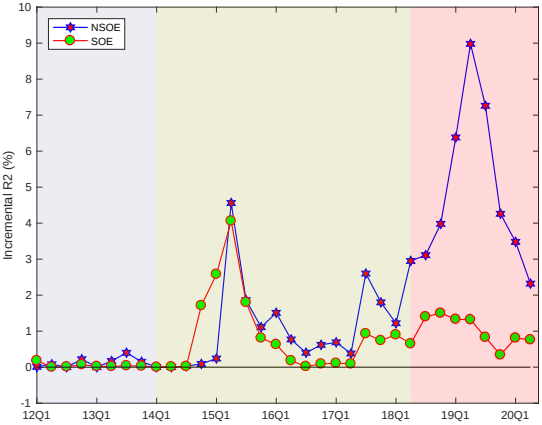
$$\text{CreditSpread}_{i,t} = a + \mathbf{b}\,\text{DM}_{i,t} + \mathbf{c}\,\text{GovtHoldings}_{i,t} + d\,\text{Rating}_{i,t} + \sum_k \text{Controls}^k_{i,t} + \epsilon_{i,t}$$

NSOE	Phase I				Phase II				Phase III			
DM		-0.03		-0.01		1.63***		1.62***		7.89***		8.01***
		[-0.03]		[-0.02]		[2.88]		[2.89]		[3.83]		[3.94]
GovtHoldings			0.45	0.45			0.24	0.12			-5.52***	-5.69***
			[1.06]	[1.05]			[0.52]	[0.27]			[-4.56]	[-5.14]
Rating	0.74***	0.74***	0.75***	0.75***	0.41***	0.41***	0.41***	0.42***	1.64***	1.44***	1.58***	1.37***
	[2.99]	[2.99]	[3.05]	[3.05]	[4.65]	[4.82]	[4.77]	[4.88]	[4.34]	[4.06]	[4.24]	[3.85]
Obs	1,372	1,372	1,372	1,372	4,182	4,182	4,182	4,182	2,095	2,095	2,095	2,095
Adj R^2	0.484	0.483	0.484	0.484	0.376	0.386	0.376	0.386	0.367	0.397	0.382	0.413
SOE	Phase I				Phase II				Phase III			
DM		0.09		0.08		1.04***		1.04***		2.09***		1.47*
		[0.65]		[0.58]		[3.84]		[3.83]		[2.65]		[1.87]
GovtHoldings			-0.17	-0.17			-0.11	-0.12			-2.32***	-2.18***
			[-1.26]	[-1.25]			[-0.52]	[-0.57]			[-6.05]	[-6.02]
Rating	0.39***	0.39***	0.39***	0.38***	0.55***	0.55***	0.54***	0.55***	0.58***	0.56***	0.53***	0.52***
	[11.23]	[11.20]	[11.01]	[10.97]	[9.50]	[9.83]	[9.76]	[10.06]	[4.88]	[4.72]	[4.70]	[4.61]
Obs	2,972	2,972	2,972	2,972	5,890	5,890	5,890	5,890	3,253	3,253	3,253	3,253
Adj R^2	0.542	0.542	0.543	0.543	0.500	0.508	0.500	0.508	0.386	0.393	0.412	0.415

Credit Spreads on Default Measure

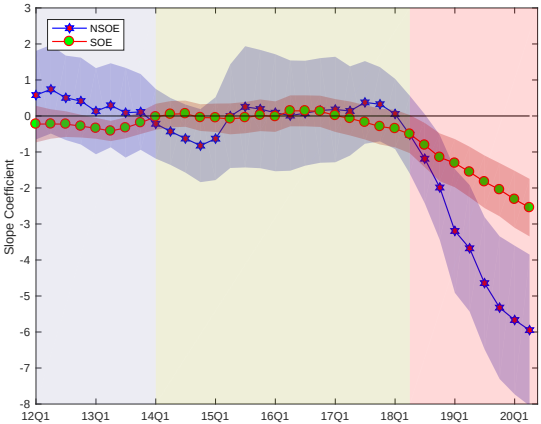


Regression Coefficient

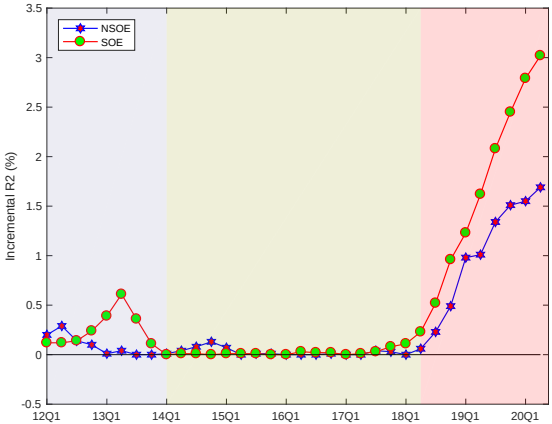


R-Squared Explained

Credit Spreads on Government Holdings



Regression Coefficient

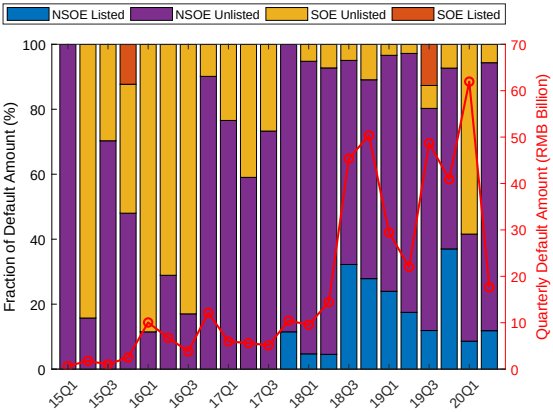


R-Squared Explained

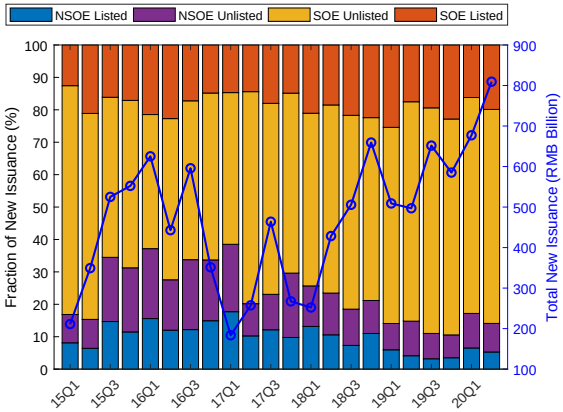
The Real Impact

- 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?

Credit Market Conditions



Quarterly Default in Credit Market



Quarterly New Issuance of Corporate Bonds

The Real Impact of the Credit-Market Segmentation

	ROA (%)			ROE (%)			DM (%)		
	Phase I	Phase II	Phase III	Phase I	Phase II	Phase III	Phase I	Phase II	Phase III
NSOE	0.56***	0.52***	0.13	1.07***	1.20***	-0.02	-2.18***	-3.51***	-0.43
	[7.76]	[8.83]	[1.07]	[6.69]	[7.93]	[-0.05]	[-6.56]	[-4.43]	[-0.68]
EquitySize	0.18***	0.19***	0.35***	0.77***	0.74***	1.09***	-0.67***	-1.50***	-2.60***
	[6.00]	[6.33]	[8.69]	[10.81]	[11.11]	[7.60]	[-2.94]	[-4.08]	[-9.10]
Constant	-3.54***	-4.33***	-7.40***	-15.89***	-15.91***	-22.78***	32.90***	57.61***	82.19***
	[-4.85]	[-6.04]	[-9.76]	[-9.40]	[-9.52]	[-7.56]	[5.90]	[6.93]	[11.62]
Obs	15,724	18,533	10,868	15,724	18,533	10,868	15,724	18,533	10,868
Adj R^2	0.065	0.063	0.095	0.051	0.045	0.084	0.092	0.590	0.181
GovtHoldings	-0.89***	-0.90***	-0.26	-1.80***	-2.08***	0.09	2.45***	6.53***	0.00
	[-6.41]	[-7.79]	[-1.01]	[-5.76]	[-6.65]	[0.12]	[3.53]	[4.30]	[0.00]
EquitySize	0.17***	0.21***	0.35***	0.76***	0.78***	1.09***	-0.55**	-1.63***	-2.56***
	[5.68]	[6.83]	[9.13]	[10.96]	[11.70]	[8.24]	[-2.45]	[-4.27]	[-9.18]
Constant	-2.75***	-4.16***	-7.38***	-14.49***	-15.51***	-22.72***	28.56***	56.99***	81.09***
	[-3.83]	[-5.72]	[-9.52]	[-9.21]	[-9.43]	[-7.48]	[5.23]	[6.84]	[11.67]
Obs	15,724	18,533	10,868	15,724	18,533	10,868	15,724	18,533	10,868
Adj R^2	0.056	0.057	0.095	0.047	0.041	0.084	0.081	0.588	0.180