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

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Motivations

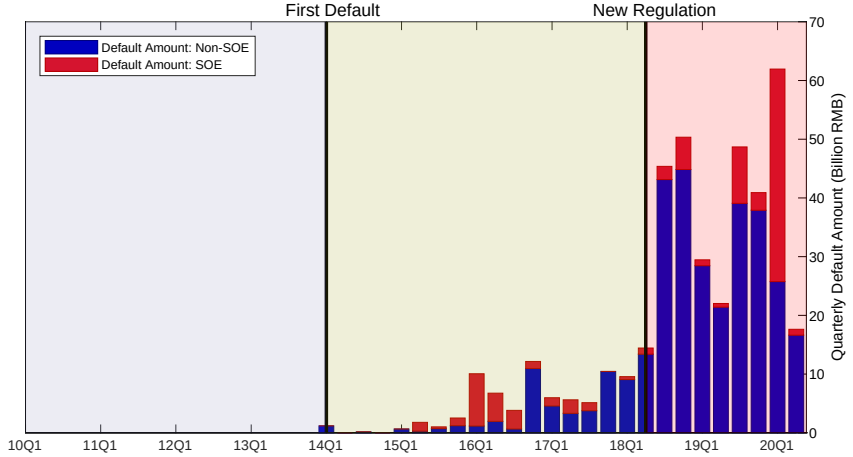
- The single most important divide in China's economy:
  - State-owned enterprises (SOE) versus non-SOEs.
  - SOEs: less efficient but more privileged.
  - Allocational inefficiency drags on aggregate growth: Hsieh and Klenow (2009):
- The extent of the allocational disparity and divide:
  - Widely cited but not well documented.
  - Interconnected debt financial channels and the opacity of bank loans.
  - Changing government policies further influence the relative credit allocation.
- Empirical evidences on the relative credit allocation: critical for discussions on the real impact of the credit misallocation and the ensuing welfare losses.

This Paper

- The first comprehensive evidence on the relative credit allocation.
  - The SOE premium: difference in credit spreads between non-SOEs and SOEs.
  - Unprecedented explosion of the SOE premium amid the 2018Q2 liquidity crisis.
- A structural default model unifying **credit risk**, **liquidity**, and **bailout**.
  - The presence of government bailout divides the pricing of SOEs and non-SOEs.
  - Interacting bailout with the liquidity-driven default of He and Xiong (2012): Explosive SOE premium amid liquidity deterioration.
  - Diverging contents of price discovery: SOEs on bailout and non-SOEs on credit.
- The real impact of credit misallocation:
  - Post 2018Q2, severe performance deteriorations of non-SOEs relative to SOEs.
  - Reversing the long-standing trend of non-SOEs outperforming SOEs.

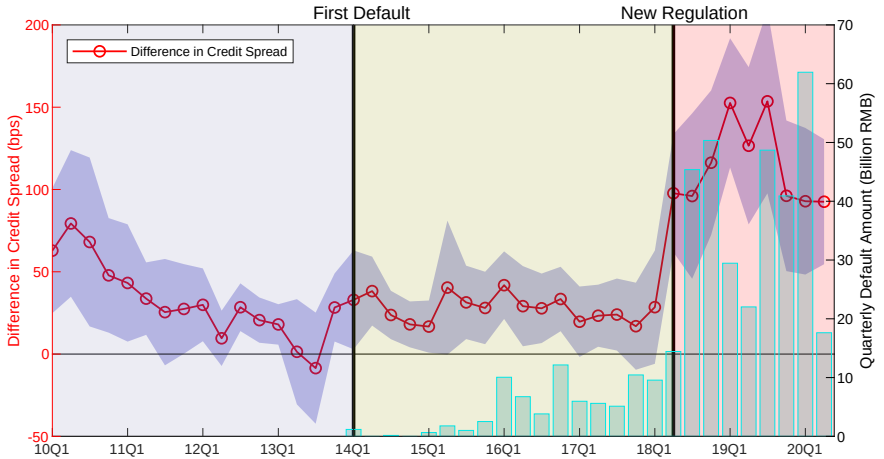
Background on China's Credit Market

- Totaling $4.5 Trillion by 2020, second only to the U.S.
- Two important shocks: March 4, 2014 and April 27, 2018.



The SOE Premium

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



Measuring the SOE Premium

Quarterly panel regressions with quarter and industry fixed effects:

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

	Listed Firms			Unlisted Firms		
	Phase I	Phase II	Phase III	Phase I	Phase II	Phase III
NSOE	0.20***	0.27***	1.13***	0.25***	0.91***	1.81***
	[2.97]	[4.28]	[7.76]	[5.65]	[15.25]	[17.87]
Rating	0.52***	0.53***	1.19***	0.49***	0.47***	0.48***
	[6.45]	[10.62]	[5.12]	[14.85]	[17.52]	[14.83]
Obs	4,292	9,967	5,338	16,179	32,240	15,833
Adj R^2	0.546	0.455	0.376	0.561	0.508	0.491

Behind the Exploding SOE Premium

- The 2018 New Regulations on Asset Management:
  - Designed to rein in the shadow banking activities by asset managers in China.
    - ⋆ Forces asset managers to value safety over yield.
    - ⋆ Sharply reduces the attractiveness of the asset-management products.
    - ⋆ Severely shrinks financing and re-financing via shadow banking.
  - Inadvertently triggers a liquidity crisis in the credit market:
    - ⋆ Worsened liquidity, reduced credit access, and unprecedented defaults.
- Our explanation: SOEs more resilient due to government support.
  - A flight-to-safety with Chinese characteristics: seeking safety in SOEs.
- Alternative explanation: non-SOEs weaker in fundamental health.
  - Non-SOEs over-borrowed and over-expanded while SOEs delevered before 2018.

The Model: Add Bailout to He and Xiong (2012)

- The firm's unlevered asset value V_t follows, under the risk-neutral measure,

$$d\,V_t = (r-\delta)\,V_t\,dt + \sigma V_t\,dZ_t$$

- Bond valuation $d(V_t,\tau)$, liquidity shocks governed by Poisson arrival with intensity ξ,

$$r\,d\,(V_t,\tau) = \frac{C}{m} - \xi k\,d\,(V_t,\tau) - \frac{\partial d(V_t,\tau)}{\partial \tau} + (r-\delta)V_t\frac{\partial d(V_t,\tau)}{\partial V} + \frac{1}{2}\sigma^2 V_t^2\frac{\partial^2 d(V_t,\tau)}{\partial V^2}$$

- Conditioning on default, the bond is bailed out with probability π_g:

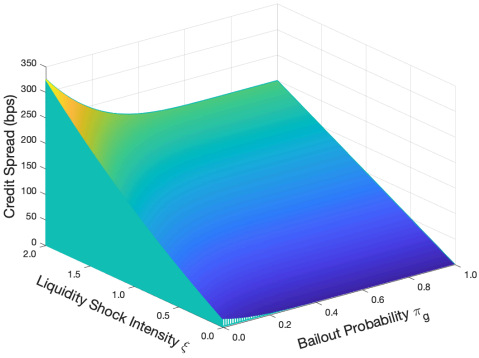
$$d\,(V_B,\tau,\pi_g;V_B) = \frac{\alpha V_B}{m}(1-\pi_g) + \frac{P}{m}\pi_g$$

- Equity valuation E, with the rollover gain/loss borne by the equity holders,

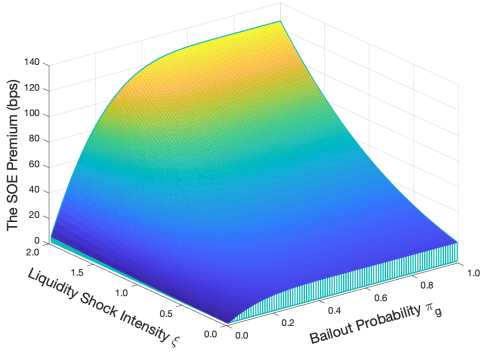
$$rE = (r-\delta)V_t E_V + \frac{1}{2}\sigma^2 V_t^2 E_{VV} + \delta V_t - (1-\pi)C + d\,(V_t,m,\pi_g) - \frac{P}{m}$$

- The endogenous default boundary V_B: default occurs when $E(V_B)=0$.

The SOE Premium



Credit Spreads



The SOE Premium

Model-Implied Default Measures (DM)

- Inverse of one-year distance-to-default:

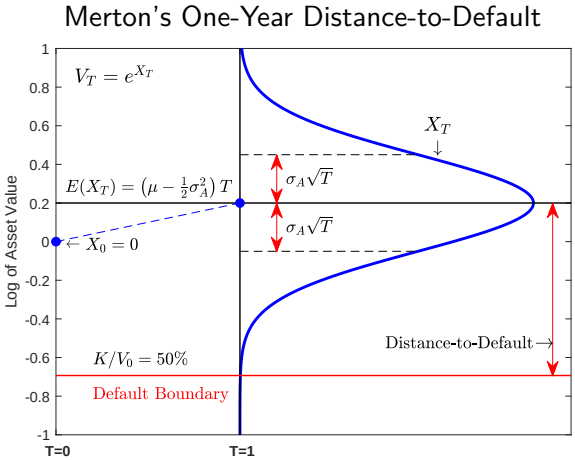
$$\text{DM}_t = \text{DD}_t^{-1}$$

- Our Model:

$$\text{DD}_t^{\text{Unified}} = \frac{\ln(V_t/V_B)}{\sigma_A}$$

- Merton:

$$\text{DD}_t^{\text{Merton}} = \frac{\left(\mu - \frac{1}{2}\sigma_A^2\right) + \ln\left(V_t/K\right)}{\sigma_A}$$



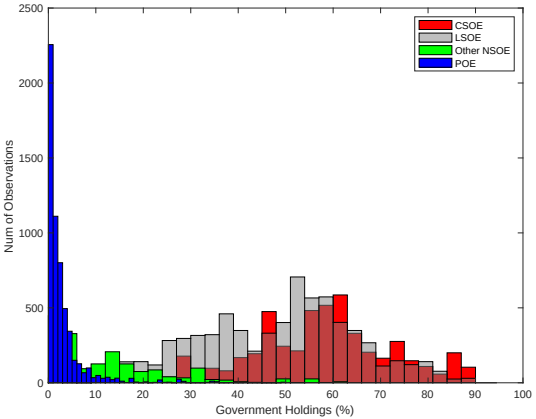
Quarterly Estimation of the Model-Implied Default Measures

- The estimation of DM is driven by equity-market and balance-sheet information.
- **DM$^{\text{Merton}}$** focuses on the fundamental credit quality.
  - Each quarter, the unlevered asset value and volatility are estimated from the empirically observed equity value and volatility,

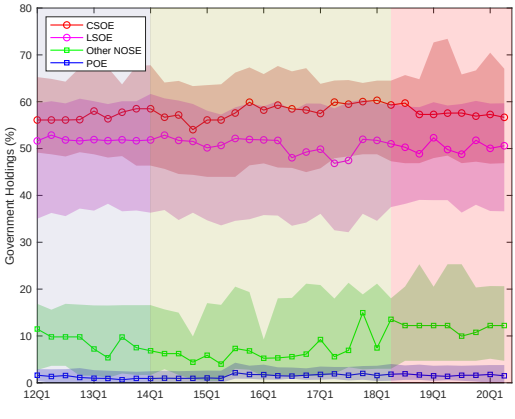
$$E_t = V_t\, N(d_1) - e^{rT}\, K N(d_2)\,; \quad \sigma_E = \frac{V}{E}\frac{\partial E}{\partial V}\sigma_A$$

  - Other information, μ and K, obtained from the firm's balance sheet.
- **DM$^{\text{Unified}}$** integrates information on credit, liquidity, and bailout.
  - Bailout π_g: using our firm-level government-holdings variable.
  - Liquidity ξ: set to 1 and 2 before and after 2018Q2.
  - Estimate the unlevered asset value and volatility from the equity market.
  - Compute the endogenous default boundary V_B, and DM $= \sigma_A / \ln(V_t/V_B)$.

Government Equity Holdings

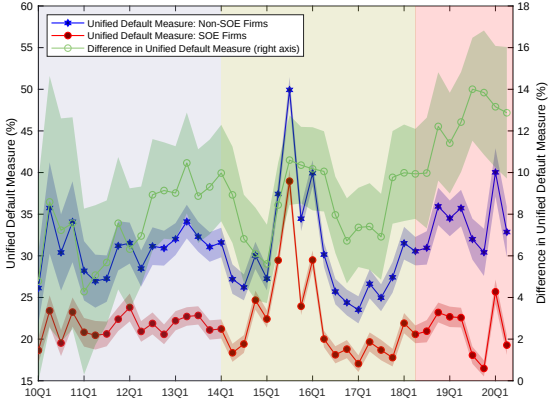


Distribution of Govt Holdings

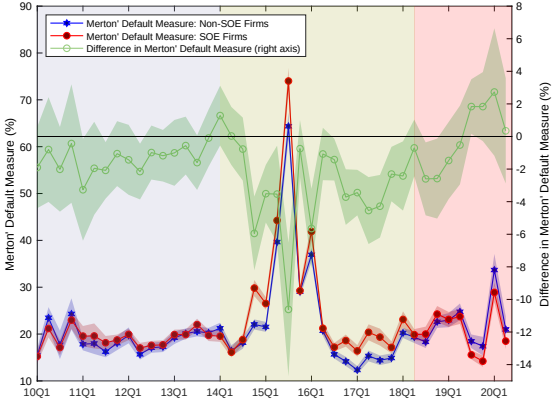


Time-Series of Govt Holdings

Empirically Estimated Default Measures (DM)



Our Unified DM



Merton's DM

Explaining the SOE Premium

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

	Phase I				Phase II				Phase III			
NSOE	0.20***	0.20***	0.21**	0.17**	0.27***	0.32***	0.17	0.06	1.13***	1.16***	-0.04	0.06
	[2.97]	[2.84]	[2.57]	[1.96]	[4.28]	[5.05]	[1.51]	[0.82]	[7.76]	[7.88]	[-0.21]	[0.38]
Merton DM		-0.12				1.36***				4.60***		
		[-0.38]				[4.52]				[4.92]		
GovtHoldings			0.04				-0.26				-2.86***	
			[0.23]				[-1.24]				[-6.95]	
Unified DM				0.34				2.27***				7.23***
				[0.91]				[6.26]				[9.92]
Rating	0.52***	0.52***	0.52***	0.52***	0.53***	0.53***	0.52***	0.52***	1.19***	1.11***	1.15***	1.23***
	[6.45]	[6.35]	[6.30]	[6.61]	[10.62]	[10.93]	[10.47]	[10.67]	[5.12]	[5.06]	[4.91]	[5.91]
Obs	4,292	4,292	4,292	4,292	9,967	9,967	9,967	9,967	5,338	5,338	5,338	5,338
Adj R^2	0.546	0.546	0.546	0.547	0.455	0.465	0.456	0.476	0.376	0.392	0.390	0.423

Explaining the SOE Premium

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

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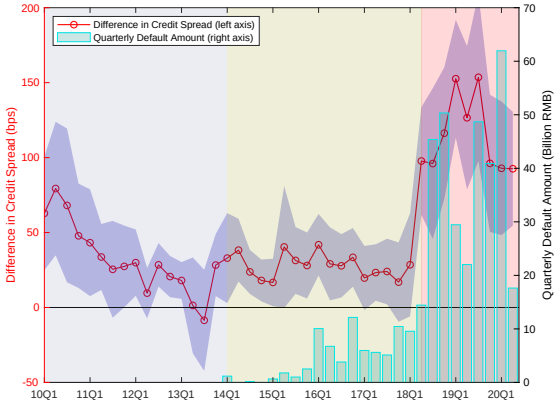
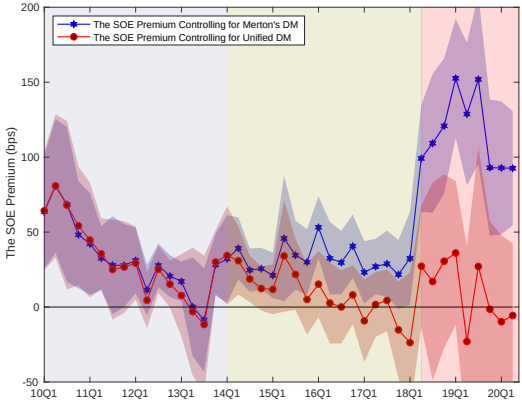
Explaining the SOE Premium



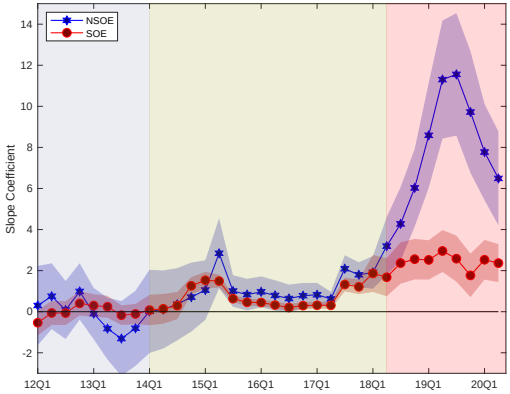
The SOE Premium



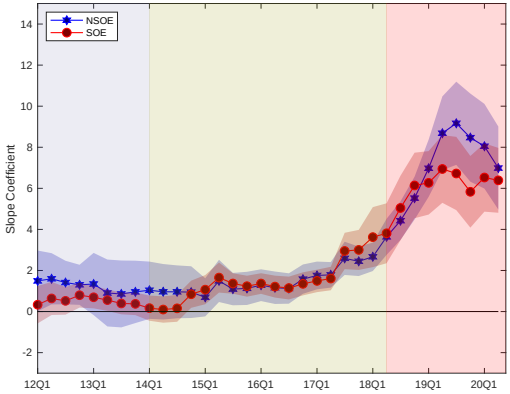
Explaining the SOE Premium

Price Discovery

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

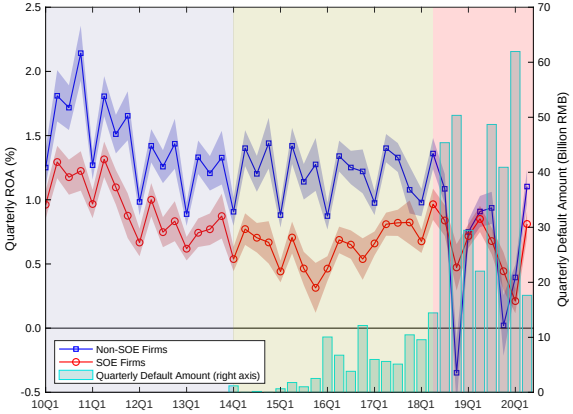


Merton's DM

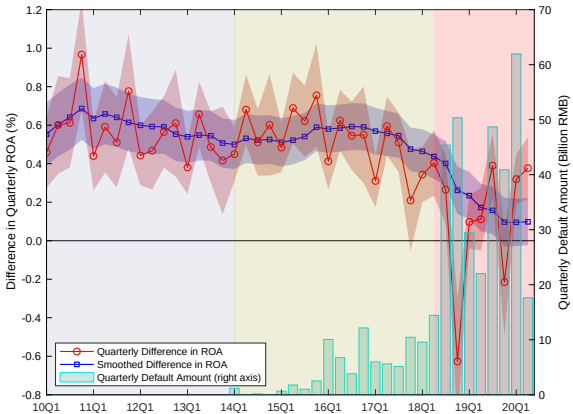


Unified DM

The Real Impact

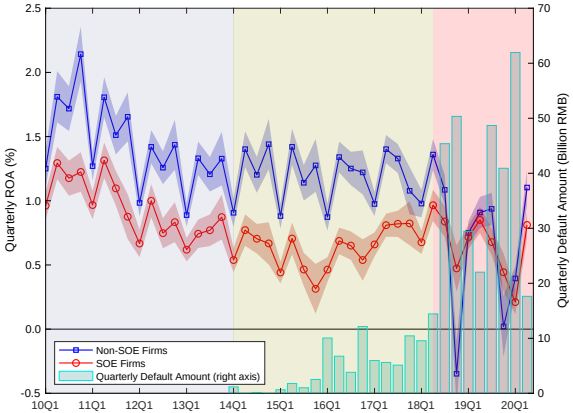


Quarterly Return on Asset



Difference in ROA

The Real Impact



Quarterly Return on Asset

	Quarterly ROA (%)		
	Phase I	Phase II	Phase III
NSOE	0.56*** [7.76]	0.52*** [8.83]	0.13 [1.07]
EquitySize	0.18*** [6.00]	0.19*** [6.33]	0.35*** [8.69]
Constant	-3.54*** [-4.85]	-4.33*** [-6.04]	-7.40*** [-9.76]
Obs	15,724	18,533	10,868
Adj R^2	0.065	0.063	0.095

$$\text{ROA}_{i,t} = a + \mathbf{b}\,\text{NSOE}_{i,t} + c\,\text{EquitySize}_{i,t} + \epsilon_{i,t}$$

Understanding the Post-Event Performance Deterioration

- Credit deterioration $\Delta\mathbf{DM}_{i,t} = \mathrm{DM}_{i,t} - \overline{\mathrm{DM}}_{i,t-1}$ at the event quarter (t=2018Q2).
- Post-event performance deterioration: $\Delta\mathbf{ROA}_{i,t+\tau} = \mathrm{ROA}_{i,t+\tau} - \overline{\mathrm{ROA}}_{i,t-1}$

	18Q3 $\tau \in [1,1]$	18Q4 $\tau \in [1,2]$	19Q1 $\tau \in [1,3]$	19Q2 $\tau \in [1,4]$	19Q3 $\tau \in [1,5]$	19Q4 $\tau \in [1,6]$	20Q1 $\tau \in [1,7]$	20Q2 $\tau \in [1,8]$
NSOE	-0.14***	-0.88***	-0.74***	-0.63***	-0.58***	-0.74***	-0.76***	-0.69***
	[-3.02]	[-12.14]	[-14.38]	[-15.08]	[-16.21]	[-19.61]	[-22.71]	[-22.50]
SOE	0.02	-0.16***	-0.13***	-0.08***	-0.08***	-0.12***	-0.20***	-0.17***
	[0.53]	[-3.28]	[-3.50]	[-2.58]	[-2.93]	[-4.81]	[-8.34]	[-7.46]
NSOE − SOE	-0.17**	-0.67***	-0.57***	-0.52***	-0.47***	-0.58***	-0.53***	-0.50***
	[-2.41]	[-7.31]	[-8.55]	[-9.56]	[-10.03]	[-12.29]	[-12.41]	[-12.72]

The Post-Event Performance Deterioration of Non-SOEs Relative to SOEs

Credit deterioration of non-SOEs leads to subsequent performance deterioration:

$$\Delta\mathbf{ROA}_{i,t+\tau} = a + \beta^{\mathrm{DM}}\,\Delta\mathbf{DM}_{i,t} + c\,\text{Equity Size}_{i,t+\tau} + \epsilon_{i,t+\tau}$$

	Predictability β^{DM} (Unified ΔDM)				Predictability β^{DM} (Merton ΔDM)			
	$\tau \in [1,2]$	$\tau \in [1,4]$	$\tau \in [1,6]$	$\tau \in [1,8]$	$\tau \in [1,2]$	$\tau \in [1,4]$	$\tau \in [1,6]$	$\tau \in [1,8]$
NSOE	-5.45***	-3.71***	-4.01***	-3.36***	-2.04*	-0.90	-0.79	-0.54
	[-4.31]	[-5.15]	[-5.98]	[-6.25]	[-1.80]	[-1.42]	[-1.32]	[-1.16]
SOE	-1.45	-1.01	-1.16*	-0.67	-0.61	-0.20	-0.07	-0.02
	[-1.05]	[-1.27]	[-1.67]	[-1.15]	[-0.98]	[-0.50]	[-0.20]	[-0.06]
NSOE − SOE	-4.28**	-2.80**	-3.03***	-2.70***	-1.48	-0.72	-0.81	-0.53
	[-2.28]	[-2.57]	[-3.11]	[-3.37]	[-1.16]	[-0.96]	[-1.17]	[-0.95]

The Post-Event Performance Deterioration of Non-SOEs Relative to SOEs

$$\Delta \text{ROA}_{i,t+\tau} = a + b^{\text{NSOE}} \, \text{NSOE}_{i,t+\tau} + c \, \text{Equity Size}_{i,t+\tau} + \epsilon_{i,t+\tau}$$

	Performance Gap b^{NSOE} (Unified ΔDM)				Performance Gap b^{NSOE} (Merton ΔDM)			
	$\tau \in [1,2]$	$\tau \in [1,4]$	$\tau \in [1,6]$	$\tau \in [1,8]$	$\tau \in [1,2]$	$\tau \in [1,4]$	$\tau \in [1,6]$	$\tau \in [1,8]$
High ΔDM_t	-0.77***	-0.60***	-0.67***	-0.60***	-0.86***	-0.62***	-0.73***	-0.62***
	[-5.44]	[-7.35]	[-9.22]	[-10.03]	[-5.93]	[-7.51]	[-9.93]	[-10.42]
Low ΔDM_t	-0.40***	-0.32***	-0.37***	-0.31***	-0.50***	-0.44***	-0.47***	-0.40***
	[-3.21]	[-4.34]	[-5.84]	[-5.72]	[-4.36]	[-6.15]	[-7.53]	[-7.73]
High − Low	-0.44**	-0.32***	-0.34***	-0.33***	-0.28	-0.12	-0.16*	-0.14*
	[-2.51]	[-3.11]	[-3.68]	[-4.31]	[-1.63]	[-1.17]	[-1.76]	[-1.78]

- The post-event performance gap between SOEs and non-SOEs stronger for firms more affected by the credit event: consistent with our hypothesis.
- Even the less-affected non-SOEs also underperform relative to their SOE counterparts: the disadvantage faced by non-SOEs goes beyond the credit channel.

Conclusions

- Studying China's credit market using a model that integrates credit risk, liquidity, and bailout, we find a deepening divide between SOEs and non-SOEs.
  - Explosive SOE premium amidst liquidity deterioration.
  - Increased importance of government support: SOEs more sensitive to bailout.
  - Heightened default risk: non-SOEs more sensitive to credit quality.
- Examining the real impact, we find
  - Severe performance deteriorations of non-SOEs relative to SOEs, reversing the long-standing trend of non-SOEs outperforming SOEs.
  - Stronger credit deterioration in 2018Q2 leads to stronger performance deterioration for non-SOEs, but not for SOEs.
  - The relative performance deterioration of non-SOEs over SOEs is present even for firms less affected by the credit deterioration, indicating that the disadvantage faced by non-SOEs goes beyond the credit channel.