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

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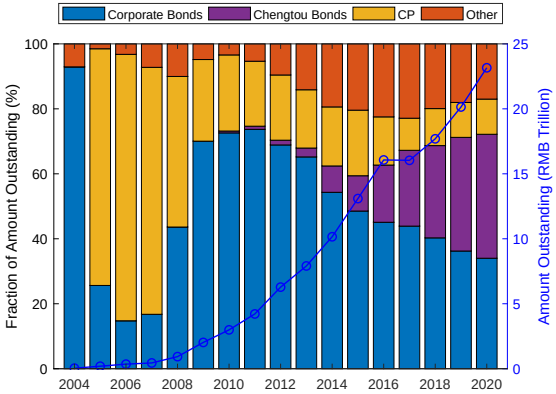
Joint work with Zhe Geng from SAIF

Motivation

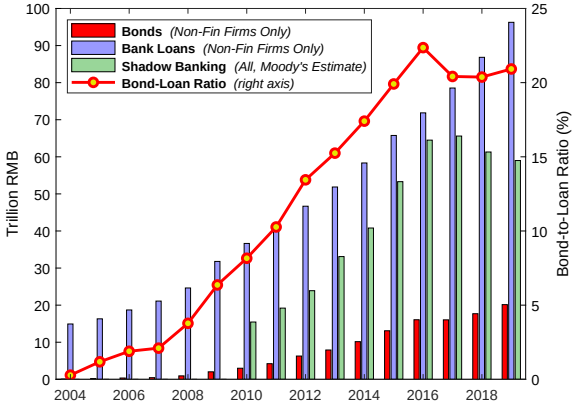
- China's credit misallocation with respect to state-owned enterprises (SOE):
  - Allocational inefficiency drags on aggregate growth (Hsieh and Klenow (2009)).
- Existing empirical evidence on credit allocation in China:
  - SOEs' preferential access to bank loans widely cited but not well documented.
  - Influenced by economic conditions and government policies (Lardy (2019)).
  - Interconnected: bank loans, credit market, and shadow banking.
- Our paper focuses on the credit market, the most visible slice:
  - The SOE premium: quantify the segmentation in pricing and its time variation.
  - Explain the SOE premium using issuer-level measures of government support.
  - Price discovery under the credit-market segmentation.
  - Estimate the real impact of the credit misallocation.

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



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

Our Findings

- 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, beyond the SOE label, becomes important in credit pricing.
- Severe segmentation in credit pricing amid government-led credit tightening:
  - Post 2018Q2, the SOE premium exploded from 20 bps to well over 100 bps.
  - Explain the SOE premium using issuer-level measures of government support.
- Price discovery diverges under the segmentation:
  - Non-SOE credit spreads: credit quality.
  - SOE credit spreads: the extent of government support.
- The real impact of the allocational inefficiency:
  - Post 2018Q2, non-SOEs have lost their advantage over SOEs in profitability.

Our Contributions to the Literature

- The macro literature on credit misallocations and their impact on China's growth:
  - Brandt and Zhu (2000), Dollar and Wei (2007), Hsieh and Klenow (2009), Song, Storesletten, and Zilibotti (2011), Lardy (2019), Cong, Gao, Ponticelli, and Yang (2019), and Huang, Pagano, and Panizza (2020).
  - **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

- Overview: Hu, Pan and Wang (2019) and Amstad and He (2019).
- Government guarantee in
  - SOE bonds: Jin, Wang and Zhang (2018).
  - Chengtou Bonds: Bai and Zhou (2018) and Liu, Lyu and Fu (2017).
- Other topics:
  - Wang, Wei, and Zhong (2015) on yield-chasing retail investors.
  - Mo and Subrahmanyam (2019) on liquidity.
  - Chen, Chen, He, Liu and Xie (2019) on pledgeability.
  - 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.
  - Huang, Liu, and Shi (2020) on the determinants of short-term credit spreads.

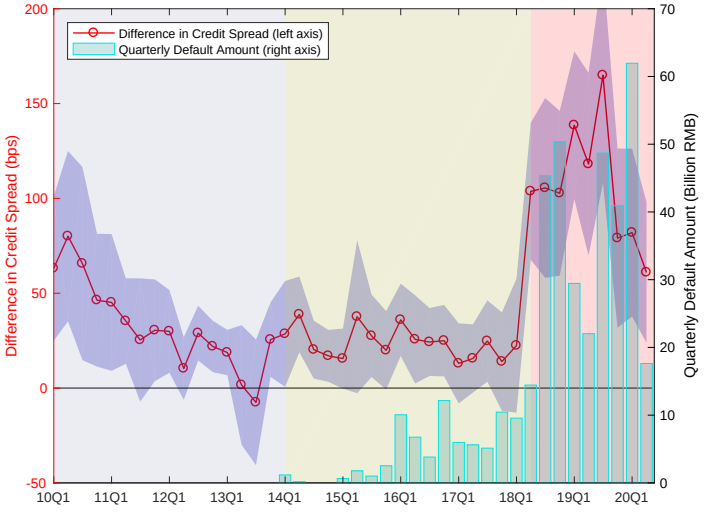
Measuring the SOE Premium

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*** [3.08]	0.21*** [3.58]	1.06*** [7.78]	0.16*** [3.47]	0.79*** [12.92]	1.54*** [17.28]
Rating	0.51*** [6.39]	0.53*** [10.96]	1.24*** [4.84]	0.54*** [14.11]	0.41*** [16.89]	0.46*** [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:
  - 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.

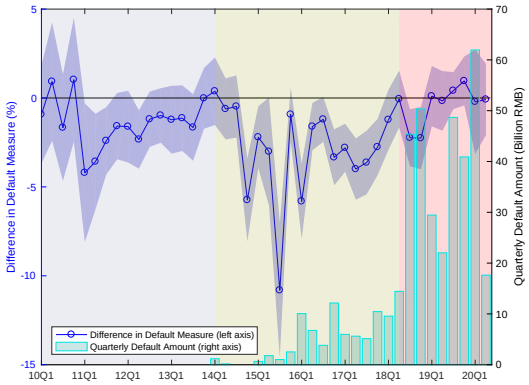
Proxy for Credit Quality: Default Measure

- 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.

Difference in Default Measure, SOEs vs Non-SOEs



Difference in Default Measure

Quarterly panel regressions with quarter and industry fixed effects:

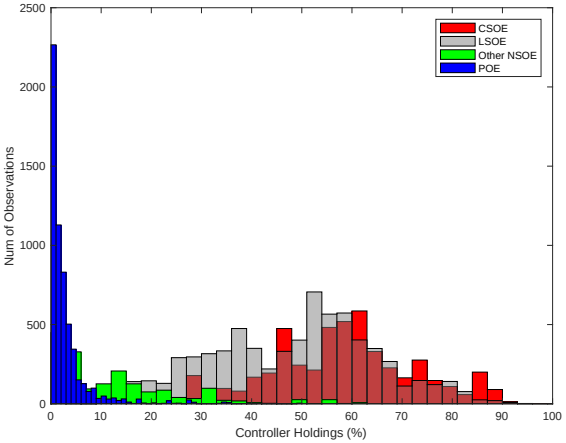
$$\text{DM}_{i,t} = a + \mathbf{b}\,\text{NSOE}_{i,t} + c\,\text{Rating}_{i,t} + \sum_k \text{Controls}^k_{i,t} + \epsilon_{i,t}$$

	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

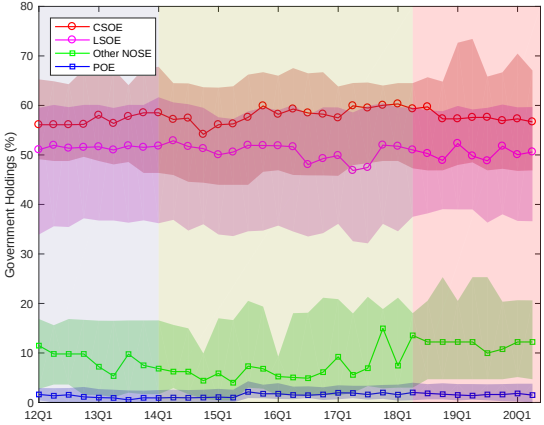
Proxies for Government Support

- **The Non-SOE Dummy:**
  - Defined by the affiliation, state or non-state, of the end-controller of the firm.
  - Government: central or local SASAC, government institutions, and SOEs.
  - Treats the SOE and non-SOE samples as two solid blocks.
- **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 both across and within the samples of SOEs and non-SOEs.

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

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]
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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*** [3.08]	0.20*** [2.95]	0.20** [2.46]	0.21*** [3.58]	0.25*** [4.32]	0.18* [1.68]	1.06*** [7.78]	1.09*** [7.76]	-0.09 [-0.48]
DM		-0.13 [-0.40]			1.26*** [4.52]			4.78*** [5.24]	
GovtHoldings			0.00 [0.01]			-0.08 [-0.37]			-2.81*** [-7.82]
Rating	0.51*** [6.39]	0.51*** [6.29]	0.51*** [6.23]	0.53*** [10.96]	0.53*** [11.23]	0.52*** [11.01]	1.24*** [4.84]	1.16*** [4.73]	1.20*** [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

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

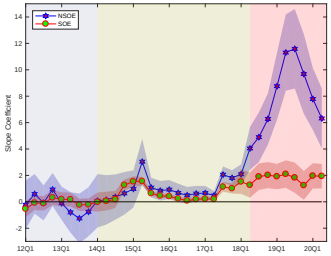
NSOE	Phase I				Phase II				Phase III			
DM		-0.03		-0.01		1.63***		1.62***		7.89***		8.01***
		[-0.03]		[-0.02]		[2.88]		[2.89]		[3.83]		[3.94]
GovtHoldings			0.45	0.45			0.24	0.12			-5.52***	-5.69***
			[1.06]	[1.05]			[0.52]	[0.27]			[-4.56]	[-5.14]
Rating	0.74***	0.74***	0.75***	0.75***	0.41***	0.41***	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

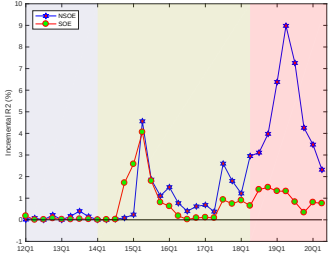
Credit Spreads on Default Measure and Government Holdings

Default Measure

Left: regression coefficient

Right: incremental R2

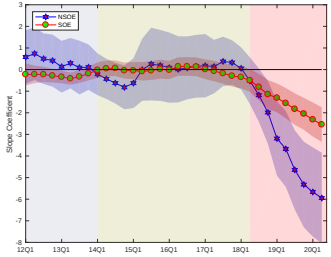


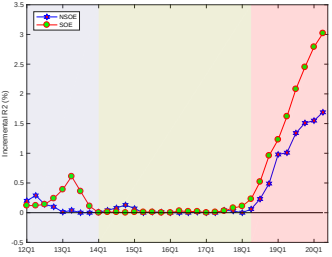


Government Holdings

Left: regression coefficient

Right: incremental R2

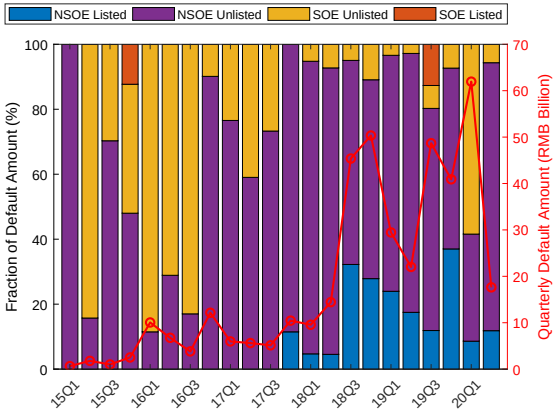




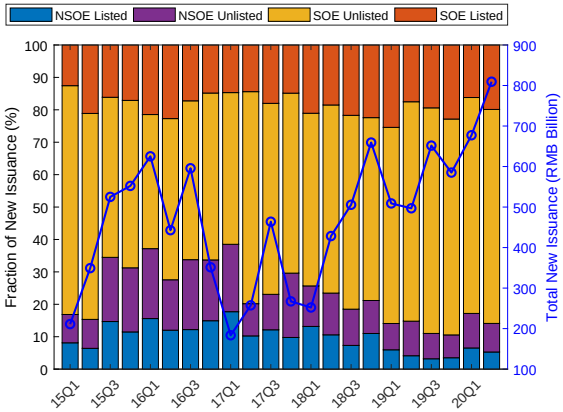
The Real Impact

- Among the most important friction in China's economy: the divide between SOEs and non-SOEs.
- 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

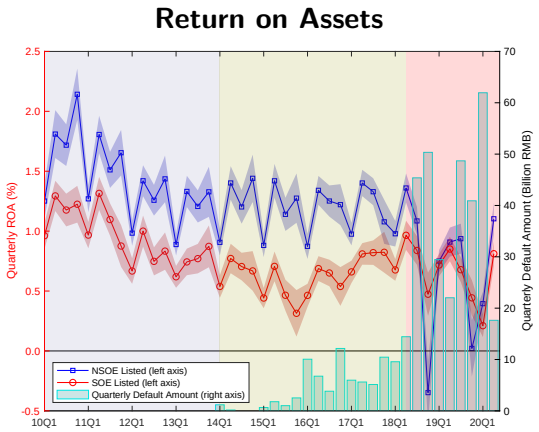


Quarterly Default in Credit Market



Quarterly New Issuance of Corporate Bonds

The Real Impact of the Credit-Market Segmentation



Quarterly panel regression with quarter and industry fixed effects:

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

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

Conclusions

- Our paper provides the first comprehensive study on the price efficiency of China's credit market with respect to credit quality.
- Focusing on the credit-market allocation between SOEs and non-SOEs, we are also the first to quantify the extent of the credit misallocation, its time variation, and its driver (i.e., the emergence of government support in credit pricing).
- Examining the real impact of the deepening allocational inefficiency, we show that non-SOEs in China are losing their advantage over SOEs in profitability and fundamental strength.
- Overall, we find a market of improved price efficiency, and, paradoxically, worsening segmentation as government support emerges as an important factor in credit pricing.

Summary Statistics: Bond-Level Data

	Non-SOE Listed			SOE Listed			Non-SOE Unlisted			SOE Unlisted		
	mean	med	std	mean	med	std	mean	med	std	mean	med	std
NumIssuers	367			403			403			1,795		
NumBonds	923			1,477			1,518			7,061		
CreditSpread (%)	2.47	1.94	2.39	1.39	0.99	1.41	2.82	2.48	1.85	1.58	1.31	1.18
Rating	2.43	3.00	0.85	1.69	1.00	0.84	2.33	2.00	0.81	1.98	2.00	0.86
Maturity (yr)	2.97	2.79	1.25	3.33	2.95	1.70	3.11	2.81	1.47	3.59	3.23	1.86
IssueSize (billion)	1.03	0.80	0.89	2.00	1.20	2.56	1.09	1.00	0.92	1.67	1.00	2.18
Age (yr)	1.75	1.53	1.26	2.01	1.61	1.67	1.66	1.38	1.31	2.29	1.86	1.86
Coupon (%)	5.91	5.90	1.24	5.13	5.10	1.09	6.11	6.20	1.31	5.79	5.80	1.25
Embed	0.63	1.00	0.48	0.39	0.00	0.49	0.56	1.00	0.50	0.26	0.00	0.44
Exch	0.69	1.00	0.46	0.53	1.00	0.50	0.48	0.00	0.50	0.21	0.00	0.41
ZeroDays (%)	77	88	26	86	93	18	85	93	20	88	94	16
Turnover (%)	31	13	62	35	10	80	48	15	117	63	21	144
TradingDays (day)	15	8	18	10	5	12	10	5	13	8	4	11

Summary Statistics: Bond-Level Data by Period

	Non-SOE Listed						SOE Listed					
	Phase I		Phase II		Phase III		Phase I		Phase II		Phase III	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
NumIssuers	178		315		227		256		340		252	
NumBonds	221		643		570		458		824		884	
CreditSpread (%)	2.03	1.25	2.06	1.39	3.57	3.78	1.21	0.79	1.32	1.31	1.70	1.89
Rating	2.73	0.75	2.60	0.73	1.91	0.91	1.85	0.86	1.80	0.89	1.34	0.61
Maturity (yr)	3.89	1.38	2.94	1.16	2.42	0.94	4.16	2.01	3.22	1.55	2.76	1.31
IssueSize (billion)	0.94	0.80	1.01	0.94	1.14	0.85	2.31	3.16	1.89	2.49	1.91	2.01
Age (yr)	1.25	1.04	1.81	1.30	1.94	1.21	1.54	1.36	2.26	1.69	1.98	1.77
Coupon (%)	6.45	0.99	5.96	1.23	5.46	1.25	5.44	0.97	5.24	1.09	4.65	1.05
Embed	0.52	0.50	0.65	0.48	0.65	0.48	0.28	0.45	0.43	0.50	0.43	0.49
Exch	0.77	0.42	0.70	0.46	0.63	0.48	0.56	0.50	0.56	0.50	0.45	0.50
ZeroDays (%)	62	30	76	26	88	16	79	21	85	19	92	10
Turnover (%)	44	91	32	56	20	47	54	118	31	70	26	46
TradingDays (day)	25	20	16	18	8	11	14	14	10	13	5	6

Summary Statistics: Equity-Level Data

	Non-SOE Listed											
	All			Phase I			Phase II			Phase III		
	mean	med	std	mean	med	std	mean	med	std	mean	med	std
# Firms	367			178			315			227		
Equity Size (log)	23.30	23.26	1.02	22.57	22.48	0.93	23.31	23.28	0.88	23.77	23.70	1.08
Leverage (%)	58.55	59.06	15.29	55.76	56.43	12.84	57.39	57.89	15.27	62.67	62.47	15.97
Asset Growth (%)	24.96	20.91	19.42	28.69	24.45	21.24	24.69	20.65	19.64	23.08	19.50	17.28
Asset Volatility (%)	22.95	19.72	15.50	22.13	21.19	10.34	26.04	21.61	17.44	17.33	14.59	12.21
Default Measure (%)	21.18	18.07	12.78	18.70	17.87	6.59	22.48	18.45	14.97	20.21	17.50	10.60
Govt Holdings (%)	5.07	2.03	8.36	4.97	1.59	8.72	4.51	1.93	7.50	6.23	2.99	9.55
Ctrl Holdings (%)	36.41	32.81	17.43	36.55	33.18	18.83	36.90	33.32	16.78	35.35	32.05	17.69
	SOE Listed											
# Firms	403			256			340			252		
Equity Size (log)	23.71	23.56	1.34	23.31	23.05	1.40	23.71	23.52	1.28	24.05	23.98	1.28
Leverage (%)	61.67	64.05	14.90	61.18	62.99	14.61	61.19	63.51	15.70	63.00	65.96	13.56
Asset Growth (%)	14.32	12.11	13.04	19.69	17.01	14.23	12.82	11.15	12.99	12.11	10.38	10.37
Asset Volatility (%)	17.18	13.31	13.83	15.07	12.89	9.54	21.41	16.69	16.24	11.46	8.51	9.07
Default Measure (%)	22.56	18.79	15.12	18.39	17.70	7.83	26.78	21.33	18.91	18.71	17.10	9.26
Govt Holdings (%)	51.93	53.86	16.76	52.08	53.85	17.34	51.22	53.60	16.71	53.08	54.65	16.26
Ctrl Holdings (%)	45.50	46.00	16.39	47.19	48.81	17.20	45.26	45.54	16.45	44.41	44.92	15.40