



Price Discovery and Market Segmentation in China's Credit Market

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Working Paper

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Introduction

Market-based credit channel has a profound and potentially long-lasting impact.

- Credit-demand side: cheaper and more efficient than the traditional bank loans.
the ratio of market-based debt to bank debt from 4.6% in 2008 to 19% in 2018
- Credit-supply side: offer a new asset class for the growing asset-management industry

Objective:

- Do market prices accurately reflect the fundamental?
(do credit spreads in China reflect the credit quality of the bond issuers?)
- How and when do differentiation such as the one between state-owned enterprises (SOEs) and non-SOE start to erode credit pricing and threaten the stability of the market?



Introduction---credit spread & fundamentals

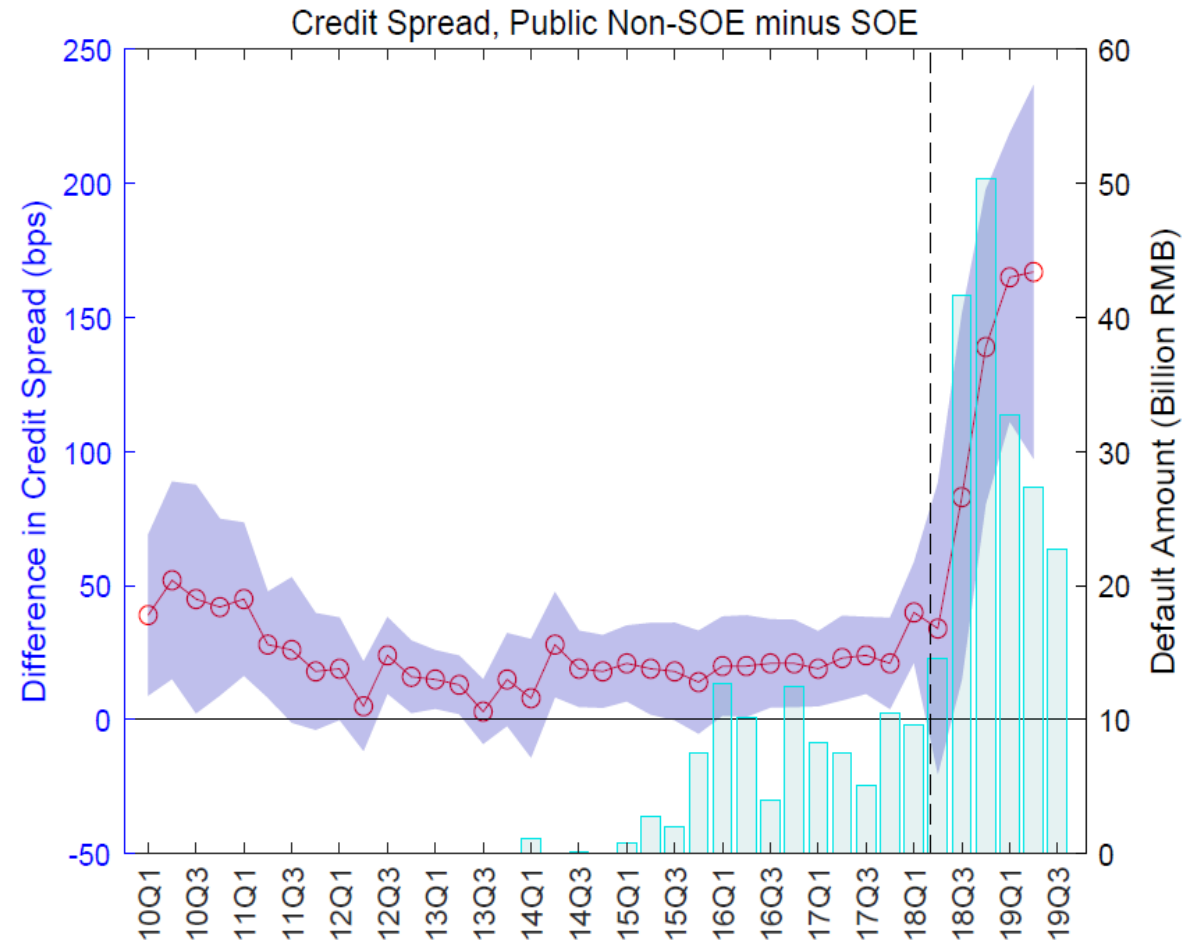
- Prior to 2014: China's credit market was absent of default events;
- From 2014 to 2018Q1: the first wave of defaults occurs mostly to privately held firms, but its impact is felt in the pricing of bonds issued by public firms. a statistically significant relation between credit spreads and default measures.
but the capacity for price discovery remains limited in the Chinese credit market.

Introduction—Market Segmentation

A severe segmentation between the pricing of non-SOE and SOE bonds that arises sharply post 2018,

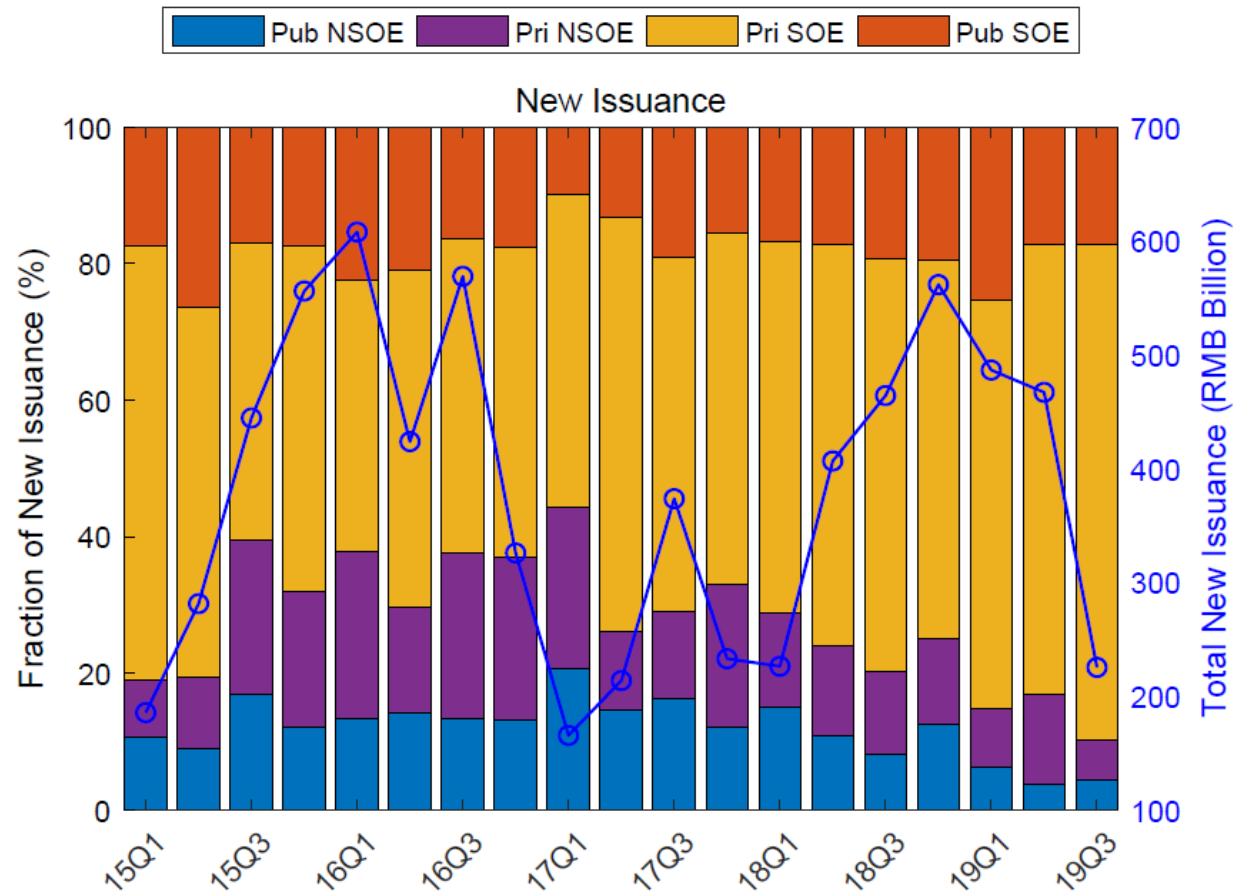
- the sequence of credit-tightening policies
- April 2018 release of “New Regulations on Asset Management,” has severely weakened the demand for corporate bonds

non-SOE issuers are more vulnerable due to their lack of outside support from central and local government



Introduction—Market Segmentation

New issuance by non-SOEs: 44% in 2017Q1---10% in 2019Q3 occurs not only for public firms but also private



Introduction—Market Segmentation

This market segmentation is not driven by the fundamentals of the firms.

- Prior to the 2014 default, the difference in default measure between the SOE and non-SOE samples is economically small and of marginal statistical significance.
- After the first default in 2014, the default measures of these two samples of firms start to diverge, with non-SOEs becoming significantly healthier than their SOE counterparts

Introduction—Market Segmentation

This market segmentation has also caused a segmentation in price discovery.

- During this severe segmentation, investors are forced to be more discriminating against the non-SOE bonds because of the perceived vulnerability, making the SOE prices less efficient.
- The relation between credit spreads and default measures is statistically insignificant for SOE bonds

The severe segmentation also has impact on market efficiency

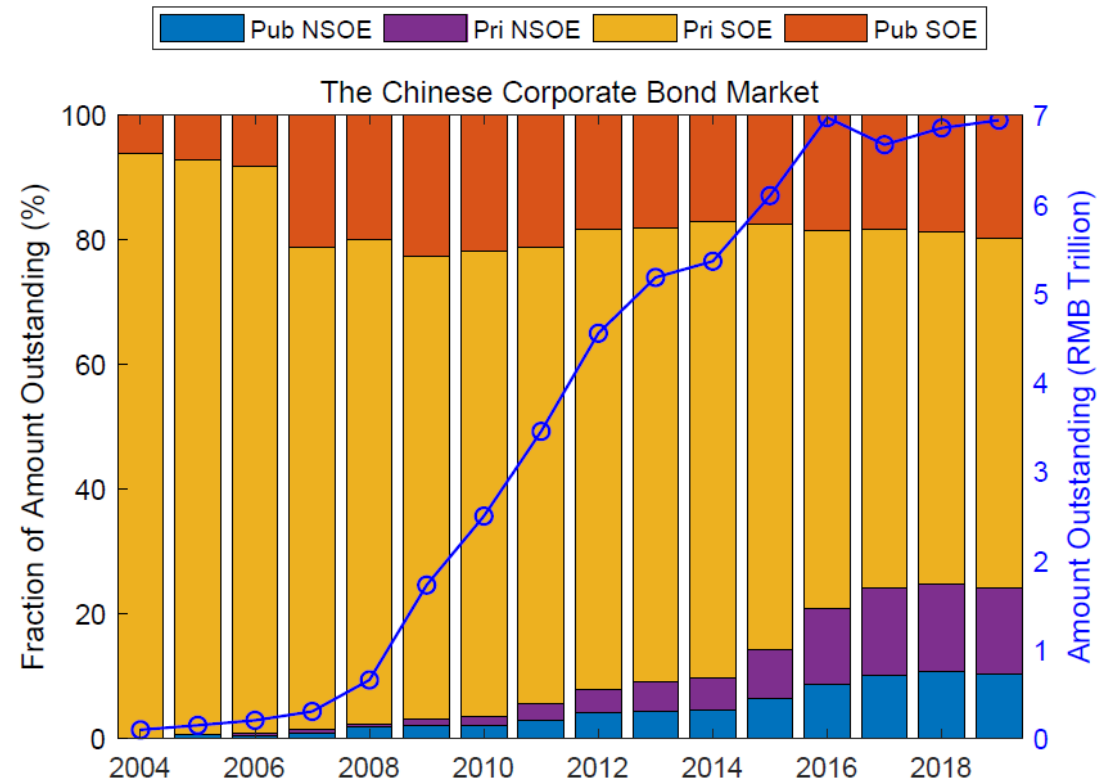
- the pricing of non-SOE bonds becomes more efficient amidst market turmoil, while there is no improvement in the pricing of SOE bonds as investors seek safety in such bonds.

Introduction—Market Segmentation

The group of corporate bonds: Medium-Term Notes, Corporate Bonds, Enterprise Bonds.

- the dominance of the public issuers.
 - the dominance of the SOE issuers.
- Gap within the private sample is even more astounding

Privately-held SOEs continue to dominate the market share is an unhealthy situation for this market.



Data——The Corporate Bond Sample

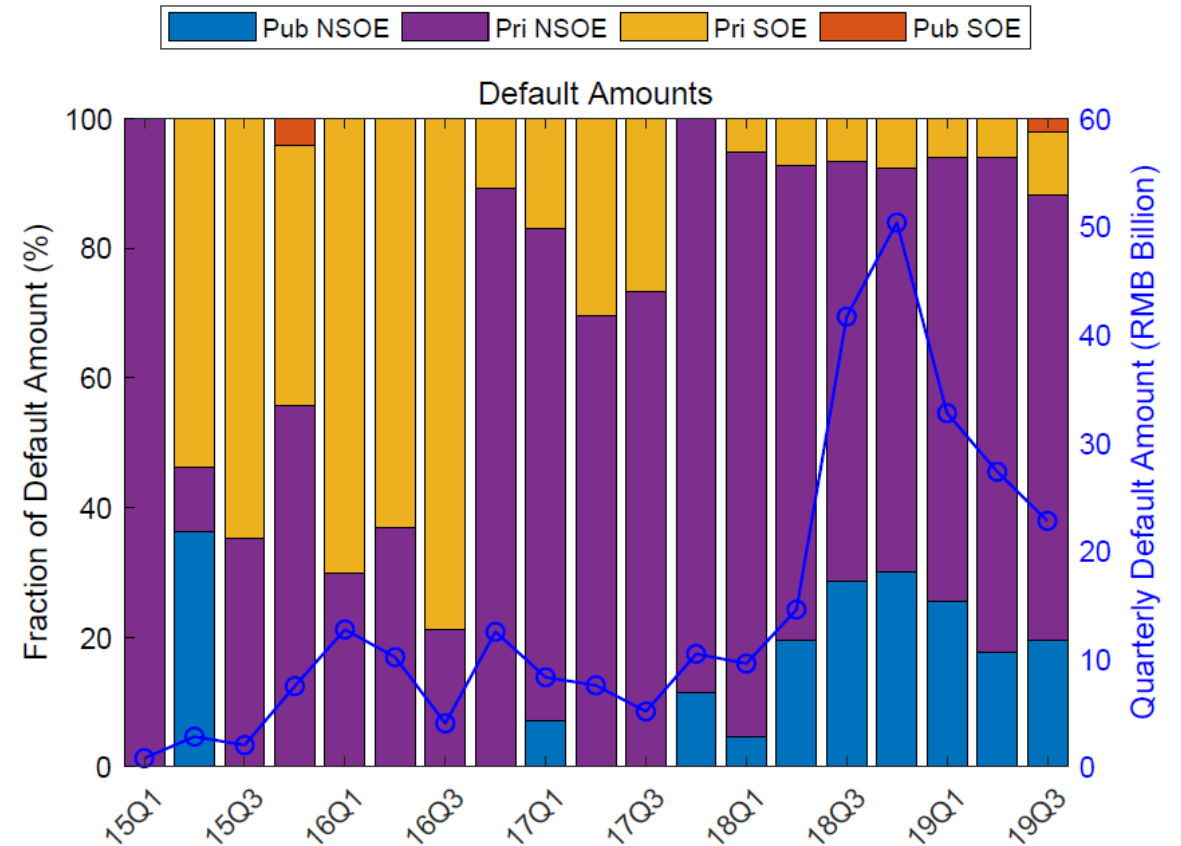
Bond-Level Data

- fixed-rate bonds in the form of medium-term notes, corporate bonds and enterprise bonds issued by non-financial listed companies.
- Quarterly bond prices with bond characteristics and bond trading variables yield to maturity
- Reference curve: yield curve of the Chinese Development Bank (CDB) bonds
- Defaulted bonds are excluded from our data sample retroactively. And other not yet defaulted bonds issued by the same firm, once the firm has defaulted on at least one bond.

Data—The Corporate Bond Sample

January 1, 2010 to June 30, 2019.

- Period I: from 2010 through 2013, is the pre-default period.
- Period II: from 2014 through 2018Q1, captures the first wave of defaults, which occurred mostly to private firms in industries suffering from overcapacity.
- Period III, from 2018Q2 to 2019Q2, captures the second and much more severe wave of defaults.



Data—The Corporate Bond Sample

SOE bonds in general have higher ratings, larger issuance size and with longer maturity and older in age.

Table 1: Summary Statistics: Bond-Level Data

	Public Non-SOE			Public SOE		
	mean	med	std	mean	med	std
NumIssuers	326			369		
NumBonds	761			1,147		
CreditSpread (%)	2.24	1.78	2.68	1.21	0.98	1.16
Rating	2.45	3.00	0.83	1.76	1.00	0.88
Maturity (yr)	3.06	2.88	1.27	3.40	3.00	1.73
IssueSize (billion)	1.03	0.80	0.92	2.04	1.20	2.69
Age (yr)	1.75	1.52	1.28	2.05	1.67	1.67
Coupon (%)	5.90	5.89	1.21	5.23	5.20	1.09
Embed	0.62	1.00	0.49	0.39	0.00	0.49
Exch	0.70	1.00	0.46	0.55	1.00	0.50
ZeroDays (%)	76	88	27	85	93	19
Turnover (%)	31	13	60	34	10	75
TradingDays (day)	16	8	18	10	5	13
	Private Non-SOE			Private SOE		
	mean	med	std	mean	med	std
NumIssuers	387			1,511		
NumBonds	1,287			5,243		
CreditSpread (%)	2.48	2.23	1.69	1.54	1.29	1.15
Rating	2.38	2.00	0.76	1.89	2.00	0.87
Maturity (yr)	3.20	2.89	1.48	3.64	3.30	1.89
IssueSize (billion)	1.09	1.00	0.89	1.87	1.10	2.46
Age (yr)	1.60	1.34	1.27	2.20	1.79	1.84
Coupon (%)	6.09	6.20	1.29	5.70	5.60	1.25
Embed	0.55	1.00	0.50	0.29	0.00	0.45
Exch	0.46	0.00	0.50	0.19	0.00	0.39
ZeroDays (%)	58	78	57	61	78	52
Turnover (%)	46	16	102	71	22	159
TradingDays (day)	10	5	13	9	5	12

Data—The Corporate Bond Sample

Table 2: Summary Statistics: Bond-Level Data by Period

	Public Non-SOE						Public SOE					
	Period I		Period II		Period III		Period I		Period II		Period III	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
NumIssuers	166		292		196		248		332		209	
NumBonds	204		587		443		445		796		568	
CreditSpread (%)	1.92	0.92	1.89	1.19	3.62	5.34	1.20	0.78	1.19	1.07	1.28	1.83
Rating	2.68	0.76	2.55	0.78	1.94	0.88	1.83	0.87	1.82	0.91	1.39	0.65
Maturity (yr)	3.93	1.39	2.96	1.18	2.48	0.92	4.13	2.02	3.19	1.56	2.84	1.29
IssueSize (billion)	0.98	0.83	1.01	0.95	1.14	0.88	2.33	3.19	1.90	2.51	2.01	2.20
Age (yr)	1.31	1.08	1.83	1.33	1.95	1.22	1.53	1.36	2.26	1.69	2.23	1.86
Coupon (%)	6.40	0.95	5.88	1.22	5.44	1.21	5.44	0.99	5.27	1.10	4.70	1.04
Embed	0.51	0.50	0.65	0.48	0.65	0.48	0.28	0.45	0.43	0.49	0.46	0.50
Exch	0.78	0.41	0.70	0.46	0.63	0.48	0.56	0.50	0.56	0.50	0.48	0.50
ZeroDays (%)	62	30	77	26	88	15	79	21	85	19	92	10
Turnover (%)	46	103	30	44	18	29	53	119	28	48	22	34
TradingDays (day)	26	20	15	17	8	10	14	14	10	13	5	7
	Private Non-SOE						Private SOE					
	Period I		Period II		Period III		Period I		Period II		Period III	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
NumIssuers	142		354		276		1,062		1,398		614	
NumBonds	280		1,014		775		2,579		3,913		2,064	
CreditSpread (%)	1.98	0.82	2.32	1.33	3.25	2.53	1.61	0.95	1.53	1.23	1.33	1.25
Rating	2.74	0.70	2.43	0.71	2.02	0.75	2.02	0.87	1.93	0.86	1.33	0.62
Maturity (yr)	3.97	1.80	3.22	1.42	2.64	1.10	4.51	1.90	3.21	1.73	2.89	1.53
IssueSize (billion)	1.03	0.71	1.08	0.89	1.16	0.99	1.90	2.60	1.81	2.41	2.05	2.23
Age (yr)	1.04	0.92	1.58	1.28	2.00	1.28	1.71	1.56	2.58	1.89	2.02	2.02
Coupon (%)	6.30	0.98	6.13	1.33	5.84	1.30	5.79	1.20	5.79	1.27	4.97	1.06
Embed	0.36	0.48	0.54	0.50	0.70	0.46	0.29	0.46	0.27	0.45	0.38	0.49
Exch	0.16	0.37	0.47	0.50	0.65	0.48	0.19	0.39	0.18	0.39	0.24	0.43
ZeroDays (%)	49	55	58	60	64	48	42	64	70	42	78	25
Turnover (%)	116	205	38	66	21	33	124	239	43	76	33	42
TradingDays (day)	12	13	10	14	8	10	13	15	7	10	5	6

Data——Issuer-Level Equity Data

EquitySize : the logarithm of the equity value.

Equity volatility : daily stock returns during the quarter

Leverage : the ratio of total current liabilities plus half of the total non-current liabilities to the total asset value.

▶ Data—Construction of Default Measures

Merton (1974) , Moody's KMV (Kealhofer and Kurbat ,2001)

A lower distance-to-default indicates that the firm is closer to the default boundary, and therefore has a higher probability of default.

The firm's equity is the European call option on the firm's asset with strike price K equalling the firm's liability.

$$E_t = V_t N(d_1) - e^{rT} K N(d_2)$$

$$\sigma_E = \frac{V}{E} \frac{\partial E}{\partial A} \sigma_A,$$

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

- **Distance-to-Default:**

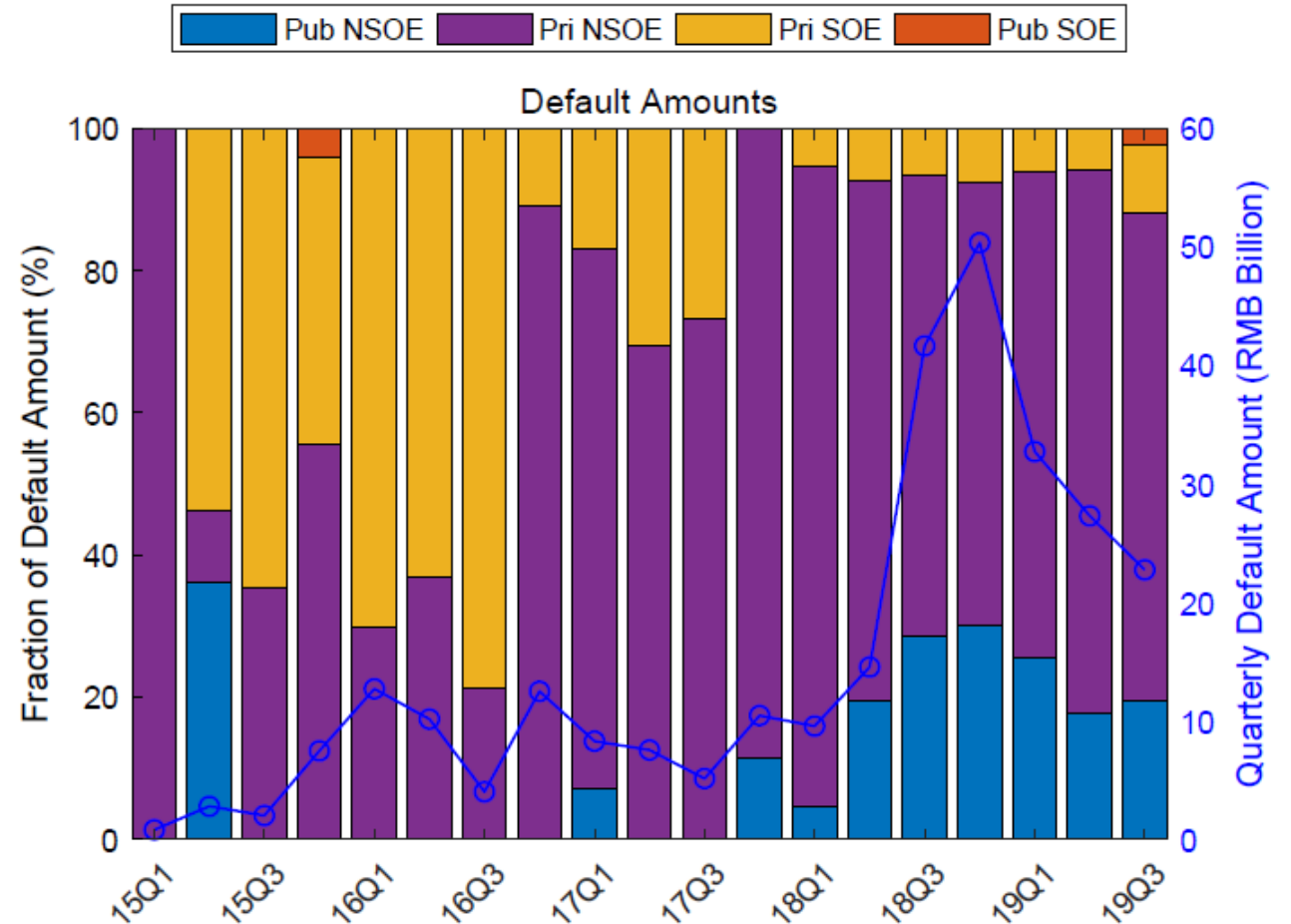
$$DD_t = \frac{\ln(V_t/K) + (\mu - \sigma_A^2/2) T}{\sigma_A \sqrt{T}}.$$

- **Default measure: the inverse of DD**

Empirical Results—Corporate Defaults in China

The first wave of defaults occurred mostly to privately held issuers

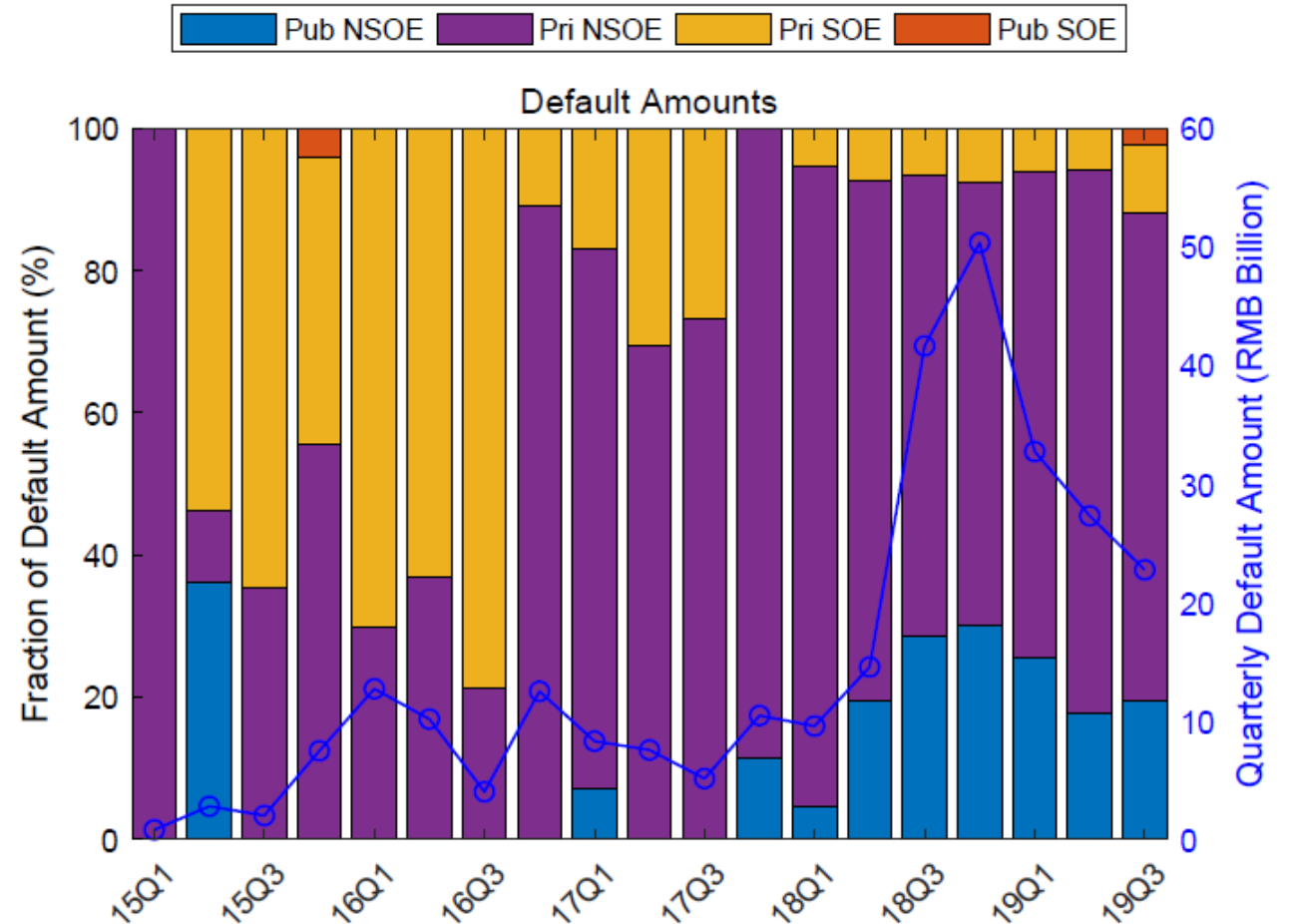
- quarterly default amount ranging from less than RMB 1 billion to 12.7 billion in 2016Q1.
- Compared with the total size of the credit market, RMB 17.6 trillion in 2016, this amount of default is tiny.
- the private SOEs were affected more severely than private non-SOEs.



Empirical Results——Corporate Defaults in China

From 2016Q4, non-SOEs took most of the blunt.

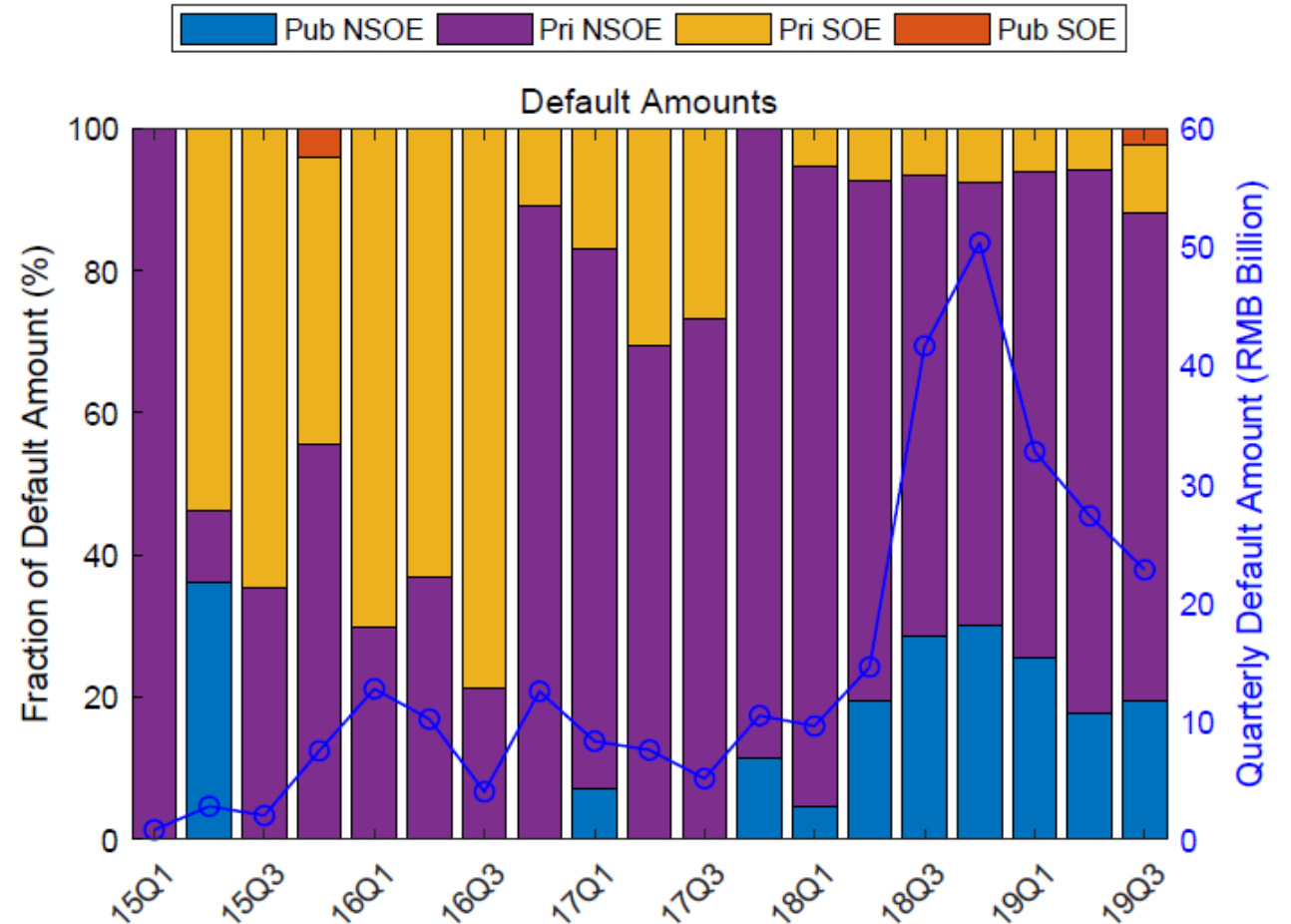
- Starting from 2016Q4, the total amount of default in the credit market lessened, fraction of private SOE defaults reduced rather dramatically, from 78.9% in 2016Q3 to 10.8% a quarter later in 2016Q4.



Empirical Results——Corporate Defaults in China

From 2018Q2, the public non-SOE issuers were severely hit and, at its peak in 2018Q4,

- the public non-SOE issuers accounted for 30% of the total default amount in the credit market in 2018Q4,
- the magnitude of the default amount has also increased rather dramatically
- Over 90% of the default occurs to non-SOE issuers is a clear signal to the market that these are the more vulnerable issuers.





Empirical Results — Segmentation between SOE and Non-SOE

Difference in Credit Spreads

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

Table 4: Market Segmentation between SOE and Non-SOE

	Public Sample						Private Sample		
	CreditSpread (%)			DM (%)			CreditSpread (%)		
	Period I	Period II	Period III	Period I	Period II	Period III	Period I	Period II	Period III
NonSOE	0.16*** [3.33]	0.20*** [4.11]	1.13*** [3.77]	-0.93* [-1.91]	-3.73*** [-4.72]	-1.91*** [-3.24]	0.14*** [2.91]	0.63*** [13.57]	1.17*** [10.88]
Rating	0.49*** [13.17]	0.63*** [17.38]	1.83*** [3.97]	0.68* [1.70]	0.87** [2.41]	1.96*** [2.93]	0.55*** [16.01]	0.60*** [25.39]	1.04*** [14.44]
Maturity	0.04*** [2.75]	0.04** [2.26]	0.08 [0.94]	-0.13 [-0.95]	0.09 [0.41]	-0.01 [-0.06]	0.09*** [8.76]	0.03** [2.10]	-0.07*** [-4.50]
Age	-0.01 [-0.84]	0.03 [1.63]	0.22*** [2.90]	-0.20 [-1.01]	0.58*** [2.77]	0.28* [1.87]	-0.01 [-1.18]	0.05*** [3.74]	0.03 [1.48]
IssueSize	-0.05*** [-4.05]	-0.11*** [-7.55]	-0.13 [-1.61]	-0.60*** [-5.07]	-0.19 [-0.85]	-0.62*** [-2.59]	-4.70*** [-9.70]	-11.79*** [-9.33]	-11.79*** [-10.10]
ZeroDays	-0.88*** [-4.51]	-1.77*** [-9.44]	-5.63*** [-5.40]	0.13 [0.17]	-4.92*** [-3.32]	-1.65 [-1.52]	-0.00*** [-4.13]	-0.00*** [-8.12]	-0.01*** [-7.32]
Embed	-0.15 [-1.11]	0.54*** [5.93]	0.53** [2.10]	-2.59** [-2.33]	1.59 [1.44]	-0.64 [-0.68]	-0.02 [-0.42]	0.08 [1.19]	0.90*** [14.82]
Exch	0.01 [0.18]	-0.24*** [-4.16]	-0.33 [-1.24]	-0.50 [-0.87]	-0.65 [-0.96]	-0.78 [-1.27]	0.07 [1.21]	0.26** [2.34]	0.10 [1.46]
Embed×Exch	0.08 [0.49]	-0.75*** [-7.48]	-1.43*** [-4.27]	2.87** [2.23]	-1.61 [-1.21]	1.43 [1.53]	-0.24*** [-3.60]	-0.71*** [-6.35]	-0.92*** [-5.22]
Constant	1.19*** [5.15]	1.97*** [9.77]	3.21*** [2.75]	16.37*** [9.47]	22.04*** [10.15]	18.63*** [8.22]	0.15 [1.42]	0.84*** [5.77]	1.08*** [6.06]
Observations	4,225	9,560	2,878	4,225	9,560	2,878	20,222	33,761	8,202
Adjusted R^2	0.606	0.544	0.294	0.162	0.660	0.189	0.558	0.384	0.445

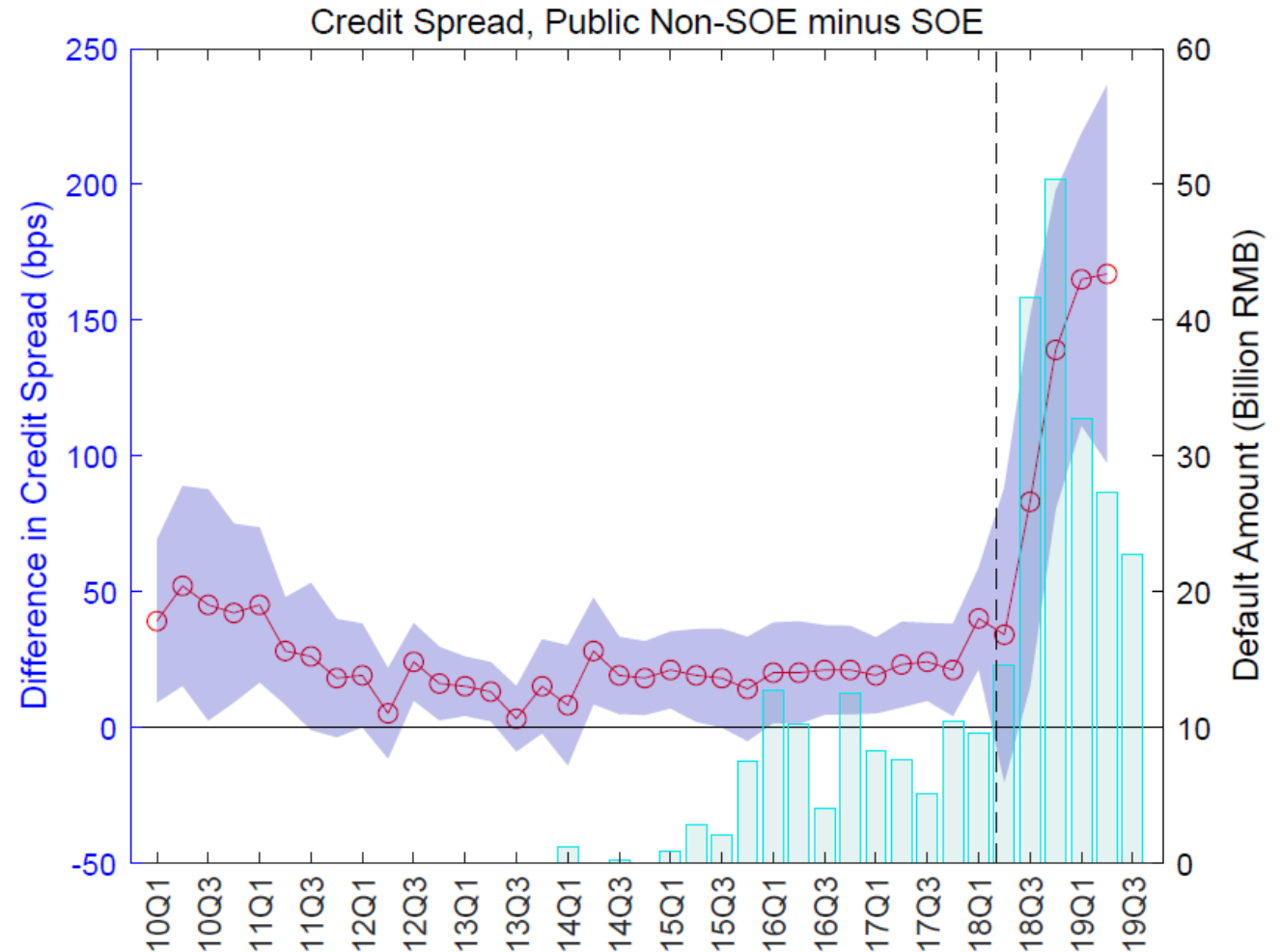
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Empirical Results—Segmentation between SOE and Non-SOE

Difference in Credit Spreads

- the most dramatic explosion in segmentation coincides with the record level of default amounts in the credit market.
- the severity of the segmentation during Period III is equivalent of the difference in pricing of two bonds that two letter grades apart.



Empirical Results—Segmentation between SOE and Non-SOE

Difference in Credit Spreads

For the public non-SOE issuer, the average credit spread for non-SOE issuers, for SOE issuers barely moves: default by public non-SOE issuers increases dramatically in Period III, peaking to 30% by the end of 2018; new issuance by public non-SOEs as a percentage of the total new issuance in the corporate bond market has decreased from its peak level of 21% to a mere 4% in 2019Q3.

Table 2: Summary Statistics: Bond-Level Data by Period

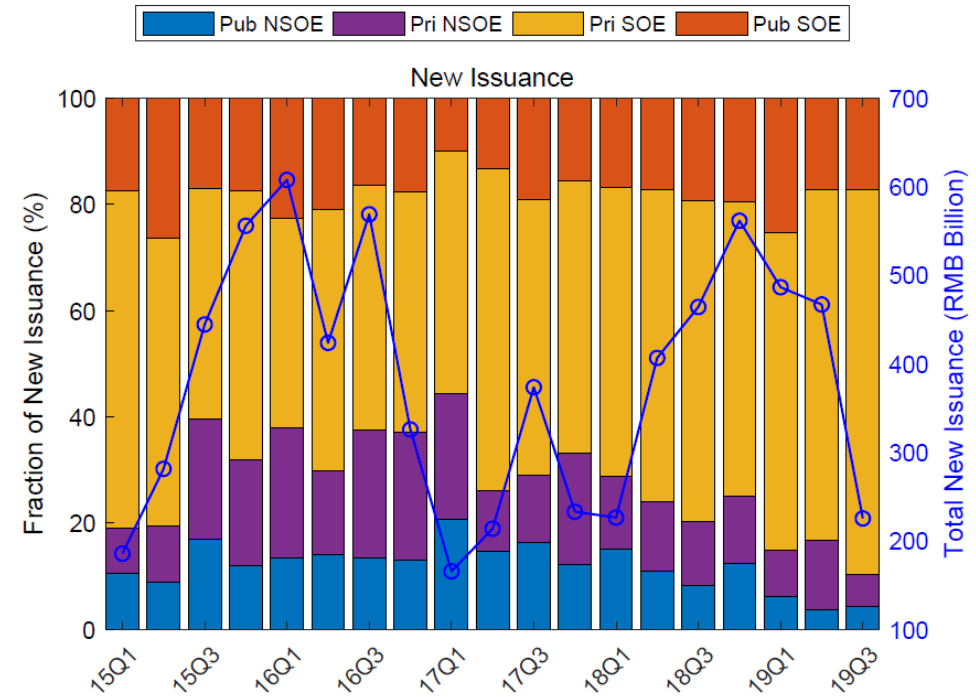
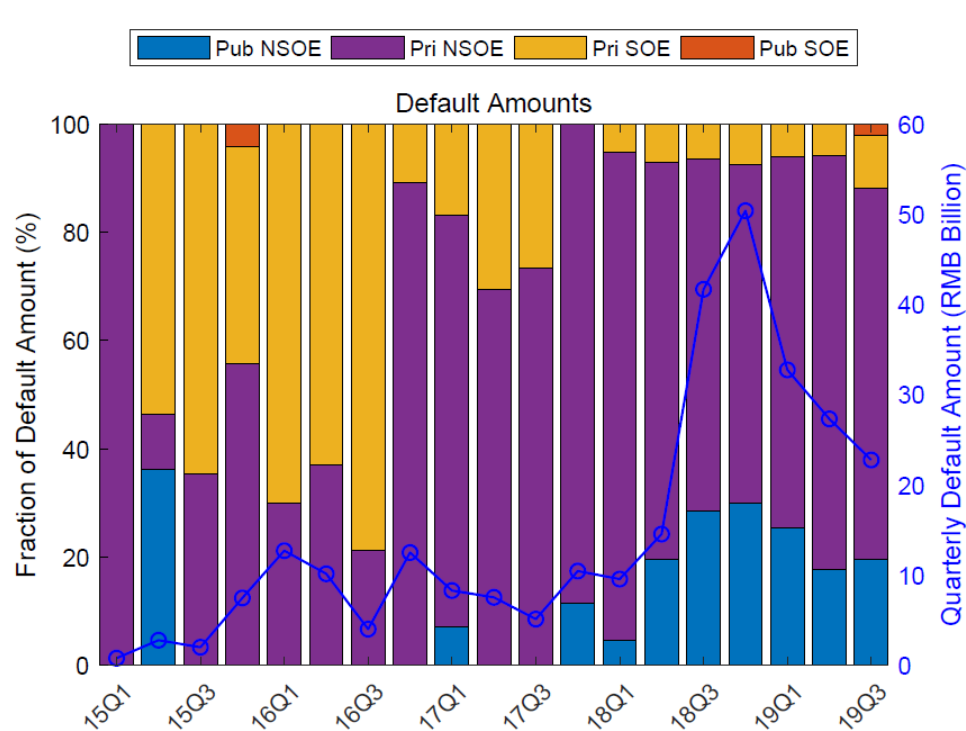
	Public Non-SOE						Public SOE					
	Period I		Period II		Period III		Period I		Period II		Period III	
	mean	std	mean	std	mean	std	mean	std	mean	std	mean	std
NumIssuers	166		292		196		248		332		209	
NumBonds	204		587		443		445		796		568	
CreditSpread (%)	1.92	0.92	1.89	1.19	3.62	5.34	1.20	0.78	1.19	1.07	1.28	1.83
Rating	2.68	0.76	2.55	0.78	1.94	0.88	1.83	0.87	1.82	0.91	1.39	0.65
Maturity (yr)	3.93	1.39	2.96	1.18	2.48	0.92	4.13	2.02	3.19	1.56	2.84	1.29
IssueSize (billion)	0.98	0.83	1.01	0.95	1.14	0.88	2.33	3.19	1.90	2.51	2.01	2.20
Age (yr)	1.31	1.08	1.83	1.33	1.95	1.22	1.53	1.36	2.26	1.69	2.23	1.86
Coupon (%)	6.40	0.95	5.88	1.22	5.44	1.21	5.44	0.99	5.27	1.10	4.70	1.04
Embed	0.51	0.50	0.65	0.48	0.65	0.48	0.28	0.45	0.43	0.49	0.46	0.50
Exch	0.78	0.41	0.70	0.46	0.63	0.48	0.56	0.50	0.56	0.50	0.48	0.50
ZeroDays (%)	62	30	77	26	88	15	79	21	85	19	92	10
Turnover (%)	46	103	30	44	18	29	53	119	28	48	22	34
TradingDays (day)	26	20	15	17	8	10	14	14	10	13	5	7

Empirical Results—Segmentation between SOE and Non-SOE

Difference in Credit Spreads

For the public non-SOE issuer

- default : increases dramatically in Period III, peaking to 30% by the end of 2018;
- new issuance : decreased from its peak level of 21% to a mere 4% in 2019Q3.





Empirical Results — Segmentation between SOE and Non-SOE

Difference in Credit Quality

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

Table 4: Market Segmentation between SOE and Non-SOE

	Public Sample						Private Sample		
	CreditSpread (%)			DM (%)			CreditSpread (%)		
	Period I	Period II	Period III	Period I	Period II	Period III	Period I	Period II	Period III
NonSOE	0.16*** [3.33]	0.20*** [4.11]	1.13*** [3.77]	-0.93* [-1.91]	-3.73*** [-4.72]	-1.91*** [-3.24]	0.14*** [2.91]	0.63*** [13.57]	1.17*** [10.88]
Rating	0.49*** [13.17]	0.63*** [17.38]	1.83*** [3.97]	0.68* [1.70]	0.87** [2.41]	1.96*** [2.93]	0.55*** [16.01]	0.60*** [25.39]	1.04*** [14.44]
Maturity	0.04*** [2.75]	0.04** [2.26]	0.08 [0.94]	-0.13 [-0.95]	0.09 [0.41]	-0.01 [-0.06]	0.09*** [8.76]	0.03** [2.10]	-0.07*** [-4.50]
Age	-0.01 [-0.84]	0.03 [1.63]	0.22*** [2.90]	-0.20 [-1.01]	0.58*** [2.77]	0.28* [1.87]	-0.01 [-1.18]	0.05*** [3.74]	0.03 [1.48]
IssueSize	-0.05*** [-4.05]	-0.11*** [-7.55]	-0.13 [-1.61]	-0.60*** [-5.07]	-0.19 [-0.85]	-0.62*** [-2.59]	-4.70*** [-9.70]	-11.79*** [-9.33]	-11.79*** [-10.10]
ZeroDays	-0.88*** [-4.51]	-1.77*** [-9.44]	-5.63*** [-5.40]	0.13 [0.17]	-4.92*** [-3.32]	-1.65 [-1.52]	-0.00*** [-4.13]	-0.00*** [-8.12]	-0.01*** [-7.32]
Embed	-0.15 [-1.11]	0.54*** [5.93]	0.53** [2.10]	-2.59** [-2.33]	1.59 [1.44]	-0.64 [-0.68]	-0.02 [-0.42]	0.08 [1.19]	0.90*** [14.82]
Exch	0.01 [0.18]	-0.24*** [-4.16]	-0.33 [-1.24]	-0.50 [-0.87]	-0.65 [-0.96]	-0.78 [-1.27]	0.07 [1.21]	0.26** [2.34]	0.10 [1.46]
Embed×Exch	0.08 [0.49]	-0.75*** [-7.48]	-1.43*** [-4.27]	2.87** [2.23]	-1.61 [-1.21]	1.43 [1.53]	-0.24*** [-3.60]	-0.71*** [-6.35]	-0.92*** [-5.22]
Constant	1.19*** [5.15]	1.97*** [9.77]	3.21*** [2.75]	16.37*** [9.47]	22.04*** [10.15]	18.63*** [8.22]	0.15 [1.42]	0.84*** [5.77]	1.08*** [6.06]
Observations	4,225	9,560	2,878	4,225	9,560	2,878	20,222	33,761	8,202
Adjusted R^2	0.606	0.544	0.294	0.162	0.660	0.189	0.558	0.384	0.445

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Empirical Results — Segmentation between SOE and Non-SOE

Difference in Credit Spreads

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

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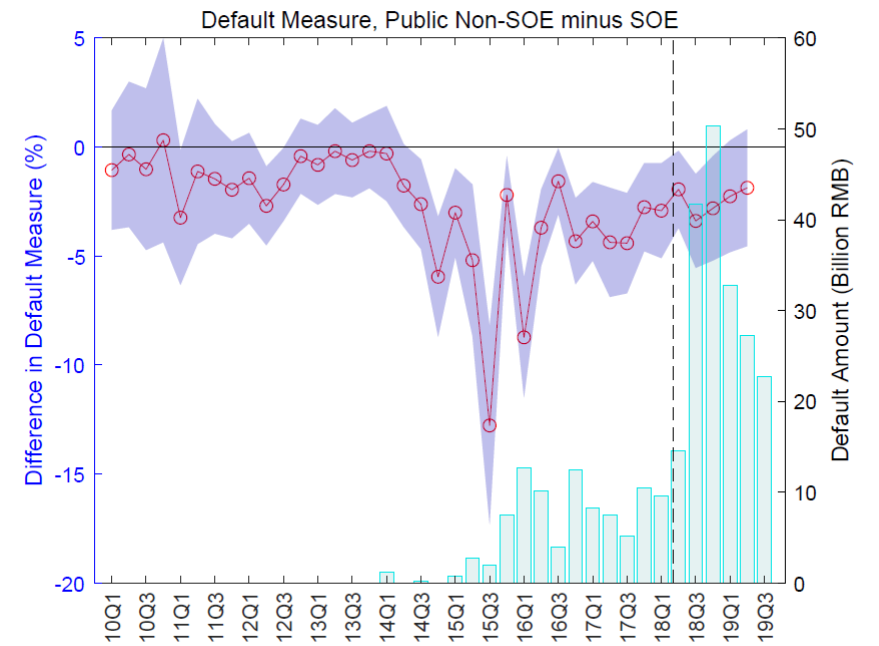
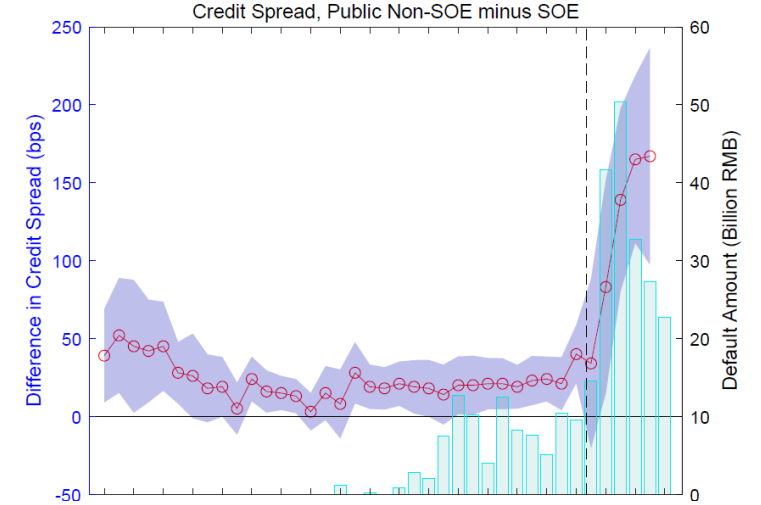
	Public Sample						Private Sample		
	CreditSpread (%)			DM (%)			CreditSpread (%)		
	Period I	Period II	Period III	Period I	Period II	Period III	Period I	Period II	Period III
NonSOE	0.16*** [3.33]	0.20*** [4.11]	1.13*** [3.77]	-0.93* [-1.91]	-3.73*** [-4.72]	-1.91*** [-3.24]	0.14*** [2.91]	0.63*** [13.57]	1.17*** [10.88]
Rating	0.49*** [13.17]	0.63*** [17.38]	1.83*** [3.97]	0.68* [1.70]	0.87** [2.41]	1.96*** [2.93]	0.55*** [16.01]	0.60*** [25.39]	1.04*** [14.44]
Maturity	0.04*** [2.75]	0.04** [2.26]	0.08 [0.94]	-0.13 [-0.95]	0.09 [0.41]	-0.01 [-0.06]	0.09*** [8.76]	0.03** [2.10]	-0.07*** [-4.50]
Age	-0.01 [-0.84]	0.03 [1.63]	0.22*** [2.90]	-0.20 [-1.01]	0.58*** [2.77]	0.28* [1.87]	-0.01 [-1.18]	0.05*** [3.74]	0.03 [1.48]
IssueSize	-0.05*** [-4.05]	-0.11*** [-7.55]	-0.13 [-1.61]	-0.60*** [-5.07]	-0.19 [-0.85]	-0.62*** [-2.59]	-4.70*** [-9.70]	-11.79*** [-9.33]	-11.79*** [-10.10]
ZeroDays	-0.88*** [-4.51]	-1.77*** [-9.44]	-5.63*** [-5.40]	0.13 [0.17]	-4.92*** [-3.32]	-1.65 [-1.52]	-0.00*** [-4.13]	-0.00*** [-8.12]	-0.01*** [-7.32]
Embed	-0.15 [-1.11]	0.54*** [5.93]	0.53** [2.10]	-2.59** [-2.33]	1.59 [1.44]	-0.64 [-0.68]	-0.02 [-0.42]	0.08 [1.19]	0.90*** [14.82]
Exch	0.01 [0.18]	-0.24*** [-4.16]	-0.33 [-1.24]	-0.50 [-0.87]	-0.65 [-0.96]	-0.78 [-1.27]	0.07 [1.21]	0.26** [2.34]	0.10 [1.46]
Embed×Exch	0.08 [0.49]	-0.75*** [-7.48]	-1.43*** [-4.27]	2.87** [2.23]	-1.61 [-1.21]	1.43 [1.53]	-0.24*** [-3.60]	-0.71*** [-6.35]	-0.92*** [-5.22]
Constant	1.19*** [5.15]	1.97*** [9.77]	3.21*** [2.75]	16.37*** [9.47]	22.04*** [10.15]	18.63*** [8.22]	0.15 [1.42]	0.84*** [5.77]	1.08*** [6.06]
Observations	4,225	9,560	2,878	4,225	9,560	2,878	20,222	33,761	8,202
Adjusted R^2	0.606	0.544	0.294	0.162	0.660	0.189	0.558	0.384	0.445



Empirical Results—Segmentation between SOE and Non-SOE

Difference in Credit Quality

- These results indicate that the non-SOEs are in fact healthier than the SOEs.
- DM reaches a record level of -12.77% in 2015Q3, after 2015 stock market crash in China, and this difference is economically large.
- the SOEs are viewed by the equity market investors as more risky and of lower credit quality

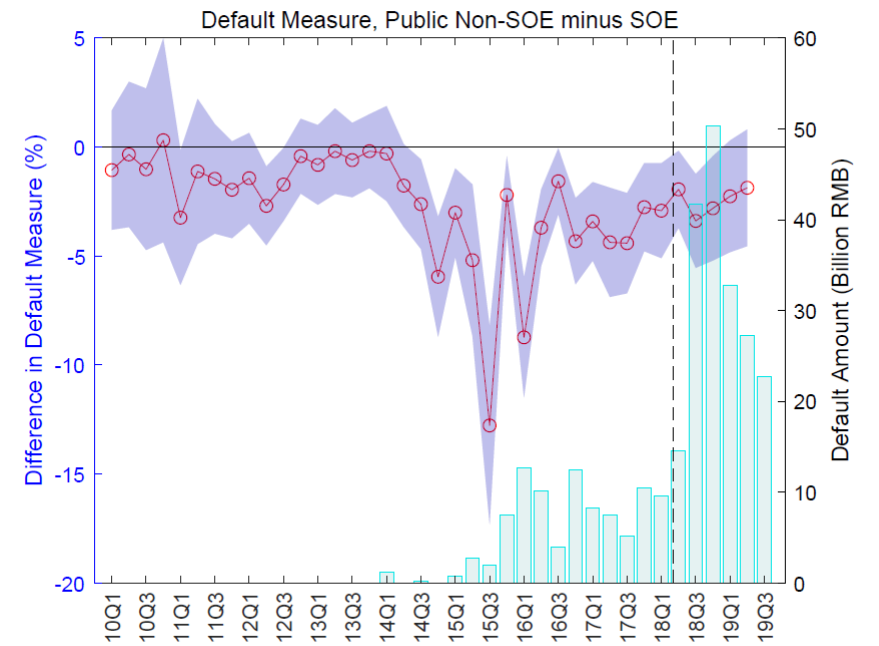
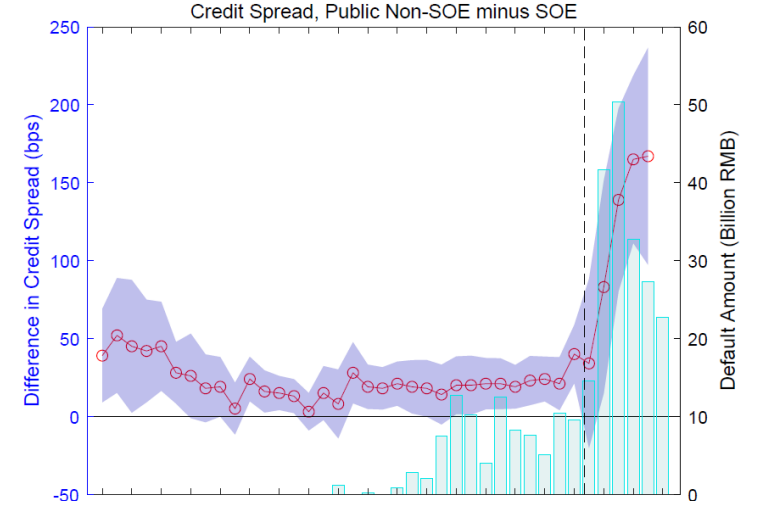




Empirical Results—Segmentation between SOE and Non-SOE

Difference in Credit Quality

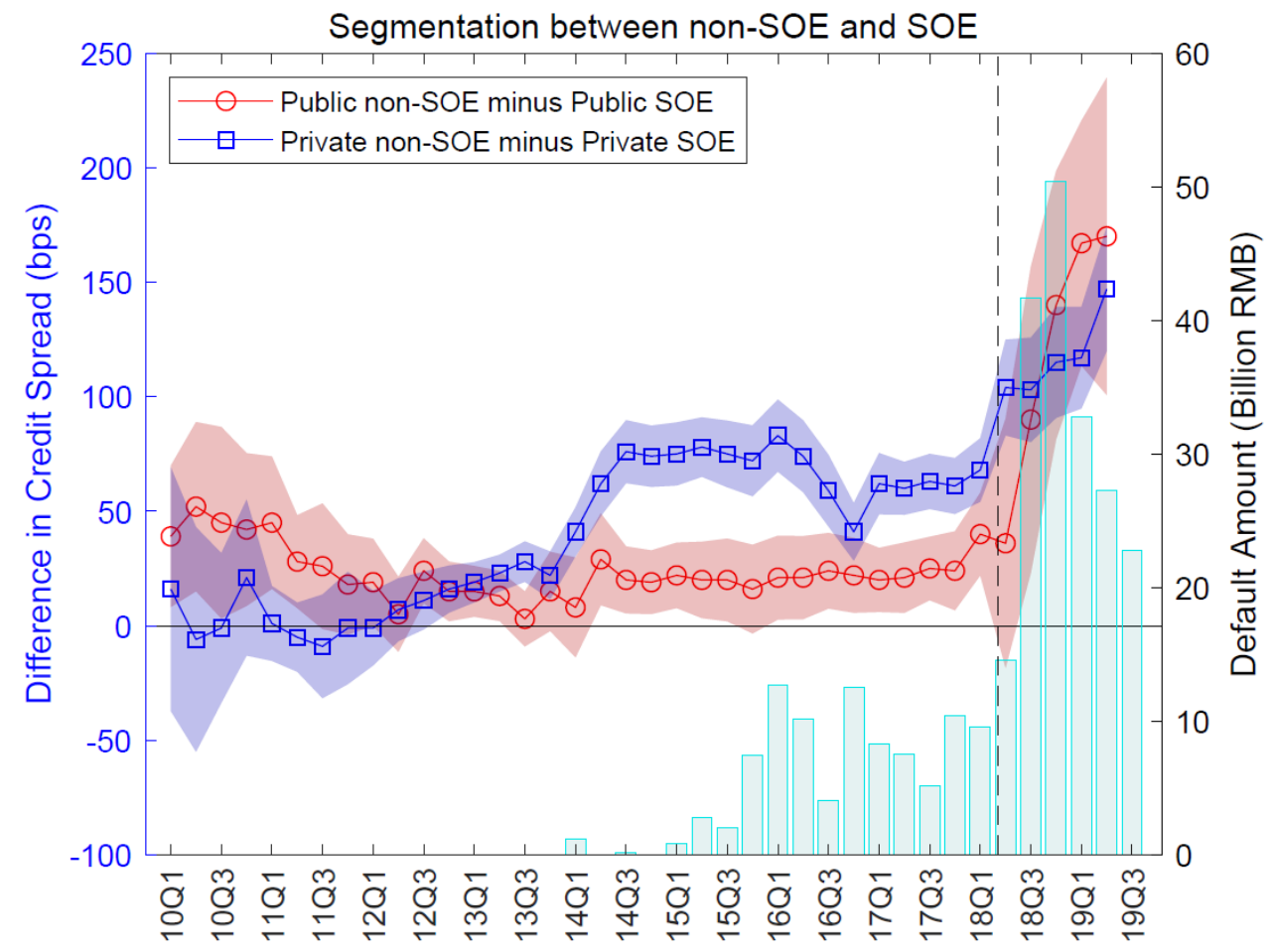
- the segmentation coefficient remains rather stable in 2015.
- the credit pricing of SOE bonds is de-coupled not only from their non-SOE counterparts, but also from their own balance sheet information and equity-market pricing.
- This segmentation hurts the price discovery for the SOE bonds.



Empirical Results — Other Differences in Credit Pricing

Public & Private:

first wave of defaults occurs mostly for the privately held firms.

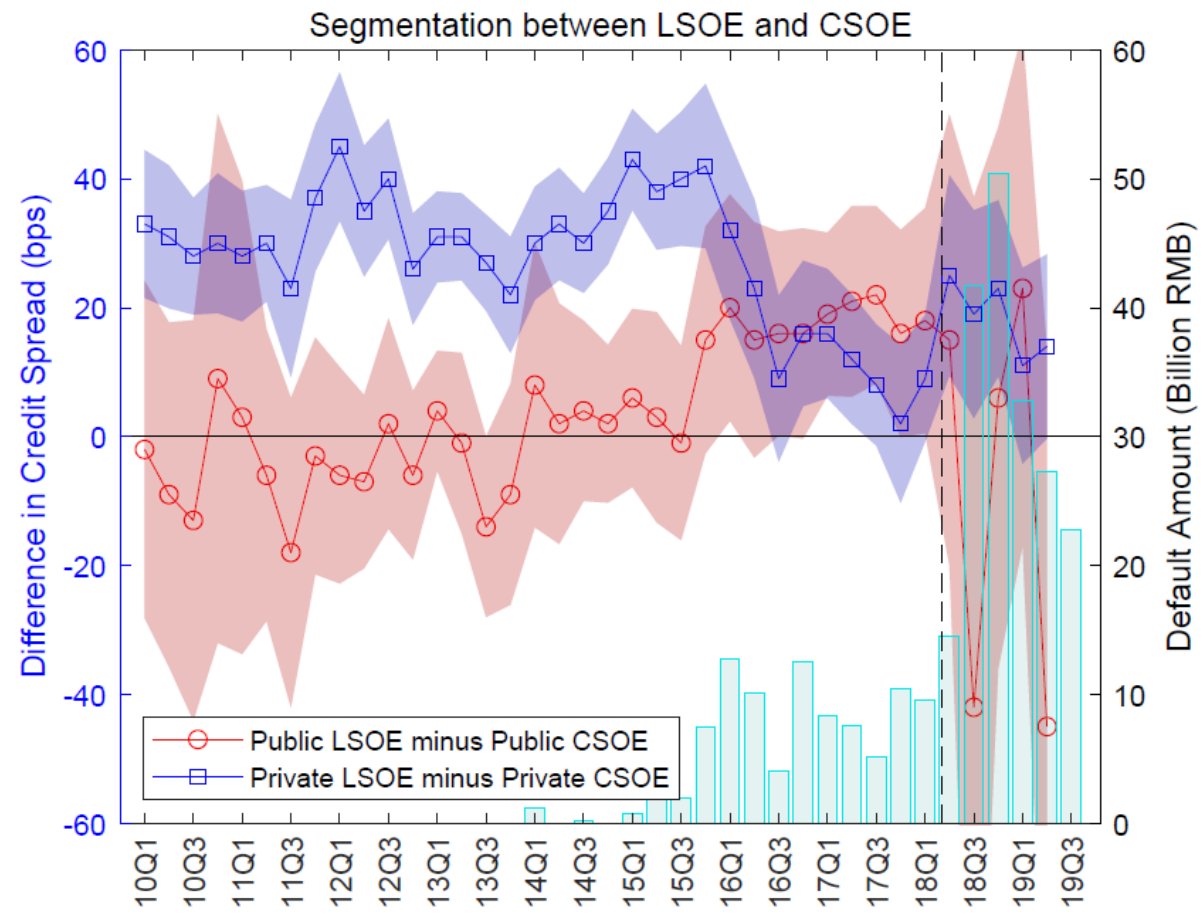


Empirical Results—Other Differences in Credit Pricing

Local SOE & central SOE

Assumption: stronger government support for LSOEs

- During the early sample period, the private CSOEs do pay a higher premium of around 30 bps relative to their CSOE counterparts of the same rating category.
- During Period III, these differences are no longer important and the segmentation between non-SOEs and SOEs becomes the dominant force.





Empirical Results—The Information Content of Credit Spreads

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

Table 5: Panel Regressions of Credit Spreads on Default Measures

	Public Non-SOE						Public SOE					
	Period I		Period II		Period III		Period I		Period II		Period III	
DM		-0.28 [-0.69]		0.84*** [2.59]		18.26*** [5.34]		0.17 [1.08]		0.92*** [4.01]		2.87* [1.65]
Rating	0.54*** [8.35]	0.54*** [8.26]	0.62*** [7.96]	0.62*** [8.05]	2.39*** [3.08]	1.98*** [3.31]	0.47*** [10.85]	0.46*** [10.72]	0.61*** [17.22]	0.60*** [17.49]	1.14*** [4.98]	1.08*** [5.60]
Maturity	0.11*** [3.05]	0.11*** [3.08]	0.03 [0.77]	0.03 [0.76]	0.40 [1.40]	0.29 [1.40]	0.03** [2.25]	0.03** [2.26]	0.05*** [2.84]	0.05*** [2.82]	-0.01 [-0.23]	0.00 [0.01]
Age	-0.12*** [-3.22]	-0.12*** [-3.30]	0.01 [0.12]	-0.00 [-0.00]	0.61** [2.07]	0.59* [1.93]	0.01 [0.46]	0.01 [0.48]	0.04** [2.37]	0.04** [2.12]	0.08*** [3.50]	0.07** [2.51]
IssueSize	-0.13*** [-3.98]	-0.13*** [-3.98]	-0.16** [-2.46]	-0.17** [-2.49]	-0.02 [-0.08]	-0.08 [-0.32]	-0.04*** [-3.52]	-0.04*** [-3.46]	-0.10*** [-6.51]	-0.09*** [-6.60]	-0.13*** [-4.09]	-0.11*** [-3.12]
ZeroDays	-1.28*** [-5.46]	-1.28*** [-5.46]	-1.95*** [-9.14]	-1.91*** [-8.96]	-6.50*** [-4.34]	-5.88*** [-4.04]	-0.58*** [-2.76]	-0.58*** [-2.78]	-1.57*** [-7.24]	-1.53*** [-7.36]	-3.71*** [-3.05]	-3.70*** [-3.07]
Embed	-0.16 [-1.13]	-0.17 [-1.17]	0.53*** [3.65]	0.53*** [3.67]	-0.76 [-1.00]	-0.64 [-0.93]	-0.16 [-1.24]	-0.15 [-1.21]	0.53*** [5.53]	0.51*** [5.54]	1.09*** [6.34]	1.10*** [6.51]
Exch	0.00 [0.01]	0.01 [0.04]	-0.40*** [-3.90]	-0.39*** [-3.86]	-0.68 [-1.02]	-0.66 [-1.02]	0.04 [0.59]	0.04 [0.61]	-0.20*** [-3.07]	-0.20*** [-3.00]	0.08 [0.80]	0.10 [1.09]
Embed × Exch			-0.65*** [-3.55]	-0.64*** [-3.55]	-1.37** [-2.03]	-1.28* [-1.72]	0.10 [0.66]	0.10 [0.63]	-0.73*** [-6.90]	-0.72*** [-6.92]	-1.46*** [-7.51]	-1.52*** [-7.45]
CSOE							-0.01 [-0.34]	-0.01 [-0.33]	-0.12*** [-2.69]	-0.13*** [-3.08]	-0.16 [-0.96]	-0.17 [-1.31]
Constant	1.20*** [2.69]	1.24*** [2.65]	2.59*** [7.24]	2.40*** [6.79]	3.08* [1.96]	-0.10 [-0.06]	0.97*** [4.37]	0.94*** [4.29]	1.70*** [7.20]	1.51*** [7.11]	3.11** [2.38]	2.62* [1.85]
Observations	1,351	1,351	3,871	3,871	1,300	1,300	2,874	2,874	5,689	5,689	1,578	1,578
Adjusted R^2	0.587	0.587	0.471	0.474	0.269	0.330	0.553	0.553	0.551	0.560	0.303	0.317



Empirical Results—The Control Variables

Table 5: Panel Regressions of Credit Spreads on Default Measures

	Public Non-SOE						Public SOE					
	Period I		Period II		Period III		Period I		Period II		Period III	
DM		-0.28 [-0.69]		0.84*** [2.59]		18.26*** [5.34]		0.17 [1.08]		0.92*** [4.01]		2.87* [1.65]
Rating	0.54*** [8.35]	0.54*** [8.26]	0.62*** [7.96]	0.62*** [8.05]	2.39*** [3.08]	1.98*** [3.31]	0.47*** [10.85]	0.46*** [10.72]	0.61*** [17.22]	0.60*** [17.49]	1.14*** [4.98]	1.08*** [5.60]
Maturity	0.11*** [3.05]	0.11*** [3.08]	0.03 [0.77]	0.03 [0.76]	0.40 [1.40]	0.29 [1.40]	0.03** [2.25]	0.03** [2.26]	0.05*** [2.84]	0.05*** [2.82]	-0.01 [-0.23]	0.00 [0.01]
Age	-0.12*** [-3.22]	-0.12*** [-3.30]	0.01 [0.12]	-0.00 [-0.00]	0.61** [2.07]	0.59* [1.93]	0.01 [0.46]	0.01 [0.48]	0.04** [2.37]	0.04** [2.12]	0.08*** [3.50]	0.07** [2.51]
IssueSize	-0.13*** [-3.98]	-0.13*** [-3.98]	-0.16** [-2.46]	-0.17** [-2.49]	-0.02 [-0.08]	-0.08 [-0.32]	-0.04*** [-3.52]	-0.04*** [-3.46]	-0.10*** [-6.51]	-0.09*** [-6.60]	-0.13*** [-4.09]	-0.11*** [-3.12]
ZeroDays	-1.28*** [-5.46]	-1.28*** [-5.46]	-1.95*** [-9.14]	-1.91*** [-8.96]	-6.50*** [-4.34]	-5.88*** [-4.04]	-0.58*** [-2.76]	-0.58*** [-2.78]	-1.57*** [-7.24]	-1.53*** [-7.36]	-3.71*** [-3.05]	-3.70*** [-3.07]
Embed	-0.16 [-1.13]	-0.17 [-1.17]	0.53*** [3.65]	0.53*** [3.67]	-0.76 [-1.00]	-0.64 [-0.93]	-0.16 [-1.24]	-0.15 [-1.21]	0.53*** [5.53]	0.51*** [5.54]	1.09*** [6.34]	1.10*** [6.51]
Exch	0.00 [0.01]	0.01 [0.04]	-0.40*** [-3.90]	-0.39*** [-3.86]	-0.68 [-1.02]	-0.66 [-1.02]	0.04 [0.59]	0.04 [0.61]	-0.20*** [-3.07]	-0.20*** [-3.00]	0.08 [0.80]	0.10 [1.09]
Embed×Exch			-0.65*** [-3.55]	-0.64*** [-3.55]	-1.37** [-2.03]	-1.28* [-1.72]	0.10 [0.66]	0.10 [0.63]	-0.73*** [-6.90]	-0.72*** [-6.92]	-1.46*** [-7.51]	-1.52*** [-7.45]
CSOE							-0.01 [-0.34]	-0.01 [-0.33]	-0.12*** [-2.69]	-0.13*** [-3.08]	-0.16 [-0.96]	-0.17 [-1.31]
Constant	1.20*** [2.69]	1.24*** [2.65]	2.59*** [7.24]	2.40*** [6.79]	3.08* [1.96]	-0.10 [-0.06]	0.97*** [4.37]	0.94*** [4.29]	1.70*** [7.20]	1.51*** [7.11]	3.11** [2.38]	2.62* [1.85]
Observations	1,351	1,351	3,871	3,871	1,300	1,300	2,874	2,874	5,689	5,689	1,578	1,578
Adjusted R^2	0.587	0.587	0.471	0.474	0.269	0.330	0.553	0.553	0.551	0.560	0.303	0.317

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Conclusion

The link between credit spreads and credit quality is generally weak in China. Prior to the first default in 2014, credit spreads in China are uninformative. Growing out of the pre-default era, credit spreads become more informative, but with rather moderate magnitude. More alarming is the severe segmentation that has developed between state-owned enterprise (SOE) and non-SOE issuers since the credit tightening of 2017-18.

this segmentation is driven not by the fundamentals of the firms, but by the perceived vulnerability of non-SOE issuers due to their lack of outside government support.



Conclusion

On the bright side, the unprecedented credit risk forces investors to price non-SOE bonds with more differentiation, making the non-SOE credit spreads markedly more informative.

But this comes at a huge cost, with non-SOEs suffering from exploding credit spreads, unprecedented defaults, and shrinking new issuance.

At the same time, as investors seek for safety in the SOE bonds, their information content remains rather limited.