A CHINESE CORE BANKING NETWORK EXTREME CASE: AN EISENBERG-NOE STRESS TEST APPROACH

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INTRODUCTION

This study investigates the propagation of financial distress within China's core banking system using the Eisenberg–Noe interbank clearing model.
A fully connected network of 16 major domestic banks is reconstructed from 2017 balance sheet data.
The goal is to simulate financial shocks and identify thresholds where the system shifts from absorbing risk to amplifying contagion.

The main balance sheet data

Bank	TA	TL	IA	IL	EA	EL	EE
ICBC	26.087	23.946	1.658	2.257	24.429	21.689	2.740
CCB	22.124	20.329	709	1.795	21.415	18.534	2.881
BOC	19.467	17.891	1.037	2.014	18.430	15.877	2.553
ABC	21.053	19.624	1.176	1.575	19.877	18.049	1.828
BOCOM	9.038	8.362	807	590	8.231	7.772	459
CMB	6.298	5.814	461	737	5.837	5.077	760
IB	6.255	5.851	193	1.758	6.062	4.093	1.969
SPDB	6.035	5.615	187	1.608	5.848	4.007	1.841
CMBC	5.694	5.322	244	1.432	5.450	3.890	1.560
CITIC	5.678	5.265	351	1.010	5.327	5.164	163
CEB	4.088	3.783	285	730	3.803	3.053	750
PAB	3.248	3.026	231	465	3.017	2.561	456
HXB	2.455	2.289	111	325	2.344	1.964	380
BOBJ	2.304	2130	214	379	2.090	1660	339
BONJ	1.131	1.065	71	103	1.060	962	98
BONB	1.032	975	93	168	939	807	132

RESULTS

- The network displays robust-yet-fragile behavior
- Small shocks are absorbed via interbank diversification
- However, once a critical threshold is crossed, the network transitions into a contagion amplifier
- Losses escalate non-linearly with shock size
- Interconnectivity is stabilizing under mild stress but accelerates failure under systemic conditions

CONCLUSION

- Dense interbank networks offer protection under normal conditions, but increase systemic fragility in crisis
- The Eisenberg–Noe model, despite abstraction, is a valuable stress-testing tool
- The study highlights the critical need for improved data transparency in interbank markets to support accurate risk modeling and regulatory policy

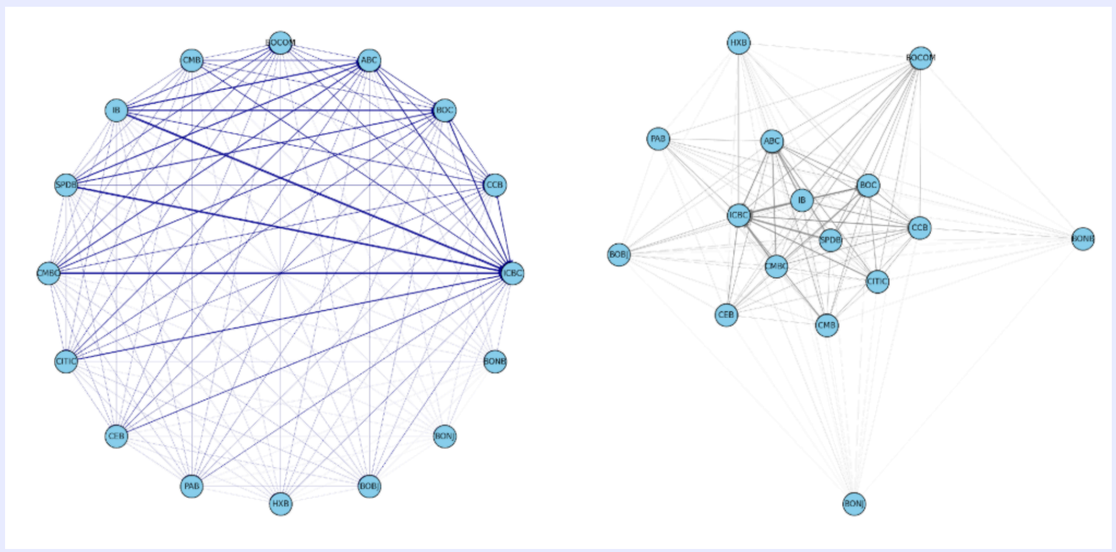
OBJECTIVE

To assess the systemic risk of China's interbank network. I reconstruct a fully connected banking system and then apply the Eisenberg–Noe clearing model under common asset shocks in order to identify conditions under which financial contagion emerges or is contained.

METHODOLOGY

- Reconstruction of the interbank liability network using:
  - Maximum Entropy method (initial matrix)
  - RAS algorithm (refinement)
- Application of the Eisenberg–Noe model for payment clearing and default dynamics
- Simulations include:
  - Systemic shocks: proportional loss of external assets across all banks
  - Idiosyncratic shocks: failure of individual banks
- Key metrics: default count, total loss, loss ratio

The constructed network



Systemic stress test compacted results

Shock Level	Direct Loss	Interbank Loss	Total_Loss	Loss Ratio	Insolvent
0.05	6707.95	1.407.69	8.115.647	0.05533036	1
0.10	13415.90	3.785.19	17.201.09	0.11727254	7
0.15	20123.85	13.494.38	33.618.23	0.22920034	9
0.20	26831.80	15.291.65	42.123.45	0.28718665	16

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