

Interconnectedness Between Banks and Insurers and Implications for Financial Stability

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Overview of Presentation

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- **Question I: How are banks and insurers interconnected?**
 - Evidence: Recent, but growing

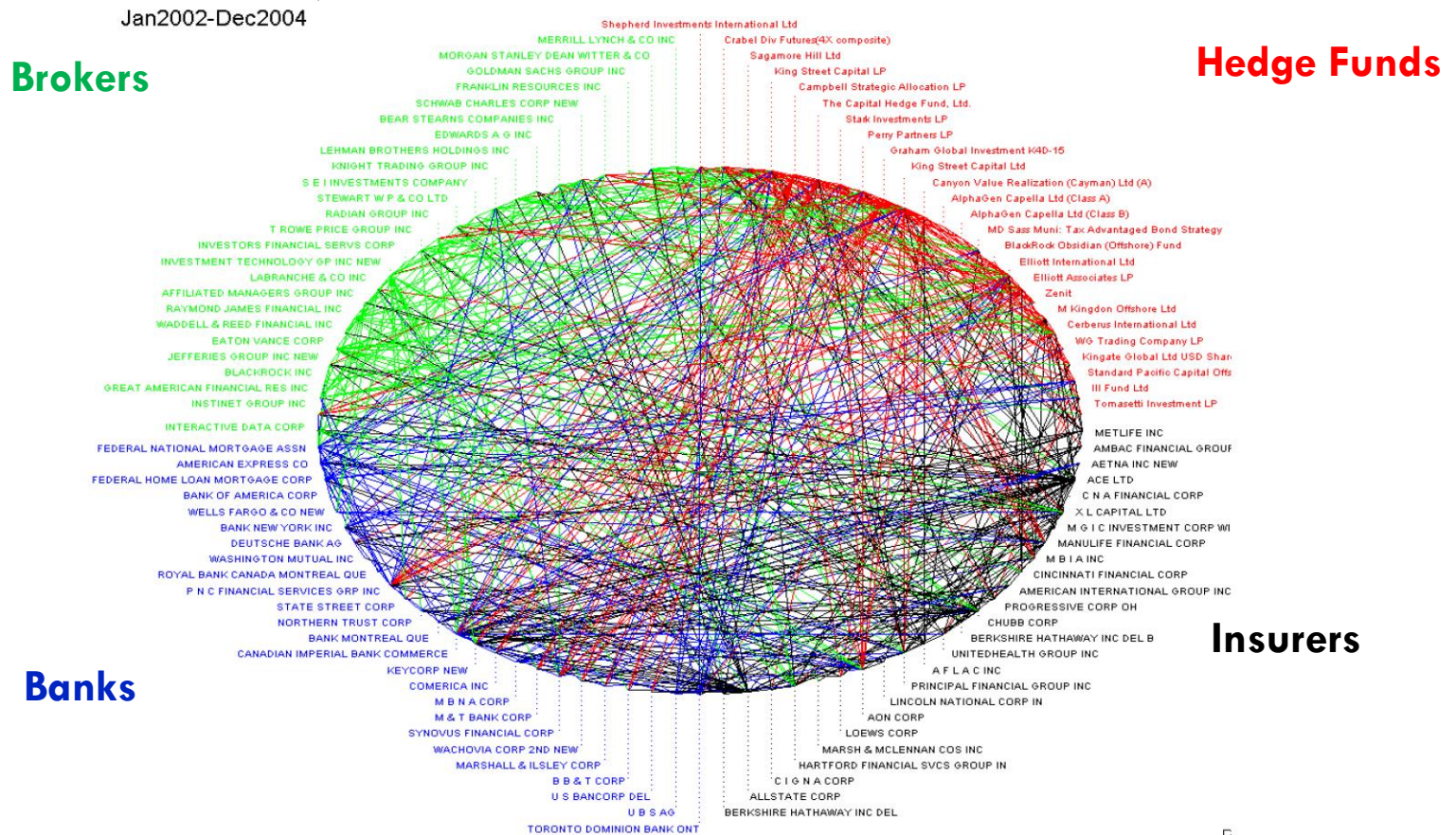
- **Question II: What are the new risk challenges arising from the insurance sector?**
 - Evidence: Very significant

- **Question III: Can banks-insurers interconnectedness pose challenges to financial stability? If yes, how?**
 - Evidence: Very limited, speculative (and for very good reasons)

How Connected are Banks and Insurers?

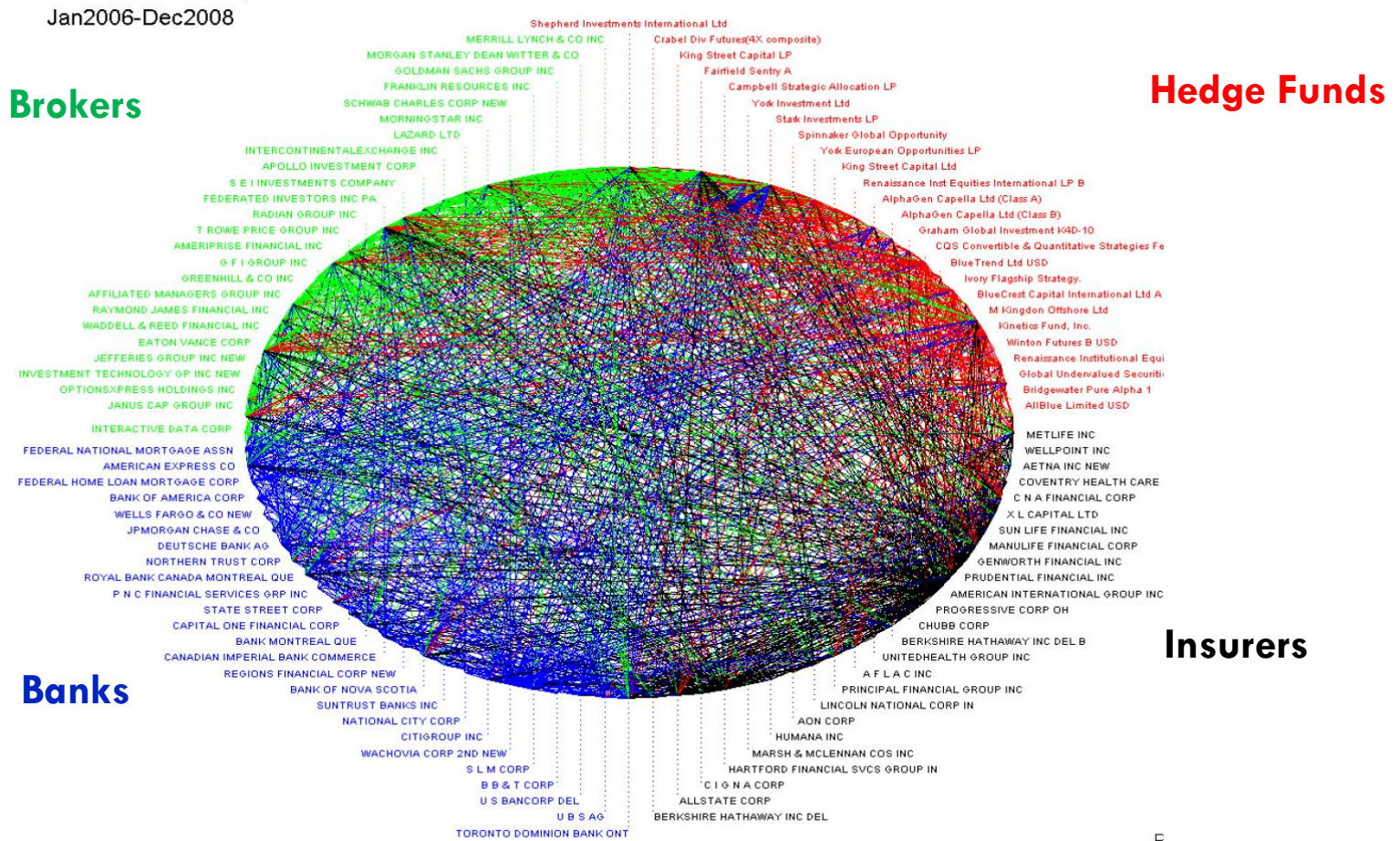
First systematic evidence provided by Billio et al. (2012)

Network diagram of linear Granger-causality relationships



How Connected are Banks and Insurers?

By the beginning of the last financial crisis, those interconnectedness had grown in intensity



Nature of Interconnectedness - I

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- **Interest rate risk sharing**: banks and insurers (and pension funds) are natural counterparties

- Insurers and pension funds: provide long-dated liabilities, making them vulnerable to low interest rates (EIOPA, 2014)

- Banks: opposite maturity transformation, lending long-term and borrowing short-term
 - ▣ Particularly vulnerable to a rising rate environment (e.g., the Silicon Valley Bank crisis)

- Natural tendency for banks and insurance companies to become counterparties in the interest rate derivative markets (to share risks)

Nature of Interconnectedness - II

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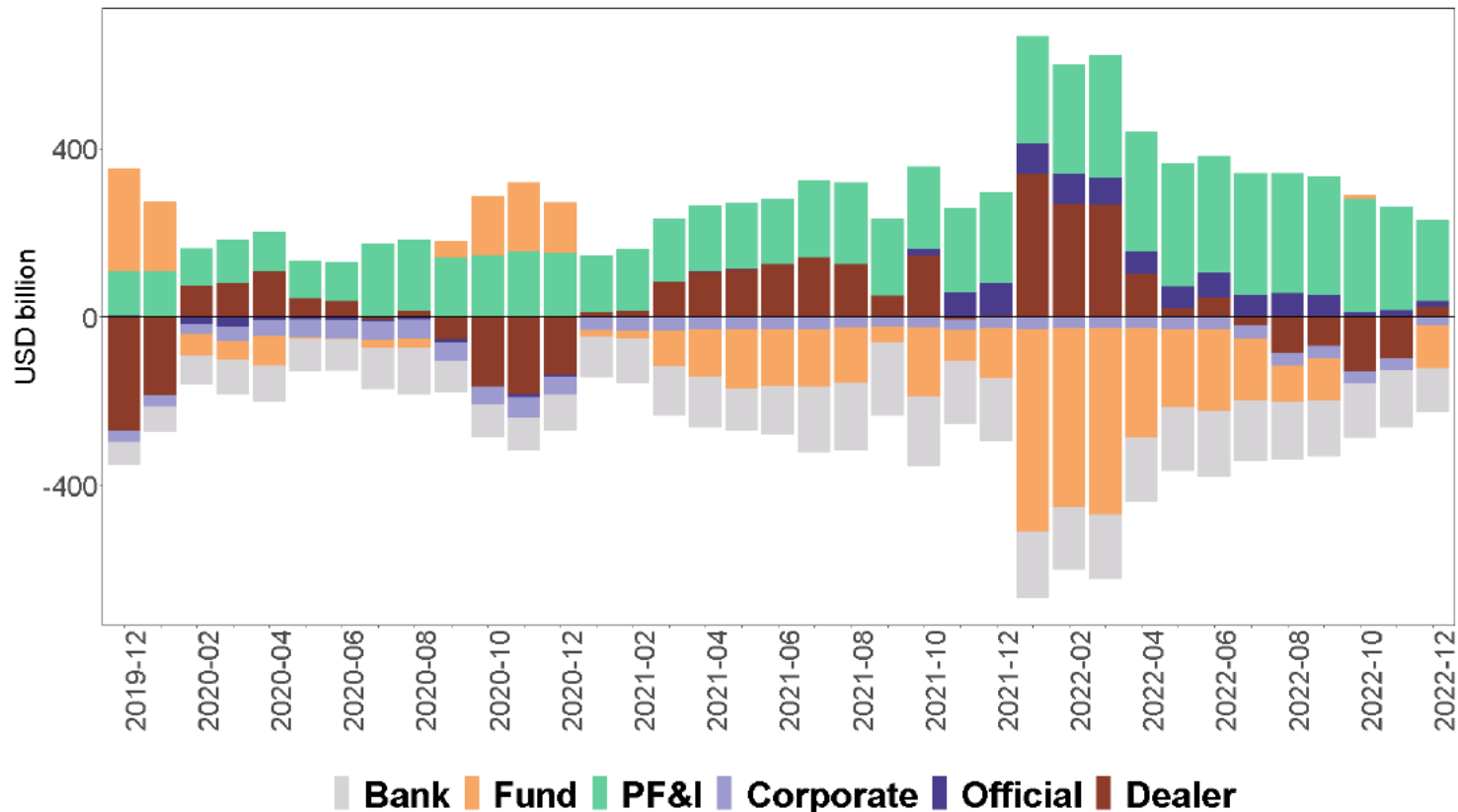
- **Insurers as the new shadow banks/non-banks**
 - ▣ Fringuellotti and Santos (2023), Foley-Fisher et al. (2023)

- Emerging concerns regarding banks and non-banks apply here
- These two sectors cannot be viewed either as operating in parallel, performing different activities, or as substitutes, performing largely similar activities
 - ▣ Acharya et al. (2024)

- Non-banks', and banks' businesses and risks are becoming deeply interwoven
 - ▣ **Banks remain special as both routine and emergency liquidity providers to non-banks (i.e. insurance companies as well)**

Banks and Insurers Counterparties?

Net outstanding positions (in US\$ billion) aggregated for all entities for a given sector at a monthly level



Source: Khetan et al. (2024)

New Risks in the Insurance Sector

- Exceptionally low interest rates placed insurance companies margins under stress
- Insurers responded by **raising exposure to more risky and less liquid assets**
- **Entry of private equity firms**
- Acquiring insurance portfolios through affiliated reinsurers
- **Emergence of offshore reinsurance**, leveraging regulatory differences across jurisdictions
- Increasingly interconnected and complex life insurance landscape

New Risks in the Insurance Sector

- Should we be concerned about the danger posed by these risks to financial stability?
 - Can these risks be limited – and managed – within the insurance industry?
- The interconnectedness discussed before indicate otherwise
 - Ellul et al. (2022): implications of **insurers as asset managers**
 - Koiijen and Yogo (2022): insurers' **variable annuities**
 - Chodorow-Reich et al. (2021): fragility limits insurers' ability to act as **asset insulators**
 - Duarte and Eisenbach (2021) **ex-ante vulnerability** of the financial system to fire sales

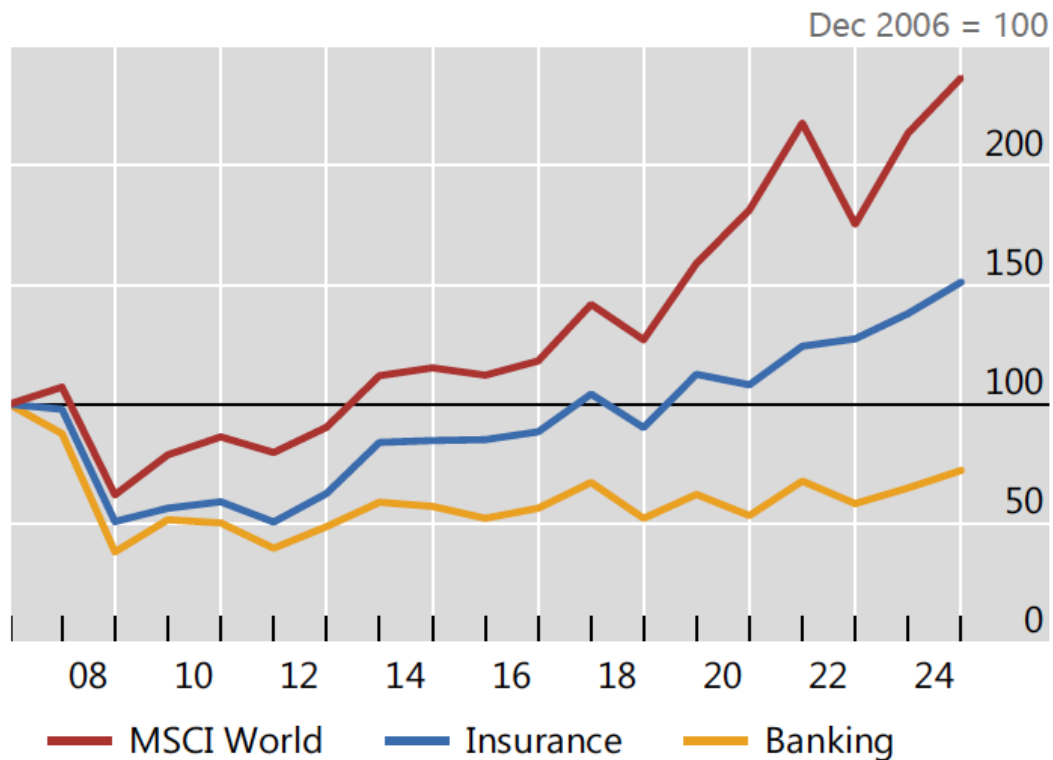
New Highs in Reaching for Yields

- Insurance companies were found to "reach for yield" in the years leading up to the financial crisis
 - ▣ Becker and Ivashina (2015)
 - ▣ Ellul et al. (2015)
- Main reason: the capital adequacy regulation's coarse treatment of risk classes
- New evidence that "reaching for yield" behavior has been reaching for new highs
 - ▣ Significant increases in **CLOs exposures** (Fringuelli and Santos (2023))
 - ▣ Increased lending to **below investment grade firms** starting in 2009 as banks refocused on commercial banking (Foley-Fisher et al. (2023))

Low Rates and Insurers' Profitability

Low-for-Long Era: Stock market valuations of many life insurers underperformed relative to the broader market throughout much of the low-for-long era

Significant pressure on insurers' profitability and thus more urgent need for reaching for yield

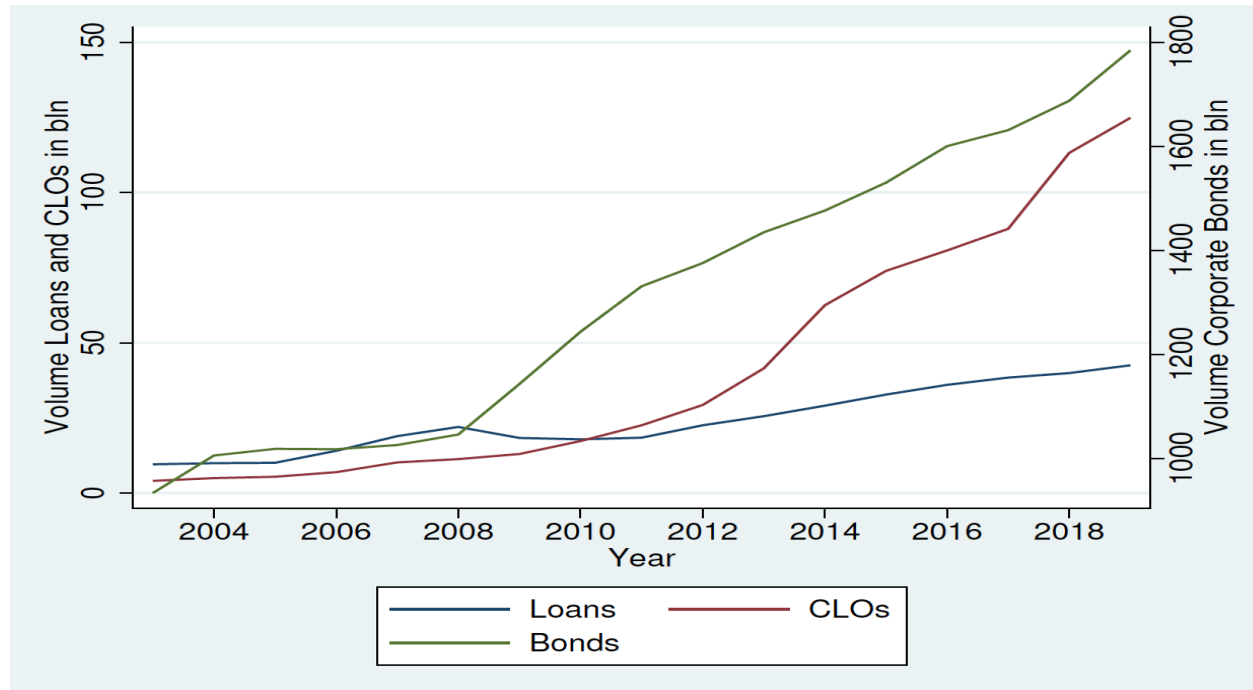


Source: Garavito et al. (2024)

Corporate Loans and CLOs

Fringuelli and Santos (2023): In the 10 years after the GFC, insurance companies' investments in:

- a. corporate bonds went from \$1,143B to \$1,784B (+56%)
- b. loans went from \$18B to \$42B (+132% increase)
- c. CLOs, went from \$13B to \$125B (+863%)

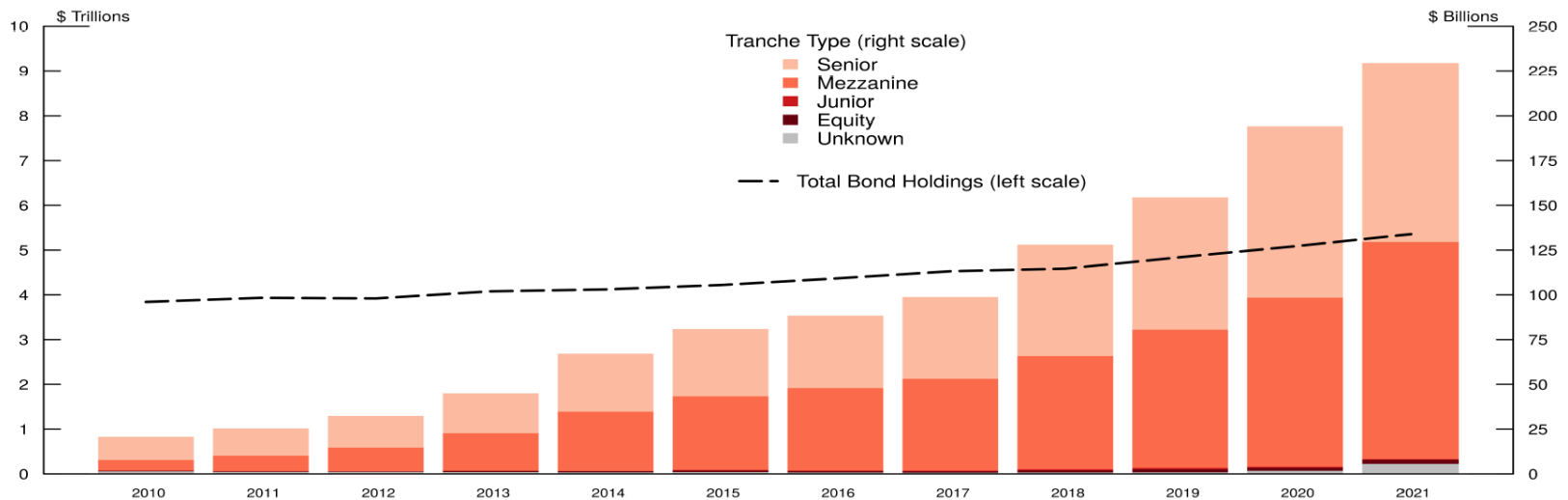


Corporate Loans and CLOs

Insurers leverage expertise in assessing credit risk, understanding of investors' preferences, and arbitrage opportunities

Foley-Fisher et al. (2023): As of year-end 2020, life insurers manage about a quarter of all CLOs using vast amounts of fixed annuity liabilities to finance their CLO businesses

About a third of these life insurers are controlled by private equity firms



Source: Foley-Fisher et al. (2023)

Insurers as Shadow Banks

Massive increase in importance of insurance groups that have a presence in the shadow banking sector

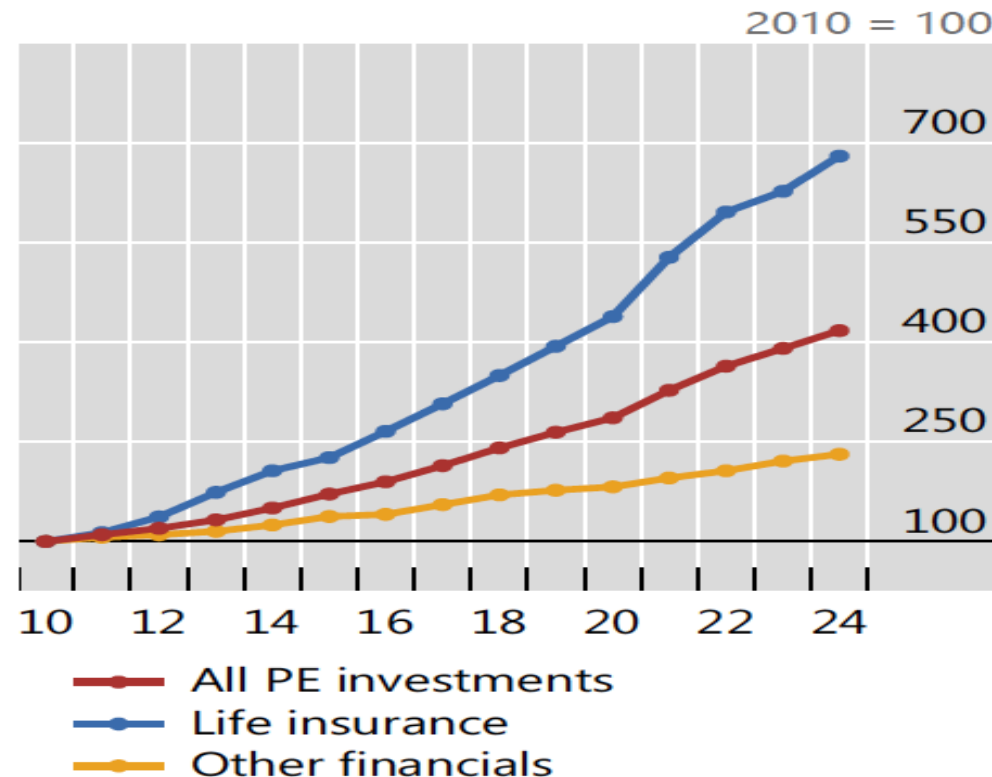
Since 2019 insurance groups with shadow banking businesses account for more than half of total industry assets

Year	Insurance groups							
	with shadow banking businesses				without shadow banking businesses			
	N	Assets (\$bn)	Mean Leverage	St. Dev. Leverage	N	Assets (\$bn)	Mean Leverage	St. Dev. Leverage
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2010	5	44	10.6	5.9	782	3,376	5.0	52.5
2011	39	604	11.4	10.3	739	2,995	6.7	8.0
2012	47	845	12.7	12.2	708	2,813	7.9	33.4
2013	58	974	11.7	8.9	683	2,779	7.9	30.3
2014	71	1,358	9.9	8.2	656	2,548	6.4	7.1
2015	68	1,431	9.8	7.1	647	2,550	6.9	8.7
2016	75	1,584	9.8	7.1	628	2,601	6.9	8.5
2017	93	1,766	10.3	8.1	601	2,603	7.3	11.8
2018	103	2,211	9.6	7.0	583	2,220	7.0	8.8
2019	117	2,451	11.0	8.9	561	2,211	6.6	8.9
2020	104	2,615	12.1	11.4	563	2,384	6.9	9.4
2021	116	2,819	11.1	8.9	549	2,446	6.6	7.4

Emergence of Private Equity

Kirti and Sarin (2024): PE investments in the life insurance space grew tenfold following the financial crisis, from \$23 billion in 2009 to \$250 billion in 2014

PE-backed insurers' arbitrage: holding less capital backing riskier portfolios



Source: Garavito et al. (2024)

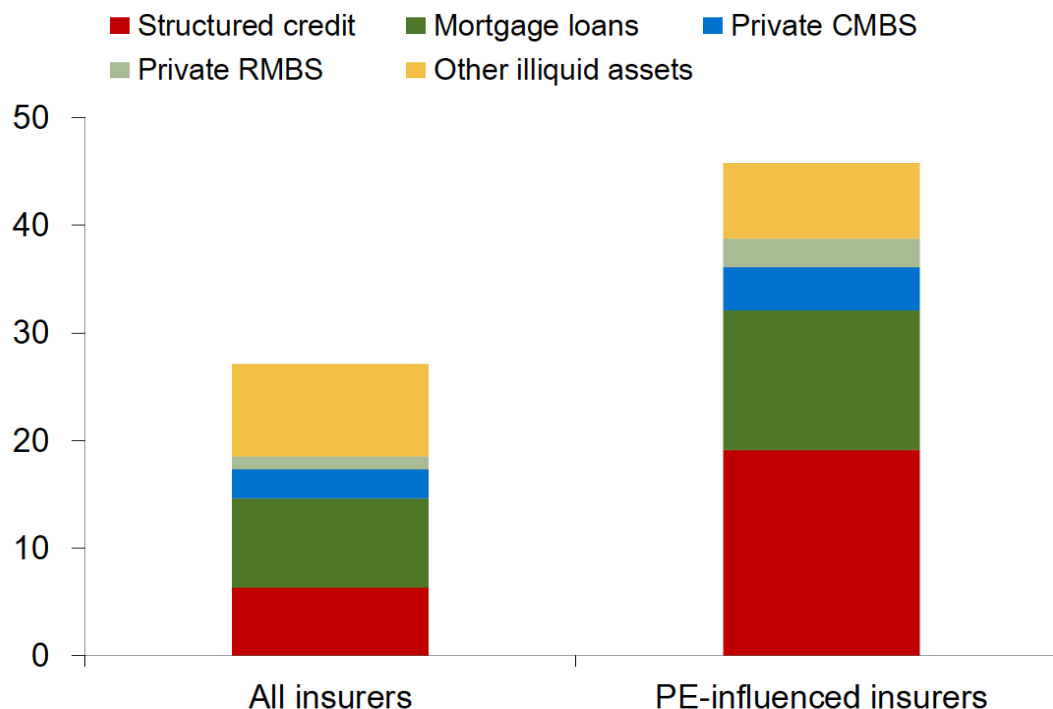
What's so Special About PE?

- Kirti and Sarin (2024): Private-equity-backed insurers are more profitable
- No evidence that this is a consequence of general partners' investment skill
- PE firms increase the asset risk of their subsidiaries without incurring commensurate capital charges and decrease tax liabilities
 - ▣ Performance of life insurers can be transformed through the increased spread earned on illiquid investments
- Major implication: **PE-influenced life insurers are also more vulnerable** to a potential adverse scenario of increases in corporate defaults and credit downgrades should the economy slow down

Private Equity and Insurers' Risk

Greater investment in structured and private credit worsens liquidity mismatches between assets and liabilities

Will make liquidating portfolios more challenging if facing margin calls on derivatives or repurchase agreement contracts or policy surrenders should interest rates rise rapidly again



Sources: A.M. Best; National Association of Insurance Commissioners; and IMF staff calculations

Asset Intensive Reinsurance (AIR)

Asset intensive reinsurance (AIR, or “funded reinsurance”) seeks to free up capital of life insurers by transferring risks associated with capital-intensive policies to other insurers

Cross-jurisdictional AIR can leverage differences in corporate and dividends taxation, valuation of technical provisions and capital requirements

Such agreements can be motivated by the reinsurer’s ability to generate higher returns on the assets that back the deal

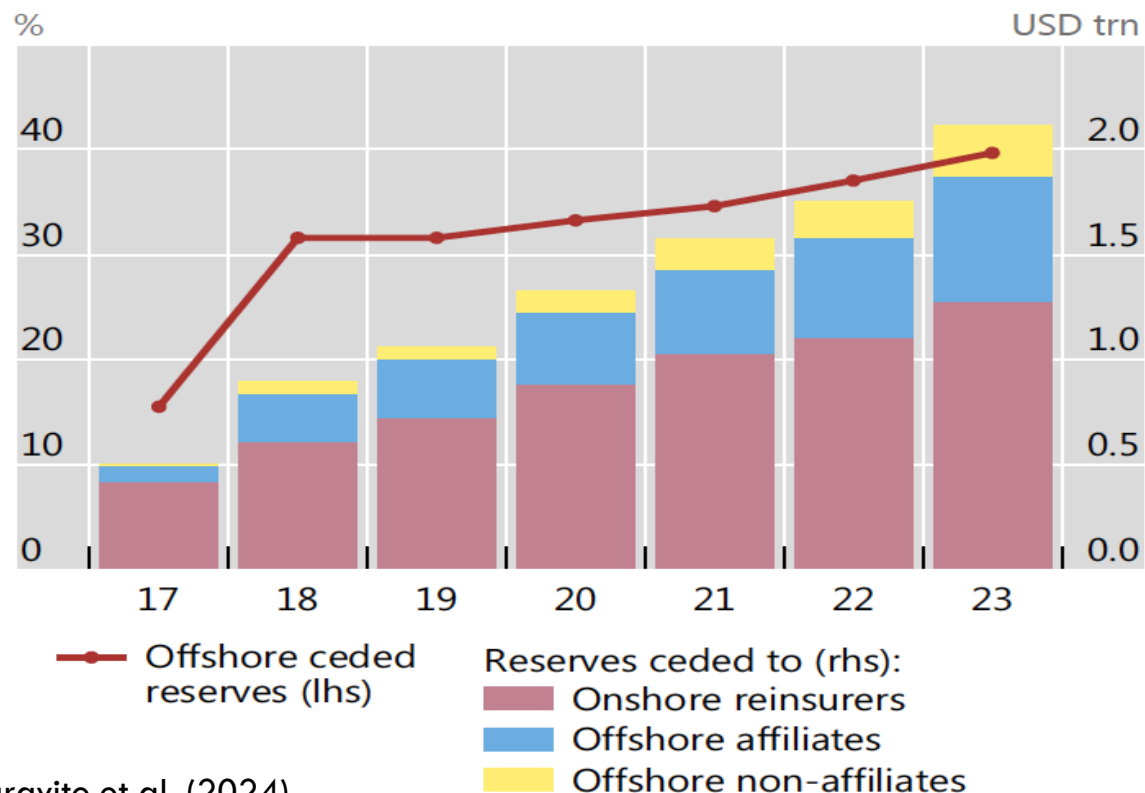
AIR differs from more conventional reinsurance in the life insurance sector, which focuses on assuming mortality and longevity risks (ie is driven by the liability side) to leverage diversification benefits for the reinsurer

It is in this context that PE firms have greatly expanded their footprint in the life insurance sector

Emergence of AIR

Major life insurers ceded reserves to the tune of \$2.1 trillion in 2023 (no less than one quarter of their total assets), up from around \$500 billion in 2017

Around 40% of ceded risks were assumed by reinsurers in offshore centres, nearly three times the share reported in 2017



Source: Garavito et al. (2024)

Emergence of AIR with PE

Large PE companies have set up their own offshore-based reinsurers (mostly in Bermuda)

Buy and reinsure blocks of life insurance or annuity business from life insurers and can even purchase life and annuity companies through their (Bermuda) reinsurers

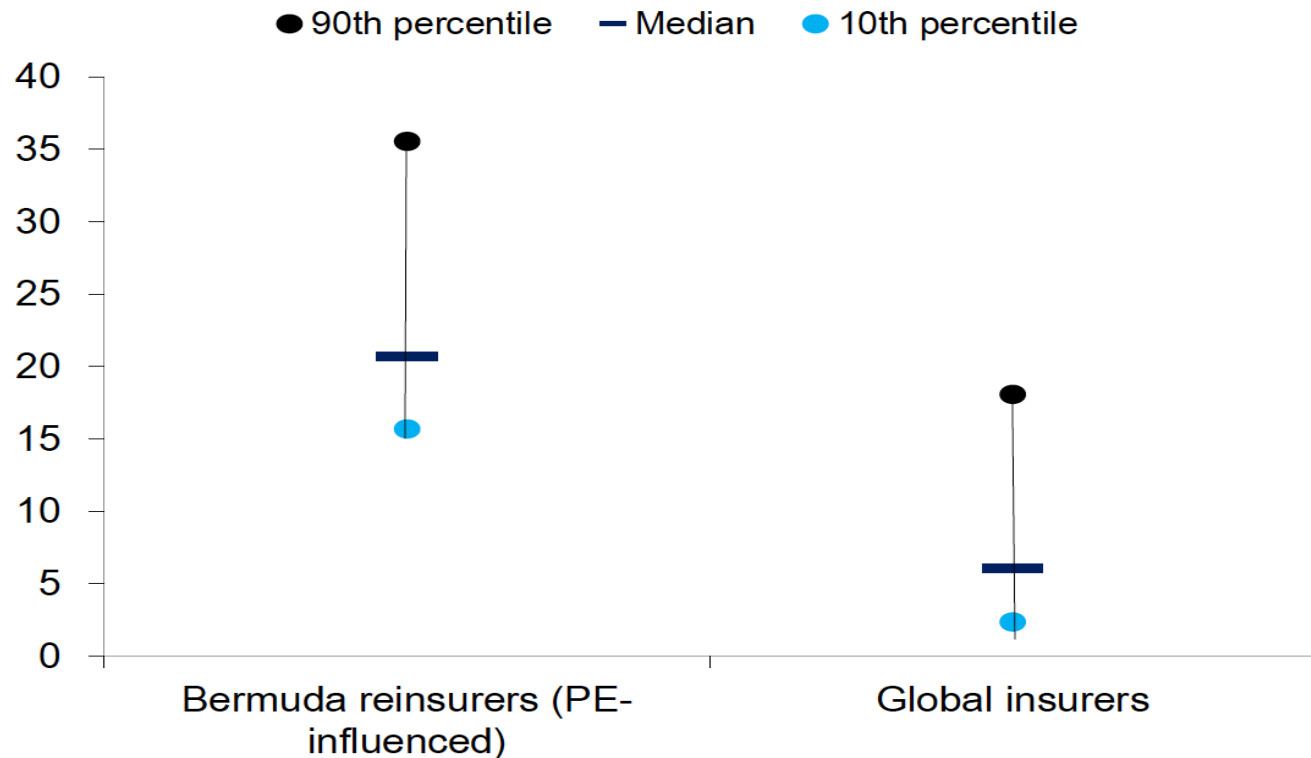
PE Company	Reinsurance Company in Bermuda	Interest
Apollo Global Management Inc	Athene Life Re Ltd	Ownership
KKR	Global Atlantic Assurance	Ownership
Blackstone	Resolution Life	Strategic partnership
Brookfield Asset Management	Brookfield Reinsurance Ltd	Partial ownership, separately publicly listed
Carlyle	Fortitude Re	Ownership
Apollo Global Management	Athora	29.9 percent ownership

Sources: A.M. Best; National Association of Insurance Commissioners; and IMF staff calculations

AIR + PE: Impact on Investments

PE-influenced reinsurers have a significantly larger share of illiquid investments
Estimates show that they allocate about 20% of their investments into illiquid investments

This is much higher when compared to the median insurers



Sources: Bermuda Monetary Authority; and IMF staff calculations.

A Recent Example: Eurovita

Notably, a group of PE-influenced life insurers has already shown signs of actual stress

Italy's Institute for the Supervision of Insurance (IVASS) identified a capital shortfall of €250 million in the midsize life insurer Eurovita

The owner, a PE, closed-end fund, was unable to meet IVASS's expectation for increasing capital

IVASS imposed a management replacement of Eurovita with an administrator; stopped on policyholder redemptions initially until March 31, 2023, extended many times

Common Counterparty Risk

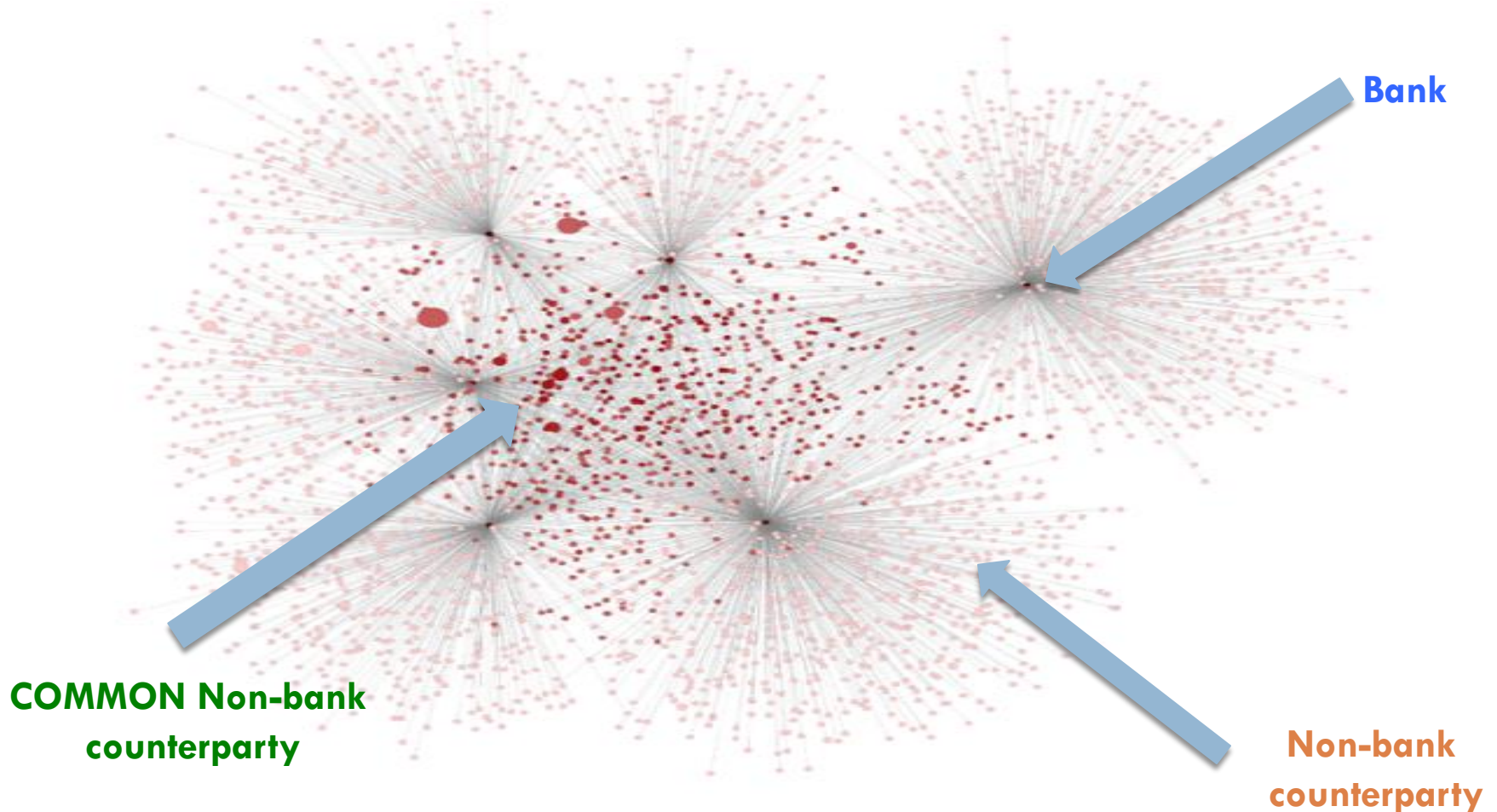
- Why should we be concerned, from a system-wide perspective, with insurance risk and connectedness with banks?
- Any trigger, e.g. significant corporate defaults, will only generate system-wide stress if multiple interconnected institutions become involved
- **Ellul and Kim (2023)**: Notion of banks and insurers becoming interlinked through common counterparties in the OTC markets
 - ▣ Importance of the network structure
 - ▣ Regulation does not consider the difference between common counterparties and other types

Structure of Network

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Nodes represent banks' counterparties with at least one relationship with other banks

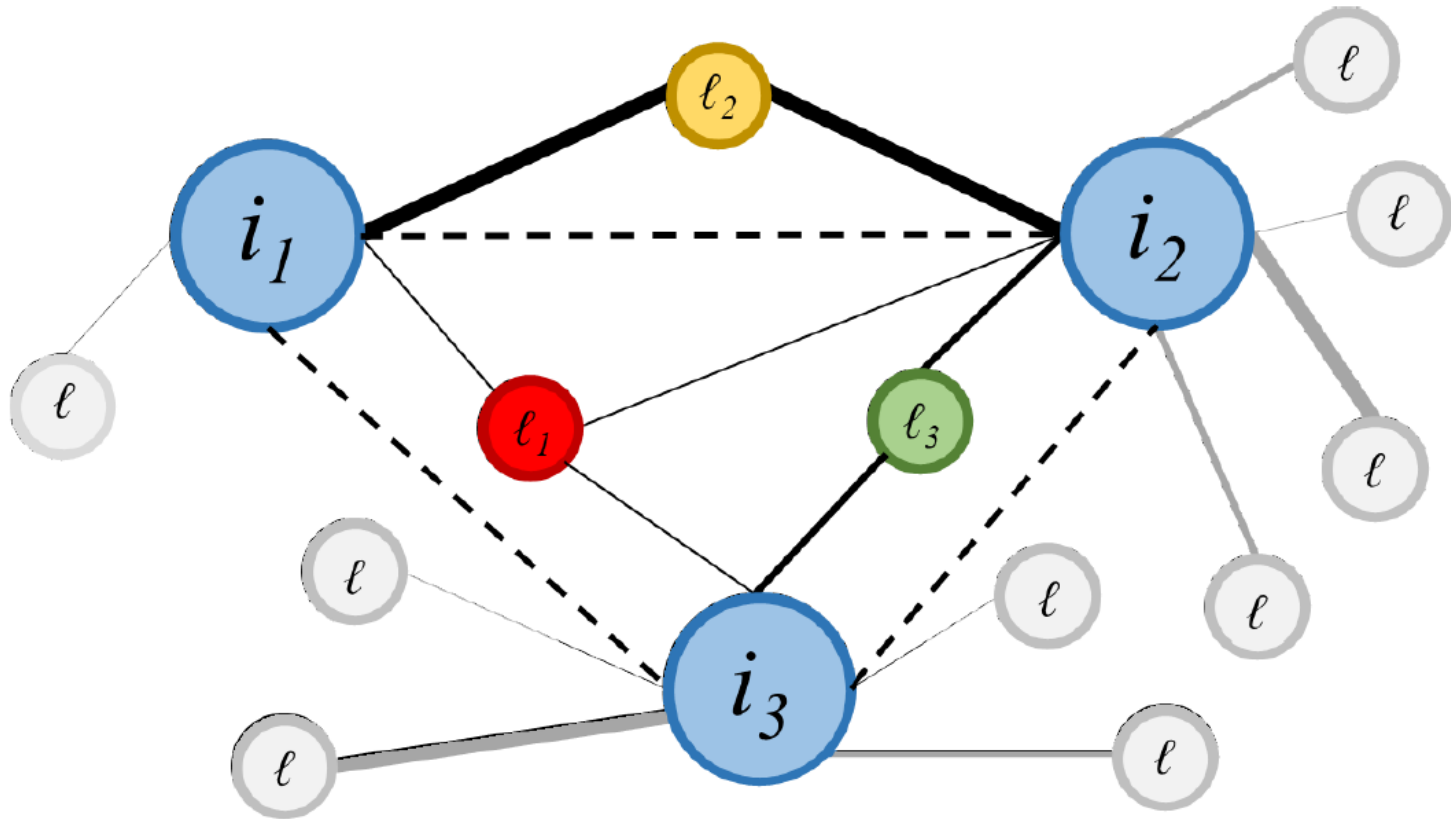
Size of each node is total credit risk exposures contributed to banks by a counterparty



Bank-Counterparty Connections: Example

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A schematic example of two of the different measures of “bank - non-bank” connectedness



Indirect Bank Connectedness Measures

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- Use three measures of *indirect* bank connections through **common, non-bank counterparties**:
 - **Number of banks** with which a specific counterparty has a relationship
 - **Network-wide dollar credit risk exposures of a specific counterparty across all banks**, providing the amount of (dollar) credit risk exposure a bank connecting with the counterparty will get exposed to vis-à-vis other banks once a connection is established
 - **Similarity in exposures to the same counterparties** between banks across the entire network

Empirical Specification: Connections

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- Construct a panel to study how banks (i) form linkages with CPs (j) with existing and non-existing relationships in next quarter ($t+1$)

$$\begin{aligned} Link_{i,j,t+1} = & \beta_1 \times IC_{i,j,t} + \beta_2 \times Relationship_{i,j,t} \\ & + \beta_3 \times Relationship_{i,j,t} \times IC_{i,j,t} + \beta \times X_{i,j,t} + \gamma_{j \times t} + \gamma_{i \times t} + \gamma_{i \times j} + \xi_{i,j,t+1} \end{aligned}$$

- Link: Dummy if bank i has relationship with CP j next quarter
- IC: Indirect connectedness of banks with exposures to the same CP
- Relationship: Dummy if bank i has existing relationship with CP j
- Fixed effects: Bank-time, CP-time, and bank-CP
- Bank-CP control variables (X): current credit exposures, collateral, net hedges, WAM, cleared-to-uncleared exposures, and default probability

Result: Bank-Counterparty Connections

Result: Banks establish connections, and maintain connections, with counterparties that have more connections with other banks

A more densely connected network emerges

	(1)	(2)	(3)	(4)
Specification for $Link_{i,j,t+1}$	All	All	All	All
Current Relationship Subsample:	No	Yes	All	All
IC	0.041***	0.126***	0.041***	
Relationship $_{i,j,t}$			0.819***	0.487***
IC x Relationship $_{i,j,t}$			0.085***	0.125***
Bank x Date FEs	NO	NO	NO	YES
CP x Date FEs	NO	NO	NO	YES
Bank x CP FEs	NO	NO	NO	YES
Control Variables	NO	NO	NO	YES

Results: Hedging Behavior

Result: CP interconnectedness is *negatively* associated with credit risk hedging

Effects are pronounced for material CPs, inconsistent with risk-sharing

Banks more likely to be net protection **sellers** of interconnected CPs

	(1)	(2)	(3)
<u>Current Relationship Subsample:</u>	Yes	Material	Yes
<u>Dependent Variable:</u>	$\%NetHedge_{i,j,t}$	$\%NetHedge_{i,j,t}$	$\%NetHedge_{i,j,t}$
IC	-0.026***	-0.055***	-0.008*
Material _{i,j,t}			-0.005***
IC × Material _{i,j,t}			-0.064***
Bank × Date FEs	YES	YES	YES
Control Variables	YES	YES	YES

Results: Counterparty Risk

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Interaction between counterparty's PD and interconnected measures are positive and statistically significant in the case of existing relationships

Banks are careful when establishing new relationships, avoiding riskier counterparties, whereas in the case of existing relationships banks tend to get more exposed to riskier counterparties

Panel A: Material Exposures

Interconnectedness (IC) Measure: Relationship Subsample:	CPBankLinks		TotalCRExposure		CPSimilarity	
	New Relationship	Existing Relationship	New Relationship	Existing Relationship	New Relationship	Existing Relationship
	(1)	(2)	(3)	(4)	(5)	(6)
IC _{j,t}	0.029*** (0.003)	0.123*** (0.011)	0.003*** (0.000)	0.035*** (0.003)	0.014*** (0.002)	0.266*** (0.026)
PD _{j,t}	0.001 (0.001)	0.058*** (0.010)	0.001* (0.001)	0.036*** (0.008)	0.000 (0.000)	0.082*** (0.013)
IC _{j,t} × PD _{j,t}	-0.001 (0.007)	0.076*** (0.024)	0.000 (0.000)	0.016*** (0.005)	0.001 (0.003)	0.168*** (0.049)
Control Variables	YES	YES	YES	YES	YES	YES
Bank × Year × Quarter FEs	YES	YES	YES	YES	YES	YES
N	242,316	67,656	242,316	67,656	242,316	67,656
R ²	0.01	0.17	0.01	0.17	0.00	0.17

Results: Counterparty Risk

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Results suggest that the effects of bank interconnectedness are uninhibited by the PD for these counterparties, implying that banks may allow some material exposures associated with counterparties with high levels of distress risk

Panel A: *CRBankLinks* Specification

Counterparty Materiality:	All (1)	Non-Material (2)	Material (3)
Relationship _{i,j,t}	0.774*** (0.012)	0.758*** (0.012)	0.023*** (0.004)
Relationship _{i,j,t} × IC _{j,t}	0.035*** (0.009)	-0.064*** (0.014)	0.079*** (0.011)
Relationship _{i,j,t} × PD _{j,t}	-0.058*** (0.009)	-0.066*** (0.014)	0.014* (0.008)
Relationship _{i,j,t} × IC _{j,t} × PD _{j,t}	0.009 (0.014)	-0.046* (0.027)	0.071*** (0.027)
Control Variables	YES	YES	YES
Bank × Year × Quarter FEs	YES	YES	YES
Counterparty × Year × Quarter FEs	YES	YES	YES
N	309,972	309,972	309,972
R ²	0.85	0.72	0.40

Results: Systemic Risk

Results so far provide evidence of fragility due to bank CP choice

Are common CP exposures a source of systemic stress?

Our results suggest the answer is yes

	(1)	(2)	(3)	(4)
<u>Dependent Variables:</u>	SRISK	MES	Trading Volume	Trading Revenue
%CommonExposure	0.134***	0.024**	0.013***	0.003**
Control Variables	YES	YES	YES	YES
Bank FEs	YES	YES	YES	YES
Year-Quarter FEs	YES	YES	YES	YES

Results: Pairwise Bank Tests

Common CP exposures positively associated with joint bank tail risks

Results significant for both NBF and non-financial CPs

Effects pronounced in stress periods

Dependent Variable:	$\rho^{IdRet}_{i1,i2,t+1}$ (1)	$\rho^{IdRet}_{i1,i2,t+1}$ (2)	$\rho^{IdRet}_{i1,i2,t+1}$ (3)	$\rho^{IdRet}_{i1,i2,t+1}$ (4)
%CommonPairExposure _{i1,i2,t}	0.709***			
%CommonPairExposure _{i1,i2,t} ^{Non-Bank Financial}		0.778***		0.738***
%CommonPairExposure _{i1,i2,t} ^{Non-Financial Corporate}			0.674***	0.617***
Bank i_1 × Year × Quarter FEs	YES	YES	YES	YES
Bank i_2 × Year × Quarter FEs	YES	YES	YES	YES

Conclusions

- There are various emerging risk-taking areas in the insurance sector
 - ▣ Growing interconnections with PE firms, rising reliance on AIR, heightened exposures to private markets with consequent shift to riskier investments
- All raise several serious concerns for financial stability **on their own**
- Concerns are even more serious when considering the **insurance-banking connections**
- Market frictions need to be addressed
 - ▣ Regulatory arbitrage, regulation that produces unintended consequences etc.
- Major question: Is regulation dealing with yesteryear's scenario, or trying to address frictions arising from the present environment?