



清华大学

Tsinghua University

Tokenization of DeFi Insurance

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June 29, 2026

2026 International
Workshop on Risk
and Insurance



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Outline

- 1 Why Innovations?
- 2 What Innovations?
- 3 How Do They Work?

Why Innovations?

Challenges with Current Insurance Market:

- Prohibitive capital requirements
- Stringent regulatory oversight
- The “brand and reputation” barrier
- High customer acquisition costs

Disruptive Innovations:

- Low-end disruption
- New-market disruption



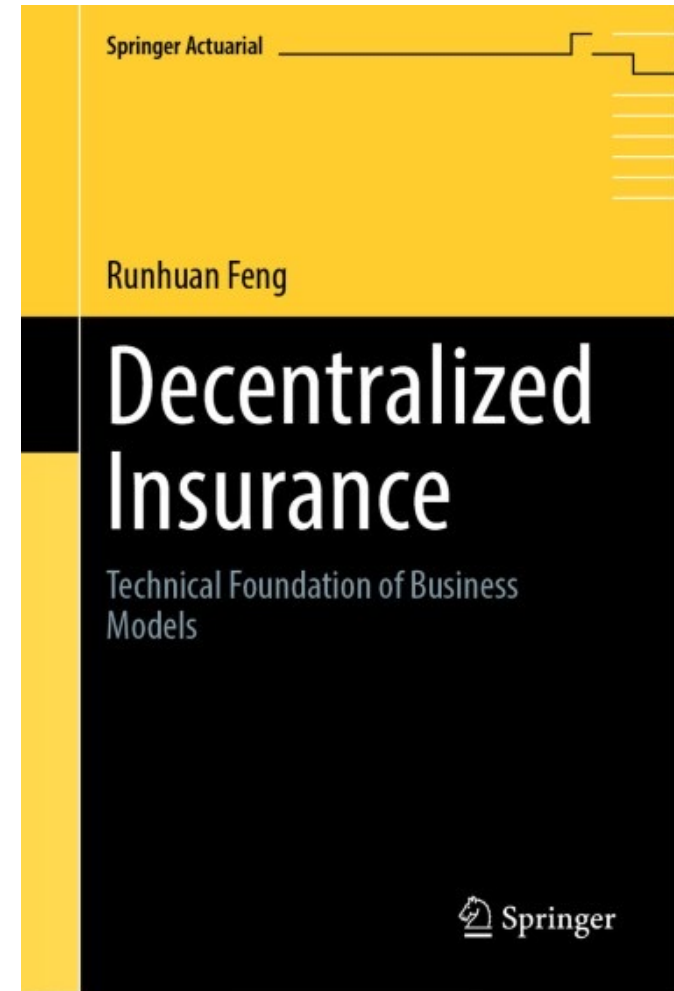
Market Innovations

- Decentralized insurance
- Distributed risk sharing
 - DeFi insurance (You are here)
 - Distributed insurance

(Day 1 Tue. 15:40 Hoam Hall 4F-12, Youxi Zhang)

- Decentralized claims processing

(Day 2 Wed. 9:00am Hoam Hall 4F-07, Runhuan Feng)



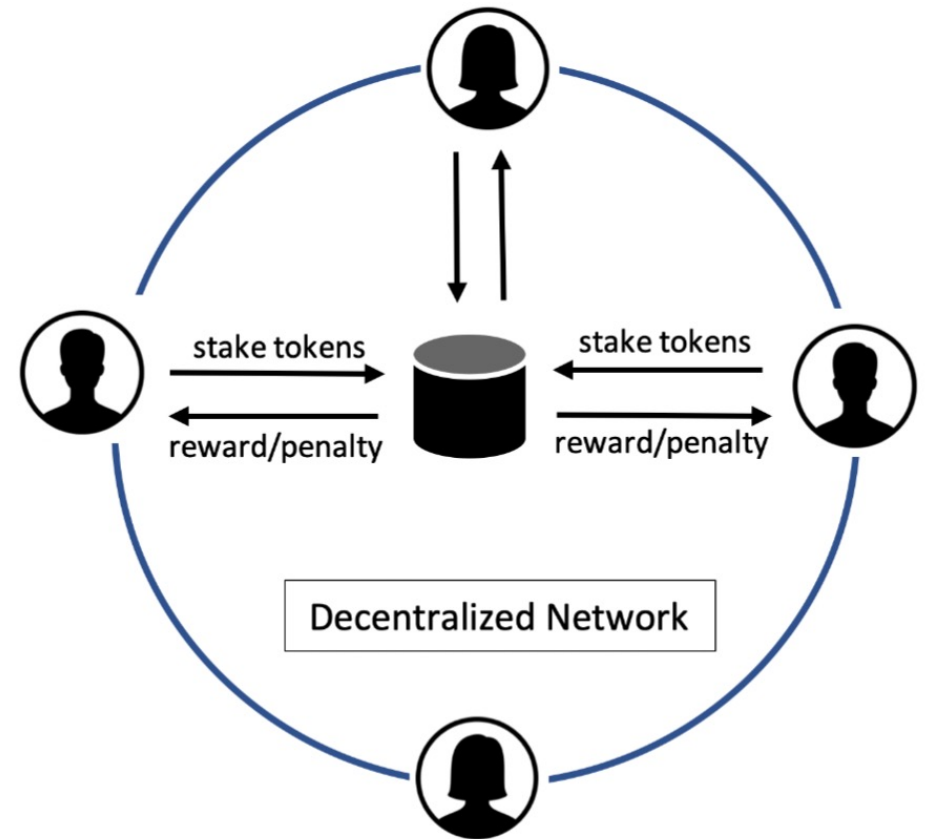
Decentralized Finance

Finance: Centralized vs. Decentralized (DeFi)

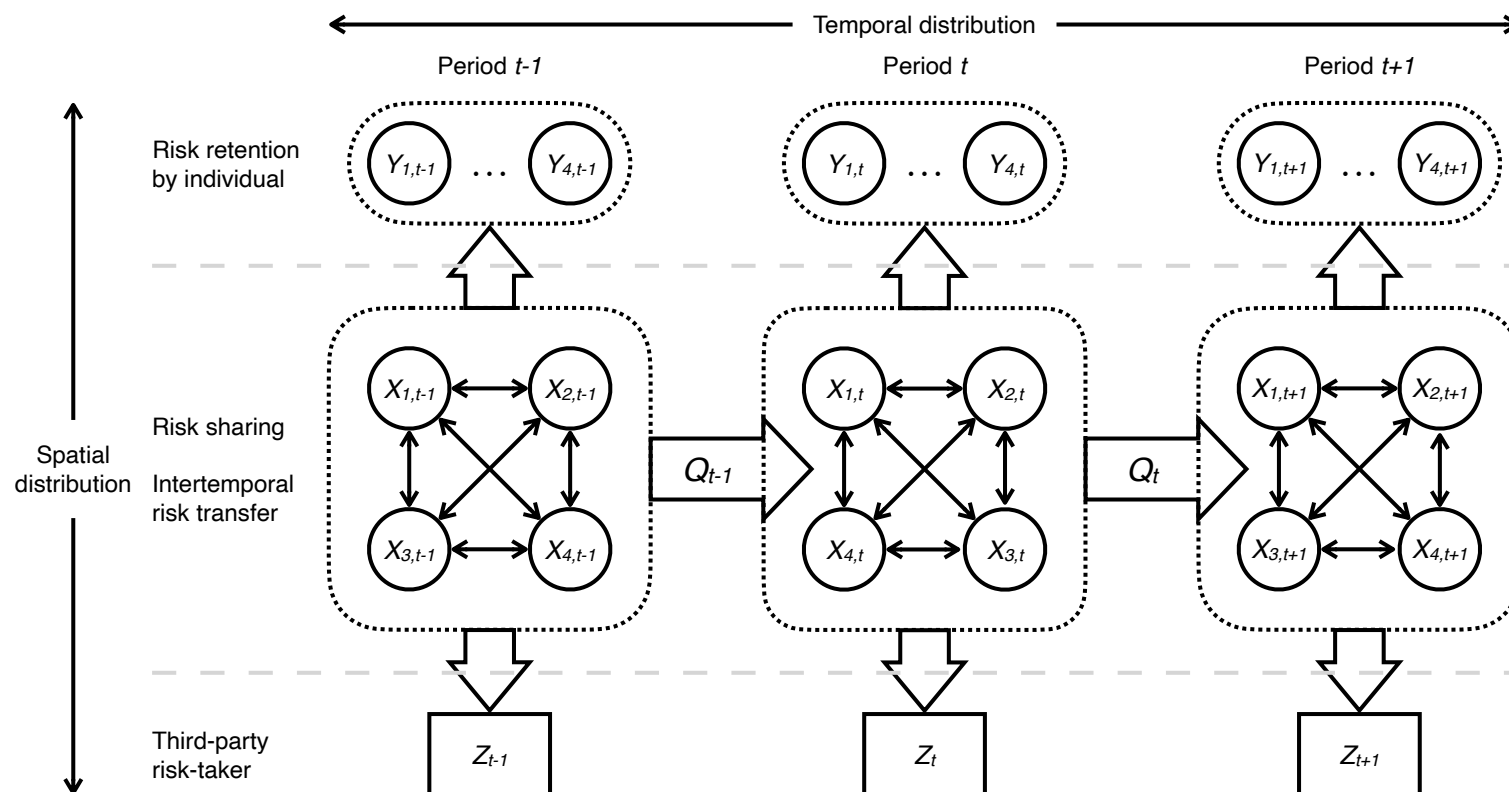
Centralized Finance



Decentralized Finance

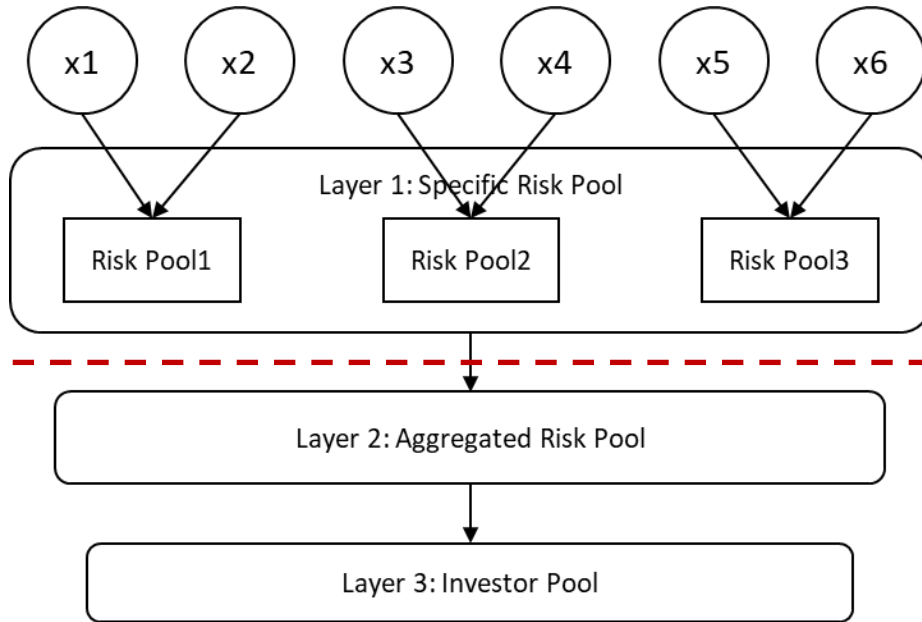


Spatio-Temporal Risk Sharing

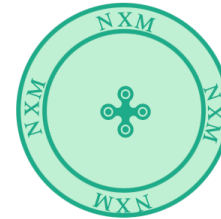


Feng, R., & Liu, P. (2025). Spatio-temporal risk sharing and transfer: A unified theory of multi-period decentralized insurances and annuities. *Journal of Risk and Insurance*.

Tokenomics of DeFi Insurance



Risk assessors stake tokens



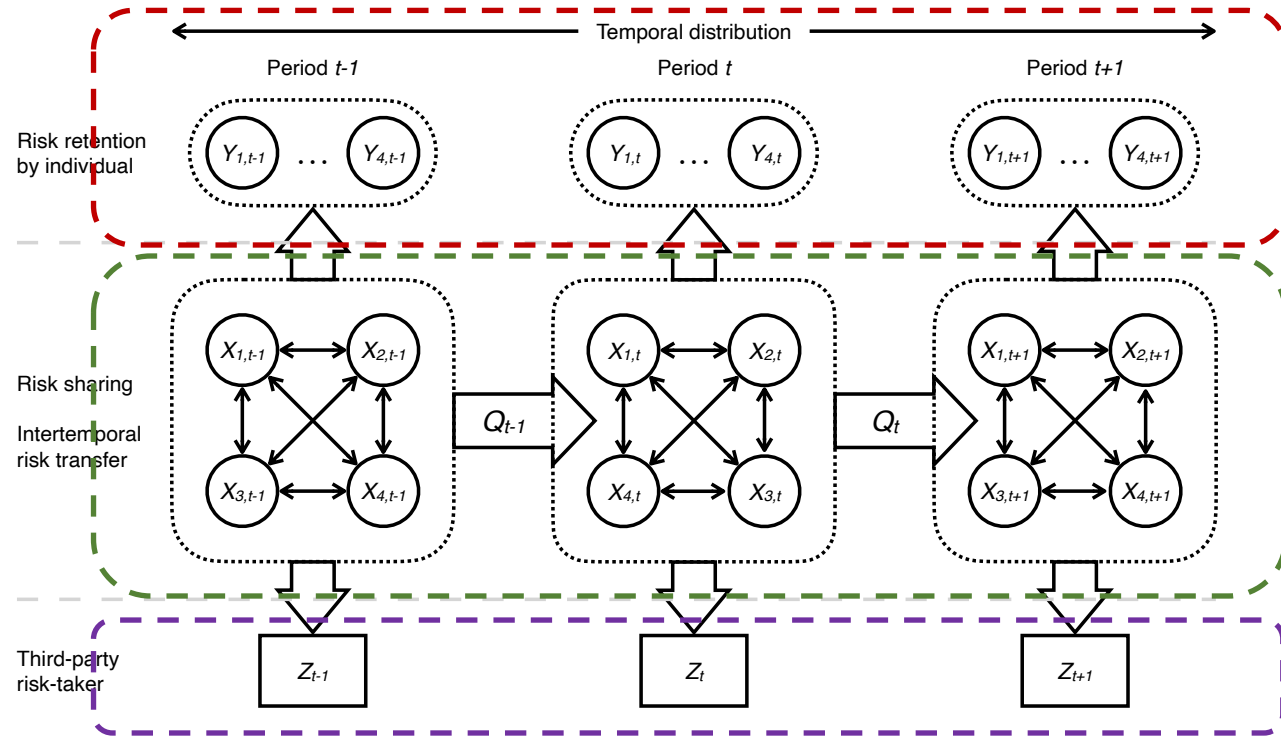
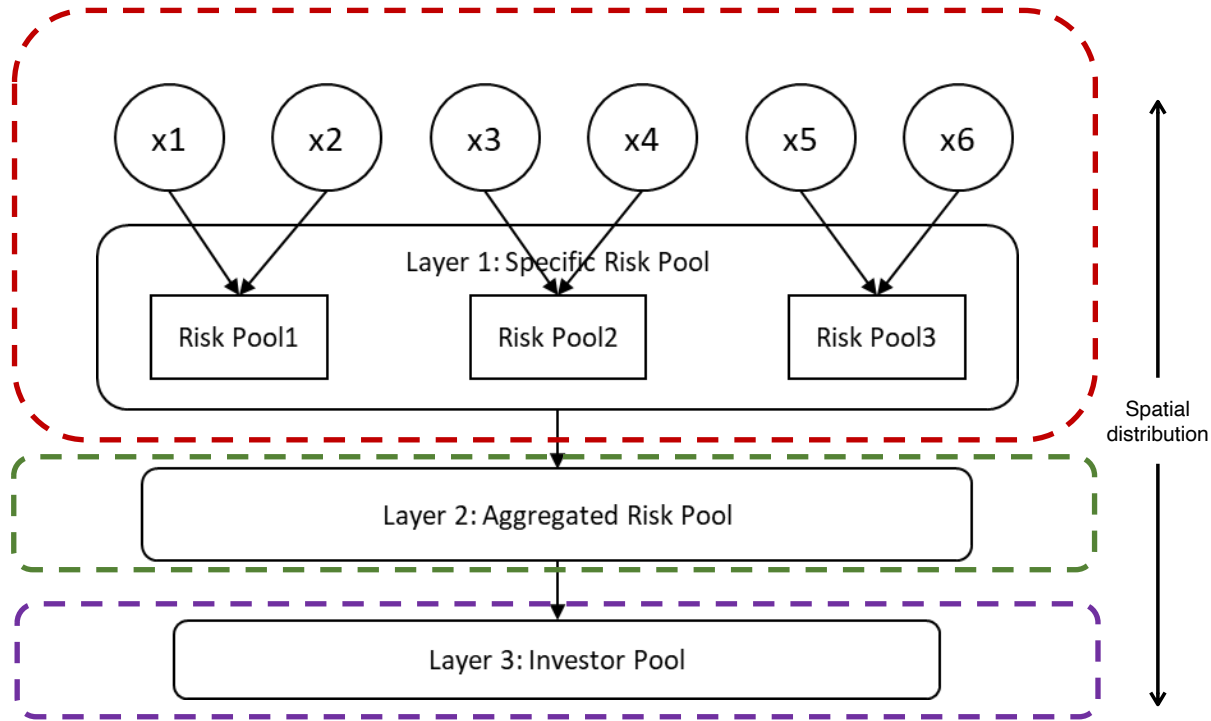
Staked tokens are used to pay for claims



Premiums allocated to risk assessors



Tokenomics of DeFi Insurance



Structural Comparison

Table 5: Actuarially Fair Risk Sharing via Different Layer Models

Business Model	Premium Distribution (%)			Claim Allocation (%)			Return (SD) (%)			Sharpe Ratio			Ruin Probability (%)	$Var_{95}(\%)$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	$L^{(1)}$	$L^{(2)}$	$L^{(3)}$	$L^{(1)}$	$L^{(2)}$	$L^{(3)}$	$L^{(1)}$	$L^{(2)}$	$L^{(3)}$	$L^{(1)}$	$L^{(2)}$	$L^{(3)}$	$L^{(3)}$	$L^{(3)}$
Panel A: Baseline Setting														
L_{123}^*	75.84	22.95	1.21	75.83	22.17	2.00	0.01 (0.09)	-0.01 (19.69)	-0.14 (6.89)	0.11	0.00	-0.02	1.40	61.71
L_{13}^*	75.84	-	24.16	75.83	-	24.17	0.01 (0.09)	-	0.00 (2.97)	0.11	-	0.00	0.24	51.17
L_{12}^*	75.84	24.16	-	75.83	24.17	-	0.01 (0.09)	0.00 (2.97)	-	0.11	0.00	-	0.24	51.17
L_{23}^*	-	96.27	3.73	-	88.49	11.51	-	-0.43 (26.06)	-0.64 (34.00)	-	-0.02	-0.02	22.96	100
Panel B: Extended Setting														
L_{123}^*	75.84	22.95	1.21	75.83	23.16	1.00	15.18 (0.09)	1.25 (12.64)	2.78 (1.66)	173.35	0.1	1.67	0.08	-55.01
L_{13}^*	75.84	-	24.16	75.83	-	24.17	15.18 (0.09)	-	2.38 (0.75)	173.35	-	3.19	0.00	-33.02
L_{12}^*	75.84	24.16	-	75.83	24.17	-	15.18 (0.09)	2.38 (0.75)	-	173.35	3.19	-	0.00	-33.02
L_{23}^*	-	96.27	3.73	-	98.78	1.22	-	2.81 (5.55)	3.6 (5.77)	-	0.51	0.62	1.17	-103.49
Panel C: Extended Setting—After 30 Periods of Accumulation														
L_{123}^*	75.84	22.95	1.21	75.83	23.82	0.35	15.18 (0.09)	0.83 (8.75)	3.10 (0.80)	173.35	0.10	3.86	0.01	-112.49

Testing of Existing Business Models

Table 6: Practical Risk Sharing via Different Layer Structures

Business Model	Premium Distribution (%)			Claim Allocation (%)			Return (SD) (%)			Sharpe Ratio			Ruin Probability (%)	$Var_{95}(\%)$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	$L^{(1)}$	$L^{(2)}$	$L^{(3)}$	$L^{(1)}$	$L^{(2)}$	$L^{(3)}$	$L^{(1)}$	$L^{(2)}$	$L^{(3)}$	$L^{(1)}$	$L^{(2)}$	$L^{(3)}$	$L^{(3)}$	$L^{(3)}$
Panel A: Baseline Setting														
Nexus Mutual	50	-	50	49.96	-	50.04	0.07 (0.06)	-	0.00 (6.28)	1.14	-	0.00	1.27	66.49
Bridge Mutual	80	20	-	80.02	19.98	-	0.01 (0.09)	0.00 (2.15)	-	0.14	0.00	-	0.11	47.05
Unslashed	100	-	-	99.62	-	-	0.14 (0.07)	-	-	2.03	-	-	-	-
InsurAce	-	1	0	-	92.02	7.98	-	0.37 (20.66)	-0.96 (38.24)	-	0.02	-0.03	17.99	100
InsurDEFI	-	50	50	-	26.99	73.01	-	-12.37 (40.21)	-4.55 (47.31)	-	-0.31	-0.10	65.36	100
Nsure	50	50	0	49.96	44.48	5.25	0.07 (0.06)	0.68 (22.35)	-0.91 (31.89)	1.14	0.03	-0.03	11.66	100
Panel B: Extended Setting														
Nexus Mutual	50	-	50	49.96	-	50.04	18.07 (0.06)	-	2.80 (1.15)	295.29	-	2.44	0.02	-39.16
Bridge Mutual	80	20	-	80.02	19.98	-	14.49 (0.09)	2.31 (0.69)	-	159.73	3.35	-	0.00	-34.34
Unslashed	100	-	-	99.62	-	-	7.75 (0.07)	-	-	108.96	-	-	-	-
InsurAce	-	1	0	-	99.33	0.67	-	3.32 (3.66)	3.32 (4.13)	-	0.91	0.80	0.77	-116.75
InsurDEFI	-	50	50	-	35.57	64.43	-	-10.32 (44.38)	2.44 (22.64)	-	-0.23	0.11	8.9	100
Nsure	50	50	0	49.96	48.31	1.73	18.07 (0.06)	2.69 (9.82)	2.73 (6.29)	295.29	0.27	0.43	1.27	-3.84

Thank you for listening!



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