The Failure of a Clearinghouse: Empirical Evidence

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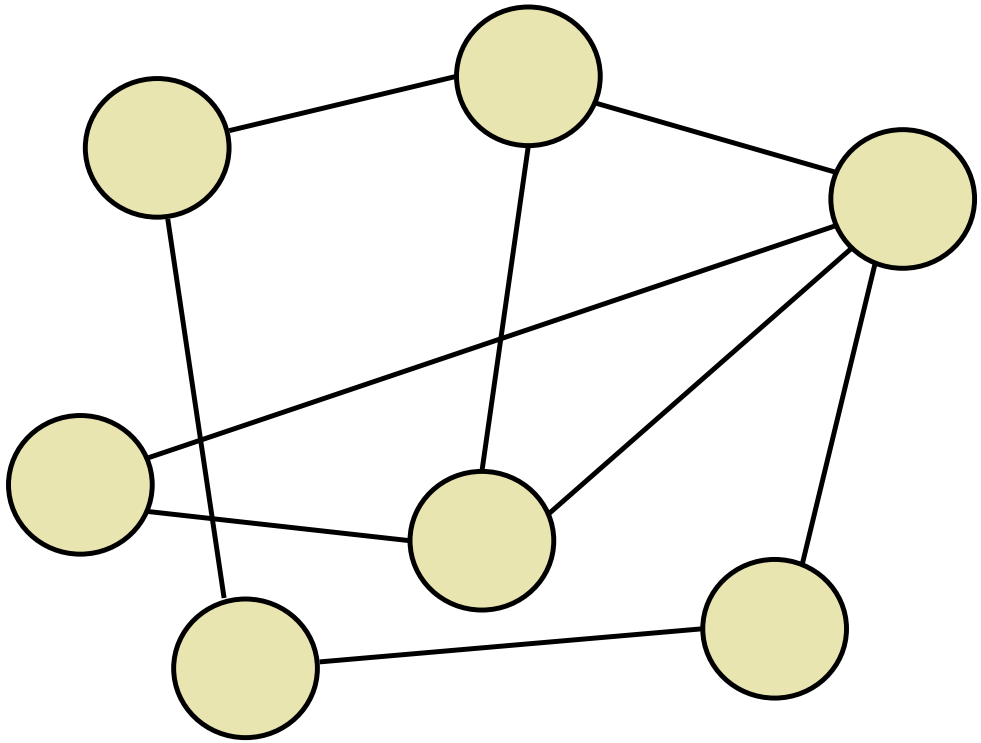

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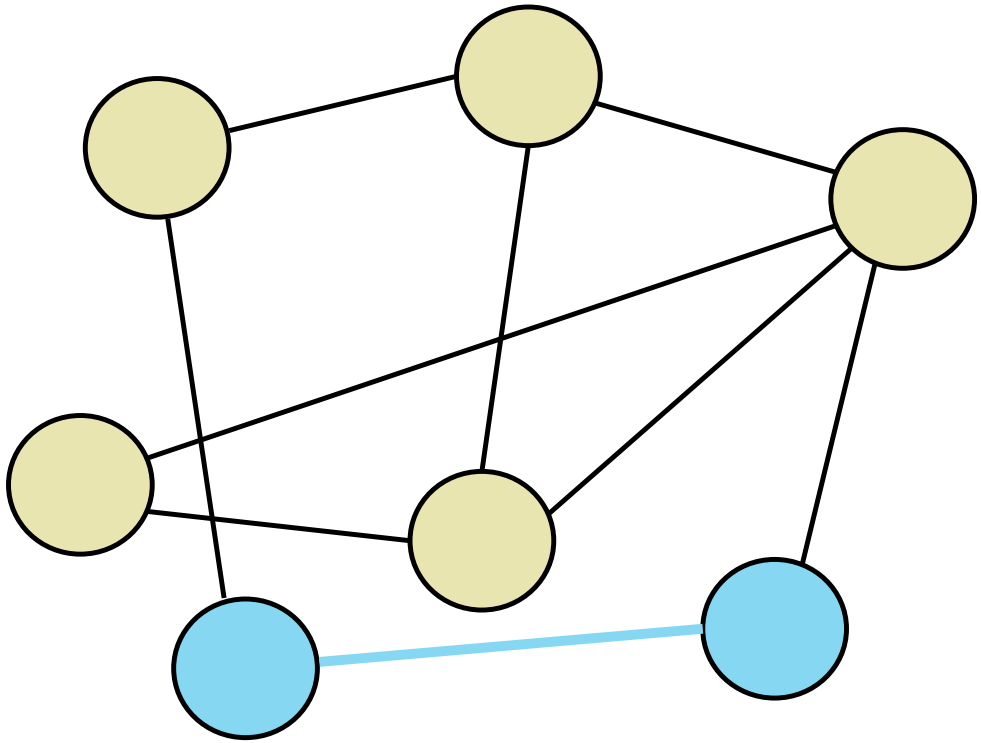

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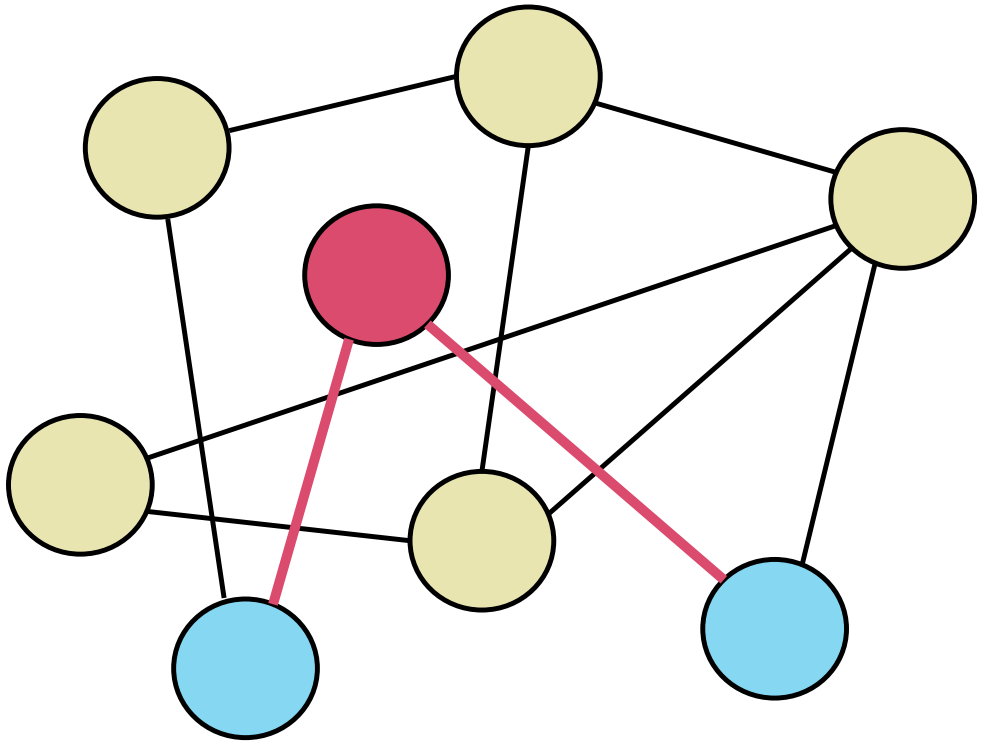

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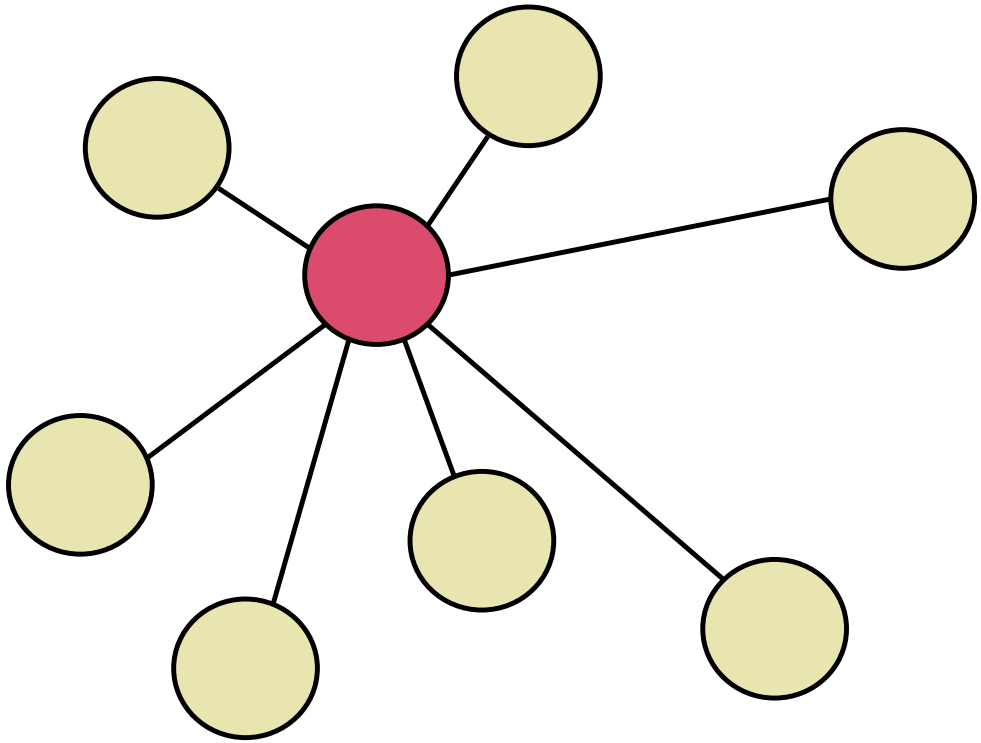

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- Implications: **CCP capital structure & default management**

CCP capital structure

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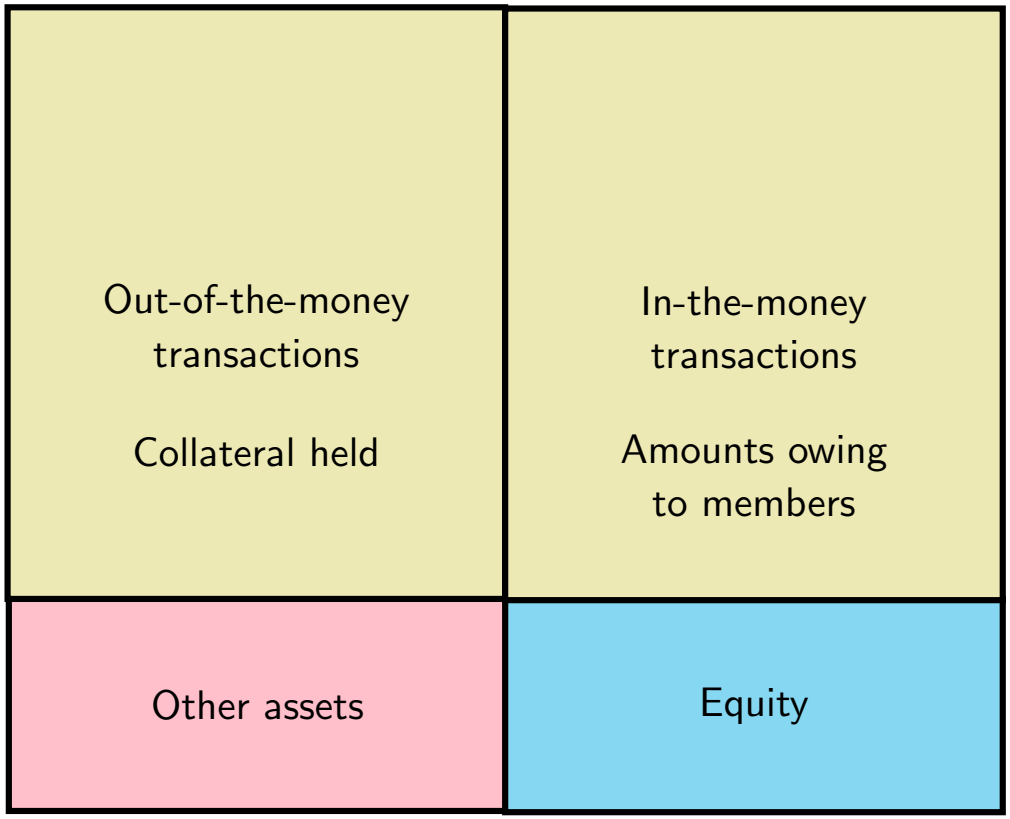

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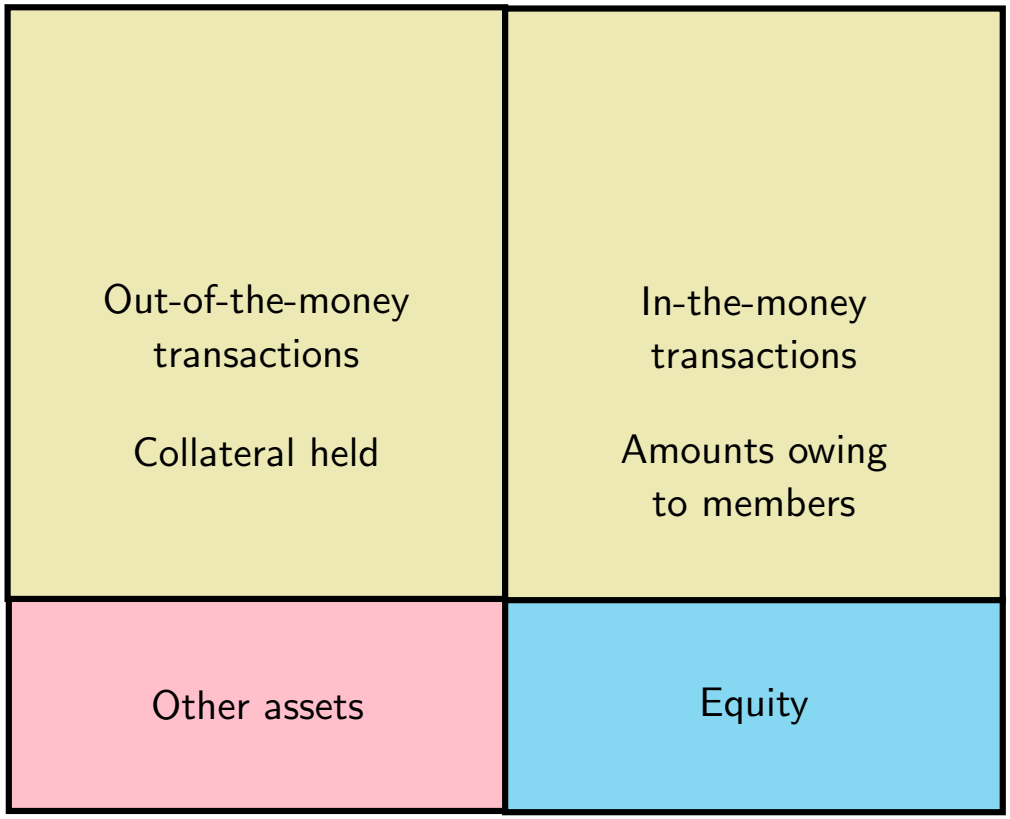

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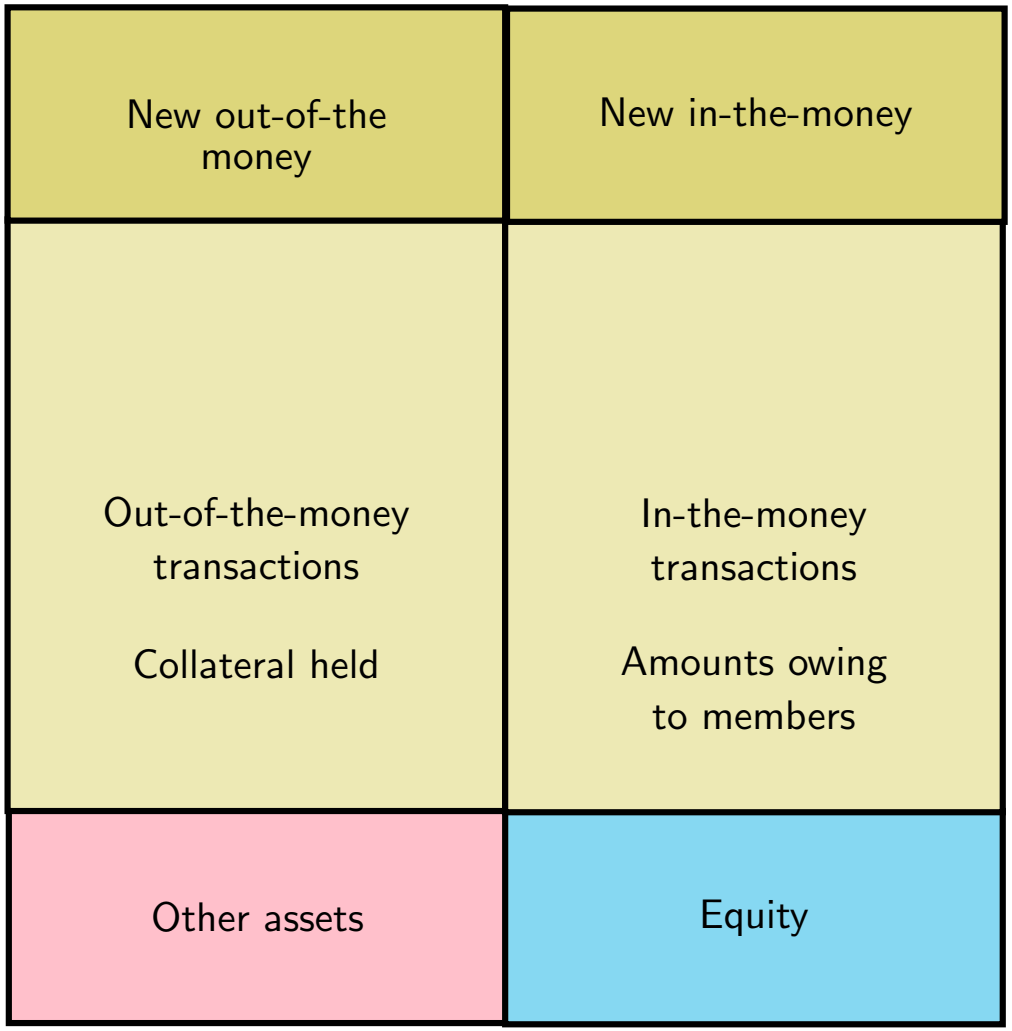

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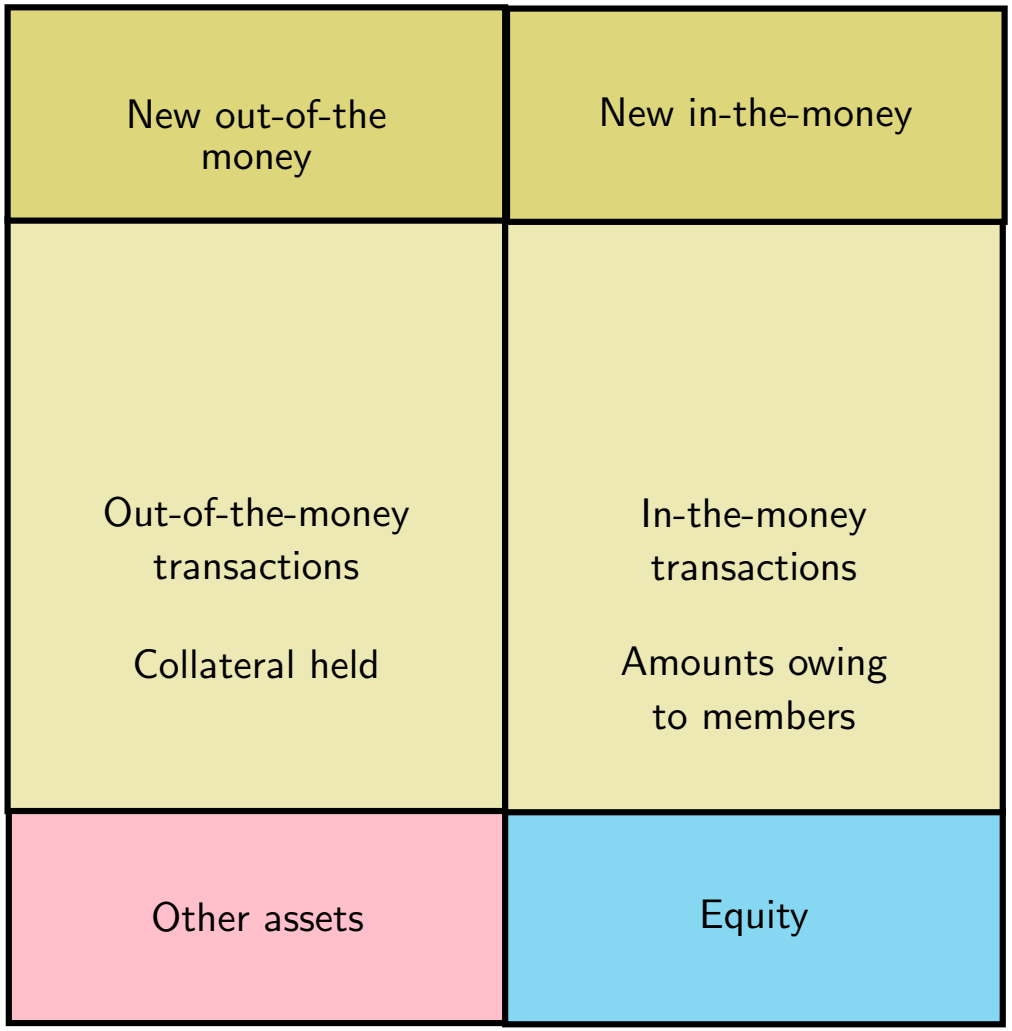

Theory of CCP risk management

- **No CCP moral hazard** — Away from large member default
  - CCPs mutualize idiosyncratic default risk (Biais et al., 2012)
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- **With CCP moral hazard**
  - Good states: Reduce margins $\rightarrow$ Higher trading volume and fees
  - Bad states: Bailout

  $\Longrightarrow$ Distortions even away from default; no discontinuous behavior

The market

- **Paris Commodity Exchange**
  - Futures on sugar, cocoa, coffee
  - Trading through 35 **registered brokers** $\rightarrow$ Also clearing members
  - Execute orders on behalf of clients, including retail investors
  - Limited trading by brokers on the own account
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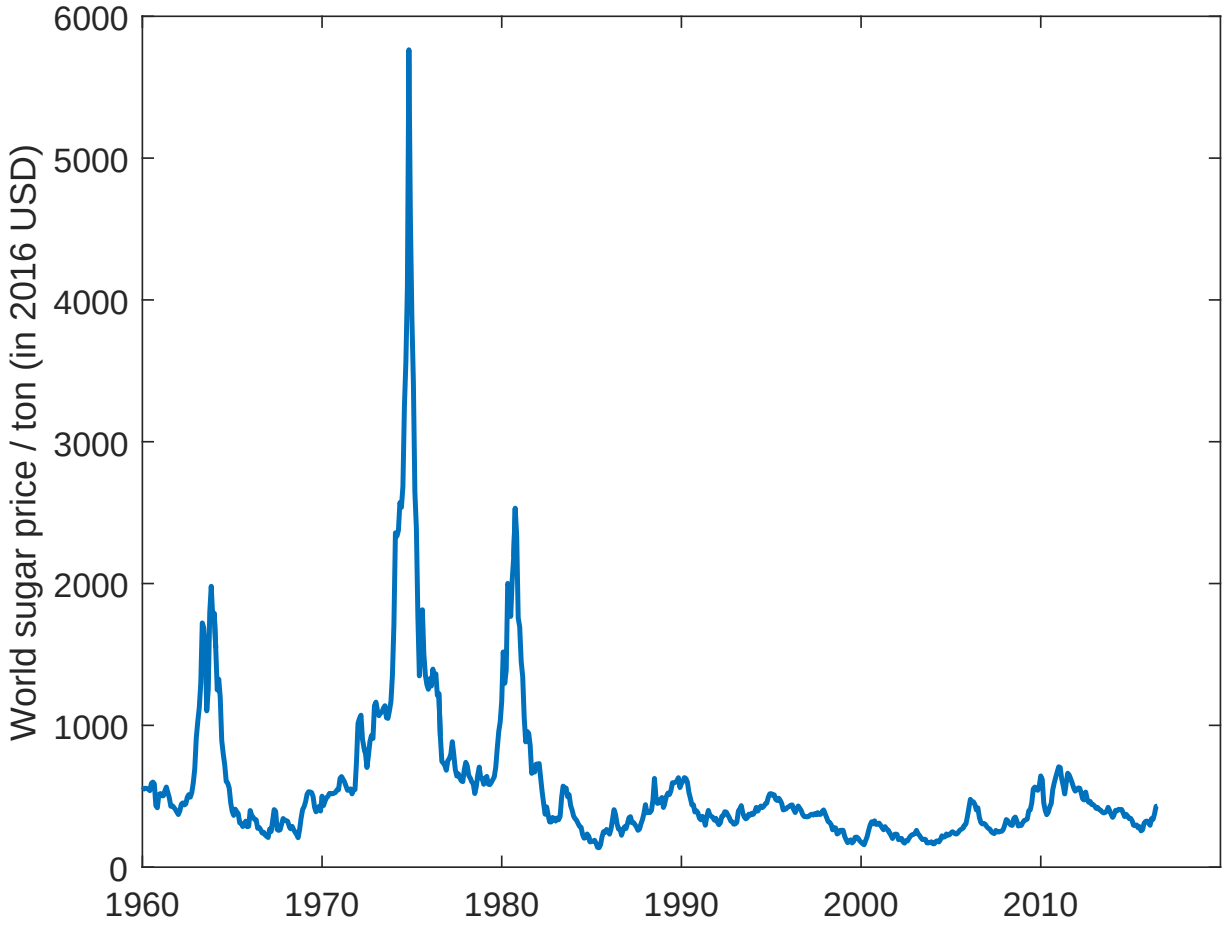
- **CCP**: *Caisse de Liquidation des Affaires en Marchandises* (CLAM)
  - All trades centrally cleared $\rightarrow$ CLAM takes counterparty risk
  - Risk managed by calling initial + variation margins
    - **Initial margins**: Paid at initiation of contract
    - **Variation margins**: Called daily based on price fluctuations
  - If default on margins: Liquidate member's position
  - If loss: equity absorbs; no additional waterfall

The 1974 sugar price boom

- Nov. 1973 - Nov. 1974: Six fold increase in **global** sugar prices



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- **Closure of sugar market**: Dec. 3rd, 1974 to Jan. 1976
  - Market closes under pressure of CLAM + registered brokers
  - Negotiation + Judicial battle about loss allocation
  - Resolution of the CLAM, re-open with new CCP

Archive data

- **Department of Commerce + Paris Chamber of Commerce**
  - Legal, judicial and statistical documents, notes, confidential reports
  - $\rightarrow$ Exposures of CLAM, brokers and investors
  - $\rightarrow$ Account and transactions by Nataf
  - $\rightarrow$ Financial position on all of Nataf's clients
- **Bank of France**
  - Supervisory reports and notes
  - Balance sheet data
- **Stock price data** from *Cours authentique et officiel*
- **Sugar price data** from *Les Echos*.
  - Spot/future in Paris, London and New York

Risk management during the boom

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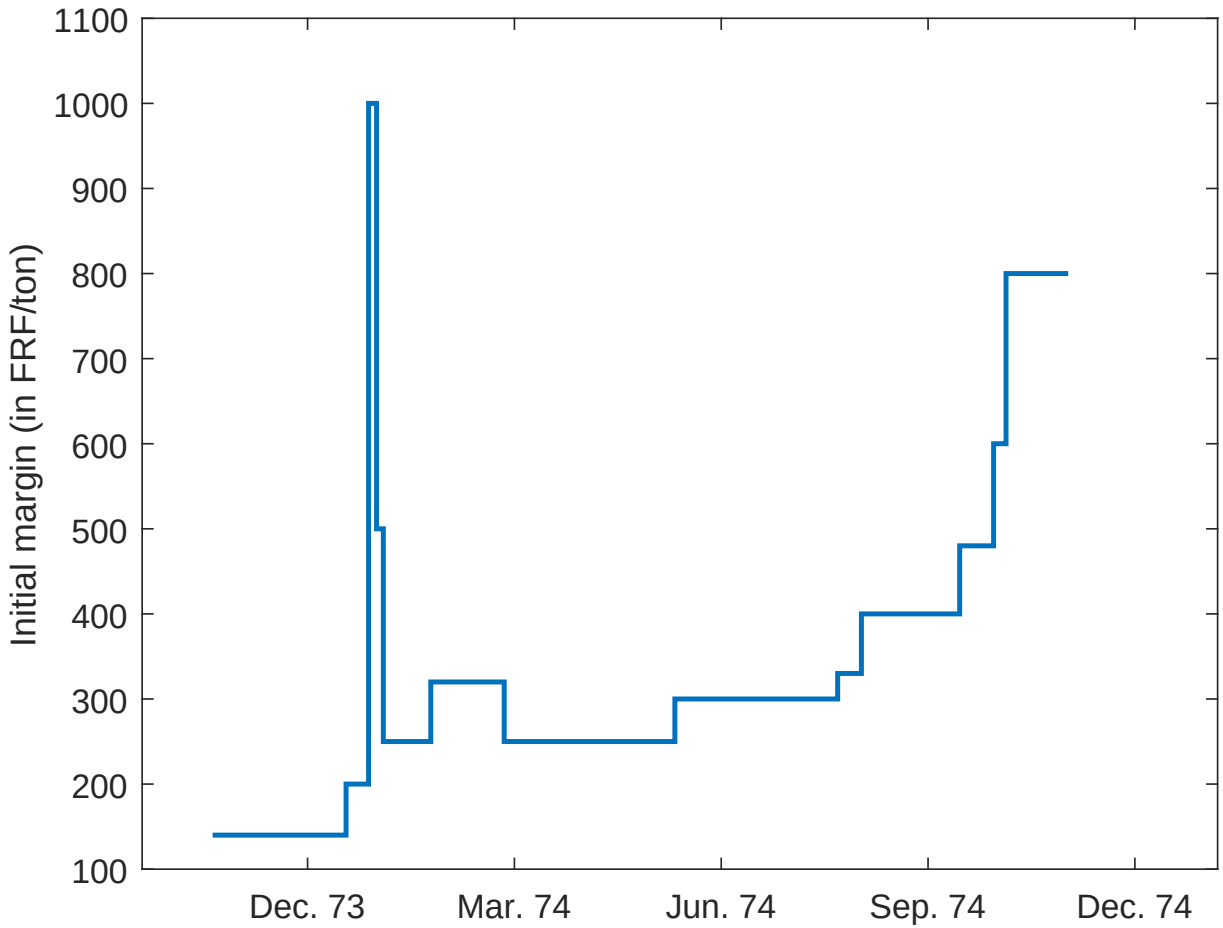
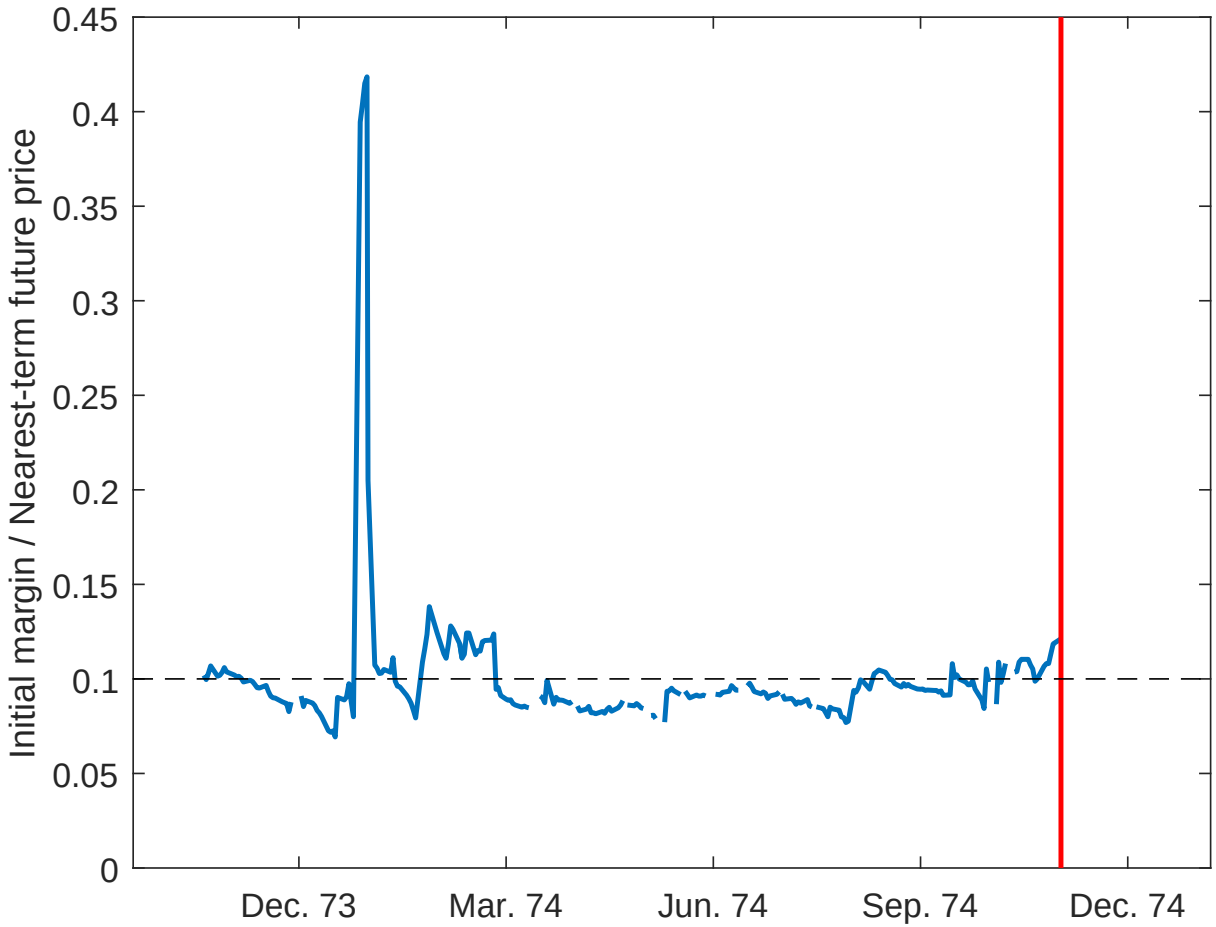
Initial margin requirements

- Initial margin in FRF per ton of sugar



Initial margin requirements

- Initial margin / Nearest-term future sugar price



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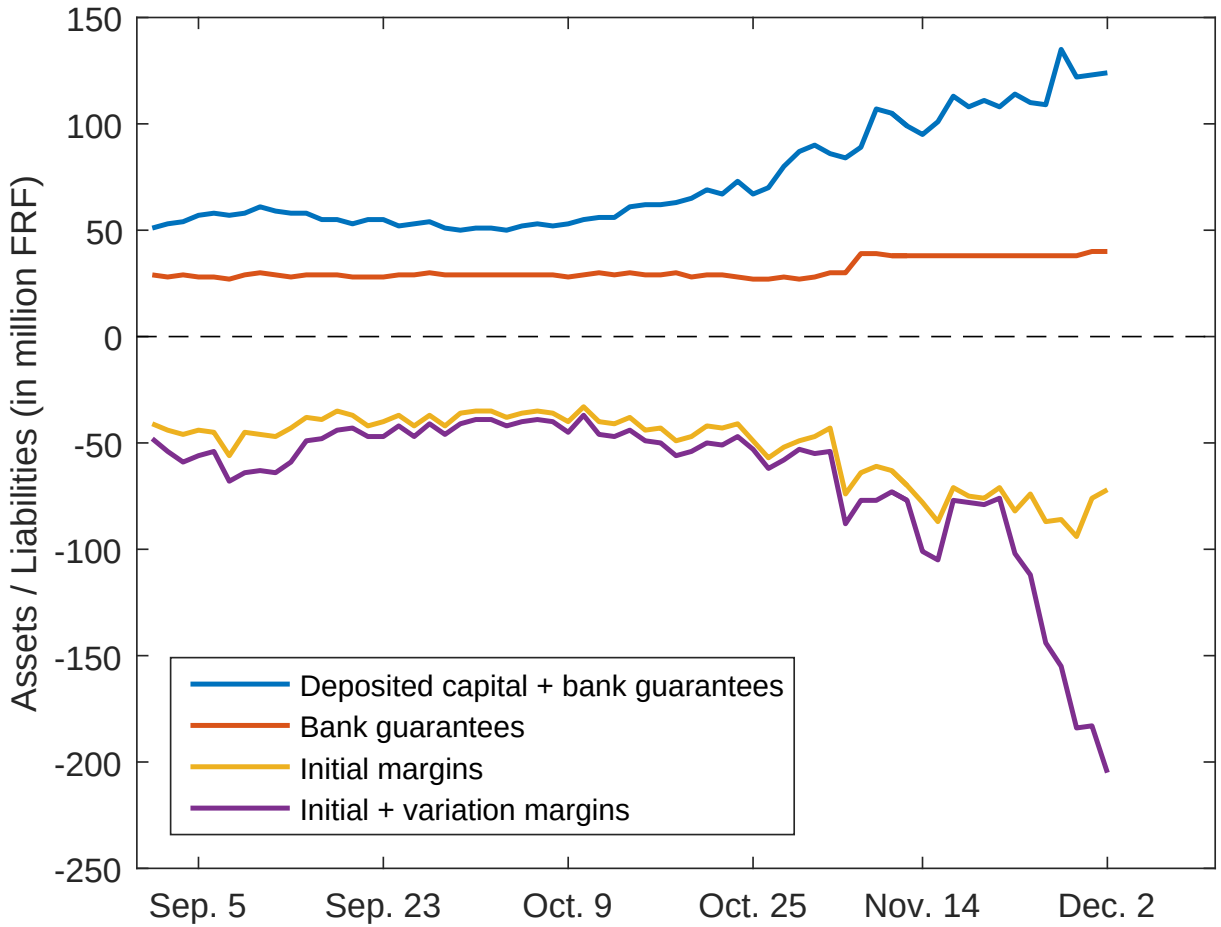
  Margins paid in cash or with bank guarantees (letters of credit)

Quality of margins

$$\text{Balance on CCP account} = \text{Deposited capital} + \text{External bank guarantees} - \text{Initial margins} - \text{Variation margins}$$



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- Inconsistent with significantly weaker risk management

Event study: increases in initial margins

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- **Cumulative abnormal return** from $\tau - 5$ to $\tau + 5$

$$C\bar{A}R(\tau - 5, \bar{\tau}) = \sum_{t=\tau-5}^{\bar{\tau}} \left(\frac{1}{N} \sum_{i=1}^{N} AR_{it} \right).$$

Event study: increases in initial margins

	Cumulative abnormal return	95% confidence interval	p-value
$\tau - 5$	-0.001	[-0.014 ; 0.011]	0.590
$\tau - 4$	0.001	[-0.020 ; 0.021]	0.471
$\tau - 3$	-0.000	[-0.021 ; 0.020]	0.521
$\tau - 2$	-0.004	[-0.028 ; 0.020]	0.658
$\tau - 1$	-0.000	[-0.028 ; 0.028]	0.504
τ	0.006	[-0.025 ; 0.036]	0.336
$\tau + 1$	0.006	[-0.025 ; 0.036]	0.331
$\tau + 2$	0.013*	[-0.009 ; 0.035]	0.097
$\tau + 3$	0.017**	[0.001 ; 0.034]	0.022
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- $\rightarrow$ CLAM is acting to protect Nataf

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- **Channel**
  - Trades registered at the CLAM at the end of the day
  - Rearrange counterparties and prices before novation

Distorted incentives of brokers

	Dependent variable: Execution price of buy orders			
Avg. exec. price of existing trades	**-0.020****	**-0.016***		
	(0.028)	(0.057)		
Size of existing position			**-0.279*****	**-0.247*****
			(0.000)	(0.000)
Volume of trade		-0.185***		-0.097**
		(0.000)		(0.027)
N. Obs.	69	69	74	74
R^2	0.993	0.995	0.995	0.995
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- Results consistent, but not significant, for sell orders

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- Push for Article 22 $\rightarrow$ **Manipulate settlement price**

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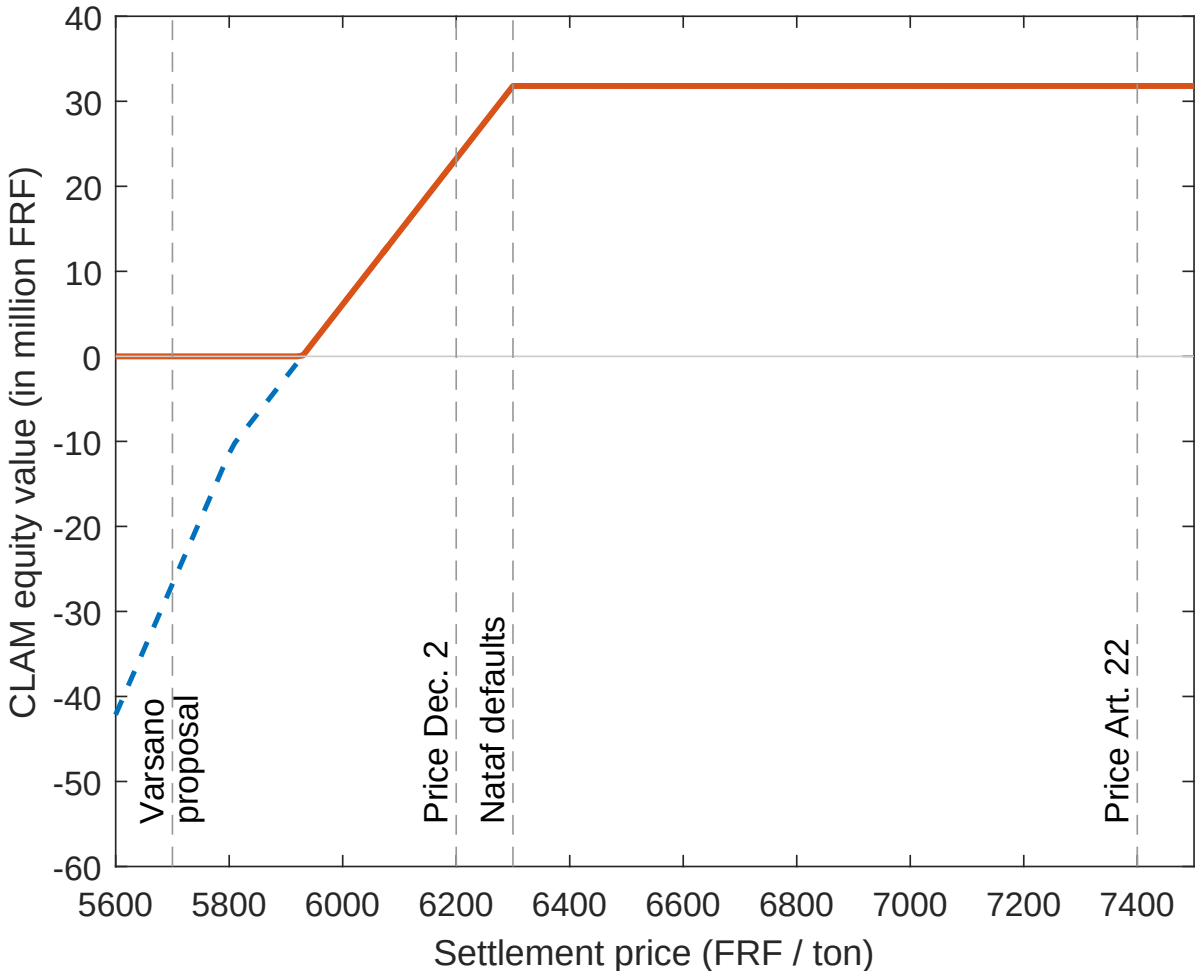
CLAM equity value



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- CLAM close to region where **equity value function is convex**
- $\rightarrow$ Risk-shifting likely to be a more general feature of CCPs

Conclusion and policy implications

- **Disruptions of clearing can occur without large moral hazard**
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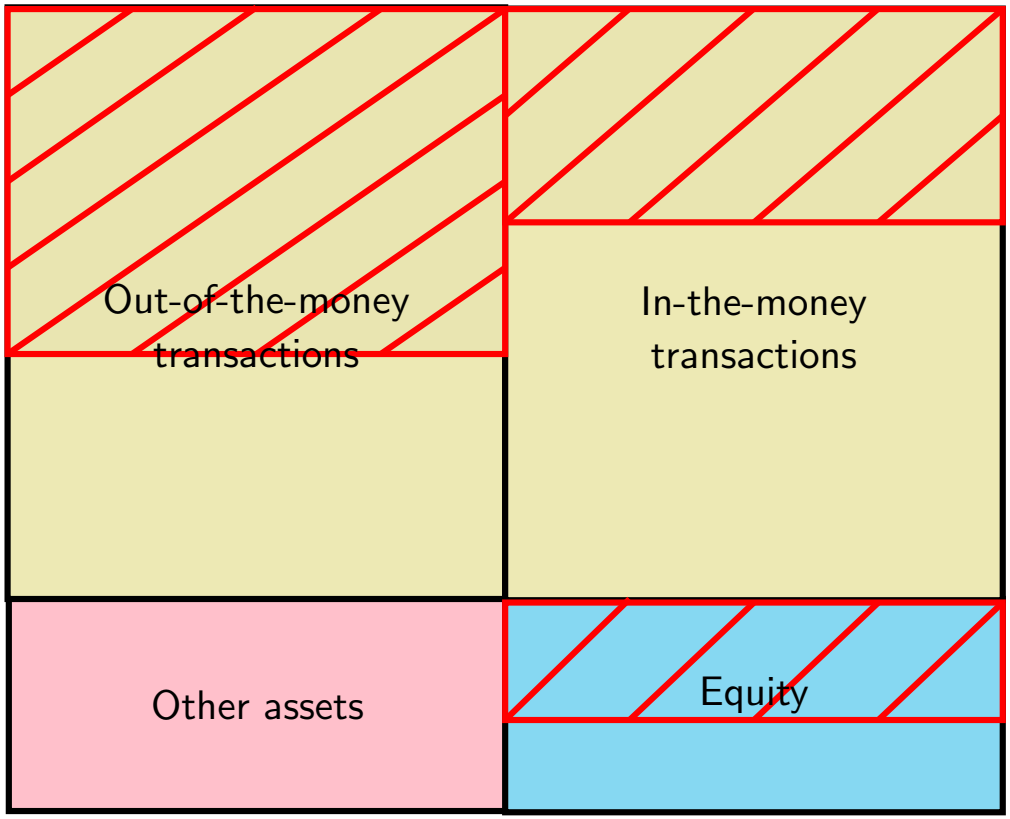
- **Better CCP governance** can reduce risk-shifting
  - More power to members that attach greater value to continuation
  - Member-owned CCPs likely to prefer continuation
  - **Rules versus discretion**: less likely to delay default

Policy implications: Default waterfalls

- **Default waterfall**
  - Tranches of equity
  - Members junior to residual equity (CoCo-like)



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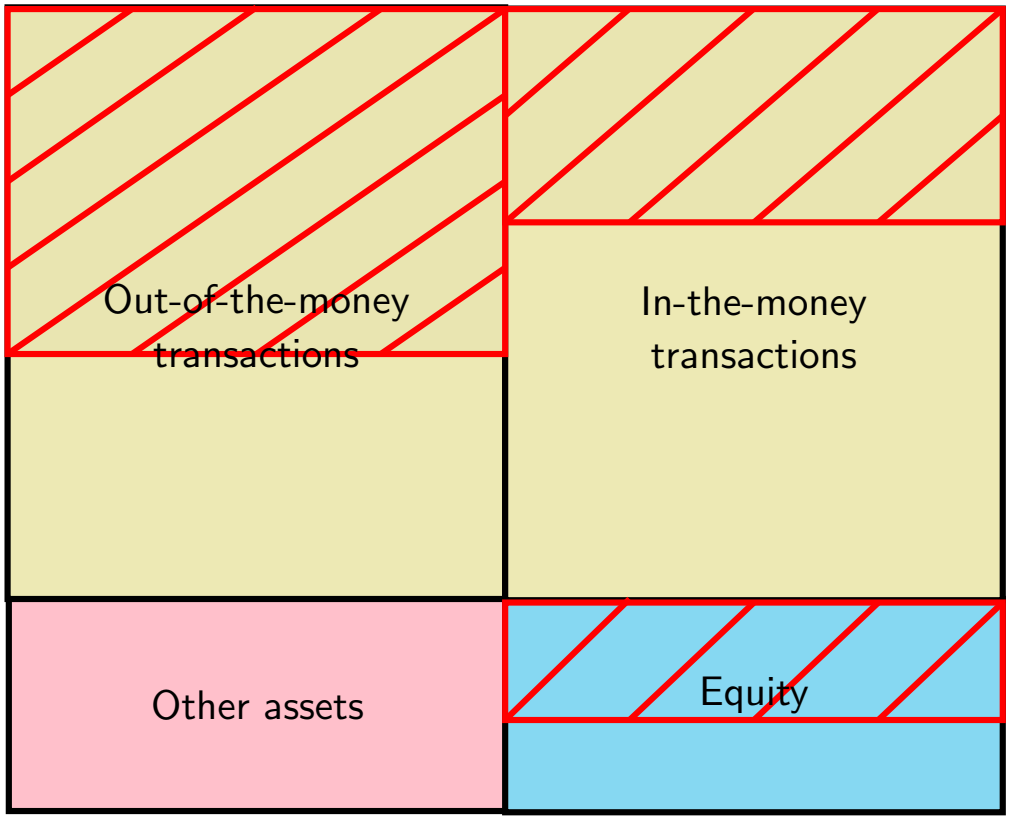

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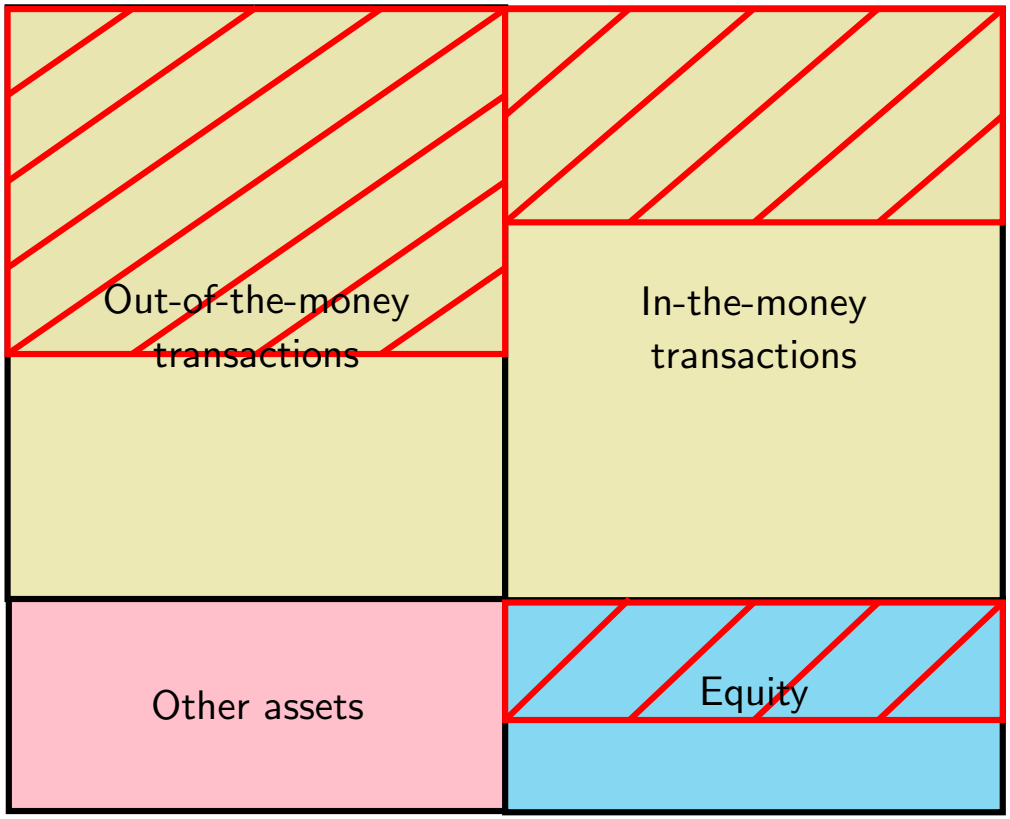

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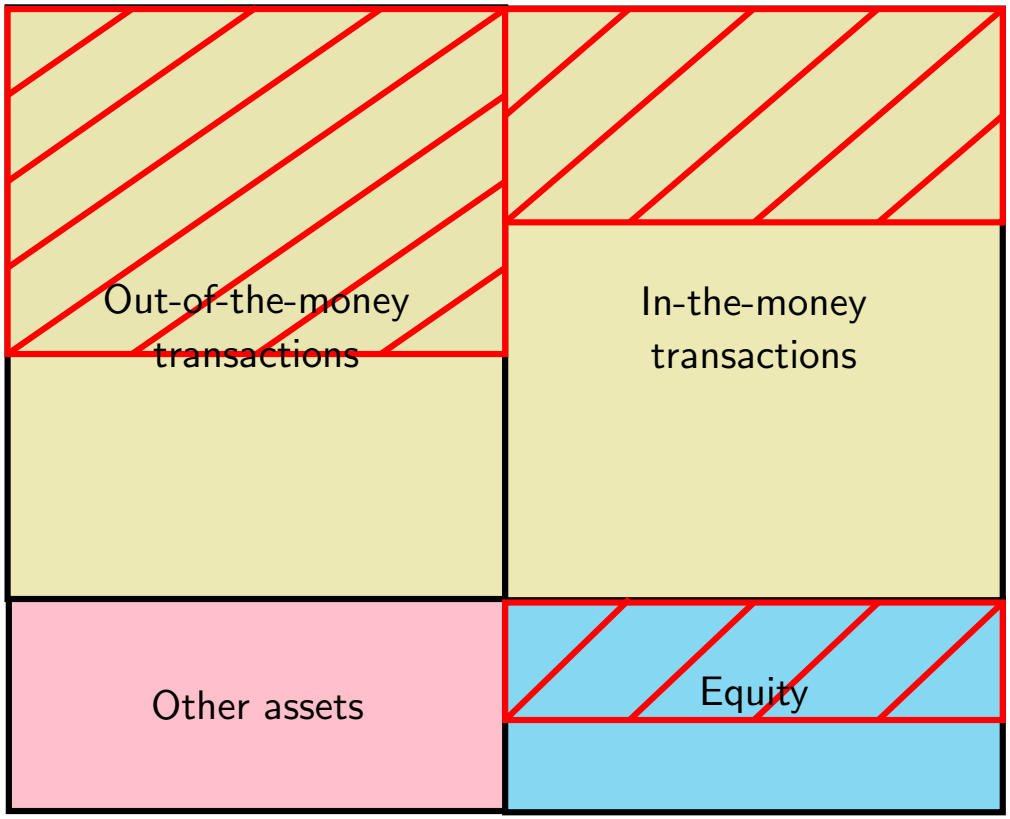
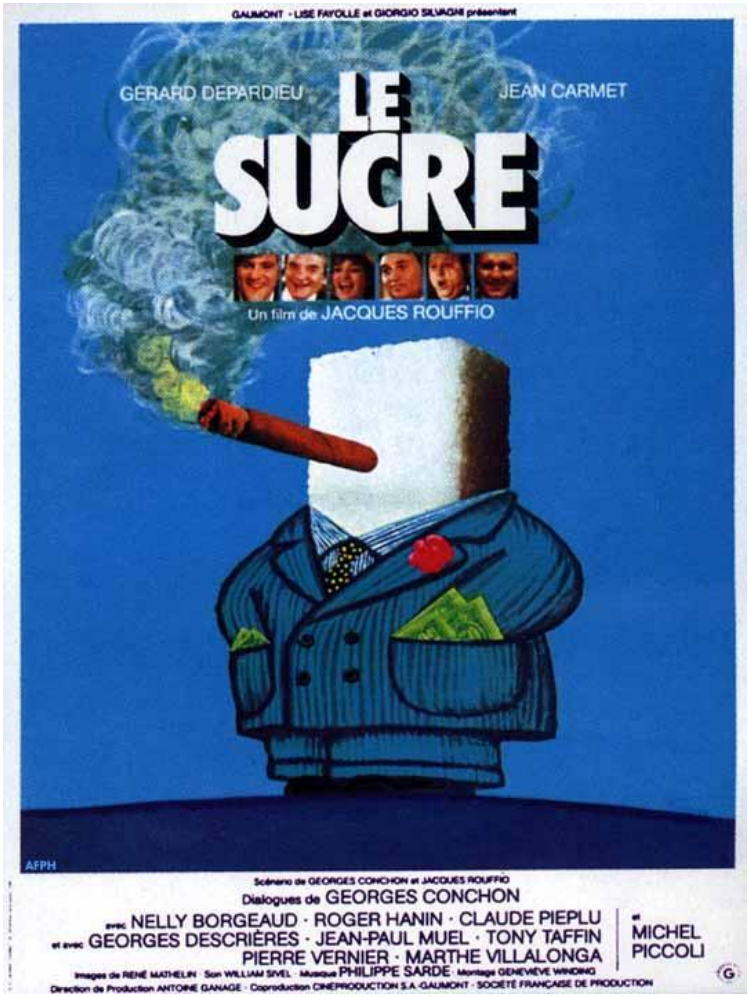


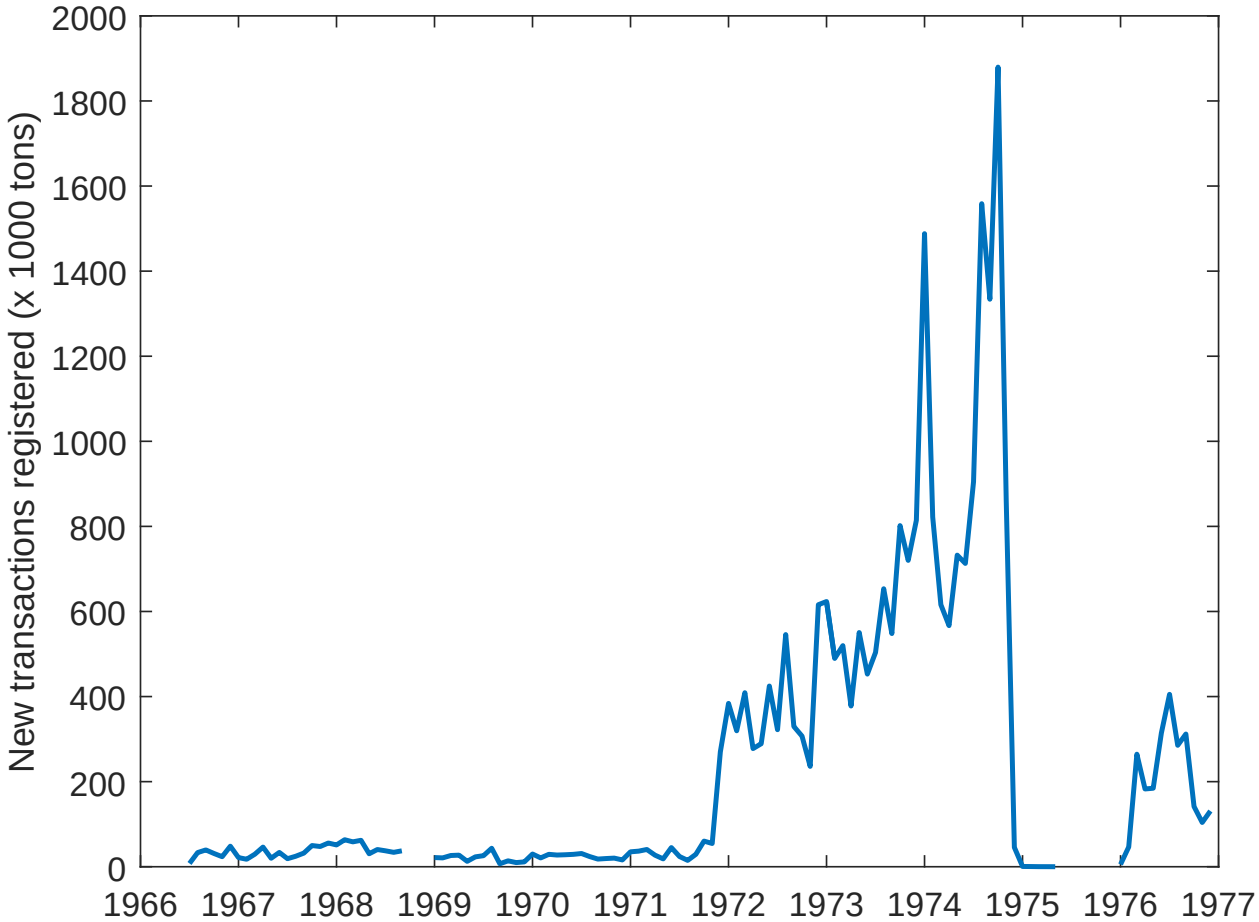
- **Increase renegotiation set**
  - Lower sensitivity of equity to settlement prices
- **Trade-off with skin-in-the-game**
  - Optimal design is open question

For more entertainment



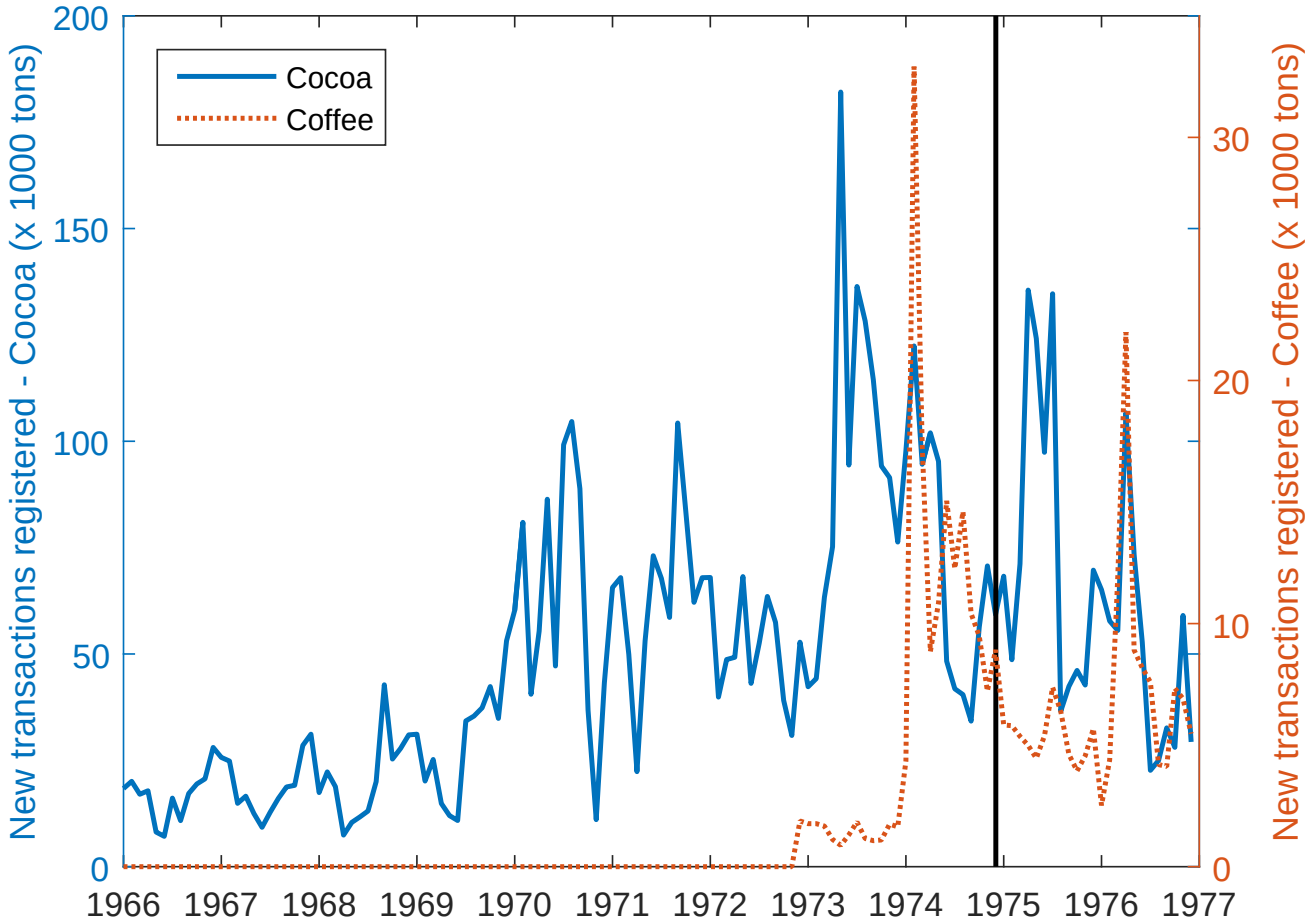
Appendix

New transactions registered — Sugar

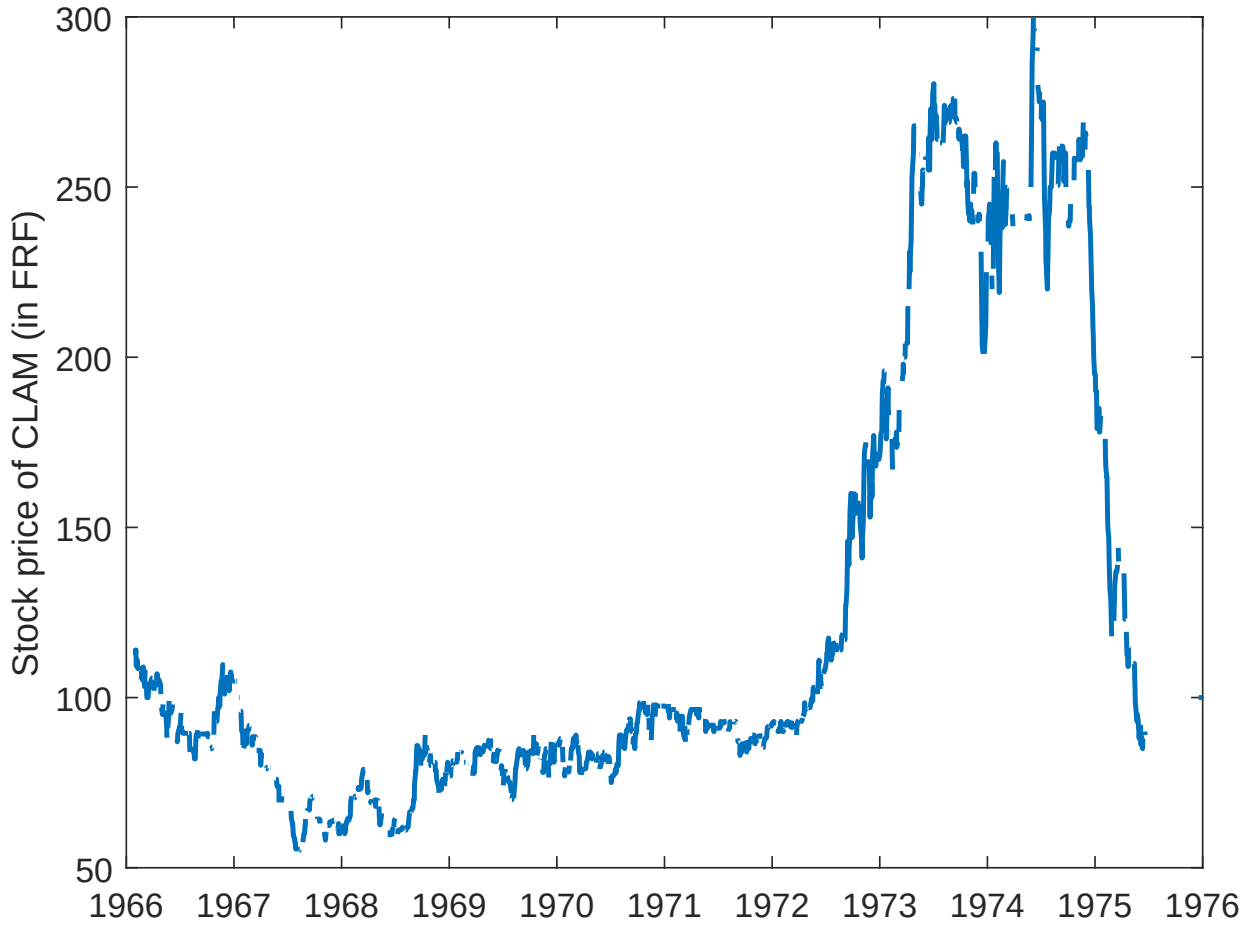


[Back]

New transactions registered — Coffee and cocoa

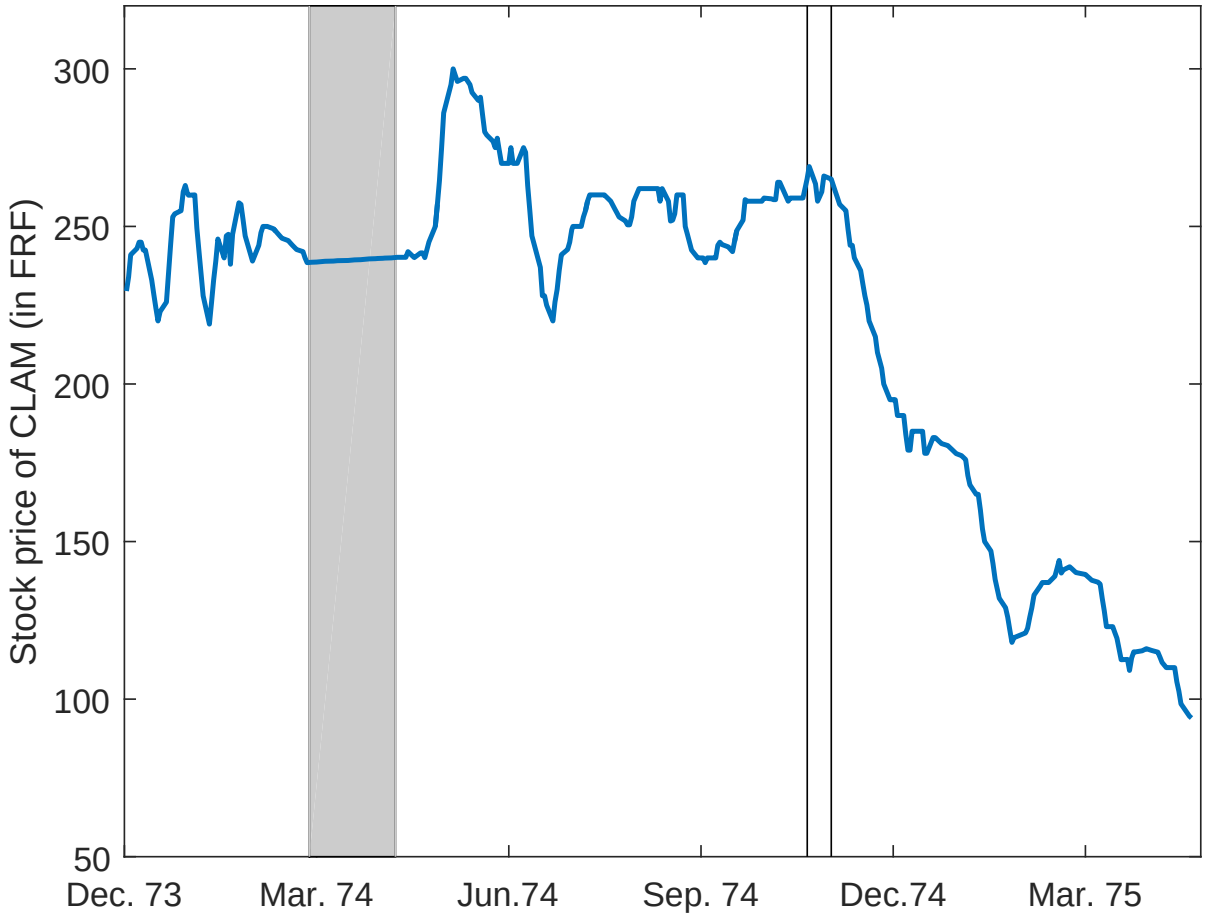


CLAM stock price — 1966-1975



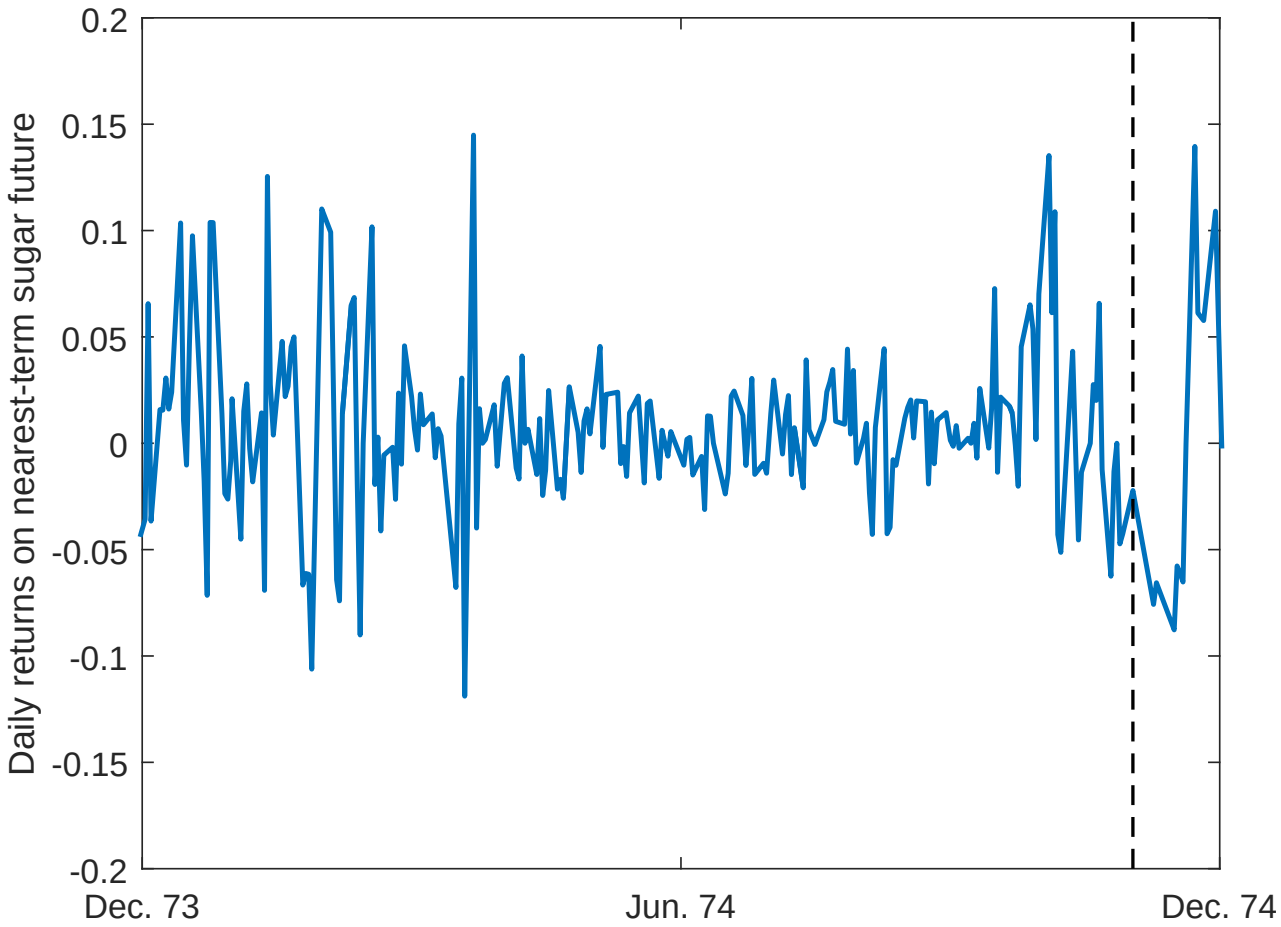
[Back]

CLAM stock price around failure



Daily returns on nearest-term contract

- **Volatility of sugar prices not markedly higher**



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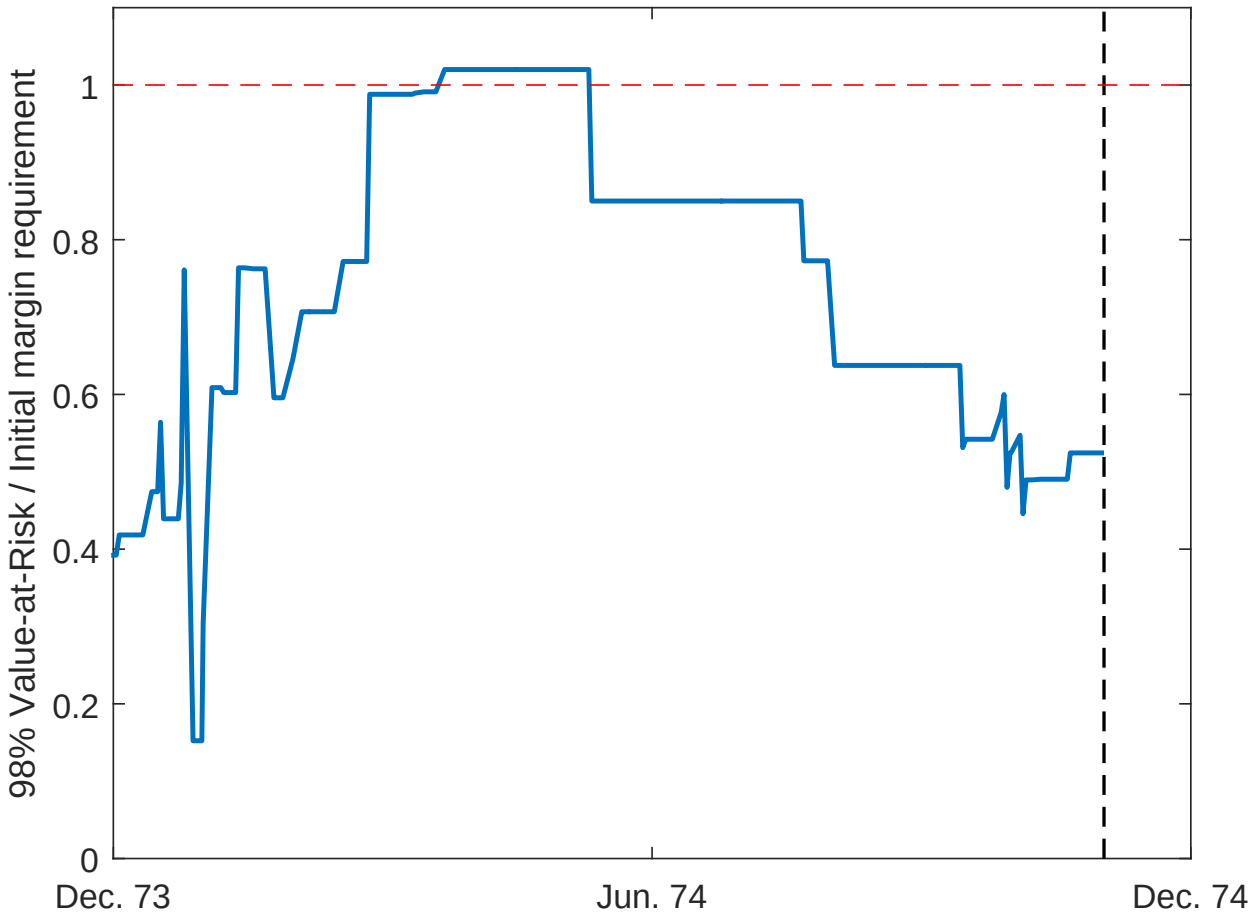
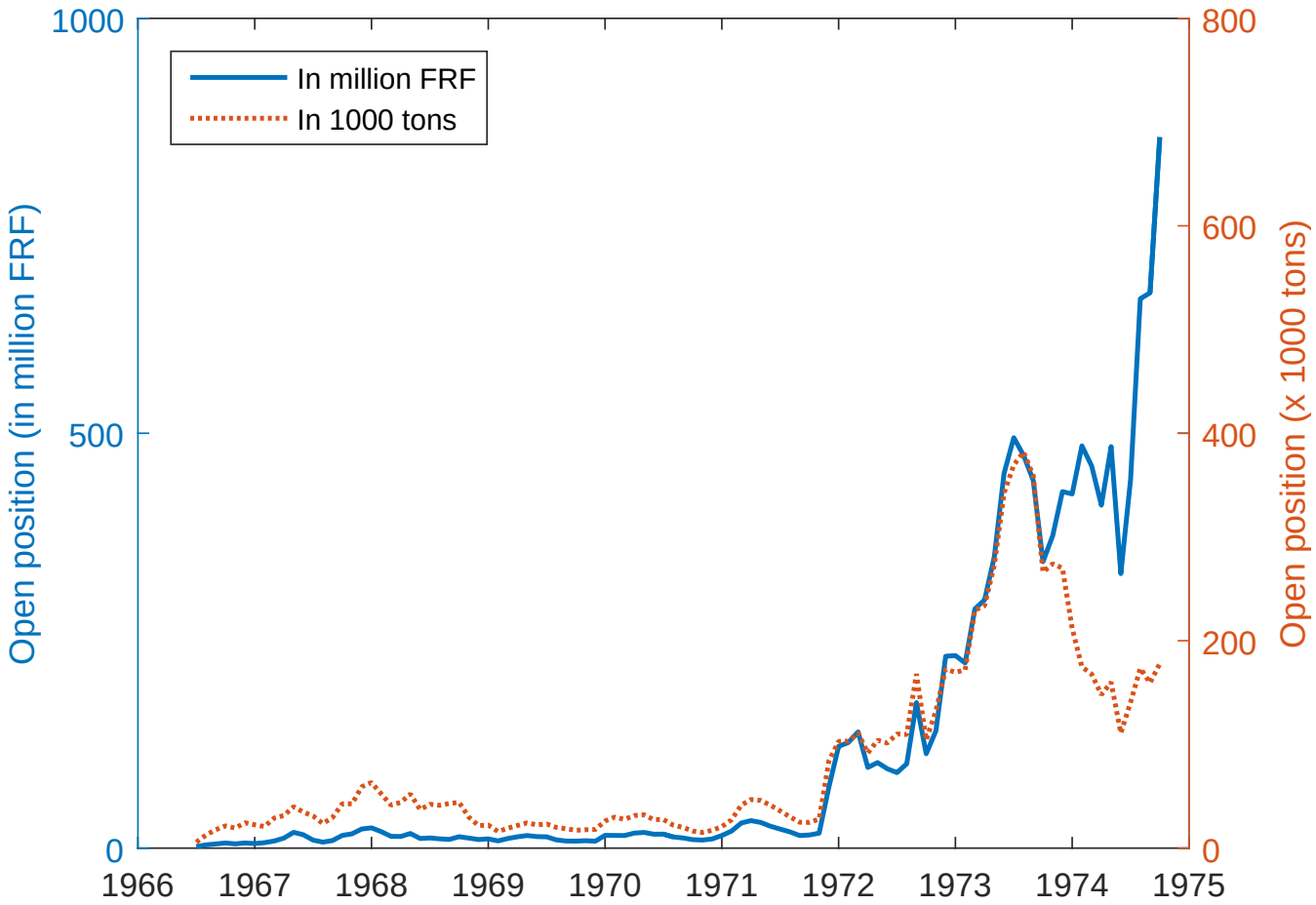
Valut-at-Risk (VaR)

- **98% VaR / Initial margin requirement is decreasing**



[Back]

Open position



Open position / Market capitalization