

The Failure of a Clearinghouse: Empirical Evidence

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Banque de France HEC Paris & CEPR

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Motivation

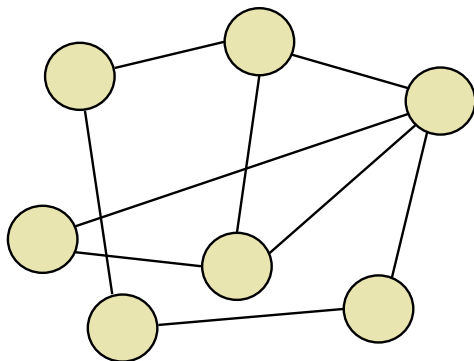
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- CCP expected to improve financial stability
 - CCPs insure counterparty risk; netting benefits

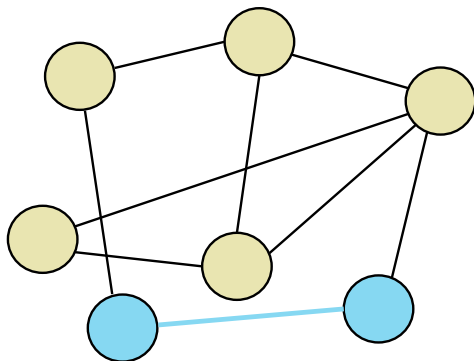
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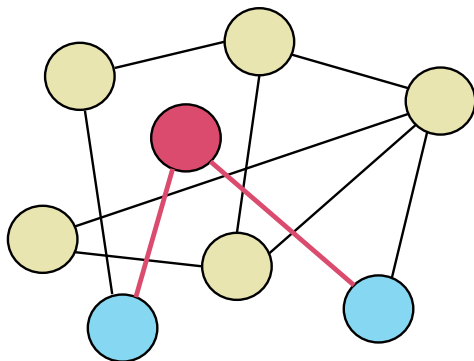
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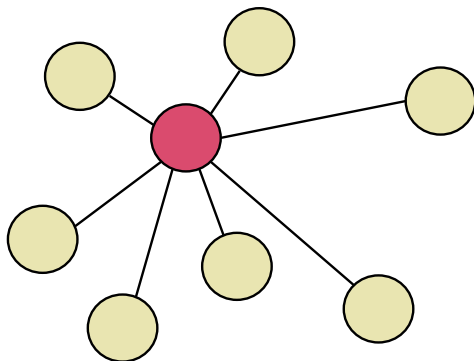
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 - CCP risk management outside and around distress

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

CCP capital structure

- Matched book

| | |
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| Out-of-the-money transactions Collateral held | In-the-money transactions Amounts owing to members |
| Other assets | Equity |

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- **No CCP moral hazard** — Away from large member default
 - CCPs mutualize idiosyncratic default risk (Biais et al., 2012)
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 - **No CCP moral hazard** — Close to large member default
 - Risk-shifting incentives (Jensen and Meckling 1976, Leland 1998)
 - Strict risk management: Equity impaired, bounded below by zero
 - Lenient risk management: No equity impairment if price reversal
- ⇒ Distortions only close to default; discontinuous behavior

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- **With CCP moral hazard**

- Good states: Reduce margins → Higher trading volume and fees
- Bad states: Bailout

⇒ Distortions even away from default; no discontinuous behavior

The market

■ Paris Commodity Exchange

- Futures on sugar, cocoa, coffee
- Trading through 35 **registered brokers** → Also clearing members
- Execute orders on behalf of clients, including retail investors
- Limited trading by brokers on the own account
- Short positions: commodity producers; long positions: retail investors

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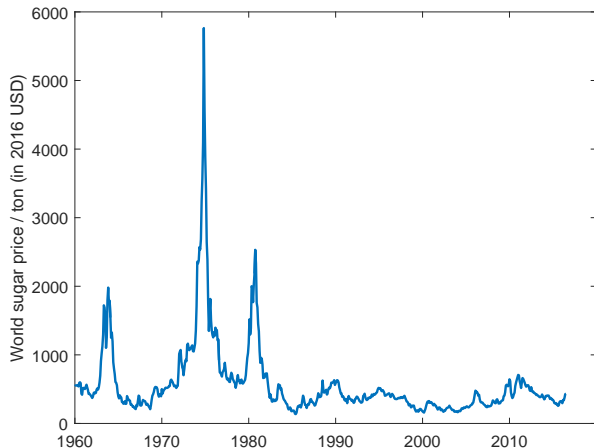
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■ CCP: *Caisse de Liquidation des Affaires en Marchandises* (CLAM)

- All trades centrally cleared → 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



The 1974 sugar crisis

- **Boom in sugar prices:** Until Nov. 21st, 1974
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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
 - → Exposures of CLAM, brokers and investors
 - → Account and transactions by Nataf
 - → 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*

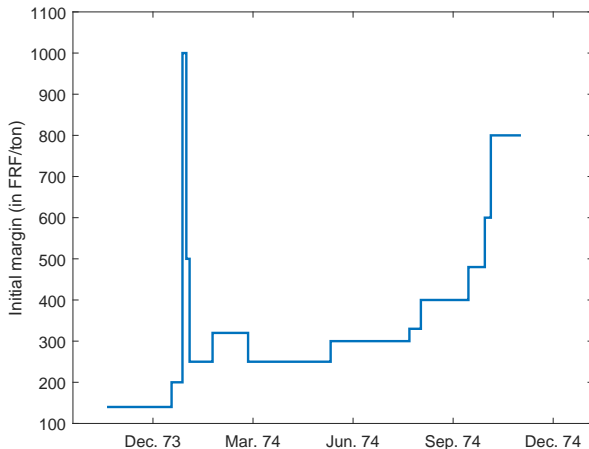
- **Sugar price data** from *Les Echos*.
 - Spot/future in Paris, London and New York

Risk management during the boom

- **Was risk management lenient during the boom?**
 - Data on all changes in initial margins in 1974

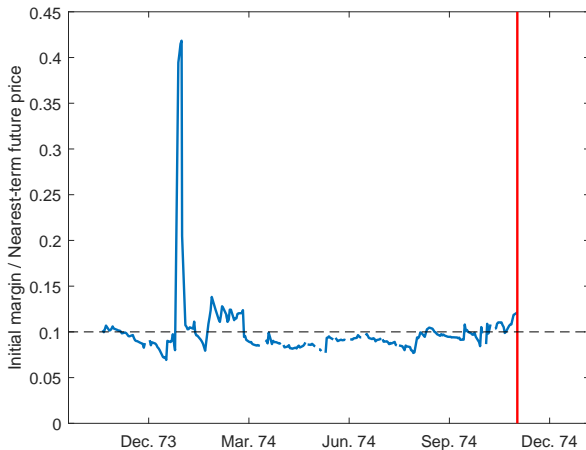
Initial margin requirements

- Initial margin in FRF per ton of sugar



Initial margin requirements

- Initial margin / Nearest-term future sugar price



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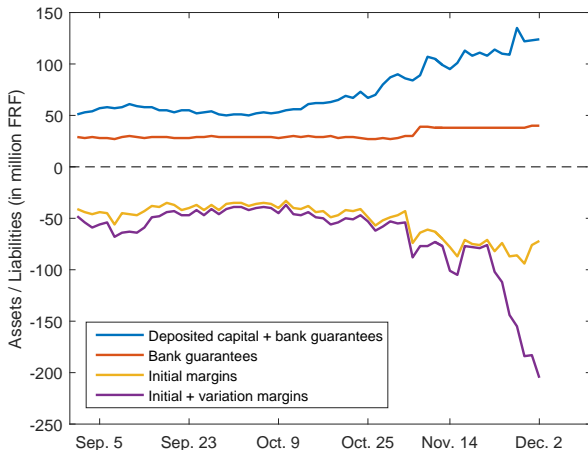
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Margins paid in cash or with bank guarantees (letters of credit)

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 | <i>p</i> -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 |
| $\tau + 4$ | 0.013* | [-0.005 ; 0.032] | 0.067 |
| $\tau + 5$ | 0.023*** | [0.007 ; 0.039] | 0.006 |

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- → 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** (0.028) | -0.016* (0.057) | | |
| Size of existing position | | | -0.279*** (0.000) | -0.247*** (0.000) |
| Volume of trade | | -0.185*** (0.000) | | -0.097** (0.027) |
| N. Obs. | 69 | 69 | 74 | 74 |
| R^2 | 0.993 | 0.995 | 0.995 | 0.995 |
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- Investors close to default get better execution prices
- Results consistent, but not significant, for sell orders

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- Push for Article 22 → **Manipulate settlement price**

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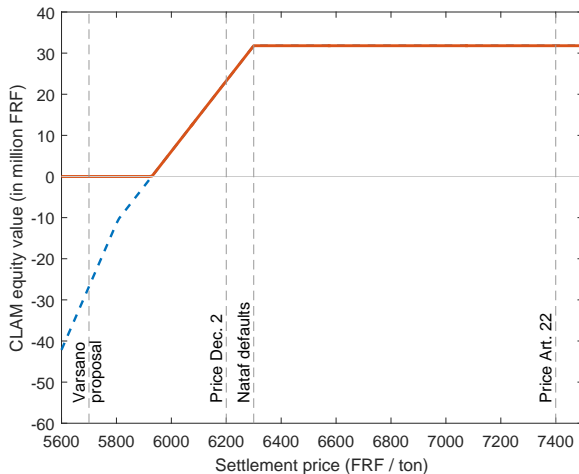
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CLAM equity value



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

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 - But: In distress, CCP equity value sensitive to settlement prices
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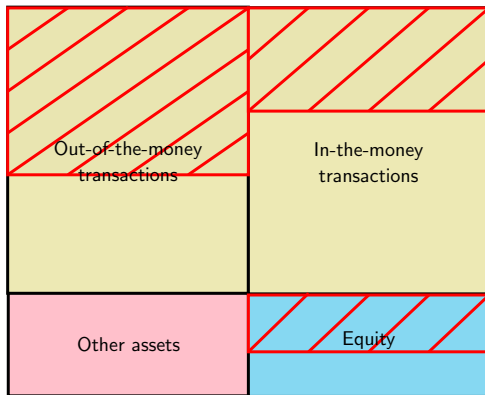
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- **Better CCP governance** can reduce risk-shifting
 - More power to members that attach greater value to continuation
 - Member-owned CCPs likely to prefer continuation
 - **Rules versus discretion**: less likely to delay default

Policy implications: Default waterfalls

■ Default waterfall

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



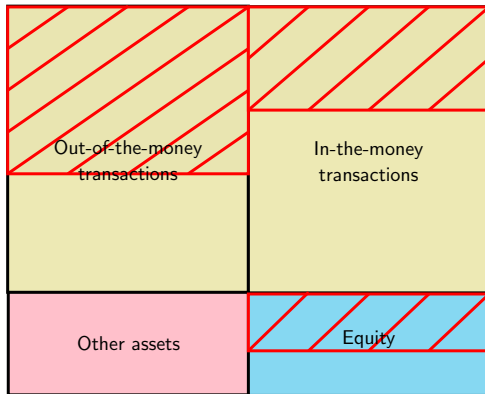
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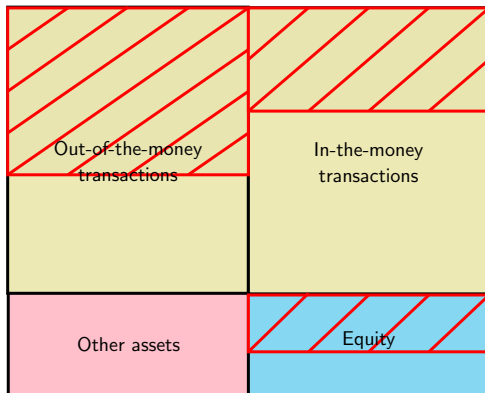
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■ Increase renegotiation set

- Lower sensitivity of equity to settlement prices



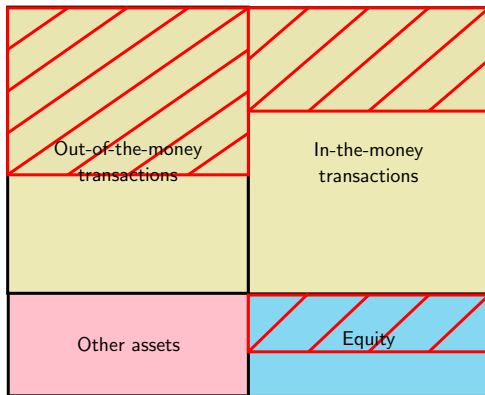
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- Tranches of equity
- Members junior to residual equity (CoCo-like)

■ Mitigate risk-shifting

- Equity not only residual claimant



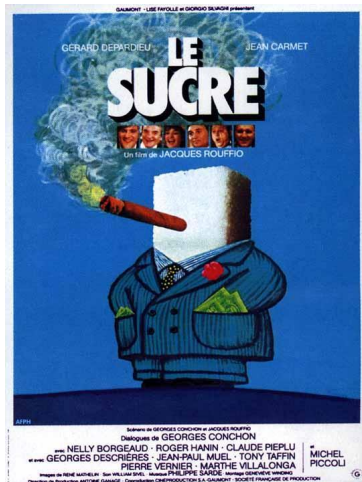
■ Increase renegotiation set

- Lower sensitivity of equity to settlement prices

■ Trade-off with skin-in-the-game

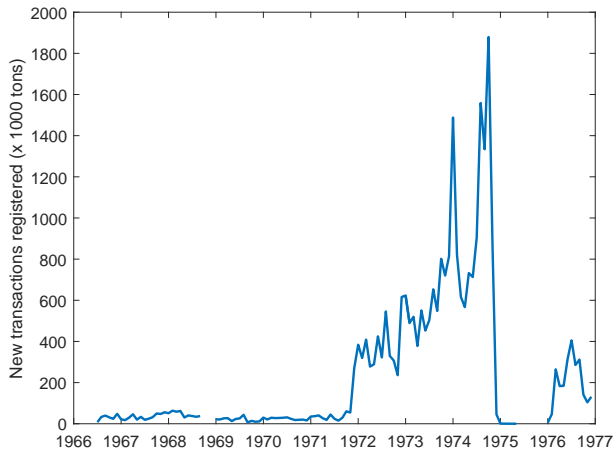
- Optimal design is open question

For more entertainment



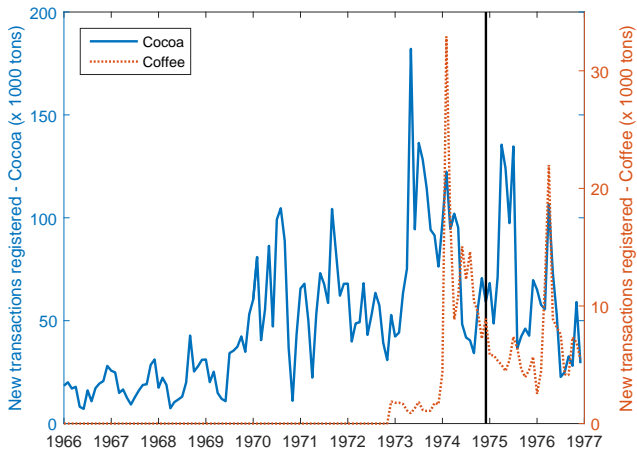
Appendix

New transactions registered — Sugar

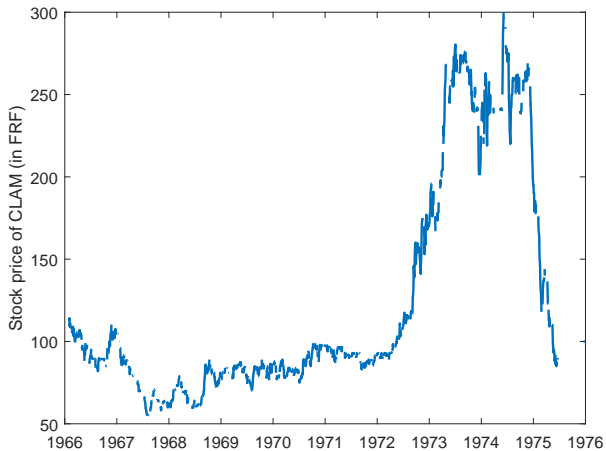


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New transactions registered — Coffee and cocoa

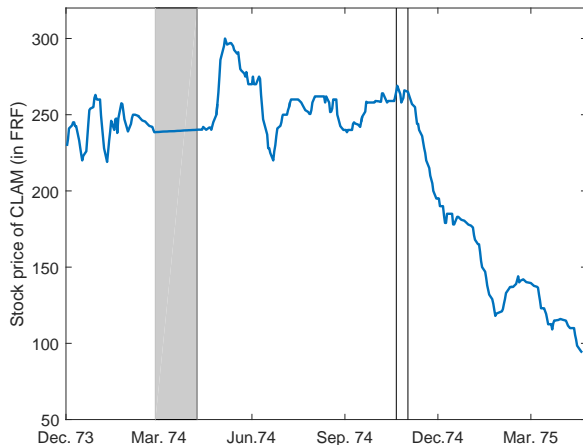


CLAM stock price — 1966-1975



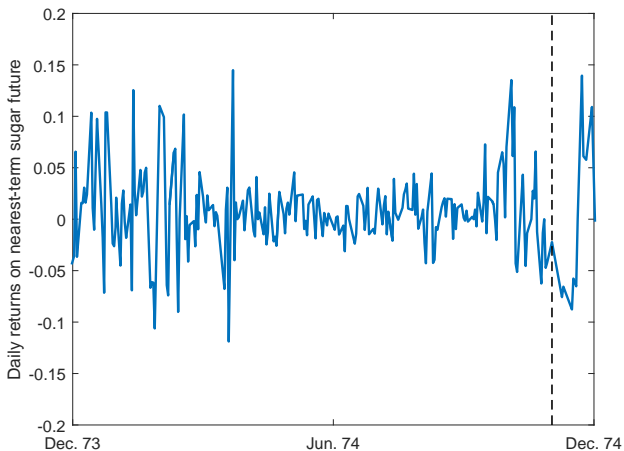
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CLAM stock price around failure



Daily returns on nearest-term contract

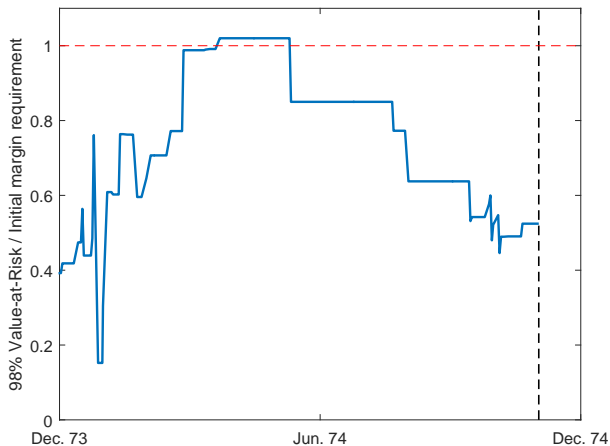
- Volatility of sugar prices not markedly higher



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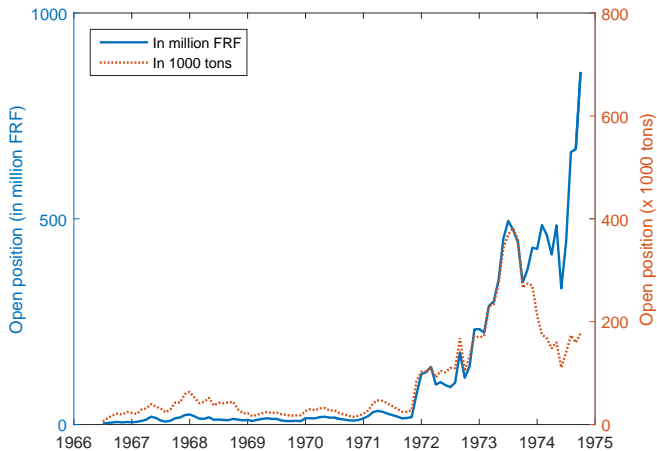
Valut-at-Risk (VaR)

- 98% VaR / Initial margin requirement is decreasing



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Open position



Open position / Market capitalization

