Comparing the pre-settlement risk implications of alternative clearing arrangements

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Plan

- Motivation
- Review literature
- Outline analytical framework
- Results
- Conclusions

Motivation

Explore two distinct recent trends in clearing arena:

- Expansion in range of products cleared through CCPs.
    - E.g. Equities, OTC swaps and repos through LCH
- Horizontal consolidation of CCP clearing
    - E.g. LCH/Clearnet; CME/CBOT.

Existing Literature

- Historical evolution of different clearing arrangements and risks that arise from clearing. (Moser 98, Hills et all 99, Kroszner 99, BIS 04).
- Competition/efficiency implications (Tapking & Yang 04, Koeppl & Monnet 06)
- Models applied to set appropriate margin levels. (Knott & Mills 02 summarises)

Our Approach

Use simulations to quantify pre-settlement risks and costs under alternative bilateral and multilateral arrangements.

Compare:

1. Magnitude and distribution of replacement cost losses.
2. Magnitude of total pre-settlement costs replacement costs + collateral costs.

Clearing Arrangements

Bilateral Clearing: Bilateral netting of positions.

Ring Clearing: Multilateral netting preserving individual counterparty exposure.

CCP Clearing: Multilateral netting with novation to a CCP.

Key results

Bilateral → Multilateral: Risks and costs significantly reduced due to netting effects.

2 CCP → 1 CCP: Risks and costs significantly reduced due to margin pooling.

Tiering: Heterogeneity in credit quality can lead to restricted direct membership and the emergence of tiered structures.

Analytical Framework

- Model system of risk-neutral agents. Generate matrices of net bilateral positions.
- Replacement cost losses are a function of price changes, margin policy and agent defaults.

➢ Generate vector of price changes.

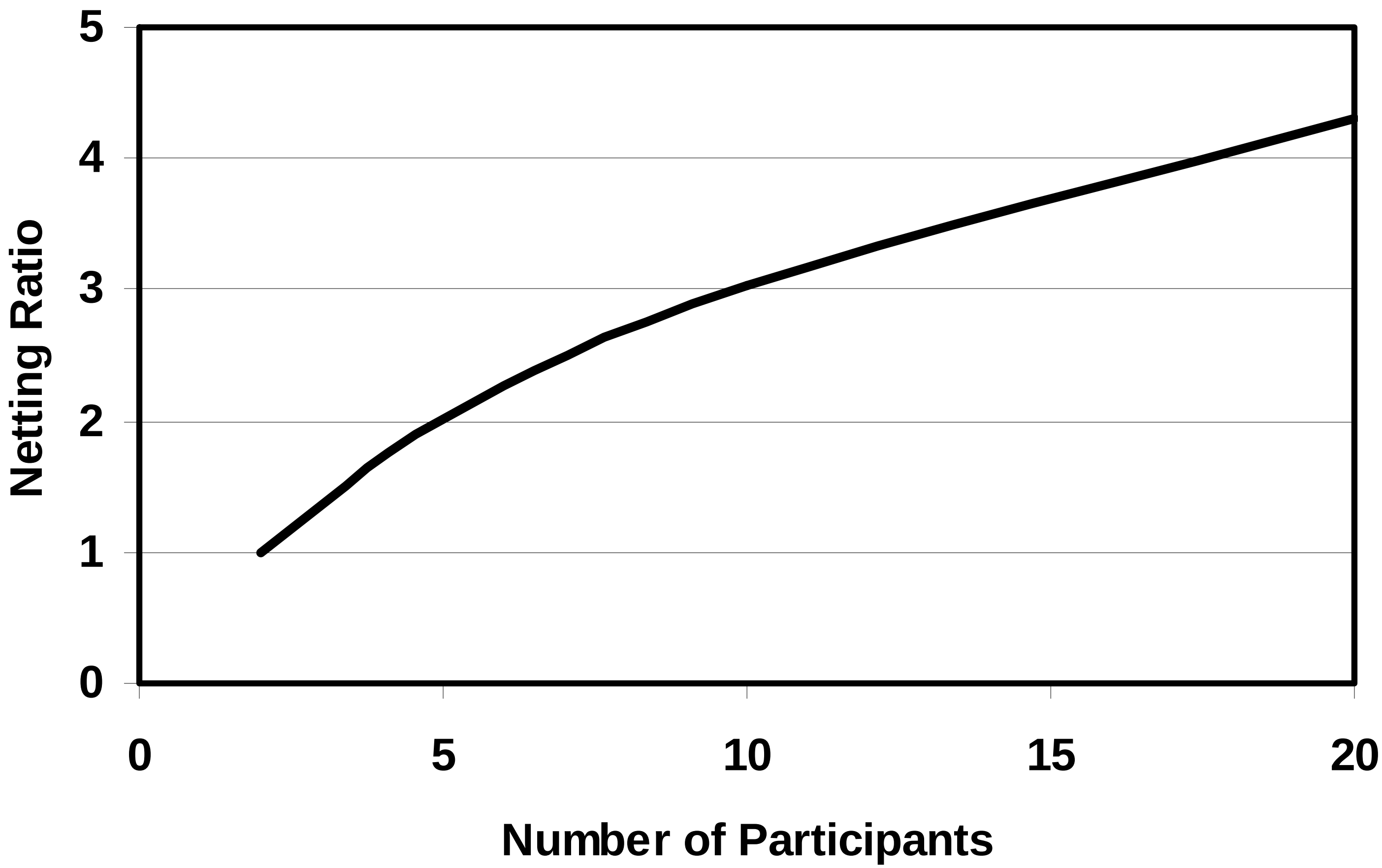
➢ Generate exogenous default vector.

➢ Model margin setting using an optimisation approach following Baer, France and Moser (2003).

Bilateral to multilateral clearing

- Replacement cost losses and total pre-settlement costs reduced by multilateral netting benefits.
- Netting benefits increasing in the # of CCP participants (at a decreasing rate).
- Losses more concentrated under ring arrangement compared to CCP clearing.
  - System of 20 agents → Largest CCP participant bears 25% of losses
    Largest ring participant bears 89% of losses

Multilateral Netting Benefits



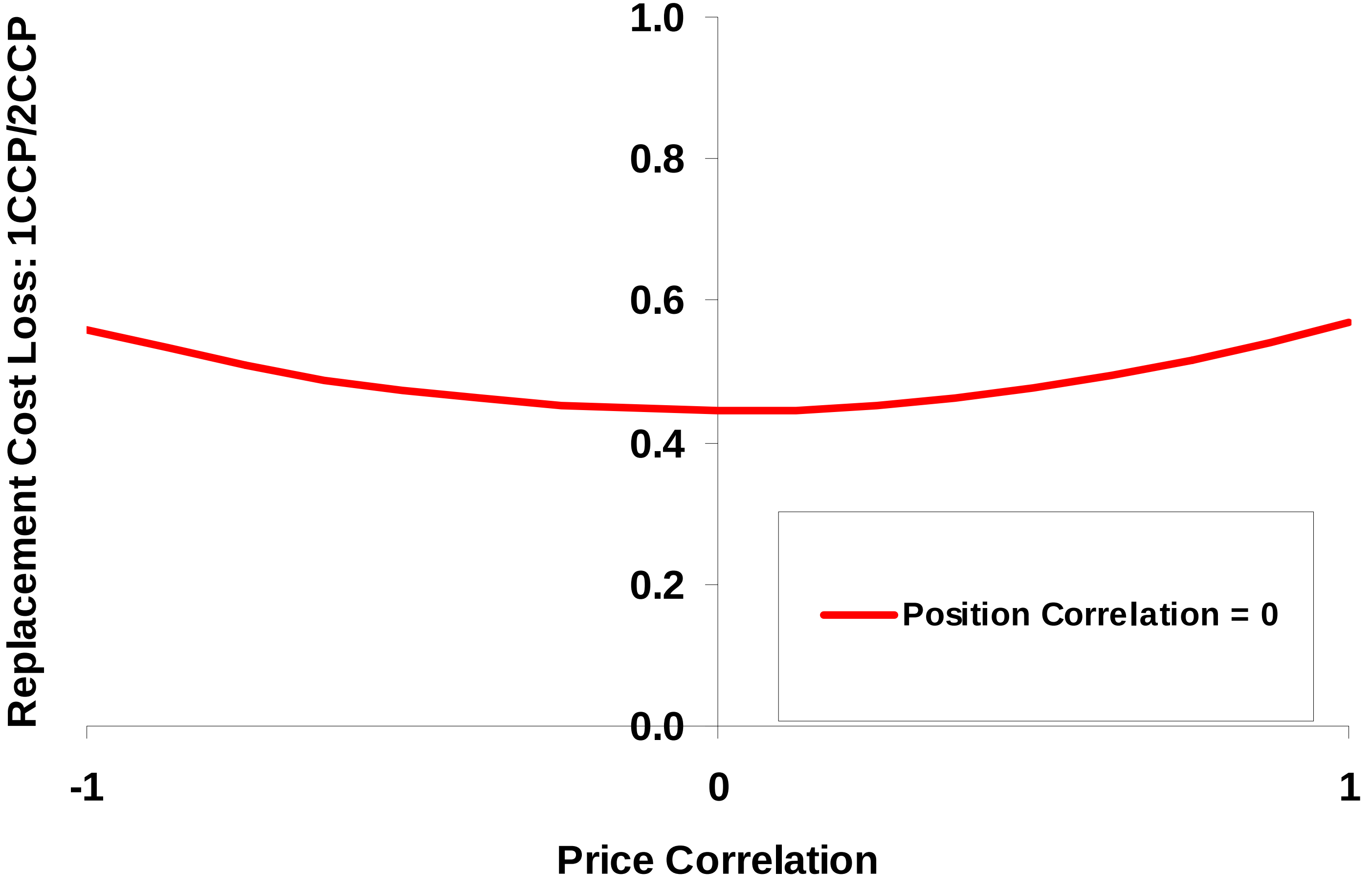
2 CCP to 1 CCP

- Multi-product CCP: captures diversification, or margin-pooling, benefits

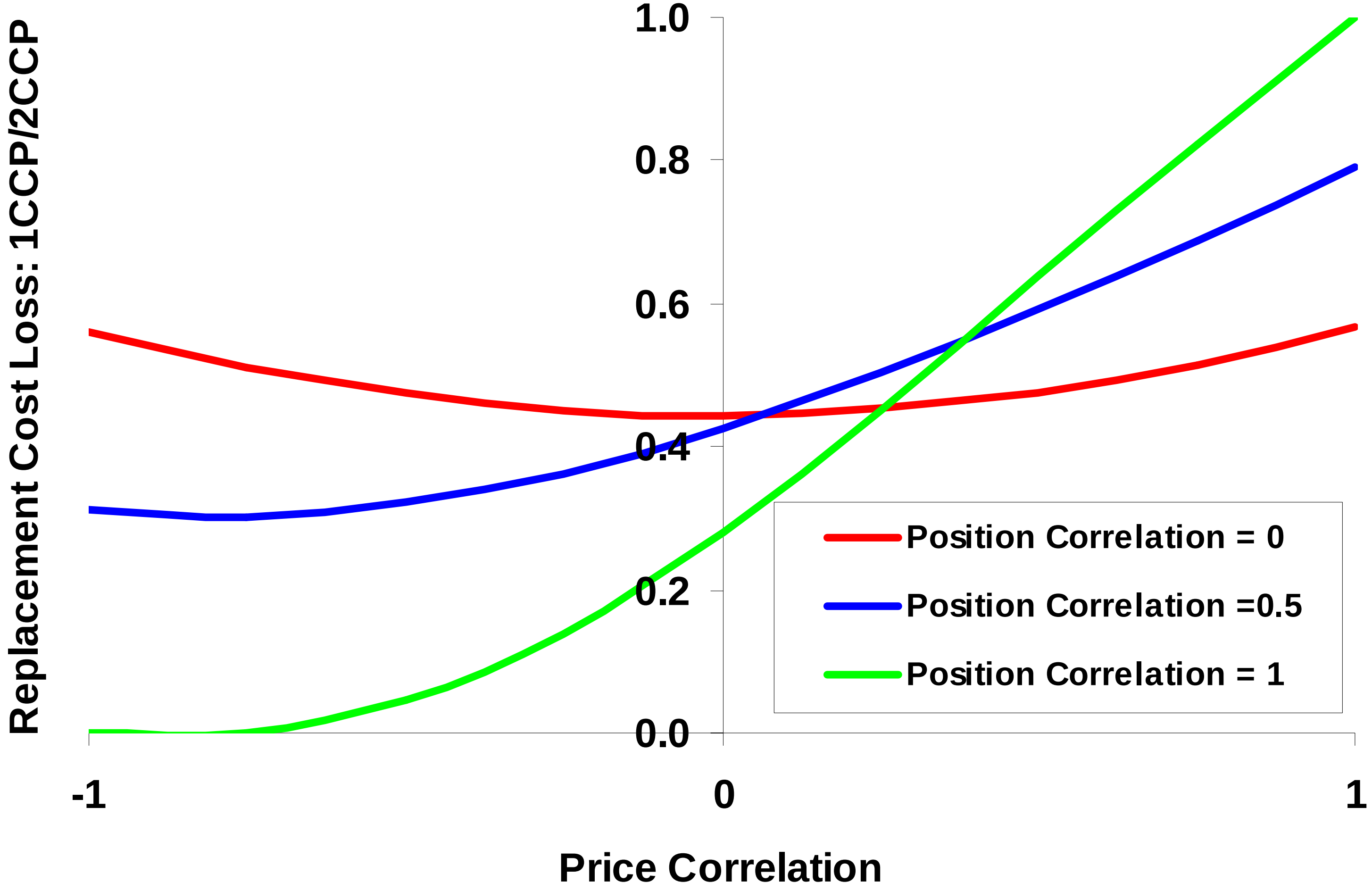
- Replacement cost losses lower when assets are cleared through a consolidated CCP

- The scale of these benefits will depend on both
  - ➢ the correlation of asset price changes
  - ➢ the correlation of agents' positions in each asset

The effect of changing correlations



The effect of changing correlations



Portfolio-based margining

- Margin reflects ***actual*** portfolio positions and ***actual*** correlations between asset prices

- Returns margin-pooling benefits to the trader as collateral, net reduction in pre-settlement costs.

- Replacement cost losses increased.

Heterogeneity in Credit Quality

Introduce 2 agent types: high risk and low risk.

Compare 3 possible arrangements:

- **Tailored margin:** set on basis of each agent's credit quality. CCP incurs monitoring cost.
- **Single margin rate:** based on average default probability of members, no restrictions on access.
- **Restricted access:** only low risk agents are direct members, single margin rate based on their default probability. Tiered arrangement.

Heterogeneity Results

	Total Pre-Settlement Costs	
CCP Clearing Arrangement	**High Credit Quality**	**Low Credit Quality**
Tailored Margin	X+M	X+M
Single Margin Rate	1.6X	0.8X
Restricted Access	1.1X	0.9X

If $M > 0.1\ X$, a tiered CCP arrangement may emerge.

Conclusions

- Multilateral netting benefits are important − vary with $\sqrt{(n-1)}$
- Losses more concentrated under multilateral ringing
- Consolidation of CCPs captures margin pooling benefits
  - Scale of these benefits depends on the asset price and trading position correlations
  - Benefits increased if margin set on a portfolio basis
- Restricted access may be a natural response to heterogeneous credit profile of agents.