Collateralized banking

Change of financial networks through central clearing and collateralized banking

Stanford University, September 2014
d-fine GmbH

» Independent European consulting firm
  › quantification and modeling
  › risk management
  › finance and reporting
  › IT integration

» Over 500 professional consultants
  › 85% physicists or mathematicians
  › 65% PhD degrees

» Offices
  › Frankfurt
  › London
  › Hong Kong
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» Extensive financial industry and implementation know-how
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A. Clearing obligation for derivatives
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Comprehensive regulation of financial markets as a response to the financial crisis 2007
- Dodd–Frank Wall Street Reform and Consumer Protection Act (dodd-frank)
- European Market Infrastructure Regulation (EMIR)

Clearing obligation for standard and OTC derivatives
- Through Central Counterparties (CCP)
- Bilateral
- Credit Value Adjustment (CVA) charge

Securitization of derivative trades by eligible assets (collateral)
- Haircuts are applied based on the credit worthiness of the issuer

Transparency of derivative transactions
- Trade Repositories

Categories of a financial portfolio
- Assets
- Liabilities
- Derivatives
A. Clearing obligation for derivatives

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Categories of a financial portfolio
B. Central clearing

- Network structure
- Netting
- Collateralization
Central clearing changes the network structure for derivative trading

» From bilaterally-connected to centrally-cleared
» Introduction of new financial institutions – central counterparties (CCP)

Diagram:
- A → 0 → B (CCP)
- A → 0 → GCM → Client → B (DCM)
B. Central clearing changes the network structure

Central clearing changes the network structure for derivative trading
» From bilaterally-connected to centrally-cleared
» Introduction of new financial institutions – central counterparties (CCP)

Adjacency matrix
B. Central clearing changes the network structure

Central clearing changes the network structure for derivative trading

» From bilaterally-connected to centrally-cleared
» Introduction of new financial institutions – central counterparties (CCP)

Arguments:
- Reduction of interconnectedness
- Centralization of information

Adjacency matrix
B. Central clearing allows netting

Central clearing allows CCPs to net opposing positions

- Offset of opposing positions

Arguments: Reduction of credit exposure
B. Central clearing requires collateralization

Variation Margin
- Compensations of value changes
- Intraday mark-to-market valuation
- Margin calls are due within few hours
- Payable in cash only

Initial Margin
- Coverage of CCP’s risk exposure
- Market sensitive risk measure
  - e.g. VaR at 99% confidence
- Margin calls are due daily
- Payable with eligible collateral
  - no proprietary capital
B. Central clearing requires collateralization

Default / Social Fund contribution
  » Mutual coverage of largest single risk exposure in extreme market situations
  » Estimated by stress scenario simulation
  » Contribution are due quarterly
  » Payable with eligible collateral
    » proprietary capital

Arguments: Reduction of credit losses
B. Central clearing enforces immediate liquidation

In case a clearing member defaults, the open positions of the CCP must be closed in a few days.

- Closing usually means hedging and auctioning
- Liquidation periods are 2-4 days
- Losses are covered by the Default Waterfall

Arguments: CCP is extremely stable because it has no open positions
C. Criticism on central clearing
C. Criticism on central clearing

Most critic are based on the fact that all arguments hold true on a micro-prudential perspective but may fail on a system wide (macro-prudential) analysis.

Interconnectedness in centralized networks:
- Members are still connected through
  - Non-derivative market
  - Collateral and Security lending
  - Default fund contribution

Transparency/Complexity:
- Multiple CCPs
- Multiple clearing entities within one CCP
- CCPs default management method
  - Separation of asset classes
  - Client protection rule

Financial portfolio of a bank or company

More complex, indirect structures
C. Criticism on central clearing

Most critic are based on the fact that all arguments hold true on a micro-prudential perspective but may fail on a system wide (macro-prudential) analysis.

Credit exposure after netting:

» CCPs only redistributes credit exposure from cleared to non-cleared/non-collateralized markets
» At default, the priority is set on cleared derivatives (prioritization)
» Wrong-Way risks

![Credit exposure diagram]

Redistribution/prioritization of credit risk

B defaults => 1500 / 1750
  = 85%

B defaults => 1000 / 1250
  = 80%
C. Criticism on central clearing

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Credit losses with collateralization:

» Trend amplification due to VM
   » Immediate realization of mark-to-market losses

» Procyclicality of IM
   » Add. margin calls in stressed market situations

» Feedback in case of a default
   » Immediate liquidation of derivatives and collateral by CCP

Transformation of credit risk into liquidity risk

- Procyclicality
- Feedback effects
C. Criticism on central clearing

Most critics are based on the fact that all arguments hold true on a micro-prudential perspective but may fail on a system wide (macro-prudential) analysis.

Incentives of a CCP

Unsufficient information

Costs

Unclear whether systemic risk is reduced or increased by clearing obligation
C. Variety of open problems for research and analyses
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Optimal use of collateral in financial institutions.
  » Collateral management, Fund Transfer Pricing (FTP)
    » New pricing of derivatives

Risk measurement at CCPs
  » Margin methods that balance risk sensitivity and procyclicality
    » Method selection, Parameter estimation
  » Design of stress scenarios
    » Risk identification of member portfolios
  » Approximation of feedback effects and liquidation risk

Systemic risk
  » Network models that include the centrally-cleared derivative market and the non-derivative market
    » Effect of clearing topology
  » Splitting of portfolios
  » Effect of immediate loss realization
References

»G20/Pittsburgh 2009, CPSS/IOSCO, Committee on the Global Financial System


Contact

Dr. Stephan Ludwig
Manager
Mobile  +49-162-263-0114
E-Mail: stephan.ludwig@d-fine.de

d-fine
Frankfurt
München
Zürich
Wien
London
Hong Kong

Head Office
d-fine GmbH
Opernplatz 2
60313 Frankfurt am Main
Germany

T: +49 (0)69 90737-0
F: +49 (0)69 90737-200
www.d-fine.de
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### C. Variety of open problems for research and analyses

<table>
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<tr>
<th></th>
<th>GCMs</th>
<th>Indirect members</th>
<th>Ratio indirect members / GCMs</th>
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<td>Euro CCP</td>
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<td>&gt; 22</td>
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<td>Market Infrastructure, Clearing &amp; Settlement</td>
<td>Trading Systems</td>
<td>Risk Management Systems</td>
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