CCP resilience and clearing membership

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9th Financial Risks International Forum
Outline

1. CCP resilience and systemic risk: why are membership criteria important?
   a) Interconnections via mutualised resources
   b) Member eligibility criteria and member diversity

2. CCP: a system to reallocate losses among clearing members
   a) Mutualisation according to CCP rule books (default waterfall)
   b) Recovery versus resolution (extra burden to clearing members?)

3. Creditworthiness of clearing members for EU and US CCPs
   a) Ability to face liquidity calls under normal and stressed scenarios
   b) Diverging CCP member bases: What happens when member base quality erodes?

4. Enhancing CCP resilience
   a) membership eligibility, waterfall design, resolution regimes…
CCPs and systemic risk: change of perspective

- “Mandatory clearing will turn CCPs into *systemic nodes* in the financial system, with **unknown, but possibly far-reaching, consequences.**” (ESRB, 2013)

- CCPs and systemic risk (Domanski et al., 2015)
  - Propagation of (exogenous) shocks through domino effects
  - Endogenous shocks: forced deleveraging, fire sales, runs....

*From fully bilateral to centrally cleared networks of trading exposure*

Source: Yellen (2013)
CCPs and systemic risk as seen by European regulators

• “...the uncertainty caused by the default of a clearing member at KRX ... which caused it to tap its mutualised default fund...revealed that clearing members were not always aware of their potential liabilities towards the CCP...” (Cœuré, 2015)

• “A proper macroprudential stress test...should...account for the interconnectedness via common exposures to clearing members as well as possible knock-on effects on the banking sector that could arise in case the guarantee fund of a CCP is wiped out and clearing members are required to cover the CCP losses.” (Constâncio, 2015)
CCPs and systemic risk as seen by US regulators

• “CCP recovery strategy...is premised on imposing losses on...CCP members...will likely be suffering losses and facing liquidity demands of their own...uncertainty is increased by the difficulty of estimating with any precision the extent of potential liability of...complicating...efforts by the official sector to assess system-wide capital and liquidity availability...” (Tarullo, 2015)

• “… since the default of two large counterparties would almost surely be accompanied by significant market disruption...it is important to ensure a consistent, robust implementation of the cover 2 standard...” (Tarullo, 2015)
Default waterfall: “robust-yet-fragile” (Haldane, 2009)?

- Initial Margin of defaulting CM
- Default Fund contribution of defaulting CM
- % of CCP capital (skin in the game)
- Pre-funded default fund contributions of non-defaulting CMs
- Additional funds provided by non-defaulting CMs (recovery tools)
- Remaining CCP capital and equity

Order of assessment

Loss-sharing mechanisms create layers of interconnectedness

Losses not covered by defaulted member margin are supported by surviving clearing members
Why is interconnectedness so important?

• Interconnectedness via common exposures can arise via mutualised resources (default fund, re-plenishment of default fund, …)
  • A densely connected network can absorb shocks of small magnitude by effectively using excess liquidity to forestall defaults (Acemoğlu et al., 2015)
  • “robust-yet-fragile” (Haldane, 2009)
    • “after a certain tipping point…the system acts…as a mutual incendiary device…”

• Links between CCPs and banks create several layers of interconnection (Domanski et al., 2015)
  • Banks are clearing participants (often in multiple CCPs)
  • Banks are key providers of liquidity: default fund contributions, assessment powers,…
  • CCPs are often owned or managed by commercial banks
Membership eligibility criteria

• Eligibility criteria for “fair and open access” (CPMI-IOSCO, 2012)
• Changes to membership criteria for SwapClear (Fontaine et al., 2012)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Former</th>
<th>New</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum capital</td>
<td>US$5 billion</td>
<td>US$50 million (scaled to amount of risk assumed)</td>
</tr>
<tr>
<td>Minimum book capital</td>
<td>US$1 trillion</td>
<td>None</td>
</tr>
<tr>
<td>Credit rating</td>
<td>“A” or equivalent</td>
<td>Member assessment based on credit ratings, financial ratios, market-implied ratings (CDS), support of parent companies and operational capabilities.</td>
</tr>
<tr>
<td>Performance</td>
<td>Proven operational capacity to assist in the orderly unwinding of a defaulter’s portfolio through a default-management “fire drill.”</td>
<td>Prove operational capabilities in the event of a default and ability to provide the CCP with live, executable prices in currencies they clear (“fire drills”); possibility to outsource these responsibilities to a third party.</td>
</tr>
</tbody>
</table>
Is there an ‘optimal’ level of member diversification?

• Aim of member diversification is to enhance the CCP’s ability to withstand member default(s) (Slive et al., 2011)

• Broad direct access to CCPs may lead to
  • wider variation in the members creditworthiness.
  • an increase of the CCP’s exposure to a sudden deterioration in credit quality in a particular segment of the financial markets (Domanski et al., 2015).

• In a network consisting of independent clusters of bank (Allen et al., 2010), banks in the same cluster
  • are associated with similar portfolios and high correlation.
  • experience higher conditional default probabilities after the first default.

• Inclusion of high-quality mid-sized institutions can increase number of CMs that can bid for defaulter’s contracts in auctions (Duffie, 2010)

• Links between a small domestic CCP and a larger global CCP increase the exposure of the small domestic CCP (Anderson et al., 2013)
Resources mutualised among clearing members

• Default fund contributions
  • Basel III capital charge for default fund exposures (BCBS, 2012): not risk sensitive

• Recovery tools may lead to increased mutualisation
  • Replenishment of the default fund
    • Surviving members are compelled to replenish the depleted DF
    • To ensure continuity of CCP (instead of resolution)
    • Creating extra exposures to good quality participants not assessed under current regulations
  • Margin haircutting
    • Variation margin haircutting caps the post-default profits of CMs
    • Initial margin haircutting dramatically increases CMs counterparty risk
    • CCPs may face contemporary under-collateralisation
Rules for CCP resolution magnify clearing membership issues

- International rules for recovery and resolution are in the making
  - UK already set its own rules.

- Being in good company is a key aspect of monitoring exposures to CCPs, as...
  - FSB (2014) and CPSS-IOSCO (2014) favour continuity (recovery) over resolution...
  - Bail-ins are to be privileged and CCP capital amounts are quite low....
  - Only surviving participants’ resources will be available
  - Need to consider surviving participants ability to raise funds in times of crisis
  - Depends on financial strength of member base
    - Should the CMs ability to provide liquidity and their credit quality be monitored?
Liquidity provision – a matter of monitoring?

- What the guidelines state on monitoring the members’ ability to provide liquidity….

  • “An FMI should have a robust framework to manage its liquidity risks from the full range of participants and other entities.” (PFMI, 2012)

  • “…an FMI should take into account the extent to which participants, owners and third parties would have sufficient resources to meet their obligations when considering the reliability of a tool or a set of tools.” (CPSS-IOSCO, 2014)
Credit exposures and credit quality – a matter of monitoring?

• What the guidelines state on monitoring credit exposures…
  • “An FMI should effectively measure, monitor, and manage its credit exposures to participants…” (PFMI, 2012)

• What is the perspective of CCPs?
  • “We could be adversely impacted by the financial distress or failure of one or more of our clearing firms…” (CME Group INC., 2014)
  • Credit quality of clearing members is a business related risk factor (Intercontinental Exchange, 2014)
Empirical analysis of member bases across EU and US CCPs

• **Topical issue**
  - Resolution regimes will enable authorities to call upon members, participants, investors and clients (EC, 2015)
  - Ability of CCPs to face default of two CMs *(cover 2 standard)*? (Murphy and Nahai-Williamson, 2014)

• **Risk distribution of member bases: assessment of CCP resilience**
  - 13 major CCPs operating in the EU and the US
  - Normal market conditions
  - Stressed scenario with two defaulted participants

• **Member base typology**
  - Average credit quality (high/low), heterogeneity (high/low)
Empirical investigation: 13 major CCPs operating in the EU and the US

- Credit ratings of clearing members as a proxy of financial strength

<table>
<thead>
<tr>
<th>CCP</th>
<th>CMs Total</th>
<th>Not-rated CMs</th>
<th>Rated CMs</th>
<th>Percentage of not-rated CMs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CME Clearing US</td>
<td>68</td>
<td>24</td>
<td>44</td>
<td>35.29%</td>
</tr>
<tr>
<td>CME Clearing EU</td>
<td>21</td>
<td>2</td>
<td>19</td>
<td>9.52%</td>
</tr>
<tr>
<td>Eurex</td>
<td>174</td>
<td>34</td>
<td>140</td>
<td>19.54%</td>
</tr>
<tr>
<td>ICE Clear Credit</td>
<td>28</td>
<td>0</td>
<td>28</td>
<td>0.00%</td>
</tr>
<tr>
<td>ICE Clear Europe</td>
<td>80</td>
<td>19</td>
<td>61</td>
<td>23.75%</td>
</tr>
<tr>
<td>ICE Clear US</td>
<td>37</td>
<td>13</td>
<td>24</td>
<td>35.14%</td>
</tr>
<tr>
<td>The Clearing Corp.</td>
<td>12</td>
<td>1</td>
<td>11</td>
<td>8.33%</td>
</tr>
<tr>
<td>LCH.Clearnet LLC</td>
<td>16</td>
<td>0</td>
<td>16</td>
<td>0.00%</td>
</tr>
<tr>
<td>LCH.Clearnet LTD</td>
<td>156</td>
<td>11</td>
<td>145</td>
<td>7.05%</td>
</tr>
<tr>
<td>LCH.Clearnet SA</td>
<td>103</td>
<td>18</td>
<td>85</td>
<td>17.48%</td>
</tr>
<tr>
<td>CC&amp;G</td>
<td>80</td>
<td>25</td>
<td>55</td>
<td>31.25%</td>
</tr>
<tr>
<td>EuroCCP</td>
<td>48</td>
<td>11</td>
<td>37</td>
<td>22.92%</td>
</tr>
<tr>
<td>ECC</td>
<td>21</td>
<td>2</td>
<td>19</td>
<td>9.52%</td>
</tr>
</tbody>
</table>
Creditworthiness of clearing members under normal market conditions – US CCPS (average quality, CM heterogeneity)

<table>
<thead>
<tr>
<th>S&amp;P Rating grade</th>
<th>Basel III DRW (in %)</th>
<th>DP (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA</td>
<td>0.05</td>
<td>0.01</td>
</tr>
<tr>
<td>AA</td>
<td>2</td>
<td>0.05</td>
</tr>
<tr>
<td>A</td>
<td>3</td>
<td>0.09</td>
</tr>
<tr>
<td>BBB</td>
<td>6</td>
<td>0.23</td>
</tr>
<tr>
<td>BB</td>
<td>15</td>
<td>1.16</td>
</tr>
</tbody>
</table>
Creditworthiness of clearing members under normal market conditions – EU CCPs (average quality, CM heterogeneity)
Creditworthiness of clearing members under stressed market conditions – US CCPs (average quality, CM heterogeneity)

High default probabilities of clearing members under a stressed scenario jeopardise the ability to replenish the default fund.

Conditional default probabilities (DP) of clearing members under cover 2 approach:

<table>
<thead>
<tr>
<th>CM DP conditional on the default of two average CMs (in %)</th>
<th>S&amp;P Rating Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP of average CMs</td>
<td></td>
</tr>
<tr>
<td>0.05 %</td>
<td>1.83</td>
</tr>
<tr>
<td>0.09 %</td>
<td>2.97</td>
</tr>
<tr>
<td>0.23 %</td>
<td>5.84</td>
</tr>
<tr>
<td>1.16 %</td>
<td>12.28</td>
</tr>
</tbody>
</table>

The Clearing Corporation

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Creditworthiness of clearing members under stressed market conditions – EU CCPs (average quality, CM heterogeneity)

Conditional default probabilities (DP) of clearing members under cover 2 approach

<table>
<thead>
<tr>
<th>S&amp;P Rating</th>
<th>Category</th>
<th>PD of average CMs</th>
<th>CM PD conditional on the default of two average CMs (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBB</td>
<td>0.45</td>
<td>0.01 %</td>
<td>CME EU*</td>
</tr>
<tr>
<td>BB</td>
<td>1.83</td>
<td>0.05 %</td>
<td>ICE Clear EU*</td>
</tr>
<tr>
<td>BB</td>
<td>2.97</td>
<td>0.09 %</td>
<td>EuroCCP*</td>
</tr>
<tr>
<td>B</td>
<td>5.84</td>
<td>0.23 %</td>
<td>EUREX Clearing*</td>
</tr>
<tr>
<td>B</td>
<td>12.28</td>
<td>1.16 %</td>
<td>LCH.Clearnet LTD*</td>
</tr>
<tr>
<td>B</td>
<td>25.94</td>
<td>5.44 %</td>
<td>LCH.Clearnet SA*</td>
</tr>
<tr>
<td>CCC</td>
<td></td>
<td>0.23 %</td>
<td>ECC*</td>
</tr>
<tr>
<td>CCC</td>
<td></td>
<td>1.16 %</td>
<td>CC&amp;G**</td>
</tr>
</tbody>
</table>

High default probabilities of clearing members under a stressed scenario jeopardise the ability to replenish the default fund
Creditworthiness of clearing members under stressed market conditions – (average quality, CM heterogeneity)

- High default probabilities of clearing members under a stressed scenario jeopardise the ability to replenish the default fund
  - Without public subsidies (bail out)…
  - Or without using Initial Margin of non defaulted clearing members …
    - Enhancing systemic risk: interconnectedness between clearing members

- Computation of conditional default probabilities
  - Mapping of default probabilities onto ratings
    - Tasche (2013) and Gordy and Lütkebohmert (2013), Basel III (2014)
  - Conditional default probabilities computed under Basel II & III frameworks
    - Banking book correlations are low
    - Trading book/market implied correlations would magnify default probabilities
Comparing CCP member bases: average credit quality (high/low), heterogeneity (high/low)

<table>
<thead>
<tr>
<th>Member base consists only of good quality CMs</th>
<th>Member base majority is of good quality, small proportion of low quality CMs</th>
<th>LCH.CLEARNET LLC ICE CLEAR CREDIT</th>
<th>ECC CME CLEARING EU LCH.CLEARNET LTD TCC EUREX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Member base majority is of low quality, only a small proportion of good quality CMs</td>
<td>Member base majority is of good quality, but significant proportion of low quality CMs</td>
<td>CC&amp;G</td>
<td>ICE CLEAR US CME CLEARING US EUROCCP LCH.CLEARNET SA ICE CLEAR EU</td>
</tr>
</tbody>
</table>
### Member base quality erosion: do we face a financial stability dilemma, when CM quality erodes?

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<th>Member base majority is of good quality, small proportion of low quality CMs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Member base majority is of low quality, only a small proportion of good quality CMs</td>
<td>Member base majority is of good quality, but significant proportion of low quality CMs</td>
</tr>
</tbody>
</table>

- **Restricted Membership**
- **Adverse Selection**
- **Increased bail-out risk**
- **Runs**
Conclusion: CCP resilience, clearing membership and regulation

- Ability of a number of CCPs to raise contingent liquidity is questionable
  - Systemic risk difficult to conceal…
  - Are such CCPs able to sustain significant losses without placing an excessive strain on CMs?
  - Does the maintenance of critical functions financed by clearing members increase counterparty credit risk exposure to the CCP?
- Strength of member base structure is a key factor
  - Should membership eligibility criteria be (re-)strengthened?
  - Should qualifying criteria (ESMA, CFTC) be revisited?
  - Why is the ability of a member base to raise funds not considered for (macroeconomic) stress tests?
Conclusion: CCP waterfall design and IM\DF ratio

- Waterfall design must be thought accordingly
  - Integration of risk sensitive default fund add-ons for members with decreasing credit quality into existing frameworks
    - Mitigation of bad incentives
    - Add-ons must be calibrated to avoid procyclicality effects
- Increase ratio of IM to DF?
  - Defaulter pays approach reduces interconnectedness
  - Clarify the status of IM under resolution regimes
  - Positions of CMs with huge client clearing business
    - Large and uncontrolled directional trades
    - DF contributions only provided by CMs, not end-users
Literature

- **CCP vs OTC**

- **Contagion and interconnection risks**

- **CCP resilience and risk management**

- **Prudence of regulatory default fund standard**
  Murphy and Nahai-Williamson (2014)

- **CCP resolution vs. CCP recovery**
Central clearing counterparties in a nutshell

A CCP
- Interposes itself between the initial parties (novation)
- Members post IM to CCP, not the converse (unilateral IM)
- Specific loss sharing rules amongst members if slippage risk in excess of defaulted member IM
## Description of the dataset - CCPs

<table>
<thead>
<tr>
<th>Group</th>
<th>CCP</th>
<th>Geography</th>
<th>Company structure</th>
<th>Ownership structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>CME Group</td>
<td>CME Clearing</td>
<td>US</td>
<td>For-profit entity</td>
<td>Exchange: 100%</td>
</tr>
<tr>
<td></td>
<td>CME Clearing Europe</td>
<td>EU</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ECC</td>
<td>EU</td>
<td>For-profit entity</td>
<td>Exchange: 100%</td>
</tr>
<tr>
<td></td>
<td>EuroCCP</td>
<td>EU</td>
<td>For-profit entity</td>
<td></td>
</tr>
<tr>
<td>Deutsche Börse Group</td>
<td>EUREX Clearing</td>
<td>EU</td>
<td>For-profit entity</td>
<td>Exchange: 100%</td>
</tr>
<tr>
<td>ICE Inc.</td>
<td>ICE Clear Credit</td>
<td>US</td>
<td>For-profit entity</td>
<td>Exchange: 100%</td>
</tr>
<tr>
<td></td>
<td>ICE Clear Europe</td>
<td>EU</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ICE Clear Europe</td>
<td>US</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The Clearing Corporation</td>
<td>US</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LSEG</td>
<td>CC&amp;G</td>
<td>EU</td>
<td>For-profit entity</td>
<td>Exchange: 100%</td>
</tr>
<tr>
<td>LCH.Clearnet Group</td>
<td>LCH.Clearnet LLC</td>
<td>US</td>
<td>For-profit entity</td>
<td>Exchange: 60%</td>
</tr>
<tr>
<td></td>
<td>LCH.Clearnet LTD</td>
<td>EU</td>
<td></td>
<td>Other: 40%</td>
</tr>
<tr>
<td></td>
<td>LCH.Clearnet SA</td>
<td>EU</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
References

References

European Commission (2012). Consultation on a possible recovery and resolution framework for financial institutions other than banks.
FSB (2011). Key attributes of effective resolution regimes for financial institutions.
FSB (2014). Key attributes of effective resolution regimes for financial institutions.

John Wiley & Sons.
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