CCP resilience and clearing membership

Angela Armakola*  
Jean-Paul Laurent**

*Université Paris 1 Panthéon – Sorbonne, PRISM

**Université Paris 1 Panthéon – Sorbonne, PRISM & Labex Réfi

3rd – 4th December 2015

Financial Stability: Policy Analysis and Data Needs
Outline

1. CCP systemic risk: a major concern for financial stability?

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: a major concern for financial stability?

- “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 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)
CCP and clearing members: loss allocation rules

- 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

Defaulter’s resources

Pre-funded resources

Mutualised resources

Unfunded resources

Order of assessment

Pre-funded loss-sharing mechanism

Unfunded loss-sharing mechanism

Losses not covered by defaulted member margin are supported by surviving clearing members
Resources mutualised among clearing members

- Default fund contributions
  - Basel III capital charge for default fund exposures (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 Corporation</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>

#### Standard & Poor’s Rating

- **AAA**
- **AA**
- **A**
- **BBB**
- **BB**
- **B**
- **CCC**
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)

<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>
<tr>
<td>B</td>
<td>30</td>
<td>5.44</td>
</tr>
</tbody>
</table>
Creditworthiness of clearing members under stressed market conditions – US CCPs (average quality, CM heterogeneity)

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>DP of average CMs</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;P Rating Category</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>

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 – EU CCPs (average quality, CM heterogeneity)

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

<table>
<thead>
<tr>
<th>CM PD conditional on the default of two average CMs (in %)</th>
<th>PD of average CMs</th>
<th>S&amp;P Rating Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>CME EU*</td>
<td>0.01 %</td>
<td>0.45 BBB</td>
</tr>
<tr>
<td>ICE Clear EU*</td>
<td>0.05 %</td>
<td>1.83 BB</td>
</tr>
<tr>
<td>EuroCCP*</td>
<td>0.09 %</td>
<td>2.97 BB</td>
</tr>
<tr>
<td>EUREX Clearing*</td>
<td>0.23 %</td>
<td>5.84 B</td>
</tr>
<tr>
<td>LCH.Clearnet LTD*</td>
<td>1.16 %</td>
<td>7.12 B</td>
</tr>
<tr>
<td>LCH.Clearnet SA*</td>
<td>5.44 %</td>
<td>17.79 CCC</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?

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Member base consists only of good quality CMs</td>
<td>Member base majority is of good quality, small proportion of low quality CMs</td>
</tr>
<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>

**Impact:**
- 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?
- Strength of member base structure is a key factor
  - Should membership eligibility criteria be 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**
  Cont and Kokholm (2014), Duffie and Zhu (2011), Singh (2011), ...

• **Contagion and interconnection risks**
  Wendt (2015), Pirrong (2014), Yellen (2013), ...

• **CCP resilience and risk management**

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

• **CCP resolution vs. CCP recovery**
## 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></td>
<td>ICE Clear Credit</td>
<td>US</td>
<td>For-profit entity</td>
<td></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% Other: 40%</td>
</tr>
<tr>
<td></td>
<td>LCH.Clearnet LTD</td>
<td>EU</td>
<td></td>
<td></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.