CCP resilience and clearing membership

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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)

Source: Yellen (2013)

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

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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)

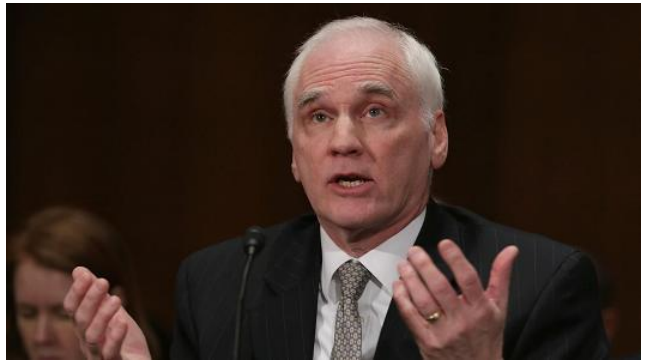
EUROPEAN CENTRAL BANK

EUROSYSTEM

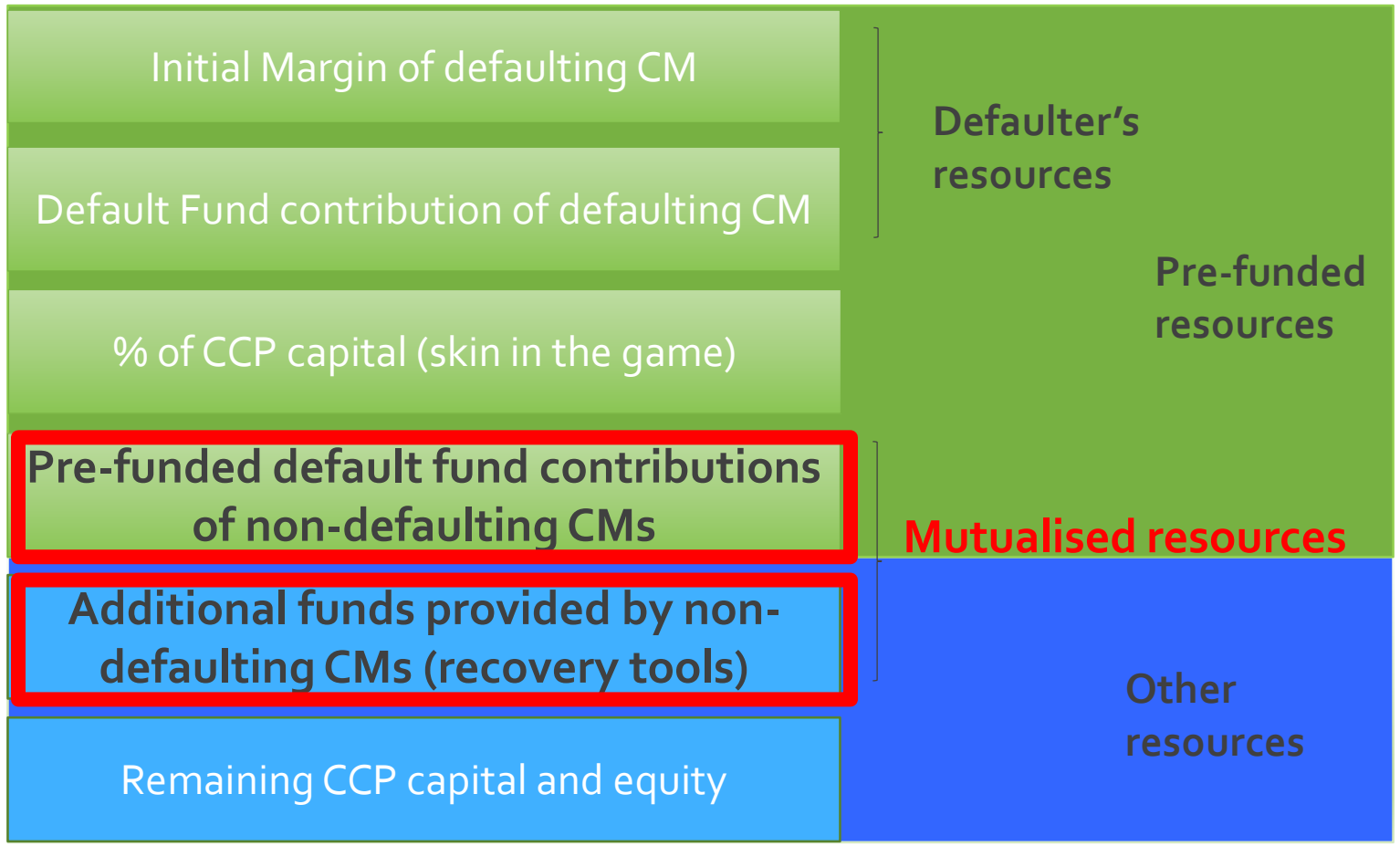
CCPs and systemic risk as seen by US regulators

- "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 assessments…" (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)

Board of Governors of the Federal Reserve System



Default waterfall: “robust-yet-fragile”(Haldane, 2009)?



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)**

Requirement	Former	New
Minimum capital	US$5 billion	US$50 million (scaled to amount of risk assumed)
Minimum book capital	US$1 trillion	None
Credit rating	"A" or equivalent	Member assessment based on credit ratings, financial ratios, market-implied ratings (CDS),support of parent companies and operational capabilities.
Performance	Proven operational capacity to assist in the orderly unwinding of a defaulter's portfolio through a default-management "fire drill."	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.

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**
  - FSB (2011, 2014); European Commission (2012); CPSS-IOSCO (2013, 2014)
  - 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)

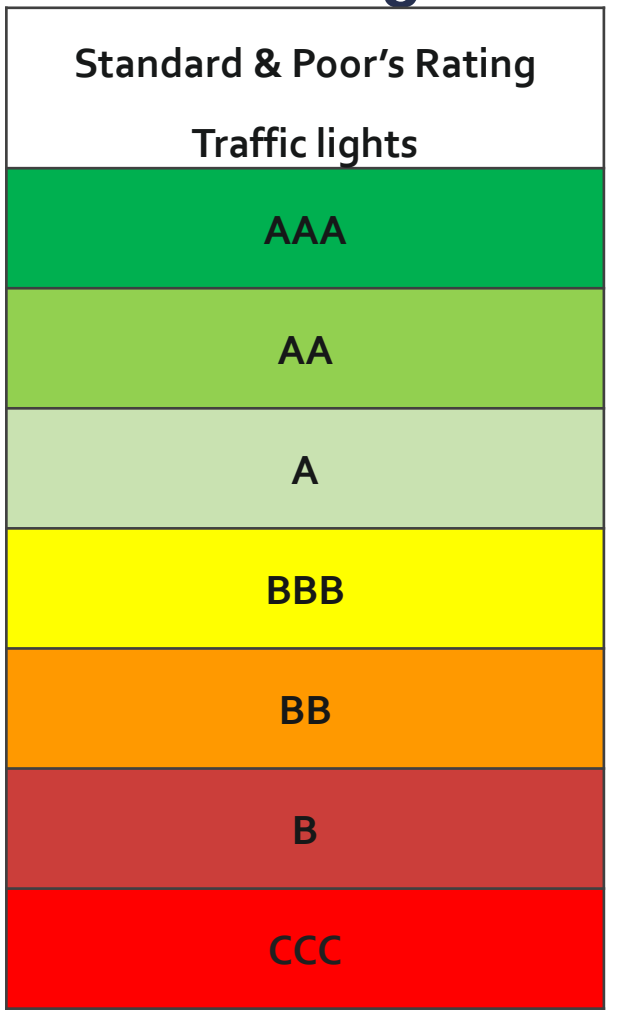
Empirical analysis of member bases across EU and US CCPs

- **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)

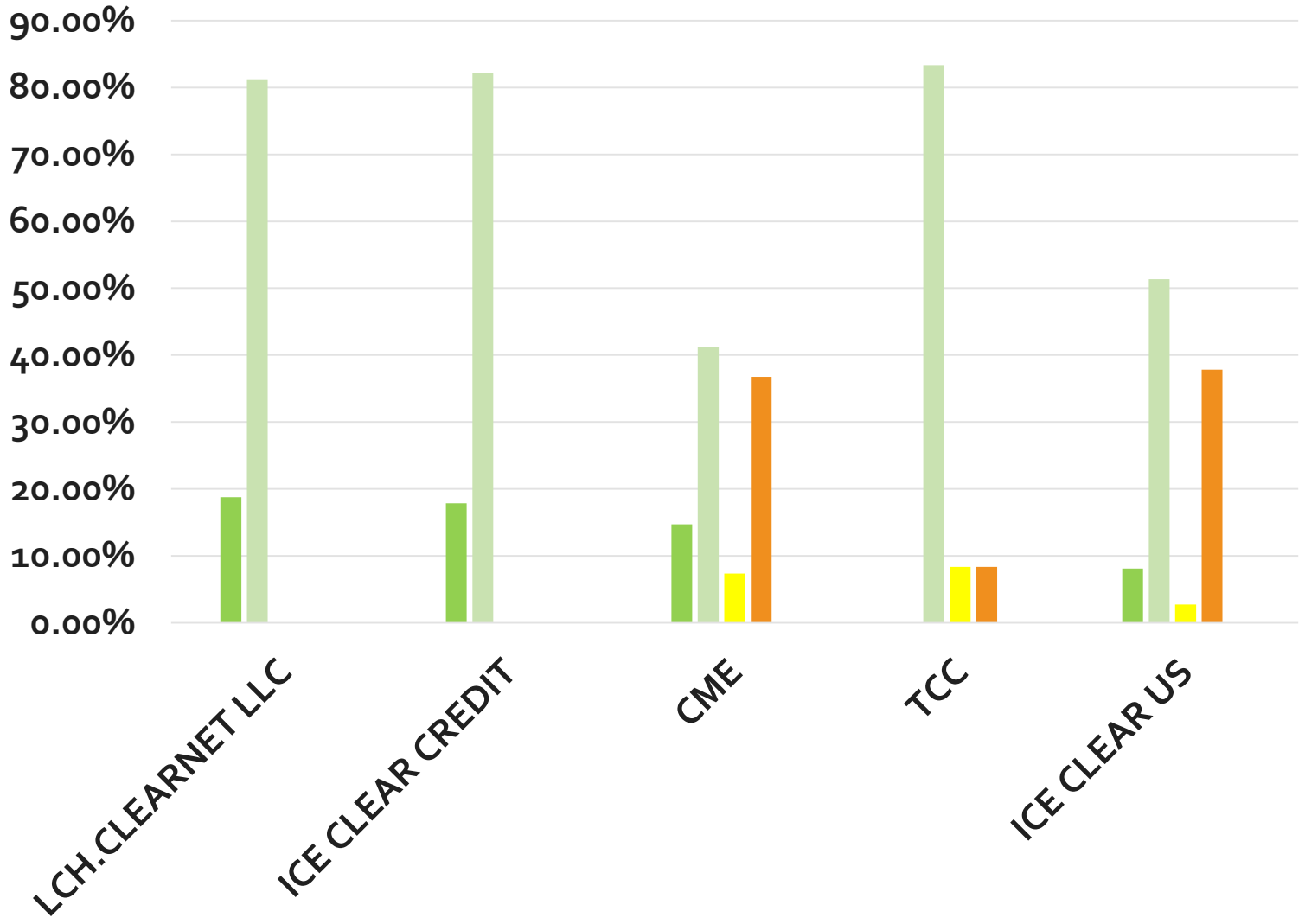
Empirical investigation: 13 major CCPs operating in the EU and the US

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

CCP	CMs Total	Not-rated CMs	Rated CMS	Percentage of not-rated CMs
CME Clearing US	68	24	44	35.29%
CME Clearing EU	21	2	19	9.52%
Eurex	174	34	140	19.54%
ICE Clear Credit	28	0	28	0.00%
ICE Clear Europe	80	19	61	23.75%
ICE Clear US	37	13	24	35.14%
The Clearing Corporation	12	1	11	8.33%
LCH.Clearnet LLC	16	0	16	0.00%
LCH.Clearnet LTD	156	11	145	7.05%
LCH.Clearnet SA	103	18	85	17.48%
CC&G	80	25	55	31.25%
EuroCCP	48	11	37	22.92%
ECC	21	2	19	9.52%



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



S&P Rating grade	Basel III DRW (in %)	DP (in %)
AAA	0.05	0.01
AA	2	0.05
A	3	0.09
BBB	6	0.23
BB	15	1.16

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CME Group

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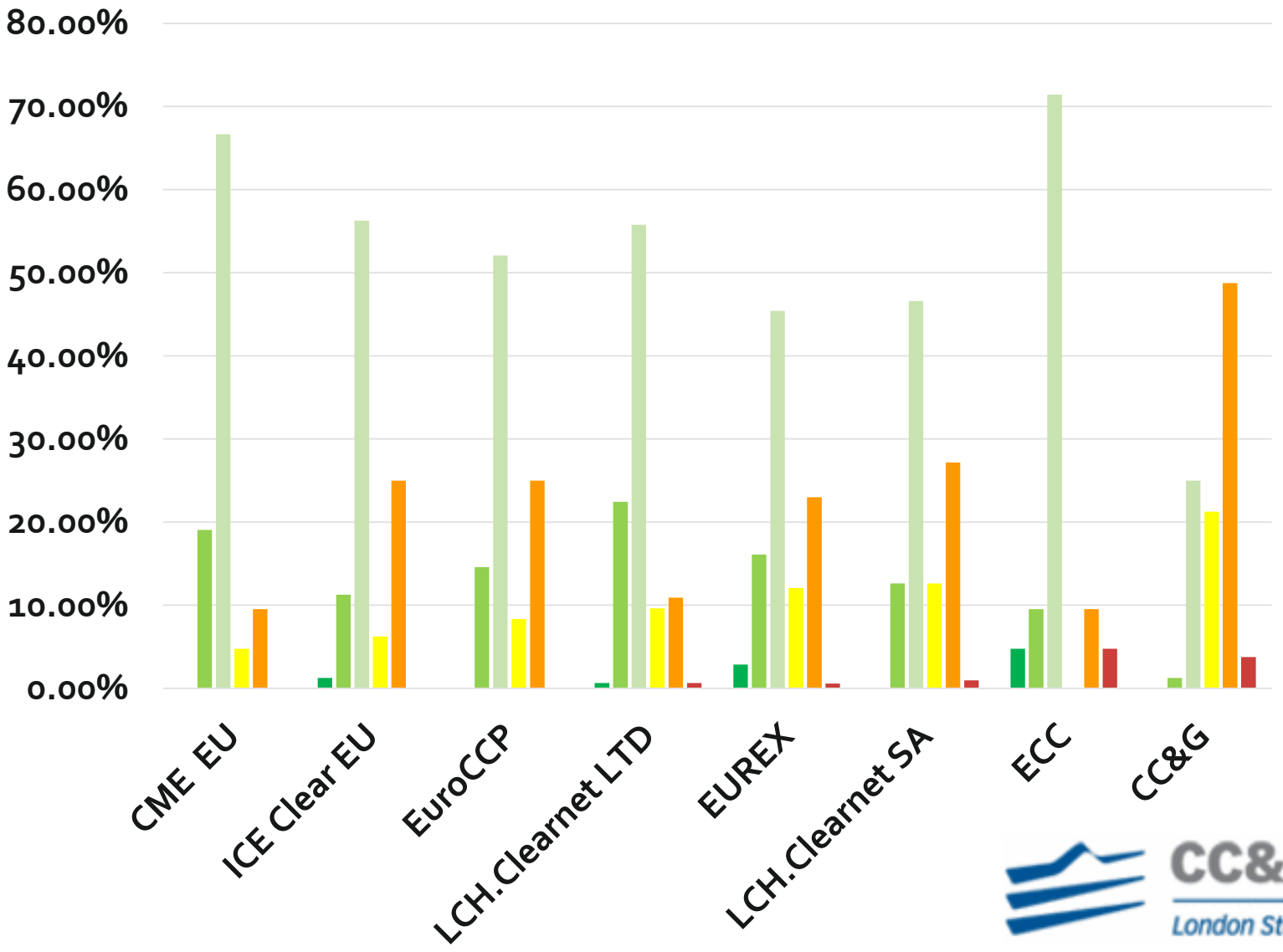

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A	3	0.09
BBB	6	0.23
BB	15	1.16
B	30	5.44

ECC European Commodity Clearing

EuroCCP Make a difference

CME Group

ICE

eurex clearing

CC&G London Stock Exchange Group

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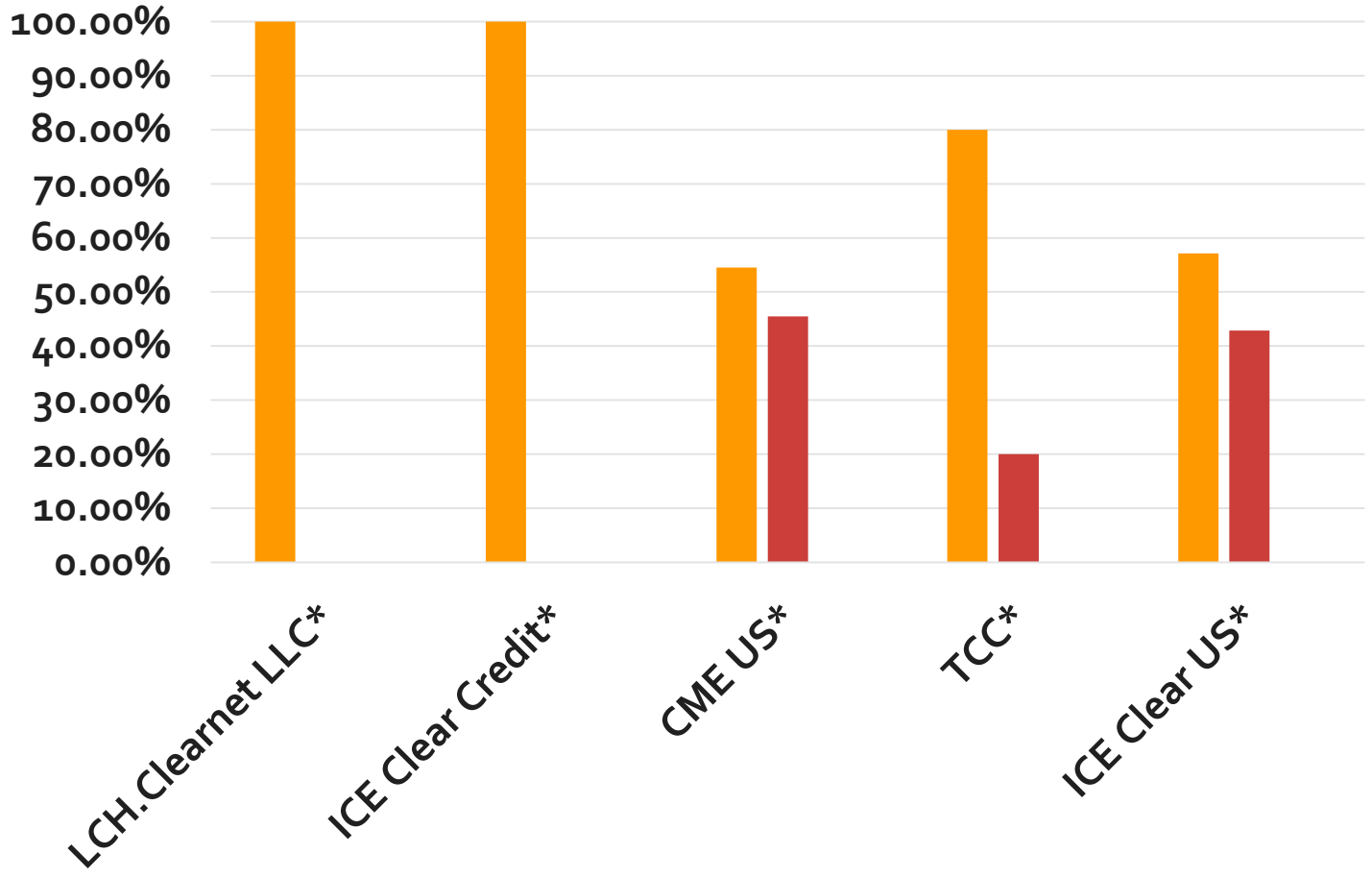
Creditworthiness of clearing members under stressed market conditions – US CCPs (average quality, CM heterogeneity)



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

CM DP conditional on the default of two average CMs (in %)		
DP of average CMs / CM DP	0.09%	S&P Rating Category
0.05 %	1.83	BB
0.09 %	2.97	
0.23 %	5.84	B
1.16 %	12.28	

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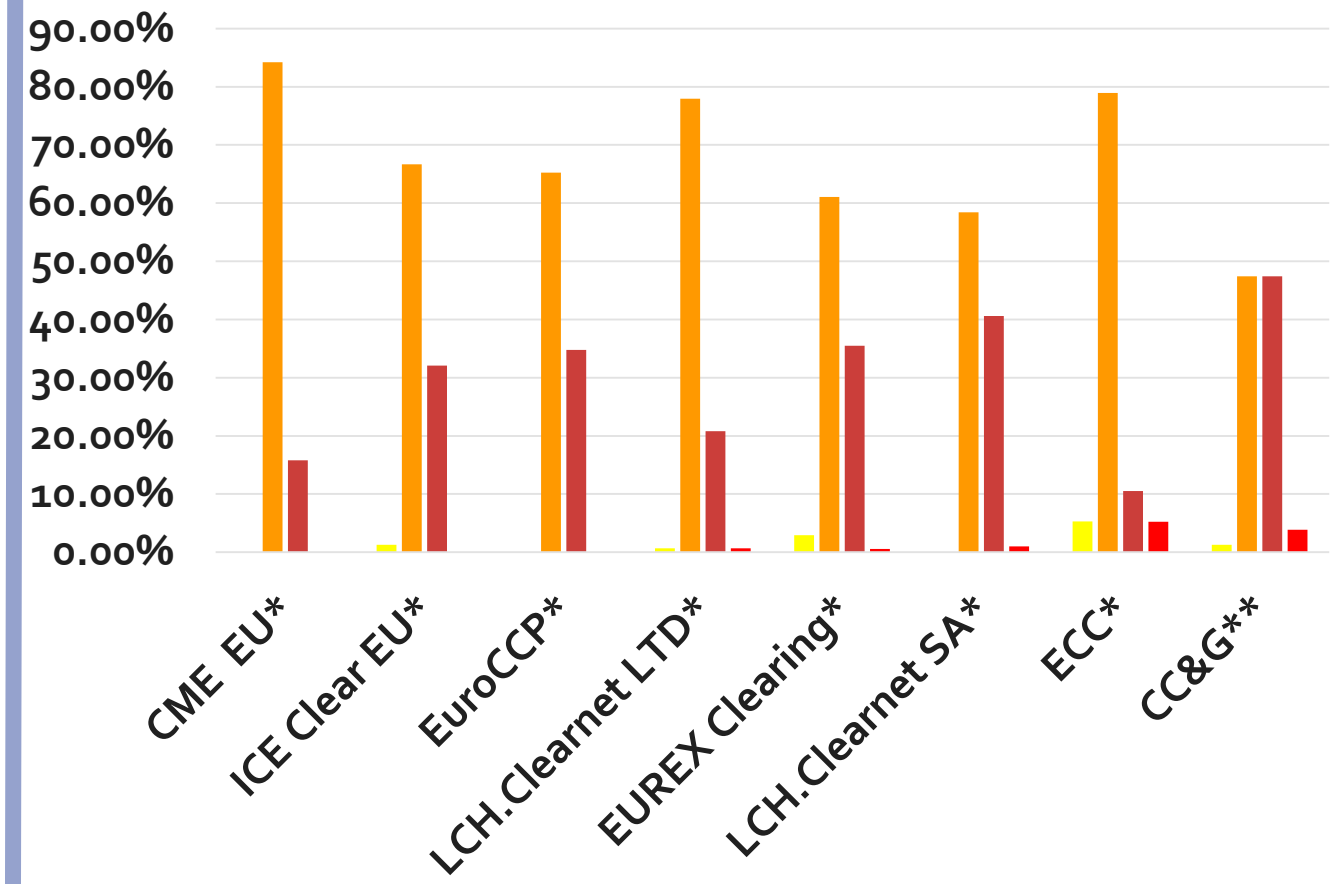
High default probabilities of clearing members under a stressed scenario jeopardise the ability to replenish the default fund

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



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

CM PD conditional on the default of two average CMs (in %)		
CM PD \ PD of average CMs	0.09%	S&P Rating Category
0.01 %	0.45	BBB
0.05 %	1.83	BB
0.09 %	2.97	
0.23 %	5.84	B
1.16 %	12.28	
5.44 %	25.94	CCC

CM PD conditional on the default of two average CMs (in %)		
CM PD \ PD of average CMs	1.16%	S&P Rating Category
0.05 %	0.75	BBB
0.09 %	1.19	BB
0.23 %	2.42	
1.16 %	7.12	B
5.44 %	17.79	CCC

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)

Member base consists only of good quality CMs	**Member base majority is of good quality, small proportion of low quality CMs**
Member base majority is of low quality, only a small proportion of good quality CMs	**Member base majority is of good quality, but significant proportion of low quality CMs**

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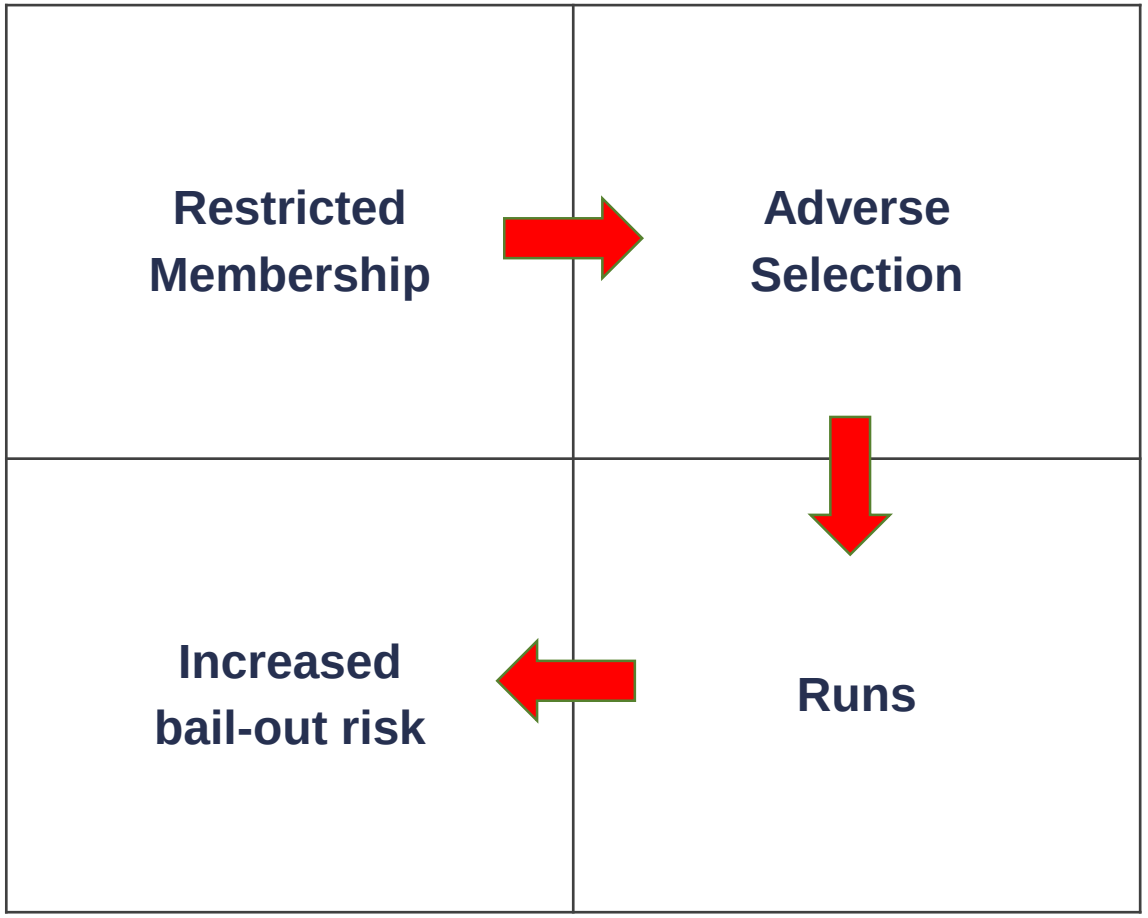
CC&G	**ICE CLEAR US** **CME CLEARING US** **EUROCCP** **LCH.CLEARNET SA** **ICE CLEAR EU**

Member base quality erosion: do we face a financial stability dilemma, when CM quality erodes?

Member base consists only of good quality CMs	**Member base majority is of good quality, small proportion of low quality CMs**
Member base majority is of low quality, only a small proportion of good quality CMs	**Member base majority is of good quality, but significant proportion of low quality CMs**



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**

  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**

  Ghamami (2015), Menkveld (2015), Lin and Surti (2015), Budding and Murphy (2014), Cruz Lopez et al. (2014), Murphy and Nahai-Williamson (2014), Pirrong (2014), Nahai-Williamson et al. (2013), …

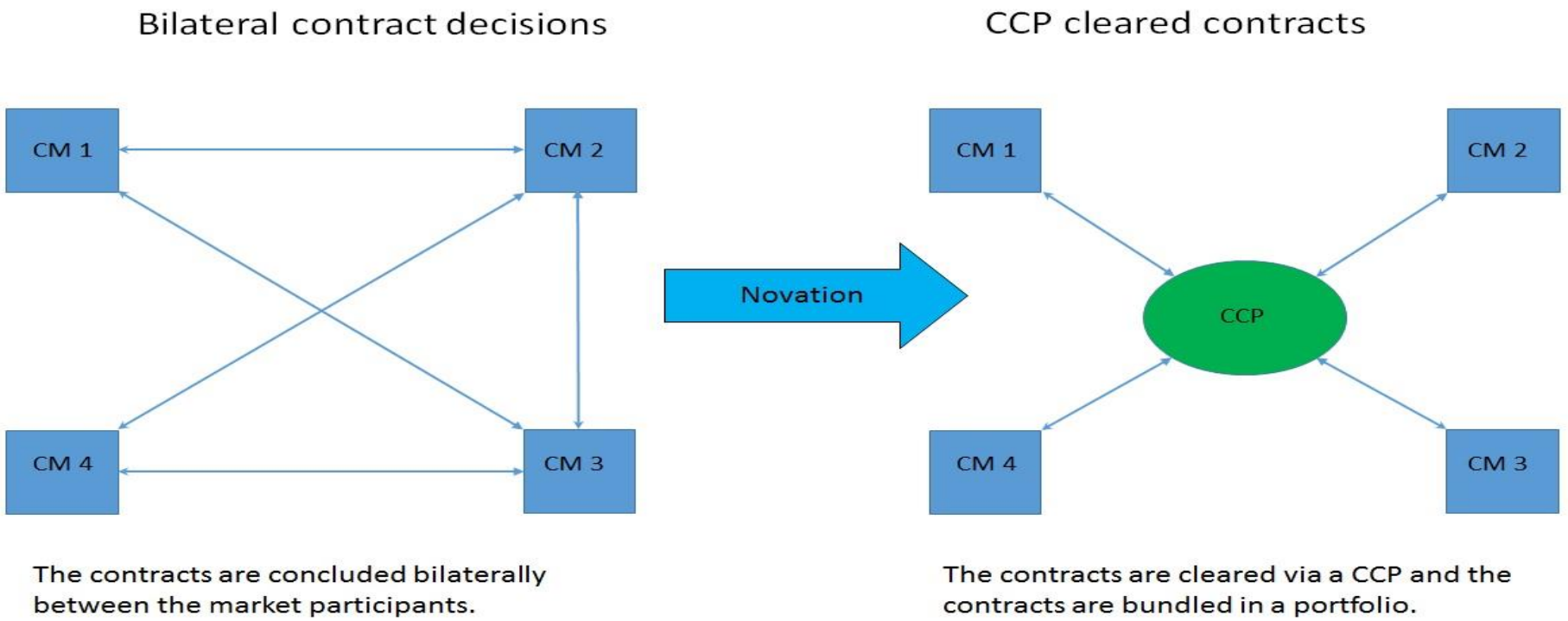
- **Prudence of regulatory default fund standard**

  Murphy and Nahai-Williamson (2014)

- **CCP resolution vs. CCP recovery**

  Duffie (2014), Lubben (2014), Singh (2014), Tucker (2014), Duffie and Skeel (2012),...

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

Group	CCP	Geography	Company structure	Ownership structure
CME Group	**CME Clearing**	US	For-profit entity	Exchange: 100%
	CME Clearing Europe	EU		
	ECC	EU	For-profit entity	Exchange: 100%
	EuroCCP	EU	For-profit entity	User: 25% Exchange: 50% Other: 25%
Deutsche Börse Group	**EUREX Clearing**	EU	For-profit entity	Exchange: 100%
ICE Inc.	**ICE Clear Credit**	US	For-profit entity	Exchange: 100%
	ICE Clear Europe	EU		
	ICE Clear Europe	US		
	The Clearing Corporation	US		
LSEG	**CC&G**	EU	For-profit entity	Exchange: 100%
LCH.Clearnet Group	**LCH.Clearnet LLC**	US	For-profit entity	Exchange: 60% Other: 40%
	LCH.Clearnet LTD	EU		
	LCH.Clearnet SA	EU		

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