CDS Central Counterparty Clearing Liquidation:
Road to Recovery or Invitation to Predation?”

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Outline

I. Financial Crises, Systemic Risk, and Central Counterparty

II. Research Issues, Questions and Evidence

III. Risk Management of Clearing Houses

IV. Recovery and Resolution of CCPs

V. Summary and Conclusions
Systemic Risk of Central Counterparties (Clearing Houses, CCPs)

• Interestingly, there is no generally accepted definition of systemic risk and how to measure it. “hard-to-define-but-you-know-it-when-you-see-it”

• All definitions attempt to capture risks to the stability of the financial system as a whole as opposed to the risk facing individual financial institutions or market participants (FSOC, 2011).

• The focus of most research and regulatory approaches is essentially on banks. It is often assumed that it can be easily transferred from banks to other institutions and markets such as clearing houses (CCP) and mutual funds.

• This perspective totally neglects the differences in the intermediation process between banks and securities markets and clearing houses.
The financial crisis highlighted risks in the OTC derivatives market – in particular, those linked to non-central clearing.

### Root causes of systemic risk

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Excessive risk taking</strong></td>
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<tr>
<td>• Wrong incentives, including moral hazard</td>
</tr>
<tr>
<td>• Deficiencies in controlling and pricing risk</td>
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<td><strong>Interconnectedness</strong></td>
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<tr>
<td>• Domino effect due to failure of single counterparty</td>
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<td>• OTC derivatives joins together a broad range of firms within opaque structure</td>
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<tr>
<td><strong>Insufficient collateral in case of default</strong></td>
</tr>
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<td>• Low or no collateralisation, reflecting TBTF or business driven risk management</td>
</tr>
<tr>
<td>• Individual firms assumed counterparts could be replaced – but not organised structure in place to create a real market</td>
</tr>
<tr>
<td><strong>Insufficient equity in case of default</strong></td>
</tr>
<tr>
<td>• Losses are higher than CCP equity</td>
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IMF and European Commission estimates put direct bail-outs of banks at 4.6% of EU GDP, indirect support at 13%, crisis related costs at 8%, and GDP contraction of 6%.
# Clearing Member Defaults

<table>
<thead>
<tr>
<th>Defaulting Clearing Member</th>
<th>Year</th>
<th>Clearinghouse</th>
<th>Default Loss</th>
<th>Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume Investors Corporation</td>
<td>1985</td>
<td>Comex Clearing Ass.</td>
<td>$9 million</td>
<td>Yes</td>
</tr>
<tr>
<td>H. B. Shane</td>
<td>1987</td>
<td>Options Clearing Corp.</td>
<td>$8.6 million</td>
<td>Yes</td>
</tr>
<tr>
<td>Multiple firms</td>
<td>1987</td>
<td>Futures Guarantee Corp.</td>
<td>Exact figure unavailable</td>
<td>Yes</td>
</tr>
<tr>
<td>Jordan Sandman Futures Ltd.</td>
<td>1989</td>
<td>New Zealand Futures and Options Exchange</td>
<td>GBP 1 million</td>
<td>Yes</td>
</tr>
<tr>
<td>Drexel Burnham Lambert Ltd.</td>
<td>1990</td>
<td>LCH.Clearnet</td>
<td>Exact figure unavailable</td>
<td>No</td>
</tr>
<tr>
<td>Woodhouse, Drake and Carey (Commodities), Ltd.</td>
<td>1991</td>
<td>LCH.Clearnet</td>
<td>GBP 900,000 (before defaulter's resources)</td>
<td>No</td>
</tr>
<tr>
<td>Lee B. Stern &amp; Co.</td>
<td>1992</td>
<td>Board of Trade Clearing</td>
<td>Exact figure unavailable;</td>
<td>Yes</td>
</tr>
<tr>
<td>Barings Futures (Singapore) Ltd.</td>
<td>1995</td>
<td>SIMEX</td>
<td>Exact figure unavailable;</td>
<td>No</td>
</tr>
<tr>
<td>Barings Securities (Japan) Ltd.</td>
<td>1995</td>
<td>Osaka Securities Exchange</td>
<td>Exact figure unavailable</td>
<td>Unavailable</td>
</tr>
<tr>
<td>Klein and Co. Futures, Inc.</td>
<td>2000</td>
<td>New York Clearing Corp</td>
<td>Exact figure unavailable;</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Lehman Brothers</strong></td>
<td><strong>2008</strong></td>
<td>LCH.Clearnet /EUREX</td>
<td>Exact figure unavailable</td>
<td>No</td>
</tr>
<tr>
<td>MF Global UK Limited</td>
<td>2011</td>
<td>LCH.Clearnet</td>
<td>Exact figure unavailable</td>
<td>No</td>
</tr>
<tr>
<td>Cyprus Popular Bank Co. Ltd.</td>
<td>2013</td>
<td>LCH.Clearnet</td>
<td>Exact figure unavailable</td>
<td>No</td>
</tr>
<tr>
<td>HanMag Securities</td>
<td>2013</td>
<td>Korea Exchange (KRX) CCP</td>
<td>KRW 46 billion</td>
<td>Yes</td>
</tr>
<tr>
<td>Maple Bank GmbH</td>
<td>2016</td>
<td>LCH.Clearnet</td>
<td>Exact figure unavailable</td>
<td>No</td>
</tr>
</tbody>
</table>
Given their growing importance in financial markets, the failure of a central counterparty could affect banks and the wider economy. The Commission therefore proposes rules to require CCPs and national authorities to prepare for and deal with financial difficulties.

The EU clearing obligation for OTC derivatives has led to a large increase in clearing through CCPs.

CCP clearing is likely to increase substantially in the coming years.

Share of global OTC derivatives market cleared through a CCP:

- 12% in 2009
- 45% in 2015
- 70% in the future
1) **Turnover of centrally cleared financial products in 2015** (nominal values).

2) **Measured by** the Herfindahl-Hirschman Index (HHI).

Market concentration is considered heightened as of an HHI greater than 1,800.

ECB and Bundesbank calculations
Central Counterparties (‘CCPs’) increase stability in financial markets. They are critical in helping to reduce risks in the wider economy. They help financial firms and corporates manage their risks. The Commission wants to make them even more robust.

Central counterparties play a key role in international financial markets. They process big and increasing volumes of derivatives trades every day.

- Almost EUR 500 trillion
- 17
- More than 15 times EU GDP

Value of all ‘over-the-counter’ (OTC) derivatives currently held globally
Number of CCPs in EU
The global volume of derivatives currently cleared by CCPs
Cleared US Dollar Credit Default Swaps

Ice Credit Clear dominates with 98% share.

CME shutting down its service.

LCH CDS with $3 billion in Q1 2019.
Cleared Euro Credit Default Swaps

Ice Credit Clear 56.8%
Ice Clear Europe 32.6%
LCH CDS Clear 10.6%
April 8, 2019
Deutsche Bank introduces client clearing through LCH CDS Clear. Deutsche Bank is the first German bank to offer client clearing in US and European CDS. Asset management firms MEAG and Union Investment are the first buy-side clients to connect to CDS Clear via Deutsche Bank.

July 3, 2018
LCH CDS Clear adds JP Morgan as first US bank to CDS clearing service. JP Morgan is using LCH CDS Clear to act as a clearing broker in CDS for Swedish pension fund AMF.

April 29, 2019
LCH CDS Clear adds Banca IMI as first Italian clearing member. Banca IMI has signed up as a clearing member for CDS, making it the first Italian clearing member to join the service. It will also act as a clearing broker for clearing CDS for its client base. “
Partnership Program Participants at Eurex

EurexOTC Clear now has over 80 Clearing Members and over 230 Disclosed Clients.
Product Structure of Eurex
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Research Ideas, Questions and Evidence

- Regulation and the clearing CDS by CCP, make CCPs systemically important.
- Paper analyzes potential failure of a CCP due to default of a large dealer bank.
- Market Impact of the unwinding of its positions.
- Price impact of liquidation and predatory selling by dealer banks.
- It provides a measure of covariance between assets in banks’ portfolios.
- Key results show that liquidation lowers CCP profits,
- Predation decreases the profits of all members, pushing banks to default.
- A hybrid CCP structure provides a natural disciplinary mechanism for predation.
- It more incentive compatible for the CCP, in expectation of a large loss.
- Model provides regulatory implications for a Lender of Last Resort in various liquidity scenarios.
The contribution of this paper to the existing literature is that it combines two strands of literature, financial networks and price impact with the feedback loop of predation.

- It is the first to explicitly model the price process in this context, and the mechanism of exchange of liabilities.
- Furthermore, it breaks down the common trading period structure to smaller time-steps allowing one to see the amplification mechanism in fire-sale contagion explicitly; it illustrates the underlying drivers of fire-sales and the cumulative effect over time.
- This paper is the first to look at forced liquidation in a CCP, modelling particularities and complexities of liquidation of CDS positions.
- Finally, it is the first to look at the punitive possibilities for dis-incentivising the predatory behavior that plagues all markets, and identifies novel (regulatory) tool to dissuade that behavior;
- the initial margin and a hybrid guarantee fund structure.
## Structure of Problems and Issues

### Ownership Structure
- Mutual Membership with **Un-limited Liability**
- For-Profit versus vs. **User-Owned**
- Get Member Banks involved with liability
- **Hybrid CCP**

### Equity of CCP
- **Low or High** (with no regulation probably probably zero)

### Margins of CCP
- **Low or High** (attracting volume of business)

### Waterfall Principle
- Optimal combination between **Margins and Equity** and limited or unlimited liability of CCP members

### Behavior of Market Participants
- Profit intentional or unintentional from crisis by trading in the defaulted products (sell and buyback)
Wolfgang Bessler Center for Finance and Banking, Justus Liebig University Giessen, and CFS Goethe University Frankfurt

Central Counterpart Capitalization and Misaligned Incentives

Wenqian Huang, Capitalization and Misaligned Incentives, BIS

• The model shows that a CCP with more capital requires more collateral from its clearing members.

• A higher collateral requirement lowers the default rate as well as the loss-given default.

• This does, however, cause profitable trades to be forgone, reducing fee income.

• When a CCP has a higher level of capital, it is more concerned about the losses from counterparty risk that eats into this capital.

• Hence, it will set a higher collateral requirement to dis-incentivize defaults.

• As a result, without capital requirements, the CCP chooses zero capital.
This figure plots the time series of CCP skin-in-the-game (SITG pre before) and total initial margin.

The red line stands for for-profit CCPs and the blue line for user-owned CCPs.

This suggests that (i) user-owned CCPs have higher capital than for-profit CCPs have;

(ii) for-profit CCPs impose a much larger initial margin than user-owned CCPs do.
This figure plots total initial margin against CCP skin-in-the-game (SITG pre before) for each CCP. The red stars stand for for-profit CCPs and the blue circles are user-owned CCPs.

Figure shows cross-sectional variations of CCP skin-in-the-game and total initial margin. The red stars stand for for-profit CCPs and the blue circles are user-owned CCPs. The scatter plots confirm the messages in the time series. In addition, the scatter plot suggests that there is a positive relationship between CCP skin-in-the-game and total initial margin for for-profit CCPs, but not for user-owned CCPs.
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V. Summary and Conclusions
CCPs reduce systemic risk in the financial system by mitigating its root causes

**Mitigation of systemic risk by CCPs**

**CCPs as independent risk managers**
- Neutral valuation of risk exposure
- Enforcement of independently determined collateralisation levels

**Addressing interconnectedness with central clearing**
- Novation of contracts to reduce interconnectedness
- Reducing risk exposure with multilateral netting

**Protecting market participants from clearing member defaults**
- Insuring against tail risks with robust lines of defence
- Transparent default management process

**Root causes of systemic risk**
- Excessive risk taking
- Interconnectedness
- Insufficient collateralisation in case of default
Neutral valuation of OTC derivatives by CCPs enables prudent collateralisation

1. Transparent valuation due to independent market position of CCPs
   Independent and uniform pricing methodology for all clearing members

2. Market-to-market valuation based on actual transaction prices

Neutral valuation and accurate determination of risk exposures

Appropriate and prudent collateralisation

Key levers for neutral valuation
EUREX CLEARING  Margin Process

Intraday-margining allows real-time monitoring

Change of positions, prices and volatility

Debit or credit of securities

Calculation of risk on net exposure

Comparison of margin requirement with collaterals

Calculation of overall risk requirements after cross margining

Daily calculation of risk haircuts on deposited collateral
Margin regulation raises two policy concerns.

First, an alignment of margins to volatility can amplify procyclicality, leading to a build-up of excess leverage in good times and a forced deleverage in bad times.

Second, competition among central counterparties (CCPs) can result in lower margin levels in order to attract more trading volume, which is referred to as a “race to the bottom.”

They empirically analyze the determinants of margin changes by using a data set of various futures margins from Chicago Mercantile Exchange (CME) Group.

They first find that CME Group raises margins quickly following volatility spikes but does not immediately lower margins following volatility declines, implying that margin-induced procyclicality is more of a concern in recessions than in expansions.

In addition, we find some evidence that the margin difference between CME Group and its competitor, Intercontinental Exchange (ICE), is an important driver of margin changes after changes in other margin determinants are controlled for, implying that competition may be factored into margin setting.
Relations of Margin to Volatility and to Futures Price: Stock Index Futures

The left panels compare maintenance margin level (solid line) to EWMA volatility (dashed line), and the right panels compare maintenance margin level (solid line) to the futures price (dashed line) for CME Group’s stock index futures.
Relations of Margin to Volatility and to Futures Price: Currency Futures

The left panels compare maintenance margin level (solid line) to EWMA volatility (dashed line), and the right panels compare maintenance margin level (solid line) to the futures price (dashed line) for CME Group’s currency futures.
The left panels compare maintenance margin level (solid line) to EWMA volatility (dashed line), and the right panels compare maintenance margin level (solid line) to the futures price (dashed line) for CME Group’s metal futures.
This figure plots the frequency of margin changes for all futures contracts. It can be seen that most of the margin changes are concentrated in the ranges of plus and minus 10 to 25 percent and that there are very few observations of small margin changes.
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Liability Cascade in a Bail-in Event for a Bank

1 Includes all categories of the class “non-subordinated liabilities” i.e. including liabilities pursuant to the new section 46 (5) to (7) of the German Banking Act.

2 Small and medium-sized enterprises. Deutsche Bundesbank
LCH.Clearnet Default Waterfall

Risk Management

Defaulter’s Initial Margin, Delivery Margin, Contingent Variation Margin and Additional Margins

Defaulter’s Default Fund Contribution

LCH.Clearnet Capital *(Skin in the Game)*

Non-defaulting Members’ Default Fund contributions

Contingent Resources – Assessment¹

Service Continuity – VM haircutting or Loss Distribution²

Voluntary Service Continuity

Service Closure

¹ Callable up to the value of each member’s Default Fund contribution at the time of the default.
² The resources available in the service continuity phase are determined by the LCH.Clearnet Rulebooks.
Eurex Lines of Defense: Default Waterfall

**Eurex Clearing Lines of Defense**

- **Position Netting**
  - Close-out of all positions

- **Margin of Clearing Member in default**
  - Collateral of member in default

- **Clearing Fund contribution of Clearing Member in default**
  - EUR 50 m
  - Clearing Fund contribution of other members approx. EUR 3.64 bn

- **Dedicated amount of Eurex Clearing**

- **Clearing Fund contribution of other members**

- **Assessments to the Clearing Fund**
  - Max 2 assessments limit CMs' liability to 3x prefunded Clearing Fund contribution

- **Remaining equity of Eurex Clearing**
  - EUR 265 m

Coverage in normal market conditions.

Lines of Defence before Eurex Clearing’s equity capital sum up to more than EUR 11 bn.
CCPs absorb losses with multiple lines of Defense

Losses covered by the defaulting clearing member

Loss allocation to reduce the impact of a default
- Position closing
- Variation margin
- Initial margin
- Default fund (DF) contribution of individual CM
- Dedicated CCP resources
- DF contribution of all CMs
- Replenishment of DF by all CMs
- Additional CCP resources

Description
- **Netting** offsetting positions of defaulted CMs
- **Auctioning** of defaulted CM's portfolios
- **Covering current exposure** from market risk
- **Charged** at least daily; real time for Eurex
- **Passed on** from losing to winning party daily
- **Covering potential future exposure** until positions can be closed with at least 99.5% confidence
- **DF contributions of the defaulting member(s)**
- **DF covers the default** of the biggest CM or the default of the 2nd-biggest and 3rd-biggest losses combined for extreme market conditions (Eurex Clearing applies Cover-2)

Source: EMIR technical standards
CCPs absorb losses with multiple lines of defence – loss absorption by the CCP and non-defaulting clearing members

### Loss allocation to reduce the impact of a default

<table>
<thead>
<tr>
<th>Losses covered by the defaulting CM</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position closing</td>
<td>- Pre-defined equity reserves of CCPs</td>
</tr>
<tr>
<td>Variation margin</td>
<td>- Incentive for CCPs to avoid loss mutualisation</td>
</tr>
<tr>
<td>Initial margin</td>
<td>- Unique ability of CCP to absorb losses</td>
</tr>
<tr>
<td>Default fund contribution of individual member</td>
<td>- DF contributions of non-defaulting CMs serve as insurance against tail risk to absorb the losses from the defaulting CMs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Losses covered by the CCP and by all CMs</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedicated CCP resources</td>
<td>- DF can be replenished</td>
</tr>
<tr>
<td>DF contribution of all CMs</td>
<td>- Replenishments are capped between 100% and 275%</td>
</tr>
<tr>
<td>Replenishment of DF by all CMs</td>
<td>- Additional equity of CCPs if loss mutualisation amongst remaining CMs is not sufficient to cover losses</td>
</tr>
<tr>
<td>Additional CCP resources</td>
<td></td>
</tr>
</tbody>
</table>

Disclosure of Currently Available Resources
Non-defaulted Clearing Members’ Contributions Have Never Been Utilised

<table>
<thead>
<tr>
<th>Position Netting</th>
<th>Close-out of positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Margin collateral of defaulted CM</td>
<td>Margin collateral of defaulted CM (EUR 2.0 bn average for Top 10 CMs)*</td>
</tr>
<tr>
<td>Clearing fund contribution of defaulted CM</td>
<td>Clearing fund contribution of defaulted CM (EUR 180 mn average for Top 10 CMs)*</td>
</tr>
</tbody>
</table>

Eurex Clearing’s Default Waterfall

- Close-out of positions
- Margin collateral of defaulted CM (EUR 2.0 bn average for Top 10 CMs)*
- Clearing fund contribution of defaulted CM (EUR 180 mn average for Top 10 CMs)*
- Eurex Clearing’s contribution to clearing fund (EUR 100 mn) (to be increased to EUR 150 mn in 2017)
- Clearing fund contributions of non-defaulted CMs (EUR 3.61 bn)*
- Additional funds of non-defaulted CMs and Eurex Clearing (Assessments capped at 2x of CM’s clearing fund contribution) (Further dedicated amount capped at EUR 300 mn)
- Remaining funds available under letter of comfort (max. EUR 300 mn minus any already utilised funds)
- Remaining equity capital (EUR 265 mn)

* Values as of 27 May 2016. Total collateral held at Eurex Clearing approximately EUR 55.39 bn.
Segmentation of Default Waterfall
Structure of Waterfall along Liquidation Groups allows Accurate Loss Allocation

- The default waterfall is structured along liquidation groups.
- All layers up until and including pre-funded clearing fund contributions of non-defaulted clearing members are segmented, but not separated, across liquidation groups.
  - Segmentation entails that for each liquidation group only those resources are utilised which are assigned to this liquidation group, unless there is a known surplus from other liquidation groups.
  - While segmentation defines an order in which financial resources are applied, ultimately spill-overs across different liquidation group are possible.
  - Segmentation across liquidation groups is based on initial margin requirements, i.e. relative risk exposures in each liquidation group.
- In contrast, clearing members’ assessments and Eurex Clearing’s further dedicated amount are completely ring-fenced across liquidation groups.
  - Ring-fencing entails that no spill-over across liquidation groups is possible on this level of the default waterfall.
- If all resources assigned to a particular liquidation group are insufficient to cover the losses arising in this liquidation group, Eurex Clearing has a right to close-out and cash-settle all transactions across all non-defaulted clearing members, within the respective liquidation group.
Segmentation of Default Waterfall
Structure of Waterfall along Liquidation Groups allows Accurate Loss Allocation

Product Services

Equities
Contributions of defaulted CM (EQ)

Fixed Income
Contributions of defaulted CM (FI)

Liquidation Group n
Contributions of defaulted CM (LG n)

Remaining contributions of defaulted CM

Dedicated amount of Eurex Clearing (EQ)

Dedicated amount of Eurex Clearing (FI)

Dedicated amount of Eurex Clearing (LG n)

Remaining dedicated amount of Eurex Clearing

Clearing fund contributions of non-defaulted CMs (EQ)

Clearing fund contributions of non-defaulted CMs (FI)

Clearing fund contributions of non-defaulted CMs (LG n)

Remaining clearing fund contributions of non-defaulted CMs

Assessments and further dedicated amount (max. 2 times CMs’ clearing fund contributions and max. EUR 300 mn)

LG enters into Recovery and Resolution

Assessments and further dedicated amount (max. 2 times CMs’ clearing fund contributions and max. EUR 300 mn)

LG enters into Recovery and Resolution

Assessments and further dedicated amount (max. 2 times CMs’ clearing fund contributions and max. EUR 300 mn)

LG enters into Recovery and Resolution

Remaining funds of letter of comfort provided by Deutsche Börse

Remaining equity capital of Eurex Clearing
Risk Management

Overview

Safety
- State of the art risk and default management capabilities and experience
- Choice of strong segregation models that are bankruptcy remote with guaranteed porting

Capital efficiency
- A legal framework allowing for maximum risk exposure netting
- Capital efficient direct clearing models

Efficiency
- Eurex Clearing Prisma enables portfolio margining across listed and OTC products
- Full interest rate derivatives coverage including futures and options on STIR, Euro government bonds, OTC IRS, FRA, OIS and ZCIS

Collateral efficiency
- Broad eligible collateral spectrum of >20,000 ISINs covering government and corporate bonds, equities and ETFs
- Integrated collateral re-use and transformation possibilities with our repo and securities lending CCP services

Our solution

At Eurex Clearing, we provide innovative and integrated solutions across exchange-traded and OTC derivatives as well as securities financing.

Our services increase capital and collateral efficiencies, reducing costs for market participants, sell side and buy side alike.

Our solutions help you to unlock the full benefits of a CCP – our superior solutions and services maximize potential for netting of payments, risk, capital and collateral.

Partnership Program

Since its launch in January 2018, the program received broad market acceptance with market participants from the US, the United Kingdom, Asia and Continental Europe joining. It is designed to further accelerate the development of a liquid, EU-based alternative for the clearing of interest rate swaps.

In addition, in November 2018, Eurex initiated the second phase of the Partnership Program and expanded it to the Special and GC Repo segment as well as the Dealer to Client segment (ISA Direct business incl. GC Pooling) for both trading and clearing.
Our new portfolio-based risk management methodology will provide the following benefits:

- **Higher capital efficiencies**: More accurate risk netting effects for listed, and between listed and OTC positions.
- **Greater accuracy**: Cross-product scenarios enable a consistent way to account for portfolio correlation and diversification effects.
- **Robustness**: Methodology designed to enable stable margin requirements with highest adequacy.
- **Consistent framework**: Consistent risk and default management process for listed and OTC products.

### Overview RBM versus Eurex Clearing Prisma and their impact on initial margin

<table>
<thead>
<tr>
<th>Prisma</th>
<th>RBM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Horizon: N days (liquidation group dependant)</td>
<td>Risk Horizon: d Days</td>
</tr>
<tr>
<td>Portfolio Model (risk-factor view)</td>
<td>Scenario-matrix approach (product-by-product view)</td>
</tr>
<tr>
<td>Liquidation groups</td>
<td>Margin Groups/Classes</td>
</tr>
<tr>
<td>Liquidity Risk Adjustment (position size dependent)</td>
<td>Liquidity Factor (independent of position size)</td>
</tr>
<tr>
<td>Volatility Hardfloor</td>
<td>Volatility Hardfloor</td>
</tr>
<tr>
<td>Stress Period Floor</td>
<td>-</td>
</tr>
<tr>
<td>Reactiveness (reacts strongly to market change)</td>
<td>Reactiveness (reacts to market change)</td>
</tr>
<tr>
<td>Historical Volatility Model (EWMA)</td>
<td>Historical Volatility Model (EWMA)</td>
</tr>
<tr>
<td>Includes FX risk</td>
<td>- *</td>
</tr>
<tr>
<td>Includes interest rate risk</td>
<td>-</td>
</tr>
</tbody>
</table>
Eurex Clearing Prisma

Example: Productive portfolio leading to reduced margin with Eurex Clearing Prisma compared to RBM

- Portfolio
  - Fixed income portfolio
  - Long/short strategy of different term debt instruments

- Features shown
  - Portfolio model

- Effects
  - Prisma initial margin lower due to offsetting of long/short position in FGBL and FGBX
  - Risk factors of different debt instruments are correlated which leads to a reduced Prisma initial margin.
  - RBM does not offset FGBL against FGBX and FOAT because they do not share a margin group/margin class.

Main portfolio components by risk contribution (16 Jun 2015)

- FGBL
- FGBM
- FBTP
- FOAT
- FGBX

EUR millions (scaled by arb. factor)
<table>
<thead>
<tr>
<th>Test</th>
<th>Objective</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress Tests</td>
<td>To ensure that the combination of margin, default fund contributions and other financial resources are sufficient to cover the default of at least the two clearing members to which it has the largest exposures under extreme but plausible market conditions.</td>
<td>Daily</td>
</tr>
<tr>
<td>Liquidity tests</td>
<td>To ensure that liquidity resources are sufficient to over the CCP’s settlement and funding flows.</td>
<td>Daily</td>
</tr>
<tr>
<td>Back tests</td>
<td>To assess the reliability of the methodology adopted to determine the margin coverage. It consists of an ex-post comparison of observed outcomes with expected outcomes derived from the use of margin models.</td>
<td>Daily</td>
</tr>
<tr>
<td>Sensitivity tests</td>
<td>To test the key parameters and assumptions of the initial margin model at a number of confidence intervals to determine the sensitivity of the system to errors in the calibration of such parameters and assumptions.</td>
<td>Monthly</td>
</tr>
<tr>
<td>Reverse stress tests</td>
<td>To identify under which market conditions the combination of its margin, default fund and other financial resources may provide insufficient coverage of credit exposures and for which its liquid financial resources may be insufficient.</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Independent tests</td>
<td>Tests performed by a third-party in order to validate the CCP’s risk management framework.</td>
<td>&gt; At least Annually</td>
</tr>
<tr>
<td>Default procedures</td>
<td>To ensure default procedures are both practical and effective. Includes simulation.</td>
<td>Quarterly (test) Annually (simulation)</td>
</tr>
</tbody>
</table>
Outline

I. Financial Crises, Systemic Risk, and Central Counter parties

II. Research Issues, Questions and Evidence

III. Risk Management of Clearing Houses

IV. Recovery and Resolution of CCPs

V. Summary and Conclusions
## Setting the highest quality standards for CCPs ensures the safety and integrity of financial markets

<table>
<thead>
<tr>
<th>Standards</th>
<th>Description</th>
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</thead>
</table>
| Governance and incentives standards | • Clear and highly **effective governance structure**  
• **Transparent** risk management process with **risk management committee**  
• **Income structure independent of return** of clearing members' positions |
| Risk management standards          | • **Margining**: collateralisation of exposure based on **neutral pricing**; incorporating **stress scenarios** to reduce procyclicality; ensure **intra-day enforcement** of margin calls  
• **Collateral**: applying **haircuts**; accounting for **concentration risk**; implementing **prudent investment policy** |
| Liquidity management standards     | • Multiple **commercial liquidity sources**  
• Collateralised **central bank liquidity** |
| Operations standards               | • Monitoring and prudently **managing operational risks**  
• **Business continuity plans** with clear responsibilities and focus on workforce and IT infrastructure |
Summary and Conclusions

• We observed failures of clearing members, but hardly any failure of a CCP.

• Clearing obligation for OTC derivatives has led to a large increase in clearing through CCPs.

• Central counterparties are essential for the stability of financial system.

• CCPs have specific Risks and Risk Management concepts & risk exposures.

• CCPs absorb losses with multiple lines of defense and a Default Waterfall.

• CCPs should not cover market losses, or compensate participants for the loss allocation in any form. The recourse to public funds should be excluded.

• The paper models all these aspects quite well and offers important insights form a theoretical perspective based on insights form the literature.

• CCPs are aware of these risks and manage the risk processes accordingly.