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

## **Clearing Member Defaults**

Defaulting Clearing Member	Year	Clearinghouse	Default Loss	Loss
Volume Investors Corporation	1985	Comex Clearing Ass.	\$9 million	Yes
H. B. Shane	1987	Options Clearing Corp.	\$8.6 million	Yes
Multiple firms	1987	Futures Guarantee Corp.	Exact figure unavailable	Yes
Jordan Sandman Futures Ltd.	1989	New Zealand Futures and Options Exchange	GBP 1 million	Yes
Drexel Burnham Lambert Ltd.	1990	LCH.Clearnet	Exact figure unavailable	Νο
Woodhouse, Drake and Carey (Commodities), Ltd.	1991	LCH.Clearnet	GBP 900,000 (before defaulter's resources)	No
Lee B. Stern & Co.	1992	Board of Trade Clearing	Exact figure unavailable;	Yes
Barings Futures (Singapore) Ltd.	1995	SIMEX	Exact figure unavailable;	Νο
Barings Securities (Japan) Ltd.	1995	Osaka Securities Exchange	Exact figure unavailable	Unavailable
Klein and Co. Futures, Inc.	2000	New York Clearing Corp	Exact figure unavailable;	Yes
Lehman Brothers	2008	LCH.Clearnet /EUREX	Exact figure unavailable	Νο
MF Global UK Limited	2011	LCH.Clearnet	Exact figure unavailable	No
Cyprus Popular Bank Co. Ltd.	2013	LCH.Clearnet	Exact figure unavailable	No
HanMag Securities	2013	Korea Exchange (KRX) CCP	KRW 46 billion	Yes
Maple Bank GmbH	2016	LCH.Clearnet	Exact figure unavailable	No

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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.



## Market Concentration among European CCPs in Central Clearing

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.

Clearing volume<sup>1</sup> (€ trillion) **Over-the-counter** 500 derivatives 400 Exchange-traded derivatives 300 200 Repos 100 Spot products 0 2,000 4,000 6,000 8,000 10,000 0 ECB and Bundesbank Market concentration<sup>2</sup> 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.



# **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 Clear56.8%Ice Clear Europe32.6%LCH CDS Clear10.6%

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**

T ABN-AMRO Clearing	M BANCA IMI	EANCO CORFERATIVO ESPANOL	<sup>o</sup> Sabadell	DZ BANK DZ BANK AG	Goldman Sachs	HSBC	ING ಖ
ABN AMRO Clearing Bank N.V.	Banca IMI	Banco Cooperativo Español, S.A.	Banco de Sabadell S.A.	J.P.Morgan		Helaba   🛓	BANK OF AN ERICA 🧇
Santander	BARCLAYS	Bayern LB-	BBVA	J.P. Morgan Securities plc	Landesbank Baden- Württemberg	Landesbank Hessen- Thüringen Girozentrale	Merrill Lynch International
Banco Santander, S.A.	Barclays Bank Pic	Bayerische Landesbank	BBVA	Morgan Stanley	Notfilest Notfilest	NOMURA	NORD/LB
BNP PARIBAS	Mill CTIADEL   Securities	citi	COMMERZBANK 🙆	Morgan Stanley & Co. International pic	NatWest Markets	Nomura International pic	Norddeutsche Landesbank Girozentrale
BNP Paribas	Citadel Securities (Europe) Limited	Citigroup Global Markets Limited	Commerzbank AG	Nordeo	📥 Rabobank		<b>WBS</b>
CREDIT SUISSE	Danske Bank	.,Deka		Nordea Bank Abp	Rabobank	Societe Generale	UBS AG
Credit Suisse International	Danske Bank A/S	DekaBank Deutsche Girozentrale	Deutsche Bank	<b>⊘</b> UniCredit		EurexOTC Clea	r now has over
				UniCredit Bank AG		80 Clearing / over 230 Disc	Nembers and losed 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.

#### **Contribution of the Paper form the Author's Perspective**

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 -	<ul> <li>Mutual Membership with Un-limited Liability</li> <li>For-Profit versus vs. User-Owned</li> <li>Get Member Banks involved with liability</li> <li>Hybrid CCP</li> </ul>			
Equity of CCP	Low or High	(with no regulation probably zero)		
Margins of CCP	Low or High	(attracting volume of business)		
Waterfall Principle	Optimal combination and limited or ur	ation between <b>Margins and Equity</b> nlimited liability of CCP members		

Behavior of MarketProfit intentional or unintentional from crisis by tradingParticipantsin the defaulted products (sell and buyback)

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# **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 lossgiven 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-incentivice defaults.
- As a result, without capital requirements, the CCP chooses zero capital

# **Time Series of CCP Skin-in-the-Game and Total Initial Margin**



This figure plots the time series of CCP skin-in-thegame (SITG pre before) and total initial margin.

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

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

(ii) for-profit CCPs impose a much larger initial margin than user-owned CCPs do.

# **Total Initial Margin against CCP Skin-in-the-Game**

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-thegame and total initial margin. The red stars stand for forprofit 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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### CCPs reduce systemic risk in the financial system by mitigating its root causes





# Neutral valuation of OTC derivatives by CCPs enables prudent collateralisation



Appropriate and prudent collateralisation

# **EUREX CLEARING** Margin Process

Intraday-margining allows real-time monitoring Change of positions, prices and volatility

Debit or credit of securities

Comparison of margin requirement with collaterals Calculation of risk on net exposure

Calculation of overall risk requirements after cross margining

Daily calculation of risk haircuts on deposited collateral

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#### An Empirical Analysis of Futures Margin Changes: Nicole Abruzzo · Yang-Ho Park

#### 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.



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#### **Relations of Margin to Volatility and to Futures Price: Gold 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.



#### **Histogram of Margin Changes for Futures Contracts**

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



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#### **LCH.Clearnet Default Waterfall**

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 – Assessment<sup>1</sup>

Service Continuity – VM haircutting or Loss Distribution<sup>2</sup>

Voluntary Service Continuity

Service Closure

<sup>1</sup> Callable up to the value of each member's Default Fund contribution at the time of the default.

<sup>2</sup> The resources available in the service continuity phase are determined by the LCH.Clearnet Rulebooks.

#### **Eurex Lines of Defense: Default Waterfall**



#### **CCPs absorb losses with multiple lines of Defense**

#### Losses covered by the defaulting clearing member



Source: EMIR technical standards

See next page

# CCPs absorb losses with multiple lines of defence – loss absorption by the CCP and non-defaulting clearing members



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



\* Values as of 27 May 2016. Total collateral held at Eurex Clearing approximately EUR 55.39 bn.

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#### 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** 

## **Risk Management**

#### Overview

Safety

Efficiency

- 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

#### Margin 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.

# **Eurex Clearing Prisma**

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

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

# **Eurex Clearing Prisma**







#### 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.

## **CCP Risk Management - Test Performed**

Test	Objective	Frequency
Stress Tests	To ensure that the <b>combination of margin, default fund contributions and</b> <b>other financial resources are <u>sufficient</u> to cover the default of at least the two clearing members to which it has the largest exposures under extreme but plausible market conditions.</b>	Daily
Liquidity tests	To ensure that <b>liquidity resources are</b> <u>sufficient</u> to over the CCP's settlement and funding flows.	Daily
Back tests	To assess the <b>reliability of the <u>methodology</u></b> 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.	Daily
Sensitivity tests	To <b>test the key <u>parameters and assumptions</u> of the initial margin</b> model at a number of confidence intervals to determine the sensitivity of the system to errors in the calibration of such parameters and assumptions.	Monthly
Reverse stress tests	To identify under which market conditions the <b>combination of its margin</b> , <b>default fund and other financial resources may provide</b> <u>insufficient</u> coverage of credit exposures and for which its liquid financial resources may be insufficient.	Quarterly
Independent tests	Tests performed by a <b>third-party in order to <u>validate</u></b> the CCP's risk management framework.	> At least Annually
Default procedures	To ensure default <b>procedures are both <u>practical and effective</u></b> . Includes simulation.	Quarterly (test) Annually (simulation)

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# Setting the highest quality standards for CCPs ensures the safety and integrity of financial markets

#### Standards

#### Description

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
- Liquidity management standards
- Operations 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
- Multiple commercial liquidity sources
- Collateralised central bank liquidity
- Monitoring and prudently managing operational risks
- Business continuity plans with clear responsibilities and focus on workforce and IT infrastructure

- 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.