

ANNUAL MARKETS REVIEW IN CENTRAL COUNTERPARTY CLEARING

-

A CCP12 REPORT

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MESSAGE FROM THE CHAIRMAN

CCPs have demonstrated time and time again their robustness during significant market stresses. As explored in our previous CCP12 report '[CCPs Again Demonstrate Strong Resilience In Times of Crisis](#)', their robustness was captured and evident from how well CCPs weathered the Covid-19 Crisis ("CC"), storm. This positive outcome was also referenced in various communications and reports from local regulators and international standard setting bodies, including the [FSB's Holistic Review](#).

In particular, CCPs provided market participants with an efficient and effective forum to manage their risks, whilst providing transparency and operational reliability. This was despite the significant operational challenges presented by the circumstances that surrounded responses to the coronavirus, as well as the extraordinary levels of volatility, as depicted in Section 3.

Furthermore, as noted in Section 7, CCPs observed significant increases in variation margin ("VM") flows due to the observed market moves but were able to process these payments as well as clear and settle a higher volume of transactions in a timely manner, as noted in Sections 4 and 5.

Due to the extreme levels of volatility observed over the course of the CC, most CCPs were required to issue margin calls as a result. As described further in Section 7, CCPs strive to strike an appropriate balance between achieving appropriate margin coverage and mitigating procyclical risk. In striking this balance, CCPs must consider having appropriate margin coverage, whilst also avoiding unnecessary procyclical changes to IM requirements relative to the observed levels of market volatility.

Ultimately, CCPs proved once again, as they have in past crises, that they provide safety and stability to the markets that they serve, particularly during periods of stress.



Kevin R. McClear

CCP12 Chairman

MESSAGE FROM THE CEO

2020 was a remarkable year in many ways, so much so that what otherwise would have been extraordinary events took second stage as a health crisis swept across the world. The tragedies, both human and cultural are deeply regrettable, and future policy must be directed to increased global resilience against such threats.

The tumult demonstrated the wisdom of previous financial sector reforms, with the extreme economic shifts across all asset classes having limited effect on banks and other financial institutions. The broad global policy of collateralizing risk prevented any magnification of counterparty credit risk or a crisis of confidence, especially for centrally cleared trading.

Collateralizing the trading book not only enables market participants with a great certainty and continuity of their business, but also helps ensure that any credit extension or creation capacity is intelligently directed outward of purely financial connections.

The centrally cleared markets proved a safe haven throughout the year, enabling their participants to continue risk transfer and price discovery. The clearing ecosystem - clearing members in particular - deserve praise for resilient operations and continued fulfilment of all obligations in highly volatile circumstances.

The emphasis on market centric finance, in lieu of purely institutions' balance sheets, makes a compelling case for further transparency.

This edition of the CCP12 – Annual Markets Review – provides as always, an overview of the previous year in clearing. The CCP industry will continue to promote transparency, and in so doing mitigate pockets of unintended or underprice risks from arising. Looking forward, we expect market participants to further their use of the optimal way to collateralize risk, given the advantages of net variation margin. Finally, the new year has already shown the more traditional benefits of CCP markets' transparency and rigor, with the social media driven moves.

Editorial Board – CCIL, CME, DTCC, Eurex, HKEx, ICE, JSCC, LCH, Muqassa, SHCH.

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Teo Floor
CCP12 CEO



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LIST OF ABBREVIATIONS

AANA	Aggregate Average Notional Amount	IM	Initial Margin
AMR	CCP12 Annual Markets Review	IMF	International Monetary Fund
APC	Anti-Procyclicality	IOSCO	International Organization of Securities Commissions
ARRC	Alternative Rates Reform Committee	IRS	Interest Rate Swap
BCBS	Basel Committee on Banking Supervision	ISDA	International Swaps and Derivatives Association
BCP	Business Continuity Plan	ISDA MA	ISDA Master Agreement
BIS	Bank for International Settlements	ISSB	International Standard Setting Body
bps	Basis Points	JPY	Japanese Yen
CC	COVID-19 Crisis - Refers to the impacted period	JSCC	Japan Securities Clearing Corporation
CCIL	The Clearing Corporation of India Ltd.	LCH	London Clearing House
CCP	Central Counterparty	LCR	Leverage Coverage Ratio
CDS	Credit Default Swap	LIBOR	London Inter-Bank Offered Rate
CE	Current Exposure	MoM	Month on Month
CM	CCP Clearing Member	MPOR	Margin Period of Risk
COVID-19	Coronavirus Disease	NPV	Net Present Value
CPMI	Committee on Payments and Market Infrastructures	NSFR	Net Stable Funding Ratio
CSA	Credit Support Annex	OECD	Organisation for Economic Co-operation and Development
CSD	Central Securities Depositories	OI	Open Interest
DF	Default Fund	OTC	Over-The-Counter
DMP	Default Management Process	PBOC	The People's Bank of China
DSB	Designated Settlement Banks	PFE	Potential Future Exposure
ECB	European Central Bank	PFMI	Principles for Financial Market Infrastructures
EFFR	Effective Federal Fund Rate	PQD	CCP Public Quantitative Disclosures
EMIR	European Market Infrastructure Regulation	PS	Payment Systems
ESMA	European Securities and Markets Authority	PSR	Price Scan Range
ETD	Exchange Traded Derivative	QCCP	Qualified Central Counterparty
EUR	Euro	QoQ	Quarter on Quarter
FCA	UK Financial Conduct Authority	RBI	Reserve Bank of India
FIA	Futures Industry Association	RFR	Risk-Free Rate
FMI	Financial Market Infrastructure	RRR	Required Reserve Ratio
FSB	Financial Stability Board	SAR	Saudi Riyals
FSDP	Muqassa Financial Sector Development Program	SHCH	Shanghai Clearing House
FX	Foreign Exchange	SIMM	Standard Initial Margin Model
G20	The Group of Twenty	SOFR	Secured Overnight Financing Rate
GBP	Great British Pound	U.K.	United Kingdom
GCE	Gross Credit Exposures	U.S.	United States
GDP	Gross Domestic Product	UMR	Uncleared Margin Rules
GFC	Global Financial Crisis (2008)	USD	United States Dollar
GMV	Gross Market Value	VIX	CBOE Volatility Index
HQLA	High-Quality Liquid Assets	VM	Variation Margin
IBA	ICE Benchmark Administration	WFH	Working-from-Home
IBOR	Interbank Offered Rate	WHO	World Health Organisation
ICE	Intercontinental Exchange	YTD	Year-To-Date

EXECUTIVE SUMMARY

2020 was overshadowed by the health and economic crisis arising from the CC, so much so that what would otherwise have been remarkable news stories for the markets - transition to risk-free-rates (“RFR”), negative oil prices, Brexit, and key elections - have taken second stage.

This issue of the CCP12 Annual Markets Review (“AMR”) has the CC and its effect on cleared markets as its main connecting theme, supplemented with case studies exploring salient aspects of both business-as-usual (“BAU”) and special circumstances across our membership.

Key Take-Aways:

- Centrally cleared markets remained open across the world and functioned normally throughout 2020. The cleared ecosystem of Central Counterparties (“CCPs”), Clearing Members (“CMs”) and their clients continued their operations, despite the challenges of remote working for extended periods of time. (>99.9% core system availability as always)
- The continuity and resilience demonstrated enabled the world’s cleared markets to continue price discovery and setting, with market participants able to open, close, and adjust their positions and engage in risk transfer. For March 2020, exchange-traded derivatives (“ETD”) volume increased 25.4% and over-the-counter (“OTC”) derivatives volume at CCPs increased 12.8% for interest rate derivatives, 10.6% for foreign exchange (“FX”), 21.0% for credit default swaps (“CDS”).
- The certainty of contractual performance in central cleared markets was unaffected by COVID-19 or the extreme volatility, with CCP and their participants performing settlement and collateralization as expected. VM collected and paid by CCPs from Q4 2019 to Q3 2020: USD 8.7tn.
- CCP margin models adjusted as designed to reflect greater market risk, providing for a low incidence of margin breaches, while also avoiding being unnecessarily procyclical, as observed, in part, by comparing VM and initial margin (“IM”) flows. Global Average VM paid increased 65.2%, in contrast global IM (required) increased 37.6% during CC.¹
- CCPs did not observe a dash for cash within the clearing system: global overcollateralization and cash ratios deposited by participants at CCPs remained constant through the crisis. For Q1 2020, overcollateralization was USD 276.9Bn and cash held as a proportion of all IM was 42% – both values similar to previous quarters.²
- CCPs did not require any extra-ordinary intervention nor public support measures, and existing rules and regulations for CCPs did not require modification.
- The post-CC analysis is complicated by insufficient transparency for uncleared markets and the CM to client relationship in cleared markets. Improved data on the scale and nature of VM and IM flows in these areas is of essential value to market stakeholders, including to inform data-driven policy.

¹ [CCP12 Q3 2020 PQD Newsflash](#) provides a summary of the Q3 2019 – Q3 2020 PQD figures

² For the selected 20 CCPs detailed in Section 7 of the AMR

1. REGULATORY CONTEXT

Prior to the re-adjustments to policy priorities during 2020, the mainstay of central clearing discussions was the implementation of regulatory reform following the Great Financial Crisis of 2008 (“GFC”).

The initial objectives as outlined by the G-20 following the GFC, were to:

- Improve the resilience of the financial sector;
- End the too-big-to-fail; and
- Make derivatives markets safer and ensuring the better pricing of risk.

These objectives were focused on the parts of the financial sector for which the GFC emanated, due in part, to the effect they had on the real economy and the requisite public sector interventions. The regulatory reforms were instrumental in ensuring that the stressed market and credit conditions during the CC did not metastasis into a broader panic nor contagion.

A key feature of these reforms was a rectification of the perceived imbalance that Basel I and II created between relatively beneficial capital treatment of the trading book and off-balance sheet items, compared to the traditional banking book.³ Broadly speaking, the increased capital and liquidity requirements for banks were directed at improving the resilience of the financial sector. According to annual reports, the 20 largest Global Systemically Important Banks (“G-SIBs”)⁴ held collectively approx. USD 7.5tn high quality liquid assets (“HQLA”) at the end of 2019.⁵ Ending too-big-to-fail was addressed primarily through recovery and resolution planning – popularly known as living wills – that outlined how banks’ critical services would be continued or others wound-down, with mitigated disruption and explicit private loss allocation.

Principles for Financial Market Infrastructures

In April 2012, CPMI-IOSCO released the PFMI, which established international standards for FMIs that codified and strengthened existing standards ahead of the greater reliance on FMIs in the new regime.

The standards cover payment systems that are systemically important, central securities depositories, securities settlement systems, and CCPs. These standards cover all aspects of FMIs, including, legal framework, credit, market and liquidity risks, operational aspects, disclosures and transparency, and governance.

The PFMI’s principles-based standards are implemented by jurisdictions around the world, and their implementation and adjustments are controlled by international standard setting bodies and their constituents.

EB: 1 (Educational Box)

Making derivatives markets safer and ensuring better pricing of risk itself was addressed in a variety of ways, including but not limited to mandated central clearing for OTC derivatives, uncleared margin rules (“UMR”) for OTC derivatives, definitions and adjustments in the capital standards, and the Fundamental Review of the Trading book.⁶ UMR applies both VM and IM requirements to uncleared OTC derivatives. The required exchange of VM was first implemented in March 2017 for the relevant covered entities, while IM requirements have continued to be progressively implemented. The resilience of CCPs was also further enhanced by the adoption of the *Principles for financial market*

infrastructures (“PFMI”) by Committee on Payments and Market Infrastructures (“CPMI”) and International Organization of Securities Commissions (“IOSCO”) in April 2012.

The various forms of collateralization of counterparty risk neatly addressed both concerns of excessive leverage and limited the effect of a firm’s default. Central clearing was mandated outright or promoted as it solves these issues directly.

³ [History of the Basel Committee and information regarding Basel I – III](#)

⁴ Details on this analysis can be requested at CCP12

⁵ According to BIS’s G-SIBs score for end 2019 data - <https://www.bis.org/bcbs/gsib/index.htm>

⁶ [BCBS Consultative Document – Fundamental review of the trading book: A revised market risk framework](#)

As described further below, the interposing of a CCP between counterparties:

- Provides operational and capital efficiencies by allowing for multilateral netting of exposures on a portfolio-level basis;
- Prevents the build-up of debt between counterparties by regular payment of profit and loss, which minimizes the effect of a default to only forward-looking risk;
- Limits leverage and guards against the forward-looking risk by collecting IM; and
- Uses the same consistent and transparent prices, minimizing valuation disputes or credit-related pricing divergences.

2. THE CCP MODEL

CCPs interpose themselves between the buyers and sellers of the markets for which they clear, becoming the buyer to every seller and seller to every buyer. Outside a CM default, a CCP has a perfectly balanced book. The role of the CCP is to be a market risk neutral risk manager, not a risk-taker in the markets it clears. A CCP is only a useful feature if it is a creditworthy counterparty to its participants, and their construction is designed to ensure this by requiring participants to collateralize and settle their trade exposures.⁷

Multilateral Netting

When trades are novated to a CCP, the resulting multilateral netting benefits can increase the operational efficiency and reduce counterparty credit risk, collateral requirements, and liquidity needs of participants. By removing the complex web of bilateral exposures into a single net exposure with the CCP, an efficient ecosystem to manage trades is created. This offsetting of trades reduces the gross exposures significantly, resulting in a more streamlined and manageable trade infrastructure.

EB: 2

As shown by Figures 1 and 2, a CCP significantly reduces the interconnectedness of a market.

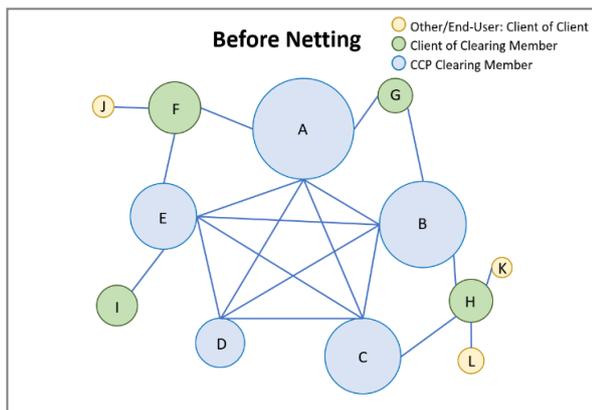


Figure 1
Complex web of bilateral trades between five counterparties and their clients.

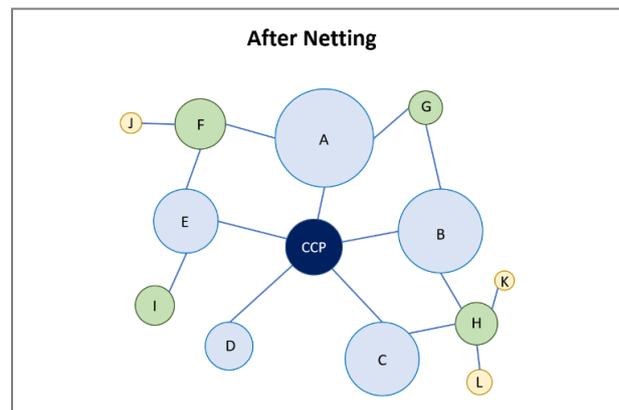


Figure 2
CCP interposed between all Clearing Member institutions reducing the complexity of the trading ecosystem. Multilateral netting benefits result in a single consolidated trading obligation when compared to Figure 1.

CCPs have a number of risk-mitigating lines of defence⁸ in place to reduce the likelihood and impact of the failure of one or more members. In designing their risk management tools, CCPs consider market, credit and liquidity risks, among others, to yield a framework they can use to make informed risk decisions. The first such defence is rigorous criteria for clearing membership. These differ between CCPs, depending, in part, on the products cleared and local regulatory framework, however the general requirements include but are not limited to:

- Minimum equity capital requirements;
- Offer derivatives trading on a commercial basis;
- Operational and administrative expertise;
- Suitable risk-management capabilities.

⁷ CCP Best Practices – A CCP12 Position Paper, May 2019

⁸ <https://ccp12.org/lines-of-defence/>

In addition to these general requirements, if a CM provides client clearing, then it is subject to membership requirements that are designed to ensure that it is able to guarantee the financial performance of its customers to the CCP. CCPs monitor their CMs on an on-going basis, including through regular reporting and risk reviews. Some CCPs also require their members to provide information on their liquidity management capabilities, such as disclosure of Liquidity Coverage Ratio numbers.

The next line of defence are the IM requirements, for which collateral is posted by CMs for the open position they hold with the CCP. IM requirements are carefully calculated by CCP margin models to accurately and adequately provide a safety cushion to cover the potential future losses that could be incurred if that CM was to default on its contractual obligations. In particular, IM is calculated in order to cover potential liquidation costs during adverse market moves in the expected closeout period of the default management process (“DMP”). While multilateral netting can substantially reduce the risk exposures faced by a CCP, the residual risk that remains, in part, is addressed through the CCPs collection of IM. IM requirements are established to meet a single-tailed confidence level of at least 99% with respect to the estimated distribution of future exposures over the margin period of risk (“MPOR”).

VM is exchanged between a CCP and its CMs on at least a daily basis. VM captures the marked-to-market on a CM’s open positions between settlement – e.g., simplistically, a CM portfolio that has declined in value since the last VM collection owes VM that is then paid out by a CCP to a CM portfolio that has increased in value. This means the CM’s profits and losses are settled on a daily basis (or in many cases, more frequently) in order to prevent the excessive build-up of exposure during the lifetime of the contract. CCPs also make participants collateralize any loss arising from short option positions based on current prices. This is a form of mark-to-market margin that is not pass through, and is especially significant for equity options markets.

The typical CCP default waterfall (**Figure 3**) comprises the following layers and would be used in the order listed:

- The defaulting CM’s resources, which include the: i) defaulter’s margin (IM and any other additional margin held by the respective CCP); ii) defaulter’s default fund resources; and iii) any additional resources available to the CCP of the defaulter;
- If the defaulting CM’s losses exceed the defaulter’s resources, a portion of the CCP’s own contributions typically included (i.e., commonly known as the “CCP Skin-in-the-Game” or “SITG”);
- If a defaulting CM’s losses exceed the funded resources above, the next layer is the mutualized default fund (“DF”)⁹ contributions of non-defaulting CMs, which are sized to cover tail risks arising the default of the CCP’s largest CM defaulting under extreme but plausible market conditions – often CCPs also size the DF to cover the default of their two largest CMs; and
- Beyond the mutualized DF resources, a CCP may also call for unfunded contributions from non-defaulting CMs (typically referred to as “assessments” or “cash calls”), or deploy other recovery tools.

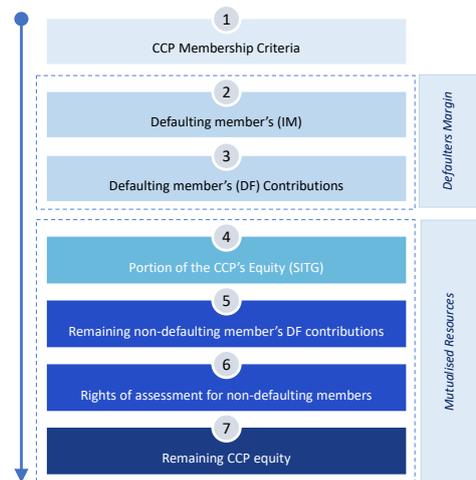


Figure 3: A typical CCP Default Waterfall

In terms of the margin flow contributions and the relationship between the client, CM and CCP, **Figure 4** provides clarity on how these are generally routed between each entity. The figure assumes that the CM provides both client clearing services in addition to propriety trades for the CMs own portfolio, however, depending on the CM, this figure can be applied to either scenario.¹⁰

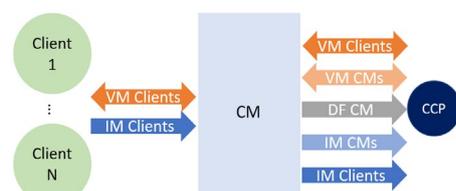


Figure 4: Margin Contributions flow chart

EB: 3

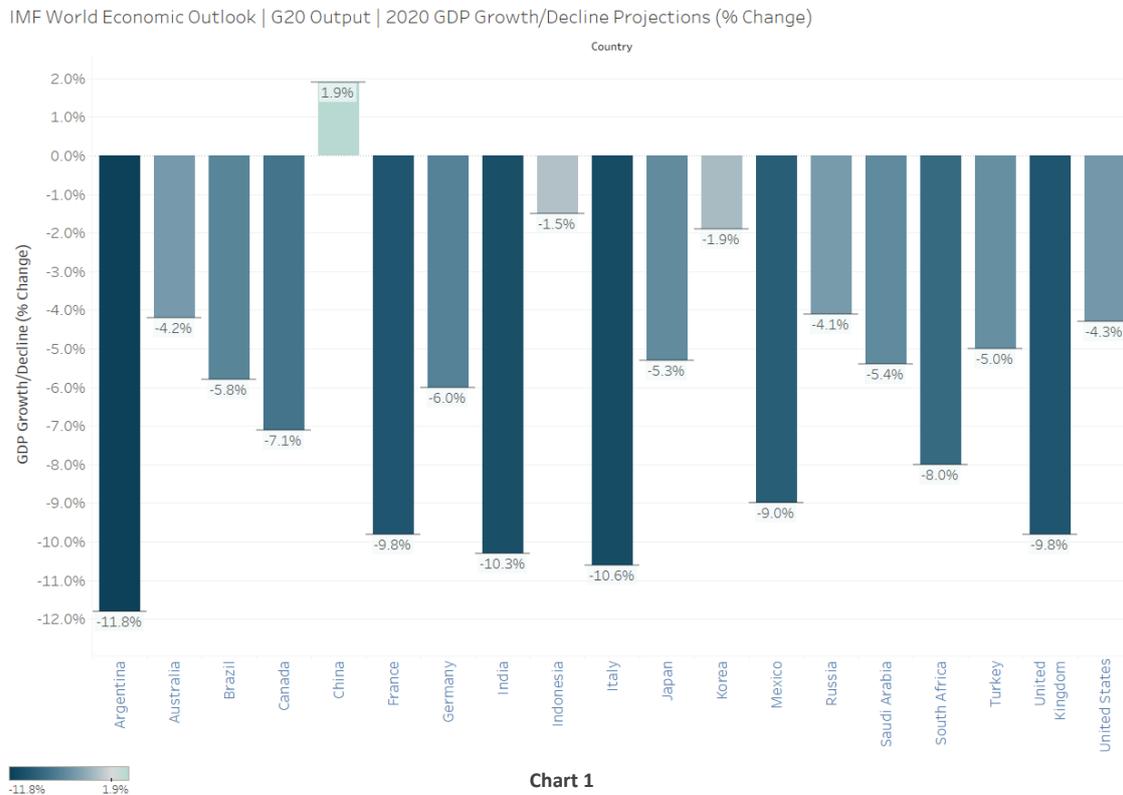
⁹ May also be known as Reserve Fund, Guarantee Fund, Clearing Fund, or Security Deposits.

¹⁰ Client IM and CM obligations are passed through the CM to the CCP. Clients may choose to trade directly with the CCP (becoming a CM themselves) or indirectly through another CM.

3. COVID-19 GLOBAL IMPACT AND ECONOMIC RESPONSES

3.1 COVID-19 ECONOMIC IMPACT

Within the International Monetary Fund (“IMF”) World Economic Output Report, a deep recession of -4.4% of global Gross Domestic Product (“GDP”) growth was predicted in 2020 as a result of the CC, followed by a revised contraction of -3.5% in the January 2021 IMF Update.^{11,12} Although there was a partial recovery in the second half of 2020, a severe recession across the global economy was observed. Analysing the GDP of the G20 countries, only China reported a growth (**Chart 1**).



Given the widespread lockdowns to prevent the transmission of COVID-19 and avert further strains on healthcare systems, many sectors faced great problems in 2020, with the travel and tourism industry among the most affected sectors. As an example, the United Nations World Travel Organization, the global international tourist arrivals were 72% (YTD from January to October 2020) less than in 2019.¹³

3.1.1 MONETARY AND FISCAL POLICY RESPONSE

With the rapid spread of COVID-19 during the beginning of 2020, nearly every country around the globe responded with social containment and economic stimulus to cope with the crisis.

- The Federal Reserve announced they would purchase United States (“U.S.”) Treasury securities and agency mortgage-backed securities in the amounts needed to support smooth market functioning and effective transmission of monetary policy to broader financial conditions and the economy.¹⁴ The Federal Reserve also expanded overnight and term repos. Furthermore, several bills were passed through U.S. Congress to cope with the economic impacts.

¹¹ <https://www.imf.org/en/Publications/WEO/Issues/2020/09/30/world-economic-outlook-october-2020>

¹² <https://www.imf.org/en/Publications/WEO/Issues/2021/01/26/2021-world-economic-outlook-update>

¹³ <https://www.unwto.org/international-tourism-and-covid-19>

¹⁴ <https://www.federalreserve.gov/monetarypolicy/openmarket.htm>

- The Brazilian Central Bank (*Banco Central do Brasil*) injected liquidity worth 17% of its GDP, to be implemented through lower reserve and capital requirements and special liquidity lines for banks.
- The Bank of England reduced their Bank Rate by 65bp to 0.1%, and expanded the central bank's holding of UK government bonds and non-financial corporate bonds by GBP 450bn (in three tranches announced in March, June and November).
- In March the European Central Bank (“**ECB**”) introduced an additional EUR 750bn asset purchase program of private and public sector securities, initially through 2020-end. The European Commission passed a Coronavirus Response Investment Initiative worth EUR 37bn in March. In the EU, on December 11, 2020, EU leaders finalized the agreement on the EU budget and Next Generation EU Recovery Fund, which provided EUR 750bn in total, financed by borrowing at the EU level.
- China launched stimulus measures to ensure market liquidity just after the Chinese Spring Festival (Chinese New Year). On February 1, 2020, the Chinese government announced a multi-agency package to support the financial system. The People's Bank of China (“**PBOC**”) conducted large open market operations, injecting RMB 1.2tn into the financial system on the first trading day after Chinese New Year, to ensure ample liquidity supply. As a result, the liquidity in the whole banking system was RMB 900bn more than that of the same period in 2019. Subsequently on March 16, 2020, the PBOC implemented targeted Required Reserve Ratio (“**RRR**”) cuts for inclusive finance, lowering the RRR for banks that meet assessment criteria by 0.5 to 1 percentage point, releasing RMB 550bn of long-term funds.¹⁵
- In Japan, on April 7, 2020 (*subsequently revised on April 20, 2020*), the Government of Japan adopted the ‘Emergency Economic Package’ against COVID-19 of JPY 117.1tn. In December 2020, the Government of Japan adopted the Comprehensive Economic Measures to Secure People's Lives and Livelihoods toward Relief and Hope, which worth JPY 73.6tn.
- In India, since March 2020, the Reserve Bank of India (“**RBI**”) reduced the repo and reverse repo rates by 115 and 155bps to 4.00% and 3.35%, respectively, and announced liquidity measures across three areas comprising Long Term Repo Operations, a Cash Reserve Ratio cut of 100 bps, and an increase in Marginal Standing Facility to 3% of the Statutory Liquidity Ratio, resulting in cumulative liquidity injections of 5.9% of GDP through to September.

3.2 KEY MARKET DYNAMICS DURING 2020

COVID-19 shocked global financial markets heavily in the first half of 2020, especially during March. Nearly all markets (including equity markets, bond markets, and commodity markets) were severely affected, and market prices and volumes reflected the changing economic circumstances and prognoses. The scale and velocity at which the CC struck the global markets was extraordinary, prompting direct government and central bank intervention.

In equity markets, major markets fluctuated wildly from the end of February to the middle of March. In the period late February to mid-March, leading equity indices in the US, UK and Japanese markets dropped between 35% - 40%. The Shanghai Stock Exchange Composite also saw a 12% decrease from February 21, 2020 to March 23, 2020. Similar volatility occurred throughout other markets around the world in both February and March.

¹⁵ RRR cuts: <http://www.pbc.gov.cn/en/3688110/3688172/4048269/3990507/index.html>

S&P500 and CBOE VIX During the 2008 GFC and 2020 COVID-19 Market Turmoil

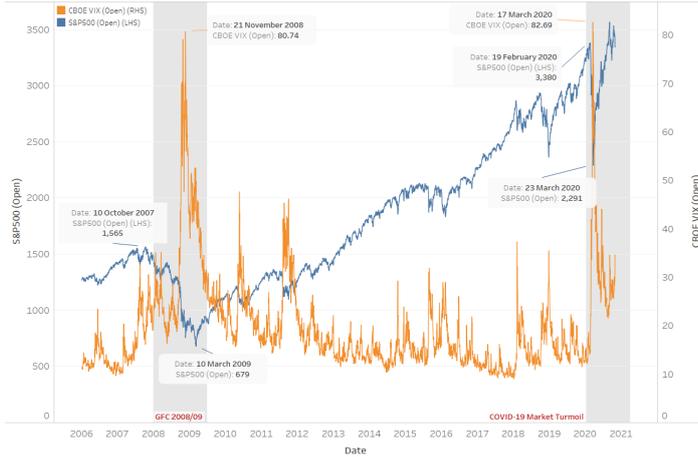


Chart 2 Source: Data from investing.com

Furthermore, the CBOE VIX increased to 83 on the March 17, 2020, 2.4% higher than compared to the November 21, 2008 maximum levels seen during the 2008 GFC (**Chart 2**). Across other volatility indices on March 16, 2020, the Euro Stoxx 50 (VSTOXX) reached 86 and the Nikkei Volatility Index reached a high of 60.86.^{16, 17} These record numbers indicate the extent to which the CC severely impacted the markets and yet, CCPs have managed to maintain their smooth functioning despite this.

In the bond markets, according to the IMF’s Global Markets Monitor, U.S. Treasury 10-year securities’ market depth declined 93% from the February average. The U.S. Treasury Yield Curve started to fall sharply from late February as can be seen from **Chart 3**.¹⁸ The yield of short term (6-month) U.S. Treasury Bonds dropped from 1.56 (19-Feb) to 0.02 (27-Mar), while the yield of long term (10-yr) U.S. Treasury Bond dropped from 1.56 (19-Feb) to 0.54 (9-Mar). It is worth noting that between the 19-Feb to 27-Feb, the yield of the short-term U.S. Treasury Bond was higher than the long-term, indicative of a worsening market outlook.

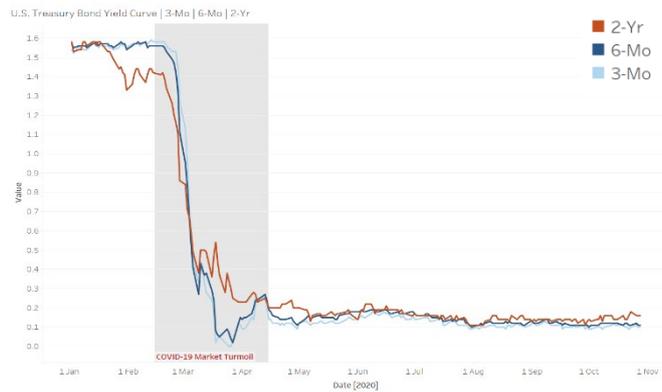


Chart 3 Source: Data from investing.com

Crude Oil WTI Futures and CBOE VIX During the 2008 GFC and 2020 COVID-19 Market Turmoil

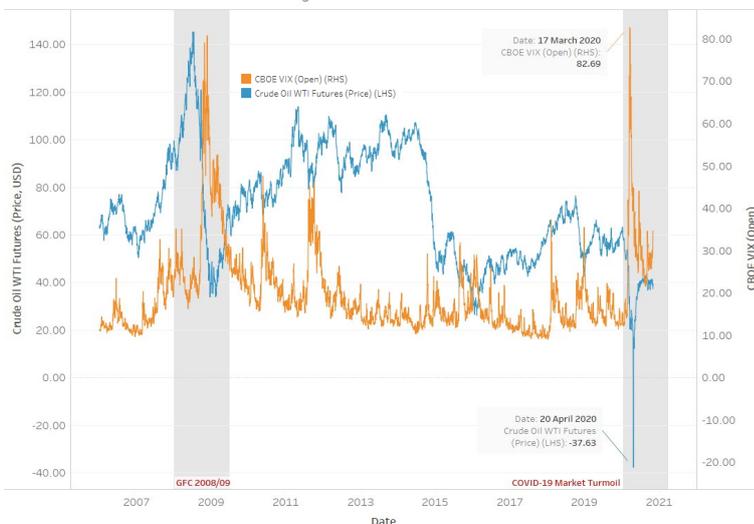


Chart 4 Source: Data from investing.com

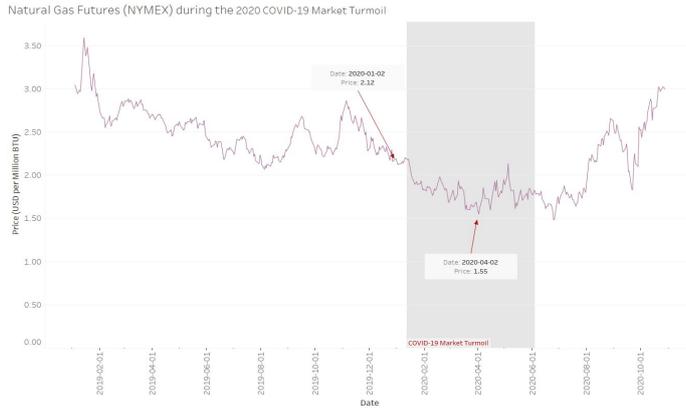
Across the commodities market (**Chart 4**), concerns over oil prices added pressure to the global financial markets. In early March, the OPEC+ countries failed to reach an agreement on output cuts to maintain stable oil prices in the face of weakening global demand resulting from the spread of COVID-19. In response, crude prices dropped significantly, and the entire oil futures curve shifted down, putting additional pressure on equity markets. WTI crude oil price dropped from USD 63.27 per barrel (6-Jan) to USD 20.09 per barrel (30-Mar). The low oil price continued in April

and WTI crude oil traded at negative prices on April 20, 2020, the first time the price for the WTI futures contract went beyond zero since trading first began in 1983.

¹⁶ <https://www.stoxx.com/index-details?symbol=V2TX>

¹⁷ <https://indexes.nikkei.co.jp/en/nkave/index/profile?cid=5&idx=nk225vi>

¹⁸ The U.S. Treasury: <https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2020>

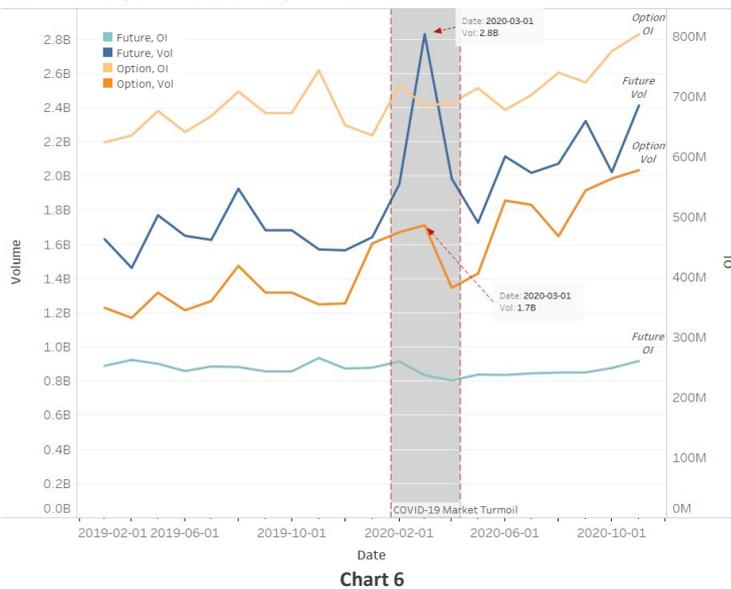


Natural Gas prices declined as well (**Chart 5**), dropping from USD 2.12 per Million BTU (2-Jan) to USD 1.55 per Million BTU (2-Apr), representing a 27% decline.

Chart 5 Source: Raw data from investing.com

4. EXCHANGE TRADED DERIVATIVES MARKETS

ETD Derivatives | Futures vs. Options | Volume & OI Data



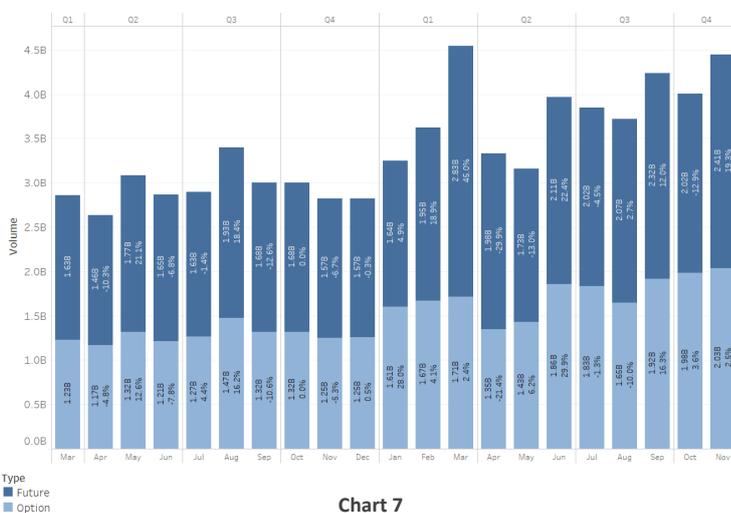
Open interest (“OI”) and Volume data for ETD provides insight into the clearing dynamics across 89 CCPs and exchanges within 34 regions during the CC.¹⁹

As can be seen from **Chart 6**, ETD Volume and OI have been plotted across the period of early 2019 to the end of 2020.

Prior to January 2020, the Futures and Options ETD volume (in total) did not exceed 3.5bn contracts; however, since the beginning of January 2020, both Futures and Options volume began to increase until it surpassed the 3.5bn contract barrier in early February 2020 until reaching a peak of 4.5bn contracts in March 2020.

From March 2020 to November 2020, Total ETD OI (i.e., Futures and Options) increased from 884m to 1,064m, representing a 20.36% increase.

The impact that the CC had on ETD markets can be clearly observed (**Chart 7**), as the volumes of ETDs increased significantly during the COVID-19 outbreak. From March 2019 to before the CC hit, volumes remained fairly constant with marginal variance between each month. Following the onset of the pandemic in January 2020, a 15.2% increase was observed, followed by a 25.4% increase in



March 2020 at the height of the CC turmoil. This suggests that market participants have favored centrally cleared

¹⁹ [Futures Industry Association \(FIA\) ETD Data](#)

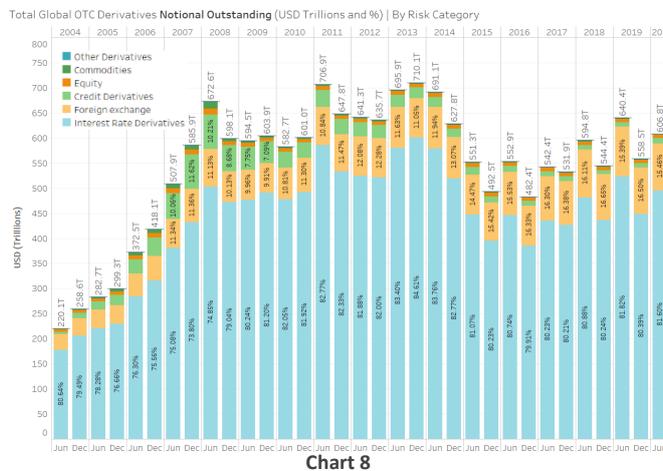
standardized products during the crisis. The 25.4% volume increase in March 2020 was the largest single increase seen in two years across ETD contracts.

The increases in ETD volume were primarily attributable to the Futures market. Futures contract volume increased by 45.0% in March 2020 to 2.83bn contracts, the largest single increase seen in the preceding months, followed by a decline of 29.9% to 1.98bn contracts in April 2020 to eventually a steady increase from May 2020 to December 2020. Relative to preceding months, the March 2020 – April 2020 decline is overshadowed by consistent growth across the ETD volumes. In comparison the ETD Options market has seen an increase in contract volume since January 2020 with a 28.0% increase to 1.61bn contracts.

5. OTC DERIVATIVES MARKETS

OTC derivatives markets data is primarily available from regulatory sources, in particular the Bank for International Settlements (“BIS”) OTC Derivatives Statistics.²⁰ The data covers all major asset classes (i.e., Commodities, Credit Derivatives, Other Derivatives, FX, Interest Rate Derivatives, and Equity Derivatives), across a range of counterparty types faced by the reporting dealers.

5.1 GLOBAL OTC DERIVATIVES



There has been an upward trend in notional amounts since the end of December 2016 with a value of USD 482.4tn, reaching a total of USD 606.8tn at the end of June 2020 (Chart 8).

The Gross Market Value (“GMV”) tracks the aggregate un-netted change in value of outstanding contracts, and thus sheds further light onto the scale of risk transfer in OTC markets. The increase in GMV during the CC is consistent with large price moves, in particular in interest rate markets given central bank policy rate changes and other monetary policy tool deployment. The International Swaps and Derivatives Association (“ISDA”) also outlined the changes in liquidity affecting uncleared contracts prior to and after central bank stabilization measures.²¹

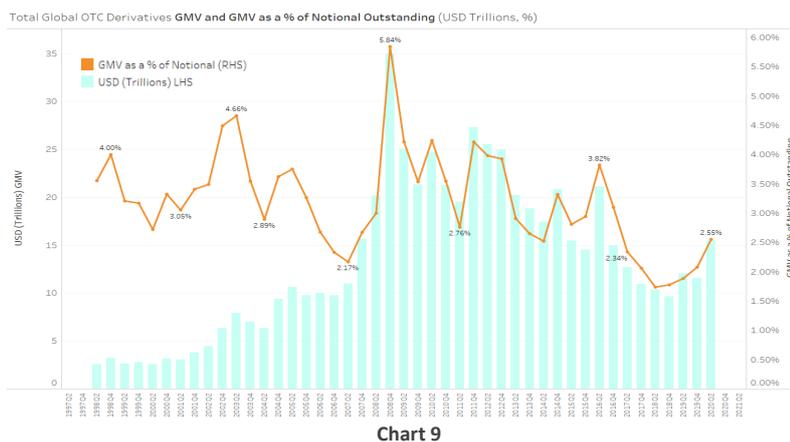


Chart 9 provides analysis of the global OTC derivatives GMV between 1998 and Q2 2020. GMV as a percentage of notional outstanding is also provided on the right axis. In Q2 2020, the GMV made up 2.55% of notional outstanding amounts.

²⁰ BIS OTC Derivatives Statistics <https://www.bis.org/statistics/derstats.htm>
²¹ <https://www.isda.org/2020/06/30/covid-19-and-the-impact-on-liquidity>

The Gross Credit Exposure (“GCE”)²² is a more precise measure of risk, as it accounts for enforceable netting agreements.

GCE does not include collateral, and thus does not reflect a pure uncovered credit exposure arising between market participants for their OTC derivatives. For centrally cleared markets, all profit and loss is settled amongst all participants of the CCP at least daily. For uncleared OTC derivatives, ISDA survey responders for 2019 year-end collateralized USD 944.7bn of profit and loss through VM on their open trades.²³ During the peak stress of CC, those firms using AcadiaSoft for their bilateral VM paid approximately USD 5.4tn in VM.²⁴

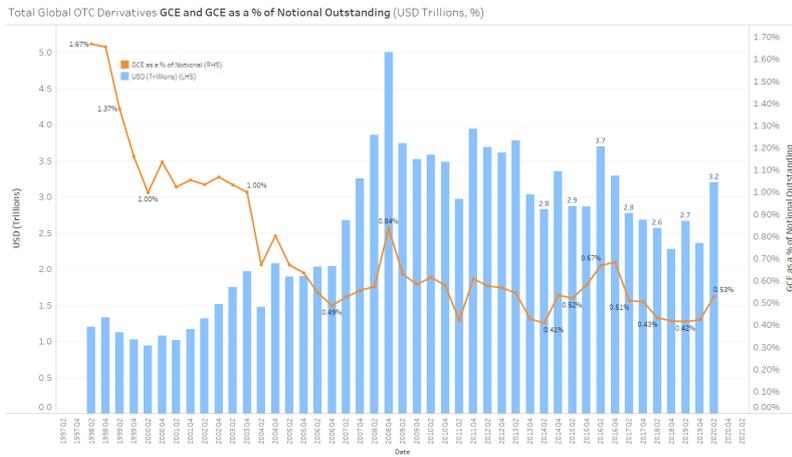


Chart 10

As shown from **Chart 10**, GCE data from the BIS has been compiled to indicate both GCE in USD trillions, in addition to indicating the GCE as a percentage of notional between 1998 and Q2 2020.

Over the June Q2 releases of the BIS data, GCE has fluctuated from USD 3.7tn in Q2 2016, to USD 3.2tn in 2020 Q2. For Q2 2020, GCE made up 0.53% of notional outstanding amounts.

In the uncleared space, ISDA survey respondents held aggregate IM of USD 173.2Bn in IM for their non-cleared derivatives transactions of which USD 105.2bn was required by UMR regulations.²⁵ IM for uncleared OTC derivatives is presumed to be virtually all calculated using the ISDA Standard Initial Margin Model (“SIMM”)²⁶ methodology. This advanced methodology is permitted by regulation, in lieu of a straightforward table. SIMM is calibrated based on the past three years of historical data and one year of market stress, currently identified as the 2008/09 GFC. It is recalibrated on an annual basis, with a one-year lag, and thus all volatility of 2020 will be incorporated into the model starting 2022. It is not expected that CC, with its relatively short-lived volatility, will replace the GFC as the stress year. It is also not expected that the increased volatility now included in the 2020 part of the regular look-back period will change ISDA SIMM numbers by more than 10%.

²² BIS Glossary Definition of Gross Credit Exposure

²³ Figures obtained from ISDA Margin Survey Year-End 2019, since 2020 Year-End survey not yet released as of March 2021.

²⁴ <https://acadiasoft.com/wp-content/uploads/2020/06/Smooth-Sailing-Through-the-Perfect-Storm-060220.pdf>

²⁵ Figures obtained from ISDA Margin Survey Year-End 2019, since 2020 Year-End survey not yet released as of March 2021.

²⁶ ISDA SIMM analysis was supported by SHCH, an approved ISDA SIMM Licensed Vendor.

5.2 GLOBAL CLEARED OTC DERIVATIVES²⁷

Global OTC Interest Rate Derivatives at CCPs
Notional Outstanding

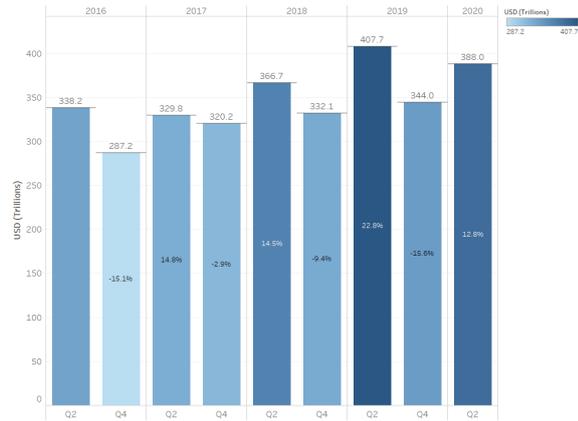


Chart 12

Q2 2016 – Q2 2020

Cleared OTC Derivatives

Global Interest Rate Derivatives

(Notional Outstanding)

Between Q4 2019 – Q2 2020, there was an increase from USD 344tn to USD 388tn, representing an almost 13% increase.

Global OTC FX Derivatives at CCPs
Notional Outstanding

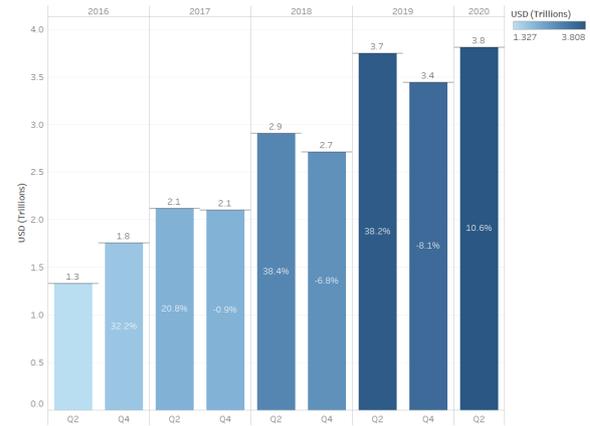


Chart 11

Q2 2016 – Q2 2020

Cleared OTC Derivatives

Global FX Derivatives

(Notional Outstanding)

Between Q4 2019 – Q2 2020, there was an increase from USD 3.4tn to USD 3.8tn, representing an almost 12% increase.

Global OTC Credit Default Swaps at CCPs
Notional Outstanding

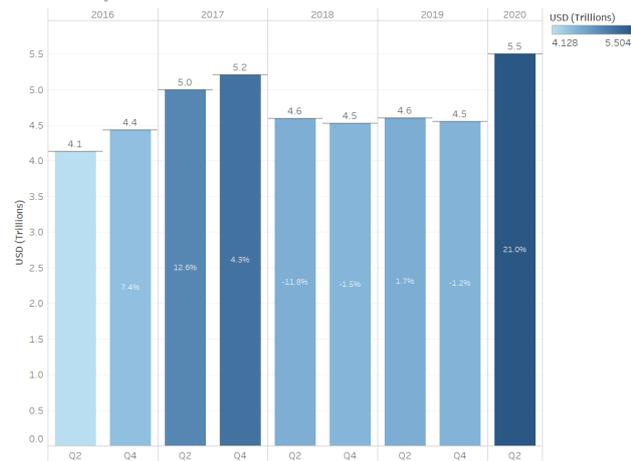


Chart 13

Q2 2016 – Q2 2020

Cleared OTC Derivatives

Global CDS Derivatives

(Notional Outstanding)

Between Q4 2019 – Q2 2020, there was an increase from USD 4.5tn to USD 5.5tn, representing a 22% increase.

²⁷ Data sourced from: [BIS Statistics Explorer](#)

6. CCP RESILIENCE DURING 2020

CCPs have demonstrated time and time again their robustness during significant market stresses. As explored in our previous CCP12 report ‘*CCPs Again Demonstrate Strong Resilience In Times of Crisis*’, their robustness was captured and evident from how well CCPs weathered the CC storm.²⁸ This positive outcome was also referenced in various communications and reports from local regulators and international standard setting bodies, including the Financial Stability Board’s (“FSB’s”) Holistic Review.²⁹

In particular, CCPs provided market participants with an efficient and effective forum to manage their risks, whilst providing transparency and operational reliability. This was despite the significant operational challenges presented by the circumstances that surrounded responses to coronavirus, as well as the extraordinary levels of volatility, as depicted in Section 3. Furthermore, as noted in Section 7, CCPs observed significant increases in VM flows due to the observed market moves but were able to process these payments as well as clear and settle a higher volume of transactions in a timely manner, as noted in Sections 4 and 5. Due to the extreme levels of volatility observed over the course of the CC, most CCPs were required to issue margin calls as a result. As described further in Section 7, CCPs strive to strike an appropriate balance between achieving appropriate margin coverage and mitigating procyclical risk. In striking this balance, CCPs must consider having appropriate margin coverage, whilst also avoiding unnecessary procyclical changes to IM requirements relative to the observed levels of market volatility. Ultimately, CCPs proved once again, as they have in past crises, that they provide safety and stability to the markets that they serve, particularly during periods of stress.

During this market turmoil, some CCPs were even required to manage a CM suspension. Ronin Capital LLC, a CM at Chicago Mercantile Exchange Inc. (“CME”) and the subsidiary of DTCC, the Fixed Income Clearing Corporation (“FICC”) was suspended. Ronin Capital LLC, a Chicago based proprietary trading firm, failed to meet its capital requirements during the week of March 16, 2020. Consequently, CME announced on March 20, 2020 that Ronin Capital LLC’s portfolios cleared by CME were successfully auctioned off.³⁰ CME was able to resolve the suspension with no impact to CME’s guaranty fund, nor were there any customers or CMs of CME impacted.³¹

Also, FICC reported on March 25, 2020, after suspending Ronin Capital LLC already on March 20, 2020³², that the “*liquidation process for the positions of Ronin Capital LLC [...] has been completed*”.³³ FICC was able to wind-down and liquidate Ronin Capital LLC’s cash positions without any impact to the DF or the overall Default Waterfall.

6.1 CCP CORE SYSTEM AVAILABILITY

CPMI-IOSCO’s Public Quantitative Disclosures (“PQDs”) evidenced the operational reliability of CCPs during the CC. As part of the PQDs, CCPs report the quantity and duration of operational failures affecting their core clearing systems over the previous 12-months on a quarterly basis, where:

- **Core Systems:** Within clearing, systems enable the acceptance and novation of trades, and provide the calculation of margin and settlement obligations.
- **Loss of Availability:** An incident that results in an interruption to the CCP’s ability to perform its own functions in relation to trade acceptance and novation, or calculation of margin and settlement obligations. An incident

²⁸ [CCPs Again Demonstrate Strong Resilience in Times of Crisis - A CCP12 Paper](#)

²⁹ <https://www.fsb.org/wp-content/uploads/P171120-2.pdf>

³⁰ https://www.cmegroup.com/media-room/press-releases/2020/3/20/cme_group_statementonroninllc.html

³¹ <http://investor.cmegroup.com/node/45166/html>

³² <https://www.dtcc.com/-/media/Files/pdf/2020/3/20/GOV857-20.pdf>

³³ <https://www.dtcc.com/-/media/Files/pdf/2020/3/25/GOV864-20.pdf>

Public Quantitative Disclosures

In 2015, the CPMI-IOSCO published PQD standards for CCPs as an important component of the set of PFMI public disclosure requirements, while also encouraging CCPs to use a common PQD submission template. CCP12 supports CPMI-IOSCO's efforts to improve the level of standardization and transparency of CCP disclosures; our members collaboratively worked to create a common PQD template in 2015, and officially released the CCP12 PQD Template in 2017. An update of the CCP12 PQD template was published in 2020 together with the CCP12 PQD guide, which provides details of the CCP12 PQD Template such as 'Disclosure Title', 'Reference', 'Description' and 'Reporting Frequency', as well as an FAQ section for each disclosure, in order to give additional guidance to market stakeholders when evaluating a CCP's PQDs.

EB: 4

this data point. PQD 17.4 figures across Q3 2019 – Q3 2020 have remained very high and consistently above 99.96%. During the CC, average core system availability across CCP12 member PQDs were higher than previous quarters.³⁴

This demonstrates the high degree to which global CCPs have remained operationally resilient during the CC, and were able to meet the demand of the clearing processes without the need to close operations, nor reduce operations.

that compromises the CCP's ability to correctly perform the aforementioned functions is also considered a 'loss of availability', even if there is no actual outage. Failure to a back-up site without interruption to services would not count as a loss of availability.

43 global CCP PQDs, under PQD disclosure 17.4, on average reported a 99.98% core system availability for the previous 12-month period spanning, October 1, 2019 through to September 30, 2020. This is reflection of CCP resilience during such a critical and stressed period.

Although the figures are the previous 12-months, Q1 2020 and the majority of 2020 was captured within

6.2 SUCCESSFUL LIBOR TRANSITION TO RFR DURING COVID-19

The FSB and national authorities and central banks have continued their work on increasing the robustness and use of interest rates, in particular by developing new risk-free-rates (i.e., Sterling Overnight Index Average (SONIA), Euro Short-Term Rate (€STR), Tokyo Overnight Average Rate (TONAR)) to replace many existing IBORs.

The announcement by the UK Financial Conduct Authority ("FCA") in July 2017 that the publication of the London Interbank Offered Rate ("LIBOR") would not be guaranteed past 2021, set a time frame for the decommission of one the most used interest rate benchmarks in terms of outstanding notional for derivatives linked to it. CCPs managed this vital change over the CC period with no impact to CMs.

6.2.1 WHAT IS SOFR DISCOUNTING?

In the US, the Alternative Rates Reform Committee ("ARRC") in 2017 selected the Secured Overnight Financing Rate ("SOFR") as the successor for the USD LIBOR. SOFR was chosen as the rate that best met the standards for a reference Risk Free Rate ("RFR") to replace USD LIBOR and to become the main benchmark rate used for USD denominated rates derivatives and other financial contracts. SOFR is an overnight secured rate, derived from financial institutions funding costs from overnight borrowing activity, collateralized by U.S. Treasury securities.

The nature and size of the market underlying SOFR fixings makes it a transparent rate, representative of the market participants' overnight funding activity and therefore resilient to attempts of manipulation.

To support a smooth transition from USD LIBOR to SOFR, ARRC has put forward a Paced Transition Plan, initiated in 2018.³⁵ As part of that plan a key milestone was changing the discounting rate for centrally cleared USD-discounted products, from referencing the Effective Federal Fund rate ("EFFR" or "Fed Funds") to SOFR. The discounting rate is used to estimate today's present value of future cashflows in financial derivatives such IRS or FX forwards.

³⁴ Public Quantitative Disclosure 17.4 on average across all CCP12 member PQDs for each respective quarter can be obtained from the [CCP12 Newsflash publications](#)

³⁵ Source: Alternative Reference Rates Committee <https://www.newyorkfed.org/arrc/sofr-transition>

6.2.2 WHY THE SWITCH FROM FED FUNDS TO SOFR?

The benefit from switching from Fed Funds to SOFR discounting was two-fold. The benefits were to firstly, to move to a secured reference rate, backed up by U.S. Treasury liquidity pool and secondly, to foment liquidity of SOFR products, required for that index to become LIBOR's replacement.

The EFFR is an unsecured rate, derived from the overnight rate at which U.S. depository institutions trade federal funds. The activity underlying this rate has been on a downward trend since the GFC.³⁶

Despite the SOFR rate being based on a deep and well-established pool of financial transactions, at the time of its choice as the USD LIBOR successor there was no liquidity in SOFR linked derivatives and there was not a term structure for it. Since then, the liquidity of SOFR linked derivatives has been steadily growing; the switch to SOFR discounting, for centrally cleared products, has boosted the SOFR products liquidity pool, with volumes tripling in the longer dated tenors, immediately following the transition.³⁷

6.2.3 WHO IS AFFECTED AND WHY IS IT IMPORTANT? – A CME AND LCH PERSPECTIVE

The switch to SOFR for cashflows discounting and Price Alignment Interest/Price Alignment Amount, conducted in October 2020 by the two major CCPs, impacted *all outstanding centrally cleared USD-discounted products*, including but not limited to fixed/float IRS, forward rate agreements, inflation products and non-deliverable IRS.

CME and LCH have provided an in-depth perspective at how the switch took place during 2020.

Please see: [Section 10](#)

6.2.4 LOOKING FORWARD: WHAT'S NEXT FOR 'IBOR' INDEX SWAPS?

The transition from Fed Fund rates to SOFR for USD-discounting, has been one of the major steps on the road to interest rate benchmark reform. The FCA and the ICE Benchmark Administration ("IBA") have set deadlines for cessation of the publication of LIBOR indexes, with January 2022 set for CHF, EUR, GBP and JPY LIBOR and Q2 2023 for USD LIBOR.³⁸ These timelines dictate the final cut-off date after which IRS and other LIBOR linked derivatives, will cease to exist.

Approximately USD 400tn of financial derivatives were linked to LIBOR as of mid-2018.³⁹

The mammoth size move to a RFR world, requires:

- **Know how** on how to use the new RFRs in practice, i.e., well understood standards and definitions for financial products referring to the new RFRs;
- **Liquidity** to enable the trade of RFRs, without penalizing costs to the market participants;
- **Conversion of existing LIBOR repository** to prevent a liquidity pool fragmentation LIBOR vs RFRs in the period leading to the cessation; and
- **Mapping** LIBOR interdependences.

It is an ambitious task which will require the continued collaboration between regulators, financial market infrastructures and market participants.

³⁶ Source: Data sourced from <https://apps.newyorkfed.org/markets/autorates/fed%20funds>

³⁷ Source: [Financial Stability Oversight Council, 2020 Annual Report \(2020\)](#)

³⁸ Source: ICE Benchmark Administration (December 2020). ICE LIBOR Consultation on Potential Cessation

³⁹ Source: Schrimpf, A. & Sushko, V. (2019). Beyond LIBOR: a primer on the new reference rates. [\(BIS Quarterly Review, March 2019\)](#)

7. CCP MARKET RISK MANAGEMENT STATISTICS

7.1 CCP MARGIN MODELS

Different markets and products available for clearing may be more or less suited to certain model choices and settings - there is no one-size-fits-all solution for IM. A CCP considers IM models holistically when it sets its risk parameters (e.g. confidence levels, lookback periods, IM scenarios, aggregation algorithm – to name a few). Moreover, a CCP must focus on outcomes appropriate to the market in which they operate.

According to the CPMI-IOSCO PFMI Principle 6 “[a] CCP should appropriately address procyclicality in its margin arrangements. [...] [Furthermore a] CCP should adopt forward looking and relatively stable and conservative margin requirements that are specifically designed to limit the need for destabilising, procyclical changes.”

CCPs incorporate mechanisms in their respective margin methodologies that mitigate the need and likelihood of one-time large or unreasonable changes in IM levels in times of stress, but also are sufficiently risk-sensitive.

For instance, CCPs can:

- (i) Utilize floors on the IM rate, amount, or risk factors;
- (ii) Install a buffer which is adjusted lower as volatility increases;
- (iii) Include data from stressed market episodes in the IM methodology; and/or,
- (iv) Increase the lookback period.

These mechanisms limit the declines in IM rates in periods of low volatility, so that IM rates are less likely to increase drastically when volatility increases (or vice versa for decreases in volatility).

The CC demonstrated that the mechanisms that CCPs employ to mitigate procyclical risk were well calibrated and worked as designed. During the CC, CCPs’ IM increases were less than VM flows, even where VM figures are reported as an average in the PQDs. Of course, CCPs have to strike the right balance between mitigating procyclical risk and maintaining appropriate margin coverage. Consequently, it was appropriate and to be expected that due to the extreme levels of volatility observed over the course of the CC that CCPs would be required to raise IM levels. Note that aggregate IM levels during the CC were also impacted by participants changing their portfolio.

7.2 INITIAL MARGIN, VARIATION MARGIN AND DEFAULT FUND ANALYSIS⁴⁰

The transparency that CCPs provide through their PQDs^{41,42,43} provide the market with a level of clarity into the cleared markets. The high level of standardization across the disclosures makes it straightforward for market participants to analyse cleared markets.

In this section, we explore the trends across IM, VM and DF data with a special focus on the CC. For this we have looked at a broad group of CCP12 members’ PQD data sets and analysed the developments from Q1 2016 until Q3 2020 across twenty selected CCPs.

⁴⁰ All exchange rates normalised to USD based on quarter-end rates. FX rates sourced directly from [ECB](#).

⁴¹ Public quantitative disclosure standards for central counterparties; BIS; February 2015; Accessed: 10th of December 2020; (<https://www.bis.org/cpmi/publ/d125.htm>)

⁴² CCP12 PQD Template; 2020-11-04; Accessed: 2020-12-10; (<https://ccp12.org/wp-content/uploads/2020/12/CCP12-PQD-Template-202011-v2.xlsx>)

⁴³ CCP12 PQD FAQ; 2020-11-04; Accessed: 2020-12-10; (https://ccp12.org/wp-content/uploads/2020/11/202011_CCP12_PQD_FAQ_Guide_Final.pdf)

7.2.1 TOTAL IM (REQUIRED) ANALYSIS

Within PQD Disclosure 6.1.1, CCPs are required to disclose the *Total Initial Margin Required*, as of quarter end.^{44,45} We can see an upward trend of IM Required until Q4 2019. However, as can be seen further from **Chart 14**⁴⁶ below, the IM increases were limited relative to the extraordinary volatility observed, as demonstrated by the substantial size of VM flows. Subsequently this suggests that built-in conservativeness and the anti-procyclical (“APC”) measures of the respective margin models worked as designed. The IM Required remained elevated through Q2 and Q3 2020.

PQD 6.1.1 | Total IM Required for 20 selected CCPs

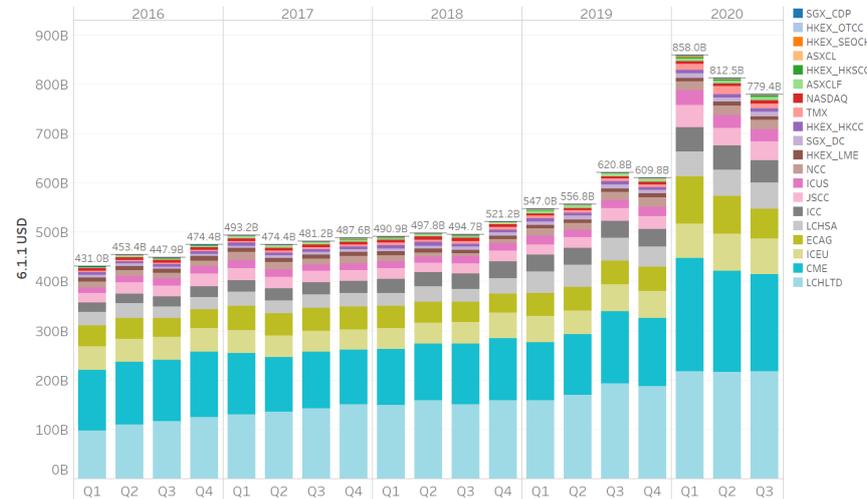


Chart 14

Chart 14, opposite provides a QoQ USD distribution of PQD 6.1.1 IM (Required) data for 20 selected CCPs between Q1 2016 and Q3 2020.

As seen from the data, between Q1 2016 and Q3 2018, IM has remained under USD 500Bn. Slight increases were observed between Q1 2019 to Q3 2019, followed by a 1.77% dip in required amounts for Q4 2019.

IM (Required) increased during the CC, however, as will be seen on preceding pages, these were shadowed by VM movements.

Across the board IM increases were observed between Q4 2019 and Q1 2020 quarter-end. In light of the fact that many asset classes had repeated, significant price movements, as described in Section 3, some of these new observed price moves had to be incorporated into IM calculations to respect the selected confidence interval, while other moves may constitute “extreme but plausible market conditions” that are more appropriately incorporated in a CCP’s DF sizing. This is designed to ease collateral pressures on participants, while providing sufficient margin coverage. In comparison, the VM disclosures (explored in section 7.2.3), even when assessed on an average basis over the quarter were significantly larger, on a percentage basis, than the changes in IM from Q4 2019 to Q1 2020.

⁴⁴ 20 members incl: ASXCL, ASXCLF, CME, ECAG, HKEK_HKCC, HKEK_HKSCC, HKEK_LME, HKEK_OTCC, HKEK_SEOCH, ICC, ICEU, ICUS, JSCC, LCHLTD, LCHSA, NASDAQ, NCC, SGX_CDP, SGX_DC, TMX

⁴⁵ All exchange rates normalised to USD based on quarter-end rates. FX rates sourced directly from ECB.

⁴⁶ NCC 6.1.1 Q2 2017 figure taken as an average of the Q1,3,4 2017 6.1.1 figures, due to a minor change in a PQD reporting method by NCC for Q2 2017.

7.2.2 ICE AND CME - MARGIN REQUIREMENTS AND LIMITED PROCYCLICALITY⁴⁷

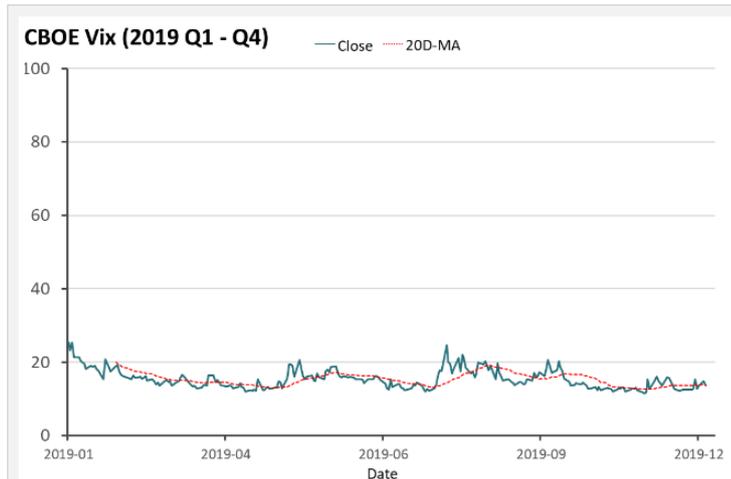


Chart 16a: CBOE Volatility Index Q1 – Q4 2019
(Source: www.CBOE.com/vix)

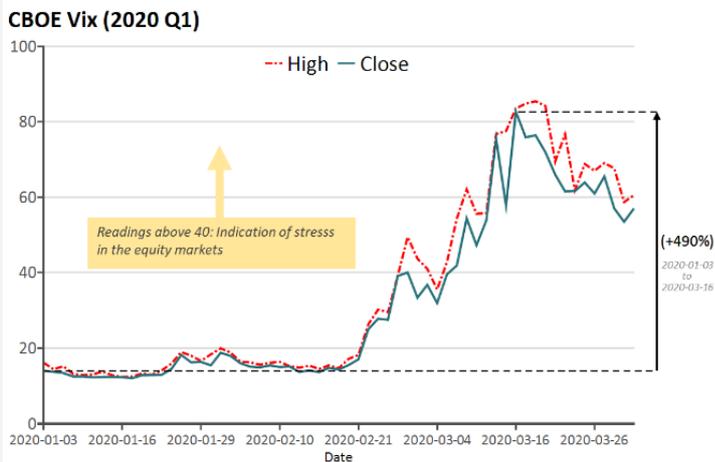


Chart 16b: CBOE Volatility Index Q1 – Q3 2020
(Source: www.CBOE.com/vix)

(1) ICE Perspective

When analysing one CCP from the selection as an example, the Intercontinental Exchange (“ICE”) margin requirements and peak margin calls in Q3 2020 were relatively lower when compared to those in Q1 2020 and Q2 2020 as the COVID-19 related volatility eased. However, ICE for instance continued to retain relatively higher margin rates in anticipation of the volatility relating to the U.S. Presidential and Congressional elections.

The increases that we saw in 2020 as compared to 2019 directly relate to the extreme market volatility related to various geopolitical events and the CC. As a benchmark and a comparative tool, we can look at the VIX (*Chart 16a and Chart 16b*). The VIX started moving up in mid-February with a peak of 83 observed on March 16, 2020 (*Chart 16b*). The aggregate move was approximately an increase of 490%. In comparison, the increase in margin rates at ICE Clear U.S. and ICE Clear Europe were much smaller, proving further that ICE’s margins were not procyclical. Furthermore, the margin rate increases were gradual in nature over a 2-week period with the first increase implemented on 9 March, two weeks after the VIX started moving. The Margin Buffers that were implemented pre-CC resulted in margins being able to address the initial volatile period and only requiring the first margin rate increase to be on 9 March. Furthermore, ICE Clear Credit maintained a relatively stable margin rate requirement despite market moves that were 2x times those observed during the 2008 GFC.

(2) CME Perspective

Despite the volatile markets observed during the CC, CME did not implement any new rules, policies, processes, or procedures in managing the crisis. Consistent with its BAU risk management practices, CME employed appropriate step-change increases to its IM requirements, opposed to making inappropriately large one-time increases, and always gave the market at least 24-hours’ notice before increases became effective. The size of CME’s IM increases were relatively modest during March and April 2020, which is particularly true relative to the extraordinary volatility observed, as demonstrated by VM flows. During this period, CME’s largest VM paid was USD 18.1bn in aggregate for its CMs, which is exchanged on a net basis. If CME collected customer IM on a net basis for futures and options, the largest one-day change in total IM required at CME would have been USD 5.8bn – note, in practice, CME collects all customer IM on a gross basis (i.e., one customer’s exposures cannot offset another unaffiliated customer’s exposures).¹ The fact that CME’s theoretical adjusted IM change was less than one-third of the size of the VM paid shows that CME’s APC measures appropriately dampened the impact of the volatility on market participants’ IM obligations.¹ Notwithstanding this, the largest actual one-day percentage change in total IM required at CME was 6.5%, which was also quite small relative to the volatility observed.

Despite the success of CME’s APC measures, CME also maintained appropriate backtesting coverage and did not run any ad hoc settlement cycles – in line with its BAU practices, CME ran its standard settlement cycles at intraday and end-of-day. During each of its settlement cycles, CME collects IM and collects and pays out VM. CME’s portfolio coverage level for the twelve months from the end of Q1 2019 to the end of Q1 2020 stood at 99.97% for its Base (i.e., primarily futures and options) products and 99.87% for its IRS products.

⁴⁷ <https://www.theice.com/clear-us/notices>, ICE Quarterly Clearing Disclosures Public Presentation, Q3 2020, www.CBOE.com/vix

7.2.3 VARIATION MARGIN (VM) ANALYSIS

PQD 6.6.1 | Average Total VM Paid to the CCP by Participants Each Business Day QoQ | For 20 selected CCPs*

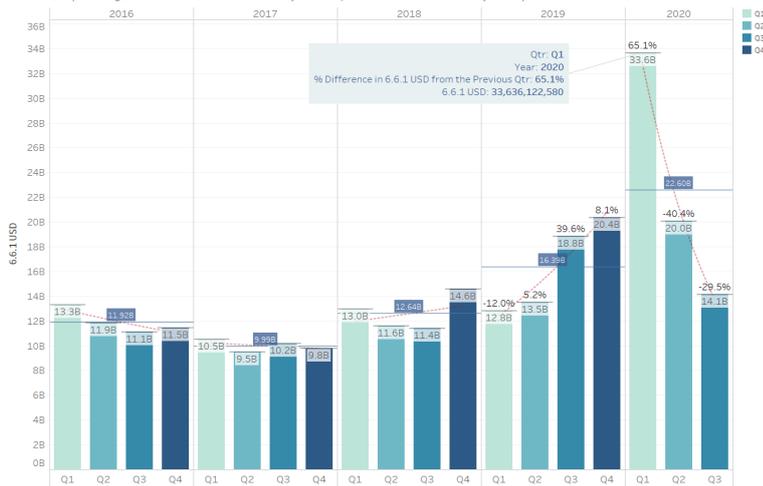


Chart 17 *No VM data provided for HKSCC, therefore actual data represents 19 CCPs as a result

As seen from **Chart 17**, the *Average Total Variation Margin Paid To The CCP By Participants Each Business Day Over The Quarter*⁴⁸ as disclosed in PQD data point 6.6.1 are shown to be fairly consistent from quarter to quarter prior to the CC. However, in Q3 2019, Average VM Paid increased by 40% in comparison to the previous quarter and Average VM Paid continued to increase through Q1 2020.

VM flows during the CC increased significantly following the March 2020 volatility.

The large price movements resulted in larger mark-to-market gains and losses to be paid (and received) by CMs. CCPs managed to facilitate these payments without any material issues.

From Q4 2019 to Q1 2020, the Average VM Paid increased by 65%, whereas IM Required increased by 41%. On a percentage basis, the increases in VM flows still exceed the IM increases, despite the fact that the VM disclosures are provided on a quarter average basis so days with more typical VM flows, as were observed in many cases in the early part of Q1 2020, depress the overall average for Q1 2020. The significant Average VM Paid increases demonstrate the severe day-over-day mark-to-market movements portfolios were experiencing, as would be expected given the levels of volatility during that period.

7.2.4 TOTAL DF (REQUIRED) ANALYSIS

PQD 4.1.4 | Total DF Required for 20 selected CCPs

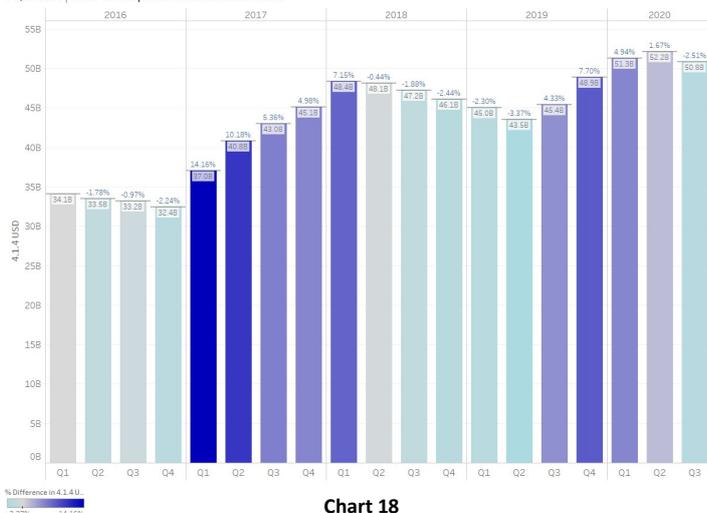


Chart 18

Upon analysing the total value of pre-funded DF (Required) resources⁴⁹ as of quarter end (Disclosure 4.1.4), it is evident from the PQD data that there is an almost cyclical trend in the DF (Required) resources across the quarters. From 2016, there is a downward trend, followed by an upward trend – and this pattern continues throughout the years, for the selected 20 CCPs. However, the total amount across the selected 20 CCPs for 2020 has remained relatively constant since Q1 2018.

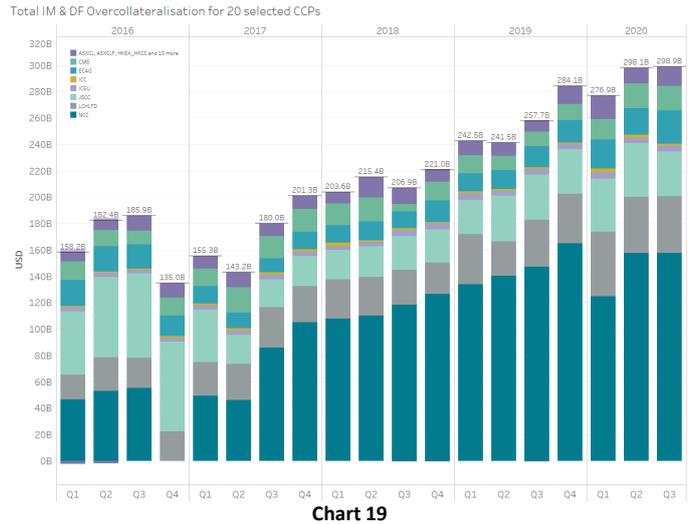
The DF (Required) resources have steadily increased during the periods from 2016 Q1 until 2018 Q1, until the levels plateau. The increase of DF (Required) resources between Q4 2019 and Q1 2020 however, was even less than the increase between Q3 2019 and Q4 2019. The DF (Required) resources across the 20 CCPs, during the CC, increased 4.94% during Q1 2020 which was overshadowed by the previous quarters' increase of 7.70%.

⁴⁸ 19 members incl: ASXCL, ASXCLF, CME, ECAG, HKEX_HKCC, HKEX_LME, HKEX_OTCC, HKEX_SEOCH, ICC, ICEU, ICUS, JSCC, LCHLTD, LCHSA, NASDAQ, NCC_CCP, SGX_CDP, SGX_DC, TMX

⁴⁹ 20 members incl: ASXCL, ASXCLF, CME, ECAG, HKEX_HKCC, HKEX_HKSCC, HKEX_LME, HKEX_OTCC, HKEX_SEOCH, ICC, ICEU, ICUS, JSCC, LCHLTD, LCHSA, NASDAQ, NCC, SGX_CDP, SGX_DC, TMX

7.2.5 TOTAL IM AND DF OVERCOLLATERALISATION

The total overcollateralization (i.e., Total IM & DF OC)^{50, 51} (IM overcollateralization plus DF overcollateralization) shows a steady increase over the years (**Chart 19**). The steadiness of the overcollateralization ratio throughout 2020 is evidence both by the strong capital and liquidity profile of CMs, but also the absence of a dash for cash in the centrally cleared space. Were there substantial liquidity requirements, one would expect CMs to reduce their overcollateralization. **Chart 22** also provides a summary of the Cash (Held) collateral as a percentage of the Total IM (Held), which can be helpful in understanding how a dash for cash did not appear to present itself in the centrally cleared space.



7.2.6 IM CASH VS. NON-CASH CCP DEPOSITS

PQD 6.2.1 - 6.2.4, Cash Collateral (Held) | Total for 20 selected CCPs

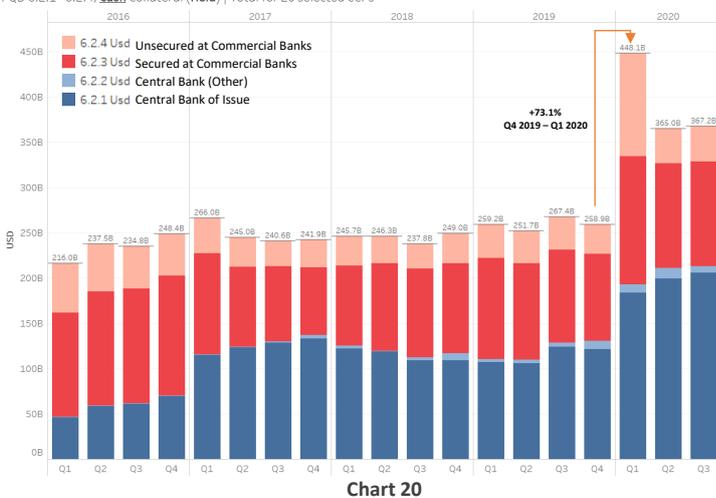


Chart 20, opposite provides a summary of how Cash (Held) is distributed across Central Banks and Commercial Banks (Secured and Unsecured). Data for selected 20 CCPs between Q1 2016 and Q3 2020.

As can be seen from the chart, the increase in Cash (Held) can be interpreted as CMs providing cash collateral to CCPs for their obligations.

This willingness by CMs to still provide cash during the CC instead of other (Non-Cash) collateral indicates that there was tendency to place cash into safe havens, such as CCPs.

PQD 6.2.5 - 6.2.14, Non-Cash Collateral (Held) | Total for 20 selected CCPs

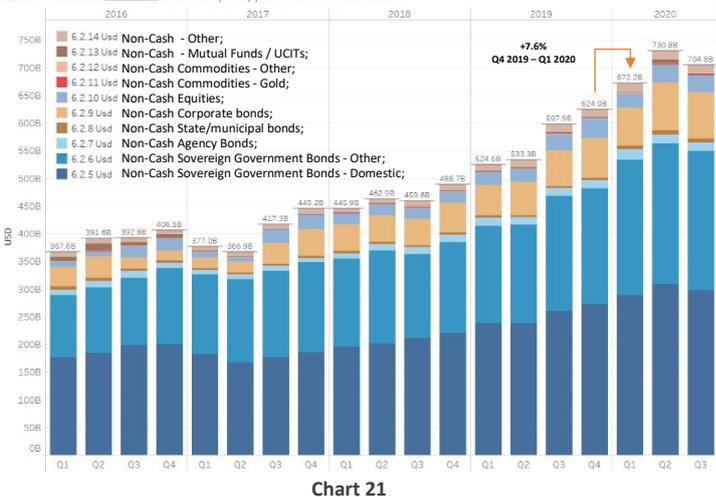


Chart 21, opposite provides a summary of how Non-Cash (Held) is distributed across Bonds, Equities, Commodities, Funds and Other. Data for selected 20 CCPs between Q1 2016 and Q3 2020.

As can be seen from the chart, there were marginal increases in Non-Cash collateral held at the selected CCPs.

Between Q1 2019 and Q1 2020, during the height of the CC market volatility, there was a 7.6% increase, compared to the 73.1% increase in Cash (Held) deposits at CCPs (**Chart 20, above**).

Non-Cash Sovereign Government Bonds (Domestic and other) remain the largest proportion of Non-Cash deposits.

⁵⁰ Members incl: ASXCL, ASXCLF, CME, ECAG, HKEX_HKCC, HKEX_HKSCC, HKEX_LME, HKEX_OTCC, HKEX_SEOCH, ICC, ICEU, ICUS, JSCC, LGHLTD, LCHSA, NASDAQ, NCC, SGX_CDP, SGX_DC, TMX
⁵¹ All exchange rates normalised to USD based on quarter-end rates. Sourced directly from [ECB](#).

Chart 22, opposite provides a ratio of Total Cash IM to the Total IM (Held) (Cash & Non-Cash). Data for selected 20 CCPs between Q1 2016 and Q3 2020.

As can be seen from the chart, over the quarters from 2016 – 2020, the amount of Cash deposits as a percentage of Total IM remains more or less the same.

During the CC, Cash (Held) deposits were 42% of Total IM – similar to levels in early 2017 for the selected CCPs; and very close to the 5-year average (orange line).

Overall, there is no discernible difference across the quarters for the percentage of Cash deposited. The ratio remains fairly consistent quarter-on-quarter.

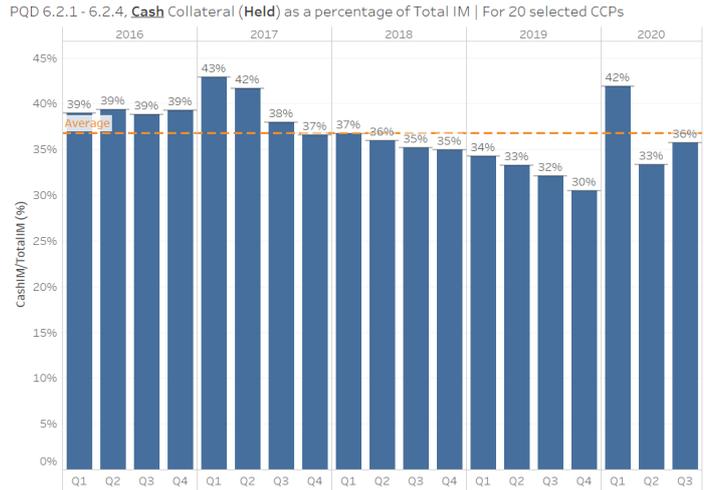


Chart 22

Central Bank accounts play an important financial stability role and could further help manage substantial risk in their jurisdiction. They are widely agreed by the industry and regulation community as the safest option for the safekeeping of CMs’ margin. Derivatives Clearing Organizations (“**DCO**”) maintain large daily U.S. dollar cash balances and although the DCOs continue to operate extensive collateral management functions to ensure safety of margin that they receive, having direct access to a central bank account would only enhance this security.

A recent working paper titled: *‘What are the financial systemic implications of access and non-access to Federal Reserve deposit accounts for central counterparties?’* by Maggie Sklar senior policy advisor and director of international engagement, Financial Markets Group, addresses these aspects and explores the interconnectedness across designated CCPs with and without central banking access.

“Having Federal Reserve deposit accounts as permitted by the Dodd-Frank Act and FSOC designation helps the designated CCPs to safely manage and mitigate the risks of where to put collateral and reduce custodial risk. These accounts are considered riskless in terms of U.S. dollars, and the Federal Reserve is considered a risk-free counterparty.”*

EB: 5 Source: <https://www.chicagofed.org/publications/working-papers/2020/2020-21>

*Reference from Maggie Sklar’s report: Please see: Jerome H. Powell, “Central clearing and liquidity,” speech by Federal Reserve Governor at the Federal Reserve Bank of Chicago Symposium on Central Clearing, Chicago (June 23, 2017) available [online](#), (describing the benefits of CCP access to Federal Reserve deposit accounts for designated CCPs); see also David Marshall, “Liquidity, Settlement Risk, and Systemic Stability,” (Sept. 8, 2017), available [online](#), (noting that with respect to CCPs, the use of the most liquid collateral and eliminating custodial risk could be encouraged by allowing clearing member cash margin to be deposited at a central bank).

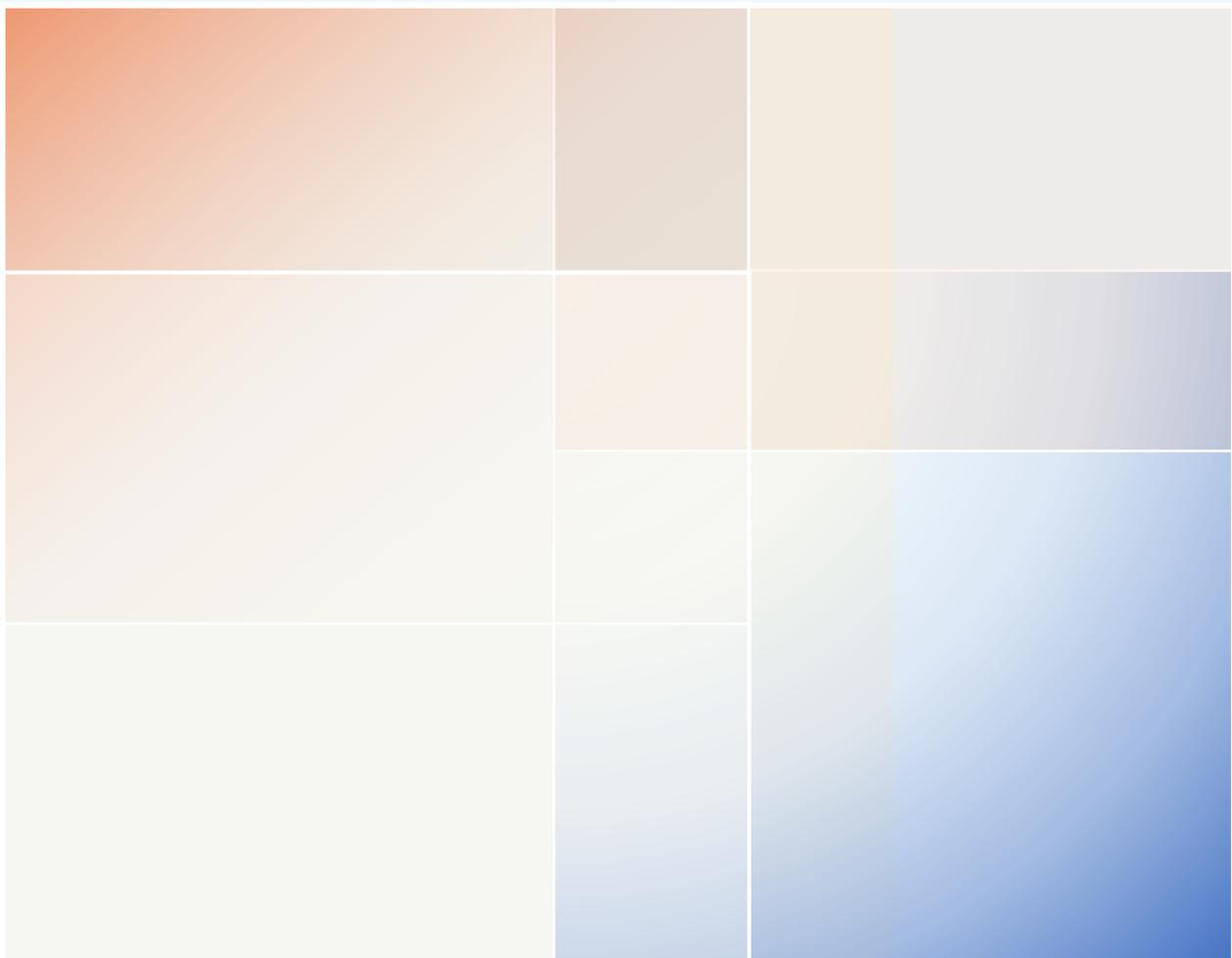
8. INTRODUCTION TO THE CASE STUDIES

The trends and events of the year are expressed in the AMR through CCP12 members experience during the past year. Some features may be unique to our members’ specific CCP or jurisdiction and other aspects may be generalised and applicable across all global CCPs.

The case studies provide key insights into certain CCP mechanics and operational processes, paying particular attention to how CCPs operated during the extreme volatility of the CC.

CCP12 members included in this years’ AMR:

		Specific Case Study Title
CCIL	<i>The Clearing Corporation of India Ltd.</i>	CASE STUDY: CCIL SEGREGATION ACCOUNT MIGRATION DURING
CME	<i>Chicago Mercantile Exchange</i>	CASE STUDY: SOFR SWITCH – CME PERSPECTIVE
Eurex	<i>Eurex Clearing</i>	CASE STUDY: MARGIN CALL PROCESS AT EUREX
JSCC	<i>Japan Securities Clearing Corporation</i>	CASE STUDY: MARGIN CALL PROCESS AT JSCC
LCH	<i>London Clearing House</i>	CASE STUDY: LCH MARGIN ATTRIBUTION ANALYSIS CASE STUDY: SOFR SWITCH – LCH PERSPECTIVE
Muqassa	<i>The Securities Clearing Centre Company</i>	CASE STUDY: SAUDI STOCK EXCHANGE LAUNCHES DERIVATIVES MARKET AND CCP
SHCH	<i>Shanghai Clearing House</i>	CASE STUDY: CCP RESILIENCE AND BCP DURING THE CC AT SHCH



9. MARGIN ATTRIBUTION ANALYSIS

During the initial CC in 2020 nearly all financial markets experienced a significant jump in volatility as large parts of the economy were shut down and investors rapidly shifted resources to safe haven assets like cash or cash equivalent securities. CCPs who are at the center of these markets act as natural shock absorbers by disintermediating the credit risk between participants in the market. CCPs protect themselves and their participants using a number of tools, one of the most important tools is the collection of IM from all participants. These resources act as loss absorbing capital in the unlikely event a participant fails to meet its obligations and the CCP needs to step in and honor those obligations for the benefit of the remaining participants.

The question of how much IM a CCP should collect has been the subject of much debate over many years. Regulation sets out minimum standards which CCPs must abide to, but between CCPs the calculation of the margin requirements will vary based on a number of factors, including products cleared and jurisdictional and regulatory differences. Further, these calculations will depend to a varying extent on the prevailing market conditions, for example more volatile 'risky' assets will attract higher margins when compared to stable 'risk-free' assets. Over time the 'riskiness' of assets will change; in other words, their volatility is not constant.

One of the downsides to these calculations is that when prevailing conditions deteriorate, such as those conditions observed during CC, and APC measures are employed, the margin requirements demanded from CCPs can rise in response to the change in conditions – e.g., risky assets become even riskier, or risk-free asset prices start to move in ways not seen before. The combination of deteriorating conditions coupled with greater margin requirements from CCPs may aggravate the liquidity needs of participants. Most regulators, CCPs and participants agree such procyclical actions should be avoided where possible. The consequence is that CCPs have to balance the prudential need to maintain adequate resources (*especially during unprecedented stressed periods*) whilst avoiding procyclicality affects.

9.1 CASE STUDY: LCH MARGIN ATTRIBUTION ANALYSIS

The following case study looks at two markets cleared by LCH Ltd and assesses the change in margin requirements during the initial CC. The study will also try and attribute the change in margin caused by the margin calculations mentioned above and the changes due to participants trading activity – i.e., their change in positions during the period. The combination of these two effects will drive the change in margin requirements.

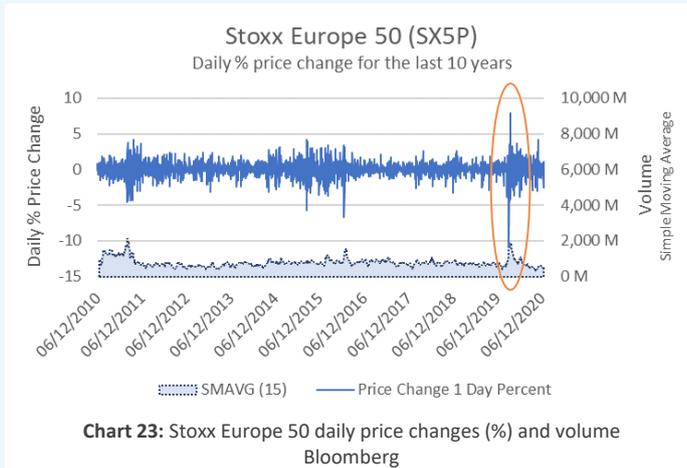
9.1.1 MARKET CASE 1 – EUROPEAN CASH EQUITIES

LCH Ltd.'s EquityClear service provides clearing for cash equities and cash equities equivalents, enabling members and their clients to clear cash equities transacted on exchanges and trading venues located throughout Europe. In 2020 the service cleared on average 7.3m trade sides per day across 18 different trading venues.

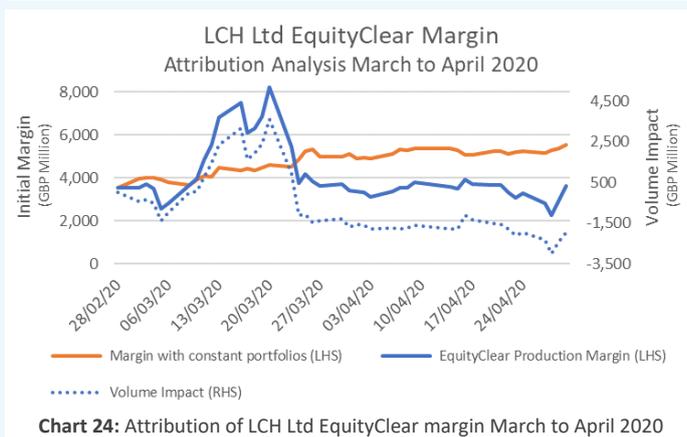
We examine the critical two-month period from March 1 to April 30, 2020 where most of the volatility was observed. Over the period we chart the IM requirements at the service level. Then we chart the same IM requirements but keeping the positions constant from the start of March. The purpose of this calculation is to isolate the effect of margin calculations on participant portfolios.

This will show the true impact of LCH's risk models on the market and gives an idea of how procyclical the margin requirements were. The difference between these two figures will be the participant volume (*or trading*) impact and any residual cross terms.⁵²

⁵² Cross terms can arise via the confluence of trading activity and the risk model. For example if day 1 a member is long equities the adverse risk scenario will be a fall in prices, if on day 2 the member is now short equities the adverse scenario will be a rise in prices. Even if the model has not changed, the up scenario is likely to be different to the down scenario and the margin requirement could be higher or lower.



Firstly, we will examine the state of the market during this period to provide some context on how volatile the period was. **Chart 23** depicts the daily movement in the broad-based Europe 50 Stox Index over the last 10-years. March 2020 has the biggest one day shifts in the last 10 years and also a 3X increase in average volumes.



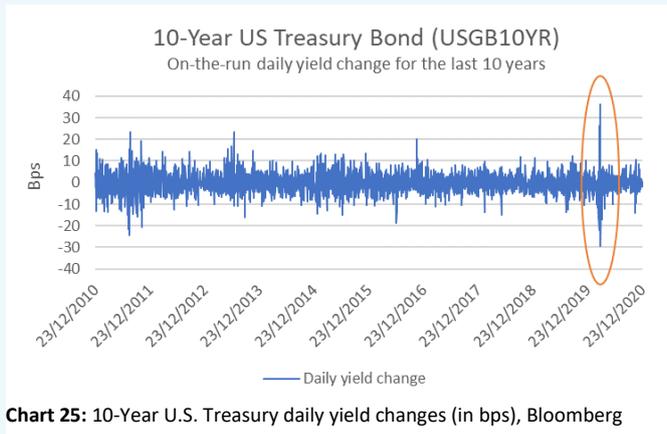
Given this remarkable period in March 2020 how did the LCH Ltd EquityClear margins evolve? The evolution of margins and the impact of volume activity on the margin is depicted in **Chart 24**.

The chart illustrates that EquityClear IM peaked at GBP 8.2bn on March 20, 2020, approximately +133% increase from the beginning of the month (GBP 3.5bn to GBP 8.2bn). However, when stripping out the volume impact, the margin increase attributable to LCH’s risk models is gradual, rising to only GBP 4.6bn by March 20,

2020 (+16% from the beginning of the month). In the case of cash equity clearing, the biggest driver of peak margin requirements during the first 3 weeks of March are due to participant activity and not CCP activity. By the end of March as volumes returned to more normal levels so did the margin requirement. In these types of markets, it seems wise for participants to model changes in volume when stress testing their liquidity needs.

9.1.2 MARKET CASE 2 – INTEREST RATE SWAPS

LCH Ltd.’s SwapClear service clears hundreds of interest rate products in 27 currencies, encompassing tenors stretching from one month to 51-years, referencing dozens of different benchmark rates. SwapClear provides the deepest liquidity in the OTC interest rate swap market providing broad access to the “vanilla” IRS market. Given the size and scale of the service it seems a good candidate to examine how the margins evolved during the volatility of March 2020. The margin attribution calculations performed for EquityClear (*described above*) have been performed for SwapClear over the identical period.



Firstly, we will examine the state of the rates market during this period to provide some context on how volatile the period was. **Chart 25** depicts the daily movement in the 10-year U.S. Treasury Bond yields over the last 10 years. U.S. Treasury yields provide a good barometer on the state of the global rates market.

March 2020 had the biggest one day shifts in the last 10 years in both directions (rally and sell off).

Given this remarkable period in March 2020 how did the LCH Ltd SwapClear margins evolve? The evolution of margins and the impact of volume activity on the margin is depicted in **Chart 26**.

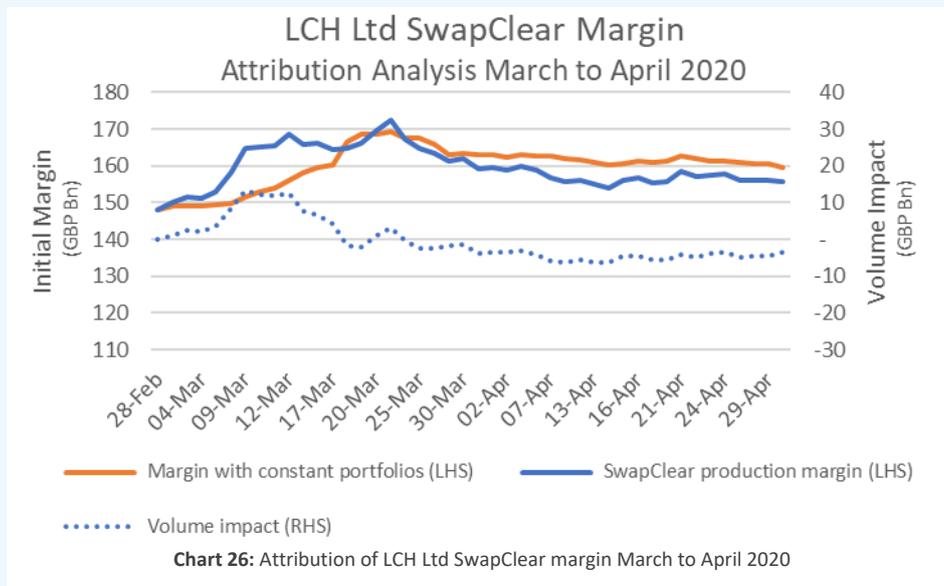


Chart 26 is similar pattern to **Chart 24** (EquityClear) where a surge in volume drives the margin requirement up to almost GBP 170bn (+12%) by March 12, 2020. However, when stripping out the volume impact, the margin increase attributable to LCH’s risk models are (again) more gradual, rising only (+4%) by March 12, 2020 then peaking in the last week of March (+14%), thereafter stabilizing during April at (+8%) from the beginning of the period.

Similar to the equity case study (9.1.1), participants in the rates markets should be mindful to factor in sudden increases in volume when estimated liquidity needs in stressed market conditions.

9.1.3 SUMMARY

The above analysis has provided deeper insight into two significant markets that a CCP serves. Both cases have shown that the activity from participants will have a considerable bearing on the margin requirements demanded from a CCP. It follows that adding volume effects to participant liquidity stress testing regimes may be beneficial to better size potential liquidity draws from CCP margin calls. The CCP risk models will also have an influence on the required margins from participants but in these two cases during March 2020 the impact has been unexceptional.

10. SOFR SWITCH DURING THE CC

As we explored in section [6.2](#), the SOFR switch which took place at CME and LCH during the CC was managed with no impact to CMs. The following case studies explore how both CCPs facilitated this switch during the unprecedented challenges of the 2020 CC period.

10.1 CASE STUDY: SOFR SWITCH – CME PERSPECTIVE

CME has been an active participant in the work of the ARRC right from the start. In support of SOFR adoption, CME launched futures and options contracts based on SOFR for trading and clearing and also added a suite of SOFR based OTC swaps products available for clearing. CME further supported the transition plan by planning for and converting the discounting rate on cleared USD swaps Fed Funds to SOFR. In similar fashion, CME also converted the discount rate on EUR denominated swaps from EONIA to ESTR in July 2020, and is converting the discount rate on all other swaps which use Fed Funds to SOFR, including swaps based on non-deliverable currencies and Mexican Peso. Additional efforts that are planned in support of the transition include the launch of a SOFR Term Rate prototype and implementing fallbacks and a conversion mechanism in preparation for LIBOR cessation.

In terms of the discounting conversion carried out successfully on March 16-19, 2020, this was a cross-industry initiative involving hundreds of client conversations, dozens of panels, an all-day tabletop exercise organized by the Market Risk Advisory Committee of the U.S. Commodity Futures Trading Commission, and much education and preparation. Because of this, the transition day itself was trouble free from an operational standpoint. Following the standard end-of-day cycle on September 16, 2020 using EFR discounting/Price Alignment Amount on Friday, CME generated a discounting transition report that provided the net present value (“NPV”) of all trades under SOFR discounting and corresponding cash adjustment amounts needed to account for the change in discounting rate. To neutralize the value transfer from the change to SOFR discounting, CME processed a cash adjustment equal and opposite to the NPV change on each trade in all accounts.

By changing the discounting curve, CME effectively moved the discounting risk of all participants from EFR to SOFR. To mitigate re-hedging costs, CME booked a series of EFR/SOFR basis swaps to each participants’ account. These basis swaps approximately restored participants back to their original discounting risk profile at the portfolio level.

On the morning of Monday, October 19, 2020, CME offered and facilitated an auction for participants looking for an efficient way to unwind unwanted basis swaps. The auction had broad participation (approximately 200 participants) and strong, stable bidders. Operationally, the auction, which was run on CME’s default management platform, experienced no issues, despite being run by staff working remotely.

Since the discounting conversion, participation in CME’s cleared SOFR swap market has continued to grow. The number of participants clearing SOFR swaps has gone from some 60 participants to more than 320 as at the time of writing, with more than USD 458bn notional cleared. In addition, CME’s SOFR futures have seen continued growth since launch, which as at the time of writing, have an open interest of over 761K contracts.

10.2 CASE STUDY: SOFR SWITCH – LCH PERSPECTIVE

The process to convert all USD-discounted trades in LCH’s SwapClear from Fed Funds to SOFR discounting was designed to enable the industry-wide targeted transition whilst maintaining a stable and normal functioning market.

A like for like comparison of centrally cleared portfolios, with USD exposure through discounting, would show a change to its monetary value as well as discounting risk, before and after the switch to SOFR. The design of the switch process was therefore aimed at minimizing the impact to the members and clients from changes to those two portfolio characteristics. The process was discussed at length with members and clients and communicated in advance to the broader market over the 12-18 months leading to the switch.

What were the LCH process steps to convert to SOFR discounting (over the weekend of October 16, 2020)?

There were 4 key process steps which ran from Friday October 16, 2020 to Monday October 19, 2020:

- **Fri. 16-Oct:** Auction and calculation of cash compensation amounts
- **Sat. 17-Oct:** Booking of cash compensation amounts, compensation swaps and auction proceeds.
- **Mon. 19-Oct:** Implementation of SOFR discounting at opening, impacting all existing and new registered trades with USD-discounting.
- **Tue. 20-Oct:** Settlement of compensation amounts and auction proceeds

How many trades / notional was affected?

The steps executed over the transition weekend impacted approximately USD 120tn of USD-discounted outstanding notional of LCH product.⁵³ Most of the impacted contracts were USD IRS, USD denominated inflation swaps and non-deliverable IRS.

What did the compensation payments represent?

The change of reference discounting from Fed Funds to SOFR would give rise to gains/losses in respect of the valuation of USD-discounted portfolios. To ensure that counterparties were neither gainers or losers, compensation payments were processed, which guaranteed that before and after the switch, all else equal, portfolio values remained unchanged.

What did the compensating swaps represent?

In addition to the potential change in value of the portfolios from using a different discounting curve, the switch to SOFR discounting would have implied a change to the risk profile of the portfolios. For example, if before the switch, a portfolio was exposed to price changes in USD Libor and Fed Fund rates, then after the switch it would result in exposure to USD Libor and SOFR rates moves.

To protect the members and clients against price moves around the switch to SOFR, compensation swaps were booked to neutralize the resulting additional SOFR exposure, and maintain the Fed Funds exposure as in the pre-switch state, in the form of Fed Funds vs. SOFR basis swaps.

Why did LCH need to auction some of these compensating swaps?

It was recognized in early discussions that some clients preferred to avoid receiving compensating swaps, due to unwanted operational overhead and/or de minimis basis exposure. As such LCH gave clients the choice to opt into receiving the compensating swaps or not. The remaining unsubscribed basis swaps were sold using a competitive auction within the LCH membership.

How big was the auction and was it successful?

The remaining basis swaps were aggregated into 6 maturity buckets from 2-30Y with net notionals of up to USD 14bn per bucket, adding to less than USD 23bn in total.⁵⁴

The success of the auction was demonstrated by:

1. Oversubscribed auctions for all maturities;
2. Competitive bidding with tight bid/offer;
3. Operational smoothness.

Given the novel event, were there any operational issues over the weekend?

The seamless transition to SOFR discounting, was the culmination of many months of work with members and clients. The steps required for a successful switch were completed within targeted timelines, and without impact on the opening of the clearing service for business as usual on Monday October 19, 2020.

⁵³ Source: [Financial Stability Oversight Council, 2020 Annual Report](#)

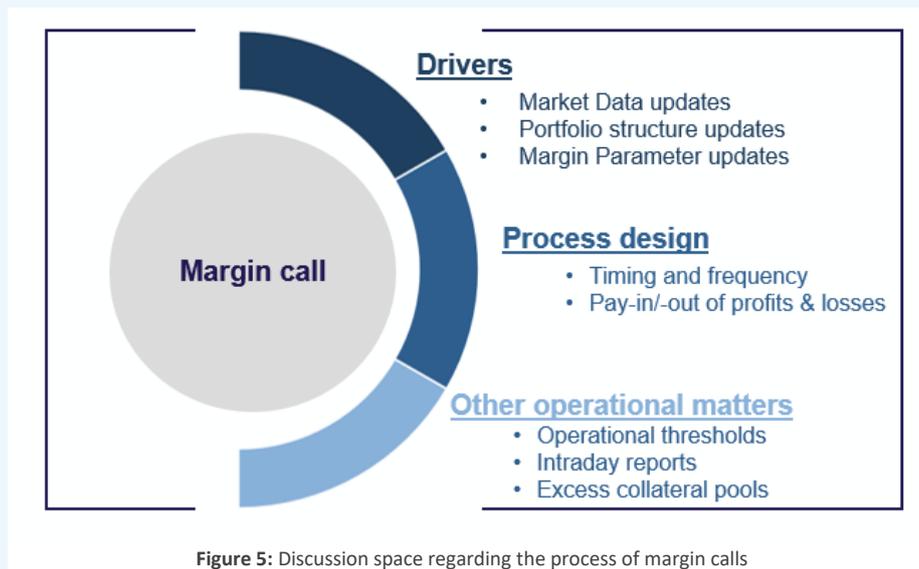
⁵⁴ Source: LCH website (October 16, 2020). [SOFR Discounting Auction Results](#)

11. MARGIN CALL PROCESS AT CCPS

11.1 CASE STUDY: MARGIN CALL PROCESS AT EUREX

The CC represented a real stress test for the financial market architecture resilience with central clearing playing a greater role since the GFC. This case study focuses on Eurex Clearing AG’s intraday margin calls, its main drivers, process design and other important operational matters. It leaves out of scope the matter of cyclical of margin models – a factor which has a limited impact on the intraday margin call process of Eurex Clearing AG.

Eurex Clearing AG’s margin calls can be regarded as a function of three main groups of factors: drivers, process design and further operational matters. These factors define when and with which amount margin calls are issued to members.



Predictability of margin calls play a major role in current discussions. In the following section, we will outline that full predictability is impossible due to the fact that markets are innately, *by design*; unpredictable. However, the elements of Eurex Clearing AG’s approach noted above helps to achieve partial predictability.

11.1.1 MARGIN CALL DRIVERS

In general, margin calls are used to cover backward-looking margin exposures (e.g., premium payments, variation and current liquidating margin) and forward-looking margin exposures (IM).

11.1.1.1 MARKET DATA UPDATES

Together with portfolio structure and risk model parameters, market data serves as an important input for margin requirement calculation. Once a clearing day starts, market prices start changing. The price changes imply realized profits and losses. The settlement of profits and losses helps to prevent the build-up of uncovered exposure and represent a redistribution of liquidity in the financial market. Without the settlement of losses, a CCP carries a certain level of counterparty risk. Certainly, positions already existing since the last margin call cycle are already covered by IM. However, IM models are calibrated in a way to cover potential exposure for a time period which is needed to liquidate the positions in case of default. The MPOR is set according to the liquidity profile of the contract and the CCP’s capabilities during the DMP. In case significant intraday losses are not enforced in a timely manner, CCPs would need to tolerate these losses in the event of a member default prior to (or during) the next settlement cycle. This could lead to negative impacts on the DMP, since collateral might be insufficient and eventually this could place the

DF contributions at risk. This shows that even though IM and VM are clearly separated, when it comes to intraday profits and losses, the margins are closely linked in their purpose of collateralizing uncovered exposures of CCPs.

11.1.1.2 PORTFOLIO STRUCTURE UPDATES

Any portfolio structure changes might require additional collateral to cover new exposures as quantified by IM. Due to the open offer principle for ETD cleared by Eurex Clearing AG, market participants are allowed to enter positions without being obliged to prefund the exposures. For OTC derivatives cleared by Eurex Clearing AG, due to the absence of high-frequency trading, novation principles ensure that portfolio changes only happen to an extent that Eurex Clearing AG is willing to accept it for clearing. Eurex Clearing AG allows certain buffers according to its risk appetite but does not clear OTC derivatives exceeding these thresholds without prefunding.

Similarly, as market prices change, portfolio structure changes can be performed at any time of the clearing day. Regardless of the timing approach chosen for margin calls, any time period without the enforcement of IM may place CCPs in a position to bear all new exposures, to the extent that the portfolio changes increase IM requirements and no excess IM is available, arising during the liquidation of the portfolios in case of a default.

11.1.1.3 MARGIN MODEL PARAMETER UPDATES

The increased volatility and ongoing extreme market movements during the onset of the CC resulted in an IM increase, to reflect the change in market regime. Eurex Clearing AG’s applied APC controls worked in a way that the IM increased gradually and not to the same extent as the volatility. *Table 1* provides information on the Initial Margin Maximum Rate of Change (“IM MRC”) over one day of the last two years for selected popular products at Eurex Clearing AG. It can be observed that there have been significant maximum day-to-day changes of around 11-26%. Next to the IM changes, for Eurex Clearing AG, the severity of the 1-day margin breaches is reported as the Loss to Margin Ratio (worst 1-day Loss/IM). For the selected products, the breaches reach a severity of 154% Loss to Margin Ratio. Such quantitative disclosures on product level provide KPIs for procyclicality and backtesting. Furthermore, the figures help to understand potential liquidity needs.

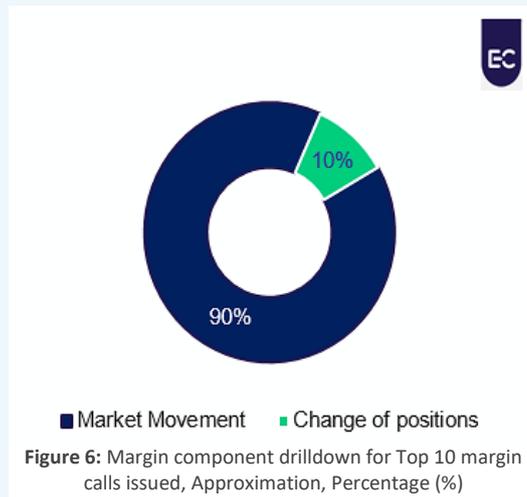
Product ID	Product Name	MPOR	Target C.L.	Breaches	Long		Breaches	Short	
					LTMR	IM MRC		LTMR	IM MRC
FESX	EURO STOXX 50 Index Futures	3	99.00%	2	103%	16%	0	0%	18%
FGBL	Euro-Bund Futures	2	99.00%	1	103%	24%	0	0%	11%
FBTP	Long-Term Euro-BTP Futures	2	99.00%	2	154%	20%	1	105%	26%

Table 1: Product level margin procyclicality and backtesting KPIs

While intraday market and position data inevitably changed during the March 2020 stressed market conditions, there were no extraordinary model parameter updates performed at Eurex Clearing AG. Therefore, the observable margin changes induced by the unexpected market or portfolio events were ex ante predictable to a maximum extent, as the model was transparent and calibration did not change.

11.1.1.4 RELATIVE IMPACT OF DIFFERENT MARGIN CALL DRIVERS

Figure 6 shows the components driving intraday margin changes for Eurex Clearing AG’s top ten margin calls during 2020’s market turmoil. The figures provide an indication that **during March 2020’s extreme market turmoil, market movement was mainly driving the intraday margin calls** at Eurex Clearing AG during the unprecedented stressed market conditions. Intraday margin calls predominantly enforced realized losses from existing positions, i.e., variation and premium margin. This indicates that position changes only played a minor role for top margin calls during this period as observed by Eurex Clearing AG.



With regards to predictability, Eurex Clearing AG’s provision of near to real-time margin reports enable members to monitor the risk situation closely. Furthermore, transparency on the drivers and timing approach helps to predict the timings and amounts of intraday margin calls. Eurex Clearing AG’s approach, where unpredictable parameter adjustments were avoided, the information on operational thresholds and the clear rules of intraday margin calls were available, ensured that the processing was performed as predictable as possible while having unpredictable markets.

Take-away: During March 2020’s extreme market turmoil, market movement was mainly driving the intraday margin calls at Eurex Clearing AG.

11.1.2 MARGIN CALL PROCESS DESIGN

Next to the margin call drivers which mainly define margin figures, the process design is a crucial variable for margin calls. The process design defines when but also with what volume margin calls are issued to members.

11.1.2.1 TIMING AND FREQUENCY OF MARGIN CALLS

Whilst the existence of end of day margin calls is the common denominator of all CCPs, there are various approaches to intraday margin call processes, including in regard to their timing. Eurex Clearing AG distinguishes **scheduled** margin calls, and for unscheduled calls between **ad-hoc** and **event-driven** intraday margin calls. The term ad-hoc implies that the margin calls are purely unpredictable in its nature while event-driven margin calls work as a reaction to observable changes. The changes – *market and portfolio data changes* – can be observed by both the Eurex Clearing AG and its market participants, allowing each to prepare for these margin calls despite being unscheduled. In contrast, ad-hoc margin calls are driven by discretionary model parameter changes performed by Eurex Clearing AG.

From Eurex Clearing AG’s perspective, it is rational to enforce all emerging uncovered exposures as soon as possible. Additionally, EMIR requires assessment and measurement of liquidity and credit exposures on a near to real-time basis. On the other hand, Eurex Clearing AG’s members are also interested in a resilient CCP, as their DF contributions are at stake. However, CM’s liquidity management may be stressed in case of changes in liquidity needs. Hard deadlines, difficulties to pass on margin calls to clients and unsynchronized calls of different CCPs are additionally causing operational hurdles as reported by members.

What is the appropriate frequency for margin calls?

Market participants, regulators and CCPs have different perspectives on this question. However, they share the same objective of having stable financial markets. There is a broad range of alternatives. One alternative is to have no margin calls at all. Such an environment resembles a part of the uncleared ecosystem a decade ago. Without passing through profits and losses and without collecting collaterals for possible future losses, market participants are open to the full hazards of counterparty risk. The past has shown us that such an approach bears high systemic risks and that central clearing targets to reduce it significantly. Regular settlements of profits and losses and collateralization of potential future exposures are cornerstones of the central clearing model.

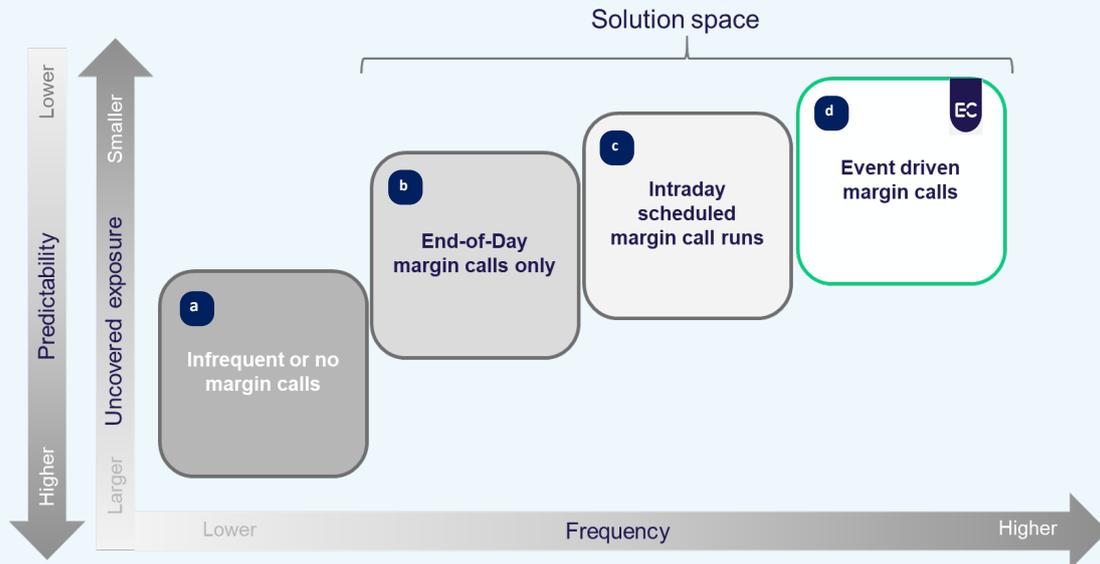


Figure 7: Possible modes of margin call process design

Formerly, in the uncleared space, bilateral agreements have only foreseen infrequent, if any at all, collection of margins. While there is no discussion in the industry of an approach where CCPs would go for extended periods of time without collecting margins, in case of defaults, the exposures that would accumulate where margins are not collected over such long periods bears great uncertainty as to whether CCPs could take over the obligations for their members’ portfolios. Theoretically, for CCPs to be confident in fulfilling their purpose, margin figures for potential future exposures would need to reflect this long holding period and be excessively high, making central clearing unattractive and inefficient. Theoretically, monthly or weekly settlement runs are imaginable but considering potentially quickly changing market conditions, the current industry practice is that CCPs establish at least daily cycles. There is no discussion for extending the time period to multiple days, especially given the clear implication for MPOR parameter of IM. Current discussions rather question the intraday frequency and timing of intraday margin calls.

To investigate the topic of approaches to intraday margining in the context of Eurex Clearing AG, we have analyzed the actual development of a margin pool's intraday uncovered exposure during one of the most volatile days in March 2020. For example, on this day the *EuroStoxx 50* plummeted sharply by 12% (see **Chart 27**, below) – the large price move resulted in triggering high VM flows on products with this underlying.

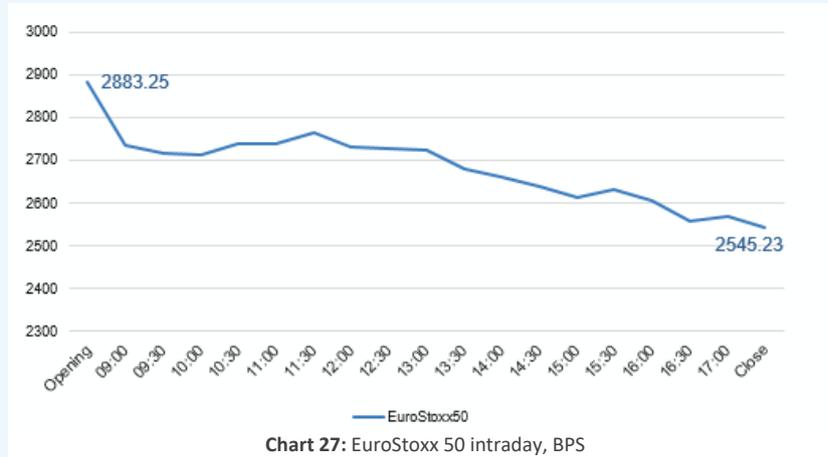


Chart 28-30 show the development of the intraday uncovered exposure of a theoretical margin pool for one CM in March 2020 at Eurex Clearing AG using various margin collection approaches. **Chart 28** represents the intraday uncovered exposure if there were **no intraday margin calls**. In this specific case, the intraday exposure increases throughout the day utilizing up to 50% of the collected IM. In this case, a CCP faces significant uncovered exposures until the end of day cycle, which means, that in case of a concurrent default, the CCP would be left with forward-looking margin levels strongly depleted and respectively, effective MPOR much lower than intended. As outlined before, the exposures might not solely be uncovered losses but changed portfolio structures as well.

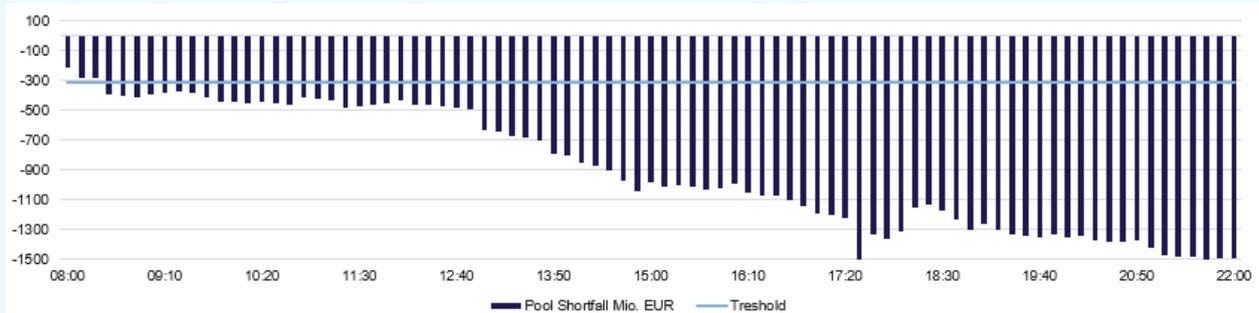


Chart 28: Reconstructed intraday risk exposure of one clearing member in March '20 in case no intraday margin calls performed, EUR (Millions)

Alternatively, intraday margin calls could be performed on a **scheduled basis** for all margin pools exhibiting uncovered exposures at the determined time. This way the frequency and points in time can be chosen deliberately, which also ensures predictability to a great extent. **Chart 29** shows the intraday risk exposure development of the respective theoretical margin pool at Eurex Clearing AG when using a scheduled intraday margin call at 13:00 CET. For this specific case, already one intraday margin call significantly reduces the potential intraday exposure piling up at Eurex Clearing AG. Still, the uncovered exposure reaches levels of approximately 20-30% of the collected IM.

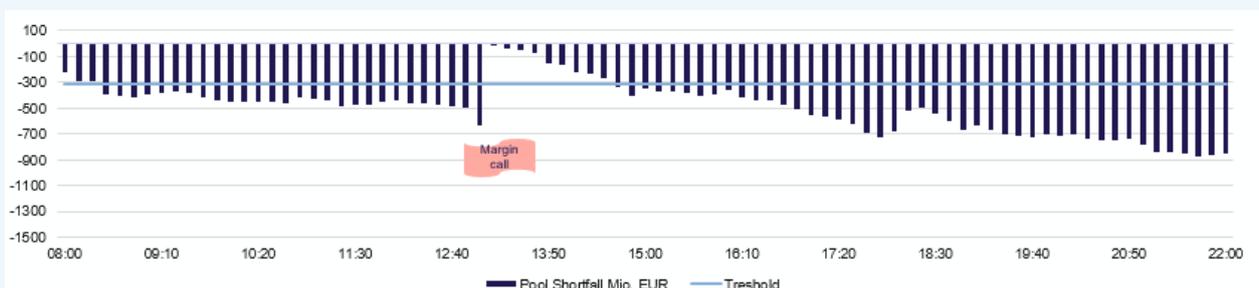


Chart 29: Reconstructed intraday risk exposure of one CM in March '20 in case of one scheduled intraday margin call performed, EUR (Millions)

When using scheduled margin call cycles intraday, another alternative is to complement these with event-driven intraday margin calls in case of extreme market events. **Chart 30** represents exactly this approach which is used by Eurex Clearing AG. On this very volatile day, the respective margin pool breached its operational threshold of 10% of the initial margin three times. Certainly, this results in significant operational efforts for Eurex Clearing AG’s members. However, likewise, the extent of uncovered exposure at CCPs is lowered significantly too.

The combination of scheduled and event-driven intraday margin calls allows for choosing a lower frequency of regular margin call cycles but also allows Eurex Clearing AG to constantly monitor risk exposures and to intervene in case operational thresholds are breached. During normal market conditions, the same advantages of scheduled margin call cycles apply. The only difference is that during extreme market events, Eurex Clearing AG reserves the right to intervene in order to not bear such high uncovered exposures. Generally, the approach resolves the issue of Eurex Clearing AG not being able to limit its uncovered exposures. However, especially in case of extreme market events such as 2020’s market turmoil, Eurex Clearing AG would stress market participants with unscheduled margin calls. This lowers the predictability of intraday margin calls. It is a question of what amount of uncovered exposures Eurex Clearing AG is willing to take until the next scheduled cycle takes place. A discussion of operational thresholds of margin calls will be covered below.

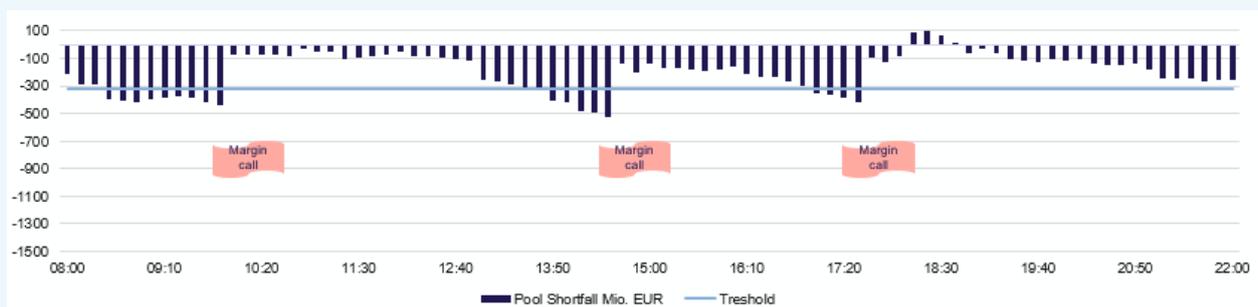


Chart 30: Actual intraday risk exposure of one CM in March `20 with event driven intraday margin calls with operational thresholds, EUR (Millions)

A combination of scheduled margin call cycles and event-driven margin calls, as Eurex Clearing AG employs, bears the same disadvantages as only having event-driven margin calls: similarly, as the markets, the margin call timings of event-driven calls are not fully predictable. Nevertheless, only using event-driven margin calls has an upside. All collateral shortfalls below a certain threshold would be accepted by Eurex Clearing AG and no actions would be needed. Risk exposures can be monitored constantly by both market participants and Eurex Clearing AG. Under a purely event-driven approach, once the threshold is breached, Eurex Clearing AG would proactively contact the clearers, offering them to provide any eligible collateral or to resolve the shortfall using the CCPs *power of attorney*. In the context of Eurex Clearing AG, an **event-driven** approach would not necessarily result in a higher frequency of intraday margin calls, as calm market conditions or an active collateral management approach from a member’s side could potentially prevent any margin calls from being issued. Comparing the different margin call timing alternatives evaluated above, **there is a trade-off between predictability and uncovered exposures at CCPs.**

Take-away: There is a trade-off between predictability of timing for margin calls vs. uncovered exposures at CCPs and effective MPOR.

11.1.2.2 PAY-IN/-OUT OF PROFITS AND LOSSES

Another topic of discussion refers to the symmetry of margin collections and pay outs. Eurex Clearing allows non-cash collateral to cover intraday margin calls incl. the effect of market move (intraday VM). Passing through VM intraday in cash would therefore abolish any possibility to fund VM losses with non-cash collaterals or advantageous margin changes. Additionally, as VM can only be settled in product currency, paying out profits requires also enforcing VM losses in possibly illiquid product currencies during the trading day.

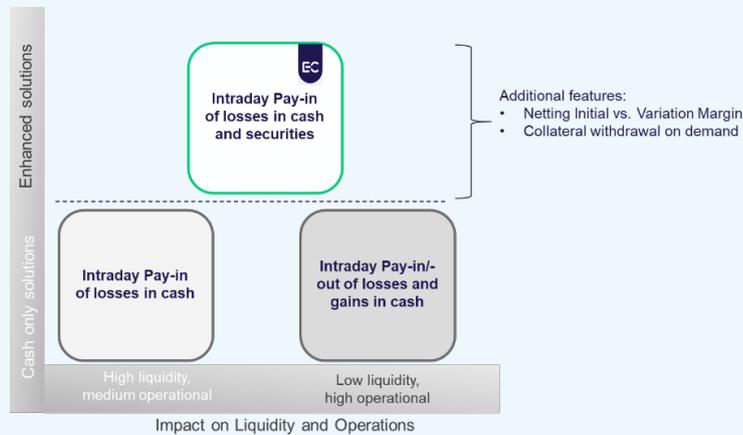


Figure 8: Possible modes of Pay-in/-out of losses and gains design

A combination of allowing non-cash collateral, not enforcing illiquid currencies and automatic VM settlement runs intraday is not possible. However, as shown in **Figure 8** the combination of event-driven intraday margin calls and ad hoc withdrawals allows both to a limited extent. At Eurex Clearing AG, the overall risk situation determines if intraday margin calls are issued or not. Furthermore, in case of a cash collateral surplus of a member at Eurex Clearing AG, withdrawals may be triggered when adhering to the defined cut-off times. At Eurex Clearing AG, VM profits are collateralized but only cash already deposited beforehand can be withdrawn. This approach allows using non-cash collaterals, while still enabling members to withdraw cash collateral in case it is not needed anymore.

Take-away: A combination of allowing non-cash collateral, not enforcing illiquid currencies and automatic VM settlement runs intraday is not possible.

11.1.3 ADDITIONAL OPERATIONAL MATTERS

Besides choosing an appropriate approach for timing and settlement practices, other aspects are impacting margin call processes and their perception. As previously described, the volume and timing of margin calls plays an important role in the margin call process design. To consider operational burdens, especially event-driven margin calls are subject to **operational thresholds**. These thresholds are set relative to the members' exposures at Eurex Clearing AG. Eurex Clearing AG's operational thresholds mainly define the frequency of margin calls in case event-driven risk management approaches are applied. The frequency could be lowered by increasing the thresholds of acceptable uncovered exposures. Still, the exact timings would not be predictable but there would be a lower number of intraday margin calls, also lowering operational burdens. Unavoidably the amounts of these intraday margin calls would be higher which may lead to even higher liquidity stress for members. Moreover, the increase of operational thresholds could induce them being breached later during the clearing day, limiting the choice of currencies to deliver. Additionally, the potential loss to the default waterfall increases likewise in case of member default.

With regards to the margin call volumes, Eurex Clearing AG's **intraday margin reports** are crucial to allowing members to monitor their exposure levels constantly. Particularly, for Eurex Clearing AG's event-driven margin call approach, the reports also serve to predict margin call timings since, event-driven margin calls are issued as a

reaction to unpredictable market movements or portfolio changes once operational thresholds are breached. A regular creation of intraday reports fundamentally supports that market participants and Eurex Clearing AG have the same picture. At Eurex Clearing AG, such reports are generated on a 10-minute basis. Especially for continuously rising exposures, these reports help to predict margin calls even before they are issued. Full transparency enables Eurex Clearing AG’s members to prefund collateral or to induce risk reducing actions as precautionary measures in case markets are moving against their portfolio or in case fundamental portfolio changes are planned.

The possibility to net IM and VM requirements when not having intraday VM settlements has been elaborated above. Additionally, the general netting level is worth mentioning. Regulators require collateral to be separated according to the chosen segregation models considering the porting possibilities in case of defaults. To avoid inefficient collateral allocations intraday, Eurex Clearing AG has developed a functionality which enables members to efficiently allocate cash collaterals to linked margin pools. At Eurex Clearing AG, a so-called **Excess Collateral Pool** has been established which allows depositing cash collateral which is then automatically distributed to margin pools which are in shortfall and booked back in case it is not needed anymore. Using this functionality market participants can provide cash collaterals to Eurex Clearing AG to cover intraday exposures without overcollateralizing each of their margin pools. This functionality presents one of the initiatives helping Eurex Clearing AG’s members to more efficiently manage collateral intraday and saving operational efforts. The objective of Eurex Clearing AG is not to be as overcollateralized as possible but to achieve an efficient coverage of exposures.

11.1.4 CONCLUSION

This case study elaborates on the margin call process at Eurex Clearing AG in the context of 2020’s market turmoil. Increased intraday margin calls were predominantly driven by market moves and respective realized losses in members’ portfolios at Eurex Clearing AG. Full predictability is not possible, due to uncertainty in nature of market moves. When it comes to the frequency of intraday margin calls, there is a trade-off between timing predictability vs. uncovered exposures at Eurex Clearing AG and ultimately MPOR. Furthermore, a solution with automatic intraday settlements of profits and losses is not compatible with allowing non-cash collaterals to cover intraday losses.

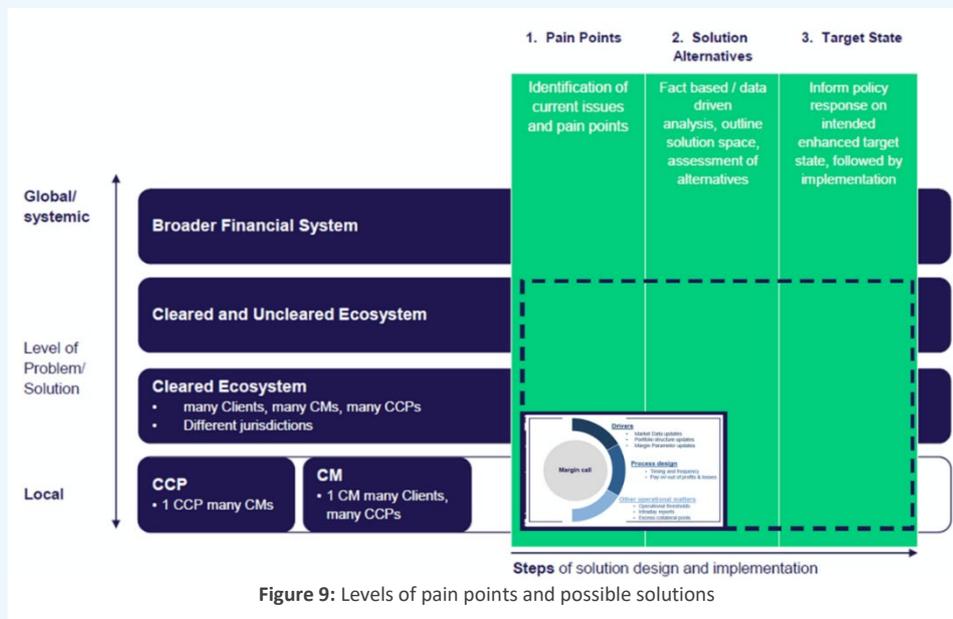


Figure 9: Levels of pain points and possible solutions

As outlined initially, the CC serves as an important dataset to validate the established practices employed in the central clearing environment in a meaningful way. However, the industry should use the CC to evaluate and enhance, where necessary, risk management practices. This evaluation should be done in a data-driven manner. Potential enhancements should be considered and evaluated given potential conflicting goals and possible trade-offs. Please see **Figure 9**.

11.2 CASE STUDY: MARGIN CALL PROCESS AT JSCC

The following case study provides a detailed description of the margin operation in JSCC's Listed Derivatives clearing service. JSCC calculates VM (i.e., change in mark-to-market and option premium in Listed Derivatives clearing services) and IM requirements at least once a day for all products and pays/receives them on the same day or next business day. For many products, JSCC routinely recalculates margin requirements, using the latest intraday market prices, and calls for the deposit of any shortfall. For all products, JSCC also requires the additional deposit of margin in the event of sudden intraday market fluctuations exceeding a pre-determined threshold.

All of the products JSCC clears are denominated in Japanese yen, and JSCC requires Clearing Participants (i.e., the AMR report more broadly uses the term CM) to deposit VM in Japanese yen cash. For other margin, Clearing Participants may deposit not only Japanese yen cash, but also highly liquid securities, such as Japanese Government Bonds.

11.2.1 INITIAL MARGIN

For Listed Derivatives, JSCC calculates IM to cover Potential Future Exposure (“PFE”) for all accounts held by each Clearing Participant, both proprietary and each customer account, based upon various notifications that may result in a change in their net position for each account – such as give-up notification or allocation/close-out reports – filed by each Clearing Participant after the close of the day session. IM requirements are then reported to each Clearing Participant at around 19:30.⁵⁵ Any shortfall in the IM reported to the Clearing Participants is required to be deposited by 11:00 on the next business day.

11.2.2 VARIATION MARGIN (CHANGE IN MARK-TO-MARKET & OPTION PREMIUM)

JSCC reports the change in mark-to-market and option premiums that cover the current exposure of each Clearing Participant's Listed Derivatives, at around 19:30. Clearing Participants with losing positions are required to pay VM by 11:00 on the next business day. JSCC then makes payment to Clearing Participants with winning positions at or after 13:00.

11.2.3 INTRADAY MARGIN

For Listed Derivatives, JSCC manages its intraday risks using the following three types of intraday margin calls, which cover PFE and CE.

1. **Scheduled Intraday Margin:** PFE and CE are recalculated based on the market prices and positions as of 11:00 every business day, for each Clearing Participant. Any collateral shortfall arising from these calculations is required to be deposited by 14:00. This provides Clearing Participants with a 3-hour window (during Tokyo business hours) to perform their margin operations. JSCC deems this reasonable to mitigate any funding stress on the side of Clearing Participants.
2. **Emergency Margin:** When the difference between the market price of any of the benchmark products as of 11:00 and 13:00 exceeds a certain threshold prescribed in the rulebook, JSCC recalculates each Clearing Participant's PFE and CE based on the market price as of 13:00. Any collateral shortfall arising from such calculation is required to be deposited by 16:00. As with the Intraday Margin framework, this provides Clearing Participants with a 3-hour window (during Tokyo business hours) to complete their margin operations.

⁵⁵ Thereafter, a Clearing Participant may also file additional notifications that are necessary but could not be filed prior to the IM calculation. For such a case, JSCC updates the IM requirements, reflecting such additional notifications, and reports the updated IM requirements around 06:00 on the next business day.

For both Intraday Margin and Emergency Margin, if a Clearing Participant’s collateral shortfall does not exceed a certain de minimis threshold prescribed in the rulebook, a collateral deposit is not required. This reduces the operational burden on JSCC’s Clearing Participants, without exposing JSCC to any undue risks.

- Emergency Margin for Specified Party: PFE and CE are calculated on a real-time basis, for each Clearing Participant. If there is a collateral shortfall exceeding a pre-determined threshold prescribed in the rulebook, between 9:00 and 13:00, the shortfall is required to be deposited within 3 hours. After 13:00, JSCC could suspend clearing for the relevant Clearing Participant if their collateral shortfall exceeds a separately established threshold. This is because there would be insufficient time available (less than 3 hours) for the relevant Clearing Participant to meet a margin call, due to the current practices of settlement in Japan.

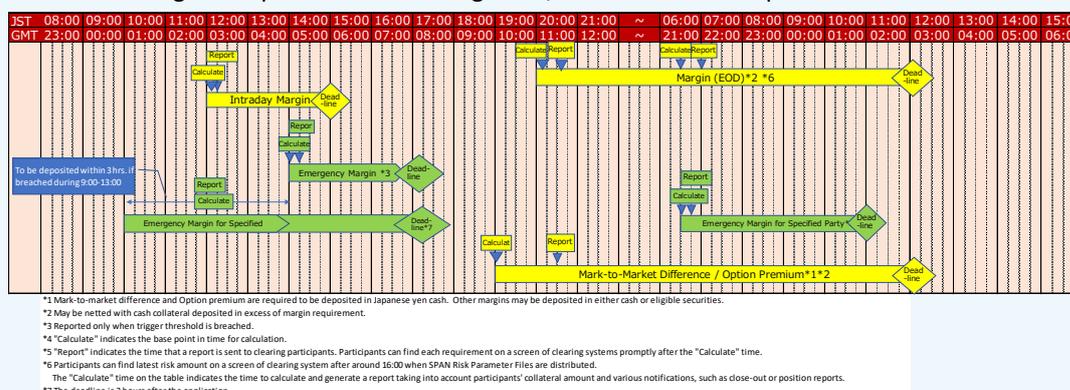


Figure 10: JSCC IM Deadline (ETDs)

11.2.4 LESSONS LEARNED BY PANDEMIC CRISIS

JSCC FROM THE COVID-19

Due to the market disturbances in Spring 2020 caused by the CC, limiting CCP margin procyclicality has been a focus for both the users of clearing services and regulators.

During the market turmoil, JSCC successfully operated all of its Intraday Margin frameworks without any identified issues. This is because all of JSCC’s margin frameworks are highly predictable and are called at predetermined times, as prescribed in the rulebook for JSCC’s Listed Derivatives clearing service.

Even during the most stressed times, JSCC maintained the transparency of its trigger thresholds and considered Clearing Participants’ operational burden, as well as the practices of Japanese settlement systems. All of which operated as prescribed in the rulebook for JSCC’s Listed Derivatives clearing service, without relying on the discretion permitted by JSCC.

JSCC understands that these measures may have contributed to limiting the procyclicality of the margin call process. In 2020, JSCC has also revised the margin calculation method for Listed Derivatives. In addition to the fact that parameters were already subject to a floor of multiple lookback periods, JSCC extended the MPOR for financial derivatives to 2 business days for both house and customer accounts. With a view to containing the procyclical effect further, JSCC also employed a period of stress in the calculation of the parameters for crude oil futures. JSCC will continue to review the effectiveness of its margin methodology in view of APC.

11.2.5 NETTING ON PAYABLE CASH FOR VM AND EXCESS COLLATERAL DEPOSITS

Clearing Participants are allowed to net the payable VM against excess cash collateral that exceeds their IM requirement, which may reduce the funding burden resulting from margin calls.

This functionality is available as an option to each of JSCC’s Clearing Participants, for each of their accounts – proprietary accounts, individually segregated affiliate/client accounts, and gross omnibus affiliate/client accounts.

This beneficial functionality is available to JSCC's Clearing Participants that clear a wide variety of listed derivatives in each of the following two categories:

1. Those under the jurisdiction of the Financial Services Agency, and;
2. Those under the jurisdiction of the Ministry of Agriculture, Forestry Fisheries & the Ministry of Economy, Trade and Industry.

This functionality mitigates possible funding concerns when expanding clearing into new products in each of these two categories.

12. CCP OPERATIONAL RESILIENCE DURING A GLOBAL HEALTH CRISIS

The continuity of services is critical to CCPs, and therefore all CCPs around the globe have set up BCPs in order to prepare for different types of events that could disrupt their operations, which are tailored according to their needs and can be implemented to minimize or negate any impact on business services. Across the board, CCPs were called to implement their BCPs during the CC, in order to ensure the resiliency, availability and stability of the ongoing business and clearing and IT operations. Under strict government lockdowns, remote working environments (WFH, secondary or tertiary sites) and coupled with the extreme market volatility, CCPs' managed to operate business as usual, despite these significantly stressed operational factors to maintain core clearing system availability (as seen in Section [6.1](#)). The following case study explores key aspects of these operational features in further detail.

12.1 CASE STUDY: CCP RESILIENCE AND BCP DURING THE CC AT SHCH

The continuity of services has always been a cornerstone of the CCP offering and consistently considered in CCPs' processes and planning to provide for business continuity in times of stress. Take the Shanghai Clearing House ("SHCH") as an example, which is the focus of this case study and its subsections. Immediately after the COVID-19 outbreak, facing unprecedented challenges including delayed market opening, office buildings lockdown, remote access to systems and communication arrangements interruption, SHCH quickly deployed its business continuity plan, demonstrating the operational resilience of CCPs in response to such crisis.

This is just one example of a CCPs' quick and active response to such a crisis whereby the BCP's general plan is to provide prudent continuity of clearing functions and working guidance to personnel during the event of a significant crisis such as the COVID-19 pandemic.

12.1.1 TIMELY SYSTEM ADJUSTMENTS IN RESPONSE TO DELAYED OPENING OF THE MARKET

In response to delayed opening of the China inter-bank market after the Chinese Spring Festival due to the outbreak, SHCH made emergency adjustments to its core business systems, involving high-volume business data processing. For example, within the IRS clearing service, SHCH enacted interim measures to adjust cash flows and interest payments. Marked-to-market and margin values of IRS contracts with gross notional outstanding over RMB 24tn, were recalculated to adapt to temporary market calendar changes. The updated systems were launched in the very short timeframe of 5-days, helping to ensure the smooth market operation of after reopening.

This marks a very successful adjustment during critical times of stress in order to ensure market participants were minimally impacted by the turbulent period.

12.1.2 PROVIDING CONTINUOUS SUPPORT FOR MARKET PARTICIPANTS

SHCH remained in constant contact with market participants without reducing service operations, especially with regard to participants located in the most impacted regions, providing them with 24-hour consultative support to aid and adapt their business processes to remote operations. SHCH also developed contingency business procedures to help market participants to process secondary market settlements, non-trade transactions and other services via various channels including e-mails and recorded calls.

Furthermore, contributing to the fight against the pandemic, SHCH fully exempted the annual membership fees, clearing fees across all products, bond issuance fees and interest payment service fees for all financial institutions located in worst-hit areas, benefiting more than 150 financial institutions.

12.1.3 EMERGENCY TECHNICAL SOLUTIONS IN ACCORDANCE WITH BCP

To ensure the continuous operation of SHCH business systems, development and testing environment, and office environment during the outbreak, SHCH quickly launched the following emergency technical solutions in accordance with SHCH's business continuity plan:

- Formation of a specialized technology team working closely with the telecommunications infrastructure in order to develop an emergency 4G Virtual Private Dial-up Network remote access solution for business systems, IT development and test environment;
- Optimization of secured remote access to OA systems, expanding maximum concurrent users' capacity to over hundreds; and
- The deployment of a multi-party conference system, ensuring the standardization of corporate governance decision-making procedures while keeping social distancing.

12.1.4 WORKING ENVIRONMENT ARRANGEMENTS AND LOGISTICS SUPPORT PLAN

In accordance with government requirements on epidemic prevention and control, SHCH formulated a detailed work arrangement and logistics support plan.

- **Daily health reporting mechanism:** Daily summary of the health status of each employee, including the temperature of the employee and family members, and whether there is any abnormal health situation in employee's residential area.
- **Split teams:** Teams were divided by two or three (depending on the team size), the importance of the business function and the available working environments. Except for a few critical positions, most employees were asked to work from home or back-up locations at other sites.
- **Rotating teams:** Teams on critical functions took rotation in a timely manner, without having physical contact with the other teams in order to reduce any risk of cross-infection.
- **Quarantine:** Employees who travelled outside of the respective country or to regions at risk, have been required to work from home for a quarantine period (14-days) before being permitted back to the office.
- **Logistics support plan:** SHCH conducted frequent sanitization and ventilation of office premises and canteen facilities. SHCH regularly provided employees with protective gear including masks, goggles, gloves, and antimicrobial wipes to ensure the safety of SHCH employees and their families.

13. CCP LAUNCH & BUSINESS EXPANSION DURING COVID-19

13.1 CASE STUDY: SAUDI STOCK EXCHANGE LAUNCHES DERIVATIVES MARKET AND CCP

13.1.1 THE SECURITIES CLEARING CENTRE COMPANY – MUQASSA

The Securities Clearing Center Company Muqassa, a subsidiary of the Saudi Stock Exchange Tadawul, achieved the recognition from the Capital Market Authority on January 14, 2020 as a Qualified Central Counterparty (“QCCP”) to operate in the Kingdom of Saudi Arabia. This case study focuses on Muqassa’s launch.

As one of the G20 economies, Saudi Arabia is going through a tremendous amount of change across various sectors of its economy in order to implement the Kingdom’s Vision 2030.⁵⁶ The establishment of Muqassa was one of the Kingdom’s Financial Sector Development Program (“FSDP”) initiatives to realize Vision 2030.

FSDP initiatives will set along with other objectives the bases to support:

1. The formation of an advanced financial and capital markets - open to the World;
2. The launch of derivatives market;
3. Deepening the liquidity of the markets by listing private companies and state-owned enterprises;
4. Introducing an array of products to allow greater funding opportunities; and
5. Facilitate access to investment and trade in the Saudi stock markets.

13.1.2 LAUNCH OF MUQASSA AS A QCCP AND MT30 INDEX FUTURES

A cornerstone of transforming the capital markets in Saudi Arabia was to launch Muqassa as a financial institution and CCP that shall take on counterparty credit risk between parties, provide clearing and settlement services and post trade activities for the trades executed on the Saudi Exchange. Following Muqassa’s strategy, the clearing service started with ETD, clearing MT30 Index Futures Contract and a variety of other products shall follow at latter stages.

Prior to the CC, there was an ongoing aura of excitement with various activities in the organization taking place with the teams gearing-up with relevant activities, meetings, tests, and workshops for members. All teams were looking forward to meeting the targets to launch Muqassa’s CCP, that was planned to go live soon after the first half of the year. However, as the world encountered, there was a dramatic impact after the second week of March when COVID-19, began evolving into a severe threat to all nations and was subsequently declared a global pandemic by the WHO.

Despite the tremendous challenges, Muqassa was launched on August 30, 2020, taking various precautions and strict safety measures to ensure a smooth and secure activation in the market. This was a historical event for Saudi Arabia financial markets and for

Market cleared by Muqassa

Muqassa started its operation in the Saudi market clearing exchange traded Index futures with the target to cover Tadawul remaining markets (Equities, FI & Exchange traded funds) in 2021. Clearing one of the top 10 market in the world.

SF30 index futures contracts are based on MT30 index that is jointly built with MSCI, that has a daily fluctuation limit of 20% and a multiplier of 100, that is cash settled.

EB: 6

⁵⁶ [Vision 2030 – Kingdom of Saudi Arabia](#)

the world to witness a CCP, the first of its kind in the Middle East, launched successfully amidst the COVID-19 pandemic. The launch of Muqassa despite the crisis, faced several notable challenges which are detailed in the subsequent sections.

13.1.3 PREPARATION TO LAUNCH MUQASSA DESPITE CC TURMOIL

COVID-19, which posed many challenges to the globe, also posed a serious threat to Muqassa and its plans to launch and commence its operations. However, Muqassa worked alongside with the Saudi Stock Exchange (Tadawul) and managed to overcome these challenges by taking various steps and initiatives while ensuring human health was at the top of its priorities which was also top priority of the nation.

The company published awareness materials and sessions about COVID-19 in order to clarify how to deal with the crisis and align the company plans with Muqassa staff at all levels. As a principal company, Tadawul took measures for the group (including Muqassa) to deal with COVID-19 which included initiatives inter-alia such as seamless operations of the market, operations with minimal staff strength of employees operating from the office, security precautions which included thermal checks at all entry-points, mandatory usage of face masks and social distancing norms to be strictly followed.

Premise sanitization across all floors along with hand sanitizers were immediately provided at all entry-points. Any staff working from home were provided technology enabled online tools for seamless collaboration and communication, which included dedicated applications that enabled secure virtual meetings. Office work was suspended; each employee was working from their home. The IT-teams played a major role, actively enabling each employee to securely access their desktops remotely. The company facilitated and provided all the support needed to allow the staff to work from home with clear messages and instructions of the expected support from everyone to ensure smooth delivery of Muqassa's plans with the minimum impact on the desired business targets.

One of the main challenges experienced during Muqassa launch was resource allocation shortly before the go-live date. A schedule was formulated categorizing the teams to work from home and from office on an alternate week with a backup to handle possible unpredictable situations. Weekly meetings were rescheduled to daily morning meetings for a short-period. These meetings acted as a good channel to report issues, if any, and, obtain management directions to tackle obstacles and ensure more efficient workstreams across different areas of Muqassa.

The conclusion was that Muqassa managed to commence its operations very successfully and eventually BAU operations commenced with the support and collaboration of the organization leadership and employees.

13.1.4 CHALLENGES FACED AND TACKLED

Along with the launch of the Derivatives market, Muqassa teams were also testing and gearing up for market readiness for the launch of a cash segment to be cleared through the CCP. On one side, the teams were testing and preparing the market for the launch of Muqassa with the introduction of the Derivatives market and on the other hand, they were also gearing up for the launch of the Cash market as well as few other products, soon to be made available. Remote access also came with significant challenges, however, Muqassa teams were actively working to access multiple environments, coordinating with team members, working in excess of normal working schedules, conducting workshop sessions with members, promptly addressing member queries, obtaining regulatory approvals and on-boarding new members.

13.1.5 BANK PARTICIPATION IN THE DERIVATIVES MARKET

The participation of banks in the capital market activities was a new and recently introduced initiative. As the regulators segregated Banks and Authorized Persons involvement in the capital markets, whereby only AP's were licensed to execute trading and custody business. However, with the support of regulators, the Central Bank of Saudi Arabia approved bank participation in the capital market as CMs. This was indeed a historic event for banks operating in Saudi Arabia. Virtual workshops were conducted for the market participants, including banks and CMs, in order to prepare their participation in the Derivatives market, proposed to be launched by the Saudi Stock Exchange with the launch of Muqassa, which would do the post trade activities and clear MT30 Index Futures Contracts.

Subsequently, additional banks and brokerage houses started to seek membership with Muqassa, to engage in clearing activities across the Derivatives markets for their end-clients. Eventually, Muqassa was able to announce to the market, August 30, 2020 as the go-live date.

13.1.6 IMPOSING TEMPORARY ADDITIONAL MARGIN

As explored in previous sections of the AMR, the global financial markets were tremendously volatile because of the CC. As a precautionary measure, Muqassa decided to impose an additional (but temporary) margin requirement for the first week of launch. The IM as per the margin model were reflective of the elevated market volatility which increased to over 13% of the contract value, compared to earlier expectations of approximately 10%. Subsequent to the launch, the markets witnessed a steady rise as both market stability returned and volatility reduced. However, margin in percentage-terms remained at approximately 13%, since Muqassa was collecting the price scan range ("PSR") in Saudi Riyals ("SAR") there was an increase in the PSR from 13,800 SAR to 14,600 SAR. CMs were made aware of the same through a specific website announcement.

Furthermore, in addition to the minimum DF contribution, CMs were required to deposit a supplementary amount, in the form of cash or acceptable securities, corresponding to their expected daily trading volume as the temporary additional margin which would correspond to their daily trading limit for the first week.⁵⁷ Any request to increase trading volume was allowed by placing additional collateral in the form of cash. Subsequently, after the first week of Muqassa's launch, the trading limits were assigned based on the internal credit score of the specific CM at hand.

13.1.7 RESULTING OUTCOMES

"Coming together is a beginning; keeping together is progress; working together is success" - Henry Ford

Ultimately, the greatest lesson that the CC has taught humanity is that no matter what the crisis, we are all in this together. The CC came with indiscriminate destruction and ultimately provided lessons for all. The Virus destroyed lives, disrupted peace and devastated the world economy unseen in recent times. However, it allowed us to optimize our use of technology and telecommunications and encouraged distance-learning.

At Muqassa and other CCPs and other companies more broadly, workplace flexibility and remote working locations are highly valued because it allows individuals to focus their energies on work and their lives in a much more balanced and harmonious way, as opposed to excessive work commutes or other geographical complications. Despite the severity of the CC, Muqassa was successfully launched on August 30, 2020 witnessing good market participation that has been made possible through well-structured planning, coordination, the adoption of key technologies and the flexibility for personnel and strong health measures during such a pandemic.

⁵⁷ Acceptable securities for Muqassa include: Government Issued Bonds

13.2 CASE STUDY: CCIL SEGREGATION ACCOUNT MIGRATION DURING CC

The Clearing Corporation of India Ltd. (“CCIL”) had identified a series of imminent projects to be completed and released in the year 2020. Out of CCIL’s key missions for the year, the introduction of the CM Structure was the most important project which was scheduled for release in 2020. This case study focuses on CCIL’s Clearing Member Structure – i.e., segregation account migration.

The first phase of implementation took place during the onset of the market volatility, in March 2020. The client clearing model with segregation of margins was proposed to be implemented in the CCIL Securities Segment. Within this segment, CCIL provides CCP clearing services for outright, market repo and triparty repo trades in government securities. Since the margin deposited by a CM in the Securities Segment serves as a common margin pool for all other segments, it was felt that the successful launch of the CM structure would pave the way for a similar structure that would be adopted across the Rupee derivatives and Forex Forwards Segments at CCIL. The date of release of the client clearing model in the Rupee Derivatives Segment was November 1, 2020. For the Forex Forwards Segment, the plan is to provide a release in the first quarter of 2021.

Alongside this project implementation, a significant enhancement was delivered in October 2020 for the NDS-OM platform, which is a screen-based electronic anonymous order matching system for secondary market trades in Government securities.⁵⁸ For some time, CCIL had been working on the development of the Request for Quote (“RFQ”) dealing mode in addition to the anonymous order matching mode for secondary market trading in government securities on this platform.

13.2.1 IMPACT OF THE COVID-19 PANDEMIC ON CCIL

On March 24, 2020, the Government of India under Prime Minister Narendra Modi issued a complete nationwide lockdown for its population of 1.3bn people.⁵⁹ The lockdown was initially for 21-days in order to break the cycle of transmission as stated by Modi, but this was later extended further in an effort to control and contain the situation.

CCIL, being a critical service provider in India was permitted to operate with a minimum required staff volume physically in its office premises in Mumbai and its Disaster Recovery Site. With 10% of the staff present in office on any given day, the remaining staff members were given secure access to their workstations by adopting certain technologies such as a Virtual Private Network. This was a unique situation wherein individual team members, software developers and other technology support officials were working from their residences spread all over the city – and yet still able to effectively collaborate through secure channels in order to meet and in some cases, exceed the targets for CCIL’s key missions for 2020.

The target dates initially set prior to the CC for completion were challenging, however the teams involved were clear that there could be no extension of deadlines and the commitments given to the market and to the regulators would be met. The teams involved worked wholeheartedly to the mutual goal for CCIL, all the deadlines were met and the services were launched as planned whilst maintaining the safety of those working from home and in the office.

Outright and Triparty Repo at CCIL

Outright Trades refer to "Buy" / "Sell" trades of government securities in the secondary market.

‘Tri-party repo’ means a repo contract where a third entity (*apart from the borrower and lender*), called a Triparty Repo Agent, acts as an intermediary between the two parties to the repo to facilitate services.

These services may include collateral selection, payment and settlement, custody and management during the life of the transaction. CCIL acts as a Triparty Repo Agent and undertakes central counterparty clearing of Triparty repo transactions against government securities.

EB: 7

⁵⁸ The NDS-OM platform is owned by the Reserve Bank of India (RBI) which is hosted and maintained by CCIL

⁵⁹ <https://www.bloomberg.com/news/articles/2020-03-24/india-to-impose-nationwide-lockdown-from-midnight-pm-modi-says>

13.2.2 SUMMARY OF CCIL SERVICES LAUNCHED DURING THE UNPRECEDENTED MARKET VOLATILITY

We present below a brief summary of the new services implemented in this period by CCIL.

Securities Segment – Introduction of a CM structure supported by a legally segregated and operationally comingled (“LSOC”) model for segregation and protection of customer margins

CCIL launched its tiered membership structure (Client Clearing Model) in the Securities Segment in March 2020. CCIL now has the capability to identify and map clients with their CMs and subsequently segregate the margins of the clients in its books. Prior to the introduction of this formal Client Clearing Structure, CCIL did not recognize the clients who were accessing the system through the Constituent Subsidiary Ledger account holders. Consequently, there was no segregation of margins at CCIL. This has proved to be a highly important implementation for CCIL and one which will serve the CCP well for years to come.

The Government Securities market in India is essentially a cash market with outright trades settling on T+1 basis and an overwhelming majority of repo trades being transacted for overnight borrowing.

At CCIL, our experience in the cash market suggests that certain entities which include Mutual Funds, Pension Fund Trusts and Insurance Companies show a preference for direct CCP access by becoming self-Clearing Members rather than becoming clients of CM banks. Thus, they are willing to contribute to the DF (and take on the liability of meeting assessment calls) as they can see more benefits in direct access of the CCP. CCIL anticipates that in the future, some entities could come as clients in one segment and as CMs in other segments.

CCIL also has an alternative direct access model to the CCP where entities who do not have a Rupee current account with the Central Bank (i.e., RBI) to settle the funds aspect of their trades through Designated Settlement Banks (“DSB”). The CMs settling through DSBs are considered as Direct Members and contribute margins for their own trades as well as contributing for the segments’ DF contributions.

13.2.3 INTRODUCTION OF THE CLEARING MEMBER STRUCTURE IN THE RUPEE DERIVATIVES SEGMENT

At present, CCIL offers CCP services in respect of trades referenced to the MIBOR and MIOIS benchmark to banks and primary dealers. These entities are direct CMs in the Rupee Derivatives Guaranteed Settlement Segment. Regulatory approvals have been received from RBI for extending CCP services in the Rupee Derivatives (Guaranteed) Settlement Segment to institutional users. In reference to institutional users, who do not have current accounts with the RBI, fund settlement shall be carried out through a DSB.

As part of the Rupee Interest Rate Derivatives Directions issued in June 2019, the RBI has permitted non-residents to participate in the Rupee OIS market for both hedging and other trade activities. RBI has also permitted retail users to undertake IRDs for hedging and non-retail users (entities having net worth more than Rs 500 Cr) to undertake trades for hedging and other purposes.

As a result, CCIL as of November 1, 2020; now extended the services of CCP clearing and settlement to non-resident and resident users such as Foreign Portfolio Investors and Corporates who may not otherwise be eligible to become direct members of the CCP, but can benefit from such access as constituents of CM(s). The structure encompasses both trades concluded bilaterally and those dealt on the CCIL’s ASTROID (anonymous) Dealing Platform.

13.2.4 CCIL's SUBSIDIARY CLEARCORP ANNOUNCED THE INTRODUCTION OF RFQ

The *Request for Quote* (RFQ) mode was made available for all trading members and clients of NDS-OM for trading across:

1. Government securities other than liquid securities;
2. Treasury Bills; and
3. State Development Loans.

The RFQ mode facilitates bilateral negotiation between members as well as clients of the NDS-OM system. Negotiations may be conducted with single or multiple counterparties.

The RFQ mode is expected to improve liquidity across illiquid and semi-liquid securities and also increase price efficiency. The concluded trades are captured in the platform and routed for settlement with no separate reporting requirement. This is expected to enhance operational efficiency and facilitate real-time dissemination of market information. All transactions through the RFQ mode are subject to the extant risk management framework, and regulatory limits, in the platform.

The RFQ Module became operational with effect from October 5, 2020.

13.2.5 PORTFOLIO COMPRESSION CYCLES IN RUPEE DERIVATIVES SEGMENT AND THE FOREX FORWARDS SEGMENT

Despite the restrictions arising from the pandemic, CCIL successfully carried out its scheduled portfolio compression cycles across these two segments. In fact, in the Rupee Derivatives Segment, CCIL has now increased the frequency of the cycle to quarterly, with a cycle conducted for the first time in December 2020.

14. CONCLUDING CCP OBSERVATIONS FOLLOWING THE CC

From a financial market perspective, the CC brought unprecedented challenges for global economies, however, for CCPs it was business-as-usual by acting as shock absorbers to the extreme volatility – CCPs and their participants weathered the CC storm successfully using their BAU risk management practices. CCPs and the cleared ecosystem demonstrated their resilience and operational preparedness to ensure that critical financial market infrastructure operations continued without concern.

One of the prevailing success stories of 2020 was that CCPs did not shut-down operations, nor did they reduce operations during the CC. In fact, it was the opposite with some global CCPs expanding operations ([CCIL Case Study](#)) and others starting a new CCP business despite such a crisis ([Muqassa Case Study](#)). With personnel working remotely during the lockdown as explored in the [SHCH Case Study](#) the operations of CCPs remained open to serve their CMs during the turbulent events of Q1 2020 in order to clear record volumes of contracts. Average CCP core system availability for the previous 12-month period (*October 1, 2019 through September 30, 2020*) across 43 CCP PQDs⁶⁰, as stated under PQD Disclosure 17.4, was 99.98%, the same as the previous quarters' data – indicating that CCPs' core systems had the same availability as prior to the CC.

CCPs remained a safe haven during these times of stress as evident from the record increases in volumes of ETD contracts, while providing the market stability by maintaining appropriate margin coverage and avoiding unnecessarily large increases in IM. CCP margin models were well calibrated to adjust for the changing risk characteristics of exposures during the CC induced volatility, while avoiding being overly procyclical. CCP participants settled their obligations on time, a strong testament to their resilience and the ability of the cleared parts of markets to perform on its contracts. The data also shows that CCP participants maintained their collateral mix at CCPs – including the ratio of cash – as a constant proportion, indicative of a lack of liquidity pressures.

When analyzing data in the ETD space, we observed that during the extreme market volatility in March 2020, volumes increased during the crisis for both futures and options. [Section 4](#) of this AMR highlights the 25.4% increase in total futures and options contracts being traded, which demonstrates the confidence participants had in CCPs' risk management offerings. The added security of having contracts collateralized, coupled with CCPs' integrity to guarantee the trade to every buyer and seller, were just a number of factors which may have influenced the decision to centrally clear contracts. What remains clear throughout the analyses in this report, is that volumes for ETDs tend to increase significantly during periods of market stress.

Across the cleared and uncleared space, we identified that both the uncleared and cleared OTC contracts increased in volume, however, when comparing the two, it appears that slightly higher volumes were cleared, but that increase in risk exposure grew substantially in the uncleared space. This trend was also explored in our previous derivatives report – '[Progress and Initiatives in OTC Derivatives](#)'.

As market stakeholders continue to align on how to effectively enhance the financial stability of the global financial markets, it is only inevitable that ongoing participation and mutual discussion will foster new methods to improve the strength of our globally connected markets. The CC was a real-life test for our financial markets and lessons learned from this health crisis will only improve the resiliency of different areas across the financial system as a whole. That being said, CCPs have yet again shown to the market that the clearing model has been vital to supporting the security and stability of the global financial ecosystem.

⁶⁰ [CCP12 Q3 2020 PQD Newsflash](#)

15. APPENDIX: FURTHER READING

The reading list below provides a number of COVID-19 related whitepapers which explore how the CC has impacted different facets of the global economy, with a particular attention to how CCPs managed to be resilient during the extreme market turmoil.

Title:	Published by:	Release date (DD.MM.YYYY):	Link:	Brief Outline:
COVID-19 pandemic: Financial stability implications and policy measures taken	FSB	15.04.2020	https://www.fsb.org/wp-content/uploads/P150420.pdf	<ol style="list-style-type: none"> 1. COVID-19 is the biggest test of the post-crisis financial system to date. 2. The global financial system is more resilient and better placed to sustain financing to the real economy as a result of G20 regulatory reforms. 3. Financial intermediaries and markets face growing challenges in lending and funding.
COVID-19 and the Impact on Liquidity	ISDA	30.06.2020	https://www.isda.org/2020/06/30/covid-19-and-the-impact-on-liquidity/	<ol style="list-style-type: none"> 1. A decline or large decline in liquidity across product sets, in particular uncleared contracts. 96% of market participants in UK and 76% in US pointed to decline or large decline in IRS liquidity before central bank intervention. 2. Derivatives markets continue to function despite of liquidity challenges.
Smooth Sailing Through the Perfect Storm	AcadiaSoft	June 2020	https://acadiasoft.com/smooth-sailing-through-the-perfect-storm/	<ol style="list-style-type: none"> 1. The March market volatility caused surge in trading volumes across the globe. 2. During March AcadiaSoft's OTC margin call volumes increased near 80% over prior months. 3. Uncleared margin calls totalled 5.4 Trillion USD equivalent in March 2020. (3.3 times previous month)
CCPs again demonstrate strong resilience in times of crisis – a CCP12 paper	CCP12	07.07.2020	https://ccp12.org/wp-content/uploads/2020/07/CCPs_again_demonstrate_strong_resilience_in_times_of_crisis.pdf	<ol style="list-style-type: none"> 1. CCPs proved to be resilience in the COVID-19 pandemic. 2. During the pandemic, CCPs increased IM and VM, which were appropriate. CCPs found a balance between managing procyclicality and maintaining margin protection in order to mitigate counterparty risk. 3. CCPs should be prepared for the next crisis.
Revisiting Procyclicality: The Impact of the COVID Crisis on CCP Margin Requirements	FIA	29.10.2020	https://www.fia.org/resources/fia-issues-white-paper-impact-pandemic-volatility-ccp-margin-requirements	<ol style="list-style-type: none"> 1. Dramatic increase in margin requirements during the 1st quarter of 2020 demonstrates the overly procyclical nature of clearinghouse margin models and the procyclicality threatens to increase the global financial system's liquidity risk. 2. FIA calls for improvements to the design and application of margin floors, recommends that clearinghouses enhance the design of their margin models to set a target for the maximum rate of change over the defined period, and calls on clearinghouses to change the way they use intraday margin calls. 3. Margin model improvements should be made to IM calculations to reduce procyclicality of CCP margin requirements during market stresses. 4. CCPs must never be under-collateralized but should backtest the targeted increase over stressed periods.
Holistic Review of the March Market Turmoil	FSB	17.11.2020	https://www.fsb.org/wp-content/uploads/P171120-2.pdf	<ol style="list-style-type: none"> 1. The breadth and dynamics of the economic shock and related liquidity stress in March were unprecedented. 2. CCPs remain resilient despite market turbulence. 3. The March turmoil has underscored the need to strengthen resilience in the NBFIs sector, and also highlighted the increased importance of interconnectedness. 4. The market developments around March conclude the phenomena of flight to safety, which means a general risk-off sentiment began to spread through the markets, and dash for cash, which means an extremely high demand for cash and near-cash assets. 5. NBFIs has overall grown considerably and evolved over the past decade and have affected the resilience of the global system. Credit risk is increasingly being intermediated and held outside the banking sector. Interconnectedness has increased and taken new forms. Intermediation in the financial system has become more dependent on liquidity.
2020 Resolution Report	FSB	18.11.2020	https://www.fsb.org/wp-content/uploads/P181120.pdf	<ol style="list-style-type: none"> 1. COVID-19 pandemic confirmed the importance of ongoing work on resolvability, including for CCPs.

COVID19 and CCP Risk Management Frameworks	ISDA	06.01.2021	https://www.isda.org/2021/01/06/covid-19-and-ccp-risk-management-frameworks/	<ol style="list-style-type: none"> 1. CCPs were able to withstand the most volatile market period since 2008, reflecting the resiliency of CCPs. 2. There was a significant increase in both VM and IM. Procyclical IM drains liquidity from the market at greater levels during times of stress. 3. ISDA recommends to calibrate APC tools to limit procyclicality but retain risk sensitivity, greater transparency of CCP models to enable predictability of margin levels and increase the frequency of PQDs.
Evolution of OTC Derivatives Markets Since the Financial Crisis	ISDA	12.01.2021	https://www.isda.org/2021/01/12/evolution-of-otc-derivatives-markets-since-the-financial-crisis/	<ol style="list-style-type: none"> 1. Significant regulatory reforms have been implemented in order to make derivatives market safer, more resilient and more transparent. The performance of derivatives markets during the pandemic reflects important changes and a significant reduction in counterparty credit risk over the past decade. 2. There is a decline of OTC derivatives notional outstanding from 2011 peak, partly because of a portfolio compression which is used to reduce the number of transactions and gross notional while retaining the same economic exposure. The gross market value and gross credit exposure did not surpass the historic peak as well. 3. The significant turmoil in the financial market in the 1st half of 2020 was the first major test of the regulatory reforms enacted in the aftermath of the 2008 global financial crisis.
Procyclicality of CCP Margin Models	WFE	12.01.2021	https://www.world-exchanges.org/our-work/articles/procyclicality-ccp-margin-models-systemic-problems-need-systemic-approaches	<ol style="list-style-type: none"> 1. FMIs proved to be resilient. 2. Margin requirements are a fundamental part of the CCPs risk management. 3. VM is usually the one that reacts first and accounts for the largest bulk of margin calls and without reference to the portfolio, it's hard to say whether a margin call is attributed to a change in volatility or a change in portfolio composition. 4. It's important to look at procyclicality from a systemic perspective. The answer to the question of procyclicality cannot simply be to impose further constraints into the IM models.
Key Priorities for Managing Risk in Post-Pandemic Environment	DTCC	13.01.2021	https://www.dtcc.com/news/2021/january/13/dtcc-identifies-key-priorities-for-managing-risk-in-post-pandemic-environment	<ol style="list-style-type: none"> 1. FMIs demonstrate once again their role of supporting the financial ecosystem during a global crisis. 2. Volatility quickly spread across the globe in the wake of the COVID-19 outbreak and trading volumes surged across several asset classes during the same period. As a result, margins increased substantially. 3. CCP12 analysis shows that while the level of procyclicality differs across FMIs, there is no significant difference between those that employ EMIR compliant anti-procyclical margin changes and those do not. 4. Risk-based margining methodologies are naturally procyclical. Lowering margin procyclicality and ensuring margin efficiency are often competing objectives during a stressed period. 5. The most important goal for CCPs is to make sure that the margin they collect is sufficient to protect themselves and their members therefore any anti-procyclicality measures must be subordinate to maintaining an adequate level of protection in extreme but plausible circumstances. 6. FMIs should promote margin transparency to allow their members better understanding their risk models. 7. The new normal of WFH environment creates new operational risks that must be managed on an ongoing basis.
Stability During Market Uncertainty	LCH Ltd	10.02.2021	https://www.lch.com/sites/default/files/media/files/Stability%20During%20Market%20Uncertainty.pdf	<ol style="list-style-type: none"> 1. CCPs play a unique and critical role in the financial markets and are responsible and accountable for ensuring market stability by managing the risk associated with cleared financial instruments, especially during times of market stress. 2. LCH did not adjust or change any margin models or processes, which have remained consistent and performed well throughout the pre- and post-March 2020 period of volatility. 3. LCH was able to run its initial margin models as normal through this period without introducing ad hoc margin calls or intervening in models to change any margin parameters. 4. A significant percentage of the collateral increase in LCH CCPs was derived from new risk positions, rather than additional collateral being called against existing positions. 5. One clear lesson from the market stress of 2020 is that central clearing continued to play its intended role in buffering the shock to financial markets.
Recommendations Regarding CCP Margin Methodologies	Market Risk Advisory Committee of the U.S. Commodity Futures Trading Commission	12.02.2021	https://www.cftc.gov/media/5706/MRAC-CRGSubcommittee-DiscussionPaperOnBestPracticesinCCPMarginMethodologies022321/download	<ol style="list-style-type: none"> 1. The Recommendations regarding CCP Margin Methodologies reflects the collective work of the Subcommittee in putting forth recommendations to the CFTC related to CCP margin methodologies. 2. This paper sets forth recommendations across six key elements of a robust margin framework, many of which CCPs are following today. 3. Recommendations reflected in this document may not be applicable to all CCPs given the inherent differences in instruments cleared, business models or CCP rules and regulatory requirements.

16. ABOUT CCP12

CCP12 is the global association for CCPs, representing 37 members who operate more than 60 individual central counterparties (CCPs) globally across the Americas, EMEA and the Asia-Pacific region.

CCP12 promotes effective, practical and appropriate risk management and operational standards for CCPs to ensure the safety and efficiency of the financial markets it represents. CCP12 leads and assesses global regulatory and industry initiatives that concern CCPs to form consensus views, while also actively engaging with regulatory agencies and industry constituents through consultation responses, forum discussions and position papers.

For more information please contact the office by e-mail at office@ccp12global.com or through our website by visiting www.ccp12.org

17. CCP12 MEMBERS

