



2023 ANNUAL MARKETS REVIEW IN CENTRAL COUNTERPARTY CLEARING

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📍 Amsterdam | Shanghai

A CCP GLOBAL REPORT

CCP Global
The Global Association of Central Counterparties

MAY 2024

MESSAGE FROM THE CHAIRMAN

2023 was another busy year for CCP Global as the association continued to expand its engagement with the industry.

As I noted last year, the association has come a long way since it was founded in 2001 by twelve major central counterparty (“CCP”) organizations located in Europe, Asia, and the Americas. Today, CCP Global has more than tripled its membership to include 42 members who operate over 60 individual CCPs globally across Europe, the Middle East, and Africa (“EMEA”), Asia-Pacific (“APAC”), and Americas.

Given the significant expansion of its membership, in 2023, CCP Global retired the reference to “12” and officially renamed itself as “CCP Global” to reflect its much broader and inclusive membership.

CCP Global is pleased to publish the 2023 Annual Markets Review (“AMR”). As chair, I thank the association’s members and staff team who worked hard to draft this topical and comprehensive AMR. And I would like to thank the membership and the staff team for all their contributions throughout a busy year. As I often state, CCP Global is only as strong as the support we receive from our membership and our staff team (and we are very fortunate in both respects).

In 2023, CCP Global responded to numerous consultations and participated in dozens of industry meetings spanning the current topics related to central clearing. I recommend a visit to the CCP Global website where you will find a multitude of documents and information relevant to the clearing industry (including the CCP Global Public Quantitative Disclosures (“PQD”).

A highlight of 2023 was CCP Global’s role in helping to coordinate the CCP Global International Default Simulation (“CIDS”) that included over 30 CCPs.

At the time of the publication of this 2023 AMR, CCP Global is well into another busy year and consistent with our mission we continue to work closely with the industry to promote the safety and efficiency of the markets that our CCPs clear.

As CCPs, we hope that the extensive level of transparency that CCPs provide in reports, disclosures, engagement with clients, clearing members, and regulatory authorities promotes and fosters confidence and details the protection that results from centrally cleared markets.

Kevin R. McClear
CCP Global Chairman



MESSAGE FROM THE CEO

2023 marked the continuation of trends that began in 2022. The rebounding of economic growth following the COVID-19 pandemic giving way to inflation and the reaction from central banks and governments to control it. This return to a cost of capital has its benefits – it creates a greater discipline and distinguishes between those investments that are productive, and those which are not. The transition to it of course entails adjustments, and given the volatile geopolitical context, the likelihood for rapid and substantial changes in markets. The year that was saw a wide variety of mini crises – be they in bank failures, government policy proposals being withdrawn, and the consequences of levered investment strategies.

At the same time, most key economies have grown, inflation and the corresponding necessary pace of interest rate rises has abated, and attention is paid to government's and businesses sustainability. Reassuringly, participants and authorities seem intent on better understanding resilience, and the necessity of good data which underlies any predictions, plans, and valuations.

In the centrally cleared space, both resilience of operations and transparency are essential, and our segment distinguishes itself in both instances. At CCP Global, we are proud to contribute to these critical topics, and in 2023 we devoted substantial resource alongside our membership to that end. Notably, we organised the first industry wide default simulation exercise, of which the reader can find further information within this AMR and our specific report.

For transparency and information – this is a precondition to good pricing in markets. Centrally cleared markets are exceptionally transparent, and a reason why in turbulent times, participants choose the clarity and surety of CCPs for their risk management transactions. This was visible in 2023 again, with increased volumes across CCPs. With notable exceptions, broad volatility measures declined during 2023, though volumes increased markedly. This was partly due to new markets developed with the inclusion of a CCP, partly the increased need to hedge against uncertainty, and partly a reflection of more specific contract types. In some cases, an increase of retail speculation further contributed to volumes. In some markets, the greater access of preference of structured, regulated markets following a wide variety of scams and fraud outside of them drove these shifts.

High volumes increase the value as well as the challenge of smooth and reliable operations. Operational resilience was also increasingly tested by cyber criminals and malicious state actors. This is an area of focus for CCP Global going forward, in collaboration with our ecosystem and the public sector.

In this report, you will find information on all these salient aspects of our industry across the world in 2023. I hope you enjoy reading the report – especially the case studies from our Members!



Teo Floor
CCP Global CEO

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TABLE OF CONTENTS

MESSAGE FROM THE CHAIRMAN	2
MESSAGE FROM THE CEO	3
PRIMARY CONTRIBUTORS TO 2023 AMR	4
LIST OF ABBREVIATIONS	7
EXECUTIVE SUMMARY	10
1. GLOBAL ECONOMIC LANDSCAPE IN 2023	11
1.1 THE YEAR IN CHARTS: KEY ECONOMIC INDICATORS, TRENDS, AND SELECTED MARKET EVENTS DURING 2023	11
1.1.1 INFLATION AND INTEREST RATES	11
1.1.2 GROSS DOMESTIC PRODUCT (“GDP”)	12
1.1.3 EQUITY, GOV BONDS, COMMODITY, AND CRYPTO MARKETS	13
1.1.4 GLOBAL VOLATILITY INDICES	16
1.1.5 EXCHANGE TRADED DERIVATIVES (“ETD”) MARKET	17
2. CCP REGULATORY CONTEXT AND MARKET PRACTICES DEVELOPMENTS IN 2023	18
2.1 CCP STANDARDS AND REGULATIONS	18
2.2 CCP RECOVERY AND RESOLUTION REGIMES	19
2.3 REGULATORY DEVELOPMENTS IMPACTING CENTRAL CLEARING	20
2.4 DEFAULT MANAGEMENT AUCTIONS	21
2.5 2023 CIDS EXERCISE	22
2.6 CCP MARGINING PRACTICES	23
2.7 CCP SUPERVISORY STRESS TESTS	24
2.8 CCP OPERATIONAL RISK MANAGEMENT	24
3. CCP DATA AND RESILIENCE IN 2023	26
3.1 CCP TRANSPARENCY	26
3.1.1 CCP PQD TEMPLATE PUBLICATION RATE	27
3.2 IM, VM, AND DEFAULT FUND ANALYSIS	27
3.2.1 TOTAL IM (REQUIRED) ANALYSIS – DISCLOSURE 6.1.1	27
3.2.2 IM (HELD) - CENTRAL BANK CASH DEPOSIT RATIOS	28
3.2.3 TOTAL DF (REQUIRED) ANALYSIS - DISCLOSURE 4.1.4	29
3.2.4 TOTAL VM ANALYSIS - DISCLOSURE 6.6.1	29
3.2.5 TOTAL IM AND DF OVERCOLLATERALISATION ^{90F}	31
3.2.6 RESULTS OF BACKTESTING OF IM – ACHIEVED COVERAGE LEVEL	31
3.2.7 PERCENTAGE OF IM POSTED BY THE LARGEST CMs	32
3.3 CCP CORE SYSTEM AVAILABILITY AND OTHER STATISTICS	32
3.4 CCP GLOBAL PQD QUARTERLY TRENDS REPORT	33
3.5 CCP GLOBAL – QATL	33
4. CASE STUDIES	34
5. ASX: FORECASTING PEAK TRADE VOLUME USING A HYBRID LONG-TERM TREND AND JUMP MODEL	35
5.1 ENSURING RESILIENCY OF THE CURRENT CHES	35

5.2 FORECASTING APPROACH	36
5.3 BACKTESTING THE MODEL	39
5.4 CONCLUSIONS	40
6. COMDER/CRCC: HOW THE G20 DERIVATIVES MARKETS REFORM BOOSTED THE INTERNATIONAL DEMAND FOR CHILEAN AND COLOMBIAN DERIVATIVES	41
6.1 BRIEF OVERVIEW OF THE CHILEAN AND COLOMBIAN ECONOMIES	41
6.2 G20 DERIVATIVES REFORMS, BASEL III, AND THE UNCLEARED MARGIN RULES	42
6.3 THE DEVELOPMENT OF THE INTEREST RATE SWAP (“IRS”) MARKET IN CHILE.....	42
6.4 THE FX DERIVATIVES MARKET IN CHILE	43
6.5 THE DEVELOPMENT OF THE IRS MARKET IN COLOMBIA	46
6.6 THE FX DERIVATIVES MARKET IN COLOMBIA.....	46
6.7 THE INCLUSION OF CHILEAN AND COLOMBIAN SWAPS IN CME.....	47
6.8 CONCLUSIONS	48
7. EUREX CLEARING: INITIAL MARGIN CYCLICALITY: MEASUREMENT AND TRANSPARENCY	49
7.1 UNDERSTANDING IM CYCLICALITY	49
7.2 MEASUREMENT OF IM CYCLICALITY	49
7.3 PIONEERING CCP TRANSPARENCY SERIES: INSIGHTS FROM EUREX ENHANCED DISCLOSURES.....	50
7.4 FORWARD-LOOKING MARGIN SIMULATIONS: PREPARING FOR STRESS PERIODS.....	52
7.5 TRANSPARENCY IN IM PROCYCLICALITY.....	53
8. HKEX/SHCH: PIONEERING OTC DERIVATIVES CCP INTEROPERABILITY — HKEX AND SHCH CLEARING LINK UNDER SWAP CONNECT	55
8.1 INNOVATION IN THE OTC DERIVATIVES CLEARING LINK.....	56
8.2 RISK MANAGEMENT IN THE NOVEL CCP INTEROPERABLE MODEL.....	57
9. JSCC: FIRST JSCC DLT-BASED PRODUCTION SYSTEM - LAUNCHED FOR PHYSICAL SETTLEMENT OF COMMODITY FUTURES.....	59
9.1 BACKGROUND OF DLT SELECTION	59
9.2 USE-CASE FLOW	59
9.3 KEY DRIVERS DURING DEVELOPMENT	60
9.4 DLT Platform Selection.....	61
9.4.1 HYPERLEDGER BESU.....	61
9.4.2 ERC1155	61
9.5 RESPONDING TO THE PARADIGM SHIFT SURROUNDING DLT.....	61
10. KDPW_CCP: ORDERLY HANDLING OF THE UNEXPECTED – RECOVERY PLANNING	63
10.1 KDPW_CCP’S PROFILE	63
10.2 CCP RECOVERY AND RESOLUTION PROVISIONS – CHALLENGES FOR REGULATORS AND CCPS	64
10.3 KDPW_CCP’S APPROACH TO PREPARING RECOVERY PLAN	65
11. APPENDIX I: PQD BAR CHART KEY.....	68
12. ABOUT CCP GLOBAL	69
13. CCP GLOBAL MEMBERS	70

LIST OF ABBREVIATIONS

ACL	Achieved Coverage Level
A.C.M.E.	A Clearing Member Everywhere
AMR	Annual Markets Review
APAC	The Asia-Pacific Region
APC	Anti-procyclicality
ASX	Australian Securities Exchange Ltd
BCBS	Basel Committee on Banking Supervision
BIS	Bank for International Settlements
BNB	Binance Coin
BoE	Bank of England
BRRD	Bank Recovery and Resolution Directive
BSGI	Black Sea Grain Initiative
BTC	Bitcoin
CBCh	Central Bank of Chile
CCP	Central Counterparty
CCR	Counterparty credit risk
CFETS	China Foreign Exchange Trade Systems
CFTC	Commodity Futures Trading Commission
CHESS	Clearing House Electronic Sub-register System
CIDS	CCP Global International Default Simulation
CLA	Clearing Link Agreement
CLP	Chilean Peso
CM	Clearing Member
CME	Chicago Mercantile Exchange
ComDer	Comder Contraparte Central S.A.
CNY	Chinese Yuan
COP	Colombian Peso
CPI	Consumer Price Index
CPMI	Committee on Payments and Market Infrastructures
CPSS	Committee on Payment and Settlement Systems
CRCC	Camara de Riesgo Central de Contraparte S.A.
CSA	Credit Support Annex
D/O	Delivery order
DCO	Derivatives Clearing Organization
DeFi	Decentralised Finance
DF	Default Fund
DLT	Distributed Ledger Technology
DMC	Default Management Committee
DMG	Default Management Group
DMIST	Derivatives Market Institute for Standards
DMP	Default Management Process
DTV	Daily Trading Volume
DvP	Delivery versus Payment
ECB	European Central Bank

EMEA	Europe, the Middle East, and Africa
EMIR	European Market Infrastructure Regulation
ERC	Ethereum Request for Comment
ES	Expected Shortfall
ESMA	European Securities and Markets Authority
ESRB	European Systemic Risk Board
ETD	Exchange Traded Derivative
ETF	Exchange Traded Funds
ETH	Ethereum
ETS	Exponential Smoothing Error-Trend-Seasonality
EU	European Union
EUR	Euro
FAQ	Frequently Asked Questions
FIA	Futures Industry Association
FICC	Fixed Income Clearing Corporation
FMI	Financial Market Infrastructure
FSB	Financial Stability Board
FSS	Financial Stability Standards
FX	Foreign Exchange
GDP	Gross Domestic Product
GFC	Global Financial Crisis
G-SIBs	Global Systemically Important Banks
HKEX	Hong Kong Exchanges and Clearing Limited
HMT	His Majesty's Treasury
HRW	Hard red wheat
IBR	Indicador Bancario de Referencia
ICP	Indice de Cámara Promedio
IM	Initial Margin
IMF	International Monetary Fund
IOSCO	International Organization of Securities Commissions
IRS	Interest Rate Swap
IT	Information technology
ITM	In-the-money
JSCC	Japan Securities Clearing Corporation
KPI	Key Performance Indicator
LatAm	Latin American
LFP	Lithium iron phosphate
MiCA	Markets in Crypto-Assets Regulation
NBFI	Non-bank financial intermediation
NDF	Non-Deliverable Forward
NDL	Non-Default Loss
NFT	Non-fungible token
NPR	Notice of Proposed Rulemaking
OC	Overcollateralisation
OECD	Organisation for Economic Cooperation and Development
OI	Open Interest
OIS	Overnight Index Swaps
OPEC	Organization of the Petroleum Exporting Countries
OSS	Open source software

OTC	Over-The-Counter
OTM	Out-of-the-money
P&L	Profit and Loss
PFMIs	Principles for Financial Market Infrastructures
PLN	Polish zloty
POC	Proof of concept
PQD	Public Quantitative Disclosures
QATL	Quick Access Transparency Links
QCCP	Qualifying central counterparty
QoQ	Quarter-over-Quarter
QTR	Quarterly Trends Report
R&D	Research and development
RBA	Reserve Bank of Australia
RMB	Renminbi
RSS	Physical settlement of rubber
RTS	Regulatory Technical Standards
SARIMA	Seasonal Autoregressive Integrated Moving Average
SEC	Securities and Exchange Commission
SHCH	Shanghai Clearing House
SHIBOR	Shanghai Interbank Offered Rate
SOL	Solana
SSBs	Standard-Setting Bodies
SVB	Silicon Valley Bank
TR	Trade Repository
UK	United Kingdom
UMR	Uncleared Margin Rules
USA	United States of America
USD	United States Dollar
UST	US Treasury
VaR	Value-at-Risk
VI	Volatility Index
VIX	Chicago Board Options Exchange's Volatility Index®
VM	Variation Margin
VSTOXX	EURO STOXX 50® Volatility
WSE	Warsaw Stock Exchange

EXECUTIVE SUMMARY

From a global geopolitical and economic perspective, 2023 was an eventful and oftentimes difficult and tumultuous year. The Russian-Ukrainian war continued to take its toll, tensions persisted in the Far East, and a new conflict erupted in the Middle East. The banking industry went through a tough period too – a series of failures and bankruptcies of several small-to-mid size US banks and the collapse of Switzerland’s Credit Suisse in March 2023 shook the markets and required regulators across the world to intervene and, in some cases, to undertake extraordinary actions (through the provision of extraordinary liquidity or insurance of all deposits). The technological spurt, demonstrated by the development of artificial intelligence tools, opened new possibilities but also presents a source of risks to manage. We could observe continued cybercriminal activity and cyberattacks – hence the topic of ensuring cyber resilience became a focal point for many regulators and organisations worldwide. July 2023 turned out to be the hottest month ever recorded for global average air temperature – which only confirmed the need to look even closer at climate-related risks.

Despite these stress market conditions, CCPs and the whole clearing industry fared very well. The robust risk management framework of CCPs proved resilient again, as demonstrated by overall uninterrupted provision of clearing services (as shown by the CCP core system availability), stable initial margin (“IM”) levels (even in times of increased volatility), and appropriate coverage levels achieved in backtesting. The overall high level and reliability of services provided by CCPs and the benefits, efficiencies, and transparency of central clearing which are a significant contributor to the global markets’ financial stability resulted in entrusting CCPs and the central clearing industry with even more ambitious tasks, such as shortening of settlement cycles in more jurisdictions and the clearing requirement for cash and repo transactions in the United States of America (“USA”).

The great performance of CCPs is well demonstrated by the data and accompanying commentary which can be found in the “CCP data and resilience in 2023” chapter of our AMR. It also includes other sections, such as description of the global economic landscape in 2023, and the CCP regulatory context and developments in market practices that were observed last year. CCP Global was engaged in many discussions with global Standard Setting-Bodies (“SSBs”) and policy makers on CCP-related topics, which are described in this year’s AMR as well.

A unique and very special part of CCP Global’s AMRs are case studies provided by our members. In this year’s edition, we feature:

- **Australian Securities Exchange Ltd (“ASX”)**, forecasting peak trade volume using a hybrid long-term trend and jump model;
- **Comder Contraparte Central S.A. (“ComDer”) and Camara de Riesgo Central de Contraparte S.A. (“CRCC”)**, which put together a joint case study on the development of the Latin American derivatives market: how the G20 derivatives markets reform boosted the international demand for Chilean and Colombian interest rate swaps (“IRS”);
- **Eurex Clearing**, which describes IM cyclicity - measurement and transparency;
- **Hong Kong Exchanges and Clearing Limited (“HKEX”) and Shanghai Clearing House (“SHCH”)**, which put together a joint case study describing their pioneering Over-The-Counter (“OTC”) derivatives CCP interoperability – HKEX and SHCH clearing link under Swap Connect;
- **Japan Securities Clearing Corporation (“JSCC”)**, providing insights into the first JSCC Distributed Ledger Technology (“DLT”)-based production system – launched for physical settlement of commodity futures; and
- **KDPW_CCP SA**, which shares the experience with orderly handling of the unexpected – recovery planning.

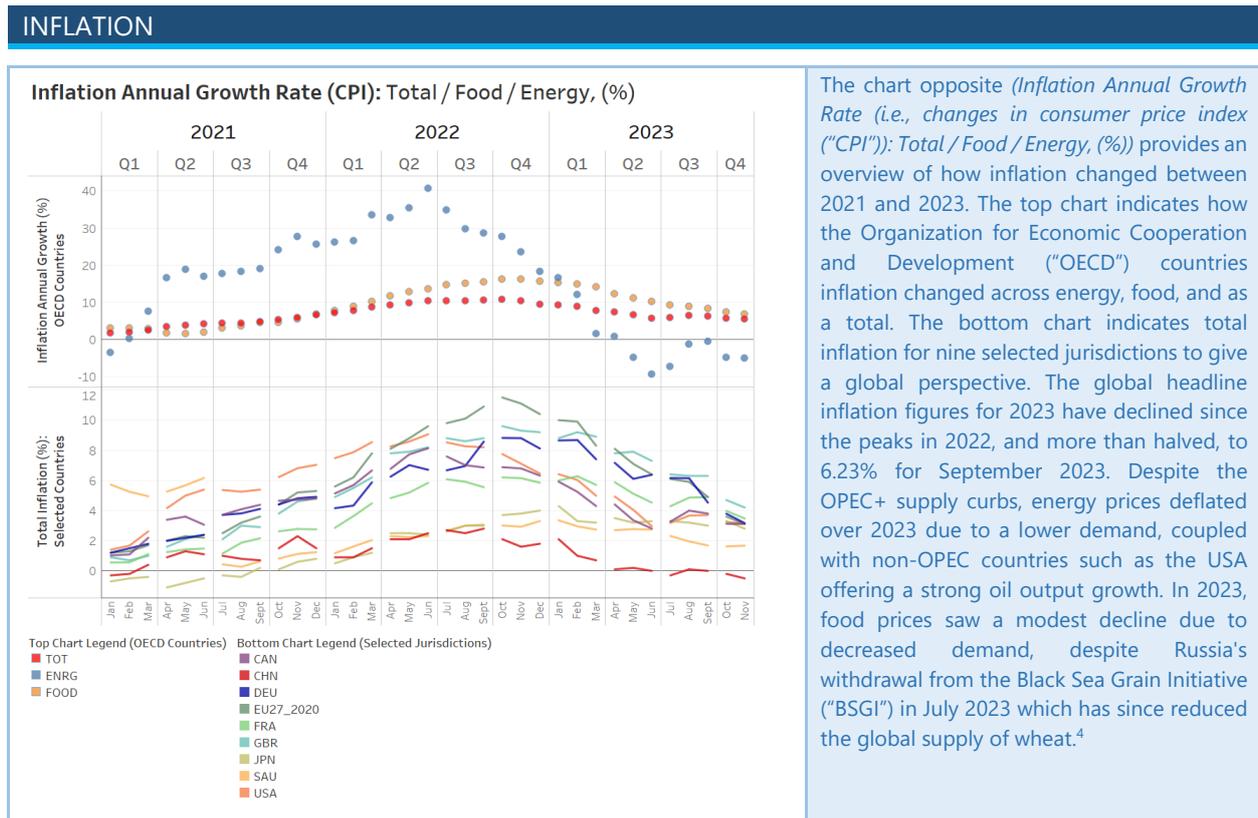
1. GLOBAL ECONOMIC LANDSCAPE IN 2023

The global economy is recovering from the challenges posed by the aftermath of the COVID-19 pandemic, Russia's invasion of Ukraine, and the cost-of-living crisis. Despite remarkable resilience, there were continued disruptions in energy and food markets, along with unprecedented cyclical elements like monetary policy tightening to address high inflation and the withdrawal of fiscal support – all of which continued to impact global recovery. These elements combined have resulted in a deceleration of the global economy. Growth remained somewhat sluggish and uneven, marked by increased global divergences. For 2023, we saw that the global economy advanced cautiously.¹

1.1 THE YEAR IN CHARTS: KEY ECONOMIC INDICATORS, TRENDS, AND SELECTED MARKET EVENTS DURING 2023

2023 overall has been labelled a year where the economy, politics, geopolitical, market, and technological events became intertwined. Silicon Valley Bank (“SVB”), Signature Bank, and First Republic Bank indicated to market participants that banks which are not Global Systemically Important Banks (“G-SIBs”) can still have a significant impact on the markets when failures occur. Credit Suisse failed as a G-SIB², the Russian invasion of Ukraine continued, oil prices surged as OPEC+ (the Organization of the Petroleum Exporting Countries (“OPEC”) plus other oil-producing countries) announced a surprise cut in oil production, central banks battled inflation, and the VIX (the Chicago Board Options Exchange’s Volatility Index) fell to its lowest levels seen in the past three years. Despite all these events in 2023, CCPs managed to uphold their function as critical financial market infrastructures and provided the necessary gateway for market participants to safely manage their risks. In this AMR, we explore a variety of key economic indicators to give context to the latter sections, and, ultimately, our much-anticipated case studies from eight CCP Global members.

1.1.1 INFLATION AND INTEREST RATES³



¹ International Monetary Fund. 2023. *World Economic Outlook: Navigating Global Divergences*. Washington, DC. October.

² 2023 Bank Failures – Preliminary lessons learnt for resolution (Financial Stability Board)

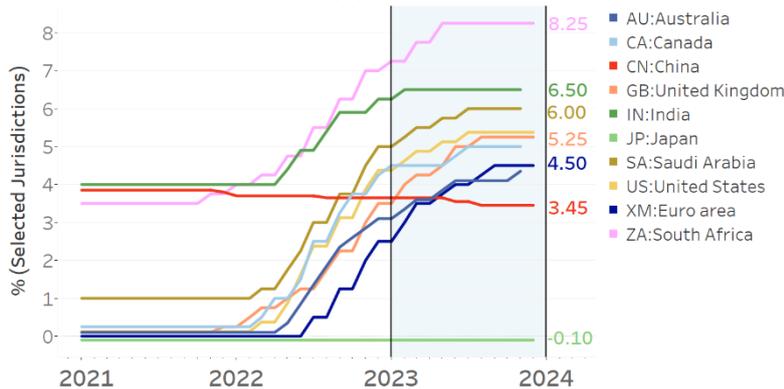
³ OECD (2023), Inflation (CPI) (indicator). doi: 10.1787/eee82e6e-en (accessed on 24 January 2023)

⁴ <https://www.spglobal.com/marketintelligence/en/mi/research-analysis/russias-withdrawal-from-the-black-sea-grain-initiative.html>

CENTRAL BANK POLICY RATES⁵

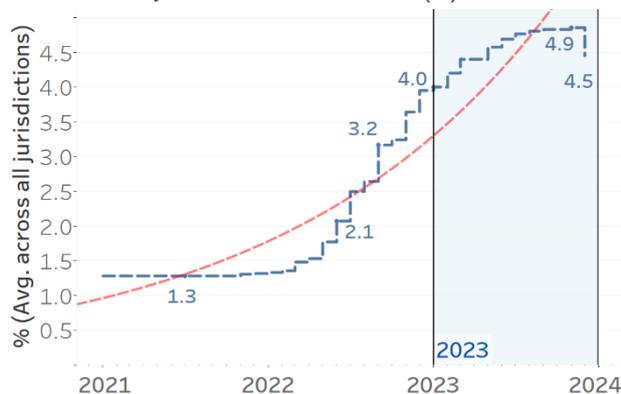
Central Bank Policy Rates:

January 2021 to December 2023 (%)



Central Bank Policy Rates - Avg. Across all jurisdictions

above: January 2021 to December 2023 (%)



The chart opposite (*Central Bank Policy Rates: %*) provides a view of how central banks took severe measures to increase interest rates since 2022 up until 2023 year-end to combat inflation.

The top chart provides a summary of ten selected jurisdictions, while the chart at the bottom provides an average across all jurisdictions in the Bank for International Settlements (“BIS”) Central Bank Policy Rate data.

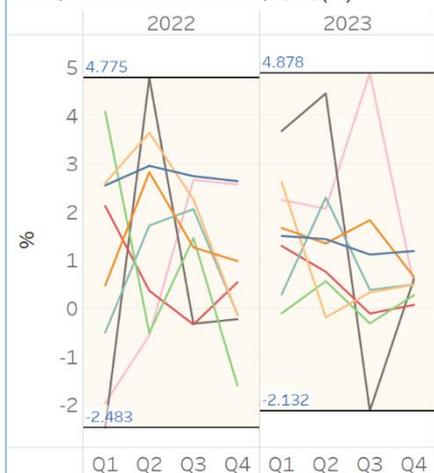
Interest rates across the ten jurisdictions have increased significantly since late 2021 and continued to increase in 2022 and well into 2023 as shown in the top chart. The world’s three major central banks (US Federal Reserve, European Central Bank (“ECB”), and the Bank of England (“BoE”)) all made the decision in late 2023 to maintain their rates steady to monitor inflation development.

The bottom chart (*Central Bank Policy Rates – Avg. Across All Jurisdictions Above: %*) illustrates the steep incline of rate hikes for both 2022 and for 2023. The chart indicates a staggering 330+ basis point increase from January to September 2023. This being said, it was only during the last month of 2023 where global rates began to decrease, however, overall, they remained elevated in the fight against global inflation.

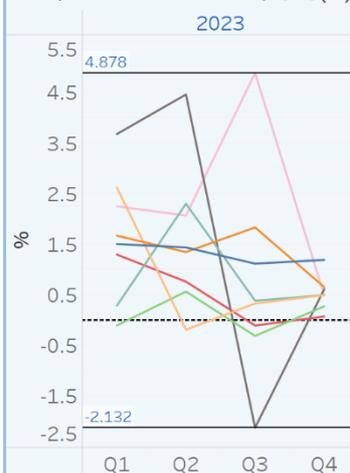
1.1.2 GROSS DOMESTIC PRODUCT (“GDP”)⁶

GDP⁷

Real GDP Growth Forecast, 2022 & 2023:
Total, Annual Growth Rate, QoQ (%)



Real GDP Growth Forecast, 2023:
Total, Annual Growth Rate, QoQ (%)



The chart opposite (*Real GDP Growth Forecast, Total, Annual Growth Rate, Quarter-over-Quarter (“QoQ”) (%)*) provides a view of how the GDP annual growth rate changed from 2022 to 2023. For the selected economies, almost all saw a decline to levels between 0.07% for the United Kingdom (“UK”) and 1.2% for Australia in Q4 2023. Amid the volatile conditions, the International Monetary Fund (“IMF”) World Economic Outlook Report for October 2023 indicates slowdown in global growth is forecast, from 3.5 % in 2022 to 3.0 % in 2023 and subsequently, 2.9 % in 2024.

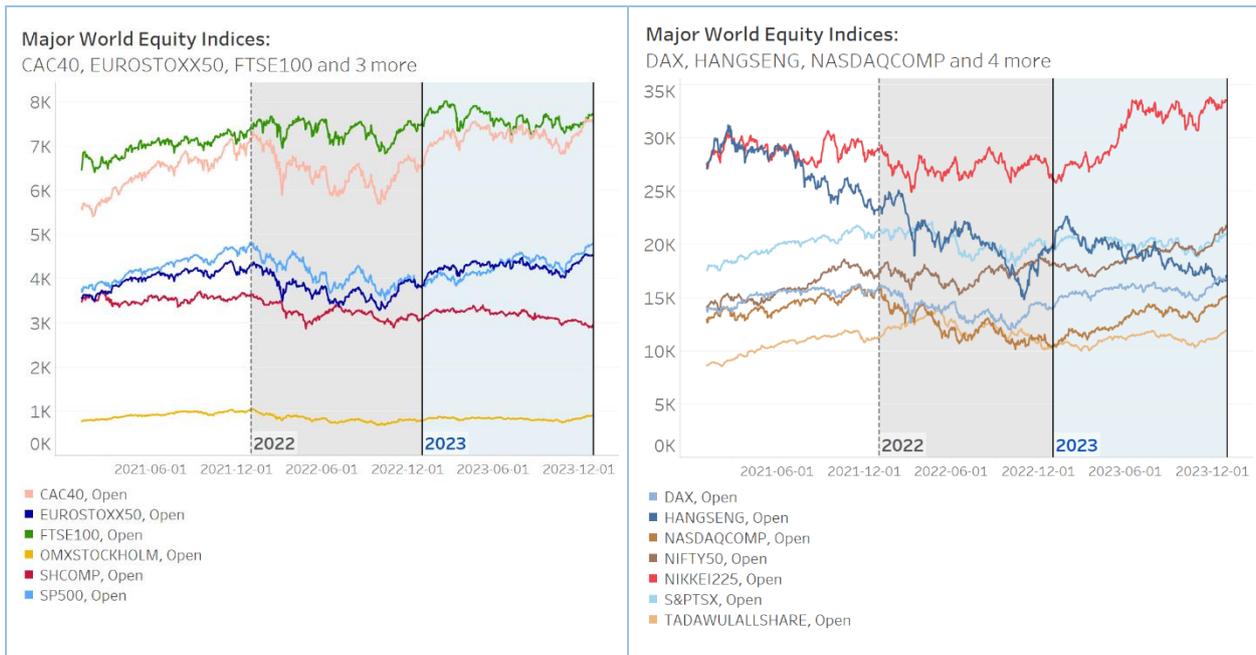
⁵ Bank for International Settlements: Central bank policy rates

⁶ OECD (2023), Real GDP forecast (indicator). doi: 10.1787/1f84150b-en (Accessed on 9 January 2024),

⁷ World economic outlook (IMF), October 2023

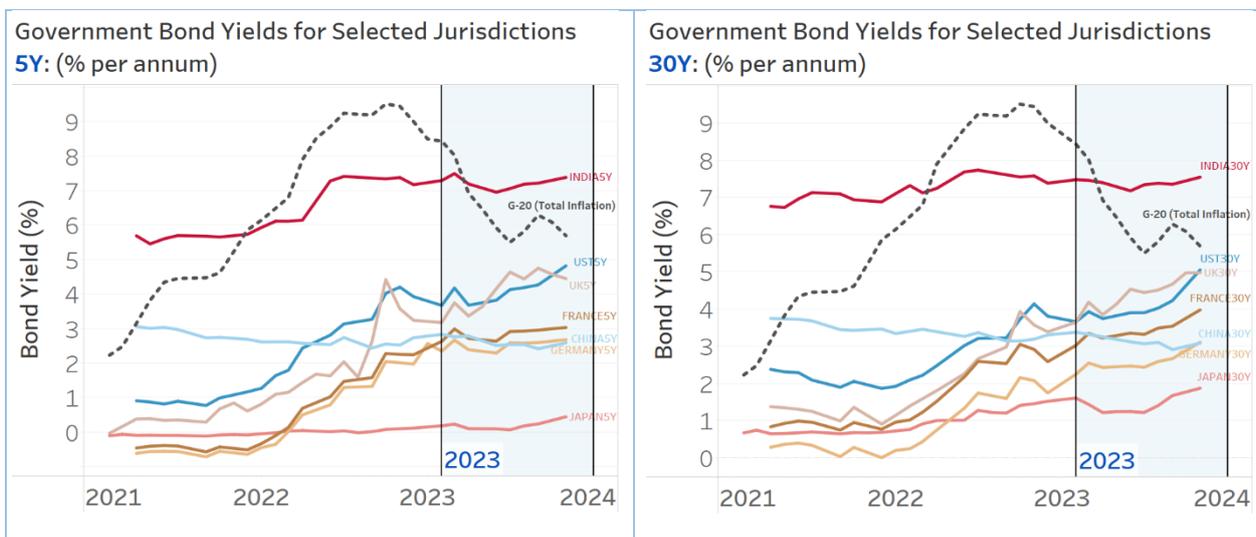
1.1.3 EQUITY, GOV BONDS, COMMODITY, AND CRYPTO MARKETS

EQUITY MARKETS⁸



The charts above (*Major World Equity Indices*) provide an overview of selected indices chosen for a geographical representation between 2022 and 2023. For the beginning of 2023, almost all equity indices listed above saw a rise in returns, recovering from their 2022 lows. US equities saw a strong performance throughout 2023, coupled with Chinese equity markets at the beginning of the year on the backdrop of the end to the zero-COVID-19 policy. With a consistent escalation in interest rates throughout 2023 (as shown from the [Central Bank Policy Rates chart, p.12](#)), it was only during the end of the year for December when the Federal Reserve signalled rate hikes were to come to an end and that potential cuts were on the horizon. The equity markets subsequently saw a rebound as a result of the news.⁹

GOVERNMENT BOND MARKETS¹⁰



The charts above (*Government Bond Yields for Selected Jurisdictions 5Y and 30Y, % per annum*) provide an overview of how bond yields fared from 2021 to 2023. The sentiment and conditions within the government bond markets remained sensitive to the market conditions throughout 2023, notably inflation policy responses and rate hikes. US long-term yields reached highs not seen since the Global Financial Crisis (“GFC”), however for the euro area, yields remained plateaued, with the exception of the USA which saw a notable rise in their yields. The dotted line indicates the Total Inflation (OECD CPI) for G-20 nations.

⁸ Data provided by CCP Global Members.

⁹ https://www.bis.org/publ/qtrpdf/r_qt2303.pdf; https://www.bis.org/publ/qtrpdf/r_qt2309.pdf

¹⁰ Data provided by respective authorities, debt market agencies, CCP Global Members; [OECD \(2023\), Inflation \(CPI\) \(indicator\)](#). doi: 10.1787/eee82e6e-en (accessed on 19 December 2023)

COMMODITIES – OIL & GAS FUTURES CONTRACTS¹¹

Oil & Gas Futures Prices, 2021 - 2023



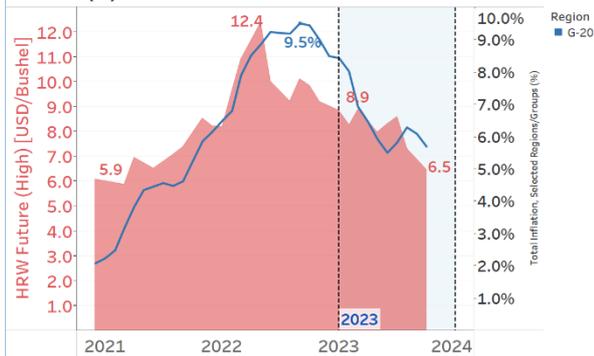
Oil & Gas Futures Prices, 2023



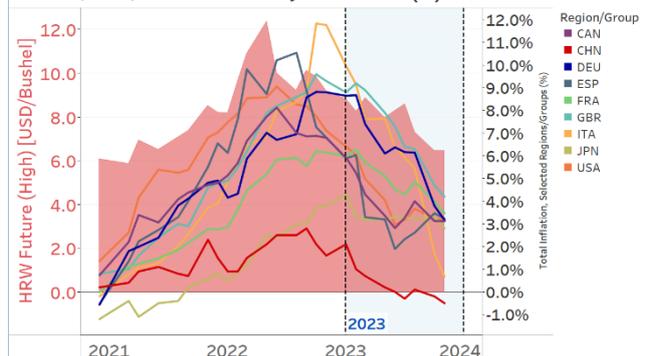
The charts above (*Oil & Gas Futures Prices, USD*) provide an overview of the Brent and WTI oil futures, coupled with the NYMEX Natural Gas Futures prices for the years 2021 – 2023 and a year’s overview in the chart on the right for 2023 alone. While 2022 marked a year of steep increases in oil and gas futures prices, 2023 indicated a more subdued outlook – with notable indications of stabilization following the geopolitical events and post pandemic period. Oil and gas futures prices in 2023 remained elevated as shown from the chart on the left hand side, similar to levels shown in 2021. For the first two quarters of 2023, oil prices showed a relatively shallow yet steady decline, however, from start of Q3 2023, a surge in oil from approximately USD 75 – 97 (Brent) and USD 70 - 94 (WTI) during the period 3 July – 28 September was observed. This was driven mainly by cuts from the OPEC+ group, notably within Saudi Arabia, whose output for Q4 2023 according to the World Bank was expected to be in the region of 2 mb/d lower compared to a year earlier. For the gas markets, a lower demand was exhibited coupled with excess winter storage, and ample LNG and pipeline gas from Norway and northern Africa, leading to lower gas prices overall.

COMMODITIES – HARD RED WHEAT (“HRW”) FUTURES VS. OECD INFLATION STATISTICS^{12,13}

Hard Red Wheat Futures (USD/Bushel) vs. Total Inflation for G-20 (%)



Hard Red Wheat Futures (USD/Bushel) vs. Total Inflation for CAN, CHN, DEU and 6 more jurisdictions (%)



The charts above (*Hard Red Wheat Futures USD/Bushel vs. Total Inflation for G-20 countries and selected jurisdictions (%)*) provide an indication of how the price of hard red wheat futures changed from 2021 to 2023.

The chart on the left-hand side provides an overview of the wheat futures market for the preceding years against the backdrop of total inflation for G-20 countries. While HRW futures peaked in 2022, the story for 2023 was somewhat of a different picture with HRW futures coming down to levels seen in 2021 mainly due to the improving grain supplies. As mentioned in our previous section on global inflation, Russia’s withdrawal from the BSGI coupled with extreme weather conditions did not significantly impact the global wheat supply. Ukraine had a very buoyant harvest in 2023 with both wheat and maize production increasing by 9 and 4%, respectively. The price of the HRW futures fell approximately 30% in 2023 from USD 8.8/bushel in January 2023 to USD 6.5/bushel in November 2023, while the *“World Bank October 2023 Commodity Markets Outlook: Under the Shadow of Geopolitical Risks”* mentions that there has been a decline of more than 11% in the grain price index.

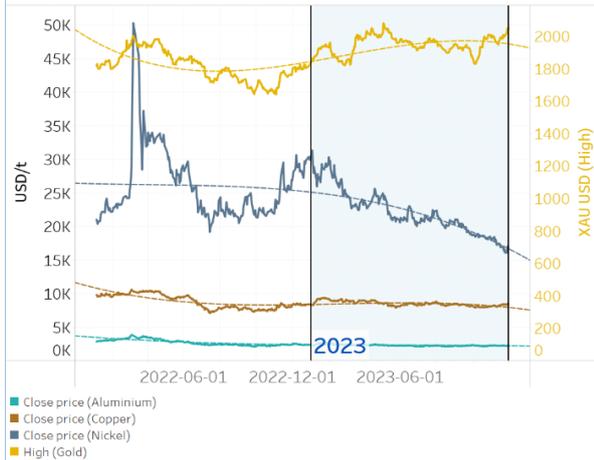
¹¹ World Bank. 2023. *Commodity Markets Outlook: Under the Shadow of Geopolitical Risks, October 2023*

¹² CME, KC HRW WHEAT FUTURES; OECD G-20, Inflation Statistics;

¹³ World Bank. 2023. *Commodity Markets Outlook: Under the Shadow of Geopolitical Risks, October 2023*

COMMODITIES – METALS¹⁴

LME Select 3M Nickel, Copper, Aluminium Futures USD/t, & Gold (XAU) Spot USD, 2022 - 2023



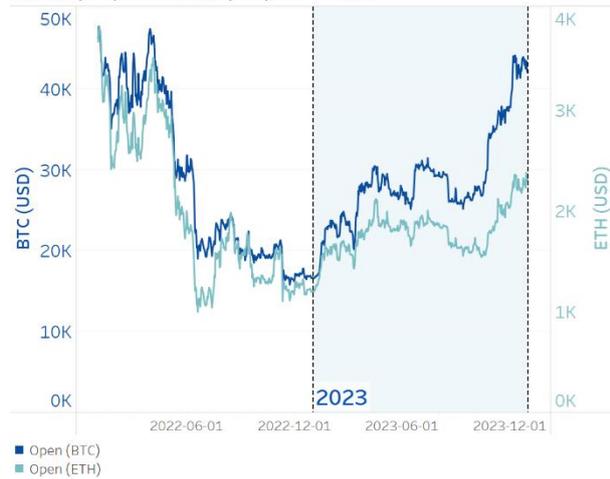
LME Select 3M Nickel, Copper, Aluminium Futures USD/t, & Gold (XAU) Spot USD, 2023



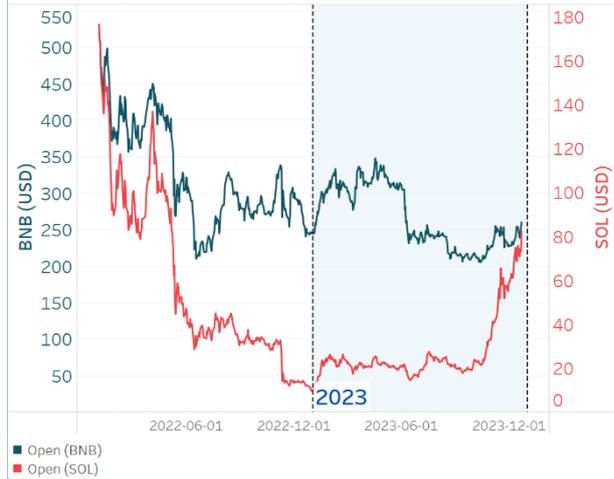
The charts above (*LME Select 3M Nickel, Copper, Aluminium Futures USD/t & Gold (XAU) Spot USD*) provide an overview of the metals market between 2022 and 2023. Within nickel, prices fell just over 60% from the start of the year, successfully recovering to levels before the nickel crisis of early 2022. The normalisation was in part attributed to the slowing battery demand in China along with the rapid nickel supply growth which was predominantly seen in Indonesia. Furthermore, the technological advancements taking place in China are reducing the demand for excess nickel usage, since companies shifted to batteries, such as lithium iron phosphate (“LFP”) packs, that do not require Class 1 nickel. Copper also saw a decline in 2022 from highs of 10,600 USD/t until it levelled out at between 8,000 – 8,900 USD/t for 2023. Aluminium experienced somewhat similar price movement and remained relatively stable throughout both 2022 and 2023. Across the gold market, a notable shift can be observed for 2022 vs. 2023. Gold was on a steady rise in 2023, moving in parallel by reflection of the geopolitical concerns.

CRYPTOCURRENCIES¹⁵

Bitcoin (BTC) & Ethereum (ETH), 2022 - 2023



Binance Coin (BNB) & Solana (SOL), 2022 - 2023



The charts above (*Bitcoin (“BTC”) & Ethereum (“ETH”), Binance Coin (“BNB”) & Solana (“SOL”), 2022 – 2023*) provide an overview of four cryptocurrencies throughout 2022 and 2023. While 2022 saw a rapid decline in many cryptocurrencies, the sentiment changed for 2023 with the evolving regulatory environment for crypto assets and considering the prospect of the “Bitcoin Halving” envisaged for April 2024 which will mark the time when the reward miners earn for adding a block to the Bitcoin blockchain is effectively halved, thus reducing the rate at which new coins are introduced.

Cryptocurrency prices for 2023 saw a notable rally throughout the year as the market watched in anticipation for the prospect of Spot Bitcoin Exchange Traded Funds (“ETF”) which were sitting with US financial regulators for a decision on an approval.¹⁶ Given investors can already buy and sell or gain exposure to BTC at a number of brokerage houses, through mutual funds, on securities exchanges, the prospect of an approved spot BTC ETF would allow certain protections for investors, thus bolstering the crypto market to some degree.

¹⁴ [Commodity Markets Outlook, World Bank, November 2023](#)

¹⁵ <https://www.theblock.co/post/267839/the-year-in-data-5-charts-that-show-how-crypto-changed-in-2023>

¹⁶ [As of 2024.01.10, the U.S. Securities & Exchange Commission approved the listing and trading of a number of spot bitcoin exchange-traded product \(ETP\) shares.](#)

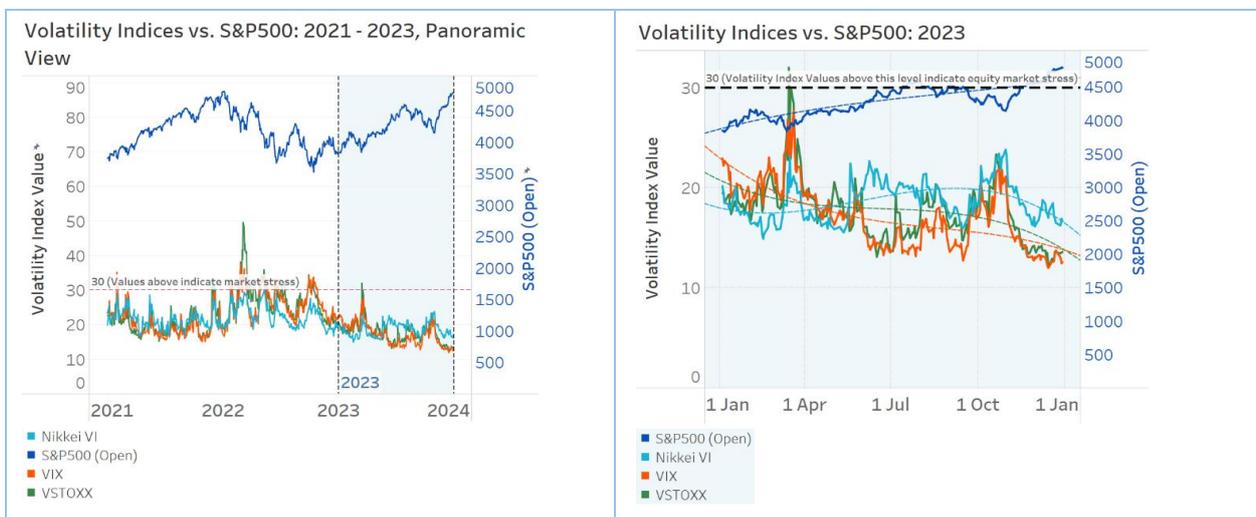
Regulatory developments in crypto and digital assets¹⁷

While the major cryptocurrencies and markets were recovering in 2023 from the “crypto winter” and collapse of firms like FTX in 2022, the SSBs and many major jurisdictions were working towards providing standards and regulations for crypto and digital asset markets in order to enhance the financial stability and increase protections for investors by addressing risks posed by these types of assets and providers of services in this area. With that in mind, the International Organization of Securities Commissions (“IOSCO”) published two sets of policy recommendations for: [Crypto and Digital Asset Markets](#) and [Decentralised Finance \(“DeFi”\)](#). The IMF together with the Financial Stability Board (“FSB”) produced a [Synthesis Paper: Policies for Crypto-Assets](#). The FSB alone also published [High-level Recommendations for the Regulation, Supervision and Oversight of Crypto-Asset Activities and Markets](#). On a more local level, His Majesty’s Treasury (“HMT”) conducted a public consultation on the [Future financial services regulatory regime for crypto-assets](#). Another jurisdictional example of further comprehensive work on regulating such assets is the European Union (“EU”) with the [Markets in Crypto-Assets Regulation \(“MiCA”\)](#) which entered into force in June 2023 and will be further developed by the upcoming Level 2 and 3 measures.

In response to the IOSCO and HMT consultations, CCP Global advocated for adhering to the ‘*same activities, same risks, same regulations/regulatory outcomes*’ principle and, to the extent practicable, for leveraging the work done so far by applying the same rules to entities providing services for crypto-assets as are applied in traditional financial markets. CCP Global also supported promoting more transparency in the crypto-asset markets and introduction of high standards of mandatory reporting, with a special emphasis on publicly available disclosures, consistent with the reporting provided by traditional financial markets today.

1.1.4 GLOBAL VOLATILITY INDICES

NIKKEI VOLATILITY INDEX (“VI”), VIX, AND VSTOXX¹⁸



The charts above (*Volatility Indices vs. S&P500, 2021 – 2023, and 2023 alone*) provide an overview of how the volatility indices (Nikkei VI, VIX, and VSTOXX) changed in the last three years. The chart on the left-hand side provides a panoramic view of how market stresses unfolded for the last three years, in order to provide context and perspective to the chart on the right-hand side which focuses on 2023 alone.

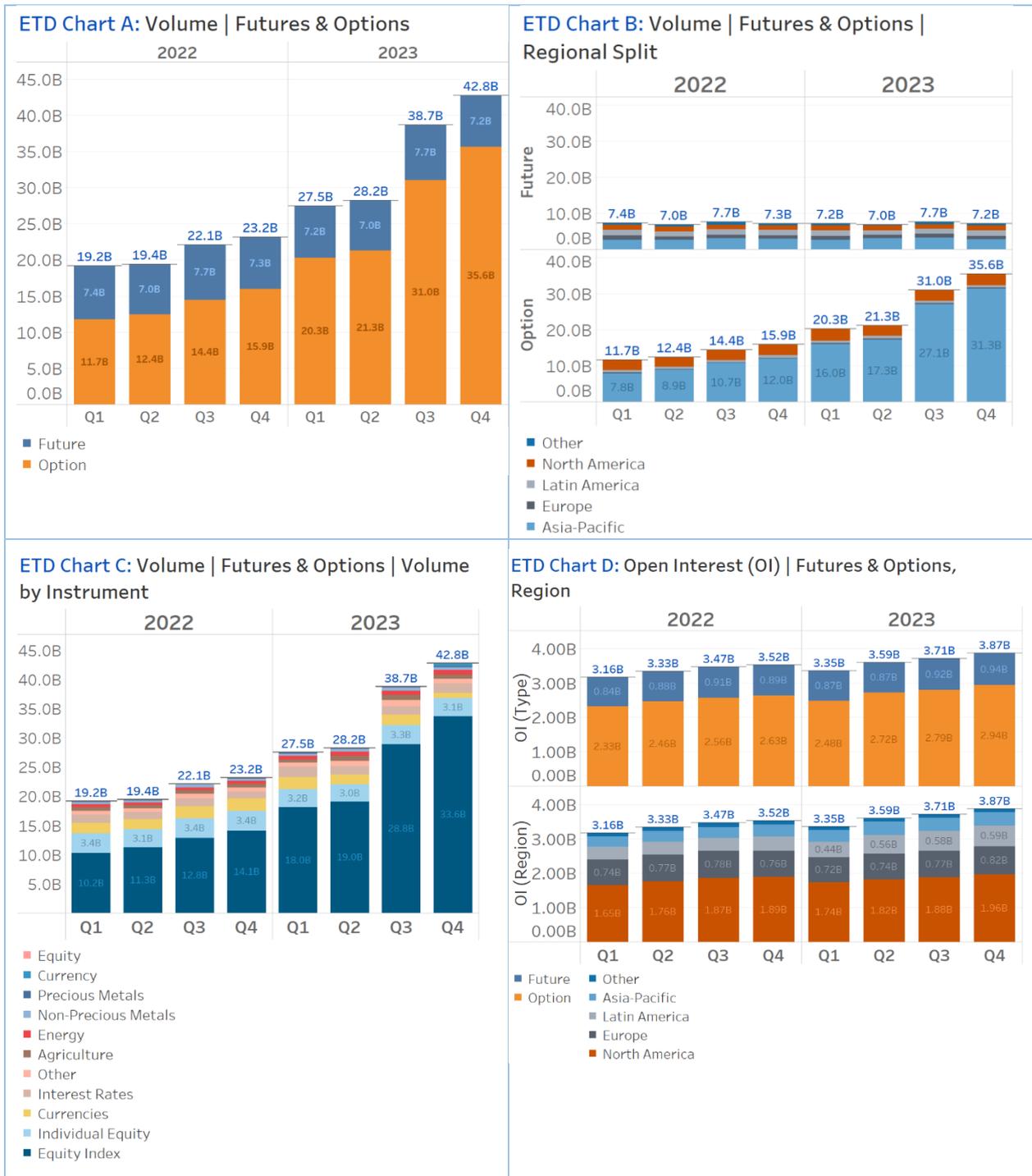
From the left-hand side chart, we can see that the previous two years saw some significant volatility, especially in 2022 due to the Russia-Ukraine war. For 2023, while from a trend perspective, equity market volatility seemed to be on a downward trend, this picture was somewhat mixed due to notable instances of the VIX either breaking the barrier at 30 (values above 30 indicate market stress) or approaching it. Overall, volatility in the equity markets was subdued in comparison to the previous year, however, the US regional banking crisis in March 2023 was of particular concern to all market participants which saw four banks with total combined assets of approximately USD 900 billion fail. The events set the above indices to the highest levels for 2023. Towards the end of Q3 2023, the news from several major central banks indicated that policy rates were kept static while the market volatility at the time hovered around 14.18 on 20 September 2023. This was somewhat short lived due to the conflict in the Middle East which exacerbated market conditions in October 2023. For December 2023, the VIX in particular reached its lowest levels seen since 2019 (12.70 on 15 September 2023 and 11.96 on 14 December 2023). Meanwhile, the Nikkei VI and VSTOXX reached 15.93, 14.73 and 16.98, 12.45, respectively, for the same dates.

¹⁷ BIS Bulletin, no. 69, [Crypto shocks and retail losses](#)

¹⁸ Data Sources: [Nikkei VI](#), [VIX](#), [VSTOXX](#)

1.1.5 EXCHANGE TRADED DERIVATIVES (“ETD”) MARKET¹⁹

ETD FUTURES & OPTIONS | VOLUMES AND OPEN INTEREST²⁰



The charts above (ETD Charts A – D) provide an overview of the total volumes and the open interest (“OI”) for futures and options contracts for both 2022 and 2023. Chart A indicates the rapid increase of volumes across all quarters within 2023, from 27.5B in Q1 to 42.8B in Q4. The significant increase observed across options contracts was primarily due to the surge in Indian exchange trading activity within their local markets. The main driver of this growth was due to the trading in equity index options. Chart B provides the geographical breakdown of volumes across the key regions. Chart C, on the other hand, provides a breakdown by asset class, where we see the most significant jump in equity index trading volumes from Q2 to Q3 2023, representing a 52% increase in volumes for this quarterly change alone. Chart D gives us a sense of the OI on a quarterly basis which measures the number of outstanding contracts at a particular point in time. As shown, OI overall reached 3.87B for Q4 2023, a ~10.6% increase since Q1 2023. From a geographical standpoint, North America consistently made up approximately 50% of the OI across all regions for 2022 and 2023. On a quarterly basis between Q1 and Q4 2023, Latin America had the largest increase in OI, up 34.15%.

¹⁹ Global futures and options volume hits record 137 billion contracts in 2023, FIA
²⁰ Futures Industry Association (“FIA”), Exchange Traded Derivatives Tracker and CCP Global Members’ data

2. CCP REGULATORY CONTEXT AND MARKET PRACTICES DEVELOPMENTS IN 2023

2.1 CCP STANDARDS AND REGULATIONS

After the GFC of 2008, CCPs became the center of attention for many authorities and SSBs. Following the introduction of the clearing mandate related to OTC derivatives and the resultant growing role of CCPs²¹ for the global markets, policy makers focused on ensuring that CCPs have robust risk management practices in place and are able to successfully perform their special economic function. This led to enhancements and codification of best practices in CCP risk management. On a global level, the Committee on Payment and Settlement Systems (“CPSS”) (renamed as Committee on Payments and Market Infrastructures (“CPMI”) in 2014) and IOSCO took the lead in this work and adopted the Principles for Financial Market Infrastructures²² (“PFMIs”) in 2012.²³ As a result, jurisdictions enhanced their regulatory and supervisory frameworks for CCPs locally. This process – on the global and local level – continues today. As markets evolve and new types of risk emerge, policy makers need to react to these developments and make sure precautions are taken to best prevent future crises. The year 2023 was no different – local jurisdictions and international standard setters continued to bring forward various topics and proposals with respect to centrally cleared markets.

The following list presents some examples of market consultations to which CCP Global responded:²⁴

- The Derivatives Market Institute for Standards’ (“DMIST”) Consultation Paper: Standard Regarding Timeliness of Trade Give-Up and Allocation (January 2023);
- The Commodity Futures Trading Commission’s (“CFTC”) Notice of Proposed Rulemaking (“NPR”) on Reporting and Information Requirements for Derivatives Clearing Organizations (“DCOs”) (February 2023);
- The HMT’s consultation and call for evidence on cryptoassets (April 2023);
- The Securities and Exchange Commission’s (“SEC”) Rule 10 Proposal (June 2023);
- SEC’s proposed amendments to Regulation Systems Compliance and Integrity (“Reg SCI”) (June 2023);
- SEC’s Proposed Rule on Covered Clearing Agency Resilience and Recovery and Wind-Down Plans (July 2023);
- IOSCO’s Consultation Report on Policy Recommendations for Crypto and Digital Asset Markets (July 2023);
- The FSB’s consultative document on Enhancing Third-Party Risk Management and Oversight (August 2023);
- CFTC’s NPR on DCO Recovery and Orderly Wind-down Plans; Information for Resolution Planning (September 2023);
- CFTC’s Request for Comment on the Impact of Affiliations on Certain CFTC-Regulated Entities (September 2023);
- European Securities and Markets Authority’s (“ESMA”) Consultation Paper on Draft Technical advice to the European Commission on fees charged to Tier 1 Third-Country CCPs under the European Market Infrastructure Regulation (“EMIR”) (November 2023);
- FSB’s Consultation report on Financial Resources and Tools for Central Counterparty Resolution (November 2023);

²¹ Please refer to CCP Global’s 2022 AMR for [the CCP model description](#).

²² [CPSS, IOSCO, Principles for Financial Market Infrastructures \(April 2012\)](#).

²³ Please find more background to PFMIs and resultant local regulations in CCP Global’s 2022 AMR, at p. 30.

²⁴ [CCP Global, Submissions](#)

- ESMA's Call for Evidence on Shortening of the Settlement Cycle (December 2023).

The work undertaken by the international SSBs and local policy-makers in 2023 was to a high degree focused on non-bank financial intermediation ("NBF"), CCPs' recovery and resolution frameworks, operational risk and resilience, including cybersecurity, margining practices, third-party risk management, the extension of the scope of the clearing obligation, CCPs' governance, shortening of settlement cycles, and establishing a regulatory framework for crypto and digital assets and DeFi. Some of these topics are elaborated on in the following sections.

2.2 CCP RECOVERY AND RESOLUTION REGIMES

CCP Recovery and resolution

A CCP recovery is a process addressing default and non-default events with the aim to restore the CCP's financial soundness and to enable the continuation of its critical functions. A CCP resolution occurs when its authorities conclude that the CCP in distress should not go through normal insolvency proceedings as it would cause financial instability. For over a decade, CPMI, IOSCO, and FSB have worked on and established a robust set of recommendations on CCP recovery ([Link](#)) and resolution ([Link](#)).

Further work on CCP recovery and resolution framework was conducted in 2023 by the SSBs and some local regulators, including by the EU, the US Commissions: CFTC and SEC, and Australia.

At the international level, following the FSB, CPMI, and IOSCO Report "Central Counterparty Financial Resources for Recovery and Resolution" of March 2022²⁵, the FSB focused its efforts on further analysing the CCP resolution framework which resulted in the publication of the Consultation report on the "Financial Resources and Tools for Central Counterparty Resolution"²⁶ ("the Report"). The FSB set out a proposal for a toolbox approach and assessed 7 types of resources or tools against parameters and dimensions it found particularly pertinent from the financial stability perspective while also taking into account the purpose and usability, timeliness and performance risk, legal and operational considerations, costs, and impact on incentives. Generally, CCP Global stood by its concerns voiced in response to the March 2022 report and commented on individual tools and resources proposed by the FSB. CCP Global continues to believe that there is a lack of empirical evidence or quantitative analysis which would merit changes to the existing CCP resolution framework, especially the carefully designed FSB Key Attributes of 2014.²⁷ Such aspects as the potentially negative impact of some of the proposed resources and tools on the CCPs' incentive structure and on the cost of clearing should also be considered.

While the FSB was working on reviewing international standards for CCP resolution, some of the jurisdictions were working in parallel on enhancing or making more detailed provisions for their local CCP recovery, wind-down, and resolution regimes. And so, in 2023, both US agencies – the CFTC²⁸ and the SEC²⁹ – published for industry consultation their proposals regarding CCPs' recovery and wind-down plans, with the objective of codifying the existing practices and guidance and bolstering the existing plans at CCPs. CCP Global had some targeted comments to both consultations and voiced concerns regarding the prescriptiveness of some aspects of the CFTC's proposal.

At the EU level, the authorities were finalising details of the CCP recovery and resolution regime. Empowered by the Regulation (EU) No 2021/23 on a framework for the recovery and resolution of central counterparties³⁰, the European Commission adopted a number of delegated regulations³¹ specifying (1) the content of the written arrangements and procedures for the functioning of the resolution colleges, (2) the

²⁵ [FSB, CPMI, and IOSCO Report "Central Counterparty Financial Resources for Recovery and Resolution" \(10 March 2022\)](#)

²⁶ [FSB, Consultation report "Financial Resources and Tools for Central Counterparty Resolution" \(19 September 2023\)](#)

²⁷ [FSB "Key Attributes of Effective Resolution Regimes for Financial Institutions" \(15 October 2014\)](#)

²⁸ [CFTC, NPR, Derivatives Clearing Organizations Recovery and Orderly Wind-Down Plans; Information for Resolution Planning \(28 July 2023\)](#)

²⁹ [SEC, Proposed rule, Covered Clearing Agency Resilience and Recovery and Wind-Down Plans](#)

³⁰ [Regulation \(EU\) 2021/23 of the European Parliament and of the Council of 16 December 2020 on a framework for the recovery and resolution of central counterparties](#)

³¹ [Implementing and delegated acts – CCP Recovery and Resolution Regulation](#)

contents of the resolution plan, (3) the circumstances in which a person is deemed to be independent from the resolution authority and from the CCP, the methodology for assessing the value of assets and liabilities of a CCP, the separation of the valuations, the methodology for calculating the buffer for additional losses to be included in provisional valuations, and the methodology for carrying out the valuation for the application of the 'no creditor worse off' principle, and (4) the conditions under which compensation, cash equivalent of such compensation or any proceeds are to be passed on to clients and indirect clients and the conditions under which passing on is to be considered proportionate. In addition to that, ESMA publishes Guidelines on templates for summary resolution plans and for written arrangements for resolution colleges.³²

Another example of a jurisdiction working in 2023 on enhancing their CCP recovery and resolution regime was Australia. The Australian Treasury published for consultation a package of proposed reforms related to, inter alia, powers for the Reserve Bank of Australia ("RBA") to address a crisis at a domestic CCP to ensure the continuity of its critical functions and to assist a foreign regulator to resolve an overseas CCP licenced in Australia. It also proposed to strengthen the role of the Australian Securities and Investments Commission and of RBA in the context of financial market infrastructures' ("FMIs") licencing and supervision.³³

In the recovery and resolution context, both default and non-default losses ("NDLs") are taken into account. In 2023, CPMI-IOSCO published the final "Report on current central counterparty practices to address non-default losses"³⁴ which described practices commonly employed by CCPs in the context of NDL scenarios. The report was meant to improve the common understanding of these practices and to facilitate the industry dialogue, particularly in the recovery and orderly wind-down context. This final report followed a consultation of 2022 to which CCP Global responded.³⁵ The SSBs have, as the next step, broadened the scope of their analysis of NDL practices to other FMIs and are now preparing to publish a consultation on guidance or other recommendations on FMI NDLs³⁶ which is expected in 2024.

2.3 REGULATORY DEVELOPMENTS IMPACTING CENTRAL CLEARING

In 2023, we saw several initiatives and rules which have potential to impact the central clearing landscape. The most notable examples come from the US where two rules in particular are worth highlighting: the SEC final rule requiring central clearing of US Treasury ("UST") transactions³⁷ and the SEC final rule shortening the settlement cycle in securities from two (T+2) to one business day (T+1)³⁸.

The former will require central clearing of certain UST securities secondary cash market transactions (effective 31 December 2025) and repurchase and reverse repurchase transactions (effective 30 June 2026). The rule mandates central clearing of UST repos if one party is a member of the Government Securities Division of the Fixed Income Clearing Corporation ("FICC"), with a few exemptions, including for repos in which one counterparty is a covered clearing agency, a DCO, or a CCP regulated in a non-US jurisdiction. The SEC's decision to push forward with the central clearing mandate for UST transactions may pave the way for similar developments in some other jurisdictions. The other final rule – regarding moving transactions in US cash equities, corporate debt, and unit investment trusts to the T+1 settlement cycle – will be implemented as of 28 May 2024. The main objectives of the shortening of the settlement cycle are to help reduce settlement risk but also liquidity and margin requirements. The SEC's decision comes at a time when other jurisdictions have already implemented a similar rule or are currently considering such a move.

³² [ESMA Guidelines on templates for summary resolution plans and for written arrangements for resolution colleges](#)

³³ [Financial market infrastructure regulatory reforms](#)

³⁴ [CPMI-IOSCO "Report on current central counterparty practices to address non-default losses" \(August 2023\)](#)

³⁵ [CCP Global 2022 AMR, p. 33.](#)

³⁶ [IOSCO Board Priorities – Work Program 2023-2024](#)

³⁷ SEC, Final rule, Standards for Covered Clearing Agencies for U.S. Treasury Securities and Application of the Broker-Dealer Customer Protection Rule With Respect to U.S. Treasury Securities, available at [Link](#).

³⁸ SEC, Final rule, Shortening the Securities Transaction Settlement Cycle, available at [Link](#).

Another prominent event in 2023 was the finalisation of the implementation of the Basel III framework. The need to complete the Basel III reforms became even clearer after the banking crisis observed in 2023³⁹, in the US (with the failures of SVB⁴⁰, Signature Bank⁴¹, and First Republic Bank⁴²) and in Switzerland (with the failure of Credit Suisse⁴³). Significant progress with the implementation of the final elements of Basel III was made in many jurisdictions, including in the EU, the UK, and in the USA. In the case of the latter, the three US federal banking agencies⁴⁴ consulted⁴⁵ with the industry on how the outstanding parts of the Basel package should be implemented there. CCP Global contributed to this consultation process, expressing its concerns that the proposal, if adopted without due modifications, will have unintended negative consequences for central clearing and will likely contravene clearing incentives. Our analysis also indicates that the proposed rule would likely exacerbate the already high concentration of the clearing activity in the industry, thus increasing systemic risk.

2.4 DEFAULT MANAGEMENT AUCTIONS

Since the publication of the CPMI's and IOSCO's report "Central counterparty default management auctions – Issues for consideration" (June 2020),⁴⁶ a wide range of industry efforts have been put in collaboration on further development of default management auction practices. In particular, first and second categories of issues have been addressed with association papers which can be referred to in the previous 2021 and 2022 AMRs.⁴⁷

CCP default management auctions – Issues for consideration

In June 2020, CPMI-IOSCO published the paper "Central counterparty default management auctions – Issues for consideration", to provide a description of the matters for CCPs to consider when planning and conducting default management auctions and to identify best practices in development of, and improvements to, default management auction rules, governance arrangements, and procedures to address these issues. The Policy Standing Group of CPMI-IOSCO sought industry action in three categories of work:

- The first category includes several operational issues (such as methods of communication and formats for auction files) where there is broad industry consensus to support further development and where CCPs should be well-positioned to advance these issues, bringing such work to closure.
- The second category includes such areas as governance of a CCP's default management processes ("DMP"), use of traders in default management groups ("DMG"), the scope of client participation, where there are differing views among clearing members ("CMs") and other stakeholders.
- The third category includes potential nascent and emerging practices (synchronizing DMPs, identification of potential hedges between CCPs) that may require further coordination and harmonisation among multiple CCPs.

On 14 February 2023, CPMI-IOSCO released the statement for stocktake of industry progress on auctions to evaluate industry progress made so far to address these issues.⁴⁸ CPMI-IOSCO considered that the industry has made good progress on the issues to be addressed, although the work on the third category of issues has not yet started. With the issues for consideration laid out in the report and the progress made by the industry thus far, CPMI-IOSCO believes further guidance is not necessary at this point. The industry is encouraged to continue efforts in enhancing the default management auction practices and promote best practices.

³⁹ [Basel Committee on Banking Supervision, Report on the 2023 banking turmoil \(October 2023\)](#)

⁴⁰ [Board of Governors of the Federal Reserve System, Review of the Federal Reserve's Supervision and Regulation of Silicon Valley Bank \(28 April 2023\); Board of Governors of the Federal Reserve System, Material Loss Review of Silicon Valley Bank \(25 September 2023\)](#)

⁴¹ [FDIC's supervision of Signature Bank \(28 April 2023\); FDIC's Office of Inspector General memorandum regarding Cotton & Company Assurance and Advisory, LLC's Material Loss Review of Signature Bank New York \(October 2023\)](#)

⁴² [FDIC's Office of Inspector General memorandum regarding Cotton & Company Assurance and Advisory, LLC's Material Loss Review of First Republic Bank \(November 2023\)](#)

⁴³ [FINMA Report, Lessons Learned from the CS Crisis \(19 December 2023\)](#)

⁴⁴ These agencies are: the Office of the Comptroller of the Currency, the Board of Governors of the Federal Reserve System, and the Federal Deposit Insurance Corporation.

⁴⁵ [Agencies request comment on proposed rules to strengthen capital requirements for large banks \(27 July 2023\)](#)

⁴⁶ [CPMI-IOSCO, Central counterparty default management auctions – Issues for consideration \(June 2020\)](#)

⁴⁷ [CCP Global AMRs](#)

⁴⁸ [CPMI-IOSCO, Stocktake of industry progress on auctions \(14 February 2023\)](#)

2.5 2023 CIDS EXERCISE

CCP Global coordinated the first industry-led multi-CCP default simulation exercise in 2023, i.e., the 2023 CIDS exercise.⁴⁹ The exercise demonstrated a great collaborative effort of different stakeholders. Multiple international regulators were consulted and CCP Global and its members were highly appreciative of their collaboration and further guidance.

The exercise aimed to achieve three objectives:

1. To test the operational viability of and the operational stress faced by CCPs and CMs in the event of a default by a common CM facing multiple CCPs, and the interplay of actions by multiple CCPs and regulators when multiple CCPs were conducting the DMP in a similar period of time.
2. To provide an opportunity to share default management best practices among CCPs through the discussion and the post-exercise workshop.
3. To identify any potential areas for follow-on work and highlight fire drill insights to SSBs and regulators, demonstrating industry efforts and CCPs' critical role in supporting financial market stability.

As many as 32 individual CCPs (consisting of CCP Global member and non-member CCPs) participated in the exercise to conduct default simulation in November 2023. In addition, 14 CCP Global members joined as observers for the 2023 simulation and planned to take a more active role in future exercises.

During the exercise, participating CCPs conducted their respective default simulations under a high-level common narrative. A hypothetical defaulting CM, whose name was A.C.M.E. ("A Clearing Member Everywhere"), was assumed to be one of the 5 largest CMs as defined by each CCP. CCPs defined their own scenarios and created the defaulting CM's portfolio(s), with the asset classes and scope they would like to include into the simulation. During the drill, CCPs followed their own internal DMP. The aspects tested by each CCP covered their core default management actions, including portfolio evaluation, simulating risk reduction and re-establishing a matched book (trading, hedging, and/or auctions), communication channels, and any relevant technical tools. The CIDS exercise assumed the hypothetical CM defaulted during the weekend of 12 November and CCPs acted accordingly to trigger their DMP. All participating CCPs completed their DMP by 22 November 2023.

The result of the exercise was positive. Based on the post-exercise survey prepared by CCP Global to the participating CCPs, the participation rates from CMs and clients, collectively participants, were similar to those of individual default simulation exercises and previous multi-CCP fire drill exercises if applicable, in a few cases even better. Participating CCPs reported that they were able to close out the positions of A.C.M.E. successfully. Notably, most CCPs did not receive requests from participants to extend the bidding windows, indicating that the overlapping of bidding windows did not appear to pose operational challenges in the 2023 CIDS exercise. This was mainly attributed to the diverse nature of auctions across asset classes and markets, aligning with the comments received from participants. While a few participants who provided their feedback to CCP Global highlighted staffing resource concerns, most respondents were adequately staffed to participate in the exercise in their required capacities, such as hedging, auction, convention of the DMG or the default management committee ("DMC"), despite the high volume of auctions conducted during the period.

CCP Global also appreciates the feedback received from the participating CCPs and participants on the improvements for future exercises (the next one planned for 2025) and the default management practices across CCPs. CCP Global hosted the CIDS workshop meetings in Madrid on 20-21 March 2024 as a forum for CCPs, authorities, and market participants to discuss such potential improvements related to default management practices (feasibilities and potential follow-up actions) and industry best practices. The key

⁴⁹ [CCP Global, Default Simulation Exercises by CCPs](#)

takeaways, along with the written feedback received from CCPs and participants, are included in the CIDS report summary published on 21 May 2024.⁵⁰ CCP Global will continue to collaborate and liaise with different market stakeholders in the next exercise planning.

2.6 CCP MARGINING PRACTICES

Margining practices remain a key topic in the SSBs' work programmes for policy recommendations. In 2023, there was ongoing policy work both at the international level and in the EU specifically on anti-procyclicality ("APC") measures.

Since the market turmoil of March 2020 which is considered as the most significant stress test of resilience of financial markets since the GFC, there has been abundance of attention from the markets devoted to CCP margining practices, specifically IM. Despite the severe market volatility, CCPs remained robust and resilient in their roles to safeguard financial market stability. It is important to underscore that variation margin ("VM") payments far outpaced the IM changes as noted in the Review of margining practices, published by the Basel Committee on Banking Supervision ("BCBS"), CPMI, and IOSCO in September 2022.⁵¹ Different from IM requirements, which depend on the CCPs' own margin models and model design choices, VM requirements reflect a position's profit or loss in relation to current market prices, and hence, significant market volatility translates directly into commensurately significant VM requirements for market participants who are holding portfolios of significant losses.

In relation to the current margining approaches across CCPs, the BCBS-CPMI-IOSCO published another report in May 2023 on margining dynamics in the centrally cleared commodities market considering the market volatility triggered by the Russian invasion of Ukraine in 2022.⁵² The report complements the 2022 report and has helped to inform the wider BCBS-CPMI-IOSCO policy work on CCP margining practices. The analysis also contributes to the FSB work to enhance the resilience of NBFIs and complements the report on The Financial Stability Aspects of Commodities Markets with a specific focus on CCP-related dynamics.⁵³

Along with the international work on margining practices, ESMA published the final report "Review of the RTS with respect to the procyclicality of CCP margin" on 19 July 2023, following the consultation released on 27 January 2022 which CCP Global commented on.^{54, 55} The proposed revisions focus only on requirements and guidance previously issued by ESMA (i.e., the Regulatory Technical Standards ("RTS") and the guidelines on APC measures), but do not make proposals in areas where further work is expected at the international level, in particular regarding margin transparency. The final report outlines modifications aimed at advancing the harmonization of CCPs' policies and procedures for selecting, assessing, and reviewing APC measures. The proposal also offers further detail on the design and use of APC tools with EU regulatory regime remaining more prescriptive than international standards. As noted in CCP Global's response,⁵⁶ CCPs performed overall well during the crisis and CCPs' margining practices were appropriately anti-procyclical, successfully supporting the stability of their respective markets and the financial markets in general. With the appropriate margin models and tools adopted, CCPs have been able to best risk manage the markets they serve and we are concerned that any overly prescriptive approach would be counterproductive.

The subject of margining practices is anticipated to maintain its status as a pivotal priority in 2024, with advancements expected at the international level.

⁵⁰ [2023 CCP Global International Default Simulation \(CIDS\) Exercise Report \(21 May 2024\)](#)

⁵¹ [BCBS-CPMI-IOSCO, Review of margining practices \(29 September 2022\)](#)

⁵² [BCBS-CPMI-IOSCO, Margin dynamics in centrally cleared commodities markets in 2022 \(24 May 2023\)](#)

⁵³ [FSB, The Financial Stability Aspects of Commodities Markets \(20 February 2023\)](#)

⁵⁴ [ESMA, Final Report: Review of the RTS with respect to the procyclicality of CCP margin \(19 July 2023\)](#)

⁵⁵ [ESMA, Consultation Paper, Review of RTS No 153/2013 with respect to procyclicality of margin \(27 January 2022\)](#)

⁵⁶ [CCP Global \(previously "CCP12"\), Response to ESMA's consultation paper on review of RTS No 153/2013 with respect to procyclicality of margin \(31 March 2022\)](#)

2.7 CCP SUPERVISORY STRESS TESTS

Given their central role in the global financial system, resilience of CCPs is paramount for financial stability. Failure of an individual CCP's risk management tools can potentially amplify shocks in the market and exacerbate systemic risk. As part of the prudential requirements, CCPs are required to conduct daily stress tests that focus on their own clearing services and business activities of the specific markets they serve.

Building on top of the individual stress tests, supervisory stress tests are an important tool to create a well-informed comprehensive picture of how the default of a CM may impact CCPs throughout the system. These exercises inform regulators of CCPs' ability to absorb default losses and maintain liquidity resources in extreme but plausible market conditions. These exercises also allow supervising authorities to identify any potential areas of follow-up work.

On 31 May 2023, ESMA, the EU's financial markets regulator and supervisor, launched its 5th Stress Test Exercise for CCPs under EMIR.⁵⁷ The exercise covered all authorised EU CCPs, as well as Tier 2 CCPs. The scope of the stress test exercise has evolved over the years, and thus the 5th stress test exercise focused on five components encompassing credit stress, concentration risk, liquidity stress, climate risk, and reverse stress test.

The BoE also published the results of its 2023 supervisory stress test of CCPs on 8 November 2023.⁵⁸ While the stress test scenarios were of greater severity than the worst-ever historical market stresses, the UK CCPs continued to demonstrate resilience to the market stress scenarios. It was highlighted that CCPs were able to comfortably absorb default losses and maintain high liquidity balances through the exercise, and were also able to survive more extreme combinations of assumptions.

2.8 CCP OPERATIONAL RISK MANAGEMENT

Operational risk management is naturally of key importance to CCPs and their participants; on both calm or stormy days, the ability of market participants to execute trades, pay or receive their profits and losses, and process any physical settlements is crucial. While operational resilience and excellence have always been a feature of operating a CCP, recent years have added emphasis on the surety of operations. The increased focus on operational resilience resulted from changing work environments, notably an increased reliance on work from home during lockdowns, a rise in the frequency and sophistication of cyber-attacks (and attack vectors), and regulatory interest in various service providers.

CCP Core system availability and Target Recovery Time

CCPs hold extremely high degrees of operational resilience. This is another area in which CCPs provide transparency and a systematic view is provided in public disclosures, as numbers 17.2 and 17.4 in particular of the PQDs. The first of these is a metric that expresses the availability of core clearing systems over the previous 12 months, are well in excess of 99.9%. The latter figure is the CCP's observed Target Recovery Time, which expresses in hours the time for a recovery from a disruption, and the average across the world of 2 hours.

In 2023, initiatives which enhance operational smoothness and robustness were undertaken notably by the Futures Industry Association ("FIA") and the DMIST initiative⁵⁹, targeting primarily give-up and allocation procedures, as these may come under strain in high volume and volatile moments. Global SSBs and regulators have also outlined approaches or expectations, and CPMI-IOSCO have established an Operational Resilience Group which will further deliberate and formulate policy and best practices. CCP Global responded to two^{60,61} SEC consultations, which address a framework and update to operational and technical incident preparedness and reporting. Additionally, CCP Global also responded to the FSB's

⁵⁷ [ESMA, Final Report Framework for the 5th ESMA Stress Test Exercise for Central Counterparties \(31 May 2023\)](#)

⁵⁸ [BoE, 2023 CCP Supervisory Stress Test: results report \(8 November 2023\)](#)

⁵⁹ [DMIST Consultation Paper: Standard Regarding Timeliness of Trade Give-Up and Allocation \(11 November 2022\); CCP Global response to DMIST consultation \(17 January 2023\)](#)

⁶⁰ [CCP Global response to the SEC Proposed Rule "Regulation Systems Compliance and Integrity"](#)

⁶¹ [CCP Global response to the SEC Proposed Rule 10](#)

consultation⁶² on 3rd party risks, and the ESMA Call for Evidence⁶³ on shortening the settlement cycle – both key topics that involve operational risk management.

Shorter Settlement Cycles

The settlement cycle of a CCP is the time for completion the trade, be it financial or physical delivery, for instance the final transfer of a share or bond from the seller to the buyer. Globally, marquee bond markets tend to have a T+1 settlement cycle, and equity markets T+1, T+2, or T+3. In 2023, various jurisdictions have either moved (India), decided to move (Canada, Mexico, and the USA), or considered moving (the EU, UK) to shorter settlement cycles. A shorter settlement cycle removes and concludes outstanding trades faster, a benefit in its own right. However, the shorter the settlement cycle, the greater the need for operational robustness and liquidity risk management to ensure that participants are ready for compressed timelines.

⁶² [CCP Global response to the FSB consultation on Third-Party Risk Management and Oversight](#)

⁶³ [CCP Global response to the ESMA Call for evidence on shortening of the settlement cycle](#)

3. CCP DATA AND RESILIENCE IN 2023

3.1 CCP TRANSPARENCY

Transparency is fundamental for the global financial markets as it fosters trust, efficiency, and stability within the entire ecosystem. By providing market participants with timely and accurate information on prices, volumes, and transactions, transparency enables informed decision-making, reduces information asymmetry, and actively promotes fair and competitive markets. In particular, transparency in the cleared markets has enhanced market integrity, mitigated systemic risks, and facilitated regulatory oversight, ultimately contributing to the resilience and sustainability of the financial ecosystem on a global scale.

CCPs instill confidence, mitigate risks, and support the smooth functioning of the markets they serve, ultimately contributing to financial stability and economic growth. With that in mind, over the years, CCPs have adopted a range of best practices to further promote confidence and provide the market with a level of comfort that CCPs have robust risk management frameworks and maintain adequate resources.

CCPs have a long-standing practice of operating under publicly available rulebooks, which are the contracts that determine and organize market participants' rights and obligations. In December 2012, following the release of the PFMI, CPSS and IOSCO published another document: "Principles for financial market infrastructures: Disclosure framework and Assessment methodology"⁶⁴, which prescribed the form and content of the disclosures expected of FMIs. To enhance the transparency of CCPs even further, in February 2015, CPMI and IOSCO released the "Public quantitative disclosure standards for central counterparties"⁶⁵. Both publications provide the basis for a CCPs' robust qualitative and quantitative disclosures. Throughout the years and in particular 2023, CCPs have provided additional resources to help market participants understand and access the comprehensive list of documents to aid CCP transparency. The "[Quick Access Transparency Links](#)" ("QATL") document was the latest update from CCP Global and CCPs to enhance clearing participants' existing access and for ease of reference to the CCPs' disclosures. The following sections present a selection of the most important CCP PQDs with analysis for 2023.

CCP PQDs

In 2015, 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 template. CCP Global supports CPMI-IOSCO's efforts to improve the level of standardization and transparency of CCP disclosures.

CCPG PQD Template & PQD Frequently Asked Questions ("FAQ") Guide:

CCP Global members collaboratively worked to create a common PQD template in 2015 and officially released the CCP Global PQD Template in 2017. Several updates of the template have been provided over the years, notably the latest CCP Global PQD template was published in February 2021, along with the PQD FAQ Guide. The latter provides details of the CCP Global PQD Template such as 'Disclosure Title', 'Reference', 'Description' and 'Reporting Frequency', as well as an FAQ section for each disclosure, to give additional guidance to market participants when evaluating a CCP's PQDs. CCP Global will continue efforts to improve the PQD FAQ Guide to support market participants' interpretation of the CCP PQDs.

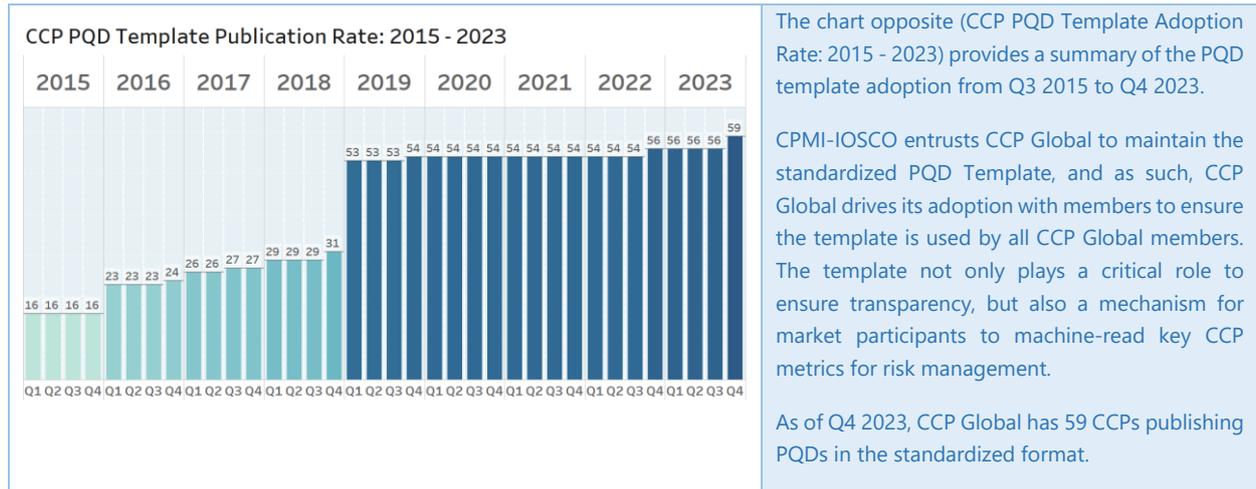
CCPG PQD Publication Timeline – Two months lag after the quarter-end

In light of CCP Global's ongoing market engagement with CCP Global members, global market participants, and regulators, a change in the PQD publication timeline from three to two months after the quarter-end was made in May 2022 which has been recognised as a positive step to aiding market participants' ability to obtain PQD data more swiftly, without compromising the CCPs' requirements for data accuracy, internal approvals, and, in some cases, regulatory approvals. This is part of CCP Global's ongoing efforts with the industry to enhance and accommodate market views to ensure better risk management practices.

⁶⁴ CPSS-IOSCO "Principles for financial market infrastructures: Disclosure framework and Assessment methodology" (December 2012)

⁶⁵ CPMI-IOSCO "Public quantitative disclosure standards for central counterparties" (February 2015)

3.1.1 CCP PQD TEMPLATE PUBLICATION RATE

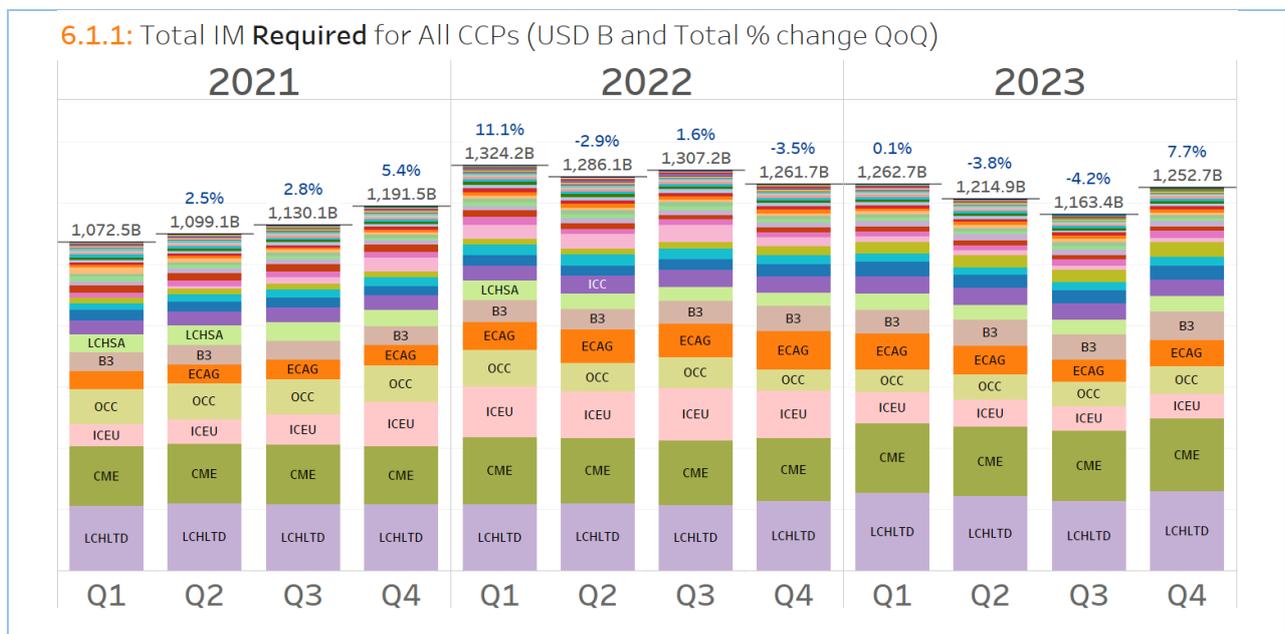


3.2 IM, VM, AND DEFAULT FUND ANALYSIS

The PQDs provide market participants with a high level of transparency into the cleared markets through various disclosures. The high level of standardization across the disclosures makes it straightforward for market participants to analyze cleared markets across each CCP.^{66,67,68} In the following sections, we explore the trends across IM, VM, and Default Fund (“DF”) data.

For this, we have looked at a broad group of CCP Global members’ PQDs and analyzed the developments from Q1 2021 until Q4 2023 across all CCP Global members who are publishing their PQDs. Therefore, for charts within this section “all CCPs” refers to all CCP Global members who are publishing PQDs and are included in the aggregation for analysis; this currently amounts to 59 CCPs globally.

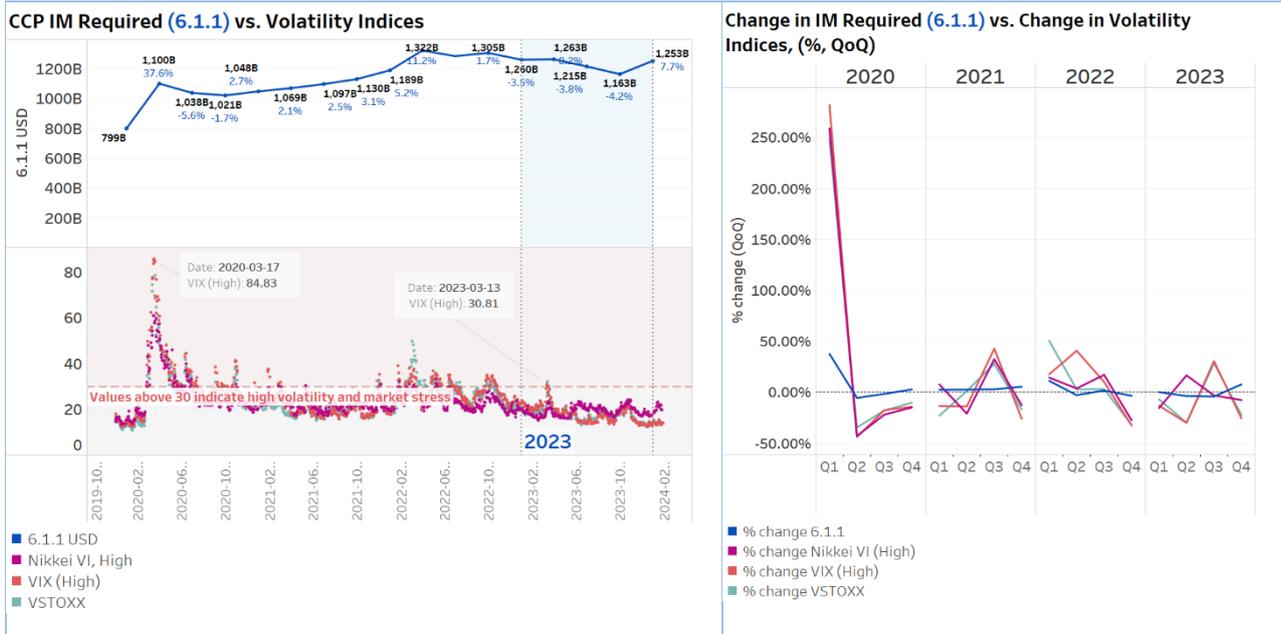
3.2.1 TOTAL IM (REQUIRED) ANALYSIS – DISCLOSURE 6.1.1



The chart above (6.1.1: Total IM Required for All CCPs (USD B and Total % change QoQ)) provides an overview of the Total IM (Required) levels for global CCPs between the years 2021 and 2023. For the year under review, IM levels in 2023 plateaued, despite periods of heightened market volatility (shown on the next chart).

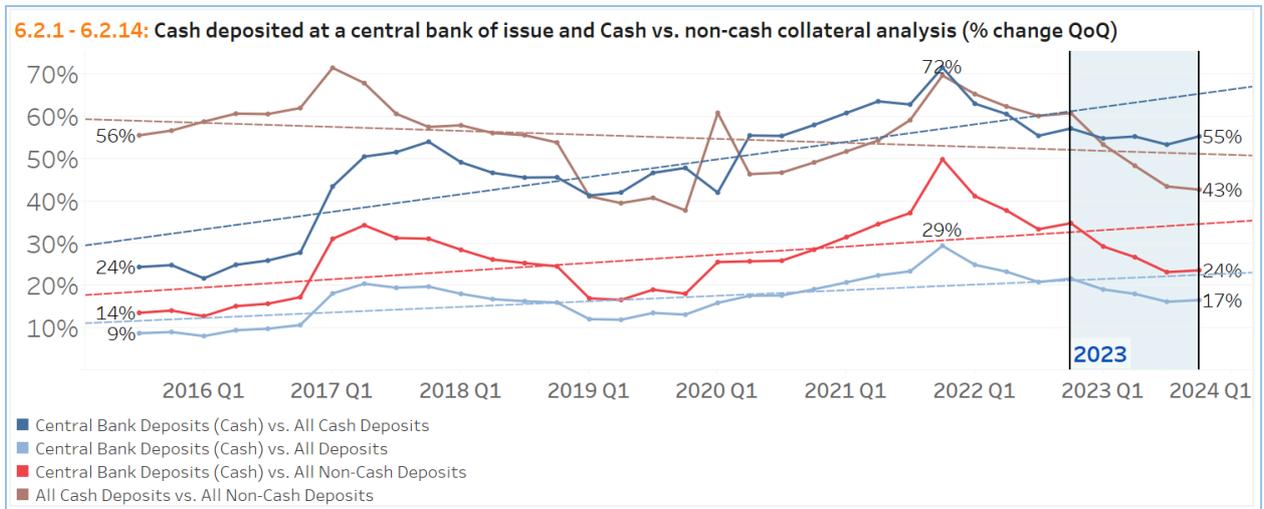
⁶⁶ CPMI-IOSCO: Public Quantitative Disclosure Standards for Central Counterparties (February 2015)
⁶⁷ CCP Global PQD Template
⁶⁸ CCP Global PQD FAQ

3.2.1.1 IM (REQUIRED) VS. VOLATILITY INDICES



The charts above (CCP IM Required (6.1.1) vs. Volatility Indices and Change in IM Required (6.1.1) vs. Change in Volatility Indices, (% QoQ)) provide a sense of how market volatility over the last several years has changed in comparison to the change in IM required. The chart on the left-hand side provides a macro view of the past volatility since 2020 to 2023-end. While market volatility has reduced somewhat since the highs of 2020, for Q1-Q4 2023, there was heightened volatility across the VIX and Nikkei VI, respectively. In percentage change terms, on a QoQ basis, the chart on the right-hand side provides a view of the IM changes vs. the three selected indices. As can be seen, in all instances, the changes in volatility indices consistently exceeded the changes in IM required. For 2023, even when volatility spikes occurred throughout the quarters, IM required on a global scale saw a decrease between Q1 and Q3 2023. It is only in Q4 2023 where we see a moderate increase in IM; despite this, IM has remained relatively stable in comparison to the changes in market volatility, testament to the carefully calibrated CCP margin models and applied APC measures.

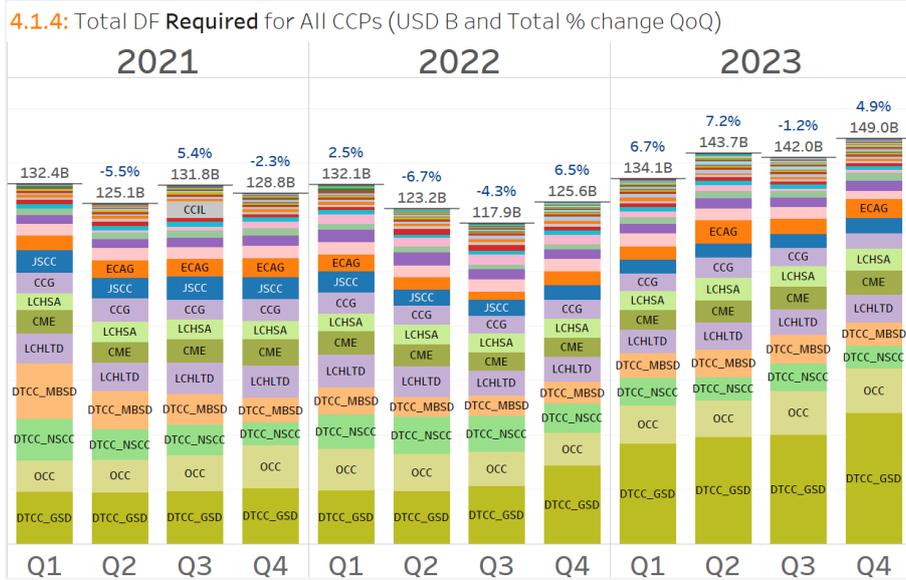
3.2.2 IM (HELD) - CENTRAL BANK CASH DEPOSIT RATIOS⁶⁹



The chart above (6.2.1 - 6.2.14: Cash deposited at a central bank of issue and Cash vs. non-cash collateral analysis (% change QoQ)) provides in percentage terms several comparisons of central bank cash deposits. As can be seen, there has been an increase in cash deposited at central banks over the years 2016 – 2023. It is important to note that central banks typically offer accounts to their local banks and in some cases local CCPs. This improves financial stability and is a reason why CCPs utilise this functionality where possible. While depositing cash with central banks is the safest option (free from credit and liquidity risks), it is still only available to the select few CCPs which have access to central bank accounts. The industry would benefit if all CCPs were given central bank access in their local jurisdictions.

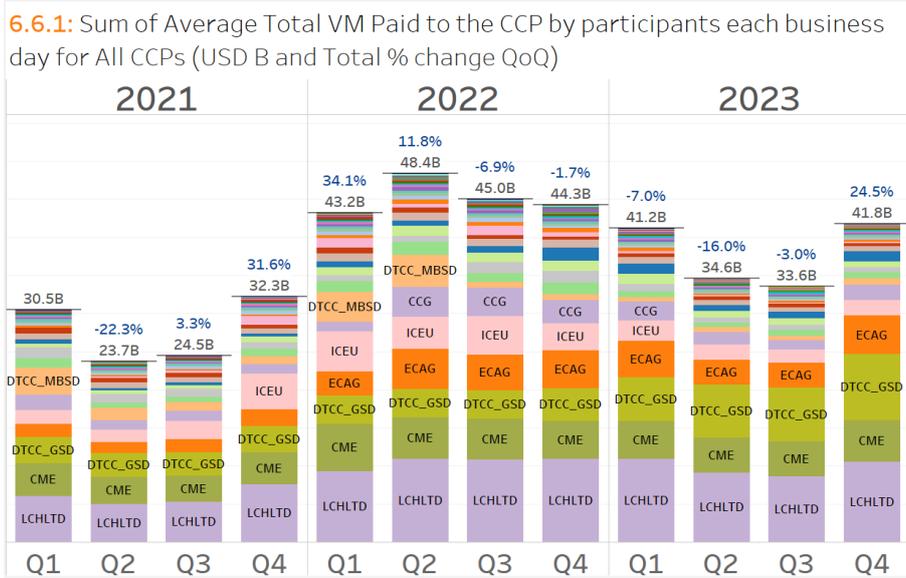
⁶⁹ BIS Quarterly Review, 4 December 2023, Liquid assets at CCPs and systemic liquidity risks

3.2.3 TOTAL DF (REQUIRED) ANALYSIS - DISCLOSURE 4.1.4



The chart above (*Total DF Required for All CCPs (USD B and Total % change QoQ)*) provides an overview of the DF levels from 2021 to 2023. As can be seen, DF levels over 2021 and 2022 remained bounded between USD 117B and USD 132B, compared to 2023 where DF levels increased moderately, ending USD 149B for Q4 2023. Despite this, DF levels over the years and for 2023 tended to remain very stable.

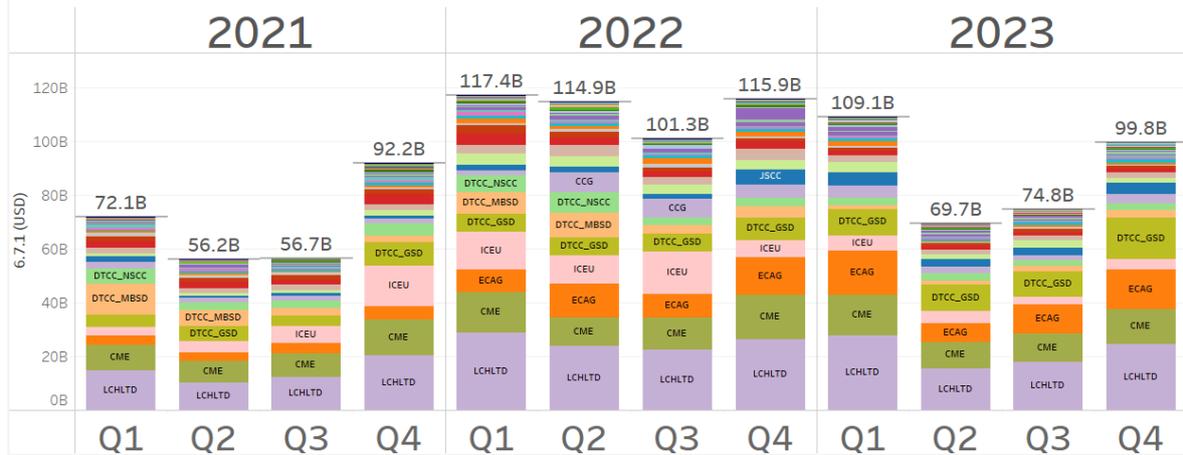
3.2.4 TOTAL VM ANALYSIS - DISCLOSURE 6.6.1



The chart above provides an overview of disclosure 6.6.1 in the PQDs (*6.6.1: Sum of Average Total VM Paid to the CCP by participants each business day for All CCPs (USD B and Total % change QoQ)*). As can be seen, over the last two years for 2022 and 2023, VM levels have remained heightened, compared to 2021. For the year under review, in 2023, VM levels dropped in the period of Q1 – Q3 2023, however, Q4 2023 saw a noticeable increase to USD 41.8B.

3.2.4.1 MAX VM CALL ANALYSIS - DISCLOSURE 6.7.1

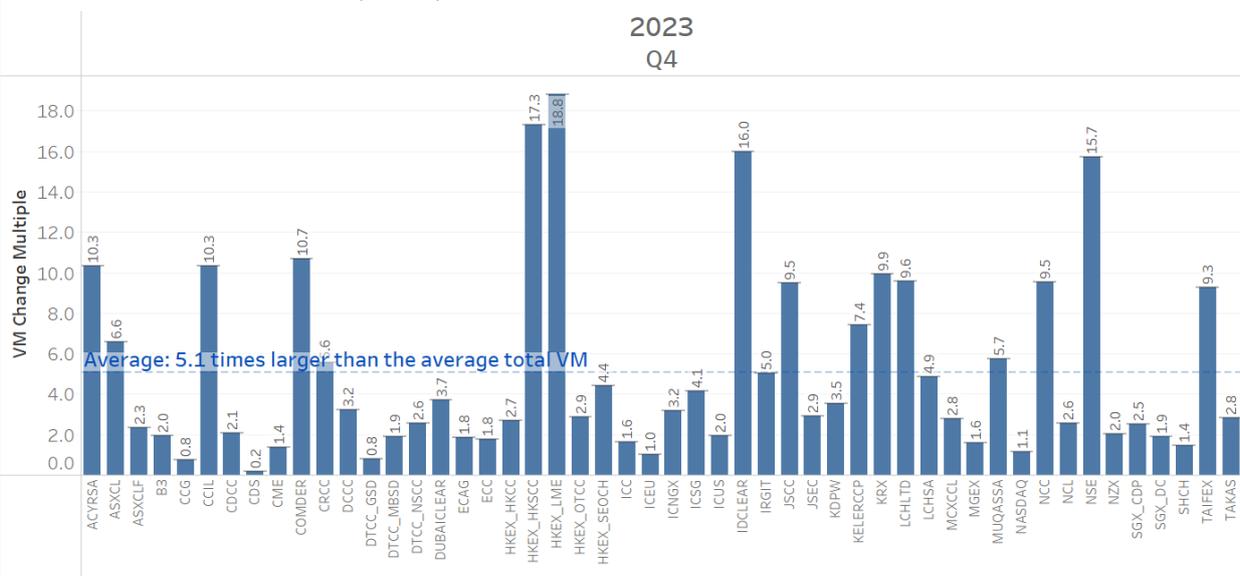
6.7.1: Maximum total variation margin paid to the CCP on any given business day over the period (USD B and Total % change QoQ)



The chart above (Maximum total variation margin paid to the CCP on any given business day over the period (USD B and Total % change QoQ)) provides us with a sense of how market volatility impacted the mark-to-market exchange of variation margin through CCPs globally on a quarterly basis. The impact of geopolitical events in early 2022 indicates just how the effects of such events can impact global volatility and the subsequent VM paid through the financial ecosystem as a result of the swings in derivatives products. 2023 marked a year of heightened volatility, to similar levels of 2022, and higher than 2021.

3.2.4.2 VM CHANGE METRICS – DERIVED CALCULATION (6.7.1-6.6.1)/(6.6.1)

Max. Variation Margin for a single business day - multiple of average VM: For a given business day, the maximum total VM paid to the CCP (6.7.1) as a **multiple** of the average Total VM paid to the CCP (6.6.1) for the quarter

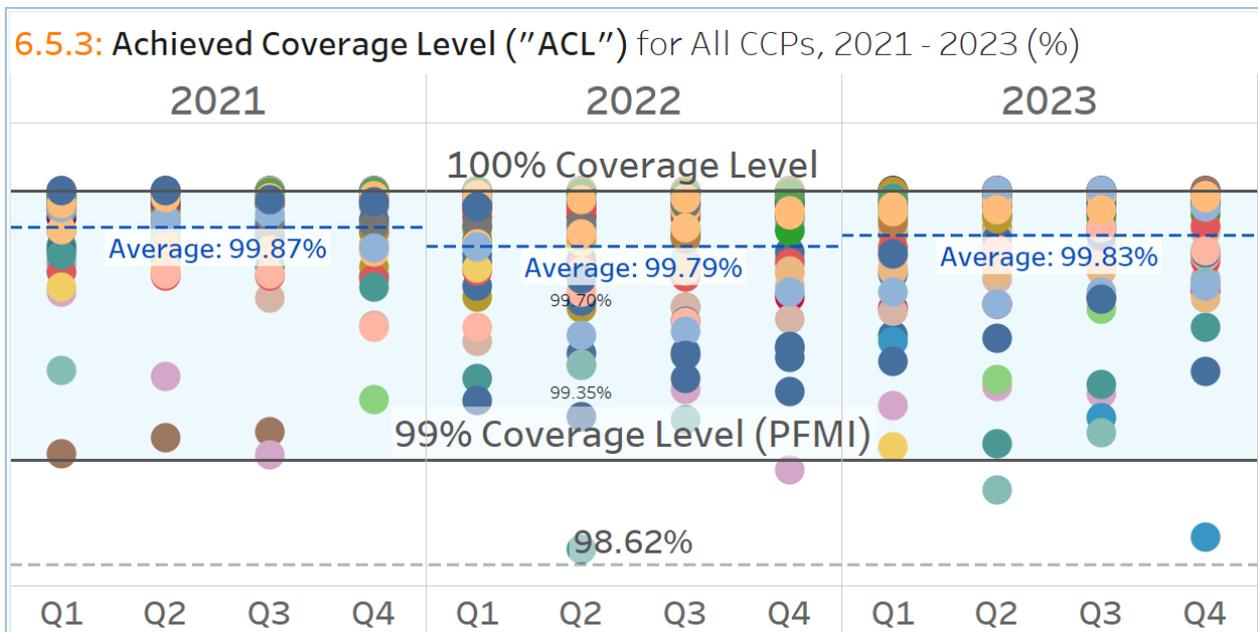


The above chart (Max. Variation Margin for a single business day – multiple of average VM: For a given business day, the maximum total VM paid to the CCP (6.7.1) as a **multiple** of the average Total VM paid to the CCP (6.6.1) for the quarter) for Q4 2023 provides us with a derived calculation from the PQDs. This chart gives us a sense of how many times greater the largest VM call (6.7.1) for a particular business day was in comparison to the average Total VM for the quarter, per CCP. For Q4 2023, globally, CCPs on average experienced 5.1 times larger VM calls for a particular business day in the quarter.

3.2.5 TOTAL IM AND DF OVERCOLLATERALISATION⁷⁰



3.2.6 RESULTS OF BACKTESTING OF IM – ACHIEVED COVERAGE LEVEL



The chart above (*Results of backtesting of IM – Achieved Coverage Level ("ACL") for All CCPs, 2021 – 2023 (%)*) indicates how the ACL for all represented CCPs has changed over time from 2021 to 2023. The blue dashed line indicates the average percentage per year across all CCPs combined: 99.87% for 2021, 99.79% for 2022, and 99.83% for 2023.

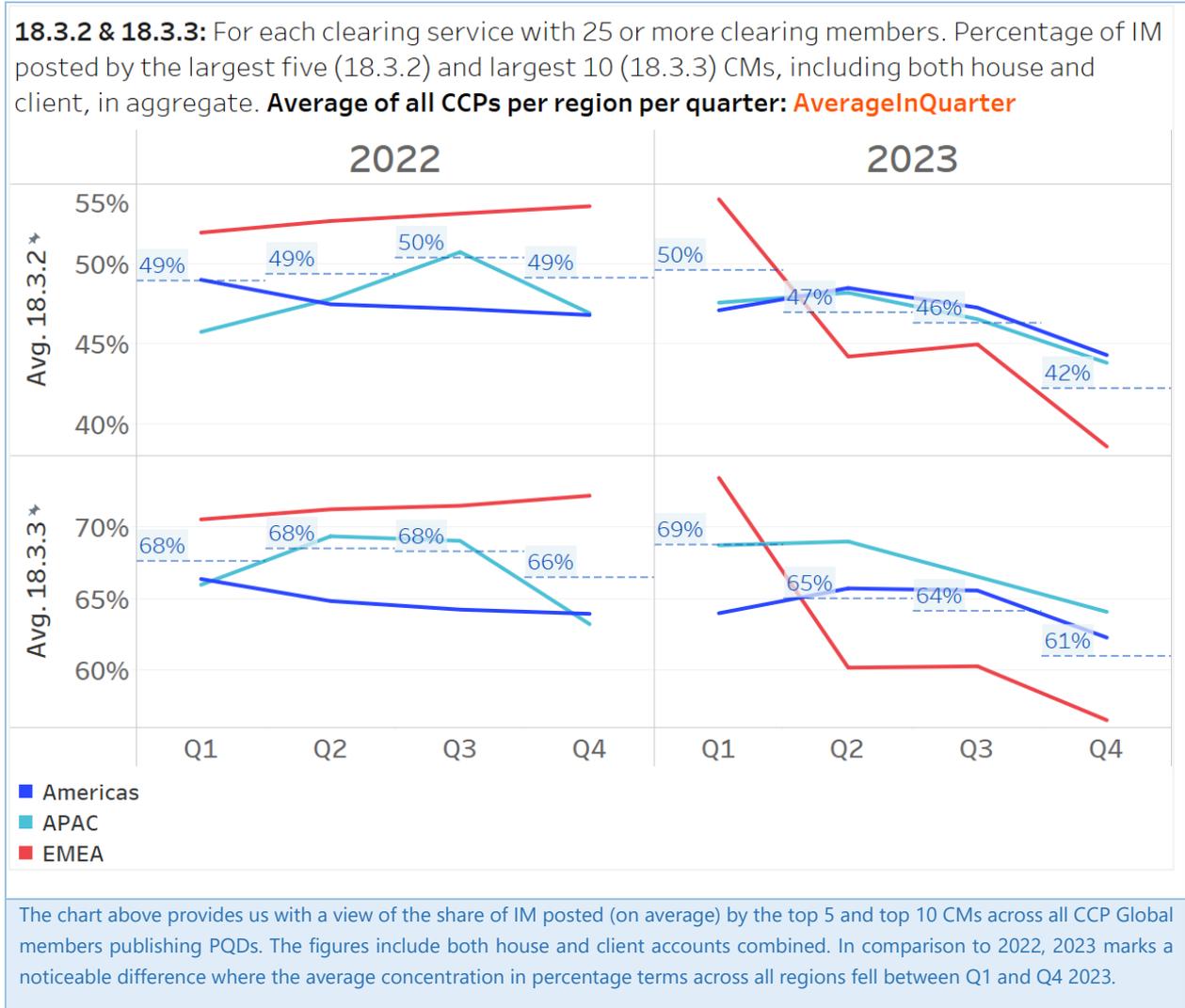
Backtesting is an important technique that a CCP utilizes to affirm that its IM model is performing as expected and that the assumptions within the model are appropriate. A CCP should assess its IM coverage by performing an ex-post comparison of observed profit and loss ("P&L") moves of a given portfolio against the IM required.

According to the PFMI, a 99.00% coverage standard is used for backtesting a CCP's IM model, however, a CCP may use a higher (percentile) benchmark. As can be seen from the above metrics, CCPs globally achieved on average levels above 99.00% in all instances from recent years indicating the appropriateness of their margin models.

For 2023, we see that the majority of CCPs had an ACL of 99.00% and above, where the majority of all the CCPs selected (except two) had an ACL beyond that of the standard PFMI requirements. For further information, please see the [CCP Global White Paper – Primer on Initial Margin](#).

⁷⁰ Total OC = (IM_{Held} + DF_{Held}) – (IM_{Required} + DF_{Required}) = Disclosures (6.2.15 + 4.3.15) – (6.1.1 + 4.1.4). Only PostHaircut values are used for Held values.

3.2.7 PERCENTAGE OF IM POSTED BY THE LARGEST CMs



3.3 CCP CORE SYSTEM AVAILABILITY AND OTHER STATISTICS

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:** enable the acceptance and novation of trades and provide the calculation of margin and settlement obligations.
- **Loss of Availability:** an incident resulting in an interruption of 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 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.

For PQD disclosure 17.4, all 59 CCPs collectively (on average) reported a 99.96% core system availability for the previous 12-month period spanning 1 January 2023 through 31 December 2023. This demonstrates the high degree to which CCPs globally remained operationally resilient during 2023 and were able to meet the demand of the clearing processes without the need to close or reduce operations.

3.4 CCP GLOBAL PQD QUARTERLY TRENDS REPORT

Since 2022, CCP Global has been publishing the PQD Quarterly Trends Report (“PQD QTR”) which provides a detailed insight into the global CCP PQD landscape through various charts and analyses. The report offers market participants a view of the distribution of collateral across the Americas, APAC, and EMEA. In addition, the report distils key summaries and trends captured from the PQD data through a variety of selected disclosures. Readers are invited to view the CCP Global PQD QTRs online – further details can be found at: <https://ccp-global.org/pqd/>.

3.5 CCP GLOBAL – QATL

As mentioned at the start of this chapter in section 3.1, in order to enhance clearing participants' existing access and for ease of reference to CCPs' disclosures, CCP Global officially announced the release of the QATL template in [February 2024](#).

This document provides a series of hyperlinks to CCPs' rulebooks and disclosures in accordance with CCP Global's template format – the “[QATL template](#)”. The information contained in this document will be compiled by CCPs for general informational purposes in order to enhance the accessibility of information from CCPs' documents. While some relevant CCP rules may be discussed, hyperlinked to, or referred to in the QATL template, all matters and information provided is subject to, and superseded by, the specific CCP's rules and disclosures. It is advised that the current versions of the CCP's rules and disclosures should always be consulted and are those that should be relied upon by the CCP's participants.

The QATL template is a result of the ongoing industry discussions with market participants and includes direct hyperlinks to disclosures such as those covering NDLs, the CCP's default waterfall/end of waterfall actions, CM approval and oversight, the CCP's Public Quantitative and Qualitative disclosures (the PFMI disclosures), margin add-ons, and APC measures, as applicable. The document aims to support existing documentation and disclosures by being a gateway to the already well-established availability of CCPs' disclosures, rules, and other CCP resources.

4. CASE STUDIES

CCP	CASE STUDY
ASX Australian Securities Exchange Ltd	Forecasting Peak Trade Volume using a Hybrid Long-Term Trend and Jump Model
ComDer & CRCC Comder Contraparte Central S.A & Camara de Riesgo Central de Contraparte S.A.	How the G20 derivatives markets reform boosted the international demand for Chilean and Colombian derivatives
Eurex Eurex Clearing	Initial Margin Cyclicity: Measurement and Transparency
HKEX & SHCH Hong Kong Exchanges and Clearing Limited & Shanghai Clearing House	Pioneering OTC derivatives CCP interoperability - HKEX and SHCH clearing link under Swap Connect
JSCC Japan Securities Clearing Corporation	First JSCC DLT-based production system - Launched for physical settlement of commodity futures
KDPW KDPW_CCP SA	Orderly handling of the unexpected – recovery planning

Disclaimer: The following case studies reflect the views and opinions of the authors from the respective CCPs and do not necessarily represent the position of all CCPs which are members of CCP Global.

5. ASX: FORECASTING PEAK TRADE VOLUME USING A HYBRID LONG-TERM TREND AND JUMP MODEL

Abstract

Securities transacted on Australian cash equity markets are settled via the Clearing House Electronic Sub-register System ("CHESS"), which is operated by the Australian Securities Exchange ("ASX"). CHESS provides several critical functions, including clearing and delivery versus payment ("DvP") settlement, an electronic sub-register for shares in listed companies and other securities, as well as other post trade services critical to the orderly functioning of the market.

In November 2023, ASX announced its decision to partner with global technology provider TATA Consultancy Services to design and deliver a new CHESS. The indicative time-frame for the delivery of the full system is 2028-2029, subject to a number of factors including stakeholder consultation and detailed planning. Until then, ASX will continue to invest in the capacity and resilience of the existing CHESS, to ensure that it can reliably process current and future trade volumes, including during periods of elevated trade activity such as was seen during the onset of the COVID-19 pandemic.

To assist with future capacity planning, the Securities and Payments team at ASX required a reliable forecast of future peak daily trade volume, extending out to 10 years. This paper describes a hybrid forecasting model which was developed by ASX's Risk Quantification Team for this purpose. The model is based on a combination of time-series modelling for long-term trade volume growth, and a jump process to model infrequent but significant volume spikes. The model has been calibrated using 16 years of historical daily trade volume data, and evaluated using in-sample (model-fit) and out-of-sample (backtesting) metrics, and is updated on a monthly basis.

5.1 ENSURING RESILIENCY OF THE CURRENT CHESS

Until the new CHESS solution design has been finalised and implemented, the existing CHESS must continue to operate reliably. Currently, around 2 million trades per day are processed through CHESS, however, as shown in Figure 1, at the onset of the COVID-19 pandemic trade volumes peaked at around 7 million trades per day. In general, historic trade volume data indicate an upward trend or growth pattern, punctuated by sudden but short-lived increases that are usually associated with specific market events.

The Reserve Bank of Australia ("RBA") Financial Stability Standards ("FSS") for Central Counterparties include specific Guidance with respect to Operational Capacity (16.3.3) and Business Continuity Management (16.7.3). In summary, the FSS requires the ASX to:

- Ensure that it has a scalable capacity adequate to handle increasing stress volumes and to achieve its service level objectives.
- Carefully forecast demand and make appropriate plans to adapt to any plausible change in the volume of business or technical requirements, with plans based on a sound, comprehensive methodology.
- Have sufficient capacity to process volumes that are at least double projected stress volumes, to ensure that it is able to operate continuously and independently even in extreme circumstances.

To ensure it meets the above regulatory standards and continues to reliably process future trade volumes, including volume spikes that might occur if another volatile market event were to occur, a forecast model for potential Daily Trading Volume ("DTV") submitted to CHESS by all equity market operators for clearing and settlement has been developed. The forecast includes a high level of confidence and has been backtested over multiple forecast horizons.

ASX has separately stress tested the existing CHES for over 10 million trades per day to identify breakpoints and is using the results of these tests together with forecasts generated by the new hybrid model as inputs to its assessment of possible capacity and performance uplifts in the existing CHES. It is noted that the product based solution selected by ASX in November 2023 to replace the existing CHES, to be delivered by global technology provider TATA Consultancy Services, is expected to deliver improved scalability and the ability to support future market growth as required.

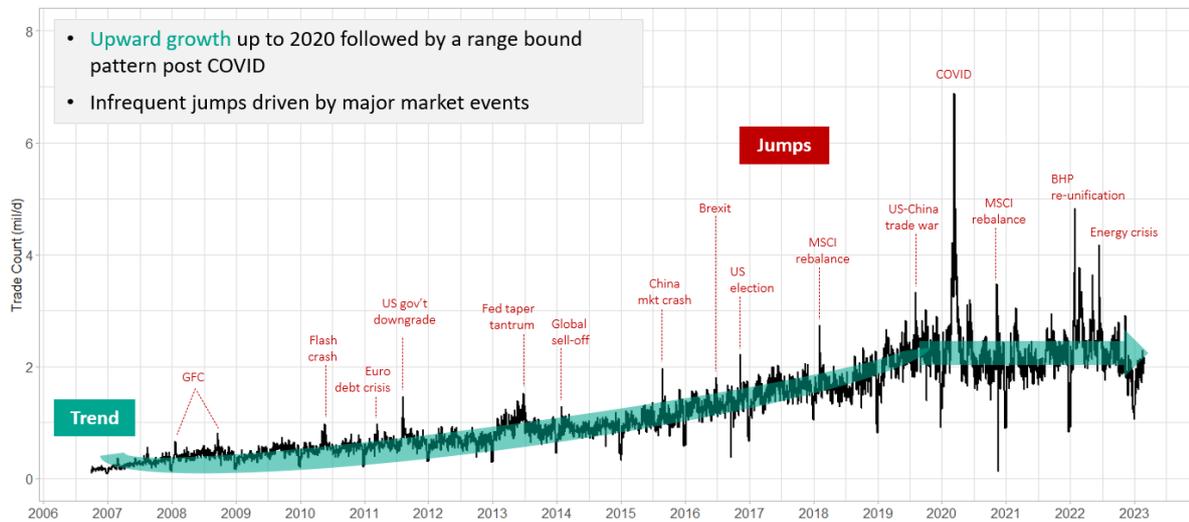


Figure 1: Historical daily trade volume registered in CHES

5.2 FORECASTING APPROACH

The historical trade volume data shown in Figure 1 above exhibits three main features: trend (which incorporates level), seasonality, and spikes. Decomposition analysis of the data strongly supports a forecast model comprised of two main components:

- A time-series model to forecast the long-term trend and seasonality, and
- A jump model to capture sudden extreme changes in DTV.

This approach has been used widely in various industry applications to model data having similar characteristics, for example electricity price dynamics. Analysis of the jump information embedded in the historical time-series data indicated no material auto-correlation between the jump events, and the distribution of jumps to be stationary. Therefore, the long-term trend and seasonality component and jump component can be modelled independently.

Identifying Jumps

Before the time-series and jump models can be calibrated, the subset of historical DTV data categorised as extreme values (jumps) is determined by decomposing the original historical times series data into trend, seasonality, and random residual components using the STL decomposition method,⁷¹ represented graphically in Figure 2. The resulting time-series of residuals (remainder) form the basis for identifying outliers or jumps. A recursive filter algorithm is applied to the entire residual time-series to identify and remove any trade volume data points in the tails of the residual distribution, where the tails are defined by the 0.5th and 99.5th confidence intervals. The remaining data are used to calibrate the trend and seasonality model while the outlier data are used to calibrate the jump model. Applying this approach to the aggregate AMO trade volume data from October 2006 to March 2023, a total of 188 outliers were identified.

⁷¹ Seasonal and Trend decomposition using Loess (local regression smoothing). R. Cleveland et al. (1990). *STL: A seasonal-trend decomposition procedure based on loess*. Journal of Official Statistics. 6 (1), 3-33.

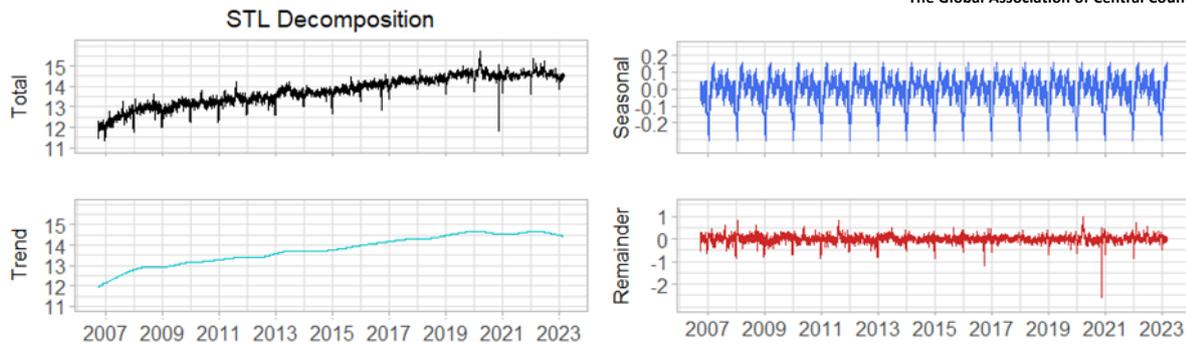


Figure 2: DTV Time-series Decomposition (log space)

Modelling the long-term trend

A range of industry standard approaches were considered for the long-term trend component; the benefits and drawbacks of each are summarized in Table 1 below. Exponential Smoothing Error-Trend-Seasonality (“ETS”) and Seasonal Autoregressive Integrated Moving Average (“SARIMA”) models are both used widely in finance and economics for trend forecasting, and can incorporate analytical confidence intervals. Both produce forecasts that are a function of historical data only. In contrast, models based on explanatory variables attempt to incorporate current and future macroeconomic indicators into the forecast. However, this approach also requires a forecast model for the future values of the explanatory variables themselves. In addition, none of the economic indicators considered exhibited any significant explanatory power, rendering this approach unsuitable.

The main benefit of the ETS approach is its ability to incorporate recent data into the trend forecasts, as opposed to SARIMA model that projects a constant growth rate. The ETS model also demonstrated superior in-sample and out-of-sample testing compared to the SARIMA model.

Modelling Approach	Benefits	Drawbacks
Error-Trend-Seasonality	<ul style="list-style-type: none"> • Current level related to past levels. • Adaptive growth and seasonality. • Simplicity and flexibility do not require stationarity. • Good in- and out-of-sample testing. 	<ul style="list-style-type: none"> • Requires regular re-calibration. • Limited ability to handle outliers or complex patterns.
SARIMA	<ul style="list-style-type: none"> • Current level/volatility related to past level and model errors. • Ability to handle seasonal features. • Conceptual simplicity. 	<ul style="list-style-type: none"> • Data requirements: length and stationarity. • Constant growth rate. • Numerical complexity to calibrate models. • Less stable and robust forecasts. • Narrower prediction intervals.
Explanatory Variable	<ul style="list-style-type: none"> • Capturing relationships with key indicators. • Economic rationale embedded in the modelling. • Interpretability of fitted model parameters. 	<ul style="list-style-type: none"> • Some indicators released on a less frequent basis. • Challenges to incorporate structural changes. • Explanatory variable forecasting required. • Fitted models lacked explanatory power.

Table 1: Comparison of various industry standard modelling approaches for the long-term trend

Modelling Jumps

Since the end goal is to ensure CHES has sufficient capacity to handle sudden and extreme increases in trade volume, any outlier data that represent a decrease in daily volume relative to the monthly average DTV (i.e., having negative residuals) are excluded from the jump model calibration. Of the 188 outlier dates identified via the recursive filter, a subset of 96 dates correspond to volume increases. A local 'outlier ratio' is then constructed by dividing the historical trade volume on each (upward) jump date by the average DTV over the month, where the latter is calculated without the jump volume included. This outlier ratio is a multiplicative measure of the jump severity. These 96 outlier ratios are then partitioned into 3 clusters based on their size, using the k-means clustering technique to determine the optimal number of clusters.

It is assumed that, on any given day, the jump probability is independent of whether a jump occurred previously. This probability is calibrated to the number of jumps observed to date divided by the total number of DTV data, with separate jump probabilities calibrated for each jump size cluster. Statistical analysis of the outlier ratios suggests that the multiplicative jump size in each cluster is well described by a Lognormal distribution. Therefore, within each cluster, the average and standard deviation of the outlier ratio (in log space) are used to calibrate a separate Lognormal distribution. The jump process is then modelled as mixture distribution, where the jump occurrence in each cluster is modelled as a Bernoulli process, and the jump size is sampled from the corresponding Lognormal distribution. Monte-Carlo simulation is then used to sample the mixture distribution to determine the jump size corresponding to a given tail confidence level.

Putting it all together

For a given calibration date, the hybrid forecast model can be distilled into the following high-level steps:

1. Identify outlier data using the STL decomposition and recursive filter.
2. Exclude outliers from the historical time series data and construct monthly average DTV time series.
3. Calibrate the ETS model to the monthly average DTV time series.
4. Calibrate the Jump model to the upward outliers.

The n-year ahead 'worst-case' forecast can then be determined analytically, assuming a given confidence level for each component (trend and jump) driving the overall trade volume. For the trend component, a 99.5% confidence level has been chosen, while for the jump component, a 99.9% confidence level is used. The rationale for the choice of confidence levels is as follows: jump events represent extreme but plausible tail risk, and therefore should be sampled at a very high confidence level; on the other hand, the trend and seasonality component can be viewed as normal (non-stressed) trading activity, and may therefore be estimated at a lower confidence level.

Figure 3 below demonstrates the forecasting approach, using trade volume data from October 2006 to January 2019 to calibrate the model. The 'worst-case' trade volume forecast at 2, 5, 8, and 10 years forward from January 2019 is shown by the red line. The trend component of the forecast is shown by the green line (forecast average) and green shaded area (range of uncertainty bounded by the 99.5% confidence level).

Forecast as of Jan 2019

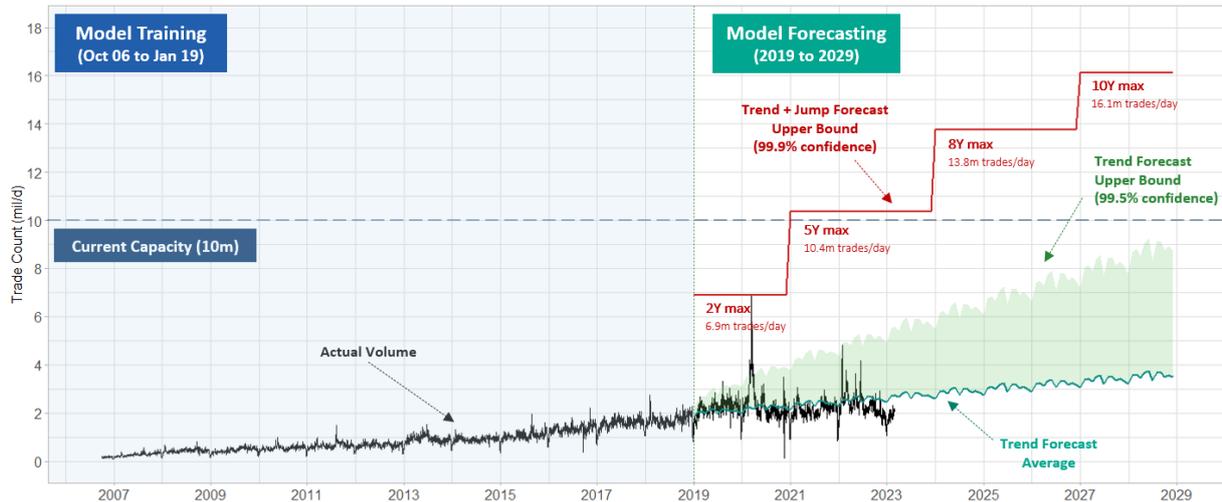


Figure 3: Long-term Trend and Jump Forecast as of January 2019.

5.3 BACKTESTING THE MODEL

Figure 4 summarises the out-of-sample testing of the hybrid forecast model. At each quarter end from January 2017 onward, the model has been (i) calibrated using the combined historical trade volume data only up to that quarter end, and (ii) used to forecast the peak trade volume over the next 2, 5, 8, and 10 years, using confidence levels of 99.5% for the trend component and 99.9% for the jump component. The blue line indicates the 2-year forward forecast at each quarter end, while the series of grey dashed lines indicate the 5, 8, and 10-year forward forecasts. The red and magenta symbols represent the maximum actual trade volume observed over the next 2-year and 5-year horizons, respectively. The chart demonstrates that until January 2018, the 2-year forecast was above the realised 2-year maximum trade volume. However, between April 2018 and January 2019, the 2-year forecast falls short of the realised maximum trade volume. These 2-year forecast breaches are driven by the extremely high volumes seen during the onset of COVID-19 in March 2020, which are not included in the calibration of the model.

From April 2019 onward, however, the 2-year forecast again exceeds the actual maximum trade volume over the same horizon, despite the model calibration data set still preceding COVID-19. This can be understood by referring to Figure 1, which shows that in 2019, the starting level and the upward trend are higher than previous years. In addition, from 2019 onward the annual incidence of volume spikes increased with respect to prior years.

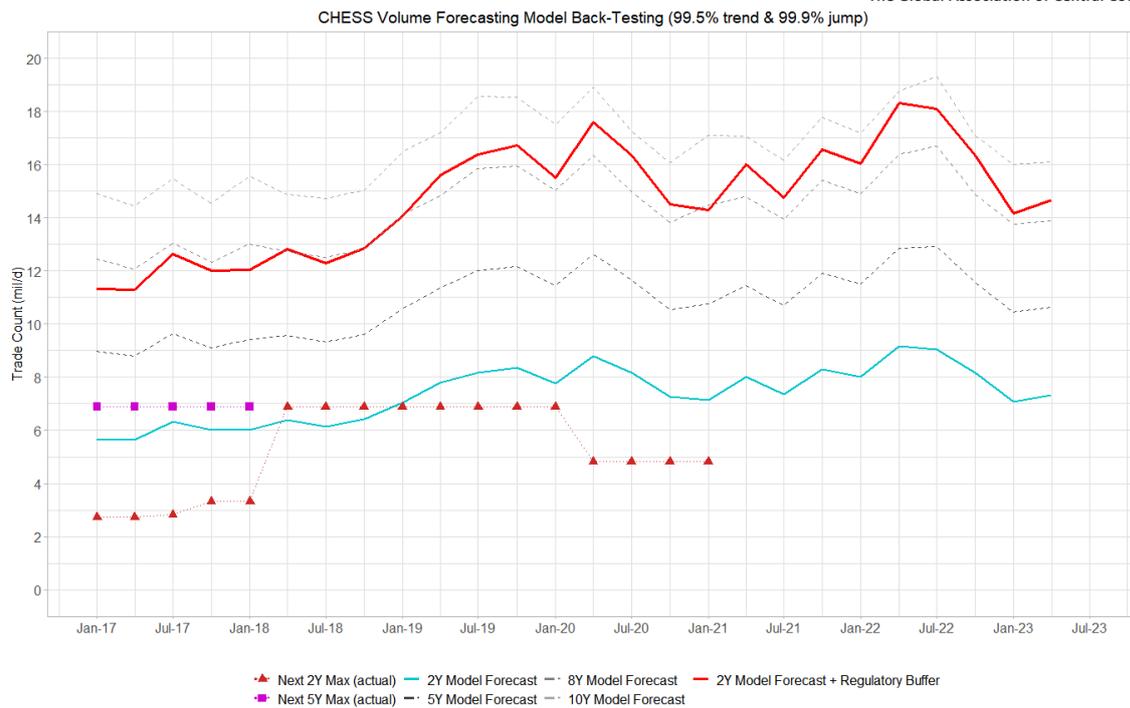


Figure 4: CHES volume forecasting model backtesting.

5.4 CONCLUSIONS

The hybrid forecasting model developed by ASX's Risk Quantification Team is considered a reliable tool for forecasting future peak daily trade volume in the Australian cash equity markets. The model incorporates a combination of time-series modelling for long-term trade volume growth and a jump process to capture sudden extreme changes in trade volume. This ultimately provides ASX with a structured approach to predicting future trade volumes, including volume spikes that may occur during volatile market events.

The backtesting of the model shows that it accurately predicts trade volumes in most cases, but there may be instances where the forecast falls short due to unforeseen events like the onset of the COVID-19 pandemic. As a result, there is always a need for continuous monitoring and updating of the forecast model to ensure its effectiveness in predicting future trade volumes and adapting to the constantly evolving market conditions.

Meeting regulatory standards, such as the RBA's FSS, require ASX to have scalable capacity and appropriate plans to handle increasing stress volumes and achieve service level objectives. The model will assist ASX in capacity planning and ensuring the resiliency of the existing and replacement CHES system.

6. COMDER/CRCC: HOW THE G20 DERIVATIVES MARKETS REFORM BOOSTED THE INTERNATIONAL DEMAND FOR CHILEAN AND COLOMBIAN DERIVATIVES

Abstract

For more than 100 years, counterparty credit risk (“CCR”) management, which, among some other critical factors such as due diligence, monitoring, etc., also involves posting collateral in the form of margin, has been the key to the success of the development of the futures and options markets, or what is called listed derivatives products. However, collateral posting to mitigate CCR is relatively new in OTC derivatives products.

One of the most important consequences of the implementation of the G20 derivatives reform, in the aftermath of the GFC, was the way that large banks manage CCR for OTC derivatives, mainly because of the introduction of mandatory clearing for a large portion of derivatives products and uncleared margin rules (“UMR”). Hence, banks moved from managing CCR by means of credit lines to their clients and counterparties, to managing CCR by posting collateral either to their direct counterparties or to a CCP.

Derivatives markets are relatively new in Chile and Colombia and their development was led by local banks since the early nineties in the form of OTC derivatives. However, listed derivatives have not had the same traction and their development still lags that of OTC derivatives. This is the reason why local banks managed CCR exposure by granting credit lines to their counterparties.

Local banks in Chile and Colombia have a long history of trading with global foreign banks, particularly after the implementation of the G20 derivatives reform. Local banks faced the obligation to send derivatives to CCPs or sign Credit Support Annexes (“CSAs”) for IM and VM. Since neither Colombia nor Chile belong to the G20, no mandatory clearing or UMR was imposed on them while the G20 countries were implementing such reforms. In practical terms, local banks faced an extraterritorial regulatory situation that forced them to change the way they were used to managing CCR.

This case study will show the positive impact of the G20 derivatives market reform in Chile and Colombia. We will see how the reforms boosted volumes of derivatives transactions between local banks and foreign counterparties, which in the case of interest rate derivatives reached levels never seen before, even amid central banks actively fighting the consequences of the COVID-19 crisis, and the related spike in inflation.

6.1 BRIEF OVERVIEW OF THE CHILEAN AND COLOMBIAN ECONOMIES

Chile⁷²

Chile’s nominal GDP is approximately USD 350 billion and the development of Chile’s macroeconomic and financial institutional environment rests on four pillars: autonomous central bank conducting the monetary policy, a responsible and predictable fiscal policy, robust regulation and supervision of the financial system, and integration with international markets through trade.

Additionally, Chile’s international market integration is characterized by low tariffs, Free-Trade and Trade Agreements. Also, free inward and outward capital mobility provides access to foreign savings and local risk diversification.

In addition, the Central Bank of Chile (“CBCh”) set a floating exchange rate regime in 1999, allowing the adjustment of relative prices under external shocks. The monetary policy rates moved from real rates to

⁷² [The Chilean Economy at a Glance, Central Bank of Chile, 23 April 2023](#)

nominal rates in 2001. However, the CBCh reserves the right to intervene if considered appropriate; these interventions were done in 2001, 2002, 2008, 2011, and 2019.

Finally, the openness of the Chilean economy is reflected in the size of the exports, which represent 30% of the total GDP (or around USD 100 billion a year). Also, in the capital markets landscape, the total foreign debt is around 30% of the total debt issued in Chile and around 35% of the total GDP of Chile. All of this shows the importance for the banks and their clients to manage foreign exchange ("FX") risk using non-deliverable forwards ("NDFs").

Colombia

As of 2022, Colombia's GDP stood at USD 344 billion with a population of 51.9 million people. The country has a track record of prudent macroeconomic and fiscal management, anchored on an inflation targeting regime, an autonomous central bank, a flexible exchange rate since 1999, and an upgraded rule-based fiscal framework, which provide a good foundation to ensure macroeconomic stability.

Colombian exports amount to USD 50 billion per year, representing nearly 15% of total GDP, whereas the country's total external debt stands at USD 190 billion, representing 55% of total GDP. On the capital markets side, the daily turnover of cash FX USD/Colombian Peso ("COP") among local dealers is USD 1.5 billion, whereas daily traded volumes among primary dealers of government bonds are around USD 0.9 billion.

6.2 G20 DERIVATIVES REFORMS, BASEL III, AND THE UNCLEARED MARGIN RULES

The GFC hit almost all developed nations and as a consequence, G20 nations committed to making significant regulatory reforms: i) the Basel III framework – aimed to bolster the resilience of the international banking system through higher capital as well as margin requirements for non-centrally cleared transactions – UMR, ii) the OTC derivatives market reform where G20 leaders agreed to migrate to central clearing, and, where appropriate, exchange or electronic trading of standardized OTC derivatives, and iii) the reform introducing the requirement to report all transactions to trading repositories.

In practical terms, CCR management changed completely after the implementation of the G20 reforms, moving away from long-used credit facilities and absorbing default losses through capital in the case of the default of a counterparty, to collateralization of CCR exposure – under extreme but plausible scenarios – through the inclusion of VM, IM, and DF.

According to the timetable set by IOSCO and the BCBS, the implementation date for G20 nations, for IM and VM for major firms was September 2016, and the second implementation date for VM for a broader class of firms was March 2017. However, no mandatory clearing or UMR were imposed on either local Chilean banks or Colombian banks at the same time as G20 countries were implementing such reforms. This meant that local Chilean and Colombian banks faced an extraterritorial regulatory situation which forced them to change the way to manage CCR. As we will see, this would prove to be a critical element in the evolution of traded derivatives volumes.

6.3 THE DEVELOPMENT OF THE INTEREST RATE SWAP ("IRS") MARKET IN CHILE

In the early 2000s, Chilean banks created the "Índice de Cámara Promedio" ("ICP") just after one of the most important changes in monetary policy: the CBCh changed the monetary policy from real rate to nominal rate. The ICP index is an indicator that seeks to represent the equivalent cost of funds of financing a position at the overnight rate, using the Average Unsecured Interbank Rate reported every day by the CBCh, which is the proxy of the monetary policy rate set by the CBCh.

One of the implications of the creation of this index was the development of an overnight index swap (“OIS”) that used as a variable rate the implied rate of the ICP index. Consequently, the swap market started functioning 20 years ago, although with small volumes. During the first years, transactions made between local Chilean banks and foreign banks represented 50% of total transactions, a situation that remained as such until 2017.

Thanks to the database of derivatives transactions maintained by the CBCh, the Chilean trade repository (“TR”)⁷³, it was possible to see the evolution of transactions of Chilean swap in the last 15 years between local Chilean banks and foreign institutions (local transactions, interbank, and Chilean clients are not shown due to the low volumes in the local market which represents around 15% of the total transactions). Figure 1 presents the monthly turnover of Chilean IRS done between local banks and foreign institutions.

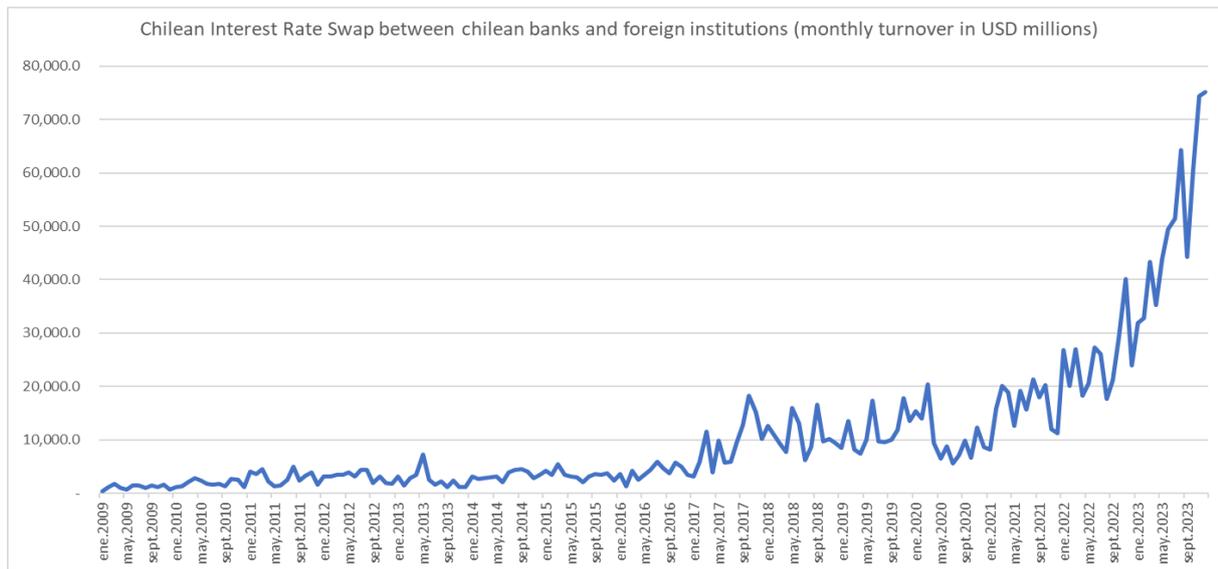


Figure 1

While trade volumes continually increased over the last 15 years, they increased exponentially starting at the end of 2016 and the beginning of 2017, during the same period as the implementation of the UMR. Traded volumes continued increasing at an accelerated pace up to the end of 2023. Later in the case study, we will explore some of the reasoning behind this activity, explained by local traders.

6.4 THE FX DERIVATIVES MARKET IN CHILE

It is also interesting to see the evolution of volumes traded in the Chilean FX derivatives markets, which is the largest derivatives market in Chile. First, we show the trading volumes between Chilean banks and foreign institutions, which, as we already said, are affected by the extraterritoriality effects of the G20 reforms. Figure 2 (on the next page) shows the FX derivatives monthly trading volume done between Chilean banks and foreign institutions.

⁷³ Please refer to the previous year's case study to see the development of Chilean TR: [Link](#).

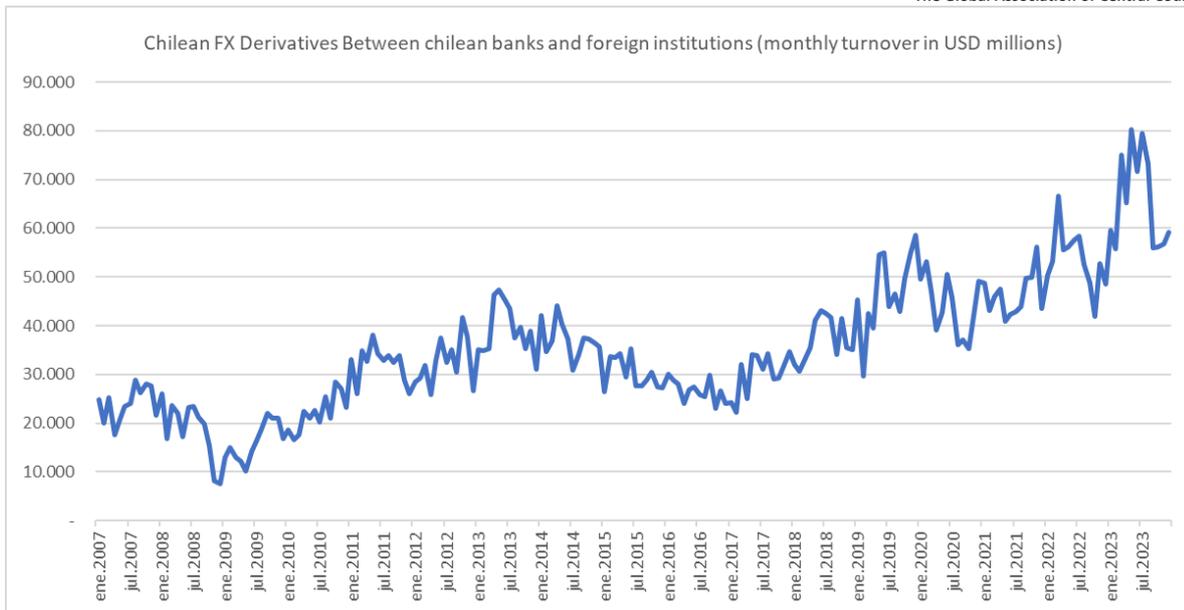


Figure 2

While there was a drop in transaction volume traded between Chilean banks and foreign counterparties in the FX derivatives markets at the end of 2008 and the beginning of 2009 (in our opinion, as a consequence of the GFC) similar to IRS, the volume of FX derivatives begins to increase steadily at the beginning of 2017, during the implementation of the UMR.

As noted previously, Chile did not incorporate UMR in the local regulation, and as such, there is no requirement for the exchange of collateral in derivatives transactions. Rather, Chilean banks have historically managed CCR by granting credit lines (this situation has been changing in the last couple of years). With this as a background, Figure 3 (below) shows the monthly turnover of transactions done between Chilean banks and other Chilean counterparties.

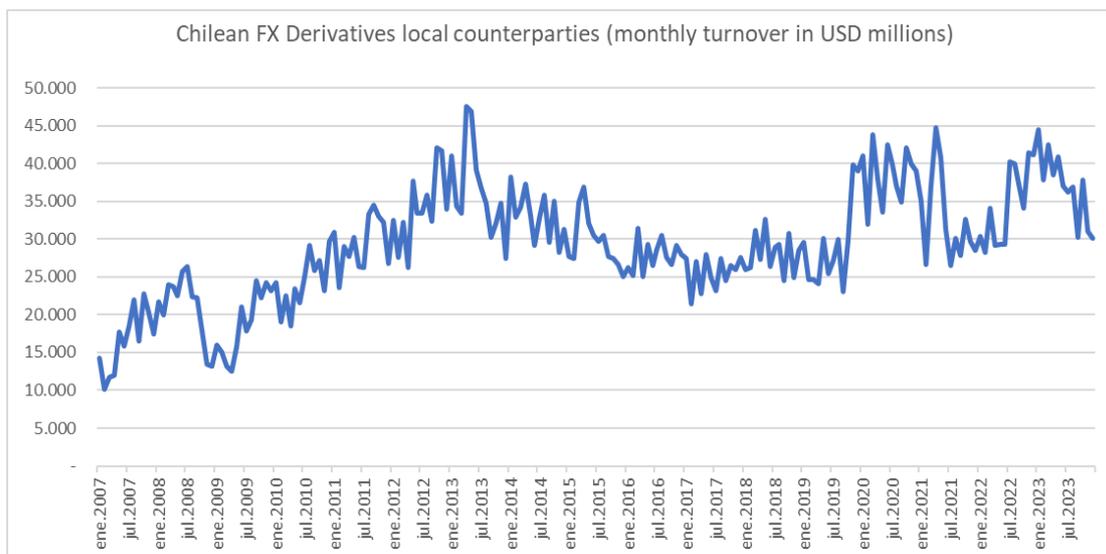


Figure 3

As we can see, Figure 3 does not exhibit the same steady increase in trade volumes as those observed in the previous two graphs. The only change observed was an increase in transaction volume produced by pension funds after the unrest situation experienced by Chile at the end of 2019, and the COVID-19 crisis of 2020, where pension funds increased the volume of transactions in the FX market after massive amounts of retirement funds were withdrawn as a consequence of political turbulence. After that, it is possible to see

an increase in FX derivatives volumes in 2022 and 2023 due to a program of central bank intervention in the FX market that was done using NDFs.

Figure 4 (below) illustrates the trading volumes in the interbank FX derivatives market in Chile.

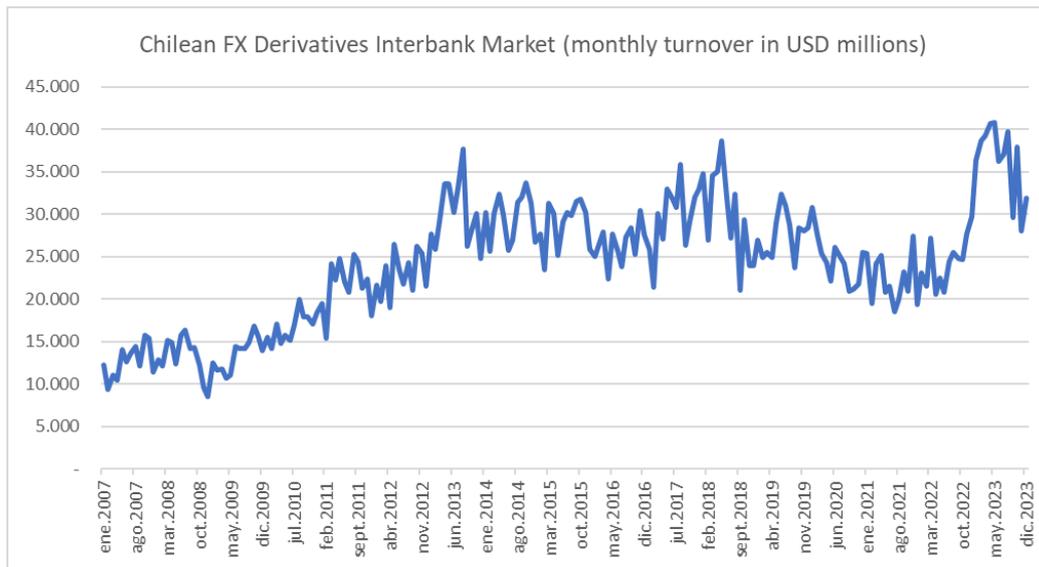


Figure 3

The volumes of derivatives transactions did not increase in the local interbank market during the period that starts at the end of 2016 and beginning of 2017, as was seen in Figures 1 and 2, previously.

The only real increase observed in the last ten years in the Chilean interbank market was in mid-2022, which is the same period where ComDer obtained the qualifying central counterparty (“QCCP”) recognition from ESMA and local subsidiaries of European banks increased the volumes of trades in ComDer.

Finally, it is important to mention that Chile did not have a positive netting opinion for derivatives transactions until 2018. During 2018, ISDA gave Chile a positive netting opinion for bilateral derivatives where a counterparty was a Chilean bank. There is a lot of evidence of the importance of close-out netting to manage CCR in the derivatives markets, especially derivatives with cross-border risk.

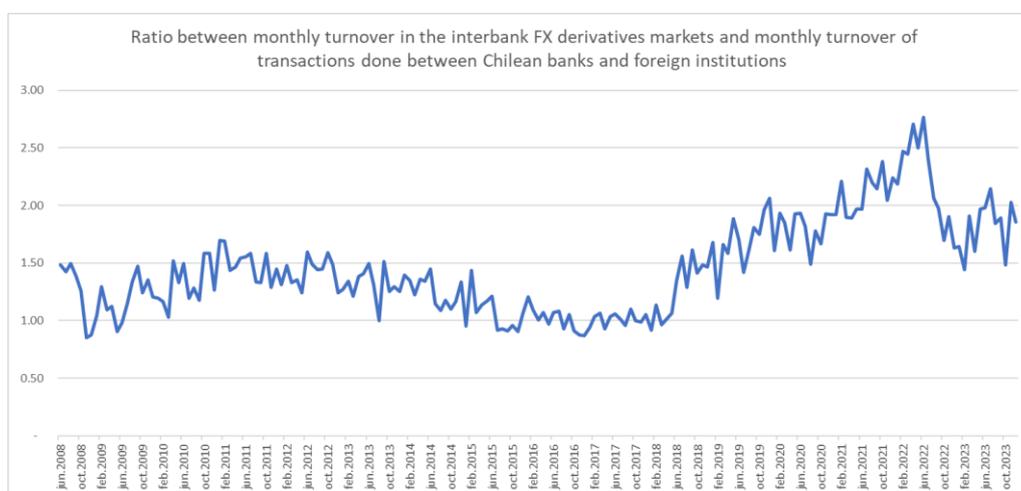


Figure 5

Figure 5 shows the ratio of trading volumes between the local Chilean interbank market and the trading volumes done between Chilean banks and foreign financial institutions. It is possible to see the massive increase of the transactions between foreign institutions and Chilean banks relative to the local interbank FX derivatives market. The increase is just after the CBCh modified the local regulation (in April 2018) to

permit close-out netting when a derivative was done between a Chilean bank and a foreign financial institution.

6.5 THE DEVELOPMENT OF THE IRS MARKET IN COLOMBIA

In January 2008, the primary market to fix the 'Indicador Bancario de Referencia' ("IBR") was introduced in Colombia. This index was developed by the private sector with the support of the Colombian Central Bank and other entities, with the objective to reflect in a transparent way the short-term liquidity of the country's money market. The IBR is a short-term reference interest rate in COP that mirrors the price at which local banks are willing to lend or borrow cash in the money market.

The IBR index and the primary market to fix it fostered the development of the IRS market in Colombia since the early 2010s. As of today, the IBR index fixes daily reference rates for the o/n, 1m, 3m, 6m, and 12m tenors and since 2015, it is 100% cleared by CRCC. With regards to the IBR swap market, the first steps were focused on the consolidation of the OIS with maturities of up to 18 months. As of today, this market has grown in tenors and volumes and there are daily quotes for up to 20 years. Since December 2016, CRCC introduced clearing and settlement of the OIS local market (up to 18 months) and since 2018 it extended tenors cleared up to 15 years.

The liquidity for the IBR swap market is largely dominated by offshore agents where more than 80% of the daily volume traded takes place.

6.6 THE FX DERIVATIVES MARKET IN COLOMBIA

FX derivatives represent the largest derivatives market in Colombia, where the OTC NDF USD/COP takes the largest share. Local banks provide FX hedges to corporations to handle their import/export exposures, as well as to pension funds hedging the currency risk of their investments abroad and offshore investors. When we look at the evolution of traded volumes between local banks and offshore agents since 2007, it was not until the end of 2018 that traded volumes began to increase at a significant pace and triple in the following 3 years, which aligns with the timing of UMR, as shown in Figure 6.

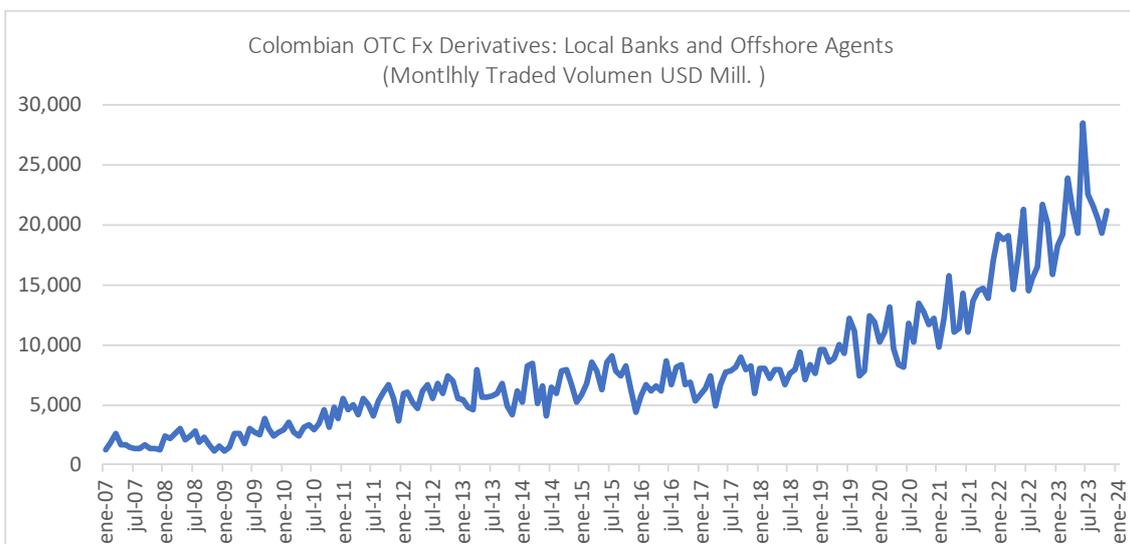


Figure 6

When we look at traded volume between local banks (FX Market Intermediaries, "IMCs"), as shown in Figure 7, we also observe that traded volume began to increase since 2017 and more than doubled during the next 5 years. As of today, 99% of the OTC NDF USD/COP market between local banks is cleared through CRCC with a monthly average traded volume of USD 15 billion, which represents a growth of over 60% in comparison with monthly traded volumes at CRCC in 2019, and reflects the migration of local banks from the traditional management of counterparty credit lines by means of credit lines to the full collateralization.

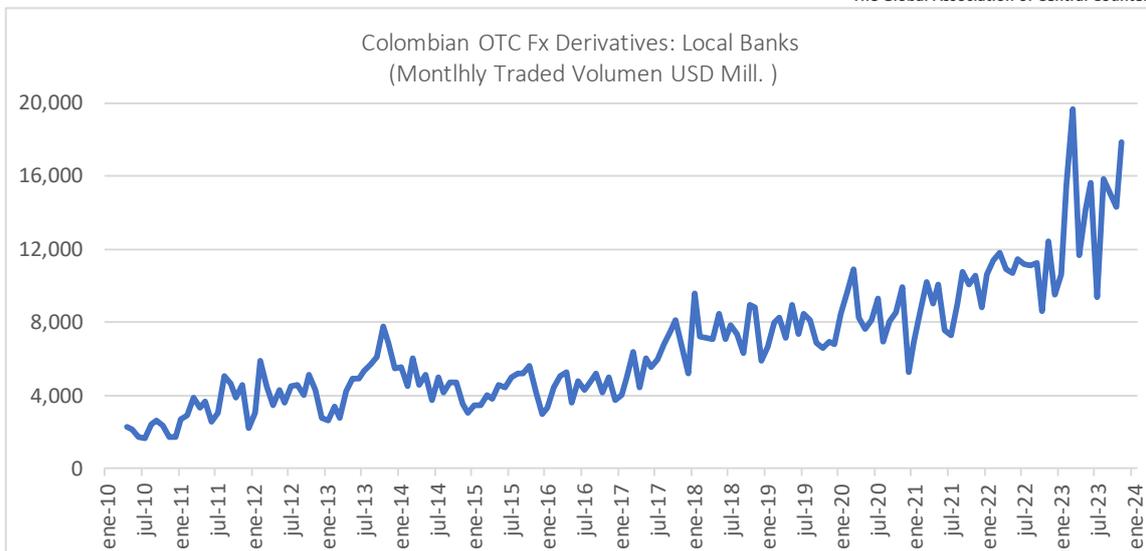


Figure 7

6.7 THE INCLUSION OF CHILEAN AND COLOMBIAN SWAPS IN CME

Chicago Mercantile Exchange Inc. (“CME”) announced in May 2018 its first cleared trades in COP and Chilean Peso (“CLP”) IRS. The reason provided by one of the traders who use CME to clear Latin American (“LatAm”) swaps was that “as costs of the uncleared swap markets continue to increase, there is more need to have a cleared solution to maintain maximum liquidity and balance sheet utilization in Emerging Market portfolios.”⁷⁴ In summary, the impact of the UMR, as well as the implementation of the largest capital requirements for derivatives under Basel III created the necessity to have a clearing house that clears LatAm swaps. Figures 8 and 9 show the monthly turnover of Chilean and Colombian IRS cleared at CME.

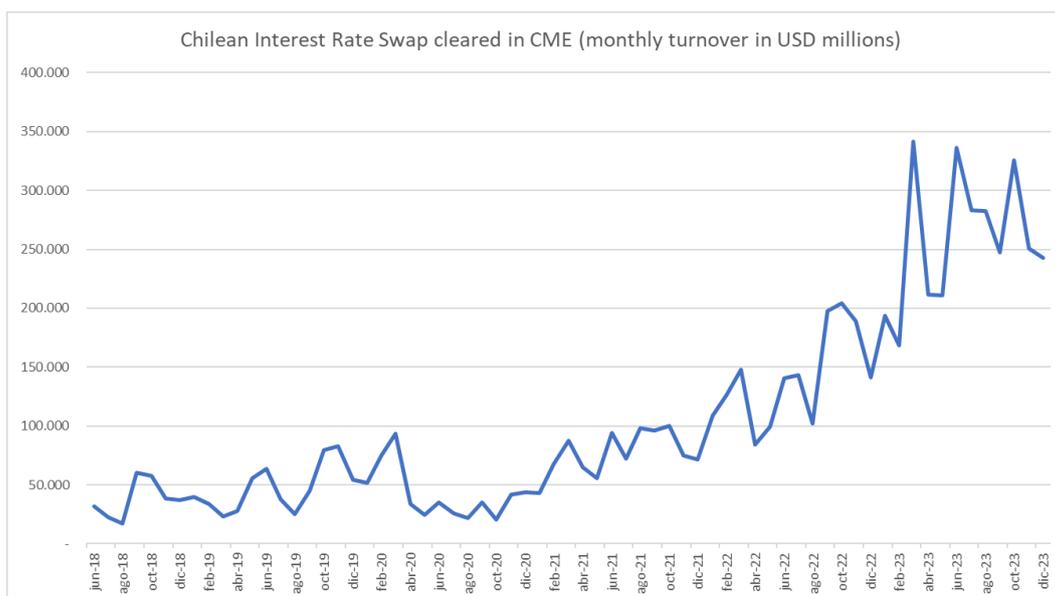


Figure 8

If we remember, Chile is a country with a nominal GDP of USD 350 billion. So, the volume of Chilean IRS cleared at CME represents almost one GDP per month. This number is very high, even for advanced economies (see for example “Triennial Central Bank Survey of foreign exchange and Over-the-counter (OTC) derivatives markets” prepared by BIS). For the case of Colombia, average monthly traded volumes in IRS cleared at CME represent approximately 18% of the country’s GDP.

⁷⁴ [CME Group Clears First Chilean Peso and Colombian Peso Interest Rate Swaps](#)

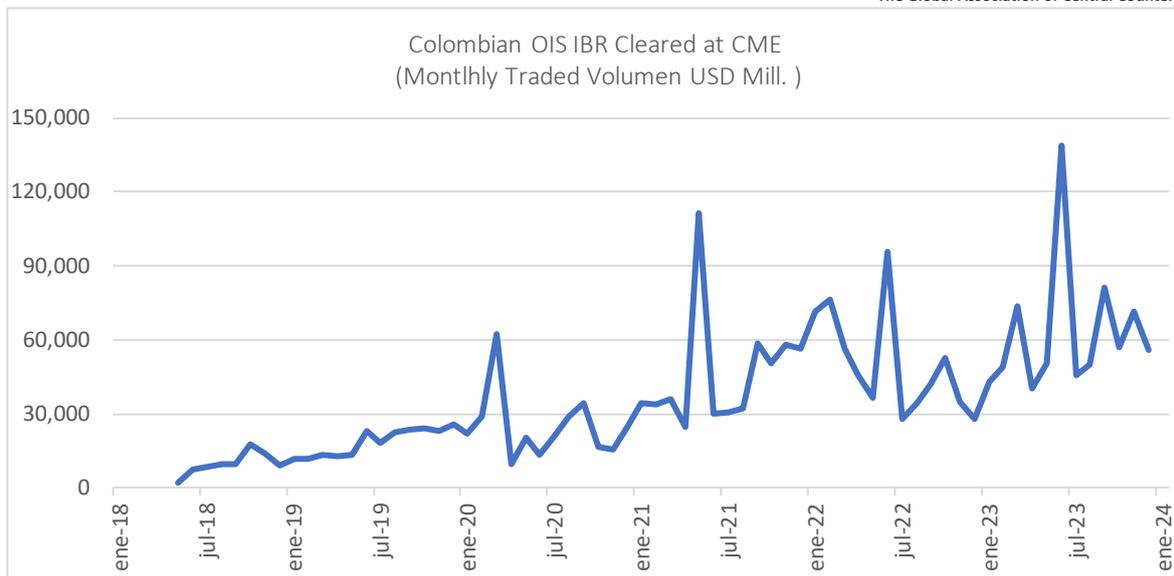


Figure 9

6.8 CONCLUSIONS

UMR, particularly VM, were implemented in advanced economies between the end of 2016 and the beginning of 2017. Also, higher capital requirements for derivatives products were implemented in G20 nations during the same period.

While these regulatory changes were not yet fully implemented by local regulators in either Chile or Colombia, due to the extraterritorial reach of these reforms, Chilean and Colombian banks were required to sign at the end of 2016 CSAs for VM with foreign banks and, later on, CSAs for IM with the same foreign banks (this was depending on the UMR phase to which local Chilean banks belonged). Chilean banks started to clear trades with foreign CCPs to improve their access to higher liquidity pools of Chilean swaps. In the case of Colombia, the introduction of the local CCP (CRCC) and the subsequent clearing of FX and interest rate derivatives among local banks allowed for significant efficiencies in the cost of capital and higher volumes traded.

The strengthening of Chile’s and Colombia’s management of CCR in derivatives motivated by the reforms from UMR enabled local banks to gain increased access to international derivatives markets and to support a larger demand from international counterparties willing to trade local derivatives products, significantly increasing traded volumes in a few years.

7. EUREX CLEARING: INITIAL MARGIN CYCLICALITY: MEASUREMENT AND TRANSPARENCY

Abstract

In the complex landscape of financial markets, the concept of Initial Margin ("IM") holds a pivotal role, especially in the context of derivatives trading and risk management. IM refers to the collateral required to be posted by a party in a financial transaction to cover potential future exposure to its counterparty arising from market movements. The cyclical nature of IM, characterized by its fluctuation in response to changes in market volatility and other factors, poses significant challenges and opportunities for market participants. This article provides Eurex's views on the nuances of IM cyclical nature, its measurement, and the imperative of transparency in its management. A few potential approaches to enhancing CCP transparency of the reactivity of their margin models are presented alongside the challenges that might arise. The article concludes with Eurex's suggestions for tangible steps CCPs and regulators could take in an effort to boost market participant liquidity preparedness.

7.1 UNDERSTANDING IM CYCLICALITY

IM cyclical nature is inherently linked to the market's perception of risk and the methodologies used to calculate IM requirements. As market conditions change, the algorithms and models used to calculate IM can lead to significant variations in the amount of collateral required. These variations can be cyclical, often increasing margin requirements during periods of high market volatility or stress, leading to potential liquidity squeezes for market participants. Anti-procyclicality ("APC") tools aim to mitigate but not eliminate that cyclical nature.

FACTORS INFLUENCING IM CYCLICALITY

The IM cyclical nature is a complex phenomenon influenced by a plethora of factors. Eurex observes that:

1. **Market Volatility:** Increases in market volatility typically result in higher IM requirements as the potential future exposure of financial positions becomes less predictable.
2. **Model Sensitivity:** The mathematical models used to calculate IM, such as Value-at-Risk ("VaR") or Expected Shortfall ("ES"), can exhibit sensitivities to market conditions, leading to cyclical patterns in IM demands.
3. **Changes in Risk Exposure:** Market participants may actively modify their portfolio compositions, leading to shifts in margin requirements. Moreover, even without any intervention, risk exposures can significantly fluctuate due to the expiration of existing hedges or options transitioning from out-of-the-money ("OTM") to in-the-money ("ITM") status.
4. **Model or Regulatory Changes:** Regulatory requirements can also influence IM cyclical nature, especially as authorities adjust frameworks in response to market conditions or systemic risks.

7.2 MEASUREMENT OF IM CYCLICALITY

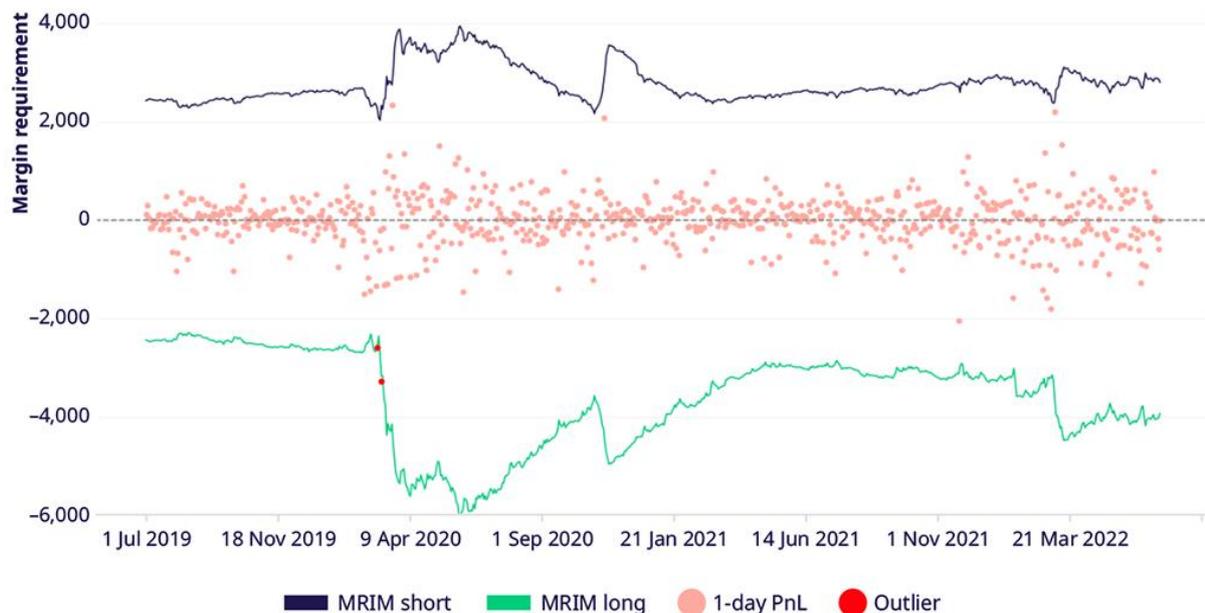
Measuring IM cyclical nature involves analysing the variability of IM requirements over time and understanding the drivers of these changes. This measurement is crucial for financial institutions to manage their collateral efficiently and for regulators to monitor systemic risks. Eurex presents two measurements:

1. **Time-Series Analysis:** Examining historical IM data to identify patterns, trends, and potential cyclicity. This includes statistical measures such as standard deviation, autocorrelation, and volatility clustering.
2. **Stress Testing:** Simulating various market conditions (e.g., extreme market movements) to assess how IM requirements would respond.

7.3 PIONEERING CCP TRANSPARENCY SERIES: INSIGHTS FROM EUREX ENHANCED DISCLOSURES

In 2021, to spur industry discussions on margin procyclicality in the post-COVID-19 era, Eurex Clearing released an extensive dataset featuring product-level backtesting results. This dataset covered some of its benchmark ETD future products and EURO-Swaps across four distinct tenors. Alongside, Eurex proposed a comprehensive set of backtesting and procyclicality Key Performance Indicators (“KPIs”) to enhance analytical depth and insight.

Backtest – Margin coverage for FESX



Graph 1. Margin and PnL time series for EuroSTOXX50 futures contract

In the study, Eurex examined backtesting results for single contract positions – both long and short – across front-month futures series for all ETD products under consideration, as well as for payer and receiver fixed-rate swaps within the scope of OTC contracts. The supplementary dataset provided a consolidated overview of product-level outcomes, highlighting metrics related to procyclicality and backtesting over lookback periods of one and three years.

In 2022, Eurex introduced additional enhancements as part of the eighth instalment⁷⁵ of their ongoing series, 'Pioneering CCP Transparency.' This instalment notably included time series data on margins, enabling market participants to conduct tailored analyses on margin procyclicality. Accompanying this data, a series of graphs were made available, designed for straightforward interpretation and analysis.

⁷⁵ [Eurex Clearing, “Part 8: Forward-looking margin simulations into periods of stress”. 2022](#)

Average of KPIs across asset class on the 3Y window

Metric	Ex-Post Coverage	Loss-to-Margin ratio	1-day MRIM increase	5-day MRIM increase	10-day MRIM increase	Peak-to-trough ratio
Asset class						
Listed Equity Index Derivatives	99.98%	115%	12%	30%	40%	81%
Listed Fixed Income Derivatives	99.92%	126%	21%	41%	56%	170%
Listed FX Derivatives	99.97%	112%	9%	15%	22%	58%
OTC Swaps	100%	-	16%	45%	51%	339%

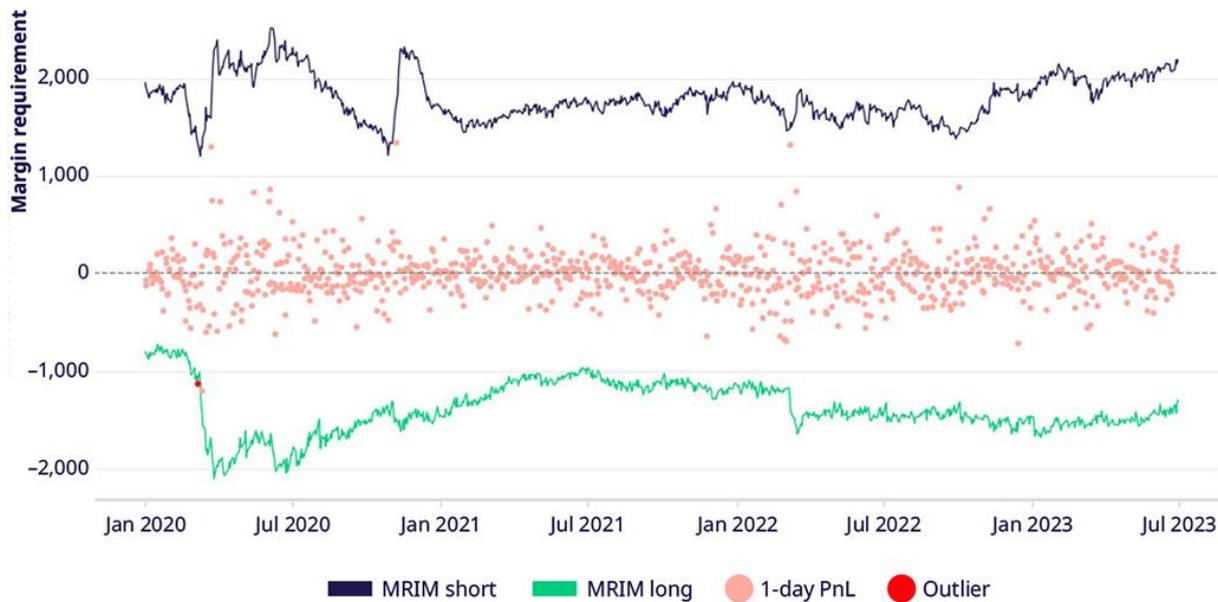
Table 1. Summary of KPIs reported by Eurex for 3-year backtesting window

In 2023, Eurex Clearing took a significant step forward in their transparency series⁷⁶ by broadening their analysis to include backtesting of option products and examining how margins respond to market shocks. This expansion not only updates the backtesting and procyclicality results but also broadens the range of covered products, notably incorporating plain vanilla options. Eurex Clearing's detailed disclosure of margin figures and related metrics for each backtesting strategy facilitates a deeper understanding of margin requirements for options, contributing to a more resilient framework for managing IM cyclicity.

Upon analysing the evolution of margins and the associated procyclicality metrics for specific risk profiles, Eurex Clearing observes significant variability in margin figures, including pronounced short-term procyclicality. This variability needs to be understood in the context of the backtesting approach previously described. The daily rebalancing of standard listed instruments means the option contract reflecting the trading strategy may vary over time due to changes in the underlying asset and the passage of time. Although the aim is to maintain a consistent risk profile over time, even minor variations in moneyness or time-to-expiry can lead to changes in margin requirements. This is especially true when moving from one strike price to another or from one expiry date to another.

⁷⁶ [Eurex Clearing, "Part 10: Extending margin transparency: option back-testing and margin response to market shocks". 2023](#)

Backtest – Margin coverage for OESX Call 90-days ATM



Graph 2. Margin and PnL time series of a single EuroSTOXX50 at-the-money call option with a target expiry of 90 days

To put things into perspective and provide a different angle on the topic, it is important to provide more details on how procyclicality is defined within the risk framework of Eurex Clearing. Procyclicality of IM is its variability originating from the model-induced perception of the risk of an instrument or portfolio of instruments. The model specific impact represents the change in IM that can be attributed to the risk model only. This means that effects resulting from changes in the portfolio, moneyness drift over time due to market level changes, or any life-cycle events such as expiries are to be excluded. As such, this stricter measurement of procyclicality is performed by applying as much as possible the following guiding principles:

- Constant exposure without noise induced by re-balancing;
- The base market levels kept static to avoid impact of market drift on moneyness;
- The characteristics of the portfolio shall be frozen (fixed time-to-expiries, no life-cycle events).

The backtesting approach and related model KPIs defined by Eurex provide an insight into productive margin figures and allow market participants to have an appreciation of the output of the Prisma Initial Margin model when applied to listed option contracts. Provision of margin time series allows market participants to define and calculate their own KPIs.

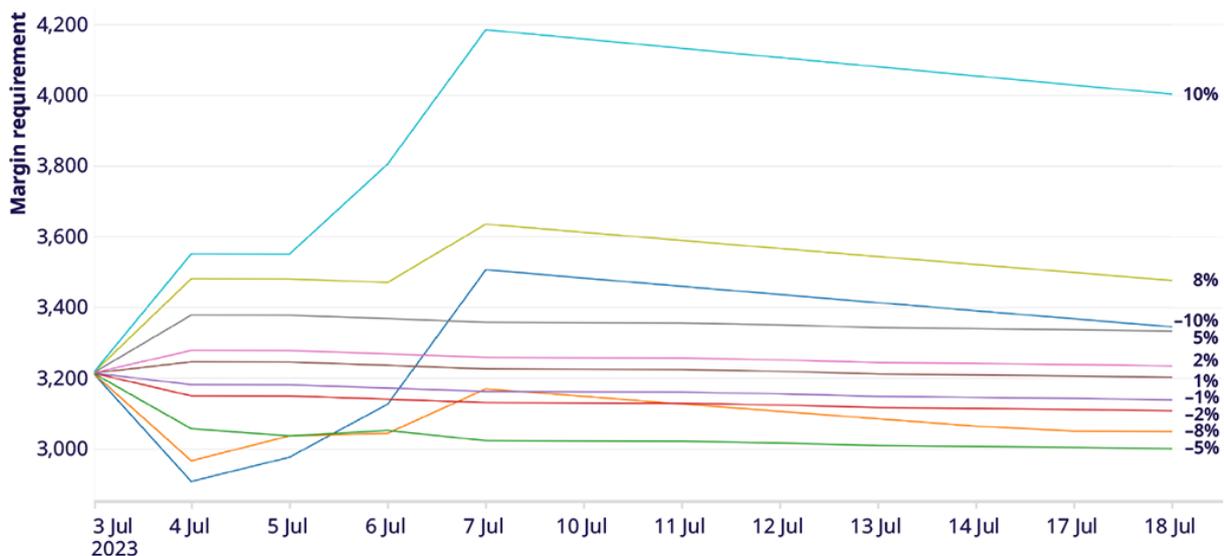
7.4 FORWARD-LOOKING MARGIN SIMULATIONS: PREPARING FOR STRESS PERIODS

Building upon the foundation laid in backtesting analyses, Eurex Clearing introduced forward-looking margin simulations to anticipate how margins might evolve during future market stress scenarios. These simulations, incorporating both calm and volatile baseline conditions, offer a novel approach to predicting future margin behaviour. By simulating historical scenarios such as the Lehman crisis, the COVID-19

pandemic, or Russia-Ukraine war, Eurex provides valuable insights into potential future margin requirements, helping market participants prepare for various market conditions.

In its 2023 publication, Eurex Clearing incorporated further feedback from market participants. While historical replay simulations are deemed a useful scenario, some participants preferred an answer to a simple question 'if market moves by x percent, what will happen to my margins?'. While the question is simple, the answer is more complicated: is next day margin sufficient? Should it be margin after 5 business days or perhaps a peak margin following initial impulse scenario? Does the participant need a number or days it would take for margin to peak following an initial impulse? For those reasons, Eurex Clearing published two week-ahead simulations with individual margin levels for each of the days to provide most flexibility and information content. This view allows for empirical impulse response analysis, akin to the one in latest paper by Gurrola Perez and Murphy.⁷⁷

Market Risk Initial Margin for FESX – Long Position



Graph 3. Simulated margin evolution for a single long EuroSTOXX futures contract in response to a range of different market moves

7.5 TRANSPARENCY IN IM PROCYCLICALITY

Eurex finds that transparency in the calculation and management of IM is essential for several reasons:

1. **Market Confidence:** Transparent IM calculation methodologies and requirements help build trust among market participants, reducing the likelihood of disputes and fostering a more stable market environment.
2. **Risk Management:** Clear insights into IM requirements enable better liquidity planning and risk management, allowing institutions to allocate collateral more efficiently.
3. **Regulatory Compliance:** Transparency ensures that regulatory standards are met, facilitating oversight and the identification of systemic risks associated with IM cyclicity. A clear regulatory

⁷⁷ Gurrola Perez, Pedro and Murphy, David, The Impulsive Approach to Procyclicality. Measuring the Reactiveness of Risk-based Initial Margin Models to Changes in Market Conditions Using Impulse Response Functions (February 15, 2024). Available at SSRN: <https://ssrn.com/abstract=4727725>

definition of procyclicality as well as articulation of policy goals regarding procyclicality will help achieve common understanding across CCPs, regulators, and market participants.

Recognizing that any changes should follow robust cost-benefit considerations, Eurex recommends that efforts to enhance transparency in IM procyclicality include:

1. **Standardization of Measurement:** Promoting the use of standardized measures for calculation of procyclicality metrics can reduce discrepancies and improve comparability across institutions but requires cautious consideration given the variability of asset classes cleared by CCPs and potential changes to risk exposures over the calculation horizon.
2. **Disclosure Requirements:** Regulators may require institutions to disclose their IM procyclicality policies and the results of ongoing monitoring of procyclicality metrics.
3. **Collaborative Initiatives:** Industry-wide initiatives, such as the development of common data standards for PQD disclosures and developing best practices⁷⁸, can support transparency and collective understanding of IM cyclicity.

Over the years, CCPs have made substantial strides in enhancing the transparency of their margining practices, particularly with regard to margin procyclicality. Looking ahead, the coming years promise even greater advancements in transparency throughout the clearing value chain. The financial industry at large is committed to devising solutions that are mindful of incremental costs yet deliver maximal benefits to liquidity preparedness and comprehensive risk management.

⁷⁸ For more details, see CCP Global initiatives: <https://ccp-global.org/pqd/>

8. HKEX/SHCH: PIONEERING OTC DERIVATIVES CCP INTEROPERABILITY — HKEX AND SHCH CLEARING LINK UNDER SWAP CONNECT

Abstract

Swap Connect, launched on 15 May 2023, is the world's first derivatives mutual market access program. Connecting Mainland China and Hong Kong, it allows international investors for the first time to trade and clear onshore Renminbi ("RMB") IRS while remaining offshore. This is achieved through a ground-breaking collaboration between HKEX's clearing subsidiary OTC Clear and SHCH, bridging the derivatives clearing infrastructure across the border.

Swap Connect has implemented an innovative CCP interoperable model to reduce the complexity for onshore and offshore investors in multiple processes without having to modify their current trading and settlement practices. For clearing and settlement, a new Clearing Link has been established which enables OTC Clear and SHCH to jointly provide clearing and settlement services, with OTC Clear providing central clearing services for Hong Kong and international investors, while SHCH provides central clearing services for investors in Mainland China. For risk management, the introduction of inter-CCP margin pioneered by SHCH and OTC Clear provides sufficient coverage in a CCP default scenario. Clear default waterfall procedures in case of a CM default are well-defined; they do not envisage the use of the inter-CCP margin, and the default fund of the other interoperable CCP.

Swap Connect marks a significant milestone in the opening up of China's financial markets. It will help further strengthen the interconnection of financial markets between Hong Kong and Mainland China and create new investment opportunities for international investors.

Swap Connect is the world's first derivatives mutual market access programme. Connecting Mainland China and Hong Kong, it allows international investors, for the first time, to trade and clear onshore RMB IRS while remaining offshore. Swap Connect is made possible through a ground-breaking collaboration between HKEX clearing subsidiary OTC Clear and SHCH, bridging the derivatives clearing infrastructure across the border, along with the China Foreign Exchange Trade Systems ("CFETS") as offshore RMB IRS trading and matching platform.

In the initial phase, Northbound trading commenced first, enabling international investors to participate in the Mainland China interbank IRS market, via HKEX's OTC Clear. Launched on 15 May 2023, it has been warmly welcomed by regional and international investors alike. On the first day of the trading, 27 offshore investors traded onshore Chinese Yuan ("CNY") IRS with a notional value exceeding RMB 8,259 million. Eligible products in the initial phase of Swap Connect include CNY IRSs on three fixed-to-floating interest rate benchmarks: 7-day Repo, Shanghai Interbank Offered Rate ("SHIBOR") 3-Month, and SHIBOR Overnight.

A ground-breaking cross-border collaboration for efficient clearing services

An innovative CCP interoperable model is implemented for Swap Connect to reduce the complexity for onshore and offshore investors in multiple processes, including clearing and settlement, and risk management, without having to modify their current trading and settlement practices. This enables OTC clearing innovation, strengthens the overall risk management framework, and facilitates the operation of the global financial market.

8.1 INNOVATION IN THE OTC DERIVATIVES CLEARING LINK

SHCH and OTC Clear jointly offer central clearing services for Swap Connect, with SHCH providing clearing services to onshore investors while OTC Clear provides the same services to offshore investors. The clearing process involves a new Clearing Link established under Swap Connect between SHCH and OTC Clear to clear, settle, and manage risks for Northbound swaps executed through the Trading Link.⁷⁹

Under the Trading Link, international investors can trade Northbound swaps with onshore dealers using international bond trading infrastructure (such as Bloomberg or Tradeweb), that is directly linked with the CFETS trading system, and then clear the executed Northbound swaps through the Clearing Link. Once the Northbound swap executed between offshore and onshore investors has passed the clearing eligibility checks in both SHCH and OTC Clear, SHCH and OTC Clear will novate the Northbound swap for central clearing on the same day by replacing the Northbound swap with three contracts: the first contract is between SHCH and OTC Clear, which will be governed by both the SHCH Clearing Rules and the OTC Clear Clearing Rules (the inter-CCP market contract); the second contract is between SHCH and its clearing participant, which will be governed solely by the SHCH Clearing Rules; and the third contract is between OTC Clear and its CMs, which will be governed solely by the OTC Clear Clearing Rules (see Figure 1).

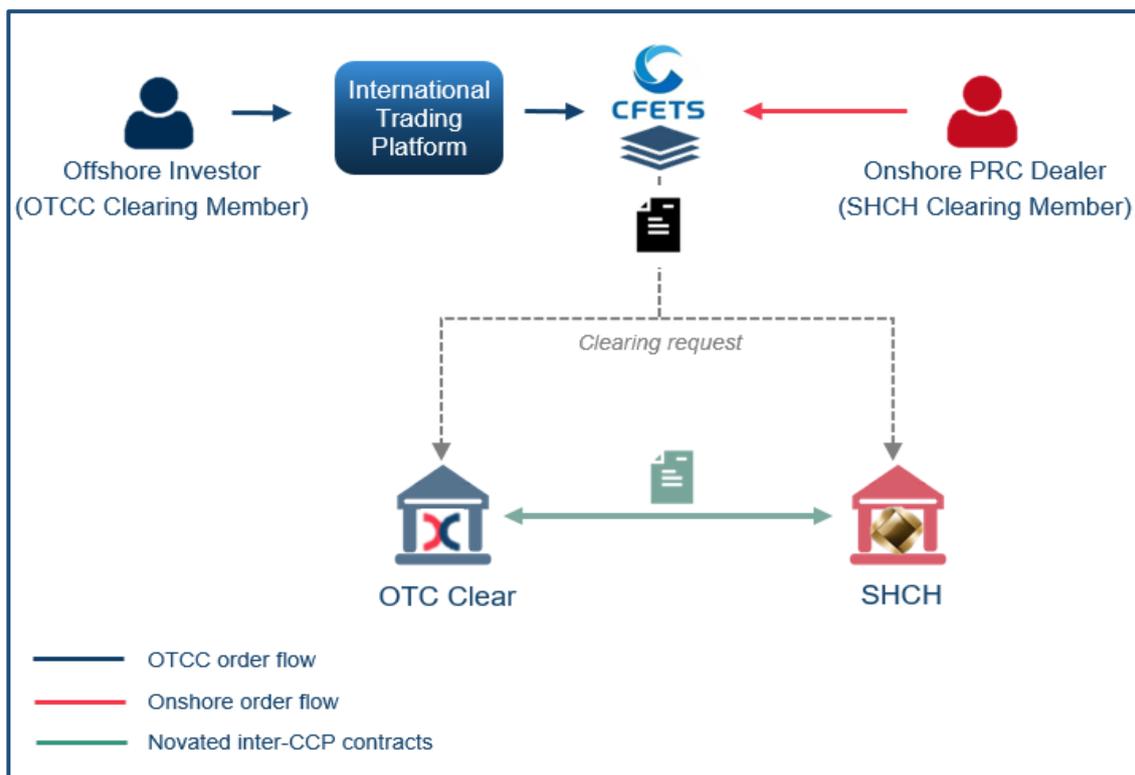


Figure 1: Simplified Clearing Flow

Once the Northbound swaps are novated, offshore investors and onshore dealers will face the CCPs in Hong Kong and Mainland China, respectively. This clearing process enables offshore investors to continue to operate under their familiar legal and regulatory framework.

⁷⁹ The Swap Connect clearing link is established and maintained in accordance with the bilateral Clearing Link Agreement (“CLA”) and the CCP Parties ensure that their respective clearing rules give effect to the arrangements set out in the CLA. As part of the structure of the Swap Connect clearing link, SHCH and OTC Clear are admitted as a Special Clearing House Participant of each other. SHCH, being a Special Clearing House Participant of OTC Clear, is bound by the OTC Clear Clearing Rules and Procedures in order for OTC Clear to be protected under the Securities and Futures Ordinance (“SFO”). Similarly, OTC Clear shall agree and accept the SHCH Rules, but only have obligations under the relevant SHCH Clearing Rules applicable to OTC Clear as identified in the CLA.

8.2 RISK MANAGEMENT IN THE NOVEL CCP INTEROPERABLE MODEL

In designing the Swap Connect risk management framework, SHCH and OTC Clear adhere strictly to the CPMI-IOSCO guidelines (PFMI and PFMI Further Guidance), with the adoption of the European Systemic Risk Board (“ESRB”) and the BoE guidelines and recommendations on CCP interoperability arrangements as benchmarks.⁸⁰

First, the introduction of the inter-CCP margin pioneered by SHCH and OTC Clear guarantees sufficient coverage in a CCP default scenario. Both CCPs have to contribute to the inter-CCP margin, which aims at covering the losses arising from either OTC Clear or SHCH’s default (see Figure 2). The inter-CCP margin⁸¹, in line with ESRB and BoE guidelines and recommendations, together equal the collateral required by the interoperable CCP as if the other participating CCP was a standard CM. In this way, the spillover effects are effectively handled and, even in a CCP default scenario, the interoperable CCP is able, with a high degree of confidence, to continuously fulfil its own obligations, as prescribed in the PFMI Principle 20 on FMI Links. The choice of the inter-CCP margin jointly contributed by both CCPs carries benefits in terms of efficiency, i.e. overall smaller contribution, while still guarantees the viability of the surviving CCP.

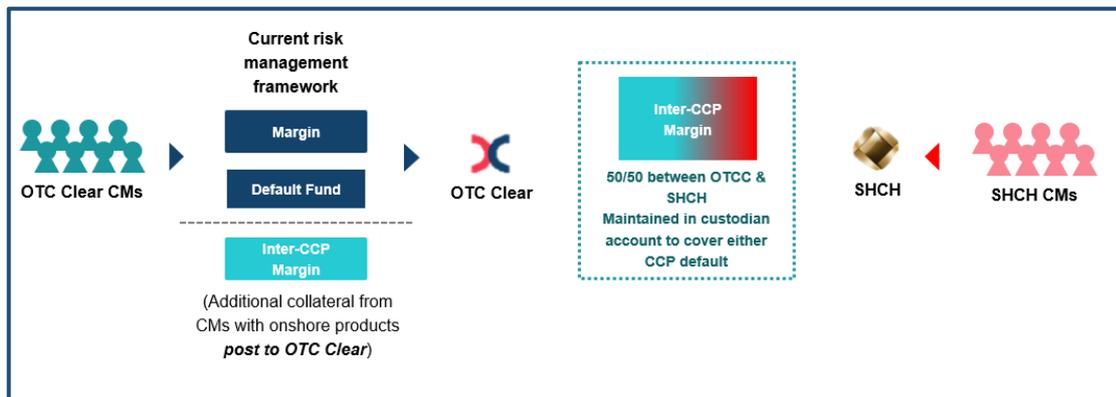


Figure 2: The use of inter-CCP margin

Second, default waterfall procedures in case of a CM’s default are clear and well-defined; they do not envisage the use of the inter-CCP margin, nor the default fund (“DF”) of the interoperable CCP. For instance, in the event an OTC Clear CM defaults, the standard default waterfall applies. The CM’s margin and its DF contribution are used as first resources and - if not sufficient - OTC Clear’s and non-defaulting OTC Clear CMs’ DF contributions will be utilised to cover the residual losses. Crucially, the resources posted in the inter-CCP margin by the CCPs cannot be used as part of the default waterfall. Moreover, since each CCP does not participate in the DF of the other, no resources from the other CCP are affected by the CM default. This setup guarantees a clear separation between each CCP’s obligations towards its own CMs and minimizes any contagion effect arising from a CM’s default.

Finally, the harmonization of the risk management frameworks between two CCPs provides efficiency for swap trading. Swap Connect trades are netted against other trades in the CM portfolio and they are subject to standard clearing rules. For instance, SHCH calculates risk resources for their CMs by combining Swap Connect transactions with their local RMB IRS transactions, which greatly reduces the cost of participating in Swap Connect for onshore and offshore participants. The two CCPs jointly designed a

⁸⁰ ESRB CCP interoperability arrangements:

https://www.esrb.europa.eu/pub/pdf/reports/esrb.report190131_CCP_interoperability_arrangements~99908a78e7.en.pdf

BoE Implementation by the Bank of England of ESMA’s Guidelines and Recommendations on CCP interoperability arrangements: summary of feedback received and policy response:

<https://www.bankofengland.co.uk/-/media/boe/files/paper/2015/implementation-by-the-boe-of-esma-guidelines-and-recommendations-on-ccp-response.pdf>

⁸¹ The inter-CCP margin is utilized by the surviving CCP party in the event of another CCP default.

transaction-by-transaction, real-time, and synchronous process for clearing eligibility checks, which effectively shortens the time window from the completion of a transaction to novation for clearing.

3. FACILITATING CHINA'S INTEGRATION INTO THE GLOBAL FINANCIAL MARKET

Swap Connect marks a significant milestone in the opening up of China's financial markets. The programme creates a robust infrastructure for cross-border RMB payment and settlement, allowing international investors to execute trades while remaining offshore and using rules and mechanisms that they are familiar with. By providing offshore investors with a one-stop clearing and settlement service for investing in onshore CNY interest rate derivative products, Swap Connect adds to the widening ecosystem of RMB products and addresses the risk management needs of international investors looking for exposure to China's sizeable onshore bond market. This in turn deepens the liquidity of the CNY IRS market.

As international investors seek their exposure to China's bond market, there is an increasing demand for effective risk management tools. The launch of Swap Connect has provided international investors with a cost-effective and convenient route to access China's liquid onshore interbank financial derivatives markets. Swap Connect will help further strengthen the interconnection of financial markets between Hong Kong and Mainland China and create new investment opportunities for international investors.

9. JSCC: FIRST JSCC DLT-BASED PRODUCTION SYSTEM - LAUNCHED FOR PHYSICAL SETTLEMENT OF COMMODITY FUTURES

Abstract

While the Japanese financial markets have always been of significant global importance, the listed derivatives market has particularly attracted a growing share of foreign investors recently. However, the global settlements infrastructure has not effectively reduced the underlying operational inefficiencies and its associated risks.

With the many recent technological innovations, JSCC sees an opportunity for major participants in our global financial markets to assess these operational inefficiencies and collaboratively transform our outdated ecosystems. This should be built upon a foundation of standard business processes and can be effectively delivered using robust and secure open-source software tools.

Particularly, the tokenization of assets can offer immediate benefits in many areas of today's post-trade operational and settlement processes. In a small first step, JSCC launched its first DLT-based production system in January 2023 with the view to improve operational efficiencies using tokens in the physical settlement of rubber ("RSS") futures. JSCC intends to influence and align with global standards to further benefit upon expanded token-based services. This case study summarizes our journey.

9.1 BACKGROUND OF DLT SELECTION

JSCC has been continuing research and development ("R&D") activities related to DLT since 2018 with the aim to foresee longer-term structural changes in the financial markets due to information technology ("IT") innovation. From 2018, JSCC built certain DLT-based prototype systems designed for use as a cross-industry and cross-border data platform. Subsequently, from 2020, JSCC started paying attention to "tokenization", another strength of DLT, and have since continued a wide range of proofs of concept ("POCs") to this day. In the RSS futures, the delivery order ("D/O") receipts issued by designated warehouse companies were physically transported using human hands, and particularly during the COVID-19 pandemic, it became more important for users to avoid human contact.

With such R&D and operational efficiencies required, leveraging DLT tokenization was determined to be the best fit with use-cases associated with ownership transfer as well as alignment with global standards for future extensibility.

9.2 USE-CASE FLOW

In the RSS futures, as shown in Figure 1, the futures seller (deliverer) brings the commodity D/O to JSCC, and the buyer (receiver) transfers cash to JSCC. After JSCC's reconciliation process, JSCC transfers cash to the seller and passes the D/O to the buyer.

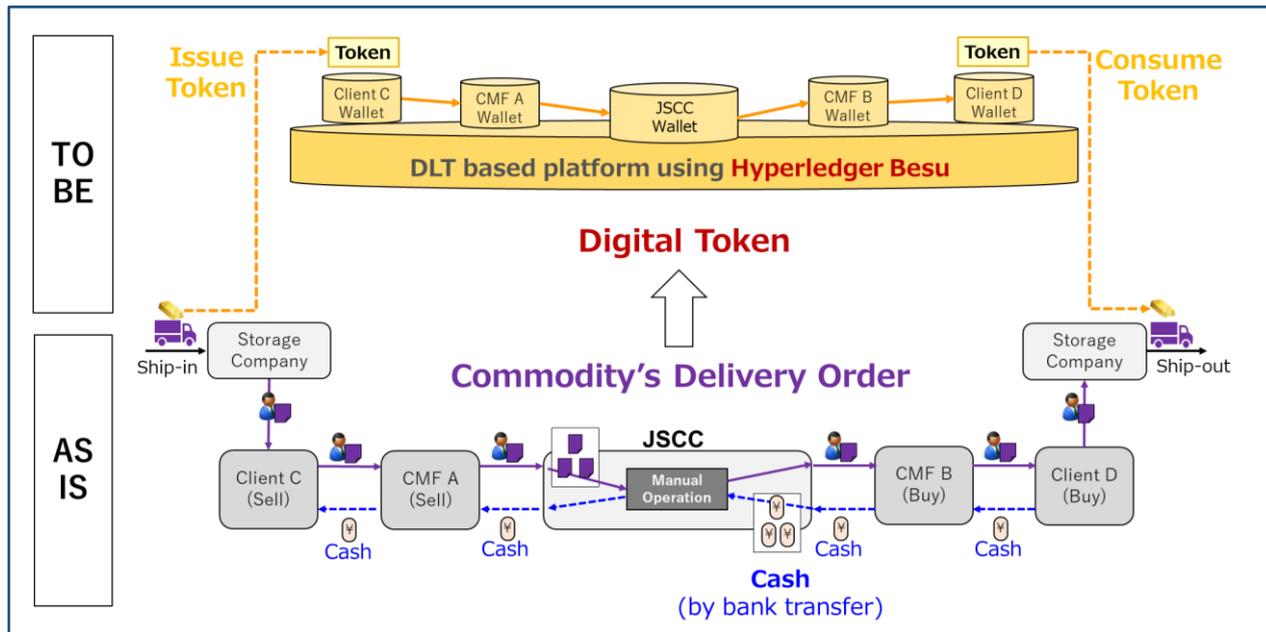


Figure 1: DLT use-case flow diagram

In the new production system, JSCC converts commodity D/O into digital tokens, making it possible to manage the transfer of ownership in real time on a distributed ledger database. (Note that the current-day cash transfers using banks continue to be used in cash settlements because digital currencies that could be used for wholesale payments are not in general circulation at this time.)

9.3 KEY DRIVERS DURING DEVELOPMENT

The key drivers for choosing the commodity delivery use-case for the first production system are (A)-(C) as follows:

- (A) Obvious benefits of operational efficiency;
- (B) Reduced physical settlement risk under pandemic circumstances;
- (C) Narrow functional scope.

As asset tokenization (digital currency, security tokens, non-fungible tokens (“NFTs”), etc.) has been globally used in recent years, we wanted to solve the facing problems by first using DLT’s asset tokenization approach as a trial within a limited area.

Furthermore, by introducing the latest globally adopted standardized features in token technology, DLT not only ensures future extensibility in the face of future business changes, assuming the use of tokens does expand within the financial industry, but also allows for a significant reduction in implementation time and costs by maximizing the use of global standards in open source software (“OSS”). So, we can add the following drivers also:

- (D) Globally standardized DLT for future extensibility;
- (E) Speedy & low-cost launch.

9.4 DLT Platform Selection

Hyperledger Besu <Private Blockchain>

- ◆ ERC1155: NFT (Non-Fungible Token) with bulk function

9.4.1 HYPERLEDGER BESU

We use "Hyperledger Besu", which is one of the private blockchain choices available and is delivered using OSS managed by the Hyperledger Foundation (source code is disclosed and can be used free of charge). The Hyperledger Foundation focuses on DLT-related OSS and is a subsidiary organization of the Linux Foundation, a non-profit organization that promotes and manages OSS globally.

In addition, Hyperledger Besu is an enterprise version of "Ethereum" which is used as the de facto standard technology for DLT/blockchain in cryptocurrencies, etc. While Ethereum is considered a "Public Blockchain" that anyone can access, Hyperledger Besu is considered a "Private Blockchain" that can only be accessed by authorized entities within a closed network and user community. Private blockchains would be generally selected by FMs for wholesale use-cases.

9.4.2 ERC1155

One of the advantages of Hyperledger Besu is that you can use Ethereum Request for Comments ("ERC") standard tokens that have already been used on public blockchains, with a wide range of options such as ERC20 (Fungible Token/currency), ERC721 (NFT), and ERC1400 (Securities Token). Users can customize and configure these standard tokens according to their product characteristics and business requirements.

Unlike fungible currencies, JSCC's rubber futures adopts NFT token types, taking the characteristics of the commodity into account. In addition, as a business requirement for CCP physical settlement, it is necessary to divide NFTs to allocate them between sell side positions and buy side positions. Therefore, we have set "1 NFT = minimum trading unit". Furthermore, we selected ERC1155, which is equivalent to ERC721 (NFT) but with bulk function added, because we need to support operational usability as the number of token records increases.

9.5 RESPONDING TO THE PARADIGM SHIFT SURROUNDING DLT

Although it is not possible to predict at this point how fast and from which fields the use of DLT will spread in the future, the number of DLT-based production solutions has increased globally during 2023. Therefore, as a CCP, we are promoting the expansion of practical applications from a short-term perspective, to benefit with (A), and also conducting POCs and research from a long-term perspective in preparation for such a paradigm shift, to further benefit with (B)-(D).

(A) Short-term DLT solution with "Precious Metals delivery"

Physical settlement process for commodity futures

- Phase 1: Rubber futures launched in January 2023
- Phase 2: Precious Metal (Gold, Platinum, Silver) now under design

To further expand operational efficiencies, we are currently working on the physical settlement of Precious Metal Futures (Gold, Platinum, and Silver) as Phase 2.

Physical settlement is currently performed through an exchange of securities called “warehouse receipts.” Unlike D/O in Phase 1, warehouse receipts are securities which can also be used as collateral for particular trades. The Legislative Council of the Japanese Ministry of Justice is discussing legal revisions towards the digitalization of warehouse receipts. So, we keep close eyes on a status of such discussions and research the feasibility of using tokens for physical settlement in our Phase 2.

(B) Long-term DLT POCs with “Collateral use-cases”

Unlike how settlements are generally performed within CCPs, where all CMs must participate jointly to complete settlement cycles such as DvP settlements of equities, or cash settlements of VM, etc., the movement by CMs of preferred collateral assets from an eligible collateral list to post collateral against IM requirements would be more flexible for member onboarding. Once a CCP has launched this service, motivated CMs can onboard once they are ready to start using asset tokenization.

Imagining that DLT asset tokenization will be commonly used in collateral operations in the future, we try to predict what breakthroughs and new benefits can be created by taking advantage of the characteristics of DLT through various types of POCs.

(C) Interoperability

If asset tokenization spreads globally in the future, it is expected that different DLT platform types (e.g., Hyperledger Besu, Corda, Hyperledger Fabric) and different cloud service providers will be combined in different countries and for different products. Therefore, the interoperability discussion on how different networks will connect to one another is indispensable and we continue to research from a broad perspective the various possibilities.

(D) Research on the OSS Ecosystem

One of the strong features of DLT is that it enables flexible governance design and, from a long-term perspective, it is possible that an ecosystem based on DLT will expand. For example, multiple organizations will jointly operate an ecosystem in a cross-sector and/or cross-border manner.

In an ecosystem, it is pictured that there will be a non-competitive area that is shared and a competitive area that each company customizes according to its own requirements, but in both areas, globally adopted OSS should be an important catalyst. Therefore, JSCC joined the Hyperledger Foundation and Linux Foundation in October 2023 to further research the effectiveness of OSS within our future ecosystem.

10. KDPW_CCP: ORDERLY HANDLING OF THE UNEXPECTED – RECOVERY PLANNING

Abstract

Entry into force of CCP recovery and resolution regulation in the EU enforced the EU CCPs to prepare their recovery plans till 12th February 2022. As the requirements regarding content of CCP's recovery plan are based on provisions regulating banking recovery, preparing such a plan poses a significant challenge for CCPs that do not have a banking license and for the local ones, as the provisions of regulation were designed mostly for the biggest players being systemically important across the EU.

KDPW_CCP is a local CCP operating on the Polish market. KDPW_CCP is the only CCP serving the Warsaw Stock Exchange ("WSE") by clearing in equity segment and the only CCP clearing OTC derivatives on the Polish market. We are then the primary choice of Polish clearing participants.

This case study provides an overview regarding challenges that KDPW_CCP has faced in preparing the recovery plan and the adopted solutions.

10.1 KDPW_CCP'S PROFILE

KDPW_CCP is the only EMIR-authorized CCP operating in Poland. KDPW_CCP was granted initial authorisation in April 2014 as the third CCP in the EU. Since then, KDPW_CCP has been active on the Polish market in the segments and instruments as shown in Figure 1 below.

Regulated market	Alternative trading systems	OTC market
<ul style="list-style-type: none"> • Equity and debt in PLN and EUR, • Following classes of derivatives in PLN: <ul style="list-style-type: none"> ○ Equity derivatives, ○ Debt futures, ○ Interest rate futures, ○ Currency futures. 	<ul style="list-style-type: none"> • Equity and debt in PLN and EUR, • Treasury securities in PLN: <ul style="list-style-type: none"> ○ Repo ○ Outright. 	<ul style="list-style-type: none"> • Following contracts in PLN and EUR (interest rate derivatives): <ul style="list-style-type: none"> ○ FRA, ○ IRS, ○ OIS, ○ Swaps.

Figure 1. KDPW_CCP's clearing activity

Source: KDPW_CCP

KDPW_CCP is the only CCP that serves Poland-based stock exchange – the WSE. There is no other CCP that is connected to the WSE or operates in this segment under an interoperability arrangement. KDPW_CCP is also the only entity providing clearing services in the OTC segment of the Polish market. As KDPW_CCP is the only such an entity operating on the Polish market, we have become the primary choice of Polish clearing participants. The vast majority of our clearing participants are domestic entities, which are credit institutions, development bank, and investment firms.

Therefore, KDPW_CCP has become a systemically important institution for the Polish financial market. It is important insofar as Poland is one of the few Members States of the EU that has its own currency – Polish zloty ("PLN"). Figure 2 below gives insight into where we operate.



Figure 2. The place of KDPW_CCP in the world of clearing

Source: CCP Global, PQD quarterly trend report. 2023 Q2 data, 2023.

KDPW_CCP operates on the basis of EMIR Regulation and on the basis of the Polish law, namely the Act on Trading in Financial Instruments, which implemented MiFID Directive⁸² in the Polish legal system. Therefore, our approach is designed to comply with both the EU and the local law.

10.2 CCP RECOVERY AND RESOLUTION PROVISIONS – CHALLENGES FOR REGULATORS AND CCPS

The CCP recovery and resolution regime in the EU is a novelty. It consists of the so-called CCP recovery and resolution regulation (“CCP-RR regulation”)⁸³, a few delegated regulations and ESMA guidelines, the first of which was published in 2021. However, the discussion on CCP recovery and resolution regime has been present in the public discourse since the adoption of the EMIR regulation.

When discussing CCP-RR regulation, it is worth recalling its history, which is summarised in Figure 3 below. The initial proposal was published by the European Commission in November 2016. The development of the proposal by the European Commission gave hope that the issue of recovery and resolution would finally be resolved by the introduction of a legislative act. To date, EU CCPs in developing their recovery plans have used CPMI-IOSCO’s report “Recovery of financial market infrastructures” published in 2014.⁸⁴ However, hope of an imminent resolution of the issue was dampened by the need for EU legislators to deal with two other proposals to amend the EMIR regulation that emerged in 2017, effectively freezing work on the CCP-RR regulation until 2019.



Figure 3. Summary of work on the CCP-RR regulation

Source: Own study

The European Commission’s work on CCP-RR regulation was lengthy due to controversial issues that triggered many debates, such as the catalogue of resolution tools, the composition of the resolution college, and protection of clearing participants and clients, among others. The work was completed in the middle

⁸² Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU (*Official Journal* L 173/349).

⁸³ Regulation (EU) 2021/23 of the European Parliament and of the Council of 16 December 2020 on a framework for the recovery and resolution of central counterparties and amending Regulations (EU) No 1095/2010, (EU) No 648/2012, (EU) No 600/2014, (EU) No 806/2014 and (EU) 2015/2365 and Directives 2002/47/EC, 2004/25/EC, 2007/36/EC, 2014/59/EU and (EU) 2017/1132 (*Official Journal* L 22/1).

⁸⁴ CPMI-IOSCO, *Recovery of financial market infrastructures*, October 2014, <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD455.pdf>

of the COVID-19 pandemic, which forced a new way of proceeding and affected the pace of the work. Finally, the regulation was adopted in mid-December 2020 and published in the Official Journal of the EU about a month later.

As regards the provisions themselves, it is worth noting that they are similar to the recovery and resolution regime for banks in the EU, except that for banks they take the form of a directive (“BRRD”).⁸⁵ The best examples of this are the annexes to the CCP-RR regulation and the BRRD which set out the elements of a recovery plan for CCPs and banks and which are largely repetitive.

As CCPs and banks differ significantly, ranging from CCPs’ role as risk managers to the functions they perform and their importance for financial stability, and in particular the fact that not all CCPs in the EU have a banking licence, compliance with the CCP-RR regulation may pose significant challenges for EU CCPs. In addition, it is worth noting that these provisions have been designed specifically for the largest players, as evidenced, for example, by the annex to the CCP-RR regulation setting out the required elements of the recovery plan, which has made the task of EU CCPs more difficult. However, the regulation allows room for manoeuvre by considering the specificities of local EU CCPs and relying on supervisors’ assessment and their experience in the process of evaluating and approving recovery plans.

One of the key inconveniences of creating a recovery plan was a mismatch between the deadlines under the CCP-RR regulation and the publication of delegated regulations and ESMA guidelines. The provisions of the CCP-RR regulation obliged EU CCPs to prepare their recovery plans till 12th February 2022. However, for the preparation of recovery plans, the EU CCPs had to take into account two ESMA guidelines regarding recovery plan scenarios and recovery plan indicators which both were published in January 2022 and translated into official languages of the EU in March 2023.

Inclusion of these guidelines in the preparation of recovery plan was inevitable as stress scenarios and indicators form a core part of the EU CCP’s recovery plan. Therefore, despite the late date of publication, EU CCPs needed to rely mainly on ESMA’s consultation papers, hoping that the changes would be minor.

Another issue was the publication of the Commission delegated regulation 451/2023.⁸⁶ It was adopted in November 2022 and published in March 2023, so several months after the deadline for EU CCPs to prepare the recovery plan. Although the regulation introduces obligation on supervisors to assess EU CCP’s recovery plan, it also refers to the elements and aspects that the recovery plan should contain, and that the supervisor should assess. As regulation introduces general framework, delegated regulations are more technical and provide more detail. As a result, the scope of the recovery plan in the CCP-RR regulation and the requirements set out in the delegated regulation have diverged significantly, to the detriment of the delegated regulation in terms of the number and calibre of requirements. While EU CCPs had access to a draft of this legislation, it was still not the final version, which further complicated the task of EU CCPs and added to the uncertainty surrounding the recovery plan process.

Such divergence in deadlines may be trivial from the point of view of regulators, as little attention is paid to the dates of entry into force, unless it concerns the implementation of the directive into national legislation but puts supervised entities in an uncomfortable position and magnifies uncertainty.

10.3 KDPW_CCP’S APPROACH TO PREPARING RECOVERY PLAN

Before preparing our recovery plan, KDPW_CCP assumed that our internal regulations, in particular the *Rules of Transaction Clearing* (organised trading and OTC trading) are superior to the recovery plan. It means that KDPW_CCP has implemented in our plan already existing solutions, for example regarding the handling of

⁸⁵ Directive 2014/59/EU of the European Parliament and of the Council of 15 May 2014 establishing a framework for the recovery and resolution of credit institutions and investment firms and amending Council Directive 82/891/EEC, and Directives 2001/24/EC, 2002/47/EC, 2004/25/EC, 2005/56/EC, 2007/36/EC, 2011/35/EU, 2012/30/EU and 2013/36/EU, and Regulations (EU) No 1093/2010 and (EU) No 648/2012, of the European Parliament and of the Council (*Official Journal* L 173/190).

⁸⁶ Commission Delegated Regulation (EU) 2023/451 of 25 November 2022 specifying the factors to be taken into consideration by the competent authority and the supervisory college when assessing the recovery plan of central counterparties (*Official Journal* L 67/7).

default of CM and already existing recovery tools. As we have included in our recovery plan new solutions, KDPW_CCP has also enshrined them in our internal regulations to ensure that they are operational.

Our recovery plan consists of 17 exhaustive chapters that cover all elements required in the annex of the CCP-RR regulation. The core element of the plan consists of three chapters describing stress scenarios. Here are the highlights of these three parts.

As for stress scenarios, KDPW_CCP has developed them on the basis of ESMA’s guidelines, however, KDPW_CCP took into account our specificity. The development of this chapter required a great deal of analysis and meetings in order to take into account our local specificities. This stage was very long, as KDPW_CCP believes that the identification of stress scenarios forms the basis for the development of the remaining chapters. Therefore, the analysis had to be very thorough and required consideration of many aspects of our business.

Hence, KDPW_CCP proposed six groups of stress scenarios covering default events, non-default events, and the combination of both – default events and non-default events. Within each group of scenarios, KDPW_CCP developed different sub-scenarios that differ in sources of risk materialisation, likely course, and potential impacts. Two of the groups concern events that cause liquidity shortfalls, and one group covers events that prevent us from providing critical functions. Without going into detail, KDPW_CCP has divided these 6 groups into 15 sub-scenarios, as shown in Figure 4.

The amount of work that has gone into the design of this part of the document is reflected primarily in the complex description of each set of stress test scenarios, which indicates the factors considered in the development of that set of scenarios, the events that accompany the materialisation of the sub-scenarios in that set of scenarios, and the methodologies used to estimate the impact of the materialisation of a particular set of scenarios or sub-scenarios.

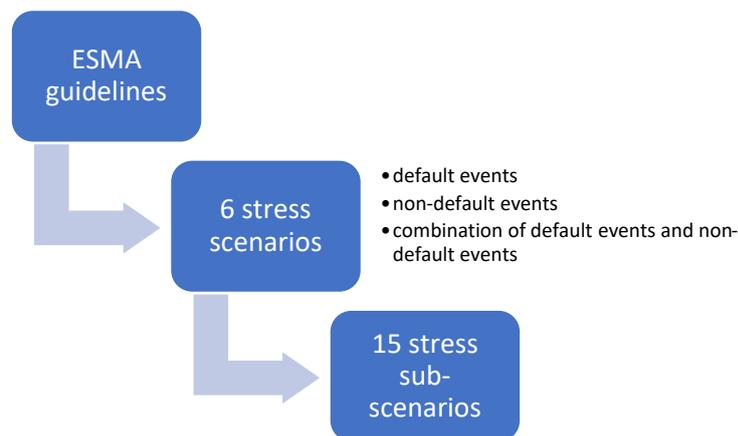


Figure 4. Groups of stress scenarios

Source: KDPW_CCP’s recovery plan.

The second important part of recovery plan is the chapter devoted to recovery plan indicators. On the basis of ESMA guidelines, KDPW_CCP divided indicators into the following two groups:

- early warning indicators,
- indicators signalling the transition from standard risk management procedures to the recovery phase.

In case of early warning indicators, exceeding the relevant levels of these indicators signals the need to analyse the consequences of the observed events, including in particular their potential impact on our financial situation. As for the second group of indicators, after exceeding the levels of these indicators, an analysis of our internal and external situation is carried out. It depends on the results of the analysis whether recovery plan is launched, and which recovery tool is used. It is also possible that the Management Board

of KDPW_CCP may decide not to take the action provided for in the plan, even though the levels of these indicators have been exceeded. This flexibility allows KDPW_CCP to activate the recovery plan and select the appropriate recovery measures based on the internal and external situation.

It should be noted that relevant indicators from both groups are assigned to each sub-scenario. They are also continuously monitored.

The third important element of our recovery plan is a catalogue of recovery tools. Our plan provides for 12 recovery measures that can only be used after the use of the second skin-in-the-game which is strictly regulated by the CCP-RR rules. In general, KDPW_CCP can divide our recovery tools into two groups: recovery tools directed at KDPW_CCP and recovery tools directed at CMs.

KDPW_CCP has proposed appropriate recovery tools to address the consequences of the occurrence of both default and non-default events and the combinations thereof. The recovery measures include measures to recapitalise KDPW_CCP in order to maintain the continuous functioning of the CCP's operational processes. There are also measures that require additional participation by CMs.

In this case, relevant recovery tools are also assigned to each sub-scenario. This approach enabled us to create a matrix where stress sub-scenarios, indicators, and recovery tools are summarised and cross-referenced, making the document a very practical tool.

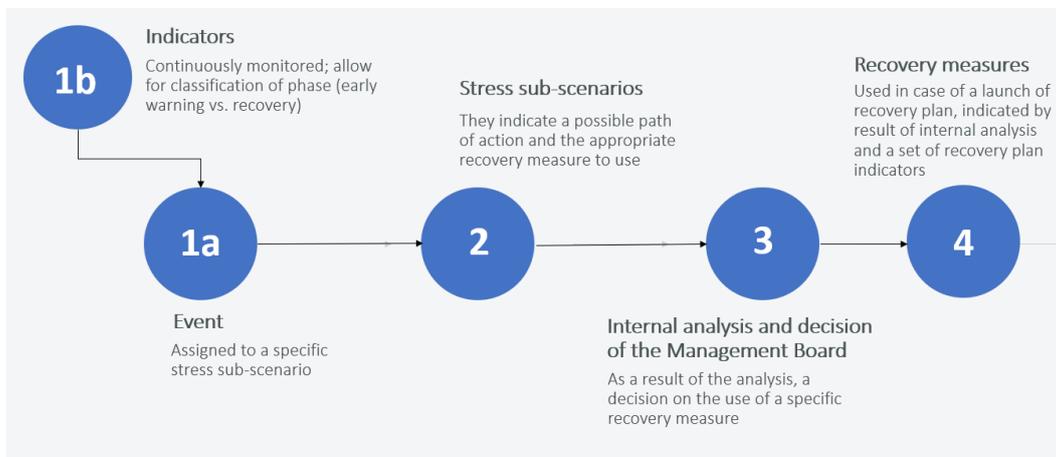


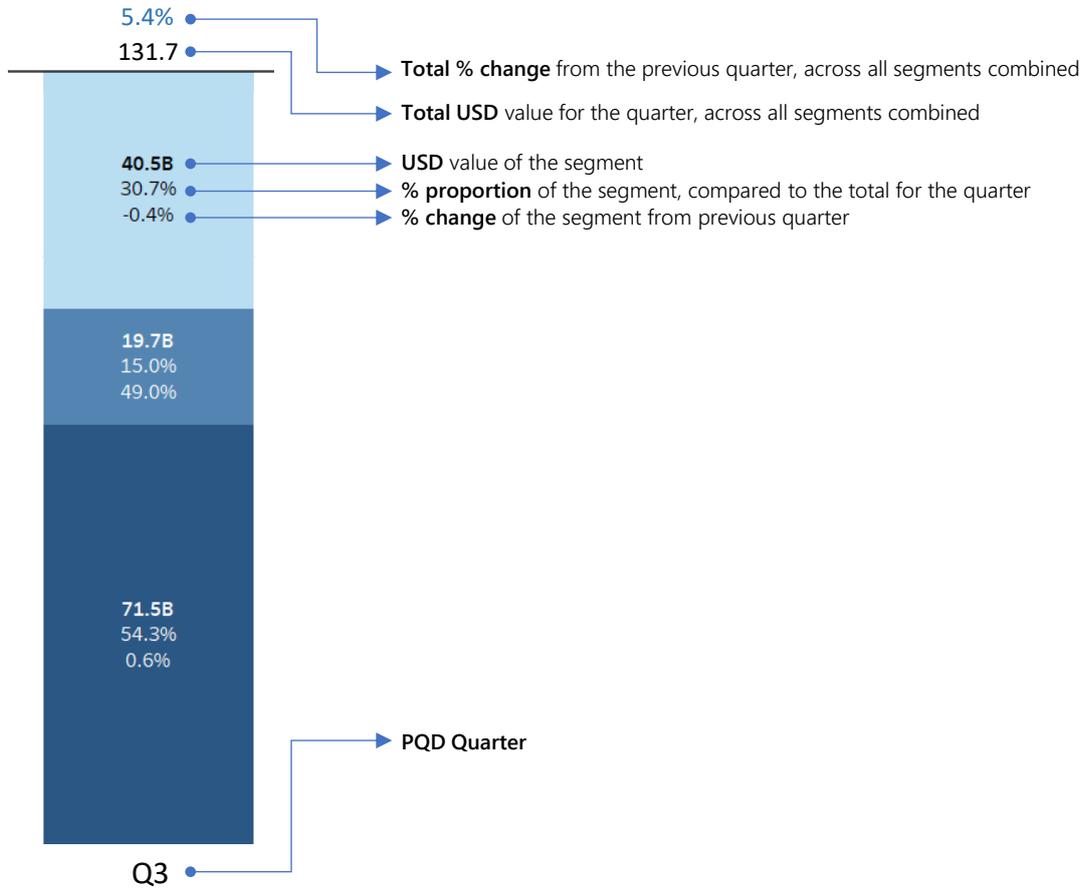
Figure 5. KDPW_CCP's recovery plan – summary

Source: KDPW_CCP's recovery plan.

In summary, as shown in Figure 5 above, our philosophy behind the design of the plan is that recovery indicators are constantly monitored. If an event occurs, KDPW_CCP is able to detect it relatively quickly and assign it to stress sub-scenarios. When the thresholds of the indicators that signal the transition from standard risk management procedures to the recovery phase are exceeded, KDPW_CCP performs the internal analysis. On the basis of this analysis, the Management Board takes a decision to activate certain measures or not to initiate the recovery plan.

11. APPENDIX I: PQD BAR CHART KEY

For certain PQD charts throughout section 3, bar charts may have three values per bar segment and two values per individual column. These can be interpreted as follows:



12. ABOUT CCP GLOBAL

CCP Global is the international association for central counterparties (“CCPs”), representing 42 members who operate over 60 individual CCPs across the Americas, EMEA, and the Asia-Pacific region.

CCP Global promotes effective, practical, and appropriate risk management and operational standards for CCPs to ensure the safety and efficiency of the financial markets it represents. CCP Global 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@ccp-global.org or through our website by visiting www.ccp-global.org.



13. CCP GLOBAL MEMBERS

