



PROGRESS AND INITIATIVES IN OTC DERIVATIVES

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A CCP12 REPORT

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MESSAGE FROM THE CEO

The derivatives markets are evolving as we see a tremendous increase of centrally cleared products across a variety of jurisdictions. Since the introduction of the Uncleared Margin Rules in 2016, the markets have seen unprecedented changes which continue to influence the derivatives market dynamics.

Following the G20 Leaders' pledge in 2009 to mandate central clearing for standardised OTC derivatives, we examine in this year's report how industry participants are coping with this ever-evolving industry. What is the future of the OTC derivatives market following the variety of post-crisis reforms? What are the current trends that CCP12 foresees?

In order to examine the trends and insights as well as to understand the benefits of clearing to the markets, CCP12 takes an in-depth view of the current state of the OTC derivatives market across three new case studies: Collateral, Foreign Exchange, and Interest Rate Derivatives.

I would like to extend a special thank you to our members and the CCP12 team involved with this year's release, without them this report would not be possible.

We hope you enjoy reading as much as we have enjoyed exploring these exciting topics and developing the report.

For further information, please e-mail office@ccp12global.com or visit www.ccp12.org.



Marcus Zickwolff
CCP12 CEO

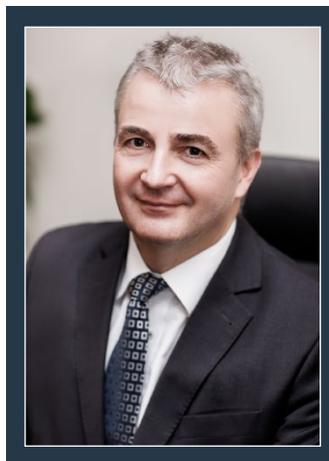


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LIST OF ABBREVIATIONS

€STR	Euro Short-Term Rate
AANA	Aggregate Average Notional Amount
ADV	Average Daily Volume
APAC	The Asia-Pacific Region
BCBS	Basel Committee on Banking Supervision
BIS	Bank for International Settlements
CCP	Central Counterparty
CDS	Credit Default Swap
CDX	Credit Default Swap Index
CFTC	The U.S. Commodity Futures Trading Commission
CHF	Swiss Franc
CME	Chicago Mercantile Exchange Group
CPMI	Committee on Payments and Market Infrastructures
CSA	Credit Support Annex
CSD	Central Securities Depositories
D2C	Dealer-To-Client
D2D	Dealer-To-Dealer
DV01	Discounted Value of a Basis Point
ECAG	Eurex Clearing Group
EONIA	Euro Overnight Index Average
ETD	Exchange Traded Derivative
EUR	Euro
FRA	Forward Rate Agreement
FX	Foreign Exchange
GBP	Great British Pound
GCE	Gross Credit Exposures
GMV	Gross Market Value
IBOR	Inter-Bank Offered Rate
IM	Initial Margin
IOSCO	International Organization of Securities Commissions
IRS	Interest Rate Swap
ISDA	International Swaps and Derivatives Association
ISIN	International Securities Identification Number
JFSA	Japan Financial Securities Agency
JPY	Japanese Yen
JSCC	Japan Securities Clearing Corporation
LCH	London Clearing House
LCR	Leverage Coverage Ratio
LIBOR	London Inter-Bank Offered Rate

NDF	Non-Deliverable Forward
NDO	Non-Deliverable Options
NSFR	Net Stable Funding Ratio
OIS	Overnight Indexed Swaps
OTC	Over-The-Counter
P&L	Profit and Loss
PQD	Public Quantitative Disclosures
Repo	Repurchase Agreement
RFR	Risk-Free Rate
RWA	Risk Weighted Average
SDR	Swap Data Repository
SEF	Swap Execution Facilities
SIMM	Standard Initial Margin Model
SOFR	Secured Overnight Financing Rate
SONIA	Sterling Overnight Index Average
STM	Settled-To-Market
UMR	Uncleared Margin Rules
USD	United States Dollar
VM	Variation Margin
WAM	Weighted Average Maturity
XCCY Swaps	Cross-Currency Swaps
YTD	Year-To-Date

EXECUTIVE SUMMARY

The Over-The-Counter (“OTC”) derivatives markets are continuing to evolve as reform efforts of the G20 approach completion across many jurisdictions. Policy makers and regulators have both mandated clearing in liquid, standardised products and introduced strict bilateral risk management practices in bilateral markets. This two-fold approach helps to foster a safer, simpler and fairer financial sector. These measures support other initiatives, including increasing transparency and an increasingly competitive pricing of risk.

In order to assess and monitor the impacts of these reforms, market participants rely on transparency. Transparency is particularly important because OTC markets are divided into four areas:

- Mandatory clearing;
- Voluntary clearing;
- Bilateral markets with margining in place; and
- Unmarginated bilateral markets.

An accurate assessment of the robustness and resilience of the market as a whole cannot be made if transparency is lacking in any one of these areas.

This report builds on top the 2019 report ‘Incentives for Central Clearing and the Evolution of OTC Derivatives’¹ in order to further investigate in-depth the progress and initiatives observed across OTC markets. This work would not be possible without the important resources provided by both post-trade transaction reporting and the work performed by the Bank for International Settlements (“BIS”) to create the latest ‘Triennial Central Bank Survey of Foreign Exchange and Over-The-Counter (OTC) Derivatives Markets in 2019’.²

A review of this data highlights more standardisation of products and processes, an increasing share of client volumes in Interest Rate Derivatives (“IRDs”), high clearing rates for interest rate and credit default swaps and the increased use of non-market facing trades for efficient portfolio management.

It is notable that data for OTC derivatives remains complex and can be difficult to understand. Increases in non-market facing trades, a lack of transparency for the amount of collateral in bilateral markets and limited post-trade transparency for uncleared derivatives across most jurisdictions is hampering the understanding of markets. This can make a direct comparison between cleared and uncleared markets a challenge and this could be improved.

BIS data shows that cleared OTC IRDs saw Average Daily Volumes (“ADVs”) increase to \$2.64trn between 2016 – 2019, more than doubling in size. Importantly, the amount of growth in cleared markets for this asset class was much greater than the growth of uncleared markets. Data shows that the improved efficiency of clearing versus a bilateral market structure was a motivating factor for this growth. This is highlighted by the increase in compression volumes in the past three years which adds a further \$1.66trn in ADV of cleared IRDs.

¹ https://ccp12.org/wp-content/uploads/2019/02/INCENTIVES-FOR-CENTRAL-CLEARING-AND-THE-EVOLUTION-OF-OTC-DERIVATIVES-A-CCP12-REPORT_FINAL.pdf

² <https://www.bis.org/statistics/rpfx19.htm>

A portion of the growth in cleared markets was driven by an increase in trading of short-dated derivative contracts, and this report analyses the growth of IRDs in short-dated contracts at Chicago Mercantile Exchange Group (“CME”).

A review of collateral management across cleared and uncleared markets has revealed that the industry would benefit from Public Quantitative Disclosures (“PQD”) regarding collateralisation and the precise amount of margin being exchanged in bilateral markets. The Committee on Payments and Market Infrastructures and International Organization of Securities Commissions (“CPMI-IOSCO”) PQDs provide a useful source of data on the amount and type of collateral held by Central Counterparties (“CCPs”) for both margin requirements and default resources. The industry requires a similar resource for uncleared markets, including the proportion of trades subject to the Uncleared Margin Rules (“UMR”), to accurately assess liquidity requirements and latent risks in the bilateral market.

The case study on collateral management also highlights some advantages of clearing compared to uncleared markets with detailed examples from Eurex Clearing Group (“ECAG”) and Japan Securities Clearing Corporation (“JSCC”).

While interest rate and credit derivative asset classes show high levels of clearing, foreign exchange remains predominantly an uncleared market. A case study into Foreign Exchange (“FX”) Options at LCH ForexClear shows there is continued innovation, and illustrates that UMRs are continuing to have a positive impact on markets. The UMRs are providing suitable incentives to clear as well as leading to innovations in reducing bilateral counterparty exposure using multilateral optimisation services to offset risk between uncleared and cleared.

Further studies would benefit from improved public transparency in Europe and the Asia-Pacific (“APAC”) for derivatives trading. Across the uncleared market, more information is required regarding funding requirements of collateral related to bilateral derivative portfolios, as well as the proportion of outstanding trades and exposure that remain outside of the UMRs.

It is important to note that a single, headline figure cannot express the size nor complexity of the OTC derivatives market. This report performs in-depth analysis of public data and demonstrates that there are strong factors that are motivating more of the market to choose clearing.

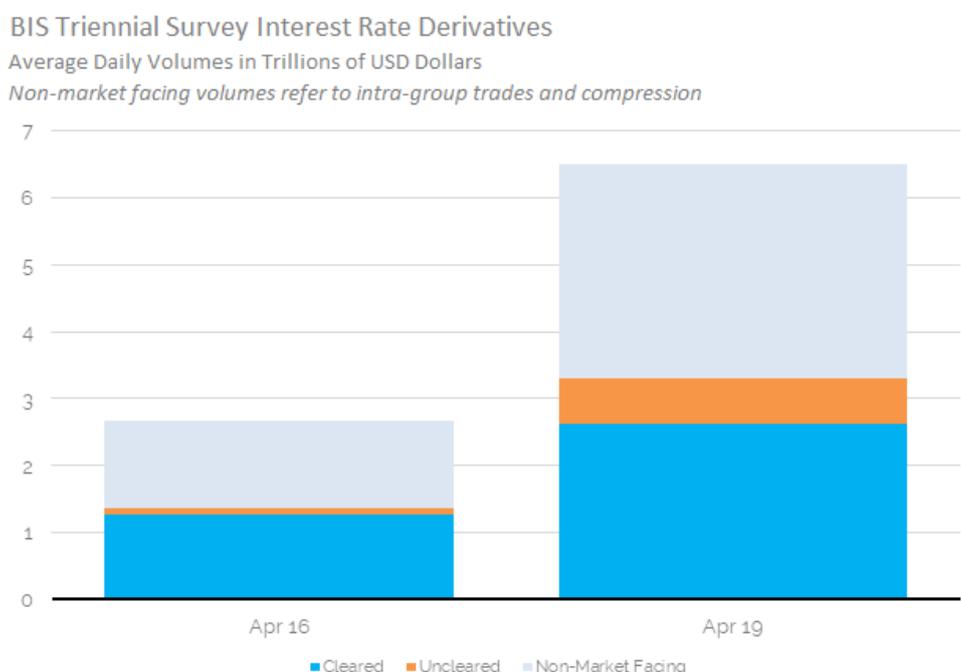
1. INTRODUCTION TO THE ANALYSIS

CCPs bring substantive risk management regimes and multilateral netting to OTC derivative markets. They improve transparency and fundamentally increase the efficiency of the financial ecosystems they serve.

Recent data shows that these benefits are helping to drive fundamental changes. As a result of clearing, more trades are being compressed³ and more trades are being executed electronically³.

A portion of OTC derivatives remain uncleared. This portion of the market remains difficult to understand because post-trade transparency remains ineffective in most jurisdictions. The BIS Triennial Survey⁴ helps to introduce clarity into this market, providing a window into globally cleared and uncleared derivatives markets. This survey therefore provides market participants with a unique insight into the overall state of the derivatives market across jurisdictions. Updated in April 2019, analysis of the data reveals that different areas of the OTC markets are growing at different speeds.

BIS Triennial Survey OTC interest rate derivatives in trillions of US dollars

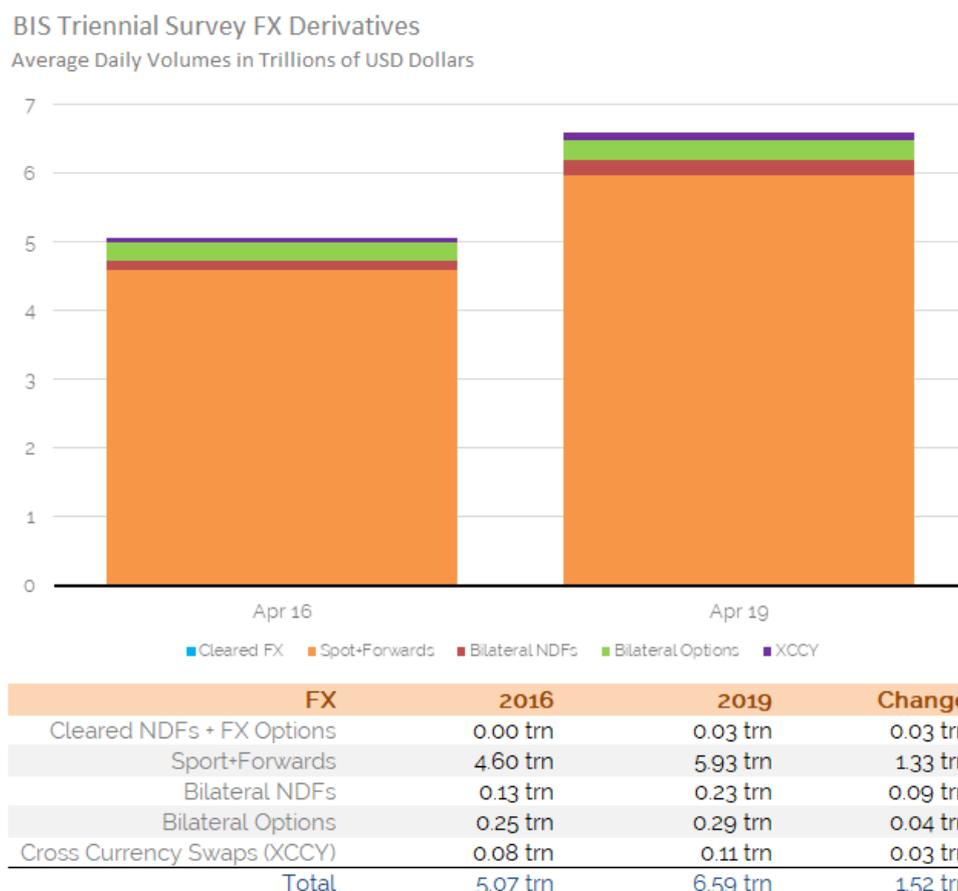


Interest Rates	2016	2019	Change
Cleared	1.28 trn	2.64 trn	1.36 trn
Uncleared	0.08 trn	0.67 trn	0.59 trn
Non-market facing	1.31 trn	3.20 trn	1.88 trn
Total	2.68 trn	6.50 trn	3.82 trn

³ See Ehlers and Hardy: https://www.bis.org/publ/atrpdf/r_at1912i.htm

⁴ Triennial Central Bank Survey of Foreign Exchange and Over-the-counter (OTC) Derivatives Markets in 2019: <https://www.bis.org/statistics/rpfx19.htm>

BIS Triennial Survey FX markets in trillions of US dollars



The BIS analysis⁵ of this data highlighted the following:

- 1) Large increases in the volume of daily trading activity have not resulted in the same level of increases in notional principal outstanding;
- 2) Gross market values have declined;
- 3) The increased use of clearing has resulted in more multi-lateral netting of contracts;
- 4) The increased use of compression in clearing has eliminated economically redundant derivatives contracts.

This report uses a combination of private data from CCP12 members coupled with data from ClarusFT to provide a unique analysis into IRDs and FX markets.

⁵FX and OTC derivatives markets through the lens of the Triennial Survey: https://www.bis.org/publ/qtrpdf/r_qt1912e.htm

1.1 REGULATORY TIMELINE

The increase in volumes over the past three years has occurred against a rapidly changing regulatory backdrop. Since April 2016, expanded Clearing Mandates and UMR have been implemented (see timeline⁶).

UMRs have motivated increased activity in cleared markets, particularly for Phase 1 firms. These counterparties were large enough to have a measurable impact on market activity. For example, total cleared volumes in markets such as Inflation Swaps and Non-Deliverable Forwards (“NDFs”) saw increases in volumes during and after September 2016.

Selected Regulatory Changes

April 2016 – April 2019

Date	Clearing Mandates	Uncleared Margin Rules
June 2016	Cat 1 European Counterparties	
September 2016		Phase 1 firms in the US and Japan (20 entities)
December 2016	Cat 2 European Counterparties	
March 2017*		Variation Margin ‘Big Bang’ (all covered entities) Phase 1 firms in Europe, Australia, Hong Kong, Singapore
April 2017	Canada	
July 2017	Hong Kong	
September 2017		Phase 2 firms globally (4 entities)
September 2018		Phase 3 firms globally (3 entities)
June 2019	Cat 3 European Counterparties	
September 2019		Phase 4a (20 entities)

*Variation Margin “VM” deadline extended

Market participants are able to monitor the impacts of these reforms by closely monitoring the volumes in cleared derivatives. However, uncleared markets remain opaque with trade-level transparency yet to be implemented effectively across a number of jurisdictions.

The BIS Triennial Survey does provide periodic insight into uncleared derivative markets. Our analysis of this survey data shows that cleared markets are growing at a much faster pace than uncleared markets. This suggests that the regulatory reforms put in place over the past three years have been effective at incentivising clearing. However, it should be noted that uncleared markets are continuing to grow, particularly in IRD Options. We analyse these volumes in subsequent sections.

⁶ Sources:

<https://www.cftc.gov/sites/default/files/idc/groups/public/@Irfederalregister/documents/file/2016-23983a.pdf>;

<https://www.emirreporting.eu/clearing-obligation/>;

<https://www.isda.org/a/nleME/ISDA-Margin-Survey-Year-End-2018.pdf>; <https://www.isda.org/2017/08/21/vm-rules-almost-there/>

1.2 DATA ANALYSIS OF CLEARED MARKETS

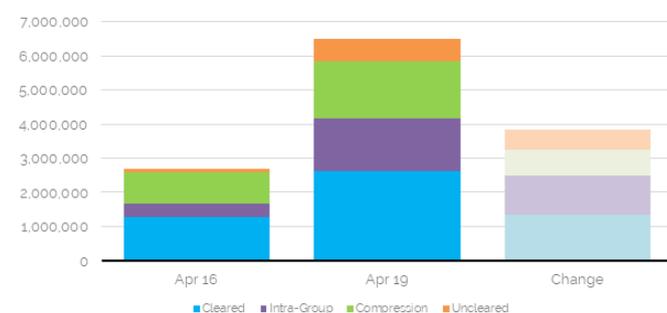
1.2.1 THE GROWTH OF CLEARING

Cleared IRD volumes have increased significantly over the past three years. The ADV of cleared IRDs doubled from April 2016 to April 2019 to stand at \$2.64trn. It has continued to increase since, reaching \$3.52trn during June 2019. This shows how liquidity continues to shift to cleared products.

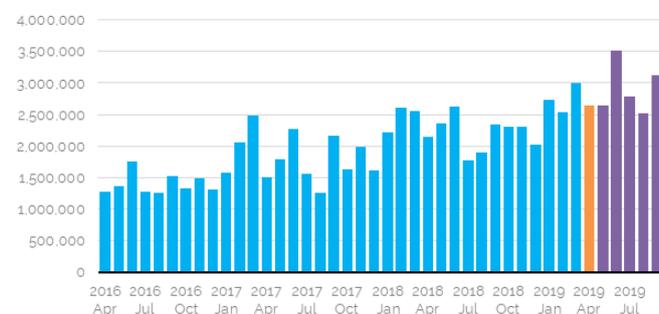
The regulatory changes that we have highlighted, including expanded Clearing Mandates and the UMRs, have resulted in increased overall volumes, with most of this growth coming in cleared markets.

Figure 2 Clearing Growth 2016-19
As measured by Average Daily Volumes in USD millions

Average Daily Volumes of Interest Rate Derivatives
BIS Triennial data and Clarus Cleared Data



Monthly ADVs Cleared Interest Rate Derivatives
Clarus Cleared Data



The BIS Triennial Survey shows substantial growth in trading volumes of IRDs. ADV have increased to \$6.5trn, an increase of 2.4 times since April 2016. The \$3.8trn increase in daily volumes is made up of four components:

1. Cleared volumes have increased by **\$1.36trn**.
2. Intra-group (aka “related party” trading) has increased by **\$1.15trn** per day.
3. Compression volumes increased by **\$0.74trn⁷**.
4. Uncleared volumes have increased by **\$0.48trn**.

Compression and intra-group trades therefore accounted for \$1.9trn (49%) of the increase. This is significant because neither type of trade is risk generating or market-facing.

The growth of uncleared markets was far less than the growth we saw in cleared markets. Uncleared markets account for just 15% of the growth we have seen.

The increase in intra-group trades is likely due to the increased use of booking hubs to consolidate all risks into a single legal entity.

For cleared markets in 2019, ADVs have been as high as **\$3.52trn** over a calendar month.⁸

1.2.2 CLEARING GROWTH BY PRODUCT AND MATURITY

Cleared markets have grown by at least \$1.36trn in ADV over the past three years. The data shows that at least \$700bn of this increase was from more trading in short-dated products, such as and Forward Rate Agreements (“FRAs”) and Overnight Index Swaps (“OIS”). FRAs and OIS together now make up 70% of all activity. OIS products are the most traded by notional of all cleared IRDs, with an ADV of \$1.06trn. The growth of OIS has been significant when compared to FRA trading, which grew by just half this amount.

To measure the total amount of risk traded, we use a measure called the Dollar Value of a Basis Point Move (“DV01”). This is a maturity-agnostic measure of risk, converting the notional traded into the change in valuation of the derivative for each one basis point (0.01%) move in interest rates.

⁷ We take total compression at LCH. This results in an estimate that is consistent with the BIS own estimate of ~25% of overall volumes in April 2019 being compression related.

⁸ Data Sources and methodology: Uncleared data from BIS Triennial OTC Derivative Surveys: <https://stats.bis.org/statx/toc/DER.html>. Cleared data from CCPView.

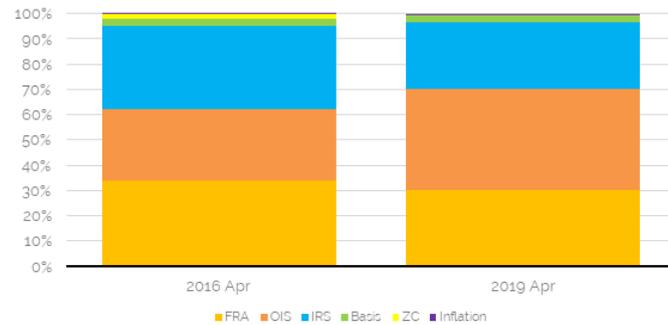
Analysis shows that the DV01 transacted grew by at least 23% (Q1-2017 to Q1-2019). During this time there has been no change in the maturities traded. There is some evidence that April 2019 saw more short-end trading than is typical. This may have been influenced by monetary policy changes.⁹

Figure 3 Clearing Analysis

As measured by Total Monthly Volumes in USD millions

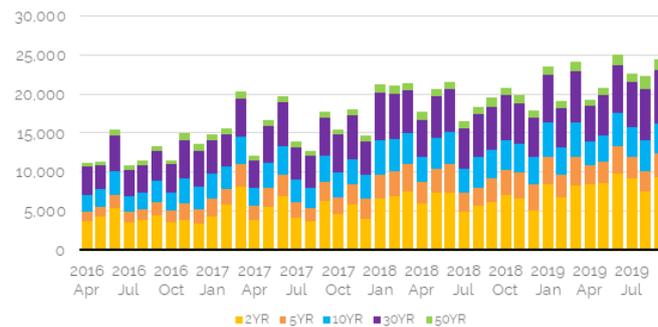
April 2016 vs April 2019 Product Types

Clarus Cleared Data



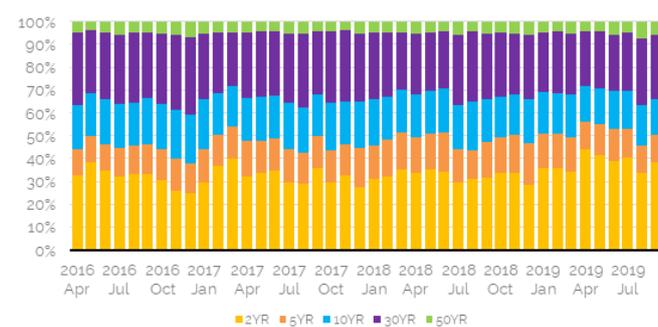
Monthly Volumes by Maturity

Millions of \$DV01 cleared at LCH SwapClear



Percentage Traded per Maturity

Millions of \$DV01 cleared at LCH SwapClear



FRA and OIS products represent short-dated, high notional trades. Our data shows that trading activity in these products has increased from 62% to 70% of total notional transacted. Such a shift would suggest that the market is trading more short-dated products.

Analysing cleared volumes by DV01 allows us to also monitor the amount of risk traded, and the maturity profile.

Data shows that the gross amount of risk traded has increased substantially. In the past 3.5 years, the DV01 cleared has increased from around \$11bn per month to nearly **\$25bn**.

The maturity profile of this risk has been stable over that time. At the beginning of our time series, 47% of risk was traded in the 2yr and 5yr tenor buckets (Q2-2016). By the end of our series (Q3-2019), this was 50%.

April 2019 was a somewhat unusual month in regards to the maturity profile of risk traded. 56% of risk transacted during April 2019 was in the 2yr and 5yr maturities. This is the highest proportion of risk that we have seen transacted in shorter tenors; it has not persisted since. This highlights risks in point-in-time survey data.

1.2.3 COMPRESSION IN CLEARING

Compression has grown significantly over the past three years. From the BIS early commentary on the April 2019 survey, it was stated:

“[S]everal reporting dealers also noted that compression trades, which are not reported as a separate item in the survey, contributed more to their turnover figures as reported in the 2019 survey than in the

⁹ See “The Changing Interest Rate Environment”, Ehlers and Hardy, BIS Quarterly Review: https://www.bis.org/publ/qtrpdf/r_qt1912i.htm

2016 survey. Compression trades replace existing contracts with new ones to reduce outstanding notional amounts, while keeping net exposures unchanged.”¹⁰

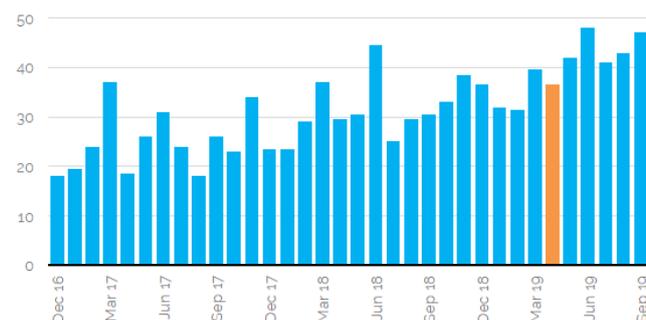
Our analysis shows that LCH SwapClear compressed \$1.66trn per day during April 2019. This is likely to be a low estimate of the total compression activity in the market, because it is based on data from a single CCP. This is consistent with the BIS analysis, which stated:

“Discussions with reporting dealers suggest that including compression trades can boost reported turnover by 40-60% for some dealers. Compression trades may thus account for a good portion of the increased turnover, though there are no hard data to provide a precise figure.”

Compression volumes are maximised in a cleared environment on account of multilateral netting, standard valuations and a single repository of trades. With market participants motivated to compress gross notional to improve Leverage Ratios, the compression architecture has been able to scale-up and deliver significant growth and capital savings over the past three years.

Figure 4 Compression

LCH SwapClear now compresses over \$40trn in notional every month



Compression at LCH SwapClear continues to grow at pace. In 2016, we saw monthly compression amounts of less than \$20trn, equivalent to ADVs of \$0.8trn.

As cleared volumes have continued to grow, and crucially as more participants join the clearing ecosystem, more risk becomes “compressible”. This is because more multilateral netting is possible to reduce gross notional exposures closer to the net notional outstanding.

In April 2019, LCH compressed \$37trn in notional (\$1.66trn ADV). This has continued to grow, and in September 2019 it hit \$47trn in a single month (\$2.24trn ADV).

Illustrative Effect of Compression

Rolling stock of 2018 volumes shows effect of Compression on Notional Outstanding

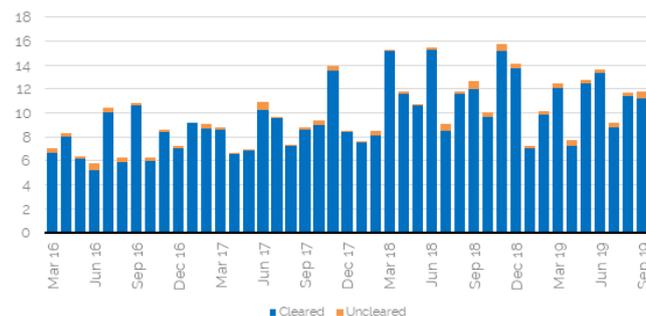


The BIS have estimated that compression activity alone accounted for 25% (\$0.96trn) of the overall increase in activity reported in the Triennial survey.

Also shown are the monthly amounts of multilateral compression conducted by CME’s TriOptima. These are single-counted amounts, with the cleared amounts one of the components of the total LCH figures (CCPs also run their own in-house compression).

Monthly Volumes of Multilateral Compression

Trillions of Dollars compressed per month by TriOptima



The TriOptima figures show how important clearing is to compression. Cleared compression volumes are an order of magnitude greater than uncleared compression.

¹⁰ OTC interest rate derivatives turnover in April 2019 https://www.bis.org/statistics/rpfx19_ir.htm

1.2.4 CURRENT CLEARING RATES IN INTEREST RATE DERIVATIVES

Using trade level reporting in the US, we establish that current clearing rates are 97% in mandated to clear IRDs. These rates fall short of exactly 100% due to clearing exemptions for some counterparties or for intra-group trades.¹¹

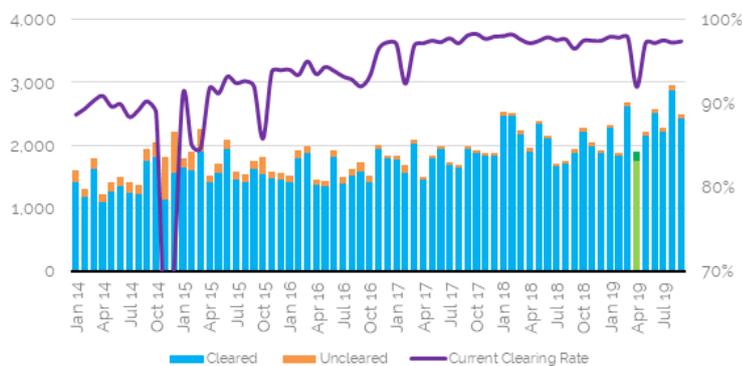
For all currencies covered by Clearing Mandates, volumes are continuing to increase in clearing. Volumes have increased over the past year by 14% year to date when measured by the total risk (DV01) traded. This highlights how liquidity in IRD trading is benefiting from the CCP environment.

Figure 7 Current Clearing Rates

As measured by DV01 transacted in USD equivalent amounts

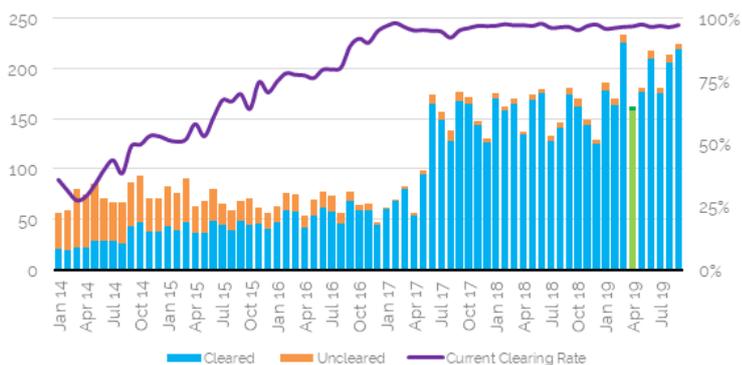
Clearing Mandate 1

IRS covered by original CFTC Clearing Mandate (USD, EUR, GBP, JPY)



Clearing Mandate 2

IRS covered by expanded Clearing Mandate (AUD, CAD, CHF, HKD, MXN, NOK, PLN, SEK, SGD)



The percentage of risk cleared across the major Interest Rate Swap markets can be monitored via US Swap Data Repository (“SDR”) data. It shows that the **Current Clearing Rates are 97%** for mandated currencies.¹²

The previous report in this series looked at the evolution of clearing since the introduction of UMRs in 2016.

Note-worthy this year is the decline we have seen in the Current Clearing Rates in April 2019 and February 2017. Interestingly, April 2019 was an observation month for Aggregate Average Notional Amount (“AANA”) for Phase Four counterparties of the UMRs. It appears that a large portion of uncleared risk was traded in this month – maybe compressing to affect the AANA calculation, or moving inter-entity risk. Importantly, the Current Clearing Rate has always bounced back after these unusual months.

The expanded Clearing Mandate was implemented between January and April 2017 in the US. Current Clearing Rates are consistently high across all currencies subject to a Clearing Mandate.

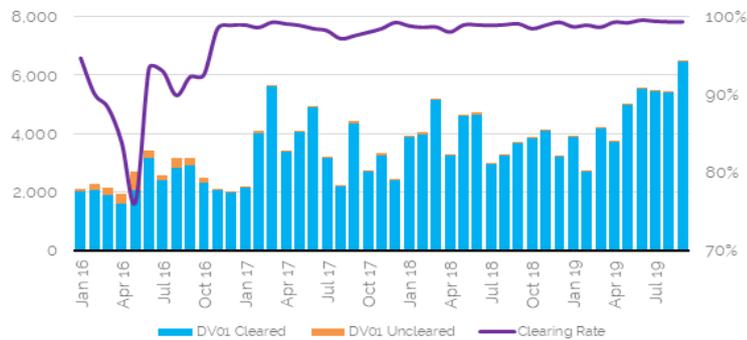
¹¹ It may also be due to data reporting inaccuracies.

¹² Data Sources and methodology: SDRView is our data source. This uses SDR data sourced from Bloomberg, DTCC and ICE SDRs. DV01s are calculated according to industry standard conventions using ClarusFT analytics and expressed in millions of USD equivalent amounts.

Figure 8 Clearing Rates in other Swap Markets
As measured by notional transacted in USD equivalent amounts

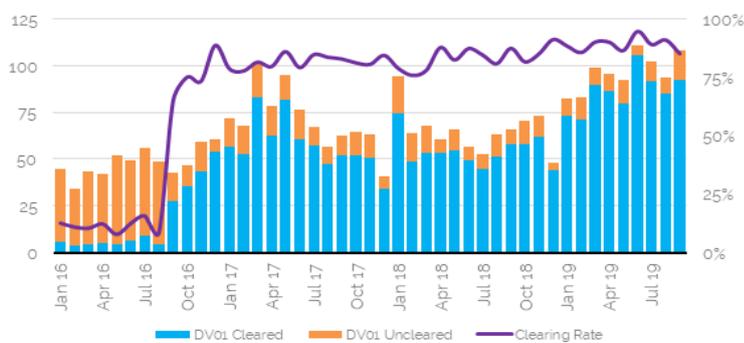
OIS Trading

Overnight Index Swaps in USD, EUR, GBP and JPY



Inflation Trading

Inflation Swaps in USD, EUR, GBP and JPY



The market chooses to clear almost 100% of OIS notional. This is despite only a partial Clearing Mandate covering maturities up to three years. This has remained the case since early 2017, after the previous BIS survey.¹³

Volumes have again continued to increase, recording a new all-time record over \$6trn in September 2019. This bodes well for the transition from traditional London Inter-Bank Offered Rate (“LIBOR”) swaps to compounded OIS as part of Inter-Bank Offered Rate (“IBOR”) transition plans.

Inflation swaps were first made available to clear during 2015 with very limited uptake. However, since 2017, the market has quickly shifted to a “cleared model” with Current Clearing Rates over 90% in recent times.

Once more, we see that volumes have prospered since the move to clearing, with record cleared volumes in 2019.

CCPs have been able to meet the demands of the market across a broad range of products in IRD markets, including OIS and Inflation Swaps. This has happened against a backdrop of regulatory change and significant adjustments to uncleared markets. This ability to innovate and to meet the market’s demands remains important today as we look toward more changes in the future.

1.2.5 INITIAL MARGIN HELD AT CCPS

The evolution of Initial Margin (“IM”) over the past four years shows why there is a propensity for liquidity to become concentrated in cleared products.

The amount of IM has been growing, but at a subdued rate. Total IM held by the four largest IRD CCPs reached over \$200bn for the first time in June 2019. This has increased by 75% between 2016 – 2019. This is a much smaller increase than we have seen in underlying volume growth.

¹³ Data Sources and methodology: SDRView is our data source. This uses SDR data sourced from Bloomberg, DTCC and ICE SDRs. Notionals are expressed in billions of USD equivalent amounts.

Figure 12 Evolution of Initial Margin in Rates
As measured by Initial Margin amounts in USD Millions



Total IM held at the four largest IRD CCPs has increased and is now over \$200bn.

For the dealer community, who typically trade via a “House” account at a CCP, their proportion of the total IM held at CCPs has decreased. Dealers accounted for 55% of total IM in 2015, falling to just 43%.

For clients, they now account for 57% of total IM held in IRDs. The absolute amount of IM posted by clients has nearly doubled in the past three years. It is now at \$115bn.¹⁴

It is strongly beneficial for market participants to be able to compare this IM to the amount that will be held after UMRs are fully implemented. This report shows that \$158bn is currently being held in bilateral IM. However, there remains a lack of transparency in the market about how bilateral IM may grow over the coming years as more counterparties are captured by the rules. More transparency around IM in bilateral markets would therefore be beneficial for all market participants.

1.2.6 CLIENT ACTIVITY IN INTEREST RATE DERIVATIVES

Client activity has increased sharply in IRDs markets over the past five years. The market leading position of dealer-to-client (“D2C”) execution platforms, such as Bloomberg and Tradeweb, shows how end users of derivatives have embraced electronic execution protocols. This has been aided by the increased use of clearing, standardising more of the market. Volumes have increased across the board, and this is why we have seen a large increase in client IM held at CCPs. The increased electrification of this area of the market shows how the industry has embraced regulatory change, increasing standardisation to drive growth in underlying markets.

Figure 11 Have rising Clearing Rates impacted Client Activity?
As measured by SEF DV01 transacted in USD equivalent amounts



Trading of IRDs on D2C SEF platforms has increased significantly.

Bloomberg and Tradeweb dominate this space, recording a 71% market share of total Swap Execution Facility (“SEF”) traded volume year to date (measured by DV01).

Both platforms have prospered since the introduction of UMRs in September 2016. Their combined market share of SEF IRD trading has increased from 57% to 71%.

Importantly, as these two platforms have grown to dominate execution, total SEF executed volumes have continued to grow. The amount of risk traded reached \$2.3bn of

DV01 in September 2019 (12-month average across IRS, OIS, Inflation and single currency basis swaps).¹⁵

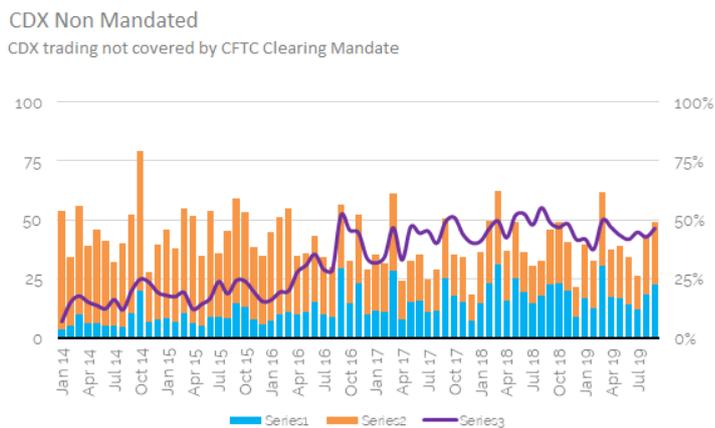
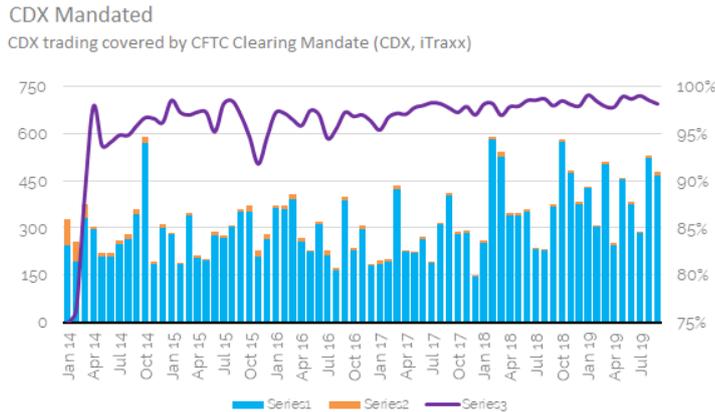
¹⁴ Data Sources and methodology: CCPView Disclosures. CCPView uses CPMI-IOSCO quarterly disclosures to track a range of data published by CCPs on a quarterly basis. The amount of Initial Margin held is shown across CME IRS, Eurex Clearing-OTC IRS, JSCC IRS and LCH SwapClear Ltd. Amounts are in USD million equivalents.

¹⁵ SDRView and SEFView are our data sources. SDRView uses SDR data sourced from Bloomberg, DTCC and ICE SDRs. DV01s are calculated according to industry standard conventions using ClarusFT analytics and expressed in millions of USD equivalent amounts. SEFView sources data directly from SEFs.

1.2.7 CURRENT CLEARING RATES IN CREDIT DERIVATIVES

Current Clearing Rates are 98% in the mature Credit Default Swap Index (“CDX”) markets covered by the Clearing Mandate, and volumes are growing. Current Clearing Rates are lower in non-mandated products, recording 46% in September 2019. It is particularly noticeable that volume growth in mandated products has far exceeded that in non-mandated. This probably reflects a market that prefers standardization.

Figure 9 Current Clearing Rates in Credit
As measured by notional transacted in USD equivalent amounts



Credit markets also have Clearing Mandates under certain jurisdictions. We therefore track the Current Clearing Rate in CDX trading (a Credit Default Swap (“CDS”) versus an Index) for both mandated and non-mandated indices.

For CDX covered by the mandate, the Current Clearing Rate is at 98%. This is a mature, cleared market. Volumes have recently hit all-time highs, with the 12-month rolling monthly average at \$0.42trn in cleared products.

For CDX not covered by the mandate, clearing has slowly started to dominate monthly traded volumes. The Current Clearing Rate in 2019 has been at 44%.

Overall volumes have been remarkably stable over the past two years. Indeed, it is notable that the mandated to clear products have seen considerably more growth (+43%) since the introduction of UMRs. Non-mandated products have actually shrunk since then, by around 7%.¹⁶

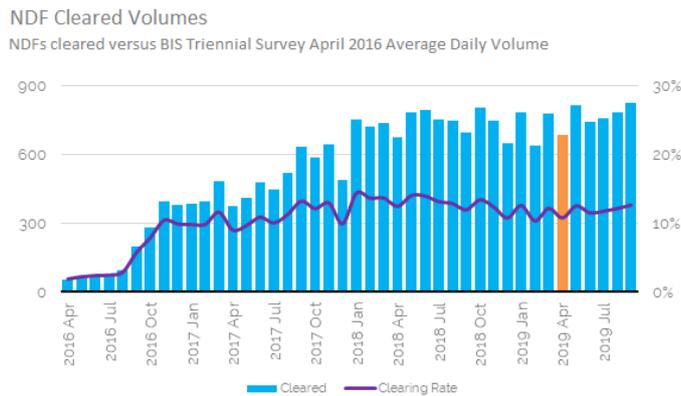
This shows the enthusiastic take up of standardisation across credit markets.

1.2.8 CURRENT CLEARING RATES IN FX DERIVATIVES

NDFs represent over 25% of the overall Outright Forwards market in FX. The Current Clearing Rate in NDFs is 13%. Clearing in these instruments has been offered since 2014, but prior to the advent of UMRs, Clearing Rates were just 2%. The Current Clearing Rate increased in late 2016 to 10% of the market.

¹⁶ Data Sources and methodology: SDRView is our data source. This uses SDR data sourced from Bloomberg, DTCC and ICE SDRs. Notionals are expressed in billions of USD equivalent amounts.

Figure 10 Current Clearing Rates in FX
As measured by notional transacted in USD equivalent amounts



NDFs are the highest volume cleared product in FX.

The NDF market has grown considerably in the last three years, from an ADV of \$134bn in April 2016 up to \$258bn in April 2019 (BIS Triennial survey).

When we pro-rata that growth rate (e.g. October 2017 ADV \$193bn) we find a Current Clearing Rate of 12%. The initial uptake of cleared NDFs was catalysed by the first wave of UMRs in 2016.

The Current Clearing Rate of FX NDFs is estimated at 13% (September 2019). Cleared FX NDFs recently recorded a record monthly volume total of \$824bn in September 2019.¹⁷

1.3 DATA ANALYSIS OF UNCLEARED MARKETS

Uncleared markets are more difficult to assess because transparency inherently available. Where transaction level reporting has been implemented, this can be used to complement BIS survey data. This is currently only the case for US markets, where public SDR data under the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd-Frank Act) is freely available. This provides a degree of trade level transparency for uncleared markets. This transparency would be greatly aided if more jurisdictions followed the lead of the US and implemented accessible post-trade transparency.

Our analysis of turnover data from the BIS suggests that, compression and inter-entity activity aside, almost all standardised OTC IRDs are now being cleared.

There still remains a stock of legacy trades that remain uncleared. Market participants would benefit from increased transparency for this stock of uncleared, legacy trades. We strongly advocate for a market study to be commissioned into these trades. Are they unclearable or are there other barriers to clearing this stock of trades?

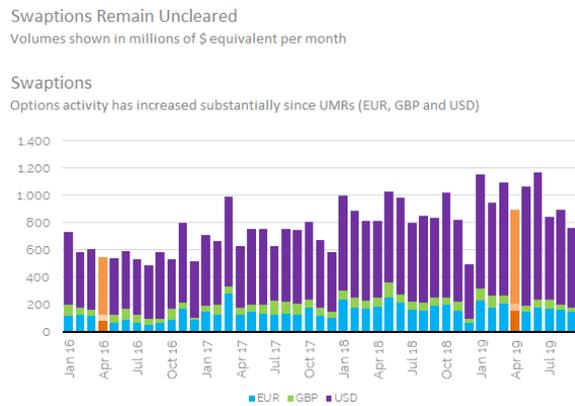
However, it is not only legacy trades that remain uncleared. There are also large uncleared markets which are broadly considered FX products (excluding NDFs) and OTC Options.

OTC Options have been launched by CCPs, for example by the CME (Swaptions, FX Options) and recently LCH (FX Options). So far, the market has chosen to continue trading these products bilaterally. We take a look at the value proposition for FX Option clearing in our case study later in this report. In general, it remains a conundrum that large volumes continue to trade in exchange traded options across a variety of asset classes, and yet OTC options remain largely uncleared.

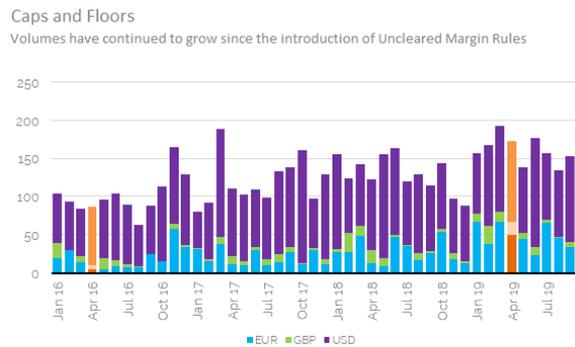
¹⁷ Data Sources and methodology: Uncleared data from BIS Triennial FX Surveys: <https://stats.bis.org/statx/toc/DER.html>. Cleared data from CCPView. Single counted methodology used to prevent double counting of cleared trades.

1.3.1 UNCLEARED INTEREST RATE OPTIONS GROWTH

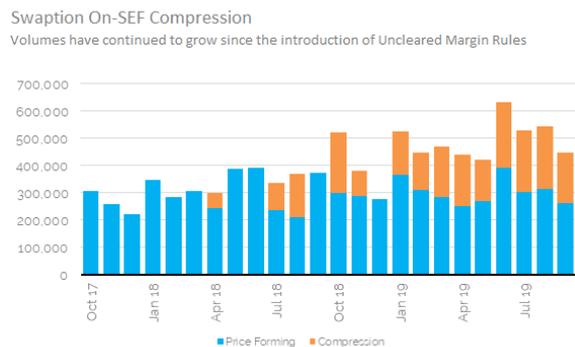
Interest Rate Options are the largest component of the uncleared Interest Rate markets, representing \$0.45trn in daily activity. Compared to cleared markets, this suggests that ~15% of new risk remains in uncleared products (\$0.45trn out of a \$3.09trn total market).



Options trading has grown from \$30bn ADV in Q2-2016 to \$55bn ADV in Q2-2019, according to US SDR data. This increase in volume is significantly below the increases reported by the BIS for the global market. This may be because there is now regular compression activity in Swaptions. This portfolio maintenance activity can account for 40% of on-SEF Swaption volumes. This activity was not apparent during 2016 and so may account for a portion of the BIS growth.



The majority of uncleared volumes are in Options (67% according to the BIS survey).



Swaptions are the most significant portion of the IRD options market. SDR data shows a significant level of growth in Swaptions between April 2016 and April 2019, with total monthly volumes now reaching over \$1trn.

For Caps and Floors, total volumes have increased by 1.55 times over the past three years.

The introduction of compression-type services can be seen in the SDR data for Options. This is because the volumes of these services are now so significant that they can be identified in daily SEF volumes. They have steadily increased each month since the beginning of 2018 until they now represent around 40% of total on-SEF swaption volume.

Service providers who help to compress options activity concentrate on a number of metrics to improve the profitability of options trading. These include reducing gross notional, as well as lowering the gross amount of initial margin that must be posted under the UMRs. These are significant innovations from the industry, but it remains the case that these activities would be more efficient in a cleared model, where all risks could be multilaterally netted.

1.3.2 FX OPTIONS

BIS survey data shows that FX Options trading has grown by 16%, now standing at \$294bn per day – equivalent to \$6.4trn per month.

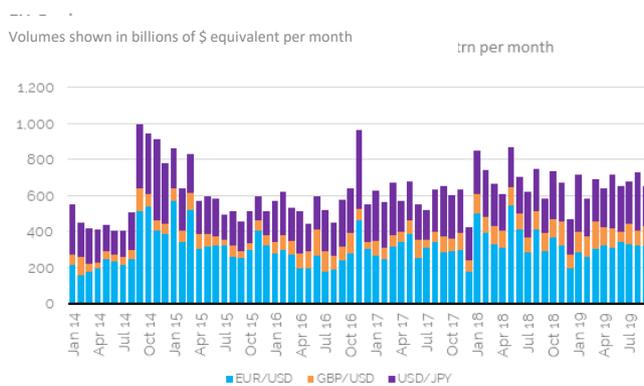
FX Options have a particular treatment under UMRs. The delta and volatility risk of the option are margined, but the vanilla delta hedges are exempt from margining requirements. This potentially complicated treatment of the risks could have resulted in a loss of liquidity in this important market.

However, seemingly in response to this treatment, we have seen the market innovate instead. We now see NDF trading on deliverable currencies that reaches in excess of \$150bn per month. Market participants trade these as IM optimisation strategies.

We will examine the motivations for potentially clearing FX Options in our case study later.

FX Volumes

Volumes shown in millions of \$ equivalent per month

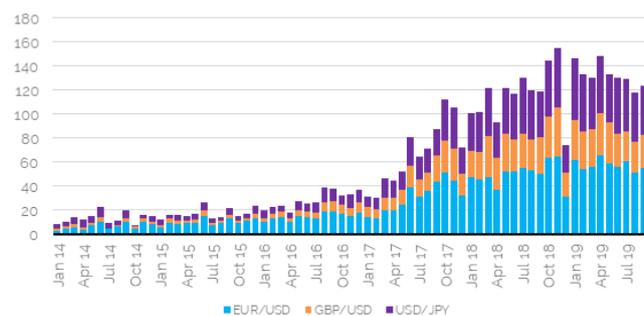


Volumes across FX Options in the three major currency pairs (“G3”) – EUR/USD, GBP/USD and USD/JPY – have continued to be robust. Year-To-Date (“YTD”) volumes in 2019 have just surpassed \$6trn reported by US persons, down slightly on 2018 (\$6.3trn).

Whilst we do not see huge growth in FX Options trading, IM optimisation strategies are popular. Monthly volumes in G3 NDFs, as reported to SDRs, have continued at a pace of \$130bn per month in 2019. Whether these NDFs are being transacted purely as optimisation trades or at the time of trading the FX Option is difficult to pin down. Nonetheless, the motivation for them is clear – to bring FX delta into the realm of UMRs to compensate against Options delta.

FX NDFs on Deliverable Currencies

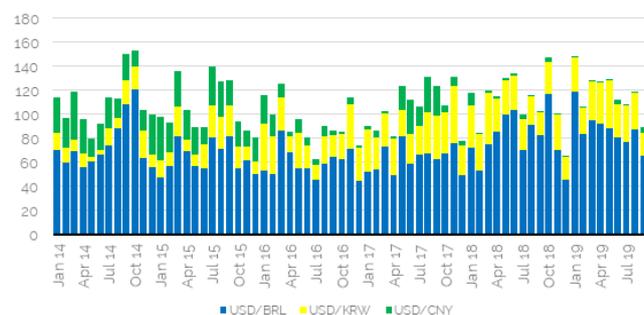
Volumes have grown since the introduction of Uncleared Margin Rules



Finally, we note that whilst there is an active clearing market in NDFs, the same cannot be said about Non-Deliverable Options (“NDOs”). Looking at the three most active currency pairs here – USD/BRL, USD/KRW and USD/CNY – we see that volumes remain robust in the uncleared markets, reaching \$150bn per month. There has been little to no impact to these volumes as a result of the UMRs.

FX NDOs

Despite a pick up in clearing of NDFs, there is no clearing market for NDOs



NDOs may present a particularly difficult risk profile for CCPs to manage, given many of them are managed currencies. If a peg or trading band were to change, it is a very difficult risk profile to hedge. This risk can be reduced when the underlying delta hedge (the vanilla NDF) is cleared at the same CCP.¹⁸

¹⁸ Data from ClarusFT SDRView.

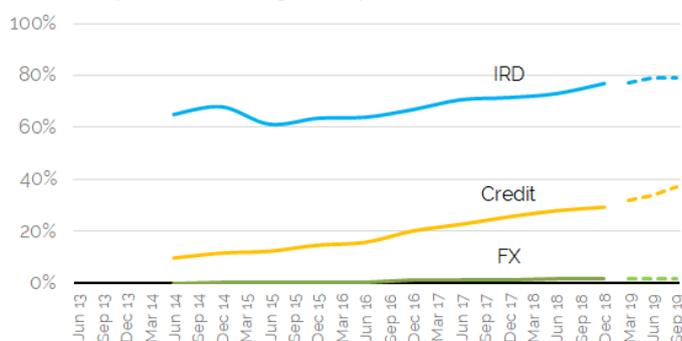
1.3.3 LEGACY UNCLEARED TRADES

Analysing outstanding notional provides an insight into whether more risk is being backloaded into clearing and what is happening with legacy risk. We found in 2018¹⁹ that Clearing Rates of these outstanding positions were still increasing, albeit some were doing so from a very low base (e.g. FX). In 2019, the uptake of clearing still varies considerably by asset class. Nearly 80% of outstanding positions in IRDs are now cleared, which has accelerated in the past twelve months. FX continues to see a very small uptake of clearing at around 2%.

From a transparency perspective it would be extremely beneficial for market participants to understand why more of these legacy positions are not being moved to clearing. Understanding the split of these trades into clearable and non-clearable products would help explain, for example, why so much of current Credit trades are cleared, whilst legacy risk remains bilateral.

Figure 1 Central Clearing Rates of Outstanding Trades

As measured by notional outstanding in USD equivalent amounts



The stock of outstanding trades in OTC derivative markets is made up of both cleared and uncleared positions. IRDs, Credit and FX vary in their overall Clearing Rate across outstanding trades.

IRDs have the highest clearing rate. It has now reached 77% as of December 2018, and is projected to rise to 79%. This is a much faster rate of growth than we predicted in 2018.

Credit markets also see significant clearing. It was 29% in December 2018, rising to 37%, in line with expectations last year.²⁰ FX markets continue to see a slow uptake of clearing, with just 1.9% cleared in 2018. The rate of uptake is yet to materially increase for FX markets.

¹⁹ See Incentives for Central Clearing and The Evolution of OTC Derivatives, CCP12 2018: https://ccp12.org/wp-content/uploads/2019/02/INCENTIVES-FOR-CENTRAL-CLEARING-AND-THE-EVOLUTION-OF-OTC-DERIVATIVES-A-CCP12-REPORT_FINAL.pdf

²⁰ Data Sources and methodology: Uncleared data from BIS Semi-Annual OTC Derivatives Outstanding Surveys: <https://stats.bis.org/statx/toc/DER.html>. Cleared data from CCPView. Projected Clearing Rates shown as dashed lines. Projection uses method of least squares to estimate uncleared volumes based on history from 2016, and real cleared volumes. Single counted methodology used to prevent double counting of cleared trades.

2. COLLATERAL OVERVIEW

Market reform in OTC derivatives has led to margin being posted on a daily basis across both cleared and uncleared markets. Cleared markets require all market participants to collateralise their portfolios at least daily. The introduction of UMRs is now beginning to solidify this practice into bilateral markets.

Multilateral netting of risks in clearing at a CCP reduces Variation Margin (“VM”) (realised gains and losses) and IM (held against potential valuation changes). Clearing also offers substantial benefits compared to the inefficiency of bilateral margining, including much needed transparency and standardisation. This transparency is provided by the CCP community via PQDs, a feature that is notably lacking from uncleared markets.

It is currently not possible to ascertain the extent of collateralization in bilateral markets, highlighting the lack of transparency. It is important that transparency improves so that potential risks can be identified, measured and monitored in an appropriate manner. Currently, it is not possible to estimate the amount of collateral that will be needed as a result of each phase of the UMRs.

It is important that the impact of UMRs is fully understood, because Margin in bilateral markets must be posted per counterparty separately. This ‘grossing up’ of margin in uncleared markets introduces operational complexity, and results in higher funding requirements for market participants.

2.1 DEFINING COLLATERAL

Collateral as it pertains to uncleared derivatives is considered as the combination of VM and IM required to collateralise traded contracts. This collateralisation is required because both future and realised cashflows of an OTC derivative contract create credit exposures between counterparties.

An OTC derivative is a commitment to fulfil certain cashflows in the future. These potential cashflows have a value as of today, which is different to the realised historic cashflows that have already occurred during the life of the contract. This value, or mark to market, represents the credit risk between the counterparties to the trade based on current market prices. If one counterparty were to go bankrupt, they would be unable to service the future cashflows. This means that the other counterparty to the derivative would lose (or gain) the value of the contract.

As such, it is good practice to “pre-fund” the current valuation of a derivative. Then, if one of the counterparties ceases to service the contract, there is protection against any potential loss (or gain) of value. Therefore, collateral can be posted against the valuation between two counterparties. This is referred to as VM.

The precise process of posting VM is more complicated than it first appears, because counterparties must agree:

1. **Contract valuations:**
This can be straightforward for liquid and readily observable instruments (if a reliable price source is available), but can be substantially more complex for some regularly traded contracts.
2. **Acceptable collateral to be posted as VM between the counterparties:**
(e.g. range of currencies, securities)
3. **How frequent VM is to be exchanged:**
Daily collateralisation is now required for relationships which are in scope of UMRs.
4. **For a portfolio of trades, the legal framework must clarify:**
Whether netting between out-of-the-money and in-the-money trades is possible.

This process of providing VM on a daily basis can therefore be complex from both an operational and risk-management perspective.

VM protects two counterparties only against the realised credit risk that they have facing each other. It collateralises the current position of the contract between two counterparties. However, there is also an element of potential future credit exposure between the two counterparties that must be collateralised via IM.

IM will therefore take a measure of the potential loss that may be incurred during trade replacement (either schedule-based or model-based) and use this to define how much collateral must be held against the risks in the portfolio.

Measures of IM are typically calibrated versus an expected holding period over which an equivalent contract may be sourced and appropriately risk managed in the event of a counterparty default. For example, the International Swaps and Derivatives Association - Standard Initial Margin Model (“ISDA SIMM”) is the broadly adopted IM model for uncleared markets. This uses a 10-day observation period across all asset classes.

The precise process of posting IM in bilateral markets is complex because counterparties must:

1. Agree to use either an IM model or a simple schedule;
2. Reconcile the portfolio and the risk factors that act as inputs to the model;
3. Agree a range of collateral that will be acceptable; and
4. Agree how and where the IM will be held (custodial relationship).

These are complex and economically impactful discussions that are privately negotiated with every counterparty in bilateral markets.

Clearing offers a meaningfully more straight-forward, transparent and simpler process. A CCP provides valuations for all cleared contracts. Therefore, on a daily (and intraday) basis a CCP values and recalculates VM and IM across all contracts. The CCP will then issue a settlement instruction to each CCP participant if that member owes VM (i.e. portfolio has a loss) and/or must deposit additional IM. For VM, this is the net flow, typically per currency across the P&L that the counterparty has versus the CCP.

2.2 COUNTERPARTY EXPOSURES

With this background in place, it may therefore be a natural assumption that increased trading volumes result in increased collateral amounts being passed across the industry. However, data from the BIS shows that this is not the case.

The BIS data shows that Gross Market Value (“GMV”) has consistently dropped in IRDs over the past few years (see Figure 13). Whilst this is not a direct measure of the amount of collateral, it provides an indication of the value transfer that is occurring.

The drop in GMV is due to innovations in clearing. Compression reduces GMV by removing redundant, off-market and off-setting swaps, therefore reducing gross mark- to- markets. Clearing increases netting, therefore the more legacy risk that can be backloaded into clearing, the more off-setting risks can be found. Finally, the adoption of settled-to-market²¹ (“STM”) at CCPs has reduced the gross market values reported to the BIS to zero for many contracts. STM effectively moves the collateralisation of a derivative into a contractual daily cash flow (complete with compensating interest amount).

The BIS also provide data on “Gross Credit Exposures” (“GCE”), defined as:²²

“Gross market value minus amounts netted with the same counterparty across all risk categories under legally enforceable bilateral netting agreements. Gross credit exposure provides a measure of exposure to counterparty credit risk (before collateral).”

This GCE data from the BIS shows that a highly significant difference. The GMV or \$9.5trn as at end 2018 is reduced to a GCE of just \$2.57trn. This is the benefit inherent to legally enforceable netting sets and highlights how important this is to the smooth functioning of markets.

²¹ “New practices such as settle-to-market (<https://www.bis.org/press/p180920a.htm>) - where banks, instead of posting collateral against the change in market value (i.e. VM), make outright payments to restore the market value to zero - have additionally contributed to the observed decline in their market values”, BIS Commentary 2018; https://www.bis.org/publ/otc_hy1905.htm

²² <https://www.bis.org/statistics/glossary.htm?&selection=313&scope=Statistics&c=a&base=term>

Figure 13 Mark to Market and Credit Exposures in OTC IRD Derivatives
As measured by Market Values in USD Billions

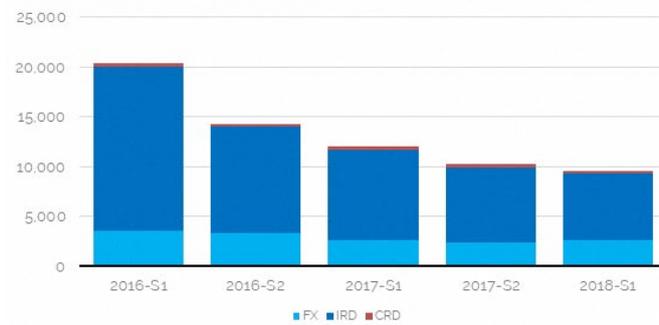
Interest Rate Derivatives

Gross Market Values have reduced dramatically in recent years thanks to STM



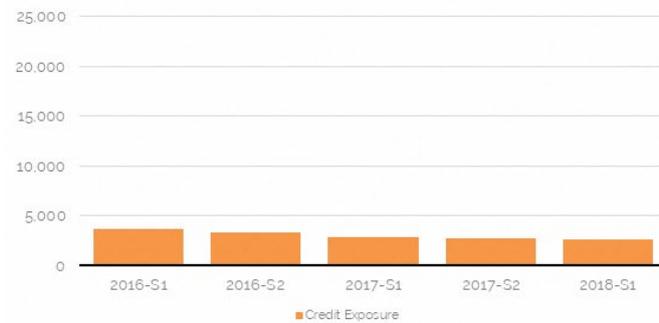
Total Market

Overall Gross Market Values have reduced



Gross Credit Exposure

Legally enforceable netting agreements substantially lower the amount to be collateralised



The BIS Semi Annual survey reports the GMV of reporting dealers facing both CCPs and bilateral counterparties for IRDs.

This data shows how GMVs within clearing have reduced in the past three years, from \$16.4trn to \$6.6trn. These reductions are the results of both compression and the adoption of STM²³ at CCPs, which results in a zero net present value.

We can also see that in uncleared markets, GMVs have steadily declined, from \$7.6trn to \$3.9trn. It is unlikely that this was driven by STM, but rather from a combination of compression and more risk being transferred into clearing.

As a result of these changes, we now see that only 40% of the GMV in IRDs reside at CCPs (down from 54% in 2016).

Across Rates, FX and Credit Derivatives, GMVs (which ignore the possibility of netting) stand at \$9.5trn. The exposures in FX and Credit have remained remarkably constant for the past three years.

When netting is taken into account, GCEs are equal to \$2.57trn. This highlights the significant role that netting plays in the smooth functioning of markets.

2.3 COLLATERAL IN UNCLEARED MARKETS

Market participants would like to better understand the split of collateral in the market. This additional transparency would also be important for global regulators to monitor systemic risks, as the purpose of this collateral is to mitigate the negative impact of credit risk in a crisis. The level of desired transparency exists along two axes – VM versus IM; cleared versus uncleared.

The main source of data in uncleared markets is the ISDA Margin Survey²⁴. Participation in this survey is voluntary, periodic in nature and does not encompass all counterparties captured by the UMRs. Therefore,

²³ CFTC Letter No. 17-51: https://www.ich.com/system/files/media_root/17-51.pdf

²⁴ ISDA Margin Survey Year-End 2018: <https://www.isda.org/2019/04/09/isda-margin-survey-year-end-2018/>

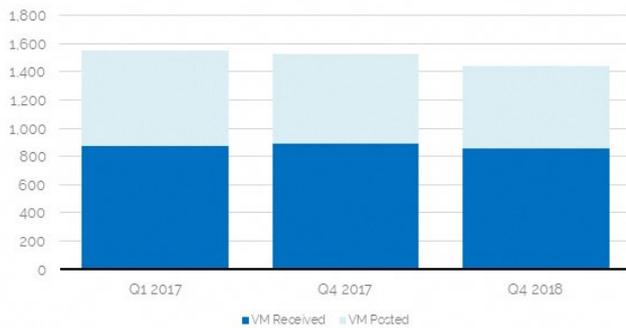
whilst it stands as a valuable resource, more transparency is needed regarding collateral in uncleared markets.

From the available data, we can state that the total exchange of VM in uncleared markets is at least \$1.5trn. Total IM is growing quickly, to now stand at \$250bn.

Figure 14 Uncleared Derivatives
in USD Billions

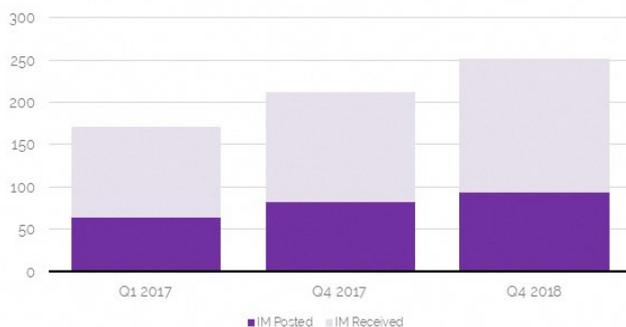
Variation Margin

ISDA Margin Survey reports periodic amounts of Variation Margin at a given date



Initial Margin

ISDA Margin Survey reports periodic amounts of Initial Margin at a given date



The ISDA Margin Surveys have consistently reported an exchange of ~\$1.5trn in cumulative VM since 2017 in uncleared markets. This represents the sum of collateral posted and received.

The same survey shows that the gross amount of IM (i.e. absolute value of posted and received) in uncleared markets has now reached \$250bn. This is as reported by the survey respondents so can be considered a minimum amount (because some market counterparties will not be captured by the survey). As more counterparties and larger portions of existing portfolios become subject to the UMRs, this number is expected to grow.

Total IM in uncleared markets has grown by 47% in the space of two years. We do not have enough data to estimate the rate of future growth at this point in time.

It would be especially pertinent for market participants to be able to estimate the IM and VM requirements of the upcoming phases of UMRs so that appropriate funding plans can be put in place. There is insufficient transparency to enable such an estimate.

2.4 COLLATERAL IN CLEARED MARKETS

CCPs provide considerable transparency over their collateral management regimes. This not only covers quantitative aspects, such as peak VM flows or IM amounts held, but also qualitative factors such as the range of eligible collateral.

Cleared markets ensure that VM is collected at least daily (some CCPs call VM intraday), and that IM is calculated according to well understood risk models. In addition, the collateral management framework within a CCP can be shown to be both operationally efficient and prudent in its liquidity profile.

These aspects of transparency and collateral management are beneficial to market participants. Transparency of collateral flows gives an accurate measure of the size of market in which they are trading. Risk management can also be compared across different CCPs. Such a level of transparency is unlikely to be achieved in bilateral markets, where a trading counterparty is unable to obtain a complete overview of another counterparty's activity, for example due to the complexity and fluidity inherent in a dealer's balance sheet.

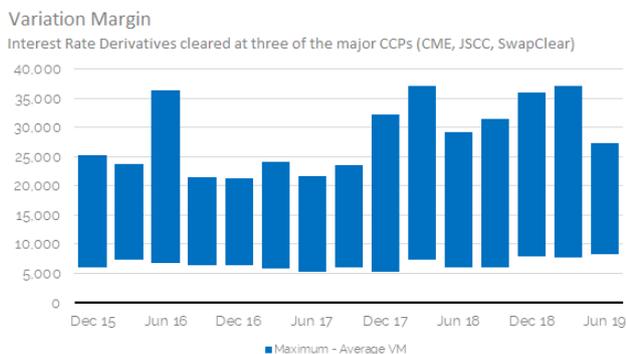
These considerations highlight how opaque a relationship in uncleared markets can be between market participants. Participants will have no insights into margin calls that might occur for a given counterparty

under stressed conditions. It is unlikely that market participants have data regarding the largest realised collateral flows that various market participants have previously faced. These data points are all available for CCPs and substantially help to provide measurable aspects of risk management and counterparty exposure.

Using this transparency data from CCPs, we find that CCPs call VM per currency per day – a risk prudent approach. Therefore the CCP loses a degree of the netting benefit across currencies.

However, this data fails to show that the cross-currency funding requirement may be facilitated for clients by Clearing Brokers. Therefore, whilst Clearing Brokers may need to meet these individual currency amounts per day at the CCP, the underlying client is able to collateralise in a single currency via a Clearing Broker agreement. This is just one example of how Clearing Brokers can help an end-user to manage their funding profile related to clearing. Other examples include in the range of non-cash collateral they can accept (and transform), as well as offering flexibility over funding deadlines.

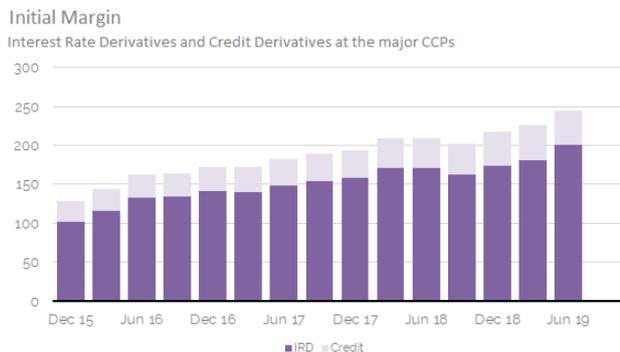
Figure 15 Cleared Derivatives
in USD Billions



PQDs from CCPs report an “Average Variation Margin”, which is evidently calculated gross across all currencies.

The VM amounts reported by CCPs are also measured across all market participants, not limited to a relatively small number of survey respondents, such as we see with the ISDA Margin Survey.

It would be beneficial for market participants to be able to analyse comparable measures of VM across both cleared and uncleared markets.



Such transparency could help highlight the risks in bilateral margining of single currency margining.

IM practices are far more comparable between cleared and uncleared markets.

Across Rates and Credit, CCP IM now totals \$245bn. This has grown by 42% since the beginning of 2017.



Comparing levels of IM across the industry, we find that the total IM across cleared and uncleared is now \$685bn, (including exchange traded derivatives (“ETD”). This total has grown by 14% in the past 12-months.

2.5 INITIAL MARGIN COSTS

IM is normally the focal point of discussion when talking about collateralisation. IM tends to be the more economically impactful form of collateralisation because IM is tied-up for the holding period of the risk, and therefore unusable elsewhere. The UMRs dictate that collateral held as IM cannot be rehypothecated, which may be a change to previous practices in bilateral markets.

The analysis below shows the cumulative margin being held by the industry. The data is split between cleared and uncleared and we attempt to put a value to the funding cost that this IM represents – assuming it is tied up and therefore unusable elsewhere.

	Bilateral	Cleared	Exchange Traded
IM Amount	\$251bn	\$245bn	\$216bn
Funding Cost	OIS+75bp ²⁵	OIS+75bp	OIS+75bp
Annual Cost	\$1.88bn	\$1.63bn	\$1.58bn

Before the UMRs were implemented, ISDA performed an analysis that suggested total bilateral IM would be \$800bn²⁶. With UMRs yet to be implemented for all counterparties, the data suggests that bilateral IM will continue to be the highest burden on the industry.

We estimate that current IM requirements create an annual funding cost of **\$5bn** across asset classes. CCPs can help their members to manage and optimise these IM costs within clearing. One such way is by making a broad range of collateral eligible for IM. This presents market participants with a flexible framework with which to optimise their collateral management and to potentially manage down their cost of funding for their cleared portfolios.

²⁵ Clarus FT proprietary data

²⁶ <https://www.isda.org/a/AMDDE/margin-for-uncleared-presentation-final.pdf>. ISDA estimates reached as high as \$1.7trn with no threshold in place.

3. COLLATERAL RISK MANAGEMENT

The management of collateral at a CCP is subject to strict governance standards. As one of the day-to-day operations of a CCP, it is a common area that clearing members (and regulators) closely monitor. What a CCP does with the collateral and ensuring it is able to liquidate it in the event of a default are key pillars to CCP risk management.

Analysing the PQDs, we find that CCPs hold between 9 – 28 times enough liquidity to meet the default of their two largest members (Cover 2 requirement), even under stressed market conditions. That is a clear quantitative measure as to how stringent risk management practices have resulted in an extremely prudent risk profile.

We specifically find that CCPs are holding \$215bn in excess liquidity that is unlikely to ever be called upon, even in the event of the largest members defaulting under stressed market conditions.

Similar measures of collateral management are currently not possible for uncleared markets. Market participants are typically unable to ascertain similar measures for how much margin a counterparty may be subject to in stressed market conditions, although capital adequacy requirements such as the Liquidity Coverage Ratio (“LCR”) and Net Stable Funding Ratio (“NSFR”) do go some way to providing dealer-level metrics. However, it is almost impossible to ascertain how much liquidity may be needed across the market. Such transparency in uncleared markets would be a welcome addition and allow more accurate comparisons between cleared and uncleared alternatives.

3.1 COLLATERAL RISK MANAGEMENT IN CLEARING

The PQDs have already published four years of transparency data. This report concentrates on the \$400bn of IM held across all cleared asset classes at CME, ECAG, JSCC and LCH. The PQDs provide transparency surrounding the investment decisions of CCPs, as well as information regarding what clearing members and clients are choosing to post as IM.

Whenever non-cash collateral is accepted as IM (VM is cash only at CCPs), an element of risk is introduced. This risk is two-fold:

- Valuation Risk – the price of the collateral may fluctuate over time;
- Liquidity Risk – can the collateral received be readily liquidated into cash when required.

These risks occur because the IM would typically be turned into cash to meet VM calls, hedging costs, as well as other liquidity needs arising from a clearing member default. This is prior to any auction of the defaulter’s portfolio.

The length and cost of this liquidation process varies on a case-by-case basis. Based on a combination of CCP risk management expertise and regulatory standards, a CCP determines the appropriate range of acceptable collateral and also any haircuts that are applied.

Very high quality and liquid assets are being delivered to meet IM requirements. Across the board, we see 60% of IM delivered as government bonds, with cash and secured cash making up another 30%.

Figure 16 Initial Margin Holdings
in USD billions

Initial Margin Pre and Post Haircut
Average Daily Volumes and Clearing

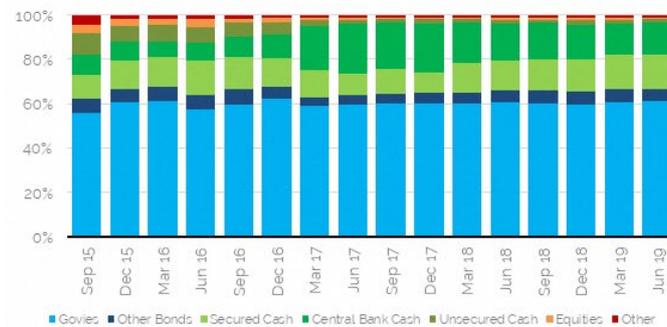


Over the past 4 years, the total haircut applied to IM has been remarkably constant, varying from 4.1% to 5.2%.

The composition of this IM has changed over time. The proportion of IM delivered as “cash deposited at a central bank” has increased substantially. Across all IM, this portion has increased from 7% to as high as 22%.

This increase seems to have been in part driven by more CCPs gaining access to central bank accounts for depositing participant cash collateral, which can incentivise clients to deposit cash. Since March 2017, up to 20% of client IM is now safeguarded by a central bank. Fixed income instruments are the most common security used as IM. Government bonds account for the vast majority – over 60% at any given time.

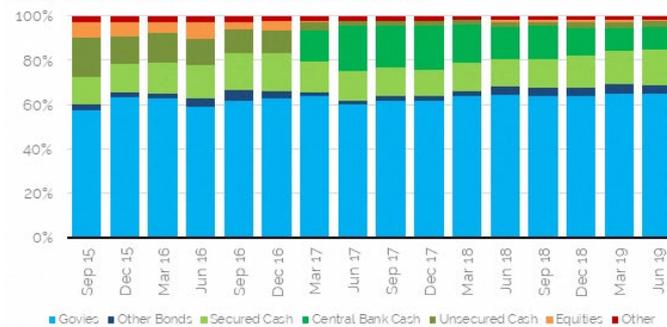
Composition of Initial Margin
What does the market post as IM?



Equity and “Other” (including gold) types of collateral have declined in the past 4 years. This may be evidence of stricter criteria from these CCPs in their range of acceptable collateral.

Composition of Client IM

Do Clients post anything different to the overall market?



3.2 COLLATERAL RISK MANAGEMENT IN BILATERAL MARKETS

CCPs can use a range of tools to mitigate the twin risks of investment and liquidity risks. The PQDs provide market participants with vital transparency concerning CCP activities with regards to collateral.

Such transparency does not exist for bilateral markets. It is therefore difficult for market participants to compare collateral risk management practices across cleared and uncleared regimes.

One key aspect of risk management is rehypothecation. Under the UMRs, collateral held as IM cannot be rehypothecated. This is a blunt instrument to remove the risk of collateral being transferred to a counterparty who may subsequently default. It is likely to be effective in limiting the risk that a single

default could set off a chain of defaults. However, it has the side-effect of grossing-up collateral requirements in bilateral markets.

Bilateral markets may also employ standardised haircuts on collateral. Under the UMR guidelines, the BIS has provided a standardised schedule of haircuts, as well as allowing entities to use *“risk-sensitive quantitative models, both internal or third party, [...] to establish haircuts provided that the model is approved by supervisors and is subject to appropriate internal governance standards.”*²⁷

Standardisation of haircuts in uncleared markets is preferable because it allows for easier reconciliation between counterparties. It can be complex agreeing the amount of collateral that needs to be physically delivered if the haircuts are not transparent and easily reconciled. Therefore, the Basel Committee on Banking Supervision (“BCBS”) provided the following table of standardised haircuts in the July 2019 paper “margin requirements for non-centrally cleared derivatives”.²⁸

Asset Class	Haircut (1yr)	Haircut (1-5yr)	Haircut (5yr+)
Cash in same currency	0%		
Government bonds (1yr/1-5yr/5yr+)	0.5%	2%	4%
IG corporate & covered bonds	1%	4%	8%
Equities and Gold	15%		
Additional FX haircut	8%		

Notes on the table: Haircuts expressed as percentage of market value. Haircut varies by residual maturity of the security for fixed income instruments (Government, corporate and covered bonds). FX haircut is an additive haircut in which the currency of the exposure differs from that of the collateral being delivered.

The table shows that whilst the rules have allowed for flexibility in terms of what can be posted as collateral, there is an economic impact to posting different forms. For example, when calculating IM under ISDA SIMM, firms define a “home currency” versus which all IM requirements are calculated. This table shows that choosing to post in a different currency to this home currency would inflict an additional 8% haircut (the “Additional FX Haircut”).

These collateral criteria must be implemented into a formal agreement between two counterparties, typically as part of the Credit Support Annex (“CSA”) of an ISDA Master Agreement. Counterparties must bilaterally negotiate this, ensuring to stay compliant with the rules in their particular jurisdictions.

²⁷ Page 17: <https://www.bis.org/bcbs/publ/d475.pdf>

²⁸ Annex B: <https://www.bis.org/bcbs/publ/d475.pdf>

The standard form for these agreements can see asymmetric posting and even posting in different currencies for each counterparty:

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Eligible Collateral (IM) Table

	Items of Eligible Collateral (IM)	[In respect of Party A's posting obligation]	[In respect of Party B's posting obligation]	Valuation Percentage
(a)	Group 1 Debt in the AAA/Aaa to AA-/Aa3 Ratings Band; remaining maturity from Valuation Date < 1 year	[]	[]	99.5%
(b)	Group 1 Debt in the AAA/Aaa to AA-/Aa3 Ratings Band; remaining maturity from Valuation Date ≥ 1 year and ≤ 5 years	[]	[]	98%
(c)	Group 1 Debt in the AAA/Aaa to AA-/Aa3 Ratings Band; remaining maturity from Valuation Date > 5 years	[]	[]	96%
(d)	Group 1 Debt in the A+/A1 to A-/A3 Ratings Band; remaining maturity from Valuation Date < 1 year	[]	[]	99%
(e)	Group 1 Debt in the A+/A1 to A-/A3 Ratings Band; remaining maturity from Valuation Date ≥ 1 year and ≤ 5 years	[]	[]	97%
(f)	Group 1 Debt in the A+/A1 to A-/A3 Ratings Band; remaining maturity from Valuation Date > 5 years	[]	[]	94%
	[FX Haircut Percentage]	[In respect of Party A's posting obligation: [8]% [], unless the Eligible Collateral (IM) is denominated in the Termination Currency specified with respect to Party B under the Agreement (including, without limitation, pursuant to this Annex), in which case, 0%.] [In respect of Party B's posting obligation: [8]% [], unless the Eligible Collateral (IM) is denominated in the Termination Currency specified with respect to Party A under the Agreement (including, without limitation, pursuant to this Annex), in which case, 0%.]		
	[Termination Currency] ³	With respect to Party A: []. With respect to Party B: [].		

Negotiating these private contracts in bilateral markets can be time and resource intensive, with each decision having a potential economic impact to both new and legacy business under the CSA. This can be considerably more complicated when considering cross-jurisdiction agreements and/or when trying to incorporate both standardised and internal models.

Additionally, data regarding bilateral management of collateral in times of stress is severely lacking for uncleared markets. CCPs provide transparency surrounding their largest VM flows both realised and under potential stressed market conditions. We do not have comparable metrics for uncleared markets. Measures such as stress-testing, liquidity metrics and Profit and Loss (“P&L”) back-testing could be employed for dealer’s uncleared portfolios. Such measure would allow market participants to better compare cleared and uncleared alternatives.

Market participants are found to be highly receptive to the standardisation and transparency offered by CCPs. Within a single jurisdiction there tends to be considerable consistency across CCP rulebooks.

²⁹ Source: <https://www.isda.org/a/L7qME/ISDA-Template-Collateral-Schedules.docx>

Therefore, when considering a new dealing relationship, it is often considered less intensive to on-board to a CCP rather than on-board a new bilateral trading relationship.

These considerations help to highlight why standardisation and transparency are pillars of cleared markets.

3.3 COLLATERAL HAIRCUTS IN CLEARED MARKETS

We have highlighted that CCPs are generally receiving very high quality and liquid assets from their clearing members.

CCPs are able to employ risk-sensitive quantitative models to calculate the haircuts on this collateral received. Employing such models allows CCPs to more carefully manage their exposures to collateral instead of using schedule-based approaches that can be considered fairly “blunt instruments”. Therefore, there is a balance struck between predictability and complexity.

3.4 CASE STUDY: COLLATERAL MANAGEMENT AT EUREX CLEARING

To highlight some of the precise facets of collateral management at a CCP, it is useful to use an example:

Eurex Clearing is one of many CCPs employing a quantitative model for collateral haircuts. Rather than employ a schedule-based approach that classifies collateral according to asset class and maturity, this is a quantitative model that provides haircuts at an International Securities Identification Number (“ISIN”) level for each eligible security.

Employing such a security-specific approach is attractive because:

- CCPs can better cover the individual risk associated with each security;
- CCPs can expand their eligibility criteria for collateral without concerns that risks associated with specific securities in a basket are not accurately accounted for.

For ECAG, the specific model looks at a number of factors. For Fixed Income:

1. Bonds are grouped into security subgroups based on the issuer type;
2. These subgroups are given minimum haircuts and yield shifts to ensure consistency amongst baskets;
3. Bond prices themselves are then stressed with yield shifts based on historic scenarios. This therefore accurately encapsulates the effect of duration on collateral valuation;
4. The larger of this calculated haircut and the minimum for the subgroup is then applied.

ECAG then provides sufficient transparency over the model to be able to replicate and reconcile specific haircuts. There is both a “high-level” overview of the subgroups with their minimum haircuts, as well as the ISIN-specific haircuts.

This model-based approach has allowed ECAG to better adapt to their member’s needs, and accept a broad range of collateral with a strong risk-sensitive model to manage the exposures. As a result, over 10,000 ISINs are now admissible collateral at ECAG.

Employing such a large range of admissible collateral at ECAG could increase operational complexity. There is already considerable operational overhead involved in meeting multiple collateral calls per day across cleared and uncleared markets.³⁰

CCPs are continuing to ensure that this operational complexity is reduced to the extent possible. One such way that this can be achieved is simplifying how securities are transferred to a CCP, and also how this is treated with regards to repo markets.

For example, ECAG integrates with the major Central Securities Depositories (“CSDs”), allowing for seamless delivery of collateral. Moreover, if a counterparty executes a reverse-repo (i.e. borrows a bond) via Eurex Repo Clearing, this bond can be directly pledged to ECAG to meet IM requirements.

Customers can utilize the connected infrastructure of Clearstream and ECAG as both are part of the same corporate group of companies. Customers having collateral accounts at Clearstream can therefore efficiently move collateral to cover margin calls from ECAG. This allows customers to re-use collateral for GC Pooling trades.

This is a particularly efficient way of managing a portfolio for both sides of the trade. In the case that the counterparty goes bankrupt, ECAG is able to step into the reverse repo trade, returning the bond to the original counterparty and receiving cash. This allows ECAG to have very efficient access to liquidity in this case.

3.5 CASE STUDY: COLLATERAL MANAGEMENT AT JSCC

JSCC provides a particular regional perspective on collateral management:

Collateral management is complicated not only by economic drivers. Complex operational barriers also exist. This is particularly evident for Asian counterparties trading cross-border with American entities. The UMRs require posting of collateral on a T+1 basis. However, when the two counterparties of a trade operate in different time-zones, this can be logistically impossible to achieve.

The Japan Financial Securities Agency (“JFSA”) in Japan implemented the rules stating that collateral should be exchanged “as soon as practicable”. Recognising this potential operational problem the U.S. Commodity Futures Trading Commission (“CFTC”) issued a NAL 17/13 in February 2017³¹ to provide relief and extend timelines to T+3, albeit temporary.

A specialist CCP with a regional focus can mitigate these issues from bilateral markets entirely. Taking the Asian time-zone as an example, it is beneficial for local counterparties to have collateral calls in their own time-zone. These early calls allow for better intraday risk management of funding and settlement schedules, as well as aligning more closely with local bilateral markets.

As such the JSCC have seen a marked increase in cleared volumes across both JPY-denominated IRS and CDS since UMRs were implemented.

³⁰ Section 2, Trade Processing: https://ccp12.org/wp-content/uploads/2019/02/INCENTIVES-FOR-CENTRAL-CLEARING-AND-THE-EVOLUTION-OF-OTC-DERIVATIVES-A-CCP12-REPORT_FINAL.pdf

³¹ <https://www.cftc.gov/csl/17-13/download>

These regional benefits can also be amplified when considering the eligibility and haircuts applied to admissible collateral.³² This is economically prudent given the overwhelming dominance of JPY-denominated exposures within the service. However, this is unlikely to be the case at other CCPs who mainly use EUR, GBP, CHF and USD as their home currencies. By extension, this also means haircuts on Japanese Government Bonds are likely to be lower at JSCC (despite employing a 99% 4-day confidence interval with stress scenario blending) because there is no FX risk associated with them.

JSCC are also able to employ Japan-specific trust structures to house IM, ensuring the IM is bankruptcy remote from JSCC itself. Such specific treatments highlight the upsides to a strong regional presence.

These benefits to a regional-service model allow a CCP to build a successful and credible local franchise. This can then be leveraged to attract the global community. This has been seen recently at JSCC with more hedge funds and international banks choosing to join the service.

3.6 COLLATERAL LIQUIDITY AND BUFFERS

CCPs are extremely conservative in their approach to liquidity. PQDs reveal the largest VM calls that CCPs made in the previous 90-days, as well as the largest VM calls that may occur under stressed conditions. Combining this data with the CCPs on-hand liquidity shows how much liquidity coverage a CCP has, even in times of stress. The data shows that CCPs generally hold 9-times enough liquidity to meet the default of the two largest members (Cover 2) under extreme market conditions. Under normal market conditions, they hold approximately 28 times enough liquidity.

Whilst these numbers are pooled across a number of CCPs, they provide an important metric that can be used to assess a CCP's collateral management regime and the CCP's approach to liquidity risk.

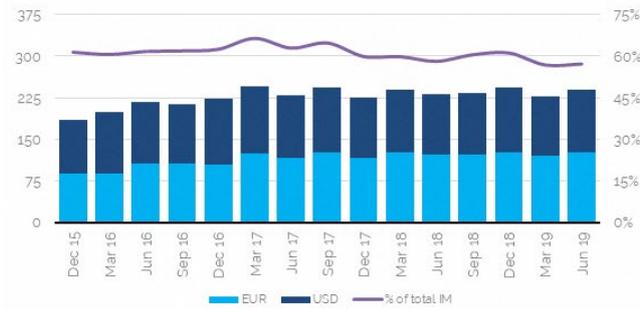
The historic and current data clearly demonstrate that CCP's are running extremely prudent liquidity and investment risk policies, resulting in a liquidity buffer of \$215bn. This helps to demonstrate how resilient CCPs will be in times of stress.

A comparison with uncleared markets could be enabled if dealers provided stress-test results concerning their maximum collateral outflows and liquidity resources. This would enable market participants to draw more accurate comparisons between cleared and uncleared markets, particularly during times of stress.

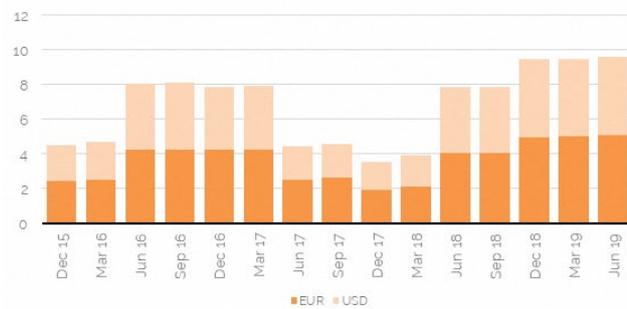
³² For example, JSCC applies: a zero percent haircut to JPY cash because this is the home currency of the CCP: <https://www.jpcc.co.jp/jsc/en/risk/collateral/collateral.html>

Figure 17 Enough Initial Margin For You?
in USD billions

Initial Margin held in liquid instruments
A large portion of total IM is held in liquid instruments



Is the Initial Margin Enough?
Actual outflows in USD billions



Liquid instruments cover even the worst cases
Available resources are enough to cover even 9 times the worst anticipated cases



The data shows that CCPs consistently hold ample liquidity to deal with stress scenarios. Even the most catastrophic of default would not see these large CCPs run out of pre-funded resources.

Across the four large CCPs (CME, ECAG, JSCC and LCH) over 60% of IM is held in cash and cash equivalents. In addition, CCPs maintain liquidity commitments, avoiding the need to liquidate collateral in a stressed market environment.

Data shows that the largest outflows over a multiday period in the past four years were during 2019. These amounts have been as large as \$9bn for a single counterparty at a CCP. At that time, the liquid resources held by these CCPs, were \$250bn, a coverage ratio of 28-times.

This is a measure under “normal” market conditions over the past four years. The \$9bn outflow increases to \$33bn when the CCPs simulate worst-case outflows based on real portfolios.

Compared to the \$250bn held in liquid resources, these CCPs can therefore cover these potential worse case (but plausible) scenarios.

The coverage ratio for these tail events has been consistently around 9-times.

CCPs are therefore in possession of a \$215bn liquidity buffer. This is being prudently managed in the best interests of the industry, without investment or liquidity risk.

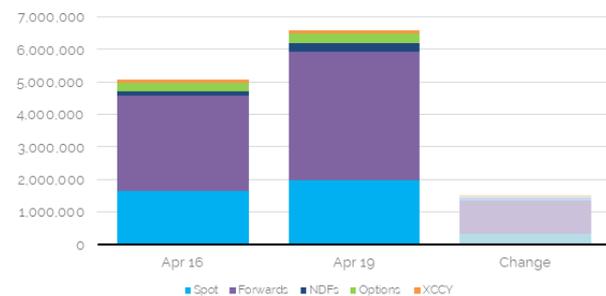
4. FX MARKETS

4.1 FX MARKET OVERVIEW

This report has analysed IRDs in depth. The BIS Triennial Survey also includes valuable volume data for FX and FX Derivatives. Analysing this data puts into context the growth we have seen within the IRD markets, as well as gaining valuable insights into specific FX markets.

Figure FX Growth 2016-19
As measured by Average Daily Volumes in USD millions

Average Daily Volumes of Interest Rate Derivatives
BIS Triennial data and Clarus Cleared Data

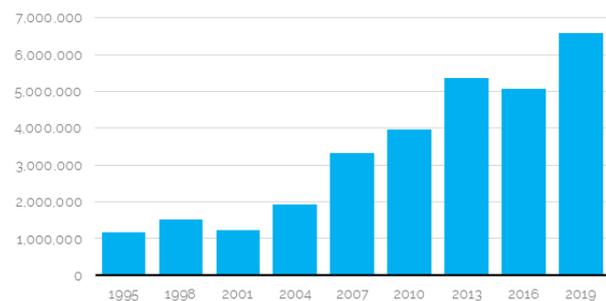


FX markets saw a ~30% growth in ADVs between April 2016 – 2019, with ADVs growing by \$1.5trn.

FX markets more than recovered their fall in activity from the 2013 survey. This may highlight that overall trading activity was more elevated in 2019 across all asset classes.

When the UMRs were implemented, products with physical FX components of risk (FX Spot, Swaps and Forwards) were exempted from the requirement to post IM. We can therefore look at the relative growth of trading in both FX trades that are exempt and are subject to the UMRs.

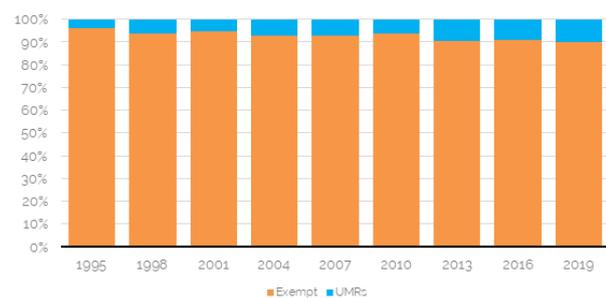
Monthly ADVs FX Products
BIS Triennial Data



We find that trading activity in UMR-eligible products has been relatively stable when compared to the growth in overall trading. In 2013, 10% of volumes were in Options, NDFs and Cross Currency (“XCCY”) Swaps. This has stayed constant in the past three surveys (2013 – 2019).

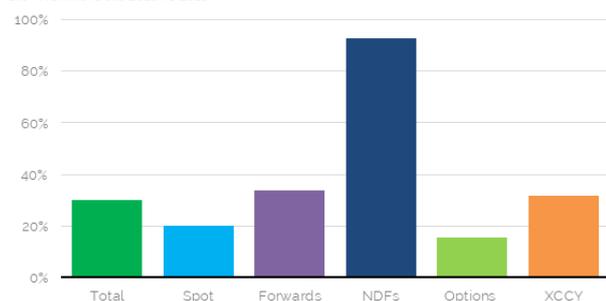
In terms of absolute volumes, XCCY Swaps continued their strong growth, increasing ADVs by \$26bn.

Relative growth of UMR exempt products
BIS Triennial Data



FX Options also grew by \$40bn ADV. This shows that UMRs have not adversely affected trading volumes in these two products.

Growth by Product Type
BIS Triennial Data 2016 vs 2019



We find it notable that NDFs are the fastest growing product in FX. These are also the only FX product to date that has embraced clearing.

4.2 NDF MARKET REVIEW

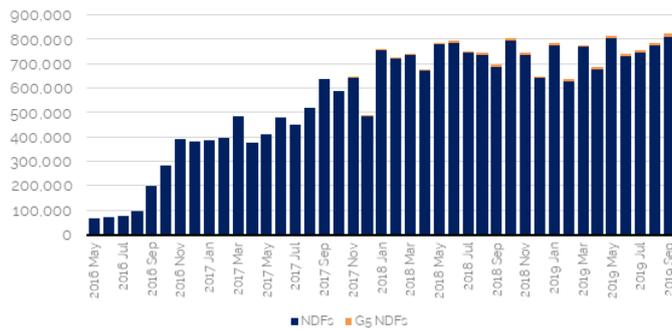
Given the particular interest in the impact of UMRs on trading volumes, it is especially important to analyse NDF volumes over the past three years.

Figure NDF Cleared Volumes

As measured by monthly volumes in USD millions

Cleared NDF Monthly Volumes

Monthly volumes across all NDF currencies



NDF total volumes as reported by the BIS have increased by 93% in the past three years.

Volumes of cleared NDFs first increased in September 2016. This was as a direct result of the implementation of the first phase of the UMRs. Many Phase 1 counterparties recognised the netting, efficiency and liquidity benefits of moving large portions of their trading activity to clearing. This was significantly more attractive than keeping NDFs bilateral. Please refer to our previous 2018 CCP12 report for more information.³³

Since September 2016, cleared activity in NDFs has consistently hit record highs, with a recent record of over \$800bn in activity being achieved in September 2019.

NDFs in BRL and KRW

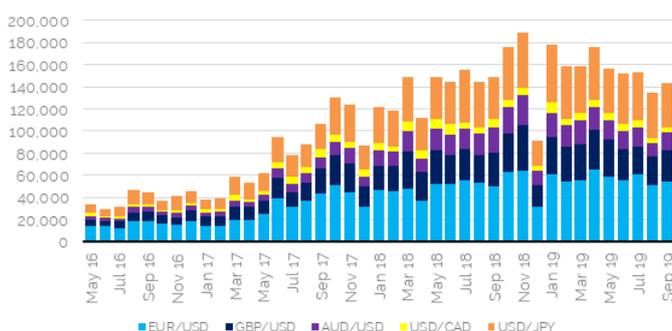
Average Daily Volumes and Clearing



It is important to cross-check these rises in trading activity in cleared markets. As well as the important BIS data in FX markets, Central Banks also provide semi-annual FX surveys. These are more granular and provide data on more specific markets – for example dealer-to-dealer (“D2D”) activity in major currency pairs.

SDR NDF G5 Volumes

Monthly volumes in G5 NDF Currencies



Importantly, the findings from both of these surveys are consistent. Cleared volumes continue to increase, in-line with the overall market (albeit with a small drop in 2019). Clearing currently accounts for around 20% of the market.

There are particular facets of clearing that show how markets are continuing to innovate.

Most notable is the growth of NDFs trading versus G5 currency pairs (AUD, CAD, EUR, GBP and JPY vs USD). since the introduction of the UMRs.

SDR data shows that the US market alone accounts for almost \$200bn in monthly notional in G5 NDFs. This is a notable amount, particularly when put against a backdrop of \$800bn of NDFs in the cleared market. Clearing has quickly evolved to meet this new market demand. As a result, G5 NDF volumes in clearing now account for almost \$10bn of monthly notional.

³³ https://ccp12.org/wp-content/uploads/2019/02/INCENTIVES-FOR-CENTRAL-CLEARING-AND-THE-EVOLUTION-OF-OTC-DERIVATIVES-A-CCP12-REPORT_FINAL.pdf

The continued growth of NDF volumes in clearing is impressive, maintaining growth as the overall market has begun to grow again. The CCP12 2018 report on *'Incentives for Clearing and the Evolution of OTC Derivatives'* demonstrated how NDF volumes in particular were growing at a faster rate than uncleared markets.

Since 2018, there have been notable innovations in FX Clearing, including the uptake of cleared G5 currencies. This has occurred across a number of different product types – NDFs, as well as physically deliverable FX Options and Swaps.

4.3 G5 NDF CLEARING

The uptake of trading and the subsequent clearing of G5 NDFs have been motivated by the UMRs. Whilst physical FX trades (FX Spot, Forward, outright and XCCY Swaps³⁴) are exempt from the requirement to post IM under the UMRs, this is not the case for FX Options. It is therefore very likely that a portfolio subject to UMRs will create FX delta inputs to ISDA SIMM in major, deliverable currency pairs.

As a result of these FX deltas, there is now a market to hedge these ISDA SIMM specific FX deltas, neutralising inputs to the margin model, hence reducing IM that must be held in bilateral markets.

The market therefore had to innovate, to create a hedging product that would create these FX deltas within the SIMM model. How can this be achieved, when the typical delta hedging instrument for FX options, an FX spot or Forward trade are exempt from the UMRs?

The industry answer has been to develop the trading of NDFs on deliverable currencies. This is particularly apparent in the G5 currency pairs. NDFs in these currency pairs now account for \$200bn of monthly notional, as reported to US SDRs.

From the US SDRs, we witness a peculiar behavioural facet to these volumes. As can be observed from SDR data, most of the volumes are executed on a single day per month.

This behaviour shows that these G5 NDFs are traded only periodically. 25% of all notional traded during 2016 – 2017 was executed on the last day of the month. They are therefore not typically traded hand-in-hand with an underlying FX Option in order to provide a non-deliverable delta hedge. If this were the case, we would see them trading as often and in similar size to FX Options (and we may also expect to see FX Options transitioning to a cash-settled model). Rather, these G5 NDFs are executed on a portfolio basis, intended to generate a delta input to the UMR-compliant ISDA SIMM model. This reduces bilateral IM that must be held between two counterparties, in line with the price-hedging properties of the NDF. Throughout 2019 we can witness that these periodic G5 NDF processes have become increasingly regular.

4.4 REGULATORY CHANGES TO PROMOTE CLEARING

The introduction of UMRs has led to positive behaviours between market participants. One such behaviour is where bilateral IM is optimised – either between bilateral participants or multilaterally via optimisation providers. This can be seen in the trading of G5 NDFs, where bilateral exposures are initially

³⁴ Only the physical settlement aspect is exempt

optimised, and may be subsequently backloaded into clearing. Optimising these risk factors between counterparties reduces overall counterparty credit risk in the system.

An alternative way to reduce counterparty credit risk is to trade the underlying product at a CCP. This introduces full multilateral netting. Clearing also goes in partnership with a prudent risk-management regime and default management process.

Following the launch of FX Options clearing at London Clearing House (“LCH”) ForexClear, cleared volumes have now increased to \$35bn per month across G5 Options and NDFs. The case study below presents background to both traditional aspects of counterparty credit risk management in FX markets, and the benefits that clearing provides.

4.5 CASE STUDY: FX OPTIONS AT LCH FOREXCLEAR

4.5.1 MANAGING COUNTERPARTY CREDIT RISK IN FX MARKETS

Currently, NDFs are being used to mitigate UMR IM requirements. This may also reduce counterparty credit risk because it reduces the impact of market price movements on the products captured by UMR. Taken on a standalone basis, coupling an FX Option with an offsetting NDF is a lower counterparty credit risk proposition than trading the FX Option “naked”.

The UMRs have therefore introduced a positive market behaviour. UMRs are helping to promote increased management of counterparty credit risk, as well as mandating that margin is held against the risk of counterparty default.

However, because physical FX products remain outside of the scope of UMRs, the use of NDFs to mitigate counterparty credit risk can only go so far. It is possible, for example, that these NDFs are coupled with physical FX trades. This would allow the counterparties to remain risk neutral, but to bilaterally optimise the UMR calculation between the two firms. This behaviour would fail to reduce any counterparty credit risk, and could conceivably increase it by introducing unnecessary settlement risk on the physical trades.

However, due to the fact that these NDFs tend to be executed periodically, the data suggests that we are witnessing multilateral IM optimisation. This is a positive aspect, as it means that overall counterparty credit risk, as measured by the ISDA SIMM risk factors, will be reduced across the whole network.

4.5.2 CLEARING FX TO MANAGE COUNTERPARTY CREDIT RISK

UMRs appear to have motivated more advanced, more proactive counterparty credit risk management in FX markets. However, it highlights that more can still be done to reduce counterparty credit risk in FX markets.

This is where clearing of FX can help. As described, the FX business has progressively become a much more complicated market. Some products are captured by UMRs, some are not. Natural hedge relationships that exist in underlying markets may breakdown when calculating UMR risk factors (e.g. hedging physical FX options with physical FX delta hedges).

In order to achieve multilateral netting of FX deltas across a portfolio captured by the UMRs, it may therefore be attractive to move some of the FX delta between counterparties into a cleared environment.

The bilateral FX deltas can be extinguished using uncleared NDFs, and the same FX deltas put into clearing using cleared NDFs (on deliverable currencies). This ensures that counterparties are kept market-risk neutral, and that their ISDA SIMM FX deltas are “ported” into a multilaterally netted clearing environment. Whilst IM must be held in clearing against these cleared NDFs, the multilateral netting of risks in clearing means that this IM is highly likely to be lower than if kept bilateral. This is because off-setting risks that were previously with different counterparties can now be netted versus the CCP.

4.5.3 PORTING RISK TO A CCP

Market participants without directional FX risk, such as the dealer community, are therefore finding that it is highly beneficial to translate some of their bilateral FX risks into cleared FX risk.

There are three key motivations behind the growth of G5 NDF clearing:

1. Bilateral IM can be optimised by porting risk into clearing;
2. Clearing is less capital intensive than trading synthetic forwards made up of two FX options;
3. Market participants can continue to trade the same products at the point of execution and use clearing as a post-trade optimisation strategy.

However, if this is taken to a natural conclusion, some areas of the market will discover that it would be preferable to execute the FX Option itself as a cleared product to begin with.

The data shows that some early adopters in the industry have begun to take this approach. As a result, cleared FX Option volumes are growing.

4.5.4 CLEARING FX OPTIONS IS A TOOL TO MANAGE COUNTERPARTY CREDIT RISK

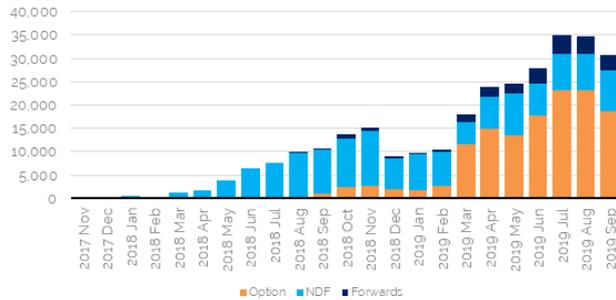
FX Option clearing was launched in 2018 at LCH ForexClear with some early adopters transacting test trades towards the end of the year and into the beginning of 2019.

Since Q2-2019 began, we have seen far more serious volumes beginning to transact in FX Options, and these have been coupled with FX delta hedges in the form of deliverable FX Forwards – replicating the typical bilateral market workflow.

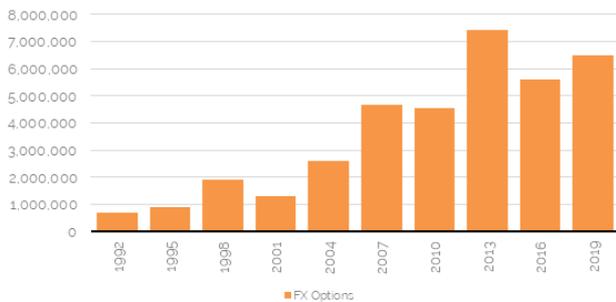
Understanding the FX Options landscape can appear complex amidst shifting trends. The added transparency of cleared markets helps us to dissect exactly what is happening.

Figure FX Options
As measured by Monthly Volumes in USD millions

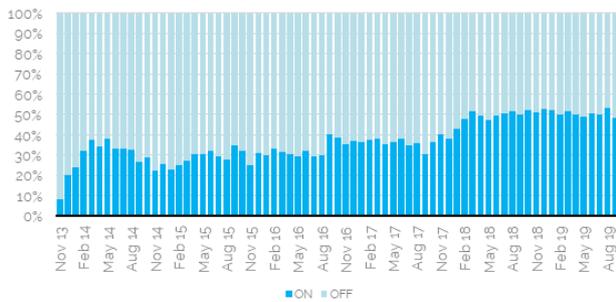
G5 Cleared Volumes by Product Type at ForexClear
Monthly Volumes in Clearing



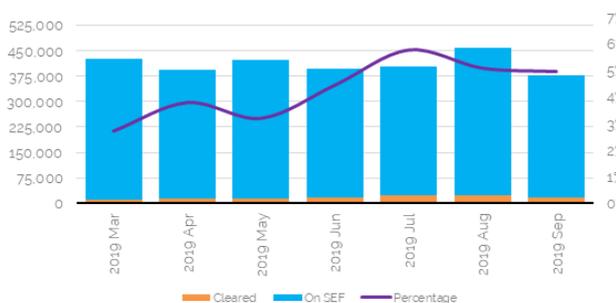
FX Options Total Monthly Volumes
Long Time-Series of Data showing 2013 peak



SDR FX Options Data
Pick up in On-SEF trading has been substantial recently



Comparing FX Option Volumes
Clearing is gaining traction in the On-SEF D2D market



FX Options volumes at LCH ForexClear are now outstripping volumes in cleared G5 NDFs. Overall, we can see that volumes in G5 products (both deliverable FX options and Forwards plus NDFs) are approaching \$35bn per month.

This remains a small portion of the overall market. Recall that total NDF clearing volumes are \$800bn per month. However, these products are still in their infancy, therefore it is worth considering how much growth might be seen in the coming months.

The BIS has a long history of FX data, stretching back to 1992 for FX Options. From this survey, we can see that the average monthly volumes in FX Options topped \$7trn in 2013. These have since retreated slightly. What is most notable is that despite the introduction of UMRs into the FX Options market in September 2016, volumes have actually climbed between April 2016 – 2019. To date, UMRs have not impacted on the amount of trading activity.

In the FX Options market, market participants inform us that on-SEF activity, as reported by SDRs and SEFs, is exclusively D2D activity. It is therefore notable to see that the proportion of FX Options that are reported as trading on-SEF has continued to increase throughout 2018 and 2019. Now, almost 50% of total SDR volumes are reported as on-SEF.

If any market would be adversely affected by the UMRs, it would be the D2D market first. This is because the Phase 1 and 2 firms captured by UMRs were exclusively dealer banks. We see that for FX Options this has not been the case, with D2D volumes remaining healthy.

In a similar vein, the early adopters of clearing OTC markets have traditionally been large dealer banks. This makes sense because they benefit the most from multilateral netting of risks. They also have strong regulatory capital motivations to translate existing exposures to clearing, such as a 2% counterparty risk weighting of Risk Weighted Average (“RWA”) in clearing.

Therefore, the current D2D market for on-SEF FX Options is most likely the initial target audience for early adopters of FX Options clearing. When we compare the sizes of these two markets it is therefore notable that the equivalent of 5-6% of on-SEF volumes are being cleared.

This enthusiastic uptake of clearing of FX Options is highly likely to lead to further efficiencies in the overall operating model.

The early adopters of FX Option clearing are highly likely to be large dealer banks, clearing their exposures versus other dealer banks. With FX Options typically being a shorter dated market than IRDs, there may not be such a focus on backloading of exposures in the early days of clearing. Rather, new trades are more likely to be identified and, along with suitable delta hedges, ported into clearing.

4.5.5 EARLY ADOPTERS OF CLEARED FX OPTIONS

The dealer community are most likely to be the early adopters of cleared FX options. There are multiple motivations for them to pursue a cleared solution:

1. Dealers have the most to gain from multilateral netting of risks – both from a counterparty and market risk perspective;
2. Dealer portfolios are unlikely to be directional, allowing for careful selection of potentially market-risk neutral portfolios in the early days of clearing. This approach can significantly reduce both counterparty risk and regulatory capital whilst keeping market risk exposures constant;
3. Risk weightings for counterparty exposures to CCPs are extremely low from a regulatory capital perspective, at 2%. This motivates counterparty credit risk to be novated to a clearing house where it can be centralised, monitored and risk managed on a multilateral basis. The CCP will of course hold suitable amounts of regulatory-defined collateral against these exposures;
4. Dealer banks are likely to be the largest users of optimisation services, which may introduce additional costs, workflows and frictions to the business. Clearing new business can be seen as a more attractive, less intrusive and more efficient solution;
5. If IM levels were similar in clearing and bilateral markets (e.g. ISDA SIMM), then the multilateral netting benefits of clearing for dealer portfolios will typically lower the overall amount of IM that needs to be held by a dealer;
6. Any off-setting FX products that are subsequently cleared can help to reduce IM generated by FX options;
7. Due to the UMRs exempting physical FX products, bilateral markets can only optimise IM using NDFs or a synthetic forward. This is complex and notional intensive.

Clearing also offers the benefits of being inherently scalable. With UMRs capturing progressively additional market participants, it is likely that workflows become more complicated and less centralised as different solutions are adopted by different categories of market participant. This is unattractive as it introduces more integration and more testing whenever changes need to be implemented, leading to a much more complex operating model across the market.

The preference for increased standardisation in operating models is best seen at the execution side of both Interest Rate and FX derivatives markets. SEFs are now the leading place for execution across many different asset classes, most notably D2C IRS flows. The benefits of a standardised, electronic workflow at the pre-trade execution phase have been enthusiastically grasped by the client community in particular.

If this pre-trade preference for electronic execution, as offered by SEF platforms, can be coupled with the inherent post-trade efficiencies of clearing, then the outlook for both clearing and SEF execution is extremely positive.

From a counterparty risk management perspective, the UMRs highlight the inherent problems in trying to reduce counterparty risk in bilateral markets. IM must now be held against these risks. The IM itself serves

as a highly transparent measure around which to monitor the exact costs of counterparty risk. When coupled with the costs of trying to optimise this in bilateral markets (more trades, integrations, gross notional), this can lead market participants to conclude that clearing is the optimal path forward.

This approach is particularly valid when both bilateral and cleared markets consume similar levels of standalone IM, as we see in both FX Options and NDFs.

FX Options clearing remains in its infancy stages right now. However, the early adopters are already benefitting from the prudent risk management, reduced counterparty credit risk exposures and workflow efficiencies offered by clearing. These benefits will spread from the adopters to an increasing number of market participants over time. The transparency in data that CCPs provide will allow all market participants to carefully monitor the uptake of this innovative solution.

5. SHORT-TERM INTEREST RATE DERIVATIVES

The trends across trading at the short-end of the curve in IRDs are particularly relevant for the following reasons:

- A driving factor towards increased notional trading across the whole market may be a shift towards shorter maturities;
- With new Risk-Free Rates (“RFRs”) beginning to trade, the adoption of OIS trading is expected to increase, which has traditionally been a short-end market.

5.1 INCREASED TRADING VOLUMES

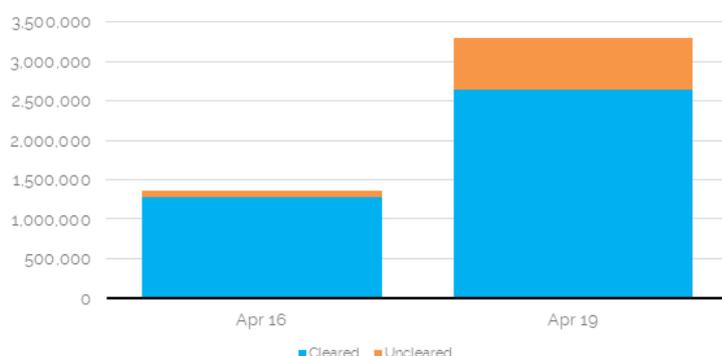
BIS data shows a 125% increase in IRD trading activity between April 2016 and April 2019. Market-facing activity was \$3.3trn per day in April 2019 with \$2.63trn (80%) per day cleared, a growth of \$1.94trn. Of this growth, \$1.36trn was within the cleared markets.

Our analysis shows that more than 50% of the growth in cleared volumes is from increased risk trading at the short-end of the USD curve alone.

To accurately present the growth in real trading activity, we concentrate on the growth of Net Risk Transfer, which are true market facing trades. This is the increase in volumes that we have seen that exclude compression and intra-entity trading. It represents the real trading activity in the market.

Growth of Net Risk Transfer Trading

BIS Triennial data and Clarus Cleared Data

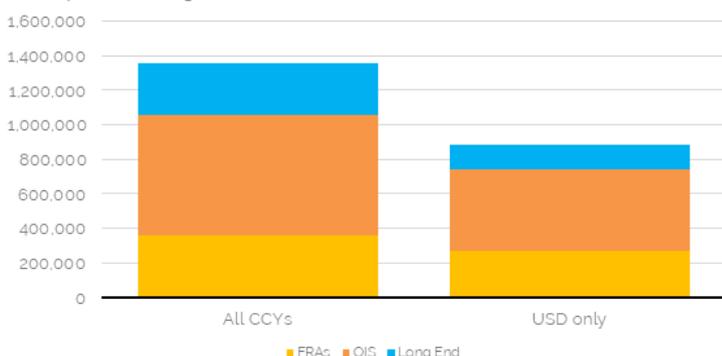


Between April 2016 – April 2019 we have seen considerable growth. Of the \$1.94trn increase in daily activity, most of this growth is the result of the cleared markets (\$1.35trn, or 70% of the growth).

Uncleared trade activity has also grown in this time, but from a much smaller base. Of the ~\$0.6trn additional uncleared activity per day, most of this has been in Option products (\$0.29trn or 49% of the growth).

Growth of Product Types

Cleared products have grown at different rates



Out of the \$1.35trn increase in total cleared volumes, \$1.06trn (78%) has been in FRAs and OIS.

OIS trading across all currencies has added \$0.7trn per day in new volumes, to now stand at \$1.06trn ADV in April 2019 in cleared markets. FRAs have added \$0.36trn in ADV to now stand at \$0.8trn.

These very short-dated products have hence accounted for most of the notional increase.

USD markets created \$0.9trn of the overall increase in volumes. Most of this increase in USD has come from OIS (+\$0.5trn per day) and FRAs (+\$0.3trn per day). Increases in USD short-end products alone therefore account for 55% of the growth in total notional volumes we have seen.

Analysing the amount of risk traded, rather than the amount of notional, reveals a lower rate of growth in IRDs than the headline numbers suggest. Our preferred measure of risk is DV01, which is maturity agnostic.

The ADV of DV01 traded in cleared markets has increased by ~\$300m between April 2016 – 2019. This is a 58% increase, compared with a notional growth of 106%.

Overall, the growth in trading is summarised below:

	Notional Per Day Across Cleared and Uncleared Markets	Notional in Cleared Markets	Cleared Risk Per Day DV01
April 2016	1.36trn	1.28trn	533m
April 2019	3.30trn	2.63trn	840m
Change	+1.94trn (+142%)	+1.36trn (+106%)	+307m (+58%)

Note: Whilst the growth in trading volumes when measured in risk terms is lower than when measured in notional terms, this does not mean that trades are getting shorter.

Key to note is that overall risk trading has increased by 58%. Analysis reveals that this increase has not been accompanied by a reduction in the weighted average life of trades.

Volume Weighted Average Maturity
In months for all IRD products across all currencies

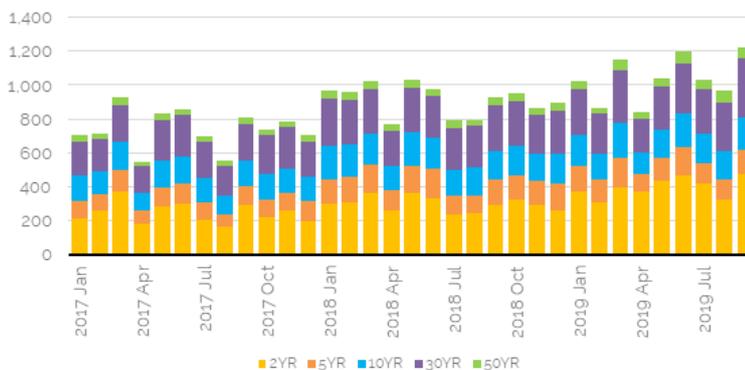


We can analyse the growth in cleared volumes across all products and all currencies on a DV01 basis because we know the tenor profile at LCH SwapClear.

We see sustained growth in volumes on a risk-adjusted basis. This means that more risk (DV01) continues to be executed within clearing than ever before.

In April 2016, 44% of total risk traded was five years and lower. In April 2019, that metric stood at 56%.

DV01 by Maturity of all IRD Products across all currencies
Has the maturity of traded IRS changed?



We see no trend in our data towards a shorter average maturity for IRDs.

Interestingly, the data shows that April 2019 had the lowest average maturity since our records began. However, this was not substantially shorter than the long-run average, which has been 169 months (~14 years).

There has not been a structural shift in trading towards shorter maturities, with both short-end and long-end trading activity increasing by similar amounts. This means that IRDs are not getting shorter.

In terms of total risk traded, this has increased by 58%, as a result of longer-dated trading increasing at a similar rate to shorter-dated activity.

Across all currencies and all products, there is an approximate 50/50 split between risk activity below five years and above five years. This has stayed constant over the past three years.

5.2 INCREASED VOLUMES IN USD INTEREST RATE DERIVATIVES

USD rates are the largest portion of the IRD markets. The changes that occur in USD markets are seen at a market-wide level due to their size. It is therefore important to look at any structural changes that have happened in USD alone.

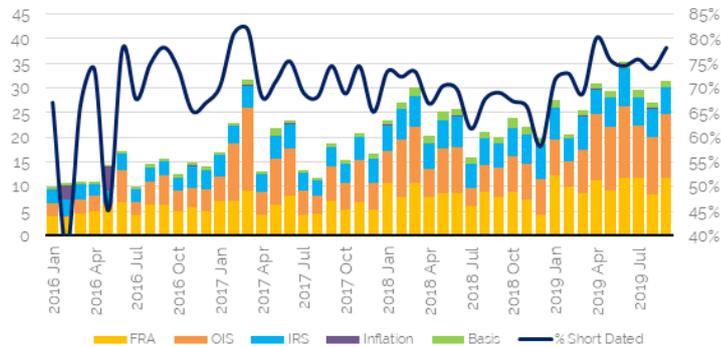
Using DV01 for this analysis allows us to understand changes in the maturity profile of activity. In cleared markets, we find that overall risk has grown by 58%, identical to the market as a whole.

Figure Cleared USD Markets

As measured by Trillions of USD Cleared across CCPs

Product Types Cleared

USD Denominated product types cleared across all CCPs

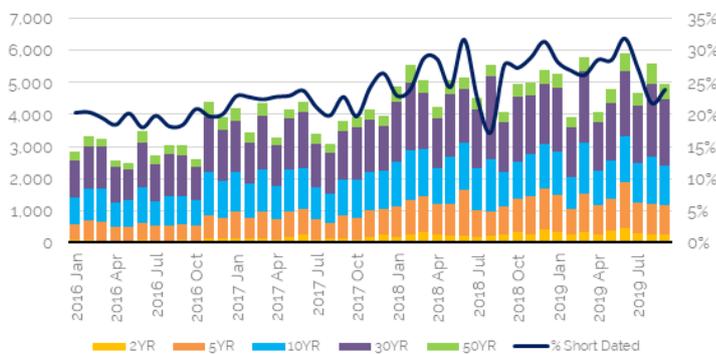


USD products are expected to be representative of the entire market. Our data shows that ADVs in cleared markets have increased by \$1.35trn. Cleared USD markets alone have seen ADVs increase by \$0.9trn in that time, representing 65% of the total growth in notional terms.

When we look across all CCPs clearing USD IRDs, we see a broad-based increase in notional volumes across all product types – FRAs and OIS at the short end; IRS, Inflation and Basis at the longer-end. As a proportion of total notional traded, the percentage traded as short dated products has increased. In 2016, 66% of notional was in either a FRA or OIS. In 2019, that has been 75% YTD.

DV01 by Maturity IRS

Has the maturity of traded IRS changed?

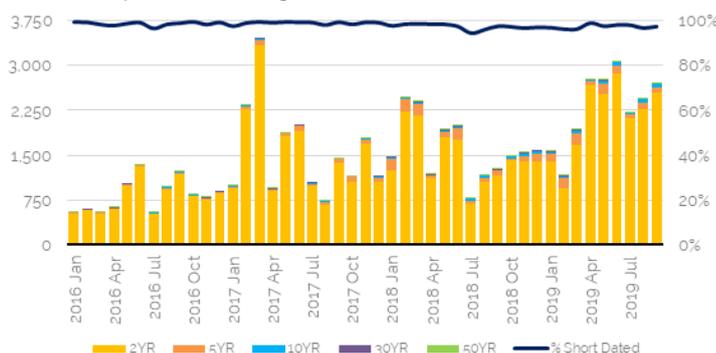


In DV01 terms we see that the amount of DV01 traded in USD IRS has increased by 58% between April 2016 and 2019. This is in-line with the broader market across all currencies. It highlights how important a risk-based measure is versus a notional-based measure to understanding true trading activity.

In April 2016, 18% of risk was five years and shorter. In April 2019, that has increased to 29%, showing evidence that a shift towards shorter dated products has occurred in USD markets.

DV01 by Maturity OIS

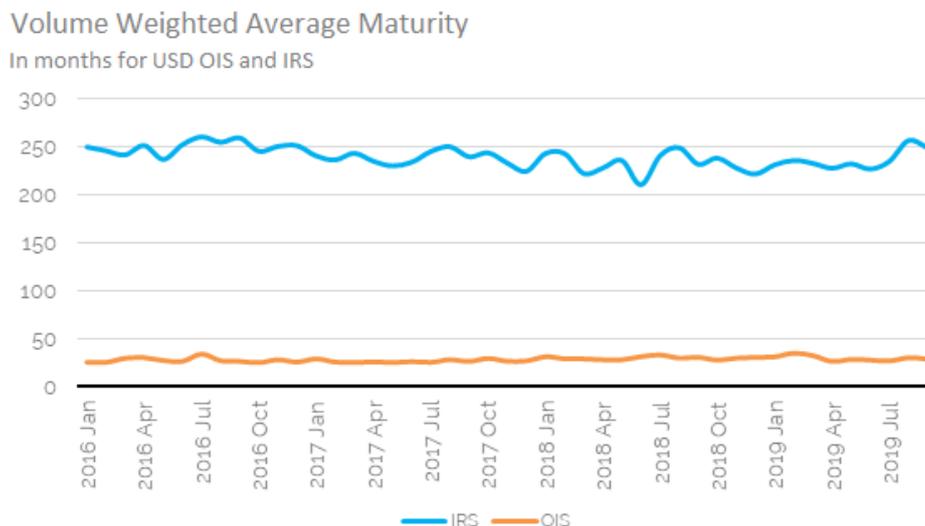
Has the maturity of traded OIS changed?



In OIS trading, risk has grown at a far greater rate than in IRS. Risk traded in cleared OIS grew by 341% in the three years. This is again consistent with trading moving towards shorter dated instruments because 97-99% of OIS risk continues to be shorter than two years.

USD markets therefore show evidence that trading has moved towards shorter-maturities. In particular, the growth in OIS trading has been significant.

There are signals in the USD data that trading is moving towards shorter-dated products. However, this is not shown in a Weighted Average Maturity (“WAM”) analysis. The average maturity of traded risk in USD IRS has remained remarkably constant at 240 months (~20 years). The same is true for OIS trades, with a consistent WAM of 29 months (~2.5 years).



Overall, we can see that USD markets have been a very strong driver in the increased notional amounts we see trading, driven by increases in both USD FRA and OIS trading. However, the weighted average life of USD trading has been constant over the past three years.

5.3 OTHER USD IRDS

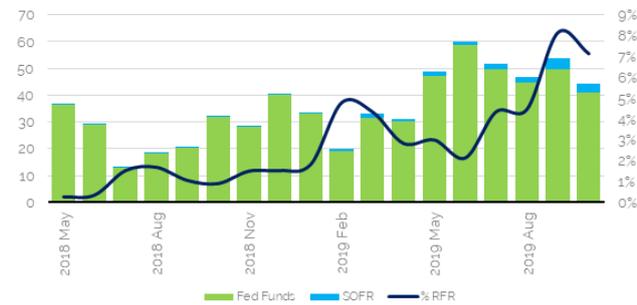
Trading in short-end USD OTC derivatives does not exist in a vacuum. Market participants have a choice of instruments to trade to gain exposure to short-dated USD interest rate risk. For example, exchange traded derivatives (Futures).

Fed Funds and Secured Overnight Financing Rate (“SOFR”) futures create exposures that are very similar to OIS swaps. The data shows that these short-dated contracts have seen considerable growth. Combined Open Interest has climbed by 27% since SOFR futures were introduced, an increase of almost \$3trn.

Figure USD SOFR Futures
As measured by Trillions of USD across CCPs

Product Volumes

SOFR Futures volumes compared to Fed Funds futures



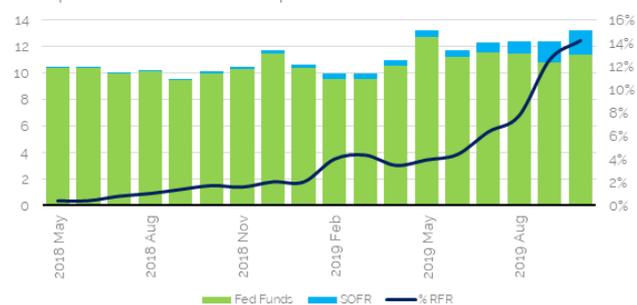
Since May 2018 SOFR futures trading has been a daily occurrence with volumes now surpassing \$4trn notional equivalent in a single month (September 2019).

The growth of SOFR trading in futures markets has been such that SOFR denominated contracts now make up almost 8% of total short-dated activity in overnight interest rate futures.

As we saw in our analysis of OTC contracts, trading activity is continuing to grow. This is shown also in the growth of Fed Funds contracts, which averaged \$27trn per month in 2018 and \$40trn per month in 2019.

Product Open Interest

SOFR Open Interest versus Fed Funds Open Interest

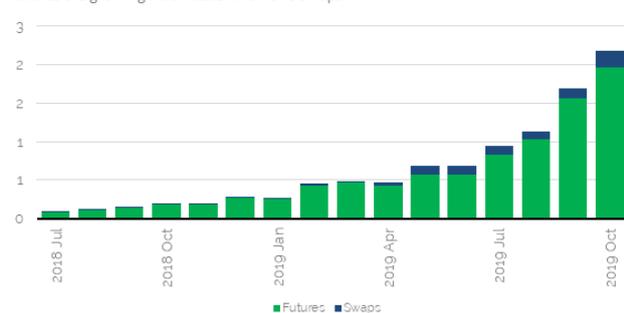


These increased levels of activity have also been accompanied by an increase in Open Interest for Fed Funds, climbing from \$10.2trn to \$11.2trn in our time series. This growth in Open Interest for Fed Funds has, however, lagged the growth in SOFR futures.

Open Interest now lies at \$2trn in SOFR futures. This is from a zero-starting point, and as such already represents 14% of all outstanding positions in overnight interest rate futures. That is a very strong uptake.

Open Interest Futures vs Swaps

Futures are growing much faster than OTC Swaps



What is notable is that this uptake has been considerably stronger in Futures markets than in OTC derivatives.

Total Open Interest in OTC derivatives now stands at \$0.2trn – nearly ten times smaller than we see for futures, despite both products being around for a similar amount of time.

This is the opposite situation to the one we see across the whole OTC market. Open Interest in USD IRDs for OTC derivatives is \$200trn, according to the June 2019 BIS semi-annual survey. For comparison, the total Open Interest in USD interest rate ETDs was \$92trn (BIS semi-annual statistics).³⁵

This serves to highlight how successful SOFR-linked products have been in the futures market compared to OTC.

³⁵ <https://stats.bis.org/statx/srs/table/d2>

5.4 RISK FREE RATES

The analysis of SOFR and Fed Funds futures show that a large proportion of trading in futures markets has shifted to RFRs. As of October 2019, 14% of Open Interest was in SOFR, and Futures markets were almost nine times larger than the OTC SOFR market.

The overall data suggests that:

- 1) There may be increased appetite for short-end products such as OIS and FRAs;
- 2) The uptake of the new USD risk free rate, SOFR, has been much more enthusiastic in Futures markets.

Combining these two components of market behaviour means that trading in RFRs are likely to begin as short-dated products. RFRs also exhibit somewhat standardised behaviour – such as movements are expected to be on pre-ordained central bank dates (plus quarter ends and capital reporting dates). This behaviour is particularly well suited to a futures style of trading environment as it can be catered for via standardised products.

The data we possess on OTC trading in RFRs so far is too sparse to accurately come to any conclusions. We can certainly state that both Euro Overnight Index Average (“EONIA”) (soon to be replaced by the Euro Short-Term Rate (“€STR”) and Sterling Overnight Index Average (“SONIA”)) have liquid long-dated markets. Anecdotally, much of the activity in long-dated SONIA is related to hedging discounting risk. It will therefore be particularly important for SOFR markets to see the uptick in trading activity that may follow the “Big Bang” switch to SOFR discounting at LCH and CME in October 2020.

6. CONCLUSIONS

Within this report, we have analysed the OTC derivatives markets across Rates and FX. Different trends are apparent across asset classes within these diverse markets. The report particularly focuses on the most recent BIS Triennial Survey, which measures activity in derivatives markets during April 2019.

In Rates markets, cleared markets have grown significantly over the past three years. The daily notional volume of cleared IRDs increased by 206% between April 2016 – April 2019 according to the latest BIS Triennial Survey data.

Comparing cleared and uncleared markets, cleared volumes increased by \$1.36trn in AVDs. In addition, uncleared markets grew by \$0.59trn.

Non-market facing activity has increased. This activity covers both compression and intra-entity trading. This report shows that AVDs in non-market facing trades grew by more than any other sector, increasing by \$1.88trn per day.

Transparency is therefore crucial in order for volumes across different market segments to be analysed and understood. For example, non-market facing trades are neither related to risk-transfer nor price-forming activity. Including these volumes can distort the perception of liquidity in markets. This report therefore examines the growth in true trading activity, and demonstrates that cleared markets are growing more than uncleared markets.

However, it is notable that innovations in the cleared ecosystem have driven the volumes of non-market facing trades to such heights. The standardisation of valuations, operational efficiencies and multilateral netting within clearing allow compression to flourish. These benefits of the cleared markets allow participants to trade in an increasingly efficient manner, reducing the overall operational overheads and capital.

These efficiencies in post-trade optimisation therefore drive more volumes and more liquidity in the underlying cleared risk-transfer markets. This is why we continue to see much larger amounts of growth in cleared markets.

However, it is also notable from our research that the bilateral markets have also grown in the past three years, however; more transparency is required to precisely understand the drivers of these volumes. It is possible that bilateral compression is serving to inflate these volumes. For example, margin optimisation activity related to the UMRs has increased over the past three years, evident in both Swaptions and FX Options activity. This activity is not true price forming activity and therefore, in the absence of increased transparency, may be distorting the accurate picture of liquidity in these bilateral markets.

With the growth in notional volumes, questions subsequently arise surrounding the maturity profile of activity. This report analyses global volumes of IRDs and finds that the weighted average life of trades has not significantly changed between the two BIS surveys in April 2016 and 2019. Nevertheless, volumes in short-dated products such as FRAs and OIS have grown at a substantial rate.

For mandated products, we find that the current clearing rate of price-forming activity now stands at 97%. In USD OIS the clearing rate is almost ~100%, indicating a strong enthusiasm for clearing across the market.

Motivations for trading in cleared markets can therefore be summarised as:

1. Provide the largest pool of liquidity in both mandated and non-mandated to clear IRD products;
2. Operational simplicity allows these pools of liquidity to be scalable and cater to a diverse range of participants;
3. Post-trade optimisation in clearing (i.e. trade compression) results in further improvements in operational efficiency and reductions in capital. This drives further liquidity into cleared markets.

The benefits of standardisation of valuations and operations in cleared IRDs are now resulting in the increased electronic trading of execution. The growth in electronic trading platforms, such as the Bloomberg and Tradeweb SEFs, has been significant. These electronic platforms now account for 71% of SEF activity and have increased the overall amount of trading taking place.

6.1 COLLATERAL

There have been marked increases in transparency across OTC derivatives markets as a result of regulatory reform. However, these efforts are not complete, and this report provides an insight as to the lack of transparency for collateral in OTC derivatives. We examine why market participants are unable to measure the split of collateral between cleared and uncleared markets, and there are no estimates as to the amount of uncollateralised exposures that still exist.

In cleared markets, the PQDs published by CCPs provide a valuable resource to analyse and discover more about collateral in cleared markets. Equivalent resources are necessary across the uncleared sector as well. Without these resources, market participants cannot accurately assess the liquidity impact of UMRs or accurately monitor risks from uncollateralised or partially collateralised exposures. Dealer-specific measures of collateralised and uncollateralised exposures would be a beneficial resource for these purposes.

The BIS provides a degree of insight into GMVs across both cleared and uncleared derivatives. Analysis of these measures reveals that the gross mark-to-market of cleared derivatives has collapsed in recent years. Trade exposures have reduced in part thanks to the twin drivers of compression and the settled-to-market treatment of variation margin at CCPs. Market participants now find that the majority of GMVs are in uncleared markets, outside of CCPs. At present, there is no resource that allows for a meaningful analysis of the collateral requirement differences across the cleared and uncleared markets.

As the UMRs continue to be released in later phases, an increasing number of market participants are now required to post IM. Despite the VM 'big bang' in 2016, there is an acute lack of transparency over how much VM and/or IM is truly being posted across the industry. The level of transparency for collateral therefore needs to improve, including introducing measures of legacy exposure that remain uncollateralised. Improving collateral transparency will allow market participants to better monitor risks and plan for liquidity needs as a result of changes in regulation.

PQDs from CCPs reveal that the quality of collateral held at CCPs is of significantly high-quality. The disclosures further reveal how prudent and risk averse the collateral management regimes of CCPs are, with extremely large liquidity buffers being held. The amounts of liquidity held at CCPs are measured and disclosed versus stressed market conditions. These disclosures reveal a huge safety-buffer is present even

in the face of extreme market moves and help quantify the resiliency of risk management at CCPs. For example, the analysis in this report reveals a \$215bn liquidity buffer held at the largest CCPs.

Case studies of ECAG and JSCC reveal that collateral management at these CCPs can be designed to be both flexible and cater to the particular needs of the specific jurisdiction. These approaches are further complemented by the flexibility that clearing brokers can offer to their clients. This may be in terms of meeting multi-currency margin payments in a single-currency or being flexible for funding timelines. Either way, collateral management at CCPs is shown to be innovative and accommodating of end-users' requirements. These facets of the clearing ecosystem may stand in stark contrast to ever-more demanding requirements of bilateral markets. UMRs are putting more emphasis on collateral management in uncleared markets.

The case study exploring collateral management at ECAG reveals that a quantitative model, when transparent and accessible, can yield positive benefits to both the client base and the CCP itself. ECAG, is one of a number of other CCPs using this type of model to allow for higher risk management of specific security risks at the CCP, whilst potentially expanding the range of eligible collateral for clearing members.

The case study at JSCC shows that individual jurisdictions have particular requirements. CCPs can tailor their collateral management infrastructure to cater for their client base. This is shown for a CCP such as JSCC who can issue margin calls within the local time-zone, allowing clearing members to more accurately match the funding requirements of their underlying franchises. This can be coupled with market-specific risk management, such as a 0% haircut on local currency exposures, to further incentivise the uptake of clearing at regional CCPs.

6.2 FX OPTIONS CLEARING

Following the analysis conducted last year into FX Clearing, this report outlines additional innovative solutions offered at LCH ForexClear. These include clearing of both G5 NDFs and physically-settled FX Options.

Data shows that underlying FX derivative markets have continued to grow, albeit at lower rates of growth than for IRDs (when measured by notional volume activity). It is particularly important to note that UMR eligible products including NDFs and FX Options, have seen volumes grow at the same rate (or higher) as the rest of the FX market. This shows that UMRs in FX have had no discernible impact on liquidity.

By analysing growth by product type, it is notable that NDFs have achieved much higher rates of growth than other areas of the FX market. NDF volumes grew by 93% in the three years between April 2016 – April 2019. This significantly outperforms the percentage growth we saw in other areas of FX, where the rate of growth was within the order of 30%. NDFs are, of course, the only FX market that has seen a significant up-take of clearing, with approximately 20% of the market now cleared. Data analysis therefore shows that UMRs have served to promote clearing in NDFs, and that this move to clearing has helped volumes grow at significantly higher rates than other FX products that remain bilaterally traded.

UMRs have substantially increased the complexity of trading of FX Options. This is because the FX Option portion of the risk is subject to the UMRs, however the physical FX trade that is used to delta hedge these options is exempt. This can result in large risk factor inputs in the ISDA SIMM model used to calculate

bilateral IM. Market participants, along with third-party optimisation providers, have therefore developed a market in deliverable-currency NDFs (“G5 NDFs”) that can neutralise these risk factor inputs and reduce bilateral IM (without changing the traded risk between counterparties).

This is a key example of UMRs introducing ‘good behaviours’ to markets. It focuses a portion of risk management resources on better counterparty risk management, in order to reduce the risk factor inputs to ISDA SIMM.

Critically, FX Clearing has been able to respond and react to these new market behaviours. For example, LCH ForexClear launched the clearing of G5 NDFs. This allows market participants to benefit from multilateral netting of risk factors, reducing the overall IM burden across both cleared and bilateral markets. It is also far more capital efficient to port the risk into clearing, further benefiting from reduced counterparty risk.

The added costs, operational overheads and complexity introduced by bilateral IM optimisation services have encouraged market participants to begin clearing FX Options. Clearing introduces many benefits, including settlement risk mitigation, multilateral netting and operational standardisation. The UMRs are driving good behaviours in the FX market, motivating CCPs to launch innovative new services and products accordingly.

G5 NDFs now trade over \$200bn in notional per month, representing just a portion of the overall IM optimisation market. The need to multilaterally net these risks, combined with a fresh look at counterparty risk management in FX markets is promoting more activity in the nascent FX Options cleared market. Total G5 activity in ForexClear FX products has now reached \$35bn per month.

6.3 SHORT USD RATES

Across the IRDs markets, daily notional volumes have increased by \$1.35trn between April 2016 – April 2019. Driving factors behind this increase have been USD-denominated products and short-dated FRAs and OIS. USD markets alone accounted for \$0.9trn of the increase, almost all of which FRAs and OIS were responsible. Overall, the \$0.74trn increase in trading of USD short-end products accounted for 55% of global growth.

Such high-level analysis has therefore suggested that trading activity, particularly in USD, is shifting toward shorter maturity products. When we measure total DV01 traded, we see an overall increase in USD markets of 58%. This shows that trading in long-dated products has also increased. However, the portion of risk that is shorter than five years has increased from 18% to 29% in the past three years.

This supports the assertion that trading activity has moved toward shorter dated products. However, on the contrary, we find that the average weighted maturity of both IRS at 20 years and OIS at 2.5 years has stayed remarkably stable over the past three years.

Certainly, however, the growth in OIS and FRA trading has been mirrored in futures products. We have seen an extremely healthy take-up in new OIS products, including SOFR-indexed products at CME. Our case study into futures trading at CME shows the uptake of RFR trading has been far greater in futures markets than in OTC.

It is therefore an interesting exercise to tie the themes together across the CME case study. Overall, we can see a preference for short dated products. These products also tend to be more standardised.

There has been a stronger uptake in futures markets of new RFRs than has been seen in OTC. It will therefore be interesting to monitor over the coming year whether these trends towards more standardised, and shorter-dated products, are maintained – presumably amid rising RFR trading volumes.

6.4 OVERALL CONCLUSIONS

This report demonstrates that transparency in OTC derivative markets allows for detailed analysis of the markets. However, it remains a complex task to accurately understand the trends in the markets. This has been made particularly difficult in recent times due to the increase in volume of non-market facing trades.

However, increasing compression volumes are an important trend. They serve to highlight in particular that the scalability, standardisation and operational efficiencies of clearing, which has helped to increase liquidity and decrease capital consumption in OTC derivatives.

There are important elements within uncleared OTC derivatives markets that still remain opaque. One such area is the amount of collateral required for uncleared OTC derivatives. Accessible data regarding the percentage of exposures collateralised and the split of collateral held in cleared and uncleared environments is notably absent. This needs to be improved upon in order for market participants to accurately monitor risks. This level of transparency would be particularly welcomed in light of the gradual release of the UMRs. Monitoring the collateral requirements across different sectors of the market would allow market participants to better plan their funding requirements.

Volume data shows that there is some evidence of markets preferring shorter dated products. Volumes in these products, particularly in USD, have strongly contributed to the increase in volumes we have seen between April 2016 – April 2019. These products tend to be more standardised and very well suited to the cleared environment. This shows that markets continue to show a strong preference toward standardised, cleared products where liquidity is greatest. The same can be said for the execution landscape, where there is a strong preference towards more electronic, and hence standardised, execution.

Finally, the report notes that the introduction of UMRs in FX markets, in particular, has driven two behaviours. Firstly, we have seen an increased adoption in NDF clearing, where volumes are growing at a much higher rate than any other area of FX. This is a particular highlight, since NDFs remain the only FX product that has seen a significant shift toward clearing.

Secondly in FX, UMRs have promoted positive behaviours in the market regarding active counterparty exposure management. This is achieved through the optimisation of bilateral risk factors to reduce IM. However, with the added complexity and costs of optimization, services have filtered down and market participants are now attracted by the fundamentals of FX Option clearing. Rather than optimise bilateral exposures, market participants are now executing FX Options in a cleared ecosystem. Multilateral netting and lower capital consumption in clearing have meant that it is more efficient and economical than bilateral trading.

7. ABOUT CCP12

CCP12 is a global association of 37 members who operate more than 60 individual CCPs globally across Europe, the Middle East, and Africa (EMEA), the Americas, and the Asia-Pacific (APAC) regions.

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

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

8. CCP12 MEMBERS



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