

INCENTIVES
FOR
CENTRAL CLEARING
AND
THE EVOLUTION OF
OTC DERIVATIVES

—

A CCP12
REPORT



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EXECUTIVE SUMMARY

Ten years after the G20 Leaders' commitment to reform over-the-counter (OTC) derivatives markets, this paper examines the progress made in central clearing with an emphasis on the incentives that are in place. It is intended to complement the Derivatives Assessment Team of the Financial Stability Board report, "Incentives to centrally clear over-the-counter derivatives".

The G20 tasked the global standard setting bodies with creating a new regulatory regime that would ensure that the financial sector was safer, simpler, and fairer. This wider goal included a package composed of interlocking and mutually reinforcing measures to enhance the resilience of institutions and end too-big-to-fail, both by raising capital and liquidity standards, as well as making the links between firms more robust and less likely to form a contagion channel. Given the large and opaque interconnection between firms created by OTC derivatives, policy makers and regulators decided that these should either be centrally cleared through Central Counterparties (CCPs), or come under stringent bilateral risk management standards. In addition to making the overall financial sector more robust and resilient, these measures would support other objectives, including greater transparency and more competitive pricing of risk.

At present, the OTC derivatives market is divided into four: mandatory centrally cleared markets, voluntary central clearing, uncleared OTC markets with regulatory risk standards, and uncleared OTC markets with optional or bespoke risk management. Given the public and common benefits of cleared markets, authorities sought to ensure that incentives existed for voluntary central clearing where this was suitable. As such, the relative costs and benefits to individual participants is of keen interest, and this paper contributes to evaluating these.

One of the key reforms being implemented into non-cleared markets has been to require sounder risk management practices similar to cleared derivatives markets, i.e. Uncleared Margin Rules (UMR), which require daily exchange of Variation Margin (VM) and/or Initial Margin (IM).

This paper shows that clearing rates for most products have been increasing steadily since the introduction of clearing mandates and UMR. This suggests that the current mix of mandates and incentive structure to clear is working as a whole, meaning that clearing is now the default choice for many standardized products. Not only are clearing mandates effective, but the data shows that markets are choosing to voluntarily clear non-mandated currencies, non-mandated indices and non-mandated products.

Clearing is evidently growing across both OTC Interest Rate Derivatives (IRDs) and credit asset classes. Foreign Exchange (FX) markets are lagging behind with only Non-Deliverable Forwards (NDFs) showing increased clearing. Further, no OTC option product has as of yet seen material clearing, even though both FX options and interest rate swaptions are amongst the largest uncleared derivatives products. Further incentives to clear may be necessary to provide a tractive force for these markets.

The market solutions that have been put in place to implement compliance with UMR are so far relatively untested across the broad spectrum of counterparties that will be captured in 2019 and 2020. The UMR readiness process and the CCP participation process is similar, though clearing generally provides risk, cost and efficiency benefits as compared to participation in uncleared markets. This means that CCPs now offer a substantially simpler trade life-cycle than that encountered in uncleared markets.

As a whole, the costs of clearing now compare favorably with the costs of implementing UMR across much of the trading lifecycle. This can lead to a fundamental shift in market mind-set.

Across three different products, three CCPs and multiple jurisdictions, this paper presents case studies that highlight the benefits of clearing to markets. Each case study on its own provides detailed explanations why the market chooses to clear certain products including without clearing mandates.

When assessing uncleared markets, this paper presents the increased trade procedural costs as a result of implementing UMR. These come from the requirements to implement rudimentary risk management processes across the entire life-cycle of an uncleared trade. These range from margin model implementation through to reconciliation and funding considerations. Set-up costs, including the custodial arrangements, further level the playing field when compared to the well-worn path of CCP on-boarding. It should be considered market best-practice to consider clearing as a complementary solution during all UMR projects.

In further studies, it would be helpful to have a focus on the clearing eligibility of legacy trades which have not yet been backloaded into clearing and an assessment of why this is the case. Data analysis such as this may provide more evidence as to why FX and options markets remain uncleared. These markets may need further incentives to clear.

CCPs provide market transparency through Public Quantitative Disclosure (PQD) while similar is done for the uncleared market with mandatory reporting to Trade Repositories (TRs). Post-trade transparency has made this study possible. As a result, much of the analysis of uncleared markets is based on transparent US markets. The industry is still lacking accessible post-trade transparency for the rest of the world, most notably Europe, given the size of its derivatives markets. In the future, improved accessibility to data, particularly for uncleared markets, is vital to be able to update and improve on studies such as this.

1. MARKET OVERVIEW

The Derivatives Assessment Team of the Financial Stability Board recently closed their consultation “Incentives to centrally clear over-the-counter derivatives.”

To further build upon this important work, we take a look at the current OTC derivatives market place, providing an in-depth look at the state-of-play across a broad array of asset classes, jurisdictions and product types.

We will use both public and private sources of data, with a particular focus on quantifying current market infrastructure with accessible, easy-to-replicate analysis.

To provide an in-depth analysis of cleared OTC Derivatives markets, we use the Clarus Financial Technology data products CCPView¹, SDRView² and SEFView³. Where appropriate, CCP12 members have provided complementary private data to augment the studies.

1.1 CENTRAL CLEARING RATES OF OUTSTANDING TRADES

Clearing mandates and UMR are two of the most visible policies that are being implemented by regulators across a number of jurisdictions since the Great Financial Crisis. These reforms have been enacted as a direct result of policy statements from the G20 after the 2009 meeting in Pittsburgh.

G20 reforms have also added considerable transparency to markets. We will use this added transparency to take a look at the current state of play in OTC derivative markets. This market transparency is vital for tracking both the implementation of reforms and their effectiveness.

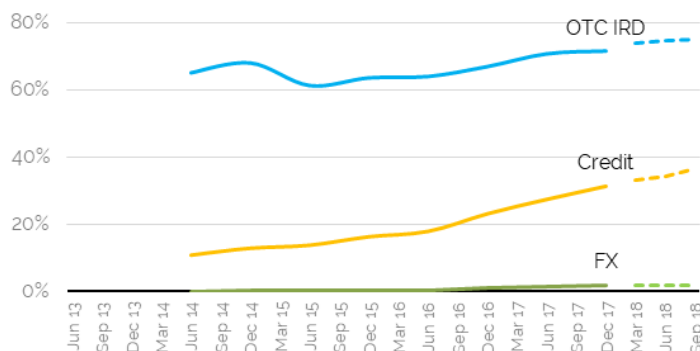
For example, to understand the market shift to central clearing, we need to understand how markets have behaved historically. Our first analysis therefore looks at the percentage of outstanding notional that is cleared. We find that in 2018, the uptake of clearing varies considerably by asset class. Up to 75% of outstanding positions are cleared in OTC IRDs, whilst 2% of outstanding FX notional is cleared.

¹ <https://www.clarusft.com/products/data/ccpview/>

² <https://www.clarusft.com/products/data/sdr-view/>

³ <https://www.clarusft.com/products/data/sefview/>

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. OTC IRDs, credit and FX make up the three largest asset classes.

OTC IRDs have the highest clearing rate. It reached 71% in December 2017, rising to 75%.

Credit markets see significant clearing also. It reached 31% in December 2017, rising to 37%.

FX markets have seen a doubling of clearing rates from 1% in 2017 to 2% in 2018.

Data sources and methodology: Uncleared data from BIS Semi-Annual OTC Derivatives Outstanding Surveys⁴. 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.

1.2 MARKET STRUCTURE – COMPRESSION AND BACKLOADING

Central clearing rates of outstanding trades provides a broad overview of clearing. However, the market structure of OTC derivatives is such that notional outstanding provides a very poor measure of market activity. Looking at trades outstanding does not sufficiently highlight the current state of clearing. Market structure issues that cause notional outstanding to be a poor measure include compression, backloading, and clearing eligibility. Furthermore, notional outstanding is a limited metric as it does not directly capture the risk or sensitivity of a single trade or portfolio.

COMPRESSION

Compression is the process of replacing existing gross positions with risk-equivalent packages that represent the net position. This significantly reduces the notional outstanding of OTC derivatives. Compression is not a level playing field across cleared and uncleared markets. It is significantly more efficient in clearing because:

⁴ <https://stats.bis.org/statx/toc/DER.html>

1. All market participants are governed by the same documentation in clearing – the CCP rulebook. This means that all trades are valued consistently. In the uncleared world, valuation adjustments (XVAs) are counterparty and Credit Support Annex (CSA) specific, introducing significant frictions to multilateral compression for uncleared trades.
2. Compression in clearing can be automated via the CCP – such as coupon blending. This can occur on a unilateral basis, further improving compression efficiency.

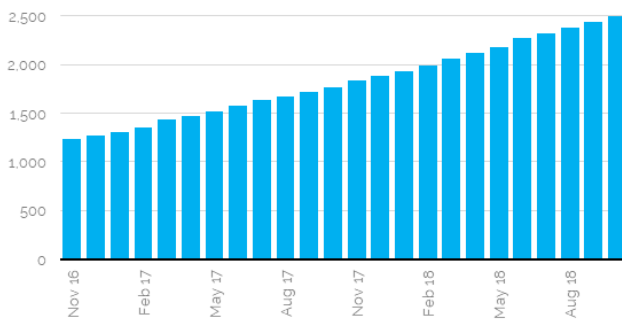
Question: Why are trades being compressed?

Answer: Leverage Ratio

Banks must hold additional capital against OTC derivatives as a direct result of the introduction of Basel III's Leverage Ratio (LR) requirements. Since 2014, LR has been calculated according to the Current Exposure Methodology (CEM). This is a gross notional measure, with very limited netting. Market participants are therefore strongly motivated to compress OTC derivative trades to reduce gross notional towards net notional.

Compression at LCH

LCH has compressed over \$2,500 Trillion of notional. Amounts in \$ Trillions



Compression in OTC IRD markets is particularly efficient and highlights why notional outstanding is a poor measure of clearing uptake and market activity.

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



LCH SwapClear announced in December 2018 that they had cleared \$1 quadrillion in new trades within a single calendar year. However, the impact on notional outstanding was only an increase of ~\$50 trillion. This is because whilst \$1,001 trillion of new trades were registered, \$700 trillion were compressed. Coupled with \$251 trillion maturing, we see that the net impact on notional outstanding was relatively small.

In total, LCH SwapClear has now compressed over \$2,500 trillion of notional.

Data source: LCH SwapClear

BACKLOADING

Backloading describes the process of clearing trades, which were held uncleared for a period of time after trading. To more efficiently manage the stock of outstanding trades, it is widely considered beneficial to backload as much of a bilateral portfolio as possible to clearing. This significantly improves operational efficiency and also improves the likelihood of old trades being compressed. Due to compression, when

trades are backloaded from the uncleared space they typically result in a lower notional in clearing. This therefore distorts the clearing rates of outstanding trades.

CLEARING ELIGIBILITY

Compression and backloading have been strong market themes since at least 2015. Using public data, it is difficult to ascertain what percentage of eligible trades has now been backloaded. Anecdotally, it seems that many of the eligible OTC IRDs have been backloaded. The remaining stock of trades in uncleared markets thus tend to be:

1. Ineligible for clearing: They may have unusual payment calendars that are not supported by a CCP, or may be in an asset class that is not cleared – such as exotic options.
2. Limited netting or compression opportunities: There may be limited benefit from backloading a directional client portfolio into a multilateral CCP if the portfolio is highly directional from a compression point of view. While there may be additional compression opportunities for the dealer as a result of a backload, the client may face additional margin frictions from backloading. This may come from higher margin requirements or stricter collateral-eligibility restrictions than they face in uncleared markets.

This also has the added impact of further reducing the likelihood of compression happening in uncleared markets. If all of the standardized, compressible stock of trades has already been backloaded into CCPs, it is even more unlikely that matching and offsetting positions can be found in uncleared markets.

Market dynamics also matter. There must be both sufficient liquidity and an appreciation of the clearing benefits for market participants to either transact new trades or even to backload old trades. We see this dynamic to a certain extent in FX markets, where only a portion of NDFs are cleared – and these are all novated post-execution. The larger portion of the FX market continues to favor a particular market dynamic whereby uncleared volumes are business as usual, and clearing is considered the “novel” option.

1.3 CURRENT CLEARING RATES

Current clearing rates rely on volume data (i.e. turnover in Bank for International Settlements (BIS) Triennial Surveys). Most jurisdictions have now enacted public trade reporting of OTC derivatives, allowing us to assess the impact of market reforms on trading activity.

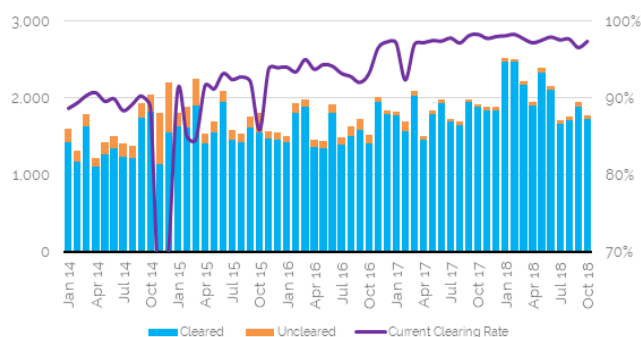
The first jurisdiction to implement public trade reporting was the US. We therefore have the longest history of data for this jurisdiction. The US has also implemented both clearing mandates (in two phases) and

UMR. Analyzing the data from this jurisdiction is therefore a great insight into the current market incentives to clear OTC derivatives.

Figure 2 Current Clearing Rates
As measured by DV01 transacted in USD equivalent amounts

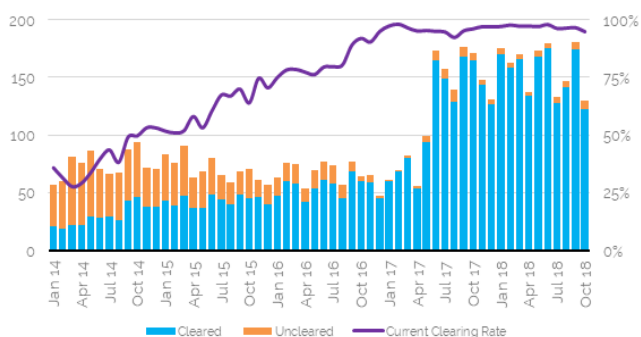
Clearing Mandate 1

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)



We track the percentage of risk traded across the major OTC IRD markets.

The clearing rates are calculated according to the DV01 of risk that is traded either cleared or uncleared. This delivers a maturity-agnostic way of monitoring volumes.

For the first four currencies to be subject to a clearing mandate, we saw that the clearing rate was at 90% during 2014 and 2015. This increased significantly from November 2016, after the first implementation of UMR in September 2016.

The expanded clearing mandate was implemented between January and April 2017. During 2014 and 2015 the clearing rate had already grown from 40% to 50%.

After January 2017, the clearing rate has been just as high as the four major currencies.

The expanded clearing mandate resulted in overall volumes increasing by over 250%. This, in particular, highlights the enthusiastic market embrace of the CCP model.

The current clearing rates for mandated currencies is 98%.

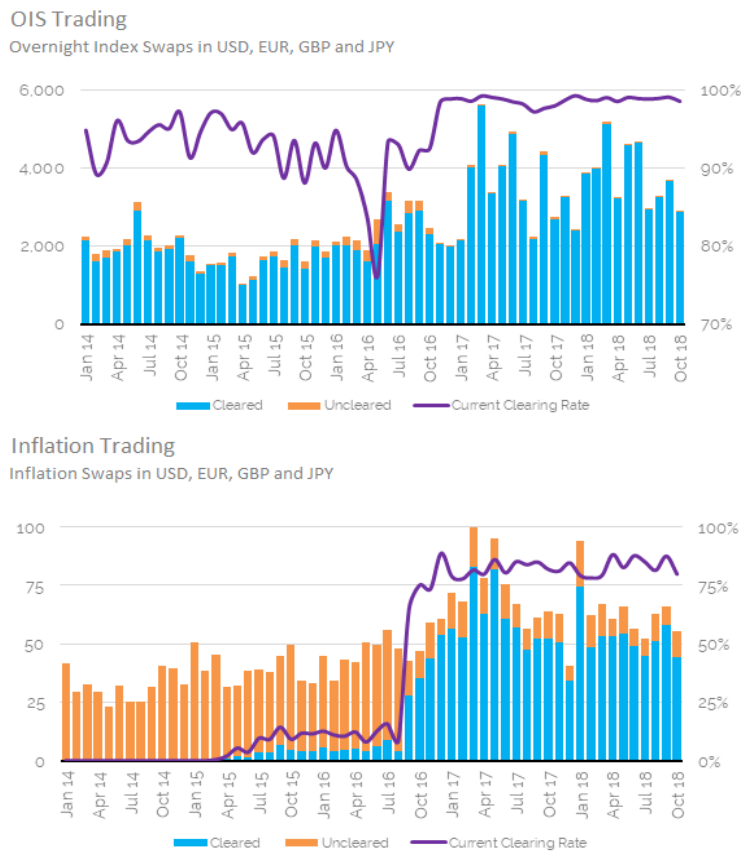
Data sources and methodology: SDRView is our data source. This uses SDR data sourced from Bloomberg, DTCC and ICE SDRs. DV01s are calculated according to industry standard conventions using ClarusFT analytics and expressed in millions of USD equivalent amounts.

Current clearing rates are 98%, showing that the market has embraced clearing. These rates are falling short of 100%. This is mainly due to clearing exemptions for some counterparties or for intra-group trades.⁵ We have analyzed the absolute amounts of DV01 traded across a broad time horizon to highlight that clearing mandates have had no negative impact on volumes traded. There have also been no counter signals to suggest that either volumes have fallen or that the market has chosen to trade a different product to circumvent the clearing mandates.

⁵ It may also be due to data reporting inaccuracies.

For the currencies covered by the expanded clearing mandate, quite the contrary is shown in the evidence. Volumes have increased substantially – a signal that the market strongly prefers to clear OTC IRD products.

Figure 3 Clearing Rates in other Swap Markets
As measured by notional transacted in USD equivalent amounts

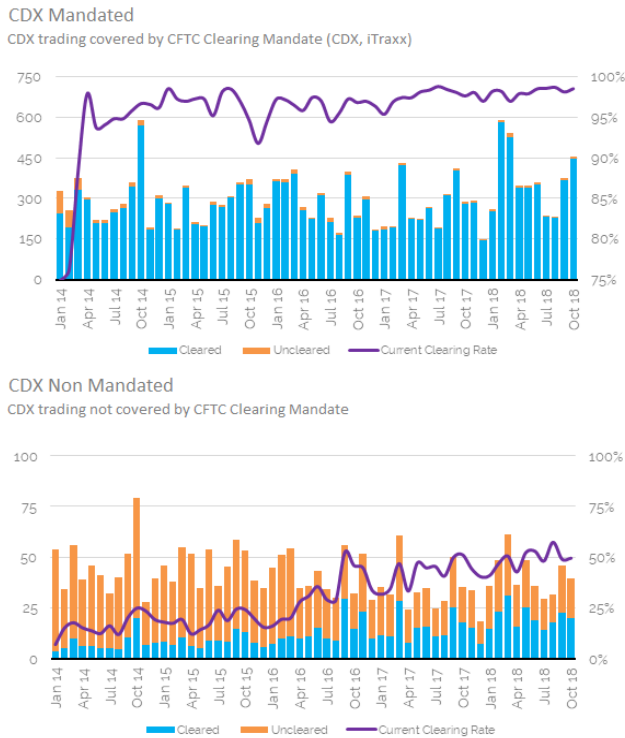


Data sources and methodology: SDRView is our data source. This uses SDR data sourced from Bloomberg, DTCC and ICE SDRs. Notionals are expressed in billions of USD equivalent amounts.

Current clearing rates can reach 99% even in the absence of a full clearing mandate – as seen for OIS. In addition, we have seen current clearing rates for inflation swaps significantly change in response to UMR. CCPs had offered inflation clearing for about 18 months prior to the UMR implementation date, but it wasn't until September 2016 that we saw clearing rates jump from 10% of the market to the 83% we see now.

Clearing rates are extremely high in mandated currencies. This is to be expected because it is a regulatory requirement to clear certain swaps. Overnight Interest Swaps (OIS) present an interesting case study, because mandatory clearing in the US is required only up to a 3-year maturity (previously two years). Nevertheless, **the market chooses to clear 99% of OIS notional**. Volumes have continued to increase in OIS trading after both the expanded clearing mandate and the implementation of UMR. Outside of mandated products, it is also important to monitor the clearing behavior of products that have been directly impacted by UMR. Inflation swaps are a great example. No CCP offered clearing in inflation swaps before 2014. During 2015 and early 2016, the Clearing rate of inflation swaps was just 10%. This jumped to 65% in September 2016 when UMR were implemented. The clearing rate is now at 83%. Importantly for the market, volumes have also grown since the move to clearing. For a liquidity-constrained market such as Inflation, this is a real success story for CCPs offering new products to market.

Figure 5 Current Clearing Rates in Credit
As measured by notional transacted in USD equivalent amounts



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.

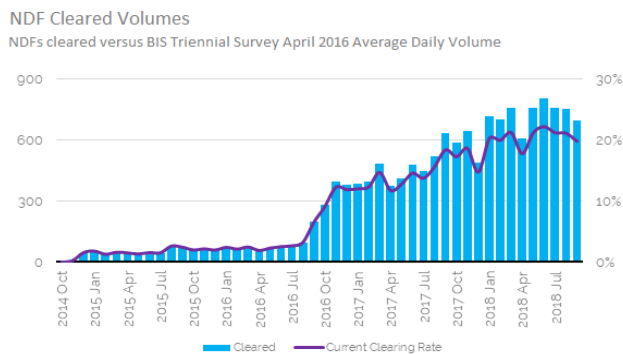
Current Clearing Rates are 97% in the mature CDX markets that are covered by the clearing mandate. This has been the case for some time. In non-mandated indices, current clearing rates are now approaching 50% and seem to be growing. This shift towards the majority of the market being cleared began with the implementation of UMR in September 2016.

Credit markets also have a clearing mandate under the Commodity Futures Trading Commission (CFTC). We therefore track the current clearing rate in Credit Default Swap Index (CDX) (trading Credit Default Swaps (CDS) versus an index) for both mandated and non-mandated indices.

For CDX covered by the mandate, the clearing rate has consistently been around 97%. This is a mature, cleared market that has seen little impact from mandated trading. In addition, volumes have been remarkably stable across the mandated products. The uncleared market is very small.

For CDX not covered by the mandate, we see a different story. The clearing rate in 2014 stood at 17%. This slowly increased up to 25% in the first nine months of 2016. Since the implementation of UMR in September 2016, we have seen the clearing rate increase significantly to 49% currently. Overall volumes have been stable.

Figure 6 Current Clearing Rates in FX
As measured by notional transacted in USD equivalent amounts



Very few FX products are offered for clearing by CCPs. It is therefore often unfair to characterize less than 2% of the market as being cleared. However, this is what we found previously when looking at notional outstanding data.

A fair measure of the uptake of clearing of FX products is to concentrate on the products that are available from CCPs. Predominantly these are NDFs.

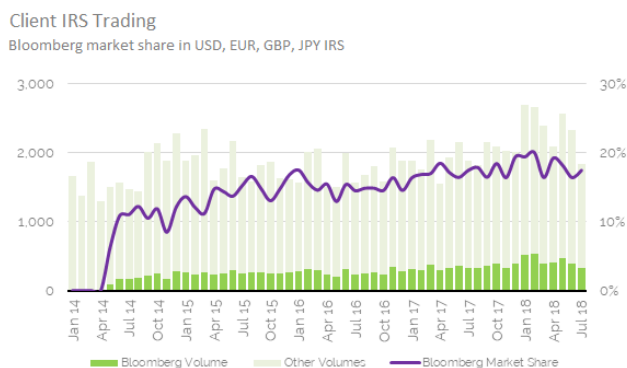
Uncleared data for NDFs is lacking, but we do know that the average daily volume in April 2016 was \$134bn. We can therefore look at the growth in NDF cleared volumes in relation to this known data point.

The current clearing rate of FX NDFs is 21%.

Data sources and methodology: Uncleared data from BIS Triennial FX Surveys⁶. Cleared data from CCPView. Single counted methodology used to prevent double counting of cleared trades.

Current clearing rates are 21% in the FX NDF market. FX NDF clearing has been offered since 2014, but prior to the advent of UMR in September 2016, clearing rates were just 2% of the NDF market. The clearing rate jumped in late 2016 to 10% of the market, and has continued to grow ever since.

Figure 4 Have rising Clearing Rates impacted Client Activity?
As measured by DV01 transacted in USD equivalent amounts



It is important to analyze the health of client activity during the implementation of market reforms.

One way of doing so is to measure the market share of risk traded on Dealer-to-Client (D2C) platforms. Bloomberg SEF, along with Tradeweb, is one of the prominent D2C platforms for rates. We can see that since April 2014, Bloomberg has consistently grown its market share. This has not been at the expense of Tradeweb. On the contrary, both platforms have enjoyed significant growth in volumes.

As clearing rates have risen, D2C activity has continued to grow.

Data sources and methodology: 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.

Increasing clearing rates have gone hand-in-hand with increasing client activity in IRS (interest rate swap) markets. This lends credence to the proposition that it is not just the largest market participants or the

⁶ <https://stats.bis.org/statx/toc/DER.html>

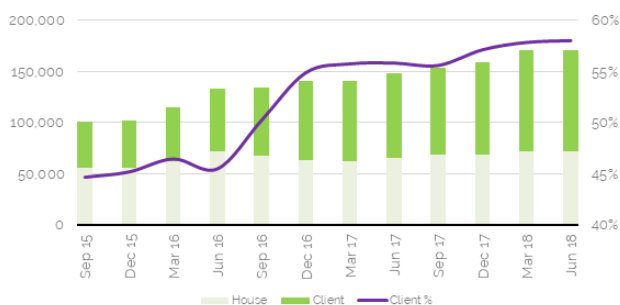
Dealer-to-Dealer (D2D) community who benefit from the shift towards cleared markets. Volumes have increased across the board.

1.4 INITIAL MARGIN HELD AT CCPS

As clearing rates increase, there is also a propensity for more of the market to choose to clear. This may not only be due to the inherent benefits of clearing (multilateral netting, central processing etc.), but also due to a concentration of liquidity into cleared products.

As a result of clearing mandates being phased in across different jurisdictions and the directionality of positions, clients have tended to lag behind the dealer community in their uptake of clearing. For the four largest IRS CCPs, we analyze the split of initial margin by house and client accounts.

Figure 7 Evolution of Initial Margin in Rates
As measured by Initial Margin amounts in USD Millions



Total IM held at the four largest IRS CCPs has increased steadily since September 2015.

For the dealer community, who typically trade via a “House” account at a CCP, their proportion of the total IM held at CCPs, has dropped. Dealers accounted for 55% of total IM in 2015, dropping to just 42%.

For clients, they now account for 58% of total IM held in OTC IRDs. The absolute amount of IM posted by clients has increased by 220% in the past 3 years. It is now at nearly \$100bn.

Data sources and methodology: CCPView disclosures. CCPView uses CPMI-IOSCO (The Committee on Payments and Market Infrastructures – International Organization of Securities Commissions) 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.

While clearing rates have increased, the absolute amount of IM held by dealers has increased by just 28% in the past 3 years. Conversely, client IM has increased over two-fold. The total IM held by the largest IRS CCPs has increased from \$100bn in 2015 to \$170bn now.

It is worth dwelling on why there is a difference in IM growth rates between members and clients in the past three years. After all, we know from looking at SEF trading data that there is no Client-to-Client (C2C) activity in IRS. Every trade that is transacted has a dealer on one side of it. Reasons that explain how there can be such a disparity in the growth rates of IM between dealers and clients are the following:

1. **Multilateral netting benefits.** A dealer will typically benefit from allocating more of their portfolio to cleared positions. Backloading old trades or transacting new trades against existing positions

mean that there is more chance of offsetting client positions that were previously held in bilateral markets, which can lower IM.

- 2. Clients have more directional positions.** This is a bit of a wide-sweeping statement, but generally, dealers will have less directional risk than clients due to their different role in the market.
- 3. It takes time for IM to build up.** Dealers may have been clearing positions at certain CCPs for decades. Clients are newer proponents of clearing, and it will take time for them to transfer positions into clearing houses.
- 4. Compression can reduce IM by reducing tails.** Dealers are larger users of compression techniques due to Basel III capital requirements and the nature of their business being more “two-way”. When using compression techniques, such as those offered by CME Group’s TriOptima or LMRKTS removing small amounts of delta risk can serve to reduce the overall amount of IM held against a portfolio. This is because these small amounts of delta risk can move a large amount during tail events.

1.5 UNCLEARED MARKETS

Clearing rates have increased across a broad array of products and product types. However, that is not to say that uncleared markets no longer exist. While it is more difficult to find data on the uncleared section of the market, SDR data under Dodd Frank has provided trade level transparency since 2013 for both cleared and uncleared trades.

As expected, volumes in uncleared space of standardized derivatives have fallen precipitously – particularly those subject to a clearing mandate. We know from previous analysis, however, that there remains a large stock of legacy transactions remaining uncleared. The proportion of these transactions that are vanilla, clearable swaps is impossible to know via public data, and it would be a useful exercise for a central authority, like the BIS, to shed some light on these legacy trades. If they are indeed “clearable” one needs to examine what are the barriers to backloading that we should look to overcome as an industry.

However, it is not only legacy trades that remain uncleared. There is also a vibrant market in products that have not yet adopted clearing. Broadly speaking, these can be considered FX products (excluding NDFs) and OTC options.

OTC options have been launched by CCPs, but there is not a single example of an options market successfully transitioning to a cleared model - yet. Options clearing is most notably offered by the CME (interest rate swaptions and cash-settled FX options) and recently LCH (FX options). So far, the market

has chosen to continue trading these products bilaterally. This is despite large volumes continuing to trade in exchange traded options across a variety of asset classes. It is a conundrum that should be solved.

1.5.1 FX OPTIONS

FX options in the major currency pairs regularly trade in excess of \$750bn per month – and these are just the volumes reported by US persons to SDRs. The BIS stated that the FX options market was \$254bn per day – equivalent to \$5.6trn per month - in April 2016⁷.

FX options have a particular treatment under UMR. The delta and volatility risk of the option are margined, and yet the vanilla delta hedges are exempt from margining requirements. This can cause particular motivations to create delta neutral packages of trades – for example by transacting NDFs on deliverable products. We have seen NDF trading on deliverable currencies increase since September 2016 to reach in excess of \$150bn per month.

This innovation in FX options trading shows that the market is willing to change and to adopt new products. It also shows the motivation inherent to reducing IM consumption. Yet it appears more motivation is necessary for this market to voluntarily choose clearing.

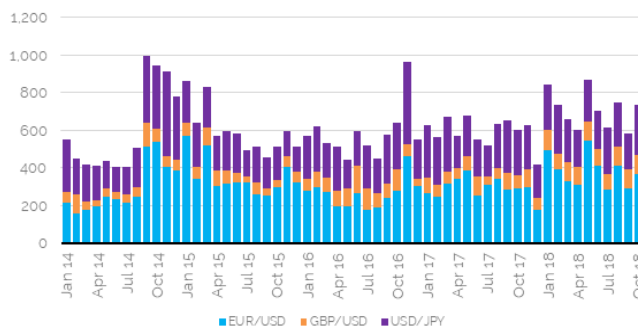
⁷ <https://stats.bis.org/statx/toc/DER.html>

FX Options Remain Uncleared

Volumes shown in millions of \$ equivalent per month

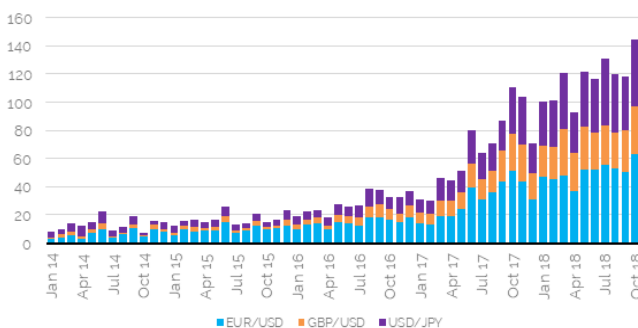
FX Options

Options reported in the three major currency pairs can reach \$1trn per month



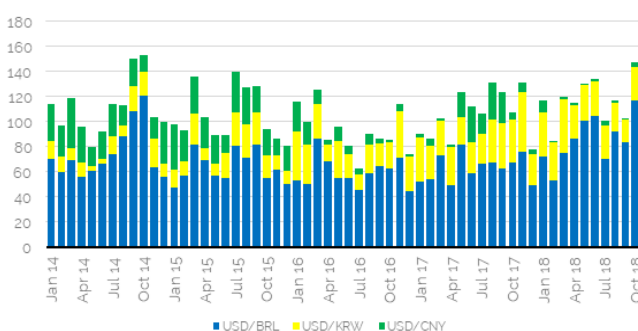
FX NDFs on Deliverable Currencies

Volumes have grown since the introduction of Uncleared Margin Rules



FX NDOs

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



Data sources and methodology: Data from SDRView.

1.5.2 SWAPTIONS

Swaptions (and their associated caps and floors) are a well-established market. The BIS published average daily volumes of \$163bn in April 2016, equivalent to a monthly total of \$3.6tn. We do not see the

Volumes across FX options in the three major currency pairs – EUR/USD, GBP/USD and USD/JPY have continued to be robust. We have seen no negative impacts on volumes since the introduction of UMR in September 2016.

However, what is noticeable in FX markets since the implementation of UMR is the development of an NDF market in deliverable currencies. When looking across the same three major currency pairs (EUR/USD, GBP/USD and USD/JPY), we see that monthly volumes now approach \$150bn in NDFs. The driver for these volumes must be IM management. Vanilla FX forwards and swaps are exempt from UMR, whilst NDFs are not. Therefore, trading an NDF in conjunction with an option allows for a delta neutral package to be traded. Both of the legs will be subject to UMR, therefore, the delta component of risk will be substantially reduced. Whether these NDFs are being transacted purely as optimization trades or at the time of trading the FX option is difficult to pin down.

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. These appear to have little or no impact to these volumes as a result of UMR.

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.

same volumes of trades reported to US SDRs (as this covers only the US persons market), but nevertheless, monthly volumes in option products regularly top \$1tn.

Again, we do not see any negative impacts on volumes from the introduction of UMR. However, we do note that the delta hedging requirements of swaptions (and other option markets) are impacted by clearing mandates.

Typically, a swaption is traded instead of a linear IRS product to gain exposure to the volatility of an interest rate. In the interdealer market, it is common to isolate this volatility component of the trade. This is achieved by trading a package of a swaption with a vanilla IRS. The size and direction of the vanilla interest rate swap is dictated by the underlying exposure of the swaption. A package traded like this can thus be thought of as “delta neutral” because the DV01 exposure on the IRS offsets the DV01 exposure of the swaption. The package has exposure only to the volatility of interest rates.

However, clearing mandates dictate that these delta hedges are typically subject to a clearing mandate in the major markets, and therefore cannot offset the delta risk in uncleared space. This may lead to a particular motivation to trade more options – in effect, trading synthetic swaps using volatility-neutral packages of swaption trades (the simultaneous purchase and sale of an option at the same strike, same expiration date).

There is some evidence⁸ of this behavior, but it is hard to measure the exact impact on volumes. More surprising is that, despite the delta hedges having to be cleared, the uptake of swaptions clearing has yet to take-off. The margin offsets alone appear to be economic-incentive enough, and yet volumes have continued to be small. Launched in April 2016, we have seen less than \$1bn of swaptions cleared in total.

Sufficient incentives to clear swaptions risk are therefore not in place yet, despite the fact that market participants are evidently motivated enough to optimize their uncleared margin requirements. This is a conundrum that regulators, CCPs and market participants should work together to understand and ultimately to resolve.

Recent research by the European Systemic Risk Board⁹ (ESRB) points toward there being positive correlations between portfolio size and the likelihood that any given trade is cleared. Coupled with the

⁸ <https://www.risk.net/derivatives/5290756/banks-turn-to-synthetic-derivatives-to-cut-initial-margin>

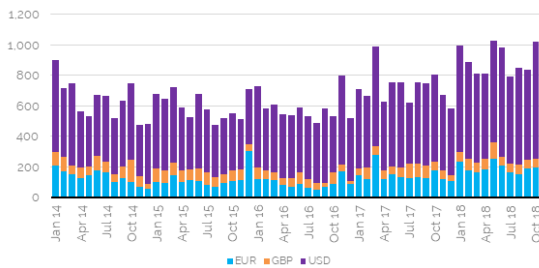
⁹ <https://www.esrb.europa.eu/pub/pdf/wp/esrb.wp72.en.pdf>

economies of scale, this is consistent with the idea that it is the largest market participants who should move to clearing first. The evidence in the swaptions market therefore suggests that these very large market participants still need added incentive to clear.

Swaptions Remain Uncleared
Volumes shown in millions of \$ equivalent per month

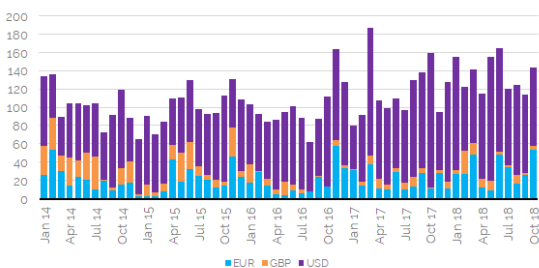
Swaptions

Options activity remains robust, with no obvious negative impacts from UMRs



Caps and Floors

Volumes have grown since the introduction of Uncleared Margin Rules



Data sources and methodology: Data from SDRView.

1.5.3 EUROPE

Clearing rates can be shown to differ across different jurisdictions and geography. For example, data from Trade Repositories (TR) in Europe is now becoming more widely available for us by regulators and academics. As a result, there are more studies being published based on European data than we have seen previously. One such study is the previously cited paper by the ESRB, “Clearinghouse-Five”.

The ESRB paper takes trade data from a large TR in Europe and looks at clearing rates in 2017. The findings of this paper serve to highlight that clearing rates are generally lower in Europe. This is likely because the regulatory reforms have been implemented at a much slower pace in Europe when compared with the US.

The ESRB clearing rates, appear to vary from those reported in this paper. On closer inspection we find them to be consistent with our findings. One must note that the ESRB is interested in finding out whether

Options activity in IRS markets has remained robust over the past four years, despite the introduction of UMR in September 2016.

Monthly volumes of swaptions have recently topped \$1trn across EUR, GBP and USD. This being US persons data reported to SDRs means that volumes are dominated by USD denominated products.

For the options market overall (swaptions plus caps and flows), it is most notable that 4 out of the top 5 monthly volumes have occurred during 2018. In each of these months, volumes have been over \$1.15trn in notional.

It has not been possible so far to calculate whether margin optimization activity has had an impact on volumes or not – at a more granular level, it may be evident that synthetic long positions are being constructed using same-strike packages. This area of research would be welcomed as it may shed more light on the current incentives to keep options risk uncleared.

mandates have driven market risk to move over. This highlights the importance of understanding the data at hand.

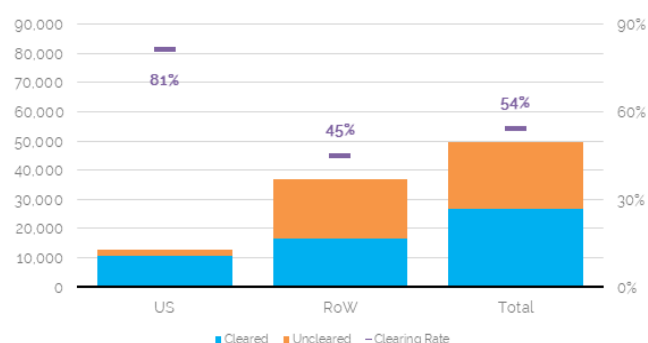
If we take for example OTC IRDS, the ESRB reports a clearing rate in May 2017 in Europe of just 50%. This clearing rate is calculated at an exceptionally high level – including option products, Cross Currency (XCCY) swaps and inflation that are ineligible for clearing. Our data is calculated at a product level and focuses on clearing eligible products.

European Clearing Rates

As measured by Total Monthly Volumes in USD millions

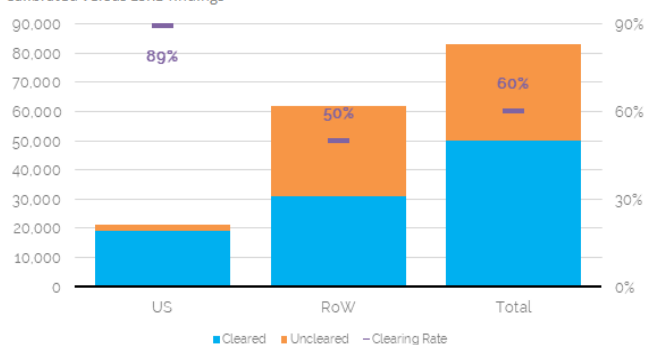
April 2016 Clearing Rates by Region

Calibrated versus BIS data



October 2017 Clearing Rates by Region

Calibrated versus ESRB findings



Clearing rates, if not measured on a per-product basis, can paint a very different picture of the market. This is even the case when considering a single asset class.

A case in point is when looking at OTC IRDs. Despite vanilla products in the major currencies having a mature cleared market, there are more complex products such as swaptions and XCCY swaps that continue to trade sizeable volumes – and that remain uncleared. This may also be the case for vanilla products in developing currencies as well, where clearing mandates are not yet in place.

If clearing rates are calculated across the whole product spectrum, we can see markedly different numbers. However, that is not to say that these clearing rates are contrary to the ones presented earlier. It is just that they are measuring a much broader array of products and currencies.

For example, the ESRB found that 50% of all OTC IRD products in Europe were cleared during October 2017. We can calibrate this versus the global cleared market using both CCP data and SDR data. This shows that 89% of the US market was cleared. By extension, 60% of the global market was cleared. Of the 11% portion of the US market that was uncleared, around \$1.75trn was in options products and XCCY swaps.

If we back-track to April 2016 and take the BIS measures of uncleared volumes, we find that 81% of the US market was cleared and just 45% of the Rest of the World (RoW) was cleared. This suggests a clearing rate of 54% for the entire global market.

Data sources and methodology: Uncleared data from BIS Triennial FX Surveys¹⁰ and ESRB. Cleared data from CCPView. US uncleared data from SDRView. Single counted methodology used to prevent double counting of cleared trades.

¹⁰ <https://stats.bis.org/statx/toc/DER.html>

2. TRADE PROCESSING

ISDA (International Swaps and Derivatives Association) and SIFMA (Securities Industry and Financial Markets Association) recently published a paper¹¹ in which they stated it would take 12 months for a typical phase four firm¹² to put the necessary infrastructure in place to be compliant with UMR. Of the necessary steps to be taken, it is notable that five of the seven all touch on trade processing, namely:

1. Custodial arrangements
2. Determination of in-scope trades.
3. Initial Margin model implementation.
4. Margin reconciliation
5. Liquidity and funding

We take a look at these processes in uncleared derivatives and examine the comparable structure for Cleared trades.

2.1 TRADE PROCESSING OF NON-CLEARED TRADES

The work to ascertain if a firm is in-scope, and what the CSA should look like, can be complex. It also has to be done in good time, to ensure that the necessary infrastructure is in place before UMR come into effect in a given jurisdiction.

Once UMR are “live” for a given counterparty group, bilateral derivatives must be valued daily, with the daily change in mark-to-market collateralized or settled on a T+1 basis. This can cause a huge operational burden on market participants. It significantly condenses the time to value, reconcile and settle daily changes. This burden is largely taken up by dealer banks, who tend to be the valuation agent on their trades. ISDA agreements can govern over 5,000 trades across multiple asset classes, making operational efficiency and robustness in this process vital to trade processing. However, one must note

¹¹ <https://www.isda.org/a/D6fEE/ISDA-SIFMA-Initial-Margin-Phase-in-White-Paper-July-2018.pdf>

¹² The compliance phases of UMR are based on average aggregate notional amount (AANA) of swaps, which equals the daily average of notional amount of swaps over June, July, and August of the previous year Phase 4 will bring into scope entities with more than \$750 billion AANA as of September 1, 2019.

that optionality in a CSA has value in itself, as the counterpart with optionality can adapt their collateralization to match their current cheapest-to-delivery collateral.

We take a look at the lifecycle of a non-cleared trade below.

2.1.1 CUSTODIAL ARRANGEMENTS

As ISDA and SIFMA state:

“UMR requires that in-scope firms segregate their regulatory IM at a third-party custodian. Since 2016, in-scope entities for regulatory IM have been required to open accounts, execute extensive documentation and build connectivity with the custodians offering UMR-compliant custodial services. These custodial arrangements require the negotiation and execution of custodial agreements and eligible collateral schedules, which have proven extremely time-consuming in the previous UMR phases.”¹³

Counterparties in uncleared markets have to sign a CSA with their trading participant. Therefore, every time someone enters into a new trading relationship a new CSA has to be negotiated. When using a CCP each clearing member has to establish a single collateralization framework with it and can trade with all clearing participants of the CCP.

2.1.2 DETERMINATION OF IN-SCOPE TRADES

A subtlety to any UMR implementation is how legacy and new portfolios will be managed. It often makes economic sense to prevent legacy portfolios from having to post IM. However, it would be preferable to have only a single VM call each day, across both legacy and new portfolios. With a CSA governing both VM and IM, this is difficult to achieve, therefore we have tended to see portfolio bifurcation. As highlighted in our upcoming section on costs, this has considerable impacts on funding and liquidity requirements.

However, portfolio bifurcation also leads to another complication – how are in-scope trades identified versus out-of-scope for UMR? This may be further complicated by the fact that a portfolio has to be operationally ready to be compliant, even if it does not pass the \$50m IM threshold. But once the portfolio passes the threshold, the counterparties must start exchanging IM – effectively in a retrospective manner.

¹³ <https://www.isda.org/a/D6fEE/ISDA-SIFMA-Initial-Margin-Phase-in-White-Paper-July-2018.pdf>

2.1.3 INITIAL MARGIN MODEL IMPLEMENTATION

To relieve some of the pain of reconciliation for IM calculations, the industry has settled on a single model to calculate IM for uncleared derivatives – ISDA SIMM. This prevents the situation of two counterparties having to reconcile two different models to calculate IM numbers. It also prevents differences in IM models between the two counterparties resulting in calculation differences. ISDA SIMM is a parametric Value at Risk (VaR) model, building heavily upon the Basel Committee on Banking Supervision (BCBS) work on the calibration of the Fundamental Review of the Trading Book (FRTB) standardized approach for market risk. To date, it is the only IM model with global regulatory approval.

Phase four and five counterparties also have the possibility to use a schedule-driven approach, but due to the limited offsets inherent in this methodology, it is likely to lead to higher IM consumption.

2.1.4 MARGIN RECONCILIATION

Margin reconciliation highlights how all portfolios must now be reconciled on a daily basis as a result of the UMR. IM must be calculated each day, involving:

1. Portfolio reconciliation: To get the right answer for IM, the portfolio of trades must match across counterparties. This can get complicated when you consider 24-hour markets such as FX options.
2. Risk factor reconciliation: These must agree across a given trade population. Market counterparties must agree that a given portfolio creates a particular risk exposure across a known number of risk factors.

With the vast majority of the industry using a single model to calculate IM, it should have relieved much of the pain in reconciling daily IM calls. However, portfolio and risk-factor reconciliation tend to be dealt with on an industry basis by TriResolve and AcadiaSoft respectively. TriResolve allows banks (and buy-side) to submit their portfolios of trades, to ensure that the population of trades is matching. AcadiaSoft allows for risk factor reconciliation across so-called ISDA SIMM CRIF (Common Risk Interchange Format).

These reconciliation steps carry a cost. These costs may come directly from the service providers (there is a license cost for ISDA SIMM, whilst both TriResolve and AcadiaSoft are run by commercial enterprises who therefore charge on a commercial basis). The costs may be indirect, as a result of increased time and effort to run the reconciliation exercises. The costs may be a one-off, from implementation work to connect to new third-party service providers. Or the costs may be on-going, from the implementation of new procedures or reconciling invoices from third-party providers.

Finally, there must be a clear process in place for dispute resolution. This can be particularly time-consuming. Whilst this has always existed for uncleared trades, the timelines in which dispute must now be resolved are considerably compressed.

All of these new processes result in new frictions and new complications being added to the uncleared business flow.

2.1.5 LIQUIDITY AND FUNDING

UMR add the operational burden of having to settle multiple VM calls each day across many different counterparties, all with different settlement instructions. This is one reason that many clients choose to collateralize entire multi-currency portfolios in a single currency. This reduces operational overheads significantly. Multi-currency VM calls can be met when made by a small number of CCPs each day, but if a client faces up to 17 VM calls across hundreds of counterparties every single day, it becomes an expensive operational overhead to maintain.

Economically, counterparties must also carefully consider their intraday funding profiles. When making multiple VM payments across multiple counterparties, market participants cannot rely on receiving their pay-ins before making their pay-outs. In a worst-case scenario, a counterparty may have to collateralize all of their losses before receiving their gains. This potential grossing up of intraday funding requirements can be complicated and expensive to manage. Multilateral netting in the CCP removes this problem.

It is also worth noting here that uncollateralized trades are now priced versus fully collateralized hedges. Dealers, seeking the best sources of liquidity, must generally hedge with either cleared instruments, or fully cash collateralized bilateral derivatives. Therefore, the potential funding exposure of these VM calls is passed onto clients at the point of execution. There is therefore little economic incentive to remain uncollateralized.

2.2 TRADE PROCESSING OF CLEARED TRADES

It is interesting to see how the uncleared world is evolving to look much more like clearing – particularly with the requirement to exchange margin (variation and initial) every day.

It is paramount to realize that the single largest difference between uncleared and cleared operational models is that clearing employs multilateral netting. This means that a single net payment can be sent to the CCP, and this will be sent on to multiple trading counterparties.

This removes the need to meet individual calls per trading counterparty every single day. This makes the multilateral processing of a CCP particularly efficient from a trade processing point of view.

2.2.1 ONBOARDING

There are certain parallels between the on-boarding work required to join a CCP and the new work required to be compliant with the UMR.

For example, a CSA does not need to be negotiated when joining a CCP. This can relieve a huge burden. CSA negotiation is difficult, and can be made even more difficult if the CSA may change the valuation of existing portfolios. With a CCP, there is a single rulebook to review. This governs everything from trade valuation to margin calls. The rulebook is the same for every member. CSAs, on the other hand, are complex legal documents that can consume significant legal resources.

Looking at this from a regional perspective, CCPs can often benefit from leveraging the local regulatory framework. The rulebook of a CCP will largely be driven by regulatory requirements, meaning that rulebooks can be substantially similar across CCPs, within a single jurisdiction. This makes it easier for end users to on-board to multiple CCPs.

The broader market can often lessen the burden of CCP on-boarding as well. Whether that is from FCM (Futures Commission Merchant) support for their clients, or from members identifying a need for a CCP to gain traction, there can be peer support to help new CCPs gain traction. This is a tangential advantage inherent in the “network effect” from multilateral clearing.

A further benefit from on-boarding to a CCP is the inherent scalability of the offering. If a market counterparty wants to trade with one or one hundred members of a CCP, the on-boarding process is the same. And the on-boarding process is the same, irrespective of the volume to be traded. This may not be true for uncleared markets, where the scalability of new arrangements may not necessarily be a given.

2.2.2 PAYMENT NETTING AT A CCP

The margin regime at a CCP has potential benefits compared to a bilateral trade operating under a CSA.

A CCP will net all payments due on a given day per currency. This means that coupons, price alignment interest/amounts, variation margin etc. are all handled via a single settlement instruction. This is markedly more efficient than the bilateral equivalent, where a coupon will be paid in full on one day, with a collateral return effective the next. For uncleared trades, this effectively results in two settlement instructions for a

single cash flow that could be netted (assuming the collateral is in the same currency as the underlying). It also means that different settlement instructions and accounts may need to be maintained across the trade itself and the collateral held. That is an overhead that you do not get with the CCP model. The CCP model also reduces Herstatt risk (settlement risk) due to this netting.

This netting of cash-flows has further benefits for counterparties who may need to employ multiple accounts under a single legal entity – e.g. fund managers who operate an account per fund. In the clearing model, a single settlement instruction can be issued, with the CCP apportioning the payments down to the account level. This is far more efficient than issuing settlement instructions for every single account.

Similarly, client service providers (i.e. FCMs) can benefit from netting, by making a single margin payment on behalf of all of their clearing clients. This simplifies operational overhead.

Finally, CCPs can help to make non-cash collateral transfer far more efficient. A CCP operates a single account at a Central Securities Depository (CSD) with sub accounts per member. This provides a particularly elegant means for non-cash collateral to be transferred between members.

2.2.3 TRADE CAPTURE AND AFFIRMATION

A contemporaneous clearing eligibility check can act much like a “sanity check” to the economic details of a trade, post affirmation. This benefit carries substantial insurance against e.g. a fat finger mistake or a simple clerical error on holiday calendars.

Across different asset classes, affirmation platforms act as a gateway to clearing. It is essential for these platforms to support the clearing workflow. In OTC IRDs, where affirmation is overwhelmingly dominated by a single platform (Markit), clearing is mature and it is a well-supported and understood workflow. Indeed, support has recently expanded into Asian hours, highlighting that affirmation platforms remain a key part of the global derivatives workflow.

However, in FX, where clearing is still gaining traction, we see a diverse range of affirmation platforms. Some support clearing, some do not. This can be further complicated by the difficulties in matching across different affirmation platforms. This is a classic problem that a centralized CCP model could help resolve – assuming both affirmation platforms support the clearing workflow. Support in Asian time zone for the large Asian NDF markets by some of these FX affirmation platforms is not as developed, which can

hinder the regional uptake of new workflow protocols, such as clearing. This helps to explain why much of the NDF clearing occurs post-trade.

It is interesting to witness the interplay between different areas of market infrastructure. OTC IRDs markets show that affirmation plays a pivotal role in the life-cycle of a trade, and has successfully integrated clearing into this model. Where affirmation is dislocated, with numerous different providers, clearing has not yet been integrated into the workflow in quite such a successful manner. This may be one area that could enhance access to clearing for all market participants.

2.2.4 PORTFOLIO MAINTENANCE

Due to multilateral netting, the processing of trade lifecycle events is much more efficient at a CCP. This is highlighted by the netting of a coupon payment versus VM return, resulting in a single net settlement instruction – instead of three in uncleared markets. There is an on-going maintenance fee at a CCP that incorporates the costs of maintaining trades – processing fixings, updating market data and issuing these settlement instructions per day. These costs are typically levied per line-item and are transparent, with pricing schedules publicly available per CCP. Outsourcing the lifecycle management of a trade to a CCP substantially alleviates the burden of portfolio maintenance. This leads to substantially reduced costs – members need only to reconcile cash flows.

Trade and post-trade reporting needs sophisticated system architecture, which can handle the timely exchange of all information required for daily workflows and regulatory compliance. Institutions have to build reporting solutions with each of their counterparts in the uncleared markets. CCPs ease this process as each market participant has to build only a link with the CCP and obtains the full information on their trades and related risk and collateral from a single source.

2.2.5 VARIATION MARGIN

CCPs act as the valuation agent of their trades, and will issue margin calls based on these valuations. Already, we have simplified that process when compared to uncleared markets – there is no choice of margin model to make, no assignment of valuation agent, no worries over reconciliation or disputes. A CCP call is irrevocable.

Any margin call can lead to concerns over liquidity and funding, even on an intraday basis. CCPs alleviate this by accepting margin in a range of currencies (EUR, USD, HKD or CNH¹⁴ for example). Other CCPs recognize the need for multiple VM calls a day – some European CCPs can make three or more intraday margin calls if required. This adds to the stringent risk management standards that all CCPs operate.

When comparing to uncleared markets, much of the reliance on third-parties to calculate and reconcile VM is removed, because the CCP acts as the golden source of the trade. This is key when considering set-up costs and implementation efforts – on-boarding to a CCP is a one-time overhead that will be stable (and scalable) once active. The same cannot be said for the shifting landscape of infrastructure required to manage multiple bilateral relationships in uncleared markets.

We can witness that dispute resolution is difficult in uncleared markets. It can be a slow and cumbersome process, which must now operate on substantially compressed time horizons. The valuations of a portfolio can be complex, and can be different depending on the exact client and the CSA they operate under. At a CCP, everyone operates under a single discounting regime, with valuations governed by a common rulebook. This makes valuations simple, predictable and above all stable. Whilst margin calls from a CCP are indisputable, the valuation framework itself fundamentally reduces the reasons for disputes.

2.2.6 INITIAL MARGIN

A CCP recalculates IM every day. Counterparties have no specific requirement to replicate this calculation. The margin call is non-negotiable. This removes much of the processing required that ISDA SIMM entails, because the CCP is the “golden record” of trade population, removing many of the reconciliation steps.

A CCP is also able to provide far more services in terms of IM calculations and support. These include:

- Intraday margin calculations with real-time data.
- CCPs maintain and design sophisticated in-house margin methodologies. These capture the underlying risk in the best possible way and may also provide for comprehensive portfolio margining.

¹⁴ CNH refers to offshore Chinese Renminbi.

- CCPs have expert teams that can help explain margin calculations, margin calls and other aspects of the margin model. This provides additional transparency as members can actively use CCP support channels to solve specific scenarios.
- CCPs provide detailed reports on both an intraday and end of day basis, allowing members to reconcile margin figures in a transparent and efficient manner.
- CCPs can create margin add-ons, including concentration risk and wrong way risk multipliers, which can account for portfolio specific risks. This may not be possible for a “one-size fits all” bilateral model.

2.2.7 POST TRADE COMPRESSION AND PORTING

Compression can be much more efficient in a standardized CCP model. This is because all trades are governed by a common CSA, and all trades have the same counterparty – the CCP. This increases the efficiency of multilateral compression and leads to further regulatory capital reductions than in the bilateral world.

CCPs are also able to offer direct large-scale self-service compression, such as netting, that can operate at a minimal cost. This reduces the need for market participants to on-board to another third-party provider. It can also be offered in an automated manner, for which participants have to choose to opt out. This operational simplicity for compression could not be replicated in bilateral markets.

For compression, gross notional reduction has been the main value driver. However, we note from a trade processing perspective that there are added operational efficiencies inherent in reducing the number of line items at a CCP. This can have the direct benefit of reducing portfolio maintenance charges, but also reducing operational overhead. A simple portfolio in clearing has a lower reconciliation burden than one with multiple line items. An automated manner of unilateral compression is particularly beneficial for buy-side clients, who otherwise may struggle to meet the operational burden of processing multilateral compression runs. In this way, the buy-side is able to take advantage of the operational efficiencies that result from compression.

From a dealer’s perspective, the gross notional reduction and counterparty risk management benefits of multilateral compression are obvious. However, when a third-party provides compression services, there are certain trade processing elements that may act as a barrier to further efficiencies. These include implementing the precise valuation regime of a CCP and the need to limit any changes in margin that result from a compression run. These obstacles can be removed if compression is run directly by a CCP itself, making the whole process more efficient.

Cleared trades can also be ported from account to account, or from FCM to FCM. From a margin optimization perspective, this porting of trades can be beneficial for end-users. It is a far simpler task to arrange for these trades to move between FCMs, than it would be to novate from one uncleared trading relationship to another. This is because, during porting, the valuation of the trade stays constant – it always remains under the same rulebook at the same CCP. It is simply the clearing broker that changes. The same cannot be said of bilateral trading relationships, which will operate under different CSAs. Coupled with the fact that each bilateral trading relationship will have a different portfolio associated with it, and hence different funding considerations, there is very likely to be a valuation change when novating trades between bilateral relationships.

Porting can also be used to change the legal entity being used to face a CCP. Rather than entering into complex bilateral negotiations to change legal entity, this can be done multilaterally at a CCP.

Porting has also been utilized to action account-to-account transfers post-trade. This allows e.g. fund managers to execute one order en-masse and employ post-trade allocation to match the risk to the appropriate funds – even across multiple clearing brokers.

2.2.8 MARKET ACCESS

One differentiator between cleared and uncleared markets is how the market itself is accessed. For clearing, most market participants will have to access the CCP via a client services provider (or FCM). This relationship is not required in uncleared markets, although of course the requirement to employ a third-party custodian now provides somewhat of a parallel.

FCMs could help to improve access to cleared markets by improving standardization across the industry. This could be in the form of two different approaches. A starting point is to offer standardized fee schedules for a given CCP, making it easier and more transparent to compare the cost of service across multiple providers. This is in line with how CCPs make their fees public.

The second aspect would be to standardize trade processing, which in turn would make porting easier. This would have the added benefit of reducing a potential cause of market instability if an FCM itself were to default.

2.2.9 DEFAULT MANAGEMENT

Finally, there are benefits inherent to trade processing if a market participant defaults. In clearing:

- A market participant may be required to participate in an auction process. These are standardized processes, which are benchmarked at least once a year via a “fire drill” procedure and are well understood.
- Otherwise, a market participant sees no change in their operations. Their risk does not change. They continue to make the same payments and margin calls as previously.
- Crucially, the risk profile of their portfolios has not changed. They continue to face the same CCP.

In uncleared markets, this is fundamentally different:

- A market participant must decide the point that a counterparty defaults.
- There is a fundamental change in risk profile.
- The market risk of old trades must be replaced.
- Suitable counterparties must be found to step into old trades. In times of stress, such as a market participant defaulting, very careful risk assessments of all surviving counterparties must be made. Market participants may choose to pay a premium to trade exclusively with “stronger” counterparties.
- Valuations of the defaulting portfolio must be conducted (which can be very lengthy in practice, often extending into many years to finalize), in order to make a claim on the defaulting counterparty’s estate.

2.3 TRADE PROCESSING CONCLUSIONS

Cleared versus uncleared derivatives is a natural comparison to look at, but it should not be considered as a choice – it is not an “either/or” decision. When considering UMR, the list of trade processing steps for bilateral derivatives can look daunting; indeed, the implementation work required to achieve compliance should not be underestimated. However, these same types of operational and funding considerations have often-times been held up as a barrier to clearing for certain areas of the market.

In reality, the choice is neither as simple nor as clear-cut as choosing one over the other. These different areas of the market are complementary to one another. This is evident in the evolution of new cleared products, which sit in harmony with the uncleared markets.

The processing of uncleared trades can be considered more onerous after UMR. When this processing has to occur across a multilateral web of counterparties, it can be cumbersome. The operational efficiency that a CCP can introduce when the risk is cleared instead is considerable. There is no need to maintain multiple custodial arrangements, nor determine which trades are “in scope” at a CCP. A CCP will reconcile portfolios and calculate IM and VM amounts on a member’s behalf. And thanks to multilateral netting, it is likely that funding and liquidity needs will be lower in clearing.

Post-trade efficiencies can therefore be a driver of cleared volumes. And this post-trade efficiency can be achieved without any changes to markets at the point of execution. This is a vital consideration when we consider that market liquidity continues to be a concern. Clearing mandates require a significant portion of the market to be cleared at, or close to, the point of execution. Post-trade efficiencies within clearing are achievable without impacting execution and in the absence of clearing mandates.

The inherent post-trade efficiency of the clearing model makes CCPs an enticing choice for the market. CCPs also offer robust risk management frameworks, inherent scalability as well as a stable valuation framework. As we have shown in the data, the market is increasingly choosing clearing – these post trade processes and efficiencies help to highlight why.

3. CASE STUDIES

With our background established, we can see that clearing rates have increased substantially across a number of asset classes. To examine in detail why, and what the particular incentives have been to cause this increase in clearing rates, we present four case studies. We would also like to draw our reader’s attention to some niche markets and peripheral impacts of the current regulatory regime.

3.1 CASE STUDY SUMMARY

CCP	Product	Value Drivers
LCH ForexClear	Non-Deliverable Forwards	Multilateral netting; UMR; unique FX risk factors; pre-existing solution.
HKEX	Cross Currency Swaps	Multilateral netting; default risk management; credit line utilisation; settlement risk management.
CME	Latam IRS	Multilateral netting; product innovation; portfolio margining; high volatility currencies

3.2 ASSET CLASS COMMENTARY

The case studies intentionally look across different asset classes and different jurisdictions. This is because there are different incentives to clear across different geographies and products, despite the fact we operate in a global market.

3.3 FOREIGN EXCHANGE

UMRs exempted most FX risk from IM. However, for a CCP to ensure settlement finality, these FX risks must be margined when these same products are cleared. This creates a particularly interesting dynamic when considering the incentives to clear FX products.

NDFs are a large market, but they are not the largest FX instrument (by notional traded or gross market value). It must be examined why did the market chose NDFs, in particular, to voluntarily clear after the implementation of UMR.

Physically settled FX products, and the FX component of XCCY swaps, are not required to be bilaterally margined. However, because NDFs trade as a contract for difference, with the price differential settled in USD, they were captured by the requirement to post IM against their FX component.

Almost all counterparties are currently using ISDA SIMM to calibrate the amount of IM that they must hold under UMR. ISDA SIMM dictated that, for a typical NDF, 7.9%¹⁵ of notional would have to be held as IM.

NDFs also typically reference emerging or controlled currencies. This leads to a unique risk profile for CCPs to manage, including potential de-peg risks. These fat-tails must be carefully considered within any margin model, including ISDA SIMM.

This meant that NDFs were somewhat uniquely positioned as large consumers of IM.

XCCY swaps have a unique market dynamic. UMR have dictated that resettable XCCY swaps are highly efficient in terms of IM when they remain bilateral. However, for the Hong Kong market, the combination of non-resettable products, legally enforceable netting and a stringent credit risk management approach has made clearing of cross currency attractive to the market.

3.4 OTC INTEREST RATE DERIVATIVES

OTC IRDs are the most mature of the asset classes in terms of clearing reach. With 70%+ of notional outstanding already cleared, and with 80-90% of new business being cleared, further impetus to clear may have been hard to engineer.

However, we have seen a dramatic shift towards more clearing in OTC IRDs, particularly since the introduction of UMR. Major currencies such as USD, EUR and GBP now see 98%+ of new OIS risk being cleared – despite only having limited clearing mandates in place. Similarly, inflation swaps have no clearing mandate and yet a significant portion of the market is now cleared.

However, the most dramatic rises in cleared volumes can be seen in Latin American (Latam) currencies. These volumes have accelerated significantly post-September 2016 and we look into the reasons why CME has the largest market share in these currencies.

¹⁵ <https://www.isda.org/a/IAiDE/ISDA-SIMM-Methodology-version-R1.0.pdf>, this has since increased to 8.1% under ISDA SIMM v2.1 as part of the annual recalibration exercises.

3.5 NON-DELIVERABLE FORWARDS AT LCH FOREXCLEAR

NDFs are the most commonly offered FX product by CCPs.

Our first case study looks at LCH ForexClear. NDFs vs USD were launched in 2012.

When we look at the uptake of clearing in NDFs, we find that it was originally very slow. Monthly volumes at ForexClear, as recently as April 2016, were as low as \$37bn. This was across 12 currency pairs. To put this in perspective, Comder (Comder Contraparte Central S.A.) cleared \$18bn in Chilean Peso alone (see box). Looking at the overall NDF market¹⁶, only 2% of the market was being voluntarily cleared.

In September 2016, the first requirements to post IM in bilateral markets came into effect as part of the global roll-out of UMR. In this same month, volumes at ForexClear increased 3.5 times from the April nadir, hitting \$197bn in cleared notional. The service has never looked back from that point, recording frequent record volumes. \$804bn of NDFs¹⁷ were cleared in June 2018.

We outline below certain incentives that aligned to move a significant portion of the NDF market towards clearing. It is important to understand these incentives, as well as their impacts on the market place.

FX RISK IS GENERALLY EXEMPT FROM UMR

NDFs are a large market, but they are not the largest FX instrument (by notional traded or gross market value). Why did the market choose NDFs, in particular, to voluntarily clear after the implementation of UMR?

The Case for Netting – Comder and the Chilean Peso Market

When looking at incentives for clearing, it is important to remember the fundamental benefits offered by a CCP. Focusing on recent regulatory reform risks distancing ourselves from the *raison d'être* of CCPs. We highlight NDF trading at Comder as a prime example of the value inherent in the CCP model.

Comder clears NDFs versus Chilean Peso of more than \$20bn per month. There are no clearing mandates and no UMRs in Chile. However, when you look at the bilateral market in Chile, you will find that there is no legally enforceable netting and very restricted credit lines.

Comder provides the market with a stable legal framework, centralized counterparty credit risk management and the ability to multilaterally net positions across a broad array of market participants.

Crucially, Comder did not rely on market reforms to bring these advantages to the market. The commercial case for central clearing certainly stands on its' own two feet.

¹⁶ The total size of the NDF market is taken from the BIS Triennial Survey April 2016, which reported an NDF ADV of \$134bn, equivalent to a monthly total of \$2,814bn.

¹⁷ We quote only single counted volumes in this whitepaper to make volumes comparable to reported bilateral trading.

UMR exempted physically settled FX forwards and spot FX from IM. Another physically settled FX product, XCCY swaps, were also exempt from calculating margin on their FX component of risk. This still left significant portions of the FX market subject to UMR – including NDFs and FX options.

NDFs trade as a contract for difference, with the price differential settled in USD. They are therefore not a “physically settled” FX product, and as such they are captured by UMR.

Almost all counterparties are currently using ISDA SIMM to calibrate the amount of IM that they must hold under UMR. In September 2016, ISDA SIMM calibrated a risk weight of 7.9%¹⁸ of notional for a typical NDF. This is the amount that would have to be held as IM.

This meant that NDFs were set to become large consumers of IM under UMR.

Multilateral Netting

Multilateral netting is the main driver in reducing IM costs. Standalone margin amounts may be higher at a CCP for any given product. However, exposures are grossed up in bilateral space, leading to much higher IM requirements across a portfolio of trades.

Multilateral netting at a CCP condenses all exposures to a single counterparty, reducing IM. This is particularly beneficial for CCP members who do not carry large directional positions, such as dealer banks.

SHORT-DATED RISK

NDFs are mainly short-dated (1 month and less), therefore it is not legacy books that are the potential large consumers of regulatory capital or IM – it is new trades that expire quickly. There were hence no market concerns from dealers around bifurcating new business versus old between cleared and bilateral markets.

EXISTING SOLUTION IN PLACE

LCH ForexClear had been live and operational since 2012. Small volumes were being cleared each month, and crucially members were familiar with the service and had previously transacted across it.

Crucially, UMR changed the operational aspect of trading uncleared NDFs. The rules introduced substantial overheads into this area of the market for counterparties captured by the rules, making trading and trade processing more painful. New, compliant collateral agreements had to be signed, agreeing to

¹⁸ <https://www.isda.org/a/IAiDE/ISDA-SIMM-Methodology-version-R1.0.pdf> this has since increased to 8.1% under ISDA SIMM v2.1 as part of the annual recalibration exercises.

post VM and IM on a T+1 basis. Within that 24-hour time-frame, counterparties must agree their portfolio of trades, reconcile risk factors and agree on valuations. This is operationally cumbersome, with any disputes leading to the possibility of increased capital consumption and further costs.

It was therefore a far more efficient and eloquent solution to use a CCP instead. As well as the multilateral netting benefits inherent in the CCP model, it also removed considerable operational overhead. Transacting across a CCP means that a multilateral portfolio attracts only few VM calls per day and one IM call. This is much simpler to deal with operationally, than having to make multitudes of payments and IM calculations across multiple counterparties.

It is also noteworthy that LCH ForexClear benefitted from its' global presence. From both its' product coverage (Asian and Latam NDFs) to the global nature of the membership, it meant that all of the 20 counterparties covered by the first wave of UMR in September 2016 could be serviced by a single venue. This was far more attractive than using one CCP for Asian NDFs, and one for e.g. Latam NDFs. As well as the operational aspect, it also allows for far more portfolio netting. This further simplifies for NDFs in particular because all VM is calculated and called in USD, allowing for a single VM call per day across all currency pairs.

This is before we even consider the multilateral netting benefits on IM. It therefore made immediate sense for the D2D community to send as much volume as it could operationally handle across the service after the advent of UMR.

A GLOBAL FOOTPRINT TO SERVICE THE ENTIRE FX MARKET

As the data shows, NDF clearing has been highly successful. Over \$800bn has been cleared in a single month during 2018. Comparing to global D2D flows, this could be up to 32% of the market.

These impressive volumes should be considered against a backdrop where only a limited number of counterparties are currently captured by UMR – around 26 Phase 1 and 2 counterparties¹⁹. Clearing of NDFs has a much larger footprint than those covered by UMR – 32 counterparties and growing. It is evident, therefore, that a portion of the market is choosing to voluntarily clear their NDFs, even when not captured by UMR. This is a telling endorsement for the LCH ForexClear offering.

¹⁹ <https://www.isda.org/a/oQmEE/ISDA-Margin-Survey-Full-Year-2017.pdf>

The evolution of NDF clearing to date has been very similar to the early days of IRS clearing. It is largely a D2D activity right now. We also see that it is a post-trade process. SDR data in particular shows that very few transaction level reports indicate that NDFs are cleared at the point of execution.

It seems inevitable that the change as the market matures will matter. NDFs can really be considered a starting point for FX clearing. Whilst counterparties having to post IM against their portfolios have a direct economic burden to consider, all counterparties posting VM to multiple counterparties have an operational overhead to manage. This is far from straight-forward and has associated costs with it. It is simpler, more secure and more reliable to make a single VM payment to a single CCP each day.

VM exchange will be, for some counterparties, reason enough to on-board to clearing FX. However, it is also worth noting that both the clearing model and the prime brokerage model²⁰ are co-existing harmoniously side-by-side under today's market infrastructure. That is a key consideration for many active market participants, highlighting that whilst clearing has gained traction, it has not disrupted end users and how they trade.

Indeed, it is very likely that clearing and prime brokerage will continue to co-exist harmoniously for some time to come. Prime brokerage providers will find that it is beneficial for them to clear the "house" side of the trades, due to multilateral netting benefits, whilst continuing to fully service their clients on the other side of the trade.

By extension, once a CCP has a footprint in the FX market, it makes sense to leverage that footprint into other products. The same clearing, settlement and operational infrastructure can then be used to clear multiple different types of FX product, without any additional work. Clearing is inherently scalable.

With the implementation of the CLS CCP session this year, we have seen LCH ForexClear now make inroads to other areas of the FX market. FX options, another large consumer of bilateral IM, have been clearing across ForexClear since July 2018. Along with FX options come the requirement to clear the delta hedges of the options, meaning that ForexClear can now accept FX forwards and FX spot into clearing. All of these are physically settled products, meaning that the type of product the market trades is unaffected. However, they all leverage the same clearing infrastructure that has made NDFs a success. The plan is evident – if you can clear NDFs it should be straightforward to use that same process to clear

²⁰ Prime brokerage describes the process of offering various financial services to qualified clients in the bilateral universe.

more of your FX portfolio. Less reconciliation, more operational efficiency, more multilateral netting benefits add up to make FX trading leaner and more cost effective in the future.

Figure 8 NDF Clearing is a Dealer Activity
Number of Bank Participants at LCH ForexClear



CPMI IOSCO disclosures from ForexClear show that the number of clearing participants continues to grow. It has now risen by 40% since 2015. All of this growth has come from bank participants, highlighting that clearing remains a dealer market activity.

It is also worth noting that not all of these bank participants are general clearing members. There is a group of 11 general clearing members, many of whom offer client clearing services to the other 21 members of the service.

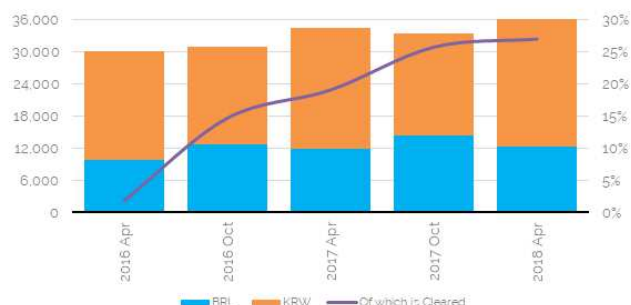
Data sources and methodology: CCPView disclosures. CCPView uses CPMI-IOSCO quarterly disclosures to track a range of data published by CCPs on a quarterly basis.

That clearing has been embraced by the dealer community is not a surprise – they are most used to clearing across other asset classes, were already participating in the ForexClear service and potentially had the most to gain from multilateral netting to reduce their bilateral margin requirements.

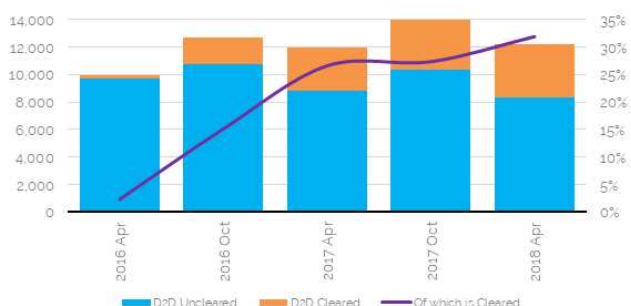
Central bank survey data on the FX markets shows that the two largest NDF markets have current clearing rates of between 25% and 35%. Almost all volume growth now originates in the cleared markets.

Figure 9 NDF Markets in Detail
As measured by Average Daily Volumes in USD millions

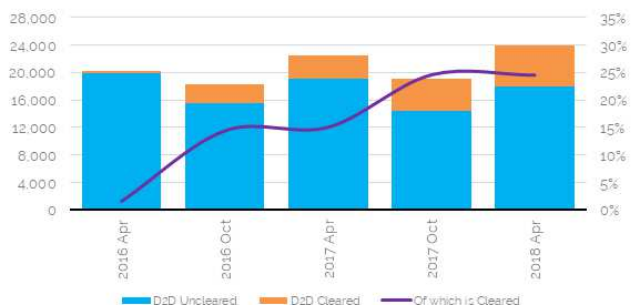
D2D NDFs in BRL and KRW
Average Daily Volumes and Clearing



BRL Interdealer Market
All volume growth is coming from Cleared volumes



KRW Interdealer Market
Clearing has reached 25% of the largest market amid stable uncleared volumes



Data sources and methodology: CCPView cleared data. Uncleared NDF market data is taken from the UK, US and Japanese central bank FX surveys. All data is shown as average daily volumes in USD million equivalents. For easy comparison to the BIS Triennial Survey, the BIS reported an average daily volume of \$134bn of NDFs across all currency pairs. The central banks reported \$147bn.

MARKET IMPACTS – INITIAL MARGIN ANALYSIS

Inevitably, this strong market uptake of clearing in the D2D community has resulted in increased IM held at ForexClear. Since September 2015, IM has increased from under \$500m to \$6bn as at June 2018. This is clearly a significant increase. However, it must be put in perspective. The dealer community is

Six central banks conduct FX market surveys of the largest counterparties in their local markets every six months. For the surveys conducted in the UK, US and Japan, the volumes are broken out by NDFs and currency pair. This allows us to monitor NDF volumes in both USD/BRL and USD/KRW on a periodic basis. These three surveys are also split by dealer volume.

Across the three centers, we find that cleared volumes at ForexClear account for 27% of D2D trading in USD/BRL and USD/KRW. This has grown from just 2% back in April 2016. Much of this growth can be attributed to UMR.

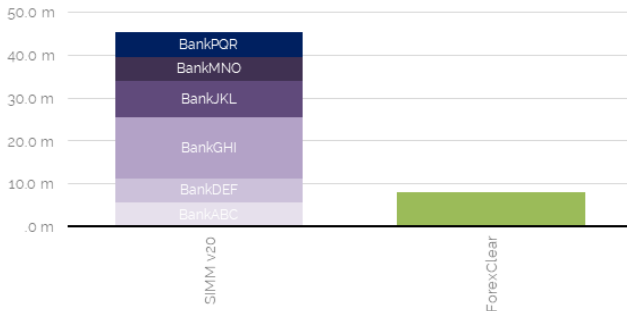
When looking at the BRL market over the past two years, we note that overall volumes have increased whilst uncleared volumes have decreased. This highlights the importance of clearing to this market – all volume growth is now being driven from cleared markets. This is a very important trend – it highlights that overall market volumes have not been negatively impacted by UMR. It also highlights the strong adoption of voluntary clearing in the dealer community.

It is a similar story in the KRW market. Overall market volumes have grown by 18% in the past two years, and yet uncleared volumes are lower in this time period. All of the growth is being driven by cleared volumes.

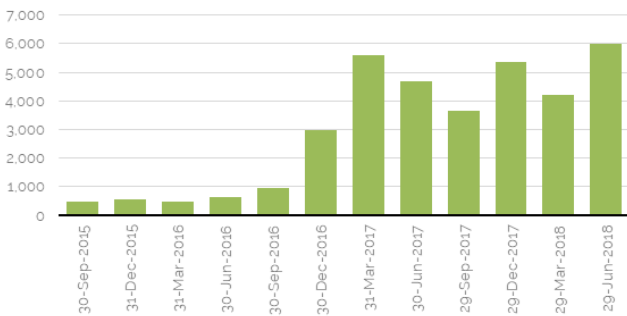
As of April 2018, we estimate that 32% of the D2D market is cleared in USD/BRL. In USD/KRW, 25% of the D2D market is now cleared.

choosing to clear at ForexClear since the implementation of UMR. We can only surmise, therefore, that the increase in IM held would have been many multiples greater if these trades had remained bilateral.

Figure 10 Initial Margin comparisons
ForexClear multilateral netting offers IM reduction of 82% on simple portfolio



Initial Margin held at ForexClear
Volume growth leads to increased Initial Margin



Standalone IM amounts for NDFs may not look compelling when comparing bilateral and cleared markets. For example, a \$10m USD/BRL 1-month NDF has an IM requirement under ISDA SIMM of 8.1%, compared to ForexClear at 7.9%.

Standalone comparisons such as these do not explain the dealer community’s appetite for clearing. This is because they ignore the multilateral benefits of the CCP model. Take for example a net position of +\$10m in USD/BRL. This may be split across 5 different counterparties, with a gross position of \$80m. In such a scenario, the IM requirement at a CCP would be around 1/8th of the bilateral requirement.

Generally speaking, we can show that the saving in IM at a CCP is the ratio of gross to net positions for an NDF portfolio. This does of course increase the IM being held at the CCP. But we can only posit how large this IM would have been if the trades remained bilateral.

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.

3.6 CROSS CURRENCY SWAPS AT HKEX

XCCY swap clearing at HKEX provides us with a case study to investigate the dynamics between cleared and uncleared markets.

HKEX was the first CCP to offer XCCY swap clearing. It was able to bring a solution to market thanks to the unique RTGS²¹ that operates in Hong Kong.

INTRODUCING HKEX OTC CLEAR

HKEX OTC Clear was founded in 2011 with 12 founding share-holder banks. It provides a platform to connect international banks and local Chinese banks to clear OTC derivatives in both global and RMB currencies. HKEX OTC clear is the only CCP outside of mainland China to accept PRC-incorporated banks as direct clearing members. The CCP develops products that are tailor made to Chinese banks.

In addition, the CCP is fully recognized by multiple overseas regulators that enable international dealers to be onboarded. HKEX OTC Clear is therefore able to develop RMB related products that bridge international dealers with Chinese banks.

A natural consequence of this strategic placement for HKEX was the development of XCCY swap clearing. XCCY swap products are traditionally intensive from both a credit risk and settlement risk perspective. By acting as a multi-lateral netting node between international and Chinese banks, HKEX has been able to provide both capital benefits and relief on credit line restrictions for participants.

SETTLEMENT RISK

One of the major hurdles to FX clearing has been the management of settlement risk between clearing members. HKEX is in a unique position amongst CCPs because it has direct access to the RTGS in Hong Kong. This settlement network settles HKD, EUR, CNH and USD. This arrangement allows HKEX to directly manage settlement risk in XCCY swaps across these four currencies.

²¹ RTGS = Real Time Gross Settlement system. This is how money is settled from one bank to another.

LOCAL MARKET DYNAMICS

HKEX is uniquely positioned amongst CCPs. It acts as the gateway between local Chinese banks and the international banking community. This enables international banks to alleviate credit constraints to PRC-incorporated counterparties. XCCY swaps are particularly credit intensive due to their initial and final exchanges of notional. They also introduce significant settlement risks on both inception and maturity. HKEX relieves credit and settlement risks through multilateral netting across counterparties. This is particularly attractive to international liquidity providers who may have offsetting positions with multiple counterparties. Clearing at HKEX is also attractive for directional market participants because netting is not enforceable under Chinese law at an ISDA master-level agreement.

XCCY swaps therefore lie at the center of the HKEX value proposition. They are naturally cross border products. They entail the transformation of international USD or EUR funding into local CNH or HKD funding – therefore most XCCY swaps will be between a local Chinese bank and an international bank. And yet they require large credit and settlement limits, which are difficult to maintain when the local jurisdiction does not support legally-enforceable netting across derivatives portfolios.

HKEX therefore successfully launched XCCY swap clearing at the beginning of October 2016.

PRODUCT SCOPE

A XCCY swap describes a host of different product types:

- Floating-Floating “Basis” swaps with Fixed Notional (aka non-resettable basis).
- Floating-Floating Resettable Basis Swaps. The FX rate is reset to market every three months, with the USD notional amount changing and the difference in FX rates cash settled in USD.
- Fixed-Float (always non-resettable).
- Fixed-Fixed (always non-resettable).

The different product types have particular market dynamics. If we look at the largest 8 currency pairs²², we find that:

- The interbank market trades a resettable basis swap.

²² EUR, GBP, JPY, CAD, AUD, CHF, NZD and SEK vs USD as per SDR data.

- Customers trade a variety of structures, but outside of hedge funds and other speculative accounts, do not trade resettable swaps.

Turning this towards the HKEX product offering, we find that the structures most frequently traded in USD/CNH and USD/HKD are;

- The interbank market trades floating USD Libor (London Interbank Offered Rate) versus fixed CNH or floating HKD Hibor (HongKong Interbank Offered Rate). The notional amounts are fixed for the life of the trade at current spot at the time of execution.
- Customers may trade a variety of structures, but also predominantly trade the same USD Libor versus fixed CNH or HKD. Again, the notional amounts are fixed for the life of the trade.

It is important to consider this particular product dynamic in the local markets for HKEX. This is because UMR have been implemented in a very specific manner for XCCY swaps. It means that the HKEX local markets exhibit a different dynamic to those in other major currency pairs.

UNCLEARED MARGIN RULES

XCCY swaps are given particular treatment under UMR²³. They state:

“1.2 Initial margin requirements for cross currency swaps do not apply to the fixed physically settled FX transaction associated with the exchange of principal of cross currency swaps.”

What the rules do not state is how this should be implemented at a trade level. This was one of the obstacles that ISDA faced when including XCCY swaps into their ISDA SIMM model. To date, ISDA SIMM remains the only model to have received regulatory approval for IM.

When we look at how ISDA SIMM removes the FX element of a XCCY swap, we find there are two approaches. One is applied to resettable swaps, and the other to non-resettable XCCY swap.

For a fixed principal (non-resettable) XCCY swap, ISDA states that the notional exchanges (and any amortizations) should be removed from the trade cash flows. This leaves only the coupon cash flows.

Amending the cash flows to create a coupon swap in this way changes the risk profile of a XCCY swap. Rather than exposure to the cross currency basis risk factor, a coupon swap exhibits sensitivity to interest

²³ <https://www.bis.org/bcbs/publ/d317.pdf>

rates in both currencies, plus a large FX position. This complex web of risk sensitivities means that fixed notional XCCY swaps can be large consumers of IM under ISDA SIMM.

For a resettable XCCY swap, the notional exchanges are only removed for the known notional exchanges. To ensure that this does not introduce an unwarranted FX risk onto the trade, we remove the known amounts at the start and end of the current period, and leave the rest of the trade as-is. This approach retains the traditional risk profile, which is almost exclusively on the cross currency basis risk.

Under ISDA SIMM, cross currency basis risk is a single risk vector, meaning that all maturities are netted together. It has a relatively low risk factor of 21 basis points²⁴. Resettable XCCY swaps are therefore efficient in terms of ISDA SIMM IM amounts.

It is worth noting that the risk factor is consistent across all currency pairs – ISDA SIMM does not correlate different basis risk factors for high and low volatility pairings. This may underestimate the tail risks for emerging market currencies, particularly those which are pegged. If a peg were to be suddenly lifted, the resulting volatility in the FX rate (as it finds a new market-led equilibrium) would also likely result in sharp moves in the cross currency basis.

INCENTIVES TO CLEAR VARY ACROSS MARKETS

The different treatment of products under ISDA SIMM can therefore lead to unique incentives to clear in certain markets.

It also highlights that bilateral markets can continue to flourish under the right conditions and the correct calibration of an IM model.

As UMR have highlighted, XCCY swaps inhabit a unique place in the market – partially interest rate product, partially FX product – and so they need to be treated in a particular manner.

Physical FX products are exempt from UMR, therefore it is only correct that XCCY swaps are granted the same exemption. Otherwise, we could see trading shifting between FX and cross currency products, resulting in less effective risk management.

²⁴ <https://www.isda.org/a/zSpEE/ISDA-SIMM-v2.1-PUBLIC.pdf>: “The risk weight for any currency’s cross currency basis swap spread is 21.”

UMR need to continue to motivate the correct risk management approaches, and avoid motivating market participants to try and find the most favorable IM treatment.

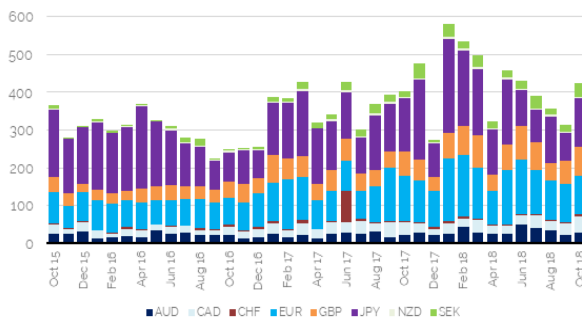
The local market dynamics for traded cross currency products, coupled with the need to optimize credit risk management, have hence combined at HKEX to result in a meaningful uptake of cleared XCCY swaps.

Figure 11 Cross Currency Swap Volumes

As measured by monthly volumes in USD millions

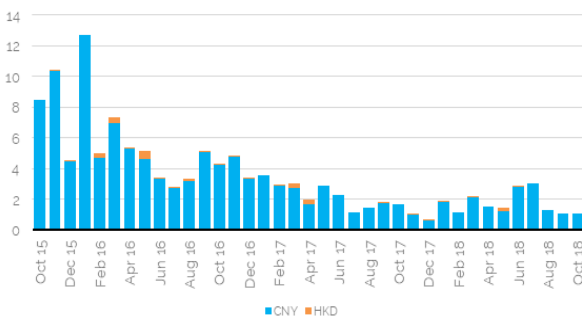
SDR "G8" Cross Currency Basis volumes

Monthly volumes across the largest 8 currencies vs USD



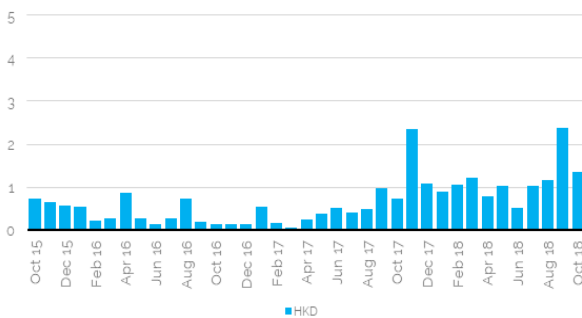
SDR Asian Cross Currency Swap volumes

Monthly volumes in CNY and HKD vs USD



SDR HKD Resettable Basis Volumes

Monthly volumes in HKD basis



SDR data provides the most complete picture into the daily XCCY swap activity across the market. It does not provide a complete market picture, but it is considered highly representative.

Looking at the largest 8 currency pairs versus USD, we see that cross currency basis volumes, as measured by notional traded, has flourished in the past 3 years. Record notional amounts were transacted in the month of January 2018, and all of the top five months have occurred since November 2017. This is after the introduction of UMR. This shows that uncleared markets are continuing to operate successfully, even in the face of increased IM consumption. Therefore, it does not appear that there is an incentive to clear the major currency pairs in the cross currency basis market. However, we see a markedly different pattern of volumes when we look at both USD/CNH and USD/HKD. These are fixed CNH or fixed HKD vs floating USD structures. The volumes have decreased from \$10bn per month to barely \$1bn per month.

Conversely, we have seen an uptick in trading of USD/HKD basis swaps. It is very interesting to see that the floating-floating USD Libor vs HIBOR product has seen an increase in volumes since UMR were introduced. Is this because resettable float-float basis swaps have a much lower risk factor under ISDA SIMM?

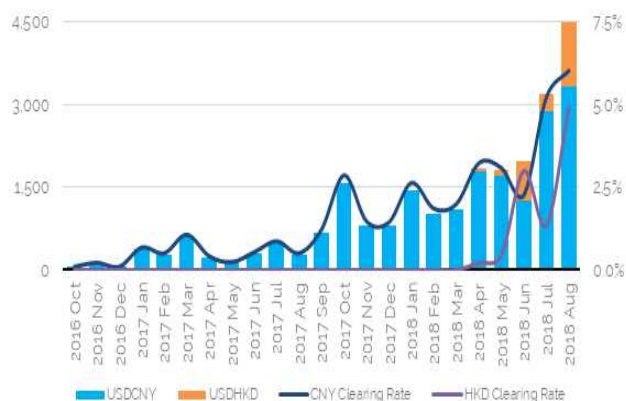
It is hard to answer that question directly, but the difference in the volume trends between the two different product types suggests that it may be so. However, it could also be due to changing market structure (e.g. Asian cross currency pairs being traded and reported by non-US persons) or simply that USD rates are now higher.

However, we note that these declining volume trends in USD/CNY have also been noted in the Bank of England (BoE) FX surveys. In April 2016, the average daily volume of USD/CNY XCCY swaps reported to the BoE was \$133bn. By April 2018, this had gradually dropped every six months, to just \$19bn.

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.

About six percent of the XCCY swap market is now cleared at HKEX. This is a prime example of the market pro-actively choosing a cleared solution in a particular market and for very particular reasons. This clearing rate is particularly impressive when put in perspective of shrinking volumes elsewhere in USD/CNH.

Figure 12 HKEX Cross Currency Swaps
Significant Growth in cleared volumes in 2018



Monthly volumes in XCCY swaps at HKEX in USD/CNH and USD/HKD reached \$4.5bn in August 2018. This has seen significant growth since launch in October 2016.

USD/CNH monthly volumes have consistently grown, and the launch of USD/HKD has been a success, with a total of \$2.4bn traded in the 6 months since launch.

The BIS Triennial survey from back in April 2016 published monthly volumes of \$55bn in USD/CNY and \$24bn in USD/HKD. We know that London based volumes in USD/CNH have shrunk dramatically since that survey (from \$2.8bn to \$400m). Therefore, our estimate of a clearing rate at 6% in USD/CNH and 5% in USD/HKD should be considered minimum rates, as volumes in uncleared markets may have shrunk since April 2016.

Data sources and methodology: Uncleared data from BIS Triennial FX Surveys. Cleared data from CCPView. Single counted methodology used to prevent double counting of cleared trades. The BIS combine CNH and CNY volumes into a single measure.

THE INCENTIVES TO CLEAR OUTSIDE OF REGULATORY REFORM

We therefore conclude our overview of cross currency markets by highlighting two market dynamics:

- 1) Uncleared markets have continued to flourish for the major 8 currency pairs. This is undoubtedly a good sign that UMR have had no unintended consequences for products without an alternative.
- 2) Where cleared alternatives do exist, such as for USD/CNY and USD/HKD, it has not only been an IM consideration that has driven the uptake of clearing.

As we examine under our costs section below, the decision to clear cross currency risk at HKEX is unlikely to be driven solely by IM considerations. Multilateral netting can help to reduce the IM burden of clearing physical FX products, but it is likely that IM will be higher at a CCP when the cleared XCCY swap portfolio has material FX delta risk. This is because the FX component of XCCY swaps is exempt from UMR.

It is therefore worth noting the precise value drivers that have led the market to clear 1 in 20 trades at HKEX.

- Default management

XCCY swaps in bilateral markets carry counterparty risk. In the event of a counterparty default, the surviving market participants must re-place the defaulting trades. However, these trades will have to be done at market rates. In the case of XCCY swaps, this will typically lead to a mismatch in funding profiles compared to the original trades. This must either be managed, or off-market trades reinstated. As we looked at under ISDA SIMM, the FX component of a XCCY swap does not have any IM held against it. Therefore, if a counterparty defaults, there will be little margin to fall back on for the bilateral portfolio.

When the trades are cleared, the situation is fundamentally different. Market participants benefit from having a single net exposure to the CCP. This net exposure does not change if a counterparty defaults. Instead, the CCP manages the default process. The CCP guarantees the trades to maturity, including the settlement amounts on the XCCY swap initial and final exchanges. This has further benefits for the wider market, because the CCP is able to centrally risk-manage the whole of the defaulted portfolio in one place. This avoids counterparties competing with each other to find replacement trades in stressed market conditions.

- Settlement risk management

In bilateral markets, settlement risk is particularly large on the final exchange date of a fixed notional swap. The FX rate for these exchanges could be significantly different to current market, and any collateral held against the position will only be returned the day after settlement. Therefore, there will always be one side of the trade who must make a deeply out-of-the-money payment – which carries significant settlement risk if the other market participant fails to make their payment. HKEX is able to manage this risk by operating a payment-versus-payment settlement system via the local RTGS. HKEX also guarantees the risk of these notional amounts, ensuring settlement finality from the point of novation to the clearing house.

- Net funding

In bilateral markets, settlement amounts are grossed up – a counterparty must make all payments to all counterparties independently of each other. This means that if a market participant has two off-setting settlement amounts on the same day, they will still need to fund each of them individually. This is not the case if the trades are cleared, where the CCP is the counterparty for every trade. In clearing, the market participant could net fund all of their settlement obligations, no matter how many other clearing members they have traded with.

- Multilateral netting

Whilst IM at a CCP could be higher on a standalone basis for a XCCY swap, a CCP member is able to multilaterally net their exposures across many counterparties. In bilateral space, their IM

amounts are grossed up across all of their counterparties. This can be particularly attractive for dealers, who may not have directional portfolios, as well as for counterparties who can actively manage their net FX delta in clearing.

- Credit limit management

When the XCCY swap is successfully novated to the CCP, a market participant has only one credit relationship to manage – and that is to a very well capitalized CCP. The CCP takes particular care and attention that all members and clients are credit worthy and robust institutions. Market participants are therefore able to lessen constraints by credit line and tenor that may exist in bilateral markets for long-dated XCCY swaps.

- Legally enforceable netting

There is uncertainty in the enforceability of close-out netting for Chinese legal entities of banks.²⁵ This results in global banks having to gross up their exposures to Chinese banks, resulting in much larger utilization of both settlement lines and credit limits. Due to the multilateral netting employed at CCPs, this problem disappears in the cleared world. If netting is not possible in a particular jurisdiction, it also means that banks no longer worry about bifurcating their cleared versus un-cleared portfolios. It becomes beneficial for them to send the nettable risk into a CCP.

- Capital requirements

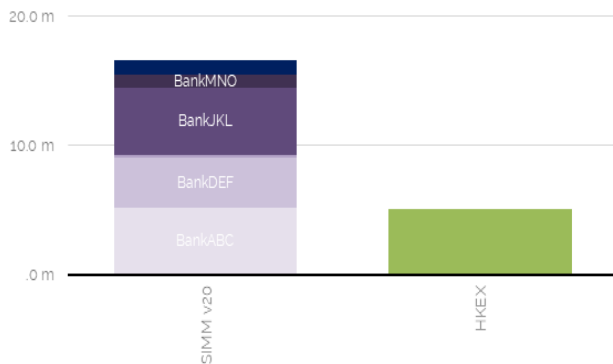
The Risk Weighted Assets (RWA) of any given XCCY swap are significantly lower when it is facing a CCP. This can be from a Credit RWA perspective (risk weighting of just 2% for a CCP), and from a Leverage Ratio perspective due to multilateral netting (and compression opportunities), helping bring gross notional down closer to net notional.

MARKET IMPACTS – INITIAL MARGIN ANALYSIS

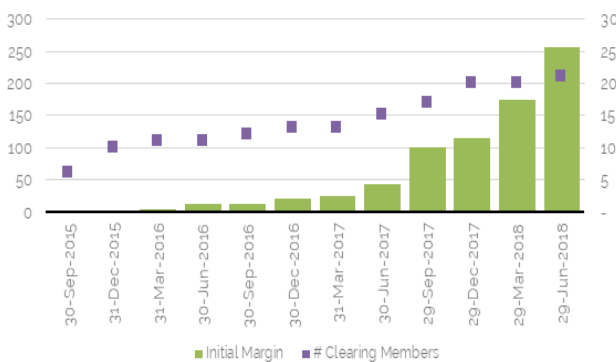
The uptake of Clearing in the D2C community has resulted in increased IM held at HKEX. Since March 2016, IM has increased from under \$5m to \$257m as at June 2018. This is a much smaller increase than we saw for NDFs. We compare IM metrics at HKEX and under ISDA SIMM.

²⁵ <https://www.isda.org/2017/03/31/steps-on-the-way-to-china-netting/>

Figure 13 Initial Margin comparisons
Initial Margin higher in clearing due to FX protection provided during default



Initial Margin held at HKEX
More Initial Margin is spread across a greater number of clearing members



Standalone IM amounts for XCCY swaps tend to be larger for cleared markets. This is because a CCP guarantees settlement finality for the life of the trade, and hence guarantees the FX exposure until maturity.

The difference can be large for resettable XCCY swaps in major currency pairs. However, it may be smaller for a pegged currency, such as USD/HKD.

For example, IM for a \$100m USD/HKD 5y resettable XCCY swap under ISDA SIMM is ~\$1m, compared to HKEX at \$1.4m. However, multilateral netting benefits at HKEX means that this 40% difference in standalone IM is easily overcome. Even with a small portfolio of five counterparties, it is likely that the grossed up ISDA SIMM bilateral IM will be higher than in clearing for USD/HKD.

Additionally, we can model the IM requirement under ISDA SIMM for a 5y USD/CNH float-fixed trade. As we highlighted earlier, this is modelled as a coupon swap under ISDA SIMM, incorporating FX delta risk, significant interest rate risk in USD and a small amount of CNH risk into the risk factors. The IM requirement of a 5y USD/CNH fixed-float at HKEX is 7.2% of notional. Under ISDA SIMM, a similar structure consumes 3.1% of notional. Again, the benefits of multilateral netting at a CCP will reduce the difference in IM across whole portfolios, when compared to the standalone comparison.

The uptake of clearing at HKEX is continuing. There are now more clients, more volume, more open interest – all resulting in a higher amount of IM being posted. This clearly means that IM factors are not the only motivation to clear.

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. Initial margin calculations from Clarus CHARM.

HKEX SUMMARY

XCCY swap clearing at HKEX OTC Clear shows how unique factors in particular markets can combine to incentivize clearing. A significant portion of the market is voluntarily choosing to clear their risk due to the unique position of HKEX as the gateway between local Chinese banks and international dealers. This, combined with how ISDA SIMM removes the FX delta from certain XCCY swaps, makes the clearing of XCCY swaps particularly attractive in USD/HKD and USD/CNH. For other markets, it is prudent and effective credit and settlement risk management framework, coupled with legally enforceable netting.

3.7 LATAM RATES AT CME

As the market uptake of clearing continues, it is particularly important that CCPs can launch new, risk-appropriate products in an environment that demands heavy regulation and stringent risk management at all times. Our markets are driven by responsible innovation.

There was a risk that as clearing mandates expanded, and UMR came into play, that it would become increasingly difficult for CCPs to launch new products. If CCPs had been poorly resourced or if regulatory restrictions had been too strict, it would have been almost impossible for new products to be launched over the past few years.

This has proven not to be the case. The regulatory regime for CCPs, designed to ensure appropriate risk management processes, has allowed a number of CCPs to launch new products on the back of success in other areas.

Our case study looks at a case in point – the successful launch of Latam interest rates clearing at CME.

MXN CLEARING AT THE CME

The first point of innovation at the CME came way back in 2013 when MXN swaps were first offered for clearing. Whilst many Latam currencies are “non-deliverable” (i.e. you cannot settle the cashflows offshore), the MXN market evolved in a very particular manner:

- IRS coupons, VM and price alignment amount (PAA) are all settled in MXN.
- Interest payable on a 28-day index, called Interbank Equilibrium Interest Rate (TIIE).
- The interest rate used for daily PAA in clearing is implied from the overnight FX swap market, using USD Fed Funds as the base rate.

This so-called “cross currency discounting” for the PAA rate means that VM is effectively funded at an offshore rate of interest. Market participants are made economically equivalent to funding in USD, performing a short-dated FX swap for the amount of VM, and earning the equivalent rate of MXN interest overnight. This is a particularly unique set-up for MXN IRS – most other currencies use an onshore overnight funding rate to calculate PAA.

PATIENCE

Launched in 2013, it wasn't until August 2015 that cleared MXN volumes first surpassed \$100bn in a single month. However, we can see the gradual build-up in volumes when we look at the average monthly volumes per year:

2014	\$7bn
2015	\$79bn
2016	\$160bn
2017	\$313bn
2018	\$375bn

Data sources and methodology: Cleared data from CCPView. Single counted methodology used to prevent double counting of cleared trades.

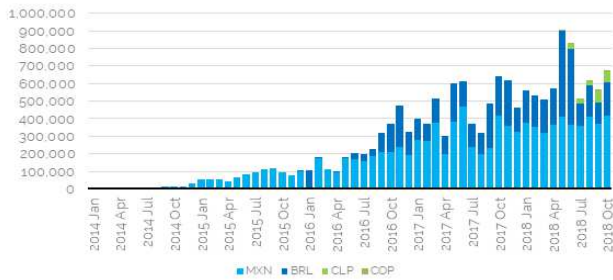
MXN clearing gained particular traction during 2016. This was helped, in part, by a clearing mandate introduced in Mexico for TIIE IRS. CME followed by LCH, are currently the only two international CCPs to have obtained full recognition as foreign CCPs in Mexico from the Banco de Mexico²⁶. This has enabled Mexican market participants subject to the local clearing mandate to fulfil their obligations at CME Clearing. Since 2016, CME has extended their MXN clearing solution to provide clearing for swaps with up to 31 years remaining maturity and has begun accepting foreign sovereign debt from Mexico as acceptable margin collateral.

²⁶ <http://investor.cmegroup.com/news-releases/news-release-details/cme-group-recognized-central-counterparty-mexico?ReleaseID=988172>

Figure 15 Latam IRS in Detail
As measured by Monthly Volumes in USD millions

Cleared Volumes at CME

Monthly Volumes continuing to increase through 2018

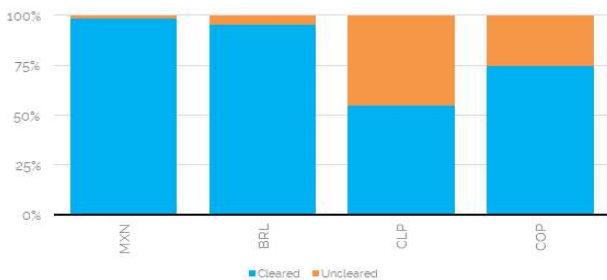


Total market activity continues to increase as clearing is increasing
Cleared volumes have driven growth in the Latam IRS market



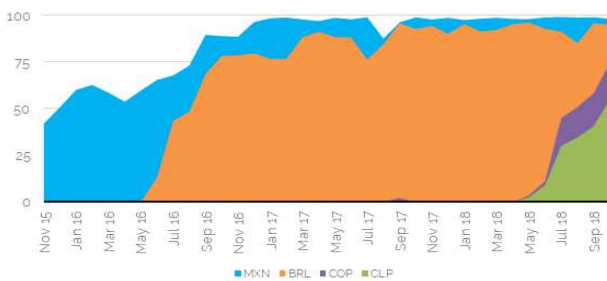
Latam Current Clearing Rates

As percentage of SDR October 2018 Notional reported



Clearing Adoption

Adoption of clearing has been progressively faster across the 4 currencies



Latam clearing at CME now accounts for up to \$900bn in monthly volumes. To put this in perspective with other cleared markets, Latam currencies are therefore bigger than CHF and SEK swaps combined. Latam currencies together rival the AUD swaps market for monthly traded volumes.

CME has been particularly successful in leveraging the MXN franchise into other currencies. The launch of BRL clearing in August 2015 saw almost immediate dividends, with impressive volumes from launch.

BRL and MXN cleared markets are now almost the same size (~\$400bn average monthly volumes), with BRL growing particularly strongly since September 2016.

Most notably, we have seen a huge shift in clearing rates across Latam currencies reported by US Persons to the SDRs. Clearing rates were averaging 12% in 2014. This has increased almost every month since, and is now at 94% across the four Latam currencies available for clearing.

It is important to note that this shift to clearing has had no negative impact on overall market volumes. Indeed, the total volumes across cleared and uncleared markets have actually increased as measured by SDR data. This type of observation is critical when judging the success of clearing incentives. Markets should not just be judged on cleared volumes – we must also continually assess the overall strength of the market, including uncleared volumes. As uncleared volumes have dwindled in Latam currencies, the cleared markets have been more than strong enough to pick up the slack.

From SDR data, we can see that clearing rates are now very high in Latam currencies – almost all of the BRL and MXN IRS markets are cleared.

What is interesting to see is the speed of clearing adoption across the four currencies. To reach clearing rates of 50%, it took MXN 2.5 years, BRL took a year but both CLP and COP were clearing more than 50% of the SDR market within 6 months. The speed of uptake in COP has been particularly noticeable, with 74% of SDR volumes cleared in October 2018.

Data sources and methodology: SDRView uses SDR data sourced from Bloomberg, DTCC and ICE SDRs. Notionals are expressed in billions of USD equivalent amounts. Uncleared data from BIS Triennial FX Surveys. Cleared data from CCPView. Single counted methodology used to prevent double counting of cleared trades.

BRL CLEARING

CME was again able to bring a new cleared product to market in August 2015. Expanding upon the successful MXN franchise, they launched the first Non-Deliverable Interest Rate Swap (NDIRS) to be cleared at CME. This offered real innovation because:

- BRL is a non-deliverable currency; all payments therefore occur in USD.
- The swaps are based on a daily floating rate index, CDI.
- Payments are zero coupon, with a single net payment at maturity.

The intricacies of pricing these swaps are complex. To have a holistic view of the market, we must consider both onshore and offshore pricing dynamics. Additionally, offshore rates are not directly observable, but rather must be implied from offshore NDF trading using the concept of covered interest parity²⁷.

CME were able to successfully create a valuation framework that considered both of these onshore and offshore inputs. VM and PAA are settled in USD, with all BRL coupons converted to USD using the applicable spot rate fixing for the value date.

BRL clearing is therefore a substantially different offering in terms of the fundamentals of the product compared to MXN TIIE swaps. BRL is a non-deliverable currency and has an onshore/offshore basis spread as a result.

Despite the technicalities, the uptake of BRL clearing at CME has been particularly quick. Cleared volumes in BRL swaps (in USD equivalents) were larger than MXN in both May and June 2018, reaching nearly \$500bn in a single month.

CLP AND COP CLEARING

Leveraging the strength of the existing Latam interest rates franchise, it made sense for CME to expand their currency offering. In May 2018, both CLP IRS and COP OIS products were launched. The speed of uptake for clearing is notable for these two currencies. SDR data shows that, just six months after launch, 55% of CLP volumes and 74% of COP volumes were cleared. This highlights the benefits that a CCP can offer on a portfolio basis – it is very likely that the early adopters of these two currencies were already

²⁷ https://www.bis.org/publ/qtrpdf/r_qt1609e.htm

clearing MXN and BRL and are motivated to take advantage of portfolio margining benefits against other Latam currencies.

CLEARING MANDATES VS UMR

The startling difference between MXN and BRL clearing has been the speed of uptake in BRL, relative to MXN. It took MXN clearing 2.5 years to consistently surpass monthly volumes of \$100bn. BRL reached the same milestone within nine months. The uptake of BRL clearing at CME was probably helped by certain synergies between the two currency offerings:

- An overlap of end-users active in both MXN and BRL.
- Offshore liquidity providers active in both MXN and BRL.
- Portfolio margining of MXN and BRL risk.
- Same payment infrastructure could be used for each currency.
- Similar FX-implied PAA discounting regimes used in each currency.

CME now report 185 active clearing participants in MXN and 120 in BRL, including both international and onshore dealers and clients across hedge funds, asset managers, and pension funds.

From a regulatory perspective, there were two major differences in terms of timing for the two currencies as well:

- MXN was launched 3 years prior to a clearing mandate in MXN and 3.5 years before the first wave of UMR.
- BRL was launched 1 year prior to UMR.

Can we therefore quantify the impact of both regulations on the individual markets?

- In April 2016, when the MXN clearing mandate was introduced, volumes in MXN swaps doubled from around \$100bn to \$200bn each month.
- In September 2016, when UMR were put in place, BRL volumes jumped from \$45bn per month to \$235bn within three months.

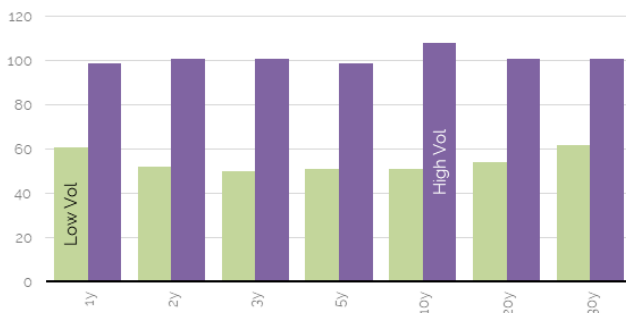
From the data, it would therefore suggest that UMR were more impactful on volumes than a (local) Mexican clearing mandate.

HIGH VOLATILITY CURRENCIES

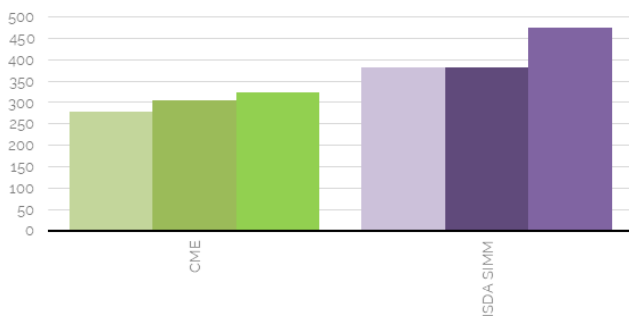
The question arises what could cause UMR that affected only 20 counterparties globally in September 2016, to have a larger impact on clearing volumes than a clearing mandate.

When we look at the details of ISDA SIMM, we find that both MXN and BRL are classified as “high volatility” currencies. This means that their risk weightings are much higher than the major currencies (e.g. USD or EUR) and that their concentration risk thresholds are much lower. This substantially increases their IM consumption in bilateral markets.

Figure 16 Initial Margin comparisons
ISDA SIMM Initial Margin for High Vol currencies can be 2.1 times higher than Low Vol



Initial Margin CME vs SIMM
CCP Margin for 2y BRL and MXN swaps, plus combined portfolio of Pay vs Rec



Data sources and methodology: Clarus CHARM calculations.

It is unusual to see that a CCP has standalone margin lower than the calibrated ISDA SIMM margins. However, for currencies classified as “high volatility” under ISDA SIMM, we can see that this is the case.

For 2-year swaps in both BRL and MXN, ISDA SIMM calibrates an IM amount of 102bp of risk.

At CME, the same standalone 2y swaps would consume between 80 and 88 basis points – an instant 20% saving, even when we do not consider multilateral netting.

We also note that portfolio margining is much more efficient at CME for Latam currencies. The combined IM amount for a 2y MXN vs BRL spread is just 6% higher than the standalone BRL swap. Under ISDA SIMM, the same package consumes 24% more margin than a standalone bilateral 2y BRL IRS. Crucially, ISDA SIMM consumes 46% more IM than if this same package were cleared at CME.

Whilst we have concentrated on multilateral netting benefits elsewhere in our document, it also warrants paying particular attention to the IM calibration for high volatility currencies under ISDA SIMM.

4. COST COMPARISONS

Broadly speaking, cost comparisons can be split into three areas – pre-trade, trade maintenance and post-trade.

4.1 PRE-TRADE

When considering the reasons that clearing rates have been increasing, it has been cited in the past that UMR act as an economic incentive to clear. This stems from the fact that multilateral netting through the CCP model significantly reduces the IM burden on market participants – particularly those counterparties who have a significant number of trading relationships and may not have a directional position.

However, that is clearly not the case for all portfolios. It is therefore important to note that IM could be lower in bilateral markets than at a CCP – and this can apply across a number of different calibration criteria. For example, the CFTC has shown that ISDA SIMM can require a lower IM amount than a CCP for a real portfolio – assuming that only the market risk were margined and that all trades were facing a single counterparty²⁸.

Away from real portfolios, we can still see that in simple cases ISDA SIMM is lower than for CCP models. However, ISDA SIMM does become correspondingly higher as portfolio complexity and the number of risk factors involves increases.

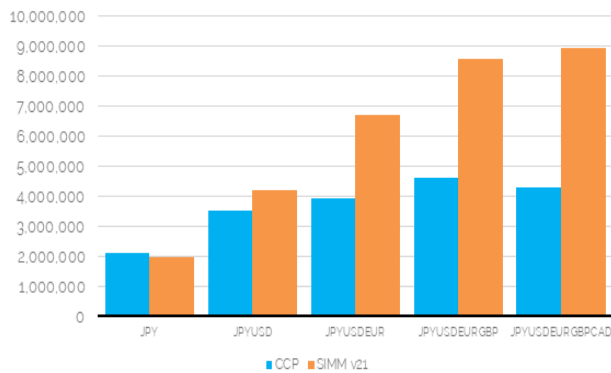
²⁸ https://www.cftc.gov/sites/default/files/idc/groups/public/%40economicanalysis/documents/file/dcr_cleared_uncleared_margin.pdf

Initial Margin Comparisons

Bilateral IM is highly sensitive to portfolio composition

Rates IM

Average IM requirements for 5y10y swaps across 1 to 5 currencies (offsetting risks)



Data sources and methodology: Clarus CHARM calculations.

IM analysis is a useful analytical tool, but it largely ignores the operational impact that UMR have inflicted on bilateral markets. Gone are the days of being able to agree a trade with a dealer and have no cash flow requirements until the first coupon date. Indeed, just getting to the point of agreeing a trade with a dealer is now a much more involved process than it was before the Great Financial Crisis.

4.1.1 CREDIT SUPPORT ANNEXES

In March 2017, we saw the VM “Big Bang”. Across multiple jurisdictions, this meant that almost all market participants had to start exchanging daily VM in cash. This VM must be posted on a T+1 basis. These margin agreements are governed by the CSA of an ISDA Master Agreement. These CSAs are custom legal agreements between two market participants – and in many ways can be considered one of the most complex derivatives in existence. These CSAs govern what collateral is eligible to be posted – both as VM (collateral held against a known and realized change in the mark-to-market move of a trade) and as IM (collateral held against a potential move in the future mark-to-market of the trade).

A CSA agreement therefore dictates the valuation terms of a derivative trade. The currency of collateral will dictate the discount curve to be used when valuing any future cash flows of a derivative governed by the CSA. This may not be straight-forward – many CSAs define a basket of eligible currencies and/or securities. Market participants are then left to either calculate the cheapest to deliver currency (the

Modelling of different portfolios under ISDA SIMM when compared to CCP models is instructive. The example portfolios use a number of different risk factors – maturity buckets, indices and currencies – to demonstrate the difference in margin amounts calculated under different IM models.

The difference between an “average” CCP model and ISDA SIMM increases as the number of risk factors being margined increases. This is largely due to the limited portfolio margining effects that are calibrated in ISDA SIMM. There is just a 21% offset between currencies allowed under the current calibration of the model.

ISDA SIMM gives a lower overall IM number if there are only JPY risk factors (the only “low volatility” currency). ISDA SIMM is higher for all examples of multi-currency portfolios that are modelled. The difference is greatest when looking at five currencies, when the IM under ISDA SIMM is 2.1 times greater than at a typical CCP. These margin models assume that the entire bilateral portfolio is traded with a single counterparty.

economic decision) or use their most readily available currency (the pragmatic decision) in which to deliver their VM.

The valuation regime may not be as simple as just deciding on a single currency either. Depending on the CSA terms, market participants may hold a “switch option”, in which they can call back the currency they have been posting and replace the entire amount with a different eligible currency. This has the potential to significantly alter the valuation of a derivatives portfolio.

Add to this the fact that cash VM dictates a different discount curve to non-cash (e.g. government bonds or other securities), and the valuation regime for bilateral derivatives can get very complex. This complexity is all thanks to CSAs that have fundamentally good intentions – ensuring that market values are collateralized, in theory reducing credit risk and exposures to other market counterparties. Incorporating this optionality into the CSAs, in theory, makes it easier and more likely that counterparties will meet their VM calls.

4.1.2 IMPLEMENTING UMR

ISDA and SIFMA recently stated²⁹ that it will take over 12 months for Phase Four³⁰ counterparties to get the necessary infrastructure in place to be compliant with UMR. This is because the following checklist must be completed:

1. Entity assessment and disclosures – will the firm be in-scope and which counterparties will it be in-scope with?
2. CSAs – are existing agreements compliant, must the firm need to amend or negotiate new agreements?
3. Custodial arrangements – including account control agreements, eligible collateral schedules and connectivity.
4. Determination of in-scope trades – how are UMR-eligible trades identified, how are legacy portfolios managed, regulatory vs non-regulatory IM.
5. IM model implementation – schedule based or ISDA SIMM?
6. Margin reconciliation – who will calculate margin on trades, how will it be reconciled on a daily basis in a timely manner, how will the firm resolve disputes?

²⁹ <https://www.isda.org/a/D6fEE/ISDA-SIFMA-Initial-Margin-Phase-in-White-Paper-July-2018.pdf>

³⁰ Firms with ~\$750bn of outstanding derivatives.

7. Liquidity and funding – what processes will be in place to ensure margin calls are met efficiently?

Looking at the points raised by ISDA and SIFMA is instructive when considering the additional costs that the implementation of UMR can entail.

4.1.3 NEGOTIATING CSAS

Looking at the list above, some decisions will be taken on a commercial basis, others led by necessary infrastructure considerations such as software compatibility and vendor support.

The negotiation of CSAs is one of the most complex areas, entailing input not only from legal departments, but also from trading, collateral, operations and even IT.

Consider, for example, what happened back in March 2017 with the VM “Big Bang”. It appeared to be a sensible move for the market to take the opportunity to simplify existing, potentially complex CSAs. For starters, UMR dictated CSAs must now mandate VM in cash only and to be collected on a T+1 basis. This was a fundamental shift for some areas of the market – existing CSAs prior to these rules may have required posting only on a T+2 time horizon. Cash only VM was also not a market standard.

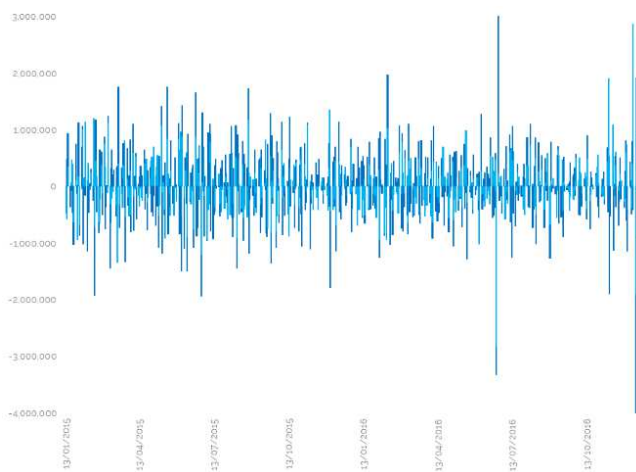
However, with this introduction of standardization, it left the market in an interesting position. Should old CSAs be amended and converted into newly UMR compliant documents? Or should new trades be governed by new UMR compliant CSAs?

4.1.4 OLD VS NEW

The decision to repaper old CSAs or write new ones ended up being a complex decision. This was because:

1. Changing an existing CSA would change the valuation of existing trades. This valuation difference would have to be agreed between market participants with fees potentially due. This was complicated for two reasons. One, the intrinsic value of CSA optionality cannot be monetized up front, it can only be realized by harvesting the value during the lifetime of a portfolio. Secondly, CSAs were being altered across huge numbers of agreements at the same time. The industry didn't have the capacity to analyze and value such a large number of agreements at the same time.

2. Clients would ultimately lose most of the optionality that they enjoyed under existing agreements. Whilst most clients might not need to post bonds as VM, they appreciated the flexibility that this might bring. This is a hard option to give up, particularly if it would not be monetized upfront.
3. The value of netting was not well understood in the market. Going forward, if portfolios operate under two (or more) CSAs, the operational overhead and valuation complexity is at least doubled. Daily VM would have to be posted twice – once for old CSAs, and once for new CSAs (potentially in a different currency/security). Worse still is if the old CSA stays on a T+2 basis. Then there is significant settlement risk each day between VM related to market moves yesterday, and market moves the day before – see chart below.



An old 10 year receive fixed USD swap is hedged with a new 10 year pay fixed USD swap. The old one has collateral called T+2, and the new one needs to be compliant and exchange collateral on a T+1 basis. Daily moves of VM will be out of sync by one day. This “hedged” position (carrying zero market risk) can have some wild swings in collateral as a result.

Data sources and methodology: Clarus CHARM calculations.

Therefore, whilst ISDA introduced a protocol to allow for mass renegotiation of CSAs, the optionality inherent in the decision ended up being too great for this to be considered a success in the same way as the CDS “Big Bang” protocol was. The default choice of market participants ended up being to consent to fairly standardized multi-currency T+1 cash only (for VM) CSAs for new trades only.

The legacy problem of complex bilateral CSAs lives on.

This backstory serves to highlight the complexity that is now inherent in managing, maintaining and settling bilateral portfolios. As we looked at in the section on trade processing, all of these carry an operational overhead and additional cost with them.

4.1.5 LIQUIDITY

Liquidity and trade certainty are benefits of clearing mandates. Any trade, cleared or uncleared, is subject to a “credit check”, but this is far more likely to be passed in clearing than an internal credit assessment.

This is because a bilateral relationship is inherently more complicated to manage - it could be affected by multiple elements of the relationship.

Equally, liquidity becomes concentrated at qualifying CCPs for mandated products, where-as it could be difficult to access on a level playing field for all market participants in a bilateral market. One of the reasons that liquidity may be different for different market participants is due to the customized nature of CSAs that govern bilateral relationships.

4.2 TRADE MAINTENANCE

Please refer to the section on trade processing for further details considering the operational aspects during a trade lifecycle, post-execution. Broadly speaking, they can be summarized as:

1. Portfolio and margin reconciliation –UMR impart a huge responsibility on market participants to ensure that their trade populations, along with their ensuing risk factors and margin calculations are in-line with all of their trading counterparties.
2. Liquidity and funding – multilateral payments to a web of trading counterparties outside of clearing is a complicated process to manage, and the timing of receipts versus pay-outs can have substantial economic impacts on intraday funding profiles and access to liquidity.
3. On-boarding – to be compliant with UMR, a third-party custodial relationship must be in place with all trading counterparties. This carries an overhead not dissimilar to on-boarding to a CCP – something that is far more standardized within a given jurisdiction.
4. Payment netting – the benefits of netting at a CCP do not only stem from multilateral netting across counterparties. The ability to net coupons, fees, VM and PAA/PAI amounts per day reduces settlement risk and reduces intraday funding requirements.
5. Portfolio maintenance – a CCP automatically processes and maintains a golden source of the trade record, applying fixings, issuing settlement instructions and acting as the valuation agent. This relieves a significant operational burden.
6. Compression and porting – compression sees far fewer frictions in a cleared environment, where trades are always under the same valuation regime. Porting is an efficient use of this consistent valuation regime to make trade processing even easier.
7. Default management – there is a substantial reduction in overall market resources required to deal with a default when a CCP deals with a counterparty default in a centralized manner.

4.3 POST-TRADE

Clearing mandates have moved clearing to the pre-trade part of the workflow for mandated products. However, it remains predominantly a post-trade activity, with many of the benefits of clearing accessible via specific post-trade processes.

The section on trade processing looked at many of the benefits of multilateral netting, including the simpler payment and settlement cycles, as well as the benefits to compression.

However, one aspect that comes to light when considering the reduced costs is that of credit assessments. The on-going counterparty monitoring that is part-and-parcel of uncleared markets is significantly reduced in a CCP environment. This is made apparent from a few different perspectives:

1. Members of a CCP are motivated that the CCP has responsible credit risk management policies. This is because, in very extreme scenarios, losses may be mutualized. Members should therefore be vigilant that this does not happen.
2. With those policies in place, members of a CCP (particularly one with substantial “Skin in the Game”), should be happy that the CCP is successfully monitoring its’ membership for any change in credit-worthiness. This is true from both a CCP membership perspective, and the fact that both CCPs and FCMs are monitoring the health of their clients.
3. Members will continue to monitor their own bilateral relationships, but there is also a virtuous circle of increased vigilance in the market place over the credit-worthiness of all market counterparties - all members should be equally motivated to avoid mutualized-losses.
4. There are far fewer external factors at a CCP that could change the valuation of a portfolio. A CCP rulebook is far more stringent than a typical bilateral CSA. The whole value of a bilateral portfolio could change if a client starts to post a different type of collateral in uncleared markets. This must be constantly monitored and assessed. Not so if the portfolio were cleared, where it is held under a single valuation regime, which has the added benefit of simplifying client relationships as well.

The combination of increased external vigilance, and less likelihood of portfolio valuation changes, means that the ongoing portfolio assessments required for a cleared portfolio are lower than those required in uncleared markets.

4.4 CAPITAL ANALYSIS

To complete our overview of OTC trading, we introduce the basic concepts of their capital consumption. Broadly speaking, the Basel III framework for risk-based capital requirements states that a bank must, amongst other requirements, maintain a certain amount of capital held against their RWAs. For OTC derivatives, contributing to these RWAs are credit risk, market risk and operational risk. The largest component of RWAs tends to be credit risk. CCPs attract a risk weight of just 2% when calculating these exposures, compared to weights of 20-150% for bilateral counterparties.

Basel Committee on Banking Supervision
BANK FOR INTERNATIONAL SETTLEMENTS

Basel III phase-in arrangements
(All dates are as of 1 January)

Phases	2013	2014	2015	2016	2017	2018	2019
Leverage Ratio		Parallel run 1 Jan 2013 – 1 Jan 2017 Disclosure starts 1 Jan 2015				Migration to Pillar 1	
Minimum Common Equity Capital Ratio	3.5%	4.0%	4.5%		4.5%		
Capital Conservation Buffer				0.625%	1.25%	1.875%	2.5%
Minimum common equity plus capital conservation buffer	3.5%	4.0%	4.5%	5.125%	5.75%	6.375%	7.0%
Phase-in of deductions from CET1*		20%	40%	60%	80%	100%	100%
Minimum Tier 1 Capital	4.5%	5.5%	6.0%		6.0%		
Minimum Total Capital		8.0%			8.0%		
Minimum Total Capital plus conservation buffer		8.0%	8.625%		9.25%	9.875%	10.5%
Capital instruments that no longer qualify as non-core Tier 1 capital or Tier 2 capital		Phased out over 10 year horizon beginning 2013					

Basel III Framework including Capital and Leverage Ratio requirements

Data sources: BCBS, https://www.bis.org/bcbs/basel3/basel3_phase_in_arrangements.pdf

Under Basel III, banks must also maintain an over-arching Leverage Ratio as well as a given Capital Ratio. This is the amount of capital that must be held versus a measure of exposure. For LR calculations, the exposure measure is very sensitive to the gross notional of OTC derivatives held. This is particularly true in jurisdictions that still employ the CEM³¹.

LR measures can employ a degree of netting at a legal entity level, but when measured by CEM, they tend to be very sensitive to gross notional at a relationship level. This has focused a lot of industry efforts

³¹ Leverage Ratio calculations are transitioning from CEM to SA-CCR. As of December 2018, most jurisdictions have not yet transitioned.

The US recently announced a consultation to move from CEM to SA-CCR for the purposes of Leverage Ratio calculations.

in OTC IRDs on compression, because it allows market participants to reinstate risk-equivalent packages of trades at a lower gross notional.

The precise measure of netting that is employed in LR calculations is regarding the market value of the derivative – not the direction of the risk factors. This means that a market-risk neutral package of trades that are both in the money would receive no netting benefit. This is true of trades held bilaterally or within clearing.

From a general perspective, it is hard to argue that the current LR framework provides much of an incentive to clear. This is because it is the market value of the trades, and not their directionality, that dictates the netting benefit.

However, it can be shown under SA-CCR (standardized approach for measuring counterparty credit risk exposures) that the netting benefits of clearing become much more beneficial from a LR perspective. This is because SA-CCR is a risk-based measure of exposure, and hence looks at the net exposure per counterparty. Therefore, moving LR calculations to SA-CCR provide added incentives to clear, over and above the ones existing today.

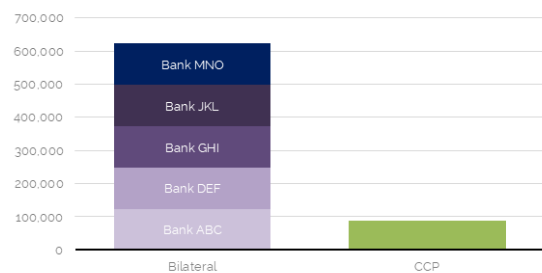
SA-CCR Comparisons

Exposure at Default for a directional USD swaps portfolio are lower at a CCP by ~30%



SA-CCR provides risk-based netting

A Dealer portfolio which is close to DV01 neutral will see even larger benefits of Clearing



SA-CCR has not yet been implemented across all Basel III jurisdictions.

This is expected to happen by 2022. Currently, LR exposures are calculated using CEM. There is no netting of market risk under CEM, there is only a limited amount of netting allowed based on market value. The SA-CCR methodology is far more risk-sensitive and will therefore have an impact on LRs for banks.

For a directional swaps portfolio, such as may be maintained by an end-user of swaps, the LR savings under SA-CCR will be around 30% from transferring bilateral exposures to clearing. This is because clearing attracts a lower Margin Period of Risk (MPoR) than bilateral trades.

For dealer portfolios, the savings could be far more pronounced. This is because risks could be multilaterally netted within the cleared framework, substantially reducing the net risk.

Data Sources and methodology: Clarus CHARM calculations.

4.5 DEFAULT FUND CONTRIBUTIONS

Finally, over and above IM and LR considerations, clearing also requires a default fund contribution. Banks must capitalize their exposures arising from default fund contributions at a qualifying CCP. This is because any losses over and above IM in clearing could, theoretically, be mutualized.

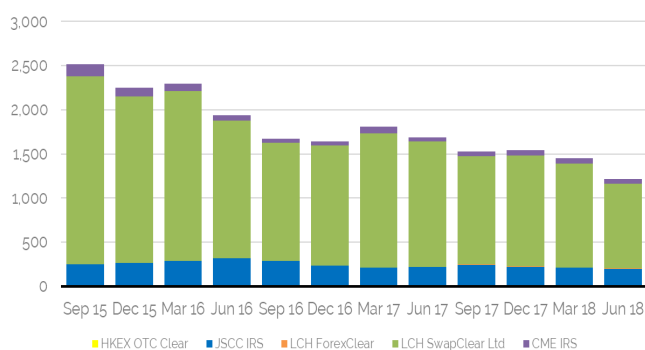
As part of the CPMI-IOSCO (The Committee on Payments and Market Infrastructures – International Organization of Securities Commissions) disclosures, all CCPs have been required to publish KCCP, which is a reflection of their credit exposures to all of their clearing members. This can only be calculated by the CCP (or its’ regulators), because it requires knowledge of all individual clearing members’ exposures. A clearing member will use this as an input to their capital calculations, along with other inputs including the total prefunded default fund contributions of other clearing members and the CCP’s own prefunded resources.

Default Fund Contributions

Amounts in USD millions

KCCP

Reported KCCP values have been dropping across the industry



The cost of default fund contributions to CCPs has evolved over the past three years.

CPMI-IOSCO disclosures from four of the largest CCPs show that KCCP has declined substantially since September 2015. Much of this decline has happened at LCH SwapClear, where KCCP is less now than half its’ previous value.

This appears to have been a consistent behavior across all of the “mature” CCPs in the data. Where the business has grown, such as ForexClear, KCCP has increased but it has not yet reached even 1% of the SwapClear value.

What could be some of the drivers of a drop in KCCP? Compression should help, as the larger percentage of trades at-market will reduce the credit exposure of a CCP to its’ members. Compression also serves to clean up the risk of a portfolio, generally reducing IM.

An increase in the market-level of long-dated interest rates may also have served to bring legacy portfolios closer to market.

Data sources and methodology: CPMI-IOSCO disclosure data from CCPView with reference to Capital Requirement for exposures to CCPs³².

³² <https://www.clarusft.com/capital-requirements-for-exposures-to-ccps/>

5. CONCLUSIONS

5.1 CLEARING RATES

Clearing rates have increased since the introduction of both clearing mandates and UMR. The particular timing and market dynamics of when these clearing rates have increased have largely been product and jurisdiction specific. For the market as a whole, there is very strong evidence from the data that the current incentives to clear have moved a sizeable portion of the market to clearing, particularly for interest rate and credit asset classes. The evidence from the FX market as a whole remains less compelling.

The industry should recognize the importance of quoting relevant data when assessing the clearing landscape. The industry focus on compression has in particular made clearing rates of outstanding trades redundant. The only way to assess clearing accurately is based on an assessment of clearing rates for new trades.

In OTC IRDs, we find clearing rates of almost 100% for mandated products and some non-mandated products such as OIS. Outside of the mandates, clearing eligible products have a clearing rate of 83% (inflation swaps). This shows that the market is voluntarily choosing a cleared solution where possible. However, we note that swaptions remain uncleared and remain a sizeable market. Over \$1.2trn trades each month in interest rates options, and they remain bilateral.

In credit markets, the mandated CDX products have seen very little impact from the clearing mandates. Volumes have been stable, the clearing rate has reached close to 100% and there is very little trading outside of the cleared market. Non-mandated CDX, on the other hand, have seen a shift towards clearing since the introductions of UMR. Around 50% of this market is now cleared, and overall market volumes have increased since the introduction of UMR.

In FX, where there is no clearing mandate in place, UMR caused a move towards clearing in NDF markets. The current clearing rate stands at 21% and has steadily increased each month since September 2016. However, FX options remain the largest single uncleared market and developments in this area warrant close attention.

Looking at the impacts of current incentives to clear on client activity, we have seen that D2C trading across the two largest client SEFs, Bloomberg and Tradeweb, has consistently increased. The Bloomberg market share of SEF trading has grown and now stands at 20%. This shows that client activity has not declined as a result of market reform.

However, where reforms have been slower to be implemented, such as Europe, we still see lower clearing rates. Compared to a 90% clearing rate across all OTC IRDs in the US, we find that Europe is down at 50%. That implies a global clearing rate of 60%. This suggests that there is room for more of the market to move to clearing, and for CCPs to examine product offerings in other risk-suitable products. The market is very far from a saturated “clearing state” at this point in time.

5.2 TRADE PROCESSING

Market studies reveal that the work required to be compliant with UMR can take over one year to implement. This is because UMR impart specific infrastructure requirements on all market participants. These add new, and somewhat unique, costs to the trade lifecycle of uncleared trades.

As more and more market participants become captured by UMR, it substantially levels the playing field in terms of trade processing overheads between cleared and uncleared markets. The clearing platform offers very obvious operational efficiencies due to the responsibilities taken on by the CCP. These range from issuing settlement instructions, calculating valuations and maintaining margin models. The inherent benefits of multi-lateral netting, coupled with a scalable architecture, means that clearing looks far more attractive in terms of trade processing than the disparate infrastructure inherent in uncleared markets.

This means that CCPs now offer a substantially simpler trade life-cycle than that encountered in uncleared markets. The “complexity barrier” that used to be held up as a restriction on access to CCPs has been substantially negated as a direct result of UMR. This means that clearing is no longer an either/or decision, but can sit alongside a suitably risk-managed bilateral portfolio and yield trade processing benefits over time. Within this “level playing field” environment, the operational efficiencies inherent to the clearing model will likely result in more volumes naturally migrating to CCPs over time.

5.3 CASE STUDIES

5.3.1 NDF CLEARING AT FOREXCLEAR

Clearing of NDFs at ForexClear is not a new service – it has been helping the market manage its’ FX risk since 2012. This incumbency put ForexClear in a unique position when UMR rolled out in September 2016. With infrastructure in place, and market participants already comfortable with the operational model, it made immediate sense for the D2D community to leverage multilateral netting to reduce their IM requirements under ISDA SIMM.

This was a particularly unique motivation in the uncleared FX market, because physically-deliverable FX risk is exempt from the uncleared margin rules. NDFs, attracting large risk weights of 8.1% of notional, had a particular propensity to be large consumers of IM under ISDA SIMM.

The clearing of NDFs at ForexClear has now grown to over \$800bn per month. This has enabled the FX market to become more familiar with clearing and to recognize the risk management and operational benefits inherent to the CCP model. ForexClear has therefore been able to leverage this to recently introduce FX options to the cleared market. The industry is closely monitoring these developments as the broader FX community assesses the opportunity to clear their risks.

5.3.2 XCCY SWAP CLEARING AT HKEX

CCPs are noteworthy risk management concepts in the market and it is easy to forget that they existed long before clearing mandates and UMR were introduced. The uptake of XCCY swap clearing at HKEX highlights why CCPs exist from the fundamental basics of risk management.

Firstly, HKEX is able to act as a gateway to mainland China and its' large banking system. Currently, HKEX is the only CCP outside of mainland China that is able to accept mainland-incorporated Chinese banks as members. Coupled with a stringent credit and risk management framework, this means that HKEX acts as a global gateway for the international banking community into mainland China.

Secondly, there is uncertainty in legally-enforceable netting in China. This means that it is very difficult to extend credit lines and almost impossible to maintain trading capacity to them as a result. HKEX employs full multilateral netting, therefore substantially relieving credit line utilization. HKEX therefore offers a stable legal trading framework.

These two factors are particularly relevant when trading credit intensive products, such as long dated XCCY swaps. The final exchange of notional on these swaps has substantial FX risk, which carries a lot of counterparty exposure. HKEX also has a unique arrangement with the local central bank, with direct access to payments systems in CNH, EUR, HKD and USD. This has enabled HKEX to build a successful clearing franchise in USD/CNH and USD/HKD XCCY swaps.

Analysis of the ISDA SIMM model for these products also highlights particular efficiencies in clearing for fixed notional swaps and for pegged currencies.

5.3.3 LATAM RATES AT CME

Latam OTC IRD clearing at CME has been a notable success story of a CCP launching new products that are complementary to one another. Recording almost \$1trn in monthly volumes, Latam currencies cleared at CME show how IM consumption for high volatility currencies under ISDA SIMM leads to a voracious appetite for clearing. The speed of uptake of new currencies has consistently improved, with 74% of COP SDR volumes cleared within six months of launch. This increased speed of uptake highlights that portfolio margining across multi-currency portfolios is far more efficient in clearing than under ISDA SIMM.

Latam currencies also shine a spotlight on the efficacy of local clearing mandates (MXN) versus UMR in terms of incentives to clear. From the data, UMR were a much stronger incentive to clear. This appears to be particularly due to the high risk factors associated with the Latam currencies.

5.4 COSTS

CCPs have transparent fee structures. CCPs must meet strict regulatory guidelines when designing margin models. And they must maintain a default fund that can withstand severe market shocks. All of these costs are highly transparent, and may be considered by some as a barrier to access. However, the introduction of UMR has substantially increased the costs of trading in uncleared markets. The IM requirements mean that margins are grossed up on a counterparty basis for uncleared trading. This results in portfolios generally consuming more margin in uncleared markets than cleared. Even if standalone margins are higher on a trade-by-trade basis, multilateral netting at a CCP means that margins tend to be lower in clearing on a portfolio basis.

Initial margin savings due to clearing tend to be greater for more complex portfolios – either those with more counterparties or those with more risk factors. Portfolio margining at CCPs can still substantially lower margin costs for fairly simple multi-currency portfolios, when compared to ISDA SIMM.

As market participants assess their UMR projects, the issue of CSA negotiation will become front and center. Analysis shows that bifurcation of portfolios into newly compliant CSAs versus old CSAs may be considered bad practice and should be avoided where possible. CCPs, operating under a single rulebook and providing a single margining and valuation regime, substantially alleviate these difficult negotiations.

Market best practice will also dictate that the one-time infrastructure set-up costs that are incurred by during UMR projects do not go to waste. Third-party service providers must prove that they are reactive

to change and scalable. These attributes are core to the clearing offering, and it will be a common decision to on-board to further CCPs as part of many UMR projects. The stability and certainty of clearing will be even further valued as markets transition away from LIBOR towards new risk-free rates.

The capital requirements of major market participants should also not be overlooked. In particular, as more jurisdictions move towards SA-CCR for LR calculations, the benefits of a risk-based measure will come to the fore. SA-CCR allows for risk-netting at a counterparty, or CCP, level. This means that LR requirements under SA-CCR will be substantially lower in cleared markets. These benefits should be passed on from leverage constrained dealers to the rest of the market, further promoting clearing.

Finally, it is evident that CCPs have been working recently to alleviate the costs of maintaining default fund contributions wherever possible. This may be as a direct result of compression activity, or due to a lower outstanding market value of trades – either way, there are now lower credit exposures in clearing. As a result, the cost of maintaining default fund contributions, as measured by KCCP under Basel III, has significantly reduced over the last three years. This is a classic example of how CCPs can work in harmony with market participants to ensure that clearing remains as attractive as possible.

5.5 FURTHER STUDIES

The current incentive framework to clear OTC derivatives is working for standardized products across both OTC IRD and credit markets. The markets are abiding by clearing mandates and, crucially, voluntarily clearing many products offered by CCPs.

There are three broad outliers to this trend.

One – FX markets. NDFs are in the process of moving the bulk of D2D activity to clearing, but the uptake across all other FX products has been minimal. This area of the market may need stronger motivations to clear than are currently in place.

Two – Options markets. It is notable that whilst most OTC IRD products are now cleared, swaptions and options remain a \$1.2trn monthly market that is bilateral. The FX options market remains the largest bilateral market. Recent developments in these markets show that market participants are choosing to trade more uncleared risk (in synthetic delta via option packages or NDFs on deliverable currencies) to manage their margin exposures, rather than transfer the risk to clearing. The industry should closely consider why this is the case.

Three – Legacy portfolios. There remains a notable stock of old trades that have not been backloaded to clearing. It would be widely beneficial to the industry if there was increased transparency over these legacy trades. What portion of these trades could be backloaded to clearing? If there are impediments to clearing old trades, what are they exactly?

Finally, this study relies on transparency. Transparency is the bedrock of the CCP model, and fundamental to the market uptake of clearing.

Post trade transparency makes detailed studies such as these possible. Publicly available data has been used in this report to analyze intricate issues across a broad array of asset classes and product types. The analysis, through necessity, has focused on the US markets using SDR data. The global cleared markets are also very transparent, thanks to voluntary volume disclosures from the CCP community.

Transparency in uncleared markets is now embedded within US markets, and there have been no negative impacts to markets. Indeed, volumes continue to hit new records, and the client community is better served than ever. However, the industry and general public is still lacking accessible post-trade transparency for uncleared markets for the rest of the world, most notably Europe. These access issues must be resolved.

6. ABOUT CCP12

CCP12 is a global association of 36 members who operate more than 50 individual CCPs globally across Europe/Middle East/Africa (EMEA), the Americas, and the Asia-Pacific (APAC) regions. CCP12 aims 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 further details please email office@ccp12global.com or visit www.ccp12.org

7. CCP12 MEMBERS

