SERNOVA FINANCIAL | 2021 White Paper
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TO CLEAR OR NOT TO CLEAR?

"In addition to its standard OTC and ETD derivatives clearing products, Sernova have extended the offering to support Eurex XCCY and LCH SwapAgent to offer our clients a single point of integration for smart post-trade solutions..."

TO CLEAR OR NOT TO CLEAR?

Evaluation of different post-trade frameworks
for not-mandated OTC derivatives

1. Introduction

The purpose of this paper is to analyse the available capital and funding efficiencies of the post trade options for 'simple' OTC derivatives that are not subject to current clearing mandate but, nevertheless, are clearable at least at some Central Counterparties (CCP). An example may be cross currency swaps, inflation swaps and swaptions; all clearable but not currently mandated. In addition, legacy portfolios exempt from clearing and/or UMR mandates but potentially clearable at the CCP could also be considered, where there is a trade-off between reduction in the cost of capital charges (e.g., RWA and CVA) for the cost of funding (Initial Margin).

The available post-trade frameworks for such derivatives consist of following three options:

- To clear at the QCCP (some product limitations apply)
- To maintain as Bilateral, subject to Uncleared Margin Rules (UMR)
- To submit trades to LCH SwapAgent, subject to Uncleared Margin Rules (UMR)

This paper considers the impact of each of the above frameworks on Initial Margin (IM) and Capital charges under both CEM and SA-CCR capital treatment methodologies. Since a lot was already written comparing SA-CCR and CEM, this is not the intention of this paper to add to already significant body of work covering this topic. What this paper intends to do, however, is to provide some guidance to facilitate decision making process regarding the optimal framework for such derivatives, considering the above-mentioned funding and capital constraints.

2. Considerations

A meaningful quantification of initial margin and capital impact will require making several assumptions regarding, among others, the type and duration of derivative portfolio, degree of portfolio diversification and the Risk Weighting of derivative counterparty. Although the absolute IM and PFE numbers presented below will greatly vary with above parameters, the relative differences and conclusions drawn below will largely hold for all three post-trade frameworks.

For the purposes of this analysis and to facilitate simplicity, we examine a single USD/GBP cross-currency swap (FX asset class) executed between two banks (20% RWA) and with nominal value of USD 100m and duration of 7 years. It is also noteworthy that FX derivatives under SA-CCR have only one maturity bucket as compared with three under CEM. While single maturity backet provides for greater netting opportunities under SA-CCR, more granular regulatory multipliers under CEM may benefit FX derivatives with shorter maturity. We also consider that under Uncleared Margin Rules (UMR), the component of risk associated with physically settled exchanges of notional are exempt from inclusion in Initial Margin calculations, aspect specifically relevant to cross-currency swaps.

Swaptions clearing has been available at the CME since 2016 and is a SwapAgent eligible product. Like cross currency swaps there are efficiencies that can be gained from using the right post-trade infrastructure, so we also present IM and Capital impacts of a single At-the-Money European Swaption, 2 into 7 years (floating – fixed) with notional of EUR 100m.

Another significant consideration is the effect of moving derivatives between netting sets. Unless the entire bilateral portfolio is moved to the CCP or to SwapAgent – which is rarely possible to do in practice, any change in composition of sub-portfolio will change its risk profile and corresponding impact on IM and Capital numbers, especially under more risk sensitive SA-CCR approach. Ability of a CCP to cross-margin between different asset classes, specifically Rates and FX, is also important consideration to consider. Since such optimisation is very specific to any given netting set, we largely leave this out of scope of our discussion below but suggest considering such effects in cases where introduction of new netting set is required. Additional consideration connected to netting sets is availability of post-trade CCP clearing for any given product type as shown in Table 1 below. This limited availability of clearing options is an important factor to consider when making decision regarding the optimal post-trade framework.

Table 1

PRODUCT	CCP Cleared			LCH SWAPAGENT
	CME	LCH	EUREX	
Swaptions	YES (USD)	NO	NO	YES
Cross Currency Swaps	NO	NO	YES (EUR/GBP, GBP/USD)	YES
Inflation Swaps	NO	YES (GBP, EUR, USD)	YES (EUR, GBP)	YES

In addition to well established CCP or bilateral post-trade frameworks, this paper also considers the SwapAgent, a service launched by LCH in 2017. SwapAgent was designed to streamline and standardise the non-cleared OTC derivatives marketplace by extending LCH clearing infrastructure to bilateral market without requiring novation to a CCP. SwapAgent allows for trades to remain fully bilateral, while following a similar operational process to that of CCP. The most important feature of the SwapAgent, however, is the benefit of the Settle-to-Market (STM) regulatory treatment, not available in purely bilateral framework. The importance of STM is most pronounced under CEM capital treatment which allows to reduce the maturity of derivatives from the notional maturity of transaction to that of frequency of collateral exchange, typically daily. In large part, this was the main driver behind the increase in volumes of transactions handled by LCH SwapAgent. The situation becomes significantly more complex under SA-CCR and this paper also considers this aspect.

3. Results and Discussion

Table 2 provides a summary of relevant parameters under both SA-CCR and CEM[1] on initial margin and capital charges under three above mentioned derivatives frameworks, together with the most relevant parameters applied under each of the two methods (SA-CCR and CEM).

Table 2

	CCP Cleared	BILATERAL	LCH SWAPAGENT
MPOR	5 days	10 days	10 days
STM/CTM	STM/CTM	CTM	STM
Counterparty Risk Weighting	2%	20% or higher	20% or higher
SA-CCR Maturity Factor	Unmargined: SQRT(5/250)	Margined: 1.5*SQRT(min(10d, M) /250) STM generally not available for Bilateral Trades	Unmargined: SQRT(min(10d, M) /250)
CVA charge	No	Yes	Yes
Netting	Yes, across all trades at CCP	Only within specific CSA	Only within specific CSA
Initial Margin (see discussion below regarding specific case of X-CCY swaps)	Baseline IM - minimal possible[2] (5 days IM, netted across all trades at the CCP) Assuming netting benefit of 30% and MPOR differential between 5 and 10 days, the total IM reduction is circa 50% compared to bilateral or SwapAgent IM	Approximately 200% of Baseline IM. (10 days IM, no netting outside CSA)	Approximately 200% of Baseline IM (10 days IM, no netting outside CSA)
Cross Currency Swap PFE[3] (7Y, 100M) Asset Class - FX (4%)	SA-CCR: 3,276,191 CEM: 500,000	SA-CCR: 6,949,852 CEM: 7,500,000	SA-CCR: 4,633,234 CEM: 500,000
European Swaption PFE (2Y/7Y, 100M) Asset Class – IR (0.5%)	SA-CCR: 185,276 CEM: 500,000 (0.5% floor)	SA-CCR: 393,030 CEM: 500,000	SA-CCR: 262,020 CEM: 500,000 (0.5% floor)
CCR Capital[4]	Baseline Capital Requirement is minimal possible - netting across all transactions at the CCP, no CVA, STM, 2% RWA	Baseline Capital Requirement ++ (CVA, 20% or higher RWA, CTM)	Baseline Capital Requirement + (CVA, 20% or higher RWA, STM)

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[1] Depending on implementation in different jurisdictions, PFE calculated under CEM may include an adjustment for **CCP cleared** transactions. In such case, a multiplier of 0.71 should be applied to the PFE number. See https://www.bis.org/publ/bcbs254.pdf for more details.

[2] Some exceptions for physically settled FX derivatives. See Initial Margin section below.

[3] EAD = 1.4 * (RC + PFE). For netting sets with daily margining and zero thresholds RC will always equal zero. EAD and PFE are shown for SA-CCR and CEM, respectively, since these two measures will be used to determine associated capital charges and RWA under each methodology.

[4] CCR Capital = EAD * Counterparty Risk weight (per standard or IRB approach) + CVA (exempt for CCP cleared sets, otherwise a function of EAD) + LR (function of PFE).

3.1   Initial Margin

In terms of IM requirement, CCP will provide the most opportunities for netting of exposures since all transactions with all counterparties are novated to the CCP. Additionally, base 5 days MPOR will provide circa 40% reduction in IM when compared with minimum 10 days as is the case for bilateral and SwapAgent frameworks. Depending on the composition of portfolio, it is not unreasonable to expect a combined reduction of about 50% in IM required at the CCP when compared to the other two frameworks.

Specific case of IM for cross currency swaps or any other FX derivatives involving physical exchange of notional, however, is somewhat more complex. Under UMR, physically settled FX component associated with the exchange of notional is excluded from IM calculation. In practice, this leaves only the interest rate risk component to be included in IM calculation. This is unlikely to be the case at the CCP (at present EUREX and HKEX are the only major CCPs that clear cross currency swaps) where, due to mutualisation, IM is expected to include all relevant risks, including FX. Standardised Initial Margin Schedule[5] (SIMS) can help in assessing the magnitude of such IM differential, with IM associated with FX products is set at 6% of trade notional, while Interest Rate component with maturity of 7 years will attract only 4% IM. Although, in practice, CCP IM calculations are based on more risk sensitive methodology, this comparison suggests that IM at CCP for this specific instrument is likely to be more than twice as high as that calculated under ISDA-SIMM for bilateral and SwapAgent frameworks. In practice, however, difference between CCP and UMR IM, in most cases, is significantly larger as the IR component of a cross currency swap in a basis between the two rates and therefore lower that 4% stipulated by SIMS. An example provided by Eurex in their OTC Currency Clearing offering[6] quotes a stand-alone IM for a 100m cross-currency swap at 6.7m (in line with 6% of SIMS) while IM on a package of the above swap and offsetting 100m FX forward (effect similar to exclusion of FX risk associated with physical exchange) is only 0.26m – some 25 times smaller! The implication of this result is to highlight the importance of cross-margining between Rates and FX asset classes and ability of such cross-margining to dramatically reduce required IM for portfolios that include reasonable FX hedges. On the other hand, for XCCY swaps that are not well hedged in terms of FX exposure, UMR IM (leaving out FX risk) will be a small fraction of that required by the CCP.

Table 3 shows the Initial Margin for cross currency swap and swaption, both with a notional value of 100m. The initial values presented in the table are approximate[7] and the CCP IM below correspond to that of CME for swaption and that of Eurex for Cross Currency Swap.

Table 3

Initial Margin	CCP	ISDA SIMM
Swaption	CME, ~ $2,000,000	~ $3,600,000
Cross Currency Swap (excluding hedge)	EUREX, ~ €6,700,000	~ €500,000
Cross Currency Swap (Including hedge)	EUREX, ~ €260,000	~ €500,000

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[5] Margin requirements for non-centrally cleared derivatives - https://www.bis.org/bcbs/publ/d317.pdf
[6] https://www.eurex.com/ec-en/clear/eurex-otc-currency-clearing/cross-currency-swaps
[7] See https://www.clarusft.com/isda-simm-swaptions-im-in-excel/ for IM estimates for swaption and
https://www.eurex.com/ec-en/clear/eurex-otc-currency-clearing/cross-currency-swaps for X-CCY swap

3.2 Capital Costs

EAD/PFE is another important measure that is involved in calculations of numerous capital costs associated with maintenance of derivative positions. Leaving CCP Guarantee Fund (GF) contributions out of scope of current discussion (it is assumed that financial institution is already a clearing member of a CCP and individual transactions marginal impact on the GF contribution is relatively small, at about 7% of total IM), EAD/PFE values will determine the Risk Weighted Assets (RWA), CVA costs and Leverage Ratio (LR) attributed to any given portfolio.

In case of a CCP, regulatory Risk Weighting is only 2% and entire portfolio will benefit from full CVA exemption. This is not the case for bilateral and SwapAgent frameworks that are subject to full CVA costs. This is in addition to significantly higher Risk Weighting, starting at 20% for interbank counterparties and increasing with decrease in credit quality of derivatives counterparty.

PFE itself is very heavily dependent on the methodology used to calculate this measure. Except for typically very large and advanced financial institutions that employ approved Internal Risk Based (IRB) models, most banks relied on Current Exposure Method (CEM) to calculate PFE. This is due to be replaced in 2022 with more advanced and more risk sensitive SA-CCR methodology. Depending on the methodology used, bilateral and SwapAgent frameworks result in PFE increase (as compared to a CCP base case) of about 112% and 41%, respectively under SA-CCR methodology. Under CEM the PFE does not change between CCP and SwapAgent framework but increases 15 times (!) for bilateral framework.

The reason for such large changes is mainly due to STM and CTM classification of trades. Under CCP and SwapAgent frameworks, regulators allow for the exchange of variation margin to be treated as daily settlement of transaction, effectively reducing transaction maturity, in our case, from 7 years to 1 day. This reduces the regulatory multiplier under CEM from 7.5% (above 5 years) to 0.5% floor (up to 1 year) and explains the difference in calculated PFE under CEM.

Under SA-CCR, the effect is smaller and somewhat more complex and follows from two interconnected factors. As shown in Annex A, PFE calculation under SA-CCR involves Maturity Factor MF_i that is further separated into Margined and Unmargined cases. Also, an input to the calculation is Margin Period of Risk (MPOR) or Trade Maturity for both margined and unmargined cases. Further, both cases are subject to a minimum MPOR of 10 days, except for CCP cleared transaction where MPOR is allowed to be set at 5 days. In addition, regulators currently require STM transaction to be classification as *unmargined* due to the daily settlement of Variation Margin. This, in turn, requires use of $MF_i^{unmargined}$ formula that does not include 1.5 multiplier present in the case for $MF_i^{margined}$ calculation (see Annex A). Based on the above differences, it can be shown that, with all else being equal, the PFE for bilateral CTM transaction is about 50% higher than that for identical transaction under STM classification in a SwapAgent framework.

4. Conclusions

Overall, it is clear from the results presented above that, on a stand-alone basis[8], CCP is the best post-trade framework to handle derivatives portfolio that potentially could be cleared at the CCP. This is applicable for any derivatives that could be cleared; 57% increase in total notional of inflation swaps registered at LCH SwapClear in H1 2021 is a case in point of market participants recognition of Capital and IM benefits derived from CCP clearing of non-mandated derivatives.

In cases when clearing at CCP is not a viable option (e.g., CCP membership or GF hurdles), SwapAgent will provide the next best available framework, allowing for significant capital cost savings of about 50% and 1400% under SA-CCR and CEM, respectively. Leaving portfolio of derivatives as purely bilateral trade is the worst available option under any capital treatment.

There is, however, one significant caveat to the generalised rule suggested above, and this is the case of Cross Currency Swaps. Large funding impact associated with UMR exemption of physically settled FX risk and typically directional cross-currency portfolios are likely to require active FX hedging in a cleared portfolio. Where this is not possible or impractical then many of the benefits of clearing can be obtained moving the cross-currency swaps position to a SwapAgent, where at least 50% capital reduction without incurring an increase in Initial Margin. The decisions around clearing Cross Currency Swaps v's SwapAgent will be specific to each derivatives user and require detailed portfolio analysis.

Portfolio analysis can also be extended to include CCP mandated trades to determine optimal netting sets and trade allocations across entire derivative portfolio between CCP (single or multiple), SwapAgent and Bilateral to minimise IM and Capital. It is important to note that such optimisation will not be static, one-off exercise, and will change as portfolio is evolving, with new trades added and existing trades maturing. Sernova Financial can assist its clients with ongoing portfolio analysis and advise on the optimal post-trade framework taking client specific portfolio information into account.

At Sernova Financials we have extended our offerings to support Eurex Cross Currency and LCH SwapAgent framework in our single point of integration suite of Smart Gateway to Clearing post-trade solutions to complement our existing OTC and ETD derivatives products.

Financial institutions interested in having more information about Sernova Financial Smart Gateway to Clearing are invited to visit our website at **www.sernovafinancial.com** or to get in touch via **info@sernovafinancial.com**

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[8] We do not consider here the highly specific effects of bifurcation of netting sets

5. Annex A:
Calculation of Exposure at Default (EAD) under SA-CCR[9]

Exposure at default: EAD = alpha * (RC + PFE) (also under CEM)

where: <u>alpha</u> = 1.4

<u>RC</u> = the replacement cost calculated as RC = max{V − C; 0} where V is the value of the derivative transactions in the netting set and C is the post-haircut value of net collateral held[10]. Replacement cost is calculated at the netting set level. For the purposes of this discussion, we would assume that all trades are fully collateralised, VM is exchanged daily (under both STM or CTM models), and therefore RC = 0. At the same time, there will be a certain period of time required to replace or unwind transaction and this period, known as Margin Period of Risk (MPOR) is captured by the PFE component and represents the change in portfolio value between the last VM exchange and close-out.

<u>PFE add-ons </u>consists of (i) an aggregate add-on component, which is the add-ons calculated for each asset class and (ii) a multiplier that allows for the recognition of excess collateral or negative mark-to-market value for the transactions.

PFE = multiplier * Add-on$_{agg}$

Where the multiplier is defined as a function of three inputs: V, C and aggregate AddOn, with a Floor set at 5%

$$multiplier = \min\left\{ 1; Floor + (1 - Floor) * \exp\left(\frac{V - C}{2 * (1 - Floor) * AddOn^{aggregate}} \right) \right\}$$

Since, in our case of fully collateralised portfolio with a value reset daily to zero, V - C < 0 and the multiplier will always be smaller than 1. For the purposes of discussion in this paper and in order to maintain simplicity, we will assume this multiplier to be one.

For each transaction, the primary risk factor or factors need to be determined and attributed to one or more of the five asset classes: interest rate, foreign exchange, credit, equity or commodity. The add-on for each asset class is calculated using asset-class-specific formulas that represent a stylised effective EPE calculation under the assumption that all trades in the asset class have zero current mark-to-market value. Although the add-on formulas are asset class-specific, they have a number of features in common. To determine the add-on, transactions in each asset class are subject to adjustment in the following general steps:

● An adjusted notional amount based on actual notional, or price, is calculated at the trade level. For interest rate and credit derivatives, this amount also incorporates a supervisory measure of duration;

  d_i = Trade Notional * Supervisory Duration

● An effective notional is calculated by multiplying adjusted notional d_i by delta adjustment based on position (+/- 1 for *linear* long or short instruments, respectively, or more complex formula for options and CDO tranches) and Maturity Adjustment MF_i resulting in an effective notional amount;

  EffectiveNotional$_i$ = d_i * delta$_i$ * MF_i

where maturity factor MF_i reflecting the time horizon appropriate for the type of transaction.

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[9] See The standardised approach for measuring counterparty credit risk exposures paper
https://www.bis.org/publ/bcbs279.pdf for more details
[10] The term TH + MTA − NICA represents the largest exposure that would not trigger a VM and, for the purpose of our example, we assume this to be zero.

Two types of maturity factor are defined, one for margined transactions and one for unmargined transactions, as appropriate;

$$MF_i^{margined} = 1.5 * SQRT(min(10\ days, MPOR)/1\ YEAR))[11]$$

$$MF_i^{unmargined} = SQRT(min(10\ days, MPOR)/1\ YEAR))$$

• A supervisory factor is applied to each effective notional amount to reflect volatility (e.g., 0.5% for Interest Rates Products and 4% for FX Products)

• The trades within each asset class are separated into hedging sets and an aggregation method is applied to aggregate all the trade-level inputs at the hedging set level and finally at the asset-class level. As an example, the following aggregation rules apply for IR and FX asset classes:

Interest rate derivatives: A hedging set consists of all derivatives that reference interest rates of the same currency such as USD, EUR, JPY, etc. Hedging sets are further divided into maturity categories. Long and short positions in the same hedging set are permitted to fully offset each other within maturity categories; across maturity categories, partial offset is recognised.

Foreign exchange derivatives: A hedging set consists of derivatives that reference the same foreign exchange currency pair such as USD/Yen, Euro/Yen, or USD/Euro. Long and short positions in the same currency pair are permitted to perfectly offset, but no offset may be recognised across currency pairs.

For credit, equity and commodity derivatives, there is also a supervisory correlation parameter to capture important basis risks and diversification.

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[11] CCP cleared transaction have a minimum of 5 days

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