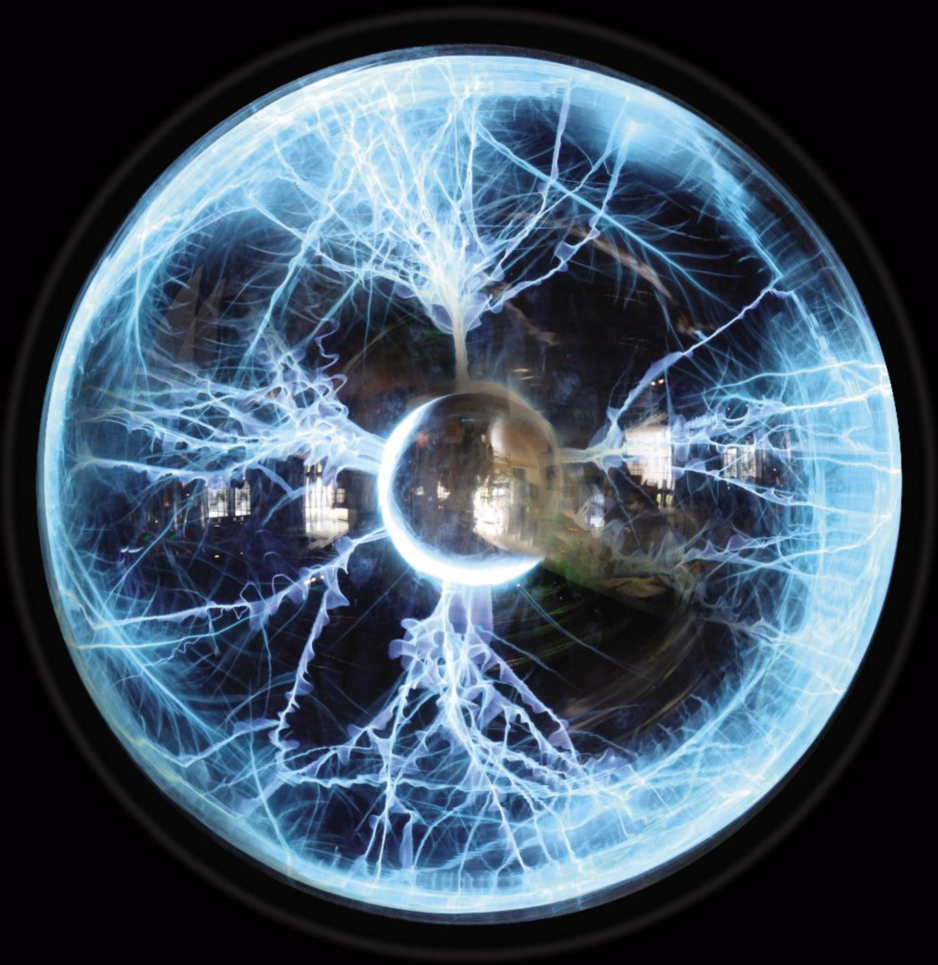

Capital management under the new standardised approach for counterparty credit risk

Understanding and using SA-CCR to drive front office decision-making

Financial Risk

Capital management under the new standardised approach for counterparty credit risk

Understanding and using SA-CCR to drive front office decision making

Do you have the full transparency your SA-CCR drivers at your fingertips?

Introduction

Setting the scene

In March 2014, the Basel Committee on Banking Supervision (BCBS) published a consultation paper on the revised standardised approach for measuring counterparty credit risk (SA-CCR) [1]. The new calculation approach is part of the Basel 3 post-crisis reforms and aims to provide an increased market resilience in stressed economic environments, the COVID-19 pandemic being its first real test…

SA-CCR replaces the existing standardised approaches (Current Exposure Method and Standardised Method) and aims to address a number of their shortcomings by (i) increasing the risk sensitivity through different risk-factor volatilities, and (ii) recognising the risk-reducing effect of netting and hedging sets, without creating undue complexity.

Under the latest Basel rules, financial institutions will have the option to calculate their counterparty credit risk (CCR) risk-weighted assets (RWA) using SA-CCR or, subject to regulatory approval, the internal model method (IMM). An internal model provides a much more risk-sensitive estimation of CCR, and is tailored to an institution's portfolio specificities, hedging strategies and risk-management policies. Whereas in most cases an IMM is expected to reduce in RWAs, the complexity and operational costs mean that internal models are typically only applied at large financial institutions with substantial derivatives portfolios.

At a first glance, one might think that SA-CCR is only relevant for "less-sophisticated", "non-IMM" banks. This, however, is far from true. Aside from the calculation of standardised CCR RWAs, the SA-CCR exposure metric is a core component of the leverage ratio calculation, irrespective of the whether the institution has an IMM waiver. Furthermore, the introduction of the standardised output floor under Basel 4 means that also institutions with internal models will have to calculate standardised RWAs, and therefore SA-CCR. Understanding SA-CCR and its key risk drivers hence ought to play a central role in every bank's capital management framework.

SA-CCR has been in place in Switzerland as of January 2020. In other European countries, the previously scheduled go live of 2022 has been delayed to 2023 due to the COVID-19 pandemic.

Historical context and market overview

The 2008 financial crisis emphasised the importance of counterparty credit risk management, and exposed how the interconnectivity of financial institutions in the over-the-counter (OTC) derivatives market can lead to substantial losses. While derivatives are essential financial instruments in hedging market and credit risks, the run-up to 2008 witnessed a rapid growth of interwoven interest rate and credit derivatives, hereby posing a major systemic risk to the financial system. This, in turn, sparked an industry and regulatory drive towards managing and reducing counterparty credit risk including central clearing of vanilla derivatives and increased margin requirements for bilateral trades.

The industry drive towards central clearing and collateralisation has significantly changed the global derivatives landscape. Whereas prior to 2009, centrally cleared derivatives were few and far between, they now make up more than 60% of the total OTC derivatives market, as illustrated in Figure 1 below.

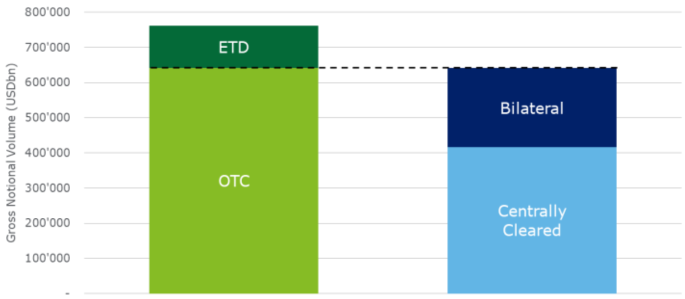

Figure 1. Global derivatives market overview (Source: BIS derivatives database, June 2019)

Despite a slight decline post 2008, the OTC derivatives market remains substantial with a gross notional volume of 640 trillion USD (as of June 2019), which is about 7 times the global GDP. Interest rate derivatives remain the dominant product type, accounting for 82% of the outstanding notional amounts, similar to their market share in 2009. For credit derivatives, on the other hand, there has been a significant shift towards the exchange-traded markets. Whereas in the years leading up to 2009, credit derivatives made up around 10% of the total OTC derivatives landscape, this share has since dropped to around 1% [2]. An overview of the OTC derivatives market by product class is shown in Figure 2.

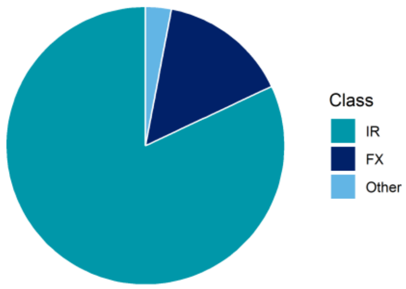

Figure 2. OTC derivatives market by product class: domination of interest-rate derivatives (Source: BIS derivatives database, June 2019)

SA-CCR Methodology

The total exposure at default (EAD) under the SA-CCR consists of two components, the replacement cost (RC) and the potential future exposure (PFE), and can be mathematically expressed as:

$$EAD = \alpha \cdot (RC + PFE)$$

where α is a constant value set to 1.4 by the Basel Committee, in line with the Internal Model Method (IMM).

The RC quantifies the immediate loss that would occur if a counterparty were to default (i.e. the current exposure). It is calculated as the total mark-to-market (MtM) of the derivative trades at the netting set level less collateral. The RC is floored at 0.

The PFE component consists of (i) a multiplier that allows for the partial recognition of excess collateral or negative market values (RC = 0), and (ii) an "aggregate add-on", which is the sum of five asset-class level "add-ons" (see below). Each asset-class is in turn subdivided into different hedging sets, representing groups of transactions within or across which full or partial offsetting is recognised. Below we briefly outline the add-on calculation approaches for the five asset classes in the SA-CCR framework:

1. Interest rate (IR) derivatives: different hedging sets correspond to IR derivatives in the same underlying currency (e.g. USD, EUR, CHF). Hedging sets are further subdivided into maturity buckets. Long and short positions can fully offset each other within the same hedging set and maturity bucket, whereas partial offsetting is recognised across maturity buckets.

2. Foreign exchange (FX) derivatives: different hedging sets correspond to FX derivatives that have the same FX currency pair (e.g. USD/EUR, CHF/EUR). Long and short positions in the same FX currency pair can fully offset each other whereas offsetting across FX currency pairs is not recognised.

3. Credit derivatives: a single hedging set is defined for all credit derivatives. Full offsetting is recognised for derivatives referencing the same entity, name or index (e.g. Firm A, CDX.NA.IG), whereas partial offsetting is allowed across different entities.

4. Equity derivatives: a single hedging set is defined for all equity derivatives. Full offsetting is recognised for derivatives referencing the same entity, name or index (e.g. Firm B, SPX), whereas partial offsetting is allowed across different entities.

5. Commodity derivatives: four hedging sets are defined: energy, metals, agriculture and others. Full offsetting is recognised within the same hedging set for derivatives referencing the same commodity, whereas partial offsetting is allowed for derivatives referencing different commodities. Offsetting between hedging sets is not permitted.

The SA-CCR calculation manages to capture, to a certain extent, the risk-reducing effect of cross-product netting. The segmentation into the different asset classes and hedging sets, however, means that the diversification benefit is more restricted than under IMM, where MtM offsets can be recognised across the entire netting set. Furthermore, the SA-CCR collateral multiplier only allows for a partial recognition of overcollateralisation (e.g., initial margin), and is floored at 5% (so no amount of collateral can drive down the exposure to zero). Conversely, under IMM, any overcollateralisation can be fully offset against the counterparty exposure. The ability to capture full cross-product netting and "dollar for dollar" initial margin exposure offsets are two key reasons as to why complex financial institutions might opt for an internal model.

Capital management under SA-CCR

Embedding SA-CCR into the business

Implementing SA-CCR into the bank's IT infrastructure and reporting systems, is only a first step of bank-wide "SA-CCR integration". Aside from the technical considerations, banks will also be faced with a more strategic challenge, namely: How to manage capital effectively under the new SA-CCR regime?

The SA-CCR exposure metric comes with a renewed set of capital drivers and mitigation levers. A key aim of a bank will be to embed SA-CCR capital management into their business decision-making, including:

- Measuring performance adjusted for capital costs:
  Understanding SA-CCR contributions allows for allocation of capital costs along the business hierarchy.
- Optimal deployment of collateral:
  Assessing the benefit of posting (additional) collateral across various netting sets can improve capital performance. Furthermore, banks ought to have in place a robust framework to deal with single pledge agreements. That is, collateral pledges across multiple accounts, covering both lending and derivatives exposures (e.g., in the Lombard lending context).
- Pre-trade analyses:
  Understanding the capital impact of adding new trades to a netting set can help incentivise capital-reducing trades.

SA-CCR capital allocations

A fundamental component of a "best-in-class" capital management framework is a robust capital cost allocation. A solid allocation approach should reflect the following desirable features:

- Fairness and correct incentives: Trades that adversely impact a bank's capital requirements should receive a higher exposure allocation, whereas trades decreasing counterparty credit exposures should be rewarded.
- Transparency: the capital allocation is easily understood by key stakeholders and provides an intuitive rationale.
- Granularity: the allocation approach allows for assessments at various levels of aggregation, from granular trade-level contributions to product type and asset-class-level breakdowns.

In the context of new SA-CCR framework, banks are looking into techniques that can help them allocate their SA-CCR exposures and resulting capital costs across their business hierarchy. One common approach is to simply pro-rate the SA-CCR exposure based on a trade-level metric (e.g., trade notional or MtM). Such a "top-down" approach, however, is not able to reflect netting-set level offsets and sensitivities.

An alternative, more risk-sensitive approach is the so-called Euler method [3], which calculates trade-level contributions of an aggregate risk metric (in this case the SA-CCR exposure) by assessing the impact of an incremental size increase of a single trade. A useful feature of the SA-CCR add-on formula is that it enables an analytical and hence computationally fast application of the Euler method. The resulting contributions are additive (i.e. individual contributions sum up to the total exposure) and take into account trade-level characteristics as well as netting-set level diversification.

Our solution: SA-CCR Calculator & Analyzer

End-to-end, transparent SA-CCR implementation

Deloitte has developed an end-to-end SA-CCR solution with an intuitive user interface allowing end-users to understand risk drivers and capital impacts through the following key components and outputs:

1. Netting-set Exposure at Default:
   The main output is the total SA-CCR exposure per netting set. The tool can handle real-life netting sets of banks with a large number of counterparties and trades.
2. Replacement Cost and Potential Future Exposure:
   The tool breaks down the EAD into its two main constituents: RC and PFE. Additionally it provides intermediate results to assess collateral contributions such as the value of the multiplier, the over-collateralisation ratio as well as the marginal value of CHF 1 million of additional collateral.
3. EAD allocation down to trade level:
   The tool provides insight into the drivers and mitigation levers through additive SA-CCR allocations to product type and down to trade-level. The RC allocation is pro-rated based on MtM, whereas the PFE allocation follows the Euler method.
4. Comparison to IMM:
   The tool is strategically linked to Deloitte's XVA solution [4, 5] and provides a visual comparison of the SA-CCR exposure to the EPE and PFE obtained using the IMM approach.

Key use cases

Beyond the regulatory SA-CCR calculation, the Deloitte SA-CCR solution provides additional information that can guide front office decision making such as:

- Transparency, breakdowns and allocations:
  Understanding the drivers of SA-CCR and the benefit of diversification.
- Comparison of regulatory versus internal risk measures:
  SA-CCR versus IMM EPE and PFE profiles
- What-if analyses:
  Sensitivity tests, scenario analyses and pre-trade assessments
- Dashboard monitoring:
  Tracking of capital performance, thresholds and limits monitoring
- Quality review and benchmarking:
  Assessments against internal IT implementations

Case Study

Sample portfolio

In this section, we illustrate some of the main functionalities of the SA-CCR Calculator & Analyzer by means of a simple case study. Consider a financial institution with the following OTC derivative trades against a single counterparty (Table 1):

Product Type	Notional [CHFm]	Expiry [years]	Currency	IM [CHFm]	VM [CHFm]
Forward (SPX)	0.001	0.50	USD	60	20
Cap	500	1.75	CHF		
IR Swap 1	3000	1.50	EUR		
IR Swap 2	2000	2.00	CHF		
IR Swap 3	-1000	1.00	CHF		
IR Swap 4	1500	2.50	EUR		

Table 1. Case study portfolio.

Long and short positions are indicated by positive and negative notional amounts, respectively. Any collateral posted as part of the netting agreement is reflected by the initial (IM) and variation (VM) margins. The IM is a fixed amount posted at origination to cover potential losses incurred between the time of the counterparty's default and the re-allocation of the trades. The VM, on the other hand, aims to capture the effect of market movements and is reassessed at regular intervals (e.g. daily).[1]

EAD and other key netting-set level metrics

Table 2 below outlines the key netting-set SA-CCR metrics.

SA-CCR portfolio metric	Value
Exposure at Default (EAD)	4.81 CHFm
Replacement Cost (RC)	0.00 CHFm
Potential Future Exposure (PFE)	3.43 CHFm
Add-on (pre-multiplier)	*17.23 CHFm*
Collateral Multiplier	*0.20*

Table 2. Key netting-set-level metrics.

The netting-set EAD for the sample portfolio is CHF 4.81 million with the PFE component equal to CHF 3.43 million. The low multiplier value of 0.2 and an RC of zero (floored) reflect the excess collateral posted.

Another interesting metric to assess at the netting-set level is the "marginal impact of additional collateral", which quantifies the decrease in SA-CCR EAD that would result from posting 1 CHFm additional collateral. Because of the high IM posted our example, we have that 1 CHFm additional collateral would only decrease the SA-CCR by 0.0045 CHFm. This highlights the limited impact of overcollateralisation under SA-CCR. In fact, a floor of 5% applied to the collateral multiplier means that it is not possible to completely reduce EAD to zero under the SA-CCR.

Trade-level exposure allocations

Table 3 provides an overview of the EAD allocations to the trade level, as well as a comparison between the stand-alone and allocated add-ons. The stand-alone add-on reflects the add-on contribution, assuming the portfolio would only consists of that particular trade (i.e., ignoring potential offsetting benefits within the same product type). The allocated add-on, on the other hand, provides an insight into the relative contribution of each product in the netting-set context using the Euler allocation method. The final trade-level EAD allocations take into account the effect of the collateral multiplier as well as the RCs, which are allocated according to the trade's market value.

Product Type	Stand-alone add-on [m CHF]	Allocated add-on [m CHF]	Allocated EAD [m CHF]
Forward (SPX)	0.0001	0.0001	0
Cap	1.0	0.9	0.3
IR Swap 1	6.8	6.8	1.9
IR Swap 2	5.4	5.4	1.5
IR Swap 3	1.4	-1.4	-0.4
IR Swap 4	5.5	5.5	1.5

Table 3. Product level add-ons and allocations.

In Table 3 one can see that IR Swap 3 has a negative allocated add-on contribution and therefore effectively drives down the total EAD. This can be explained by the fact that the short position of IR Swap 3 partially offsets the long position of IR Swap 2. This nicely illustrates the ability of SA-CCR to capture the benefit of netting-set level diversification.

Comparison to internal risk metrics

Figure 3 below compares the SA-CCR exposure to the EPE and PFE obtained using an internal model. The EPE quantifies the average future exposure towards a counterparty, whereas the PFE represents the 99th percentile worst-case exposure.

In order to have a "like-for-like" comparison between SA-CCR and the internal risk metrics, we used the SA-CCR risk-factor volatilities in the simulation of the EPE and PFE profiles. It is important to note that the SA-CCR volatilities are likely to exceed the typical volatilities used in internal risk calculations, and consequently result in higher EPEs and PFEs than a conventional IMM.

The EPE metric is the IMM counterpart to the SA-CCR EAD in the RWA context. The IMM PFE, on the other hand, is typically used for internal limit setting and stress testing frameworks. Figure 3 below shows that both the EPE and SA-CCR EAD have comparable initial values, however, the EPE displays a clear decreasing trend as time progresses. This nicely illustrates the potential for RWA reductions with an IMM, especially considering the stressed SA-CCR market volatilities used to produce the EPE profile.

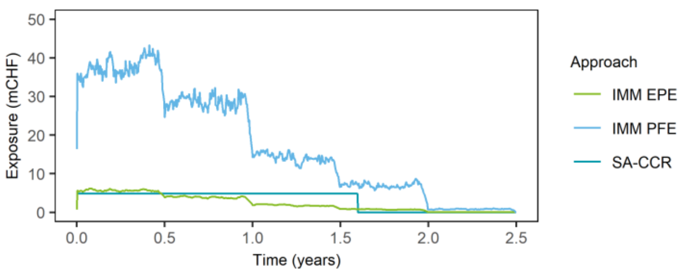

Figure 3. Comparison of the SA-CCR exposure to the IMM EPE and PFE.

[1] In the context of single pledge agreements across both loan and derivative positions (e.g., Lombard lending), the determination of the IM and VM might not necessarily be straight forward, and would typically require an additional collateral allocation framework. Such a framework would determine which portion of the collateral is used to offset the derivative positions (i.e., used in the SA-CCR), and which portion offsets the other lending exposures.

Conclusion

Capital management under SA-CCR

As a part of the post-crisis reforms, Basel III has introduced a new standardised approach for measuring counterparty credit risk. The SA-CCR exposure metric will feature both in RWA and leverage ratio calculations, and will hence play a central role in a bank's capital management for OTC derivatives.

A core component of a "best in class" SA-CCR capital management is a robust capital allocation framework. Granular trade-level exposure allocations can generate actionable insights into capital drivers and mitigation levers. To this end, Deloitte has developed a comprehensive SA-CCR solution, encompassing a complete SA-CCR calculator, trade-level allocations and key netting-set level metrics. The solution covers all aspects of SA-CCR and is scalable to the requirements of our clients' requirements.

Recommendations

Going forward, banks will have to start thinking about how to embed SA-CCR into their business decision-making. To this end, banks ought to establish dedicated SA-CCR coordination programmes across various functions including Front-Office, Finance, Risk and IT. Beyond the technical implementation challenges, key focus areas ought to include:

- Introducing a comprehensive SA-CCR capital allocation approach, incentivising risk-reducing trades, and enabling capital performance tracking along the business hierarchy.
- Developing a robust collateral framework, understanding the optimal deployment of collateral across netting sets as well as the treatment of single-pledge agreements (in particular in the Lombard lending context).
- Building a capacity to perform flexible SA-CCR analytics, allowing for real-time SA-CCR monitoring across all key dimensions.

Performance adjusted for regulatory capital costs has become one of the core measures in steering a bank. Understanding the key risk drivers of SA-CCR and managing derivatives portfolios accordingly will be essential to optimally deploy capital and reduce RWA volatility.

References

[1] Basel Committee on Banking supervision (2014). *The standardised approach for measuring counterparty credit risk exposures.*

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