ISDA Safe, Efficient Markets

March 20, 2017

Mr. Scott Nagel
Secretariat of the Basel Committee on Banking Supervision **("BCBS")**

Also sent by email to: Mr. Derek Nesbitt, Chair of the BCBS Market Risk Group

Basel Committee on Banking Supervision
Centralbahnplatz 2, Basel - SWITZERLAND

Re: Standardized Approach for Measuring Counterparty Credit Risk Exposures - Industry quantitative impact study findings and suggestions for improved coherence and calibration without adding undue complexity.

Dear Mr. Nagel,

The International Swaps and Derivatives Association ("**ISDA**") appreciates the opportunity offered by the Secretariat of the BCBS to comment on the Standardized Approach for Measuring Counterparty Credit Risk Exposures ("**SA-CCR**") framework published in April 2014.

ISDA broadly supports the replacement of the Current Exposure Method (**"CEM"**) and the Standardised Method (**"SM"**) by SA-CCR, which aims to provide a more risk-sensitive measure of exposure at default (**"EAD"**) in its application to several key areas of the regulatory capital framework such as the Leverage Ratio, Large Exposures, banks' exposures to CCPs and potentially the Basic CVA approach.

A key concern of the Industry, however, is that SA-CCR is likely to result in a significant increase in exposures and capital requirements, constraining banks' ability to support the demand of end users for derivatives products at an acceptable cost, and being contrary to the GHOS commitment not to further increase capital requirements. This assessment is supported by the **ISDA SA-CCR QIS Analysis**[1] based on BCBS RCAP Portfolios, which emphasises a **SA-CCR EAD equivalent to 2.5 times IMM EAD, and 2.3 times CEM EAD** for netting set 16, which includes all the individual interest rate, FX and equity trades[2]**. Across numerous other netting sets, particularly unmargined, SA-CCR can show significantly larger impacts**[3]. SA-CCR's lack of risk sensitivity and conservative calibration mainly result from:

- **The conservatively calibrated Alpha factor, which does not apply to a standardized and already conservatively calibrated framework such as SA-CCR**. Alpha was set in 2003 to 1.4x using industry estimates, and no longer reflects current market and regulatory environments, in particular the increase in collateral agreements; the use of "stressed" instead of "unstressed" effective EPE[4]; and additional capitalisations for specific Wrong-Way-Risk ("WWR"), illiquid trades or collateral, as well as disputes, through step ups in Margin Period of Risk ("MPOR").

[1] In its SA-CCR QIS, ISDA compares EADs across BCBS RCAP hypothetical portfolios (October 2015 BCBS RCAP report, http://www.bis.org/bcbs/publ/d337.pdf) for three counterparty credit risk calculation approaches: SA-CCR, CEM and IMM. Further details on the QIS and the IMM Model Calibration can be found in Annex 2.
[2] Results for netting set 16, unmargined.
[3] QIS results have highlighted in several instances a CCR capital charge equivalent to **more than three times existing requirements**. This is true when comparing SA-CCR to existing non-modelled approaches as well as internal model approaches.
[4] http://www.bis.org/publ/bcbs189.pdf p30: "Effective EPE with stressed parameters to address general WWR".

- **Limited recognition of the exposure-reducing effect of initial margin ("IM")**: the level of exposure reduction offered by the PFE multiplier is not sufficiently aligned with the level of actual risk mitigation provided by the exchange of IM.

- **SA-CCR does not reflect any diversification benefit across hedging sets within an asset class,** which is overly conservative and risk insensitive, and significantly overstates EADs compared to IMM approaches, where some degree of diversification is assumed.

- **Several other areas of SA-CCR are either particularly conservatively calibrated,** such as equities supervisory factors, or **would benefit from simple improvements further enhancing risk sensitivity and reducing complexity of implementation,** for example the options delta calculations and the treatment of multiple netting sets subject to a single margin agreement, and vice versa.

In this letter, ISDA analyses in more details the key design and calibration issues that still need to be addressed before SA-CCR can be implemented, and suggests improvements so that SA-CCR can better reflect the actual level of EAD and therefore risk. We believe that SA-CCR can significantly benefit from an enhanced calibration aligned with current market and regulatory environments, particularly as regards the calibration of the Alpha factor and supervisory factors for interest rates and equities. In addition, we think it is crucial that the BCBS undertakes an assessment of the overall coherence and calibration of SA-CCR in the context of its applicability to the relevant areas of the regulatory capital framework. In particular, SA-CCR should allow for better recognition of the exposure-reducing effect of IM for both cleared and bilateral transactions in the Leverage Ratio framework.

Whilst the BCBS did consult the industry prior to finalizing SA-CCR, many elements of the final framework remain overly conservative and are based on outdated parameters. We therefore respectfully request that the BCBS considers our concerns and recommendations and initiates the necessary work by engaging with ISDA to review and improve the design and calibration of SA-CCR to ensure the approach is fit for purpose in the broad context currently being contemplated.

ISDA maintains that unless the rules are revisited, SA-CCR could severely impact the availability and pricing of hedging products for end users, and negatively impact the development of robust capital markets. End users use derivatives to hedge their risks, and any rules that could constrain the use of derivatives may: (i) negatively impact corporates and investors' ability to hedge their funding and currency risks on both newly issued debt securities and banks loans; and (ii) constrict corporates ability to hedge their commercial and day-to-day risks resulting in a weakening of their balance sheets, increased uncertainty in financial performance, and more expensive funding.

This letter does not address SA-CCR implementation in the context of the Credit Risk rules, which have not yet been finalized by the BCBS. However, ISDA would caution against any suggestion that SA-CCR be introduced as a floor to the internal models framework, as we believe a floor using the notional based SA-CCR measure would undermine the use of internal models in the capital framework, and encourage banks to reduce notional amounts without necessarily reducing risk, and would further constrict provision of hedging products to end users. We reiterate the importance of risk-sensitivity to the capital framework and the internal risk monitoring and management performed by banks' credit risk departments.

A. Industry concerns, quantitative impact study findings and suggestions for improved coherence and calibration

The SA-CCR supervisory parameter 'Alpha' requires recalibration

One of the original aims of Alpha was to provide a means of conditioning internal estimates of Expected Positive Exposure ("EPE") on a "bad state" of the economy consistent with the determination of credit risk in the capital framework, whilst reflecting concerns around general WWR. Alpha was conservatively set in 2003 to 1.4x using industry estimates[5], and applied to IMM EADs.

Alpha was also viewed as a method to offset model error or estimation error to which SA-CCR is not subject given its standardized design and parameters. Furthermore, potential errors introduced through SA-CCR's simplification assumptions are balanced by the conservatism emphasised in several other areas of SA-CCR. The risks Alpha is meant to capture are to a great extent already explicitly addressed by the calibration of the Supervisory Factors which, despite an overly conservative calibration in some instances, are based on stressed markets. ISDA believes that Alpha does not apply to a standardized framework such as SA-CCR, and that if an adjustment is applicable it needs to be calibrated to reflect present market conditions, exposure calculation and regime changes in in both SA-CCR and IMM frameworks.

ISDA particularly believes that the 2003 estimates used to determine Alpha are no longer valid for the following reasons:

- The use of "stressed" instead of "unstressed" effective EPE in the capital framework already addresses general WWR[6]; in addition to separate capitalisations for specific WWR[7], illiquid trades or collateral, as well as disputes, through step ups in MPOR.

- The 2003 ISDA study found only 33% of total exposure was collateralized; as a result the study was focused around uncollateralized exposures. As markets have evolved the number of collateral agreements has increased. Additionally, the new regulation for uncleared trades currently being implemented requires collateral agreements to be in place for the majority of counterparties. As such an Alpha factor calibrated using primarily uncollateralized exposures is not relevant.

- When calculating the impact on Alpha of mixed collateralized and uncollateralized portfolios the study assumed only counterparties on the "same side of the book" would be collateralized. As the use of collateral agreements keeps increasing it is likely that both exposures to market counterparties and customers will be collateralized.

- The 2003 base case was a hypothetical portfolio of 200 counterparties and 3 orthogonal risk factors for which the Alpha value was 1.08x. Given the growth in derivatives markets, both the number of counterparties and risk factors have increased. **As an example, the recomputed analytical value of Alpha with 1,500 counterparties and 10 orthogonal risk factors, which is more representative of current markets, is 1.01x.**

- The 2003 ISDA study of an analytical estimate of Alpha was not based on real portfolios and assumed no correlation between exposure and credit events (WWR). A more recent study on a real

[5] http://www.isda.org/c_and_a/pdf/counterpartyrisk.pdf
[6] http://www.bis.org/publ/bcbs189.pdf p30: "Effective EPE with stressed parameters to address general WWR".
[7] Requirement in CRR Article 273-8 for methods set out in sections 3 to 6, details in CRR Article 291.

portfolio shows that Alpha remains below 1.2x even when the correlation between exposures and credit events is stressed to 75%[8].

Furthermore, in 2005 the BCBS recognised that the industry had posed theoretical arguments why a floor of 1.2x may be too high, depending on details of a bank's model and its CCR exposures, and regulators did emphasise their little supervisory experience validating modelled values of Alpha. The BCBS hence decided to allow institutions having the ability to model Alpha to do so, subject to a conservatively set floor of 1.2x[9].

ISDA therefore firmly believes that usage of Alpha in SA-CCR's context should be fundamentally revisited, and that Alpha should be recalibrated in general in the Counterparty Credit Risk capital framework to a level appropriately reflecting current market conditions as well as significantly higher levels of margining and counterparty credit risk capital. The Industry is currently conducting a quantitative analysis aiming to inform an appropriate calibration of Alpha, and looks forward to working with the BCBS on this issue.

Application of Alpha to the Leverage Ratio Framework

Although the Leverage Ratio is a non risk based and balance sheet aligned backstop measure, the measurement of exposure for derivatives has always included an element of risk based calculation to reflect the volatility in fair values (Potential Future Exposure, "PFE"). ISDA supports this principle in general, and specifically support maintaining the alignment between credit risk and leverage calculation for PFE by using SA-CCR.

Conversely, the current fair value (Replacement Cost, "RC") element of derivative exposures is already captured in the balance sheet as a mark to market (MtM) receivable. The treatment in existing regulatory frameworks adjusts for inconsistencies in accounting standards by recognising legally enforceable netting and variation margin ("VM") is prudent and in line with both the design principles of the Leverage Ratio and economic reality. The proposal to further adjust RC by applying the Alpha factor of 1.4x is not so aligned, and creates a situation whereby a balance sheet receivable is not included at balance sheet value, without any justification.

Inflating the balance sheet exposure for derivatives by 40% will increase the cost of hedging for end users, notably corporates, pension funds and sovereigns who are less likely to margin their hedging positions. ISDA therefore believes that the Alpha factor should in particular not apply to the RC element of leverage exposure on derivatives. RC should rather reflect the on-balance sheet exposure, consistent with the treatment of loans, overdrafts, securities or any other balance sheet exposure.

Application of Alpha to the Large Exposures Framework

Moreover, Alpha should be set to one for use in the Large Exposure framework, where the intent is to measure the propensity for concentration (not assume it, as is done when using the alpha factor).

[8] http://www.opus-finance.fr/sites/default/files/Fichier_Site_Opus/Article_recherche/Articles_externes/2013/Effective_modeling_of_wrong_way_risk/Effective_modeling_of_wrong_way_risk.pdf

[9] http://www.bis.org/publ/bcbs116.pdf

The risk mitigation effect of initial margin (IM) needs to be better recognised in SA-CCR

SA-CCR allows some reduction of the Potential Future Exposure (PFE) resulting from the posting of IM. However, because the manner in which the PFE multiplier is calibrated, this degree of exposure reduction is too low and not sufficiently aligned with the actual level of risk mitigation provided by IM. The theoretical formulation of the PFE multiplier, when applied to netting sets as opposed to a single trade, suffers from SA-CCR's intrinsic conservativeness on the treatment of hedging sets, the supervisory factors calibration, and options deltas. In addition, the introduction of the exponential function adds another conservative layer aimed to account for fat tailed distributions, which is already embedded in Add-on calculations. Consequently, the 5% floor is only reached when the quantum of IM exchanged is a multiple of what would otherwise be sufficient to extinguish PFE under an appropriate measurement of the level of risk mitigation. Furthermore, the 5% floor overstates the exposure of derivatives with strong negative mark to market for which the EAD should be close to zero, and where SA-CCR will at least result in an EAD equivalent to 5% of the aggregate notional Add-on.

Our ISDA SA-CCR QIS Analysis based on BCBS RCAP Portfolios with significant Independent Amounts emphasises levels of **SA-CCR EADs equivalent to a large multiple (10x-11x) of the IMM EADs and CEM EADs, when IMM and CEM EADs are not actually fully extinguished**[10].

The industry thinks that the conservative calibration of the PFE multiplier undermines regulatory efforts to increase the level of collateralisation of exposures as a means to decrease counterparty credit risk, and goes against the establishment of an appropriate balance between the required levels of margin and capital. This issue has become even more important for the industry given the implementation of the margin requirements for uncleared derivatives and the considerable associated funding costs. SA-CCR should therefore be made more sensitive to over collateralization and negative MTM. The industry would welcome the opportunity to assist regulators recalibrate the PFE multiplier by providing relevant data and analysis.

Multiple margin agreements applicable to a single netting set, and vice versa

Where multiple margin agreements apply to a single netting set, SA-CCR requires banks to divide the netting set into sub-netting sets in order to align with the margin agreements, thereby resulting in reduced netting across derivatives in the original single netting set. This approach is misaligned with risk management, balance sheet treatment and significantly overstates risk. In the event of a counterparty default, the transactions would be settled on a net basis based on the original single netting set. Mandating banks to create sub-netting sets would overstate the exposure to a given counterparty. A similar issue arises in situations where a single CSA applies across multiple netting sets in a combination of jurisdictions where netting is allowed and where it is not.

In addition, dividing netting sets conflicts with the broader macroprudential efforts to increase collateralization, particularly the margin requirements for uncleared transactions. Given that mandatory IM and VM requirements would only apply to new trades, additional CSAs need to be created in order to leave requirements for existing trades unchanged. The market standard is to create these new CSAs under existing ISDA Master Agreements in order to minimize credit risk through maximizing netting benefits with existing trades. The requirement to create sub-netting sets would considerably reduce the benefits of collateralization.

[10] ISDA SA-CCR QIS calculations based on BCBS RCAP Netting Sets 19, 22, 25.

Our ISDA SA-CCR QIS Analysis shows an **increase of SA-CCR EAD of 42% when splitting the BCBS RCAP Netting Set 16[11] into two groups** (arbitrarily putting odd numbered trades under one CSA and even numbered trades in another).

We appreciate that transactions covered by a VM CSA have different risk profiles compared to transactions without a VM CSA, even within the same netting agreement, given that the MPOR would be different. Therefore, netting across transactions with different margining arrangements covered by the same ISDA might be viewed as problematic from a modelling perspective. This problem, however, would not apply to an IM CSA, as the posting of IM does not affect MPOR and, as such, the trade level exposure calculation. Rather, IM is applied to the trade exposure at the netting set level. Therefore, there is no justification of why the existence of an IM CSA should result in breaking the netting set into sub-netting sets, and we would like to seek confirmation in this regard from the BCBS.

With respect to VM CSAs, ISDA believes that simple modifications would address this modelling issue while still respecting the legal agreements to the extent possible, and looks forward to working with the BCBS towards solving this issue.

Appropriate recognition of diversification benefits across IR hedging sets, FX hedging sets, as well as recognition of FX netting, is necessary

The fact that SA-CCR does not recognise any correlation between interest rate exposures in different currencies, or between different currency pairs, is overly conservative and risk insensitive, and will result in overstated counterparty credit risk. This will prevent SA-CCR from constituting a credible alternative to IMM approaches, where some degree of diversification is assumed.

The industry therefore suggests the introduction of correlations to ensure some recognition of diversification benefits across IR hedging sets, and across FX hedging sets, without modifying the existing correlation assumptions across maturity buckets within each interest rates hedging set. Banks' inability to account for diversification across hedging sets within an asset class significantly overstates derivatives exposures, and could force some end users to abandon derivatives as financial hedging instruments.

Furthermore, SA-CCR should allow the netting of cash flows in each currency to a single amount (e.g. case of FX crosses: EUR/USD and USD/JPY netting down to EUR/JPY, and case of currency triangulation: EUR/GBP, GBP/USD, USD/EUR netting down to no residual exposure) and then use the net buy amount converted to the domestic currency as the effective notional for FX derivatives. SA-CCR currently limits a hedging set to only transactions of the same currency pair, which overstates the risk in many crosses and triangular trades across currency pairs, which would otherwise net down to a smaller number of currency pairs or be risk neutral. Additionally, SA-CCR defines different methodologies for calculating the adjusted notional amount according to the currency denomination of the payment legs. Using the net buy amount converted to the domestic currency would permit a single approach to be applied consistently, regardless of the currency denomination of each payment leg.

As an illustration, our ISDA SA-CCR QIS Analysis highlights that:

- **For Netting Set 5[12] (all Interest Rates), SA-CCR EAD is 23% higher than IMM EAD, and**

[11] Unmargined
[12] Unmargined

twice CEM EAD. For Netting Sets with strongly negative MtM, SA-CCR EAD can be a large multiple of IMM EAD.

- **For Netting Set 8[13] (all FX), SA-CCR EAD is equivalent to 2.5 times IMM EAD, and three times CEM EAD.**

Supervisory factors for the interest rates and equities asset classes

SA-CCR proposes a single interest rate supervisory factor for all currencies, which is not representative of different levels of IR risks across currencies, where developed market interests rates are typically less volatile than emerging markets ones. In comparison, the industry notes that the commodities asset class has been disaggregated into five different subclasses, whereas commodities typically represent a significantly lower level of exposure for banks than interest rates, which have only one supervisory factor.

Additionally, SA-CCR attributes supervisory factors of 32% to single name equities and 20% to equity indices. These supervisory factors are overly conservatively calibrated and will penalize banks' ability to provide equity hedging solutions to end users. **As an illustration, our ISDA SA-CCR QIS Analysis highlights that for Netting Set 13[14] (all equities), SA-CCR EAD is twice IMM EAD, as well as twice CEM EAD.**

The industry therefore believes that supervisory factors for the interest rates category should offer more granularity to represent the specific level of risk of interest rate curves in different currencies, and supervisory factors for equities should be reduced to a more proportionate level, potentially allowing for more granularity as well.

Options Delta Calculation

Industry participants would strongly prefer to be given the option of using their own internal model delta adjustments since these calculations are approved by national regulators as part of the market risk framework and better aligned with their internal risk management engines and reporting systems. This would be in line with the BCBS view expressed in the latest FRTB FAQs, which permit the use of alternative sensitivity calculations for the SBA approach. Whilst the BCBS solution of introducing a Black-Scholes delta with supervisory volatility in SA-CCR is aligned with options theory, it has the drawback of requiring unnecessary additional calculations at the trade level for certain products such as caps and floors. For example deriving the factor "P" in the formula for a cap typically requires that a bank determines a new at-the-money cap level for each trade individually and determines forward levels for each leg in the cap in a very deal-specific way. Fintech companies providing SA-CCR solutions have confirmed that calculating the Supervisory Delta is in fact one of the most complex and challenging parts of SA-CCR implementation.

Options delta calculations in SA-CCR should also ensure that coherent results are obtained in negative interest rates environments as well as for American and Bermudan options, which is not currently the case.

[13] Unmargined
[14] Unmargined

SA-CCR's collateral haircut approach

Under SA-CCR, the collateral haircut approach is used to reflect the volatility of collateral where market price volatility and foreign exchange haircuts are applied to incoming and outgoing collateral as appropriate. Such a simplistic approach seems problematic as on the one hand it models the volatility of collateral in isolation of other collateral or the overall trade population and does not recognize any diversification benefit, while on the other hand it fails to reflect the uniqueness of certain types of collateral. Given the goal to improve risk sensitivity through SA-CCR, it seems prudent to incorporate the impact of the future volatility of collateral into the SA-CCR PFE calculation.

Under SA-CCR, such a treatment can be viewed as the closest equivalent to joint modeling of collateral and derivative exposures under IMM. This means that this alternative approach can ensure a closer alignment with IMM in modeling future collateral changes. Conceptually, this represents the accurate way of taking into account uncertainty around the future value of the collateral as RC should purely be a reflection of the current value while only the PFE component should consider market shocks that affect the value of collateral and the derivative population. In addition, the multiplier already models the impact of future MtM changes of the netting set on the degree of overcollateralization and therefore, a haircut on the collateral may represent a double count. Such an amendment should not be considered a change to SA-CCR as the reflection of collateral volatility is not part of the methodology on how to calculate exposures for derivatives and the suggested approach in fact aligns with the SA-CCR methodology. A more comprehensive discussion of the approach is provided in Annex 1. We also note that the BCBS has introduced an amended version of the collateral haircut formula for securities financing transactions that better recognizes diversification benefits within the collateral pool, and would suggest further potential alignment to meet the Committee's goal of simplicity and comparability in the capital framework.

B. Conclusion

ISDA thanks the BCBS for considering the industry concerns regarding SA-CCR and the suggested necessary improvements, and looks forward to continued dialogue and collaboration with the BCBS on this important area of the regulatory framework. We firmly believe that SA-CCR would greatly benefit from our suggested simple refinements, particularly as regards the usage and calibration of the Alpha factor, which should better reflect the current regulatory environment, market conditions and industry practices. Should you have any question, please do not hesitate to contact us.

Yours sincerely,

Mark Gheerbrant
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Annex 1 - Incorporation of collateral modelling into SA-CCR:

Current Methodology

Under SA-CCR, the collateral haircut approach is used to reflect the volatility of collateral where market price volatility and foreign exchange haircuts are applied to incoming and outgoing collateral as appropriate. Such a simplistic approach could be problematic as on the one hand it models the volatility of collateral in isolation of other collateral or the overall trade population and does not recognize and diversification benefits while on the other hand it fails to reflect the uniqueness of certain types of collateral. In particular:

1) **Correlation among collateral and/or the wider trade population**
   The collateral haircut approach applies a haircut to each instrument individually. In reality, different collateral instruments as well as the derivative trades are influenced by the same common risk factors, such as interest rate, credit, foreign exchange and equity. This is reflected for derivatives as part of the offsetting/netting logic within a particular asset class. In contrast, a worst case correlation is assumed in relation to the collateral where incoming collateral is assumed to decline while outgoing collateral is assumed to increase.

2) **Symmetrical treatment of fixed income securities.**
   Generally, a fixed income security exhibits only limited upside potential as the cash flows that the investor expects to receive are fixed. On the other hand, the downside potential is generally higher as the issuer could default. The collateral haircut approach, however, applies the same haircuts to incoming and outgoing collateral leading to unrealistic volatility shocks, in particular due to the worst case correlation assumptions. We appreciate that under CEM the collateral haircut approach appears to be the most sensible methodology to incorporate collateral as netting and offsetting is not based on the directionality and correlation of underlying risk factors. However, under SA-CCR we believe that banks should be permitted to choose a more risk sensitive alternative to incorporate collateral.

Suggested alternative to reflect collateral volatility under SA-CCR

SA-CCR allows banks to incorporate the effect of collateral agreements into the exposure at default (EAD) calculation. This is done in two ways:

a) Adjustment in the maturity factor MF at the trade level to reflect the margin frequency.
b) Incorporation of the collateral into the net independent collateral amount (NICA) impacting the replacement cost (RC) as well as the potential future exposure (PFE) multiplier.

As outlined above, the incorporation of collateral with respect to b) is through the collateral haircut approach. Collateral is partially treated endogenous to the exposure calculation under a) and partially exogenous under b) by reflecting the future market value volatility through a different methodology (i.e. collateral haircut approach).

Given the greater sophistication of SA-CCR compared to CEM, it seems prudent to incorporate the impact of the future volatility of collateral into the SA-CCR PFE calculation. This can be done by including collateral into the various asset classes based on the underlying risk factor(s) that drive(s) the value. For example, collateral in the form of a corporate bond can be modelled as a total return swap on that corporate bond. Equally, equity collateral can be included as an equity derivative and gold as a commodity derivative. Any foreign exchange mismatches can be reflected in the add-on for foreign exchange derivatives.

By reflecting the future volatility of collateral in the add-on calculation, no haircut needs to be taken into account for the calculation of NICA in the context of determining RC and the PFE multiplier. This ensures a consistent treatment between derivatives collateral by including both with their unadjusted actual market value in the calculation. Generally, it should not be expected that there is more uncertainty associated with the market value of collateral compared to the market value of a derivative that would justify a different approach. In fact, given the requirements of financial collateral and the generally much simpler pay-off structures, the collateral market value should be considered more rather than less stable compared to the derivative market value. Therefore, the risk mitigating benefits of collateral and a negative market value of a derivative should be treated consistently with respect to NICA and the impact on PFE and RC. Under SA-CCR, such a treatment can be viewed as the closest equivalent to joint modelling of collateral and derivative exposures under the internal models methodology (IMM). This means that this alternative approach can ensure a closer alignment with IMM in modelling future collateral changes. Conceptually, this represents the accurate way of taking into account uncertainty around the future value of the collateral as RC should be purely a reflection of the current value while only the PFE component should consider market shocks that affect the value of collateral and the derivative population. In addition, the multiplier already models the impact of future MtM changes of the netting set on the degree of overcollateralization and therefore, a haircut on the collateral would represent a double count.

Collateral Haircut Approach Example:

The netting set consists of a single name equity derivative. The netting set is daily margined with no threshold, MTA amounts. The IA collected from the counterparty is 10% of equity notional and is posted by the counterparty in the form of a main index equity security.

Trade #	Nature	Underlying	Direction	Notional	Market Value
1	Equity swap	SN Equity	Long	100,000,000	0

EAD = alpha * (RC + multiplier * $AddOn^{aggregate}$)

Collateral haircut approach:

RC = max(V – C; TH + MTA – NICA; 0) = max(0 – (10,000,000 * (1 – 0.15)); 0 + 0 – (10,000,000 – (1 - 0.15))) = 0

The collateral received is reduced by the haircut of 15% for main index equity positions based on a margin period of risk of 10 days.

The $AddOn^{Aggregate}$ calculation is as follows:

$$EffectiveNotional_k^{(Equity)} = \sum_{i \in Entity_k} \delta_i * d_i^{(Equity)} * MF_i^{(type)}$$

$$EffectiveNotional_k^{(Equity)} = 100{,}000{,}000 * 1 * 1.5\sqrt{\frac{10}{250}} = 30{,}000{,}000$$

$$AddOn(Entity_K) = SF_k^{(Equity)} * EffectiveNotional_k^{(Equity)} = 9{,}600{,}000$$

$$AddOn^{(Equity)} = \left[\left(\sum_k \rho_k^{(Equity)} * AddOn(Equity_k)\right)^2 + \sum_k \left(1 - \left(\rho_k^{(Equity)}\right)^2\right) * (AddOn(Entity_k))^2\right]^{\frac{1}{2}} = 9{,}600{,}000$$

Given the fact that there is only one equity trade in the portfolio:
$AddOn^{Aggregate} = AddOn^{Equity} = 9{,}600{,}000$

$$multiplier = min\left\{1; Floor + (1 - Floor) * exp\left(\frac{V - C}{2 * (1 - Floor) * AddOn^{aggregate}}\right)\right\}$$
$$= min\left\{1; 0.05 + (1 - 0.05) * exp\left(\frac{0 - (10{,}000{,}000 * (1 - 0.15))}{2 * (1 - 0.05) * 9{,}600{,}000}\right)\right\}$$
$$= 0.65$$

EAD = alpha * (RC + multiplier * $AddOn^{aggregate}$) = 1.4 * (0+0.65*9,600,000) = 8,683,943

Alternative approach

RC = max(V – C; TH + MTA – NICA; 0) = max(0 – 10MM; 0 + 0 – 10) = 0

In contrast to the collateral haircut approach, no haircut is applied to the collateral in the RC formula under the alternative approach.

The basic formula for calculating the effective notional is:

$$EffectiveNotional_k^{(Equity)} = \sum_{i \in Entity_k} \delta_i * d_i^{(Equity)} * MF_i^{(type)}$$

The equity derivative has the following effective notional and individual AddOn:

$$EffectiveNotional_k^{(Equity)} = 100{,}000{,}000 * 1 * 1.5\sqrt{\frac{10}{250}} = 30{,}000{,}000$$

$$AddOn(Entity_K) = SF_k^{(Equity)} * EffectiveNotional_k^{(Equity)} = 9{,}600{,}000$$

The equity collateral has the following effective notional and individual AddOn:

$$EffectiveNotional_k^{(Equity)} = 10{,}000{,}000 * 1 * 1.5\sqrt{\frac{10}{250}} = 3{,}000{,}000$$

$$AddOn(Entity_K) = SF_k^{(Equity)} * EffectiveNotional_k^{(Equity)} = 960{,}000$$

$$AddOn^{(Equity)} = \left[\left(\sum_k \rho_k^{(Equity)} * AddOn(Equity_k)\right)^2 + \sum_k \left(1 - \left(\rho_k^{(Equity)}\right)^2\right) * (AddOn(Entity_k))^2\right]^{\frac{1}{2}} = 9{,}883{,}805$$

Given that there is an additional long equity position in the form of collateral in the portfolio the AddOn increases compared to the collateral haircut approach. The collateral has the same directionality as the long equity derivative position.

Given the fact that there are only equity positions in the netting set:
$AddOn^{Aggregate} = AddOn^{Equity} = 9{,}883{,}805$

As the volatility of the collateral is modeled as part of the AddOn, no haircut is applied.

$$multiplier = min\left\{1; Floor + (1 - Floor) * exp\left(\frac{V - C}{2 * (1 - Floor) * AddOn^{aggregate}}\right)\right\}$$
$$= min\left\{1; 0.05 + (1 - 0.05) * exp\left(\frac{0 - 10{,}000{,}000}{2 * (1 - 0.05) * 9{,}883{,}805}\right)\right\}$$
$$= 0.61$$

EAD = alpha * (RC + multiplier * $AddOn^{aggregate}$) = 1.4 * (0+0.61*9,883,805) = 8,410,005

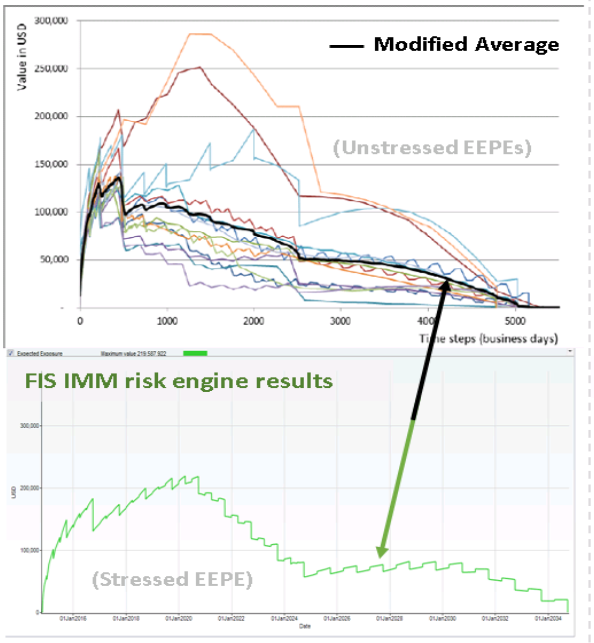
Annex 2 - QIS Overview and IMM Model Calibration performed by FIS:

The rates, FX, equity risk factors calibration of the FIS IMM risk engine ensures consistency with BCBS RCAP results for rates, FX (October 2015[15]) and EBA report for equities (July 2015[16]). Figures below illustrate the fitness of the calibration of the FIS IMM engine with the average BCBS RCAP and EBA results for the same portfolios.

BCBS RCAP Report

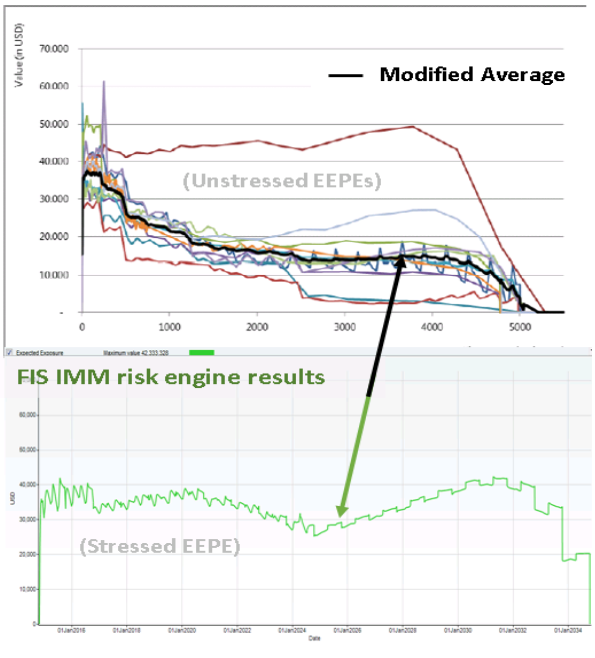
IR & FX calibration - IMM engine (unmargined)

Figure 10: Dispersion of the 20-year EE profiles for netting set 15.



IR & FX calibration - IMM engine (margined)

Figure 11: Dispersion of the 20-year EE profiles for netting set 24.



EBA CCR Benchmarking Report

Equities calibration - IMM engine (unmargined)

Netting Set ID	Description	EBA (avg) S-EEPE	EBA (STD) S-EEPE	FIS S-EEPE	Abs (Diff) |EBA - FIS|	Diff / EBA STD
Trade12	Buy AXA	123,360	52,369	112,291	11,069	0.21
Trade13	Sell Metlife	153,830	118,976	121,263	32,567	0.27
Trade14	Buy Volkswagen	138,614	38,457	132,424	6,190	0.16
Trade15	Sell DAX index	87,040	23,725	84,951	2,089	0.09
Trade16	Sell FTSE100 index	50,398	22,207	54,354	3,956	0.18
Trade17	Long Call Google	164,700	22,713	173,081	8,381	0.37
Trade18	Long Put S&P500	78,239	18,774	86,712	8,473	0.45

Netting Set ID	Description	EBA (avg) S-EEPE	EBA (STD) S-EEPE	FIS S-EEPE	Abs (Diff) |EBA - FIS|	Diff / EBA STD
9	Set9(Trades12&13)	120,594	90,276	139,423	18,829	0.21
10	Set10(Trades14&15)	151,577	63,045	171,617	20,040	0.32
11	Set11(Trades12&16)	75,864	37,122	103,641	27,777	0.75
12	Set12(Trades17&18)	289,146	123,486	258,511	30,635	0.25
13	Set13TotalEQ	307,339	137,428	318,535	11,196	0.08
16	Set16TotalPortfolio	452,816	156,539	444,245	8,571	0.05

[15] BCBS RCAP report on CCR (October 2015): www.bis.org/bcbs/publ/d337.pdf

[16] EBA report on CCR (July 2015): https://www.eba.europa.eu/documents/10180/950548/EBA+report+on+CCR+benchmarking+2014