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RESERVE BANK OF INDIA
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The Managing Director/
Chief Executive Officer of
All Scheduled Commercial Banks
(Excluding Regional Rural Banks)

Madam / Dear Sir,

Draft Guidelines for computing exposure for counterparty credit risk arising from derivative transactions

Please refer to the paragraph 27 of the first bi-monthly monetary policy statement for 2016-17. It was indicated therein that RBI will issue draft guidelines on Standardised Approach for measuring counterparty credit risk exposures (SA-CCR) by end-May 2016. This revised method will replace the Current Exposure Method (CEM), presently being used by banks for measuring exposure for counterparty credit risk arising from derivative transactions and will be implemented from April 1, 2017.

2. The draft guidelines on SA-CCR are annexed. You may provide your feedback/comments on the provisions of the draft guidelines by July 22, 2016.

Yours faithfully,

(Sudarshan Sen)
Principal Chief General Manager

Encl: as above

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Annex

Draft Guidelines on Standardised Approach for Counterparty Credit Risk (SA-CCR)

Para 5.15.3.5 of Basel III Capital Framework on Default Risk Capital Charge will be replaced by the following framework.

5.15.3.5 Standardised Approach for Counterparty Credit Risk (SA-CCR) for computing default risk capital charge

5.15.3.5.1 The SA-CCR will be used for computing exposure for default risk capital charge for OTC derivatives whether centrally cleared or not, exchange-traded derivatives and long settlement transactions. Long Settlement Transactions are transactions where a counterparty undertakes to deliver a security, or a foreign exchange amount against cash, other financial instruments, or vice versa, at a settlement or delivery date that is contractually specified as more than the lower of the market standard for this particular instrument and five business days after the date on which the bank enters into the transaction. This approach will be used by all banks whether following Standardised Approach or International Ratings Based approach for computing credit risk capital requirements. SA-CCR will not be used for SFTs which are covered under para 7.3.8 of the Basel III capital framework.

When a bank purchases credit derivative protection against a banking book exposure, or against a counterparty credit risk exposure, it will determine its capital requirement for the hedged exposure subject to the criteria and general rules for the recognition of credit derivatives, i.e., substitution or double default rules as appropriate. Where these rules apply, the exposure amount for counterparty credit risk from such instruments is zero. The exposure amount for counterparty credit risk is zero for sold credit default swaps in the banking book where they are treated in the framework as a guarantee provided by the bank and subject to a credit risk charge for the full notional amount.

5.15.3.5.2 Computation of exposure: The SA-CCR will be used for computing exposure at default (EAD) for OTC derivatives, exchange-traded derivatives and long settlement transactions. Exposure will be calculated separately for each ***netting set***. However, in cases where bilateral netting is not permitted, each and every trade will be its own netting set. The exposure will be determined as follows:

$$EAD = 1.4 * (RC + PFE)$$

where:

RC = the replacement cost calculated according to methodology given in Appendix 1, and

PFE = the amount for potential future exposure calculated according to the methodology given in Appendix 2.

<u>5.15.3.5.3 Determination of netting set</u>

Under SA-CCR, determination of netting set is critical in computing EAD as replacement cost will be calculated at the netting set level, whereas PFE add-ons will be calculated for each hedging set of an asset class within a given netting set and then aggregated.

Banks may net transactions for the purpose of these guidelines (e.g., when determining the RC component of a netting set) subject to novation under which any obligation between a bank and its counterparty to deliver a given currency on a given value date is automatically amalgamated with all other obligations for the same currency and value date, legally substituting one single amount for the previous gross obligations. Banks may also net transactions subject to any legally valid form of bilateral netting not covered in the preceding sentence, including other forms of novation. In every such case where netting is applied, a bank must satisfy that it has:

(i) A netting contract with the counterparty or other agreement which creates a single legal obligation, covering all included transactions, such that the bank would have either a claim to receive or obligation to pay only the net sum of the positive and negative mark-to-market values of included individual transactions in the event a counterparty fails to perform due to any of the following: default, bankruptcy, liquidation or similar circumstances; (the netting contract must not contain any clause which, in the event of default of a counterparty, permits a non-defaulting counterparty to make limited payments only, or no payments at all, to the estate of the defaulting party, even if defaulting party is a net creditor)

(ii) Written and reasoned legal reviews that, in the event of a legal challenge, the relevant courts and administrative authorities would find the bank's exposure to be such a net amount under:
- The law of the jurisdiction in which the counterparty is incorporated and, if the foreign branch of a counterparty is involved, then also under the law of the jurisdiction in which the branch is located;
- The law that governs the individual transactions; and
- The law that governs any contract or agreement necessary to effect the netting.

[if RBI is not satisfied about enforceability under relevant laws, the netting contract or agreement will not meet this condition and neither counterparty could obtain supervisory benefit.]

(iii) Procedures in place to ensure that the legal characteristics of netting arrangements are kept under review in light of the possible changes in relevant law.

A netting set is a group of transactions with a single counterparty that are subject to a legally enforceable bilateral netting arrangement and for which netting is *recognised for regulatory capital purposes under the provisions of above requirements. These requirements have to be satisfied on an on-going basis.*

A hedging set is a set of transactions within a single netting set within which partial or full offsetting is recognised for the purpose of computing PFE add-on under these guidelines.

*[*At present, due to lack of unambiguity of legal enforceability of bilateral netting agreements, each non-centrally cleared OTC derivative trade will be considered a netting set of its own and therefore, computation of RC and PFE will not recognise any offset among different derivative transactions. While computing PFE, the supervisory delta adjustment for short positions will be +1, supervisory correlation parameters for credit derivatives will be 1 and there will no recognition of offset across maturity buckets for interest rate derivatives.]

Different set of computations for margined and unmargined netting sets:

The computation of RC is dependent on whether the trades with a counterparty are subject to a margin agreement or not, i.e., whether the netting set is margined or unmargined. Where a margin agreement exists, the formulation could apply both to bilateral transactions and central clearing relationships. By margining agreement it is meant that both the counterparties have agreed to exchange periodic variation margins. Where collateral other than variation margin (e.g., initial margin) is taken, it is treated as unmargined netting set. *Bilateral transactions with a one-way margining agreement in favour of the bank's counterparty (that is, where a bank posts, but does not collect, collateral) must be treated as unmargined transactions.*

The replacement cost (RC) and the potential future exposure (PFE) components are calculated differently for margined and unmargined netting sets. The EAD for a margined netting set is capped at the EAD of the same netting set calculated on an unmargined basis.

5.15.3.5.55 Treatment of multiple margin agreements and multiple netting sets

If multiple margin agreements apply to a single netting set, the treatment given in the Appendix 3 may be followed.

Appendix 1

Computation of Replacement Cost (RC)

Computation of RC for unmargined netting sets: For unmargined transactions, RC is defined as the greater of: (i) the current market value of the derivative contracts less net haircut collateral held by the bank (if any), and (ii) zero. Mathematically:

$$RC = \max\{V - C; 0\}$$

where V is the market value of the derivative transactions in the netting set and C is the haircut value of net collateral held, which is calculated in accordance with the Net Independent Collateral Amount (NICA) methodology defined in paragraph 5.15.3.5.8 below. For this purpose, the value of non-cash collateral posted by the bank to its counterparty is increased and the value of the non-cash collateral received by the bank from its counterparty is decreased using haircuts (which are the same as those that apply to repo-style transactions).

Impact of excess collateral held

2. In the above formulation, it is assumed that the replacement cost representing today's exposure to the counterparty cannot go less than zero. However, banks sometimes hold excess collateral (even in the absence of a margin agreement) or have out-of-the-money trades which can further protect the bank from the increase of the exposure. Such over-collateralisation and negative mark-to market value would be allowed to reduce PFE, but would not affect replacement cost.

Computation of RC for margined netting sets:

3. The RC for margined transactions in the SA-CCR is defined as the greatest exposure that would not trigger a call for VM, taking into account the mechanics of collateral exchanges in margining agreements. Such mechanics include, for example, "Threshold", "Minimum Transfer Amount" and "Independent Amount" in the standard industry documentation, which are factored into a call for VM[1]. A defined, generic formulation has been created to reflect the variety of margining approaches used and those being considered by supervisors internationally.

4. Independent Collateral Amount (ICA) represents (i) collateral (other than VM) posted by the counterparty that the bank may seize upon default of the counterparty, the amount of which does not change in response to the value of the transactions it secures and/or (ii) the Independent Amount (IA) parameter as defined in standard industry documentation. ICA can change in response to factors such as the value of the collateral or a change in the number of transactions in the netting set.

[1] For example, in the ISDA Master Agreement, the term "Credit Support Amount", or the overall amount of collateral that must be delivered between the parties, is defined as the greater of the Secured Party's Exposure plus the aggregate of all Independent Amounts applicable to the Pledgor minus all Independent Amounts applicable to the Secured Party, minus the Pledgor's Threshold and zero.

5. Because both a bank and its counterparty may be required to post ICA, net independent collateral amount (NICA) describes the amount of collateral that a bank may use to offset its exposure on the default of the counterparty. NICA does not include collateral that a bank has posted to a segregated, bankruptcy remote account, which presumably would be returned upon the bankruptcy of the counterparty. That is, NICA represents any collateral (segregated or unsegregated) posted by the counterparty less the unsegregated collateral posted by the bank. With respect to IA, NICA takes into account the differential of IA required for the bank minus IA required for the counterparty.

6. For margined trades, the replacement cost is:

$$RC=\max \{V - C; TH+ MTA-NICA; 0\}$$

where V and C are defined as in the unmargined formulation, TH is the positive threshold before the counterparty must send the bank collateral, and MTA is the minimum transfer amount applicable to the counterparty.

7. TH + MTA – NICA represents the largest exposure that would not trigger a VM call and it contains levels of collateral that need always to be maintained. For example, without initial margin or IA, the greatest exposure that would not trigger a variation margin call is the threshold plus any minimum transfer amount. In the adapted formulation, NICA is subtracted from TH + MTA. This makes the calculation more accurate by fully reflecting both the actual level of exposure that would not trigger a margin call and the effect of collateral held and/or posted by a bank. The calculation is floored at zero, recognising that the bank may hold NICA in excess of TH + MTA, which could otherwise result in a negative replacement cost.

Appendix 2

Computation of PFE add-ons

The calculation of PFE of a netting set can be broadly broken down into the following steps:

Step 1: Allocation of derivative trades to asset classes

Step 2: Allocate those derivative trades to hedging sets within each asset class

Step 3: For every derivative trade, calculate the effective notional based on parameters of that trade

Step 4: Calculate hedging set level PFE add-ons using effective notionals and supervisory factors

Step 5: Aggregate add-ons across all hedging sets and asset classes within the netting set.

2. The PFE add-on will therefore be multiplication of an aggregate add-on component, which consists of add-ons calculated for each asset class and a multiplier that allows for the recognition of excess collateral or negative mark-to-market value for the transactions. Mathematically:

$$PFE = multiplier * AddOn^{aggregate}$$

where $AddOn^{aggregate}$ is the aggregate add-on component and multiplier is defined as a function of three inputs: V, C and $AddOn^{aggregate.}$.

Computation of multiplier

3. In cases banks hold collateral greater than the net market value of the derivatives contracts, this will be allowed to reduce PFE add-on. Excess collateral may reduce the replacement cost component of the exposure under the SA-CCR for both margined as well as unmargined trades/netting sets. The PFE component also reflects the risk-reducing property of excess collateral.

4. For prudential reasons, it has been decided to apply a multiplier to the PFE component that decreases as excess collateral increases, without reaching zero (the multiplier is floored at 5% of the PFE add-on). When the collateral held is less than the net market value of the derivative contracts (“under-collateralisation”), the current replacement cost is positive and the multiplier is equal to one (ie the PFE component is equal to the full value of the aggregate add-on). Where the collateral held is

greater than the net market value of the derivative contracts ("over-collateralisation"), the current replacement cost is zero and the multiplier is less than one (ie the PFE component is less than the full value of the aggregate add-on).

5. This multiplier will also be activated when the current value of the derivative transactions is negative. This is because out-of-the-money transactions do not currently represent an exposure and have less chance to go in-the-money. Mathematically:

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

where exp(…) equals to the exponential function, floor is 5%, V is the value of the derivative transactions in the netting set, and C is the haircut value of net collateral held.

Aggregation across asset classes

6. Diversification benefits across asset classes are not recognised. Instead, the respective add-ons for each asset class are simply aggregated. Mathematically:

$$AddOn^{aggregate} = \sum_{a} AddOn^{(a)}$$

where the sum of each asset class add-on is taken.

Allocation of derivative transactions to one or more asset classes

7. The designation of a derivative transaction to an asset class is be made on the basis of its primary risk driver, that is, the market risk factor that most significantly affects its mark to market value. Most derivative transactions have one primary risk driver, defined by its reference underlying instrument (e.g., an interest rate curve for an interest rate swap, a reference entity for a credit default swap, a foreign exchange rate for a FX call option, etc). When this primary risk driver is clearly identifiable, the transaction will fall into one of the asset classes described above.

8. For more complex trades that may have more than one risk driver (eg multi-asset or hybrid derivatives), banks must take sensitivities and volatility of the underlying into account for determining the primary risk driver.

9. In most cases, transactions will be assigned to only one asset class. However, RBI may also require more complex trades to be allocated to more than one asset class, resulting in the same position being included in multiple classes. In this case, for each asset class to which the position is allocated, banks must determine appropriately the sign and delta adjustment of the relevant risk driver.

10. Following table provides examples of the asset class allocation for a selection of derivative trades:

Derivative Transaction	**Primary Risk Driver**	**Asset Class**
Interest Rate Swap	Interest rate curve	Interest rate
FX call option	FX rate	FX
Credit Default Swap	Credit of reference entity	Credit

<u>Allocation of derivative trades within asset class to hedging sets</u>

11. After the derivative trades have been assigned to asset classes, the next step is allocate them to hedging sets. A hedging set is defined as a set of transactions within an asset class of a netting set where long and short positions can be fully offset for the purposes of calculating the PFE. Offsetting across different hedging sets is not permitted under the SA-CCR. Offsetting is also not permitted in those cases where transactions are not covered under legally enforceable bilateral netting agreements, e.g. in cases of bilateral OTC derivative transactions in India. Due to this reason, each and every OTC derivative transaction will be a netting set of its own.

12. The number of hedging sets available within an asset class, and the degree to which offsetting is allowed, varies across the different asset classes. This is required to account for differences in correlations between transactions within an asset class and basis risk. The table below details the hedging sets for each of the five asset classes:

Asset Class	Number and Definition of Hedging Sets
Interest Rate	A separate hedging set for transactions referencing the same currency
FX	A separate hedging set for transactions referencing the same currency pair
Credit	A single hedging set for all transactions in a netting set

General steps for calculating the add-on

13. 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, or credit,. The add-on for each asset class is calculated using asset-class-specific formulas. 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:

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

Step two: A maturity factor $MF_i^{(type)}$ reflecting the time horizon appropriate for the type of transaction is calculated at the trade level (see paragraph below for details) and is applied to the adjusted notional. Two types of maturity factor are defined, one for margined transactions ($MFi^{(margined)}$) and one for unmargined transactions ($MFi^{(unmargined)}$);

Step three: A supervisory delta adjustment is made to this trade-level adjusted notional amount based on the position (long or short) and whether the trade is an option, CDO tranche or neither, resulting in an effective notional amount;

Step four: A supervisory factor is applied to each effective notional amount to reflect volatility; and

<u>Step five:</u> 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. For credit, equity and commodity derivatives, this involves the application of a supervisory correlation parameter to capture important basis risks and diversification.

Each step is described, generally and by asset class, in more detail below paragraphs.

Period or date parameters: Mi, Ei, Si and Ti

There are four dates that appear in the computation of PFE:

14. For all asset classes, the maturity M_i of a contract is the latest date when the contract may still be active. This date appears in the maturity factor defined in paragraph 27 to 29 of this Appendix that scales down adjusted notional for unmargined trades for all asset classes. If a derivative contract has another derivative contract as its underlying (for example, a swaption) and may be physically exercised into the underlying contract (i.e., a bank would assume a position in the underlying contract in the event of exercise), then maturity of the contract is the final settlement date of the underlying derivative contract.

15. For interest rate and credit derivatives, the start date S_i of the time period referenced by an interest rate or credit contract. If the derivative references the value of another interest rate or credit instrument (e.g., swaption or bond option), the time period must be determined on the basis of the underlying instrument. This date appears in the definition of supervisory duration defined in paragraph 19.

16. For interest rate and credit derivatives, the end date E_i of the time period referenced by an interest rate or credit contract. If the derivative references the value of another interest rate or credit instrument (eg swaption or bond option), the time period must be determined on the basis of the underlying instrument. This date appears in the definition of supervisory duration defined in paragraph 19. In addition, this date specifies the maturity category for an interest rate contract in paragraph 32.

17. For options in all asset classes, the latest contractual exercise date T_i as referenced by the contract. This period shall be used for the determination of the option delta in paragraph 21.

18. Table 1 includes example transactions and provides each transaction's related maturity M_i , start date S_i and end date E_i . In addition, the option delta in paragraph 21 depends on the latest contractual exercise date T_i (not separately shown in the table).

Table 1

Instrument	M_i	S_i	E_i
Interest rate or credit default swap maturing in 10 years	10 years	0	10 years
10-year interest rate swap, forward starting in 5 years	15 years	5 years	15 years
Forward rate agreement for time period starting in 6 months and ending in 12 months	1 year	0.5 year	1 year
Cash-settled European swaption referencing 5-year interest rate swap with exercise date in 6 months	0.5 year	0.5 year	5.5 years
Physically-settled European swaption referencing 5-year interest rate swap with exercise date in 6 months	5.5 years	0.5 year	5.5 years
10-year Bermudan swaption with annual exercise dates	10 years	1 year	10 years
Interest rate cap or floor specified for semi-annual interest rate with maturity 5 years	5 years	0	5 years
Option on a bond maturing in 5 years with the latest exercise date in 1 year	1 year	1 year	5 years
3-month Eurodollar futures that matures in 1 year	1 year	1 year	1.25 years
Futures on 20-year treasury bond that matures in 2 years	2 years	2 years	22 years
6-month option on 2-year futures on 20-year treasury bond	2 years	2 years	22 years

__Trade-level adjusted notional (for trade i of asset class a): di (a)__

19. These parameters are defined at the trade level and take into account both the size of a position and its maturity dependency, if any. Specifically, the adjusted notional amounts are calculated as follows:

- For interest rate and credit derivatives, the trade-level adjusted notional is the product of the trade notional amount, converted to the domestic currency, and the supervisory duration SDi which is given by the following formula:

$$SD_i = \frac{\exp(-0.05 * S_i\ ) - \exp(-0.05 * E_i)}{0.05}$$

where Si and Ei are the start and end dates, respectively, of the time period referenced by the interest rate or credit derivative (or, where such a derivative references the value of another interest rate or credit instrument, the time period determined on the basis of the underlying instrument), floored by ten business days.[2] If the start date has occurred (e.g., an on-going interest rate swap), Si must be set to zero.

- For foreign exchange derivatives, the adjusted notional is defined as the notional of the foreign currency leg of the contract, converted to the domestic currency. If both legs of a foreign exchange derivative are denominated in currencies other than the domestic currency, the notional amount of each leg is converted to the domestic currency and the leg with the larger domestic currency value is the adjusted notional amount.

20. In many cases the trade notional amount is stated clearly and fixed until maturity. When this is not the case, banks must use the following rules to determine the trade notional amount.

- For transactions with multiple payoffs that are state contingent such as digital options or target redemption forwards, a bank must calculate the trade notional amount for each state and use the largest resulting calculation.
- Where the notional is a formula of market values, the bank must enter the current market values to determine the trade notional amount.
- For variable notional swaps such as amortising and accreting swaps, banks must use the average notional over the remaining life of the swap as the trade notional amount.
- Leveraged swaps must be converted to the notional of the equivalent

[2] Note there is a distinction between the time period of the underlying transaction and the remaining maturity of the derivative contract. For example, a European interest rate swaption with expiry of 1 year and the term of the underlying swap of 5 years has S i = 1 year and Ei = 6 years.

unleveraged swap, that is, where all rates in a swap are multiplied by a factor, the stated notional must be multiplied by the factor on the interest rates to determine the trade notional amount.

- For a derivative contract with multiple exchanges of principal, the notional is multiplied by the number of exchanges of principal in the derivative contract to determine the trade notional amount.
- For a derivative contract that is structured such that on specified dates any outstanding exposure is settled and the terms are reset so that the fair value of the contract is zero, the remaining maturity equals the time until the next reset date.

Supervisory delta adjustments: δ_i

21. These parameters are also defined at the trade level and are applied to the adjusted notional amounts to reflect the direction of the transaction and its non-linearity. More specifically, the delta adjustments for all derivatives are defined as follows:

δi	**Long[3] in the primary risk factor**	**Short[4] in the primary risk factor**
Instruments that are not options or CDO tranches	+1	-1
	Bought	Sold
Call Options[5]	$+\emptyset\left(\frac{\ln\left(P_i/K_i\right) + 0.5 * \sigma_i^2 * T_i)}{\sigma_i * \sqrt{T_i}}\right)$	$+\emptyset\left(\frac{\ln\left(P_i/K_i\right) + 0.5 * \sigma_i^2 * T_i)}{\sigma_i * \sqrt{T_i}}\right)$
Put options	$-\emptyset\left(-\frac{\ln\left(P_i/K_i\right) + 0.5 * \sigma_i^2 * T_i)}{\sigma_i * \sqrt{T_i}}\right)$	$+\emptyset\left(-\frac{\ln\left(P_i/K_i\right) + 0.5 * \sigma_i^2 * T_i)}{\sigma_i * \sqrt{T_i}}\right)$
With the following parameters that banks must determine appropriately: Pi : Underlying price (spot, forward, average, etc) Ki : Strike price Ti : Latest contractual exercise date of the option The supervisory volatility σ i of an option is specified on the basis of supervisory factor applicable to the trade		

[3] "Long in the primary risk factor" means that the market value of the instrument increases when the value of the primary risk factor increases.
[4] "Short in the primary risk factor" means that the market value of instrument decreases when the value of the primary risk factor increases.
[5] The symbol φ in these equations represents the standard normal cumulative distribution function.

δi	Purchased(long protection)	Sold (short protection)
CDO tranches	$+\frac{15}{(1+14*A_i)*(1+14*D_i)}$	$-\frac{15}{(1+14*A_i)*(1+14*D_i)}$
With the following parameters that banks must determine appropriately: Ai : Attachment point of the CDO tranche Di : Detachment point of the CDO tranche		

22. It has to be ensured that delta adjustment under negative sign for short positions are relevant only for those transactions which are within the legally enforceable netting agreements. For those transactions which are not covered under such a netting agreement, e.g., for bilateral OTC derivative contracts, the delta adjustment will be positive in all cases, i.e., for both long and short positions.

Supervisory factors: $SF_i^{(a)}$

23. A factor or factors specific to each asset class is used to convert the effective notional amount into Effective Expected Positive Exposure (EPE) based on the measured volatility of the asset class. Each factor has been calibrated to reflect the Effective EPE of a single at-the-money linear trade of unit notional and one-year maturity. This includes the estimate of realised volatilities assumed by RBI for each underlying asset class. The Supervisory Factors have been provided in the paragraph 44.

Hedging sets

24. The hedging sets in the different asset classes are defined as follows, except for those described in paragraphs 25 and 26 below.

- Interest rate derivatives consist of a separate hedging set for each currency;
- FX derivatives consist of a separate hedging set for each currency pair;
- Credit derivatives consist of a single hedging set;

25. Derivatives that reference the basis between two risk factors and are denominated in a single currency[6] (basis transactions) must be treated within separate hedging sets within the corresponding asset class. There is a separate hedging set for each pair of risk factors (ie for each specific basis). Examples of

[6] Derivatives with two floating legs that are denominated in different currencies (such as cross-currency swaps) are not subject to this treatment; rather, they should be treated as non-basis foreign exchange contracts.

specific bases include three-month Libor versus six-month Libor, three-month Libor versus three-month T-Bill, one-month Libor versus OIS rate, Brent Crude oil versus Henry Hub gas. *For hedging sets consisting of basis transactions, the supervisory factor applicable to a given asset class must be multiplied by one-half.*

26. Derivatives that reference the volatility of a risk factor (volatility transactions) must be treated within separate hedging sets within the corresponding asset class. Volatility hedging sets must follow the same hedging set construction outlined in paragraph 24 (for example, all equity volatility transactions form a single hedging set). Examples of volatility transactions include variance and volatility swaps, options on realised or implied volatility. *For hedging sets consisting of volatility transactions, the supervisory factor applicable to a given asset class must be multiplied by a factor of five.*

Time Risk Horizons

27. The minimum time risk horizons for the SA-CCR include:

The lesser of one year and remaining maturity of the derivative contract for unmargined transactions, floored at ten business days.[7] Therefore, the adjusted notional at the trade level of an unmargined transaction must be mutliplied by a Maturity Factor (MF):

$$MF_i^{unmargined} = \sqrt{\frac{\min(Mi; 1\,year)}{1\,year}}$$

where Mi is the transaction i remaining maturity floored by 10 business days.

28. For margined transactions, the minimum margin period of risk is determined as follows:

- At least ten business days for non-centrally-cleared derivative transactions subject to daily margin agreements.
- Five business days for centrally cleared derivative transactions subject to daily margin agreements that clearing members have with their clients.
- 20 business days for netting sets consisting of 5,000 transactions that are not with a central counterparty.

[7] Within this hedging set, long and short positions are determined with respect to the basis.

- Margin period of risk (MPOR) will be doubled for netting sets with outstanding disputes. If a bank has experienced more than two margin call disputes on a particular netting set over the previous two quarters and these disputes have lasted longer than the applicable MPOR, the MPOR to be used is double the applicable minimum MPOR.

29. Therefore, the adjusted notional for margined netting sets at the trade level of a margined transaction should be multiplied by:

$$MF_i^{margined} = \frac{3}{2}\sqrt{\frac{MPORi}{1\ year}}$$

where $MPOR_i$ is the margin period of risk appropriate for the margin agreement containing the transaction i.

Supervisory correlation parameters: $\rho_i^{(a)}$

30. These parameters only apply to the PFE add-on calculation for credit derivatives. For credit derivatives, the supervisory correlation parameters are derived from a single-factor model and specify the weight between systematic and idiosyncratic components. This weight determines the degree of offset between individual trades, recognising that imperfect hedges provide some, but not perfect, offset. Supervisory correlation parameters do not apply to interest rate and foreign exchange derivatives.

Add-on for interest rate derivatives

31. Hedging sets within the interest rate asset class are formed by grouping all trades referencing interest rates of the same currency. For example, all trades referencing INR will form a single hedging set. The supervisory factor as given in table 3 is 0.5% for entire interest rate asset class.

32. The PFE for each hedging set will be equal to multiplication of SF and effective notional. The computation of effective notional captures the risk of interest rate derivatives of different maturities being imperfectly correlated. To address this risk, interest rate derivatives will be divided into maturity categories (also referred to as "buckets") based on the end date (as described in paragraphs 16 to 18) of the transactions. The three relevant maturity categories are: less than one year,

between one and five years and more than five years. The SA-CCR allows full recognition of offsetting positions within a maturity category. Across maturity categories, the SA-CCR recognises partial offset.

33. The add-on for interest rate derivatives is the sum of the add-ons for each hedging set of interest rates derivatives transacted with a counterparty in a netting set. The add-on for a hedging set of interest rate derivatives is calculated in two steps.

Step 1: the effective notional $D_{jk}^{(IR)}$ is calculated for time bucket k of hedging set (ie currency) j according to:

$$D_{jk}^{(IR)} = \sum_{i\epsilon\{Ccyj,MBk\}} \delta_i * d_i^{(IR)} * MF_i^{type}$$

Where notation $i\epsilon\{Ccyj, MBk\}$ refers to trades of currency j that belong to maturity bucket k.

That is, the effective notional for each time bucket and currency is the sum of the trade-level adjusted notional amounts (cf. paragraph 19) multiplied by the supervisory delta adjustments (cf. paragraph 21 to 22) and the maturity factor (cf. paragraph 27 to 29).

Step 2: In the second step, aggregation across maturity buckets for each hedging set is calculated according to the following formula:

$$Effective\ Notional\ _j^{(IR)} = \left[\left(D_{j1}^{IR}\right)^2 + \left(D_{j2}^{IR}\right)^2 + \left(D_{j3}^{IR}\right)^2 + 1.4 * D_{j1}^{IR} * D_{j2}^{IR} + 1.4 * D_{j2}^{IR} * D_{j3}^{IR} + 0.6 * D_{j1}^{IR} * D_{j3}^{IR}\right]^{\frac{1}{2}}$$

34. However, for transactions which are not covered under bilateral netting agreements, there would be no recognition of offset across maturity buckets. In this case or in cases where banks do not choose to recognise offset across maturity buckets, the relevant formula is:

$$Effective\ Notional\ _j^{(IR)} = \left|D_{j1}^{IR}\right| + \left|D_{j2}^{IR}\right| + \left|D_{j3}^{IR}\right|$$

35. The hedging set level add-on is calculated as the product of the effective notional and the interest rate supervisory factor:

$$AddOn_j^{(IR)} = SF_j^{(IR)} * EffectiveNotional\ _j^{(IR)}$$

Aggregation across hedging sets is performed via simple summation:

$$AddOn^{(IR)} = \sum AddOn_j^{(IR)}$$

Add-on for foreign exchange derivatives

36. Hedging sets within the foreign currency asset class are formed by grouping all trades referencing the same FX currency pair. For instance, INR/USD, INR/EUR or INR/GBP trades will each form their own hedging set. The ordering of the currency pair is not relevant and so INR/USD and USD/INR transactions fall within the same hedging set. The add-on formula for foreign exchange derivatives shares many similarities with the add-on formula for interest rates. Similar to interest rate derivatives, the effective notional of a hedging set is defined as the sum of all the trade-level adjusted notional amounts multiplied by their supervisory delta. The add-on for a hedging set is the product of:

- The absolute value of its effective notional amount; and
- The supervisory factor (same for all FX hedging sets).

37. In the case of foreign exchange derivatives, the adjusted notional amount is maturity-independent and given by the notional of the foreign currency leg of the contract, converted to the domestic currency. Mathematically:

$$AddOn^{(FX)} = \sum_j AddOn_{HS_j}^{(FX)}$$

where the sum is taken over all the hedging sets HS_j included in the netting set.

38. The add-on and the effective notional of the hedging set HS_j are respectively given by:

$$AddOn_{HS_j}^{(FX)} = SF_j^{(FX)} \left| EffectiveNotional_j^{(FX)} \right|$$

$$EffectiveNotional_j^{(FX)} = \sum_{i \in HS_j} \delta_i * d_i^{(FX)} * MF_i^{(type)}$$

where $i \in HS_j$ refers to trades of hedging set HS_j. That is, the effective notional for each currency pair is the sum of the trade-level adjusted notional amounts (paragraph 19) multiplied by the supervisory delta adjustments (cf. paragraph 21 to 22) and the maturity factor (cf. paragraph 27 to 29). In cases where transactions are not covered under legally enforceable bilateral netting agreements, the supervisory delta adjustment for linear transactions will be positive 1 and will invariably be positive for all non-linear transactions.

Add-on for credit derivatives

39. There are two levels of offsetting benefits for credit derivatives. First, all credit derivatives referencing the same entity (either a single entity or an index) are allowed to offset each other fully to form an entity-level effective notional amount:

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

where $i \in Entity_k$ refers to trades of entity k.

That is, the effective notional for each entity is the sum of the trade-level adjusted notional amounts multiplied by the supervisory delta adjustments and the maturity factor. However, whenever these credit derivatives are not covered under legally enforceable Bilateral netting agreement, the supervisory delta adjustment will be positive 1 for all transactions.

40. The add-on for all the positions referencing this entity is defined as the product of its effective notional amount and the supervisory factor $SF_k^{(Credit)}$, ie:

$$AddOn(Entity_k) = SF_k^{(Credit)} * EffectiveNotional_k^{(Credit)}$$

For single name entities, $SF_k^{(Credit)}$ is determined by the reference name's credit rating. For index entities, $SF_k^{(Credit)}$ is determined by whether the index is investment grade or speculative grade. Second, all the entity-level add-ons are simply added to compute the total add-on for the credit derivatives. However, in cases where these credit derivatives are covered by a legally enforceable bilateral netting agreement, they will be grouped within a single hedging set (except for basis and volatility transactions) in which partial offsetting between two different entity-level add-ons is permitted. For this purpose, a single-factor model has been used to allow partial offsetting between the entity-level add-ons by dividing the risk of the credit derivatives asset class into a systematic component and an idiosyncratic component.

41. The entity-level add-ons are allowed to offset each other fully in the systematic component; whereas, there is no offsetting benefit in the idiosyncratic component. These two components are weighted by a correlation factor which determines the

degree of offsetting/hedging benefit within the credit derivatives asset class. The higher the correlation factor, the higher the importance of the systemic component, hence the higher the degree of offsetting benefits. Derivatives referencing credit indices are treated as though they were referencing single names, but with a higher correlation factor applied. Mathematically:

$$AddOn^{(Credit)} = [(\sum_k \rho_k{}^{(Credit)} * AddOn(Entity_k))^2 + \sum_k (1 - (\rho_k^{(Credit)})^2) * (AddOn(Entity_k))^2]^{\frac{1}{2}}$$

where $\rho_k{}^{(Credit)}$ represents appropriate correlation factor corresponding to the entity k.

42. It should be noted that a higher or lower correlation does not necessarily mean a higher or lower capital charge. For portfolios consisting of long and short credit positions, a high correlation factor would reduce the charge. For portfolios consisting exclusively of long positions (or short positions), a higher correlation factor would increase the charge. If most of the risk consists of systematic risk, then individual reference entities would be highly correlated and long and short positions should offset each other. If, however, most of the risk is idiosyncratic to a reference entity, then individual long and short positions would not be effective hedges for each other.

43. The use of a single hedging set for credit derivatives implies that credit derivatives from different industries and regions are equally able to offset the systematic component of an exposure, although they would not be able to offset the idiosyncratic portion. This approach recognises that meaningful distinctions between industries and/or regions are complex and difficult to analyse for global conglomerates.

<u>Specification of supervisory parameters</u>

Supervisory Factors (SF) and Option Volatility Factors:

44. Supervisory Factors (SFs) are an additional set of trade-level parameters used in the calculation of the PFE add-ons. These factors are intended to capture the potential fluctuations in the exposure value of a derivative trade stemming from the

volatility of the primary risk factor. SFs are applied to the effective notional of individual transactions. SFs prescribed are as follows:

Table 3

Asset Class	**Sub-Class**	**SF**	**Correlation parameter**	**Option Volatility Factor**
Interest Rate		0.50%	-	50%
Foreign Exchange	.	4.00%	-	15%
Credit, Single Name	AAA	0.38%	50%	-
	AA	0.38%	50%	-
	A	0.42%	50%	-
	BBB	0.54%	50%	-
	BB	1.06%	50%	-
	B	1.60%	50%	-
	CCC	6.00%	50%	-
Credit, Index	Investment Grade	0.38%	80%	-
	Speculative	1.06%	80%	-

45. For a basis transaction hedging set, the supervisory factor applicable to its relevant asset class must be multiplied by one-half. For a volatility transaction hedging set, the supervisory factor applicable to its relevant asset class must be multiplied by a factor of five.

Appendix 3

Treatment of multiple margin agreements and multiple netting sets

The netting set must be divided into sub-netting sets that align with their respective margin agreement. This treatment applies to both *RC* and *PFE* components.

If a single margin agreement applies to several netting sets, replacement cost at any time is determined by the sum of netting set unmargined exposures minus the collateral available at that time (including both VM and *NICA*). Since it is problematic to allocate the common collateral to individual netting sets, *RC* for the entire margin agreement is:

$$RC_{MA} = \max\left\{\sum_{NS \in MA} \max\{V_{NS}; 0\} - C_{MA}; 0\right\}$$

where the summation NS $\in$MA is across the netting sets covered by the margin agreement (hence the notation), V_{NS} is the current mark-to-market value of the netting set *NS* and C_{MA} is the cash equivalent value of all currently available collateral under the margin agreement.

Where a single margin agreement applies to several netting sets as described above, collateral will be exchanged based on mark-to-market values that are netted across all transactions covered under the margin agreement, irrespective of netting sets. That is, collateral exchanged on a net basis may not be sufficient to cover *PFE*.

In this situation, therefore, the *PFE* add-on must be calculated according to the unmargined methodology. Netting set-level *PFE*s are then aggregated. Mathematically:

$$PFE_{MA} = \sum_{NS \in MA} PFE_{NS}^{(unmargined)}$$

where $PFE_{NS}^{(unmargined)}$ is the PFE add-on for the netting set *NS* calculated according to the unmargined requirements.

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