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EBA FINAL draft Regulatory Technical Standards

on mapping of derivative transactions to risk categories, on supervisory delta formula for interest rate options and on determination of long or short positions in the Standardised Approach for Counterparty Credit Risk under Article 277(5) and Article 279a(3)(a) and (b), respectively, of Regulation (EU) No 575/2013 (revised Capital Requirements Regulation – CRR2)

Contents

1. Executive summary

The amendments to Regulation (EU) No 575/2013[1] (the revised Capital Requirements Regulation – CRR2) implement in EU legislation, inter alia, the revised Standardised Approach for Counterparty Credit Risk (SA-CCR).

The EBA has developed these draft regulatory technical standards (RTS) based on the proposed legislative text of CRR2[2]. Where relevant, the EBA adapted the draft to the final CRR2 text. The EBA also introduced other changes into the draft RTS in order to appropriately reflect the comments received in response to the consultation paper (CP).

The mapping of each derivative transaction to one or more of the risk categories is set out in Article 277. This mapping, which is a novelty compared with the original Capital Requirements Regulation (CRR), is to be done on the basis of the material risk drivers of each derivative transaction.

CRR2 mandates the EBA to deliver regulatory technical standards specifying the method for identifying those material risk drivers. Building on the method proposed in the Discussion Paper on the implementation in the European Union of the revised market risk and counterparty credit risk frameworks[3] published on 18 December 2017, and after further feedback was sought on the CP published on 2 May 2019, a three-pronged method for the assignment of a derivative transaction to a risk category has finally been envisaged:

- **Purely qualitative approach** identifying derivative transactions that have clearly only one material risk driver, thus easily being mapped to the corresponding risk category. This approach is based on a simple criterion to be satisfied and is meant to provide proportionality in the assessment, in the sense of rendering the mapping of 'simple' derivative transactions straightforward and without requiring the computation (and comparison) of sensitivities. This approach is expected to provide the mapping for the majority of transactions.

- **Qualitative and quantitative approach** requiring a more detailed assessment of, and applicable to, those derivative transactions for which the mapping cannot immediately be done on the basis of the first approach. Under this second approach, after the qualitative identification of all the risk drivers of the derivative transaction and an assessment of their materiality to identify material risk drivers, institutions have to use quantitative inputs, typically sensitivities. Ultimately, this assessment leads to the mapping of the transaction to one or more than one risk category, reflecting the material risk driver(s).

[1] http://data.europa.eu/eli/reg/2019/876/oj

[2] http://www.europarl.europa.eu/doceo/document/TA-8-2019-0369_EN.pdf

[3] https://eba.europa.eu/regulation-and-policy/market-risk/discussion-paper-on-eu-implementation-of-mkr-and-ccr-revised-standards

- **Fallback approach**. If the assessment performed in accordance with the second approach does not make it possible to determine which of the risk drivers are material, institutions are required to simply allocate the derivative transaction to all the risk categories corresponding to all the risk drivers (material or not) of the transaction.

The methodology for calculating the add-ons for each risk category also allows partial or full offsetting, which is recognised when transactions within a single netting set depend on the same or similar risk drivers. To reflect the dependence of transactions on risk drivers, institutions need to compute a supervisory delta, which is determined according to the direction (long or short) and type (option, collateralised debt obligation tranche or neither of the two) of the position.

Article 279a(3) requests the EBA to draft regulatory technical standards specifying:

- the formula that institutions are to use to calculate the supervisory delta of options, when mapped to the interest rate risk category, which is compatible with negative interest rates; and

- the method for determining whether a transaction represents a long or short position in a material risk driver.

Considering that the supervisory delta formula is already provided for call and put options mapped to categories different from interest rate risk, the EBA decided to focus on adjustments that allow situations of negative interest rates to be reflected without fundamentally changing the formula mentioned.

Hence, the EBA proposes to allow the use of a λ shift in the context of the Black-Scholes formula to move the interest rate into positive territory.

Finally, the EBA specifies within the present CP a method suitable for determining the direction of the position in a material risk driver, in accordance with the definition provided in CRR2.

The proposed draft RTS are expected to lead to a more harmonised calculation of own funds requirements for counterparty credit risk under CRR2.

2. Background and rationale

1. The new Standardised Approach for Counterparty Credit Risk (SA-CCR) was adopted by the Basel Committee on Banking Supervision (BCBS)[4] in March 2014 and is intended to replace all non-internal model approaches (i.e. the current exposure method and the standardised method) for measuring the exposure at default (EAD) for counterparty credit risk in the Basel framework.

2. In November 2016 the European Commission issued a legislative proposal on revisions to Regulation (EU) No 575/2013[1] (the revised Capital Requirements Regulation – CRR2), which implements in EU legislation, inter alia, the SA-CCR. CRR2 was published in the Official Journal of the European Union[5] (OJ) on 7 June 2019.

3. The EBA has developed these draft regulatory technical standards (RTS) in accordance with the mandate contained in Article 277(5), Article 279a(3)(a) and (b) of the CRR2 proposal, in anticipation of the finalisation of the legislative text of CRR2. Following its publication in the OJ, the EBA adapted the draft RTS to the final CRR2 text.

4. In addition, the EBA introduced other changes into the draft text in order to appropriately reflect comments received from stakeholders in response to the consultation paper (CP).

5. Under the SA-CCR, the EAD is given by the sum of two components, the replacement cost (RC) and the potential future exposure (PFE), multiplied by a supervisory multiplier, alpha. The PFE measures the potential change in the transaction value over a 1-year horizon. The PFE is composed of two elements: a multiplier, which allows the partial recognition of excess collateral, and an aggregated add-on component, developed for each broad risk category considered under the SA-CCR.

6. One of the parameters used in the computation of the add-on component is the supervisory delta. Specific formulae are provided for options and tranches of synthetic securitisation. For all other transactions, the supervisory delta is ± 1, depending on whether the transaction is long or short in the primary risk driver.

7. CRR2 is consistent with the Basel standards and proposes the same five risk categories: interest rate risk, foreign exchange (FX) risk, credit risk, equity risk and commodity risk. In addition, it proposes a sixth risk category in order to take into account 'other risks'.

8. One of the key steps for computing each risk category add-on as part of the PFE calculation is the mapping of each derivative transaction to one or more of the risk categories that are set out in CRR2. This mapping is based on the primary risk driver of each derivative transaction, where it exists, or on material risk drivers if there are several.

[4] https://www.bis.org/publ/bcbs279.pdf

[5] Official Journal of the European Union, L 150, 7 June 2019.

9. Although most derivatives have one obvious risk driver (e.g. interest rates for interest rate swaps (IRS), FX for FX options, credit rating of the reference entity for credit derivatives), more complex derivatives may have more than one risk driver. Consistent with this, the Basel standard on the SA-CCR states that, 'When this primary risk driver is clearly identifiable, the transaction will fall into one of the asset classes described above' (paragraph 151), while, 'For more complex trades that may have more than one risk driver (e.g. multi-asset or hybrid derivatives), banks must take sensitivities and volatility of the underlying into account for determining the primary risk driver' (paragraph 152).

10. Other than these general principles, however, the Basel standard does not provide any specific methodology for the mapping of transactions to one or more than one risk category. As a result, CRR2 entrusts the EBA with devising a method for the allocation of derivative transactions (trading book and non-trading book derivative transactions) to one or more risk categories, depending on either the primary risk driver or the material/most material risk driver(s).

11. On 18 December 2017 the EBA published for consultation a Discussion Paper (DP) on the implementation in the EU of the revised market risk and counterparty credit risk frameworks. The paper discussed some of the most important technical and operational challenges to implement the FRTB and the SA-CCR in the EU. The mapping of derivative transactions to risk categories was one of the topics of the DP. Some preliminary views on how to address possible implementation issues were collected, together with early feedback from the stakeholders on the proposals.

12. On 2 May 2019 the EBA launched a consultation on the four draft RTS on the SA-CCR. Comments to this consultation could be sent until 2 August 2019. All contributions received were published, unless requested otherwise. A public hearing took place at the EBA premises in Paris on 17 June 2019.

General method for mapping transactions to risk categories

13. Many derivative transactions have a single risk driver (disregarding interest rates for the purpose of discounting), defined by its reference underlying instrument (e.g. a tenor of an interest rate curve for an interest rate swap), or several risk drivers referring unambiguously to the same risk category. This provides a straightforward basis for the mapping of those transactions to the relevant risk category consistently with CRR2. In other words, for all the plain vanilla products that are driven by a single risk driver (or several risk drivers referring unambiguously to a single risk category), the single risk category could be directly identified.

14. In this context, it should be noted that 'complex products' does not necessarily mean complex allocation to risk categories. Some bespoke structured products might be sophisticated but still be related to a single risk category. The definition of a certain criterion, suitable for triggering an immediate mapping by institutions, is referred to as Approach 1.

15. If a unique material risk driver cannot be clearly identified, institutions will be required to use the second part of the methodology to determine the material risk drivers of the transaction. This part of the methodology could be either qualitative or quantitative: based on a decision tree leading to the relevant material risk factor(s) or following a particular algorithm using pre-specified data from

the transactions. From a theoretical point of view, a quantitative method is deemed more appropriate, as it enforces an impartial treatment, homogeneous across institutions. Such a method is based on sensitivities. However, it should be noted that sensitivities may not be available for all transactions. This is referred to as Approach 2.

16. In any case, a fallback solution should be available for cases where the identification of the most material risk drivers is either impossible or too burdensome. This will require allocation to all risk categories relevant to the product. This is referred to as Approach 3.

17. As a result, it is envisaged to specify an allocation process structured by the following three-pronged method:

- Where the allocation is straightforward, refer to a simple criterion identifying all the instruments with only one material risk driver.
- Where allocation is not straightforward, assess the derivative transaction in more detail based on a quantitative approach (using sensitivities), to determine which risk drivers are material, including the most material of these risk drivers.
- If the assessments in the first two parts of the method do not make it possible to conclude which of the risk drivers are the material ones, including the most material of these risk drivers, the fallback treatment consists in the allocation of the derivative transaction to each of the risk categories corresponding to all its risk drivers.

Approach 1

18. For those derivatives whose features allow the relevant risk category to be easily identified, it is possible to envisage a quasi-automatic approach, based on a very simple criterion. This allows each transaction to be mapped to the relevant risk category without triggering any materiality assessment but simply by considering the features of the transaction.

19. Such a qualitative approach can at the same time:

    - provide (ex ante) clarity for institutions, given that every institution would know the treatment applicable to instruments that satisfy the simple criterion;
    - limit the overall operational cost of the use of the SA-CCR.

20. The only material risk driver has to be determined at a level of granularity that also allows allocation of the transaction to the appropriate hedging set as set out in Article 277a of CRR2.

21. In Table 1 a list of simple derivatives for the assessment is outlined. Following the feedback received during the consultation on the DP, a slight modification of the statement of the relevant criterion made it possible to automatically include many derivatives that were highlighted by respondents as clearly dependent on a unique material risk driver (e.g. inflation swaps, commodity swaps, dividend swaps, FX fader options and FX target redemption forwards). In addition, following the feedback on the CP, it was noted that, although cross-currency interest rate swaps depend on other

risk drivers than FX, such as interest rates, the effect of these other risk drivers is very often immaterial for this particular transaction type. Therefore, cross-currency swaps were included under the scope of Approach 1 of the methodology.

22. Under Approach 1, discounting is disregarded as a potential risk driver, given that the presumption behind the approach is that the transactions in scope should not materially depend on the discount rate. However, under Approach 2 or 3, discounting should be considered a possible risk driver.

Table 1: Illustrative list for the mapping of instruments to the risk category

Risk category	Risk driver	Relevant criteria and examples
Interest rate	Interest rate curve in the respective currency	Instruments whose cash flows depend only on interest rates or inflation (e.g. IR swap; IR future; floating rate agreement) if underlyings are in the same currency as the settlement currency
Foreign exchange	Foreign exchange rate of the respective currency pair	Instruments whose cash flows depend only on FX rates (e.g. FX forward; FX future; FX swap) and cross-currency swaps
Equity	Equity prices and payouts	Instruments whose cash flows depend only on equity prices and dividends (e.g. equity future; equity index future; equity forward; equity swap) if underlyings are in the same currency as the settlement currency
Credit	Reference entity	Instruments whose cash flows depend only on credit quality or spreads (e.g. CDS single name or index) if underlyings are in the same currency as the settlement currency
Commodities	Commodity price with respect to the relevant commodity type (i.e. energy, metals, agricultural goods, climatic conditions and other commodities)	Instruments whose cash flows depend only on commodities (e.g. commodity future; commodity forward) if underlyings are in the same currency as the settlement currency

Approach 2

23. Transactions that have not been identified under Approach 1 are presumed to have more than one material risk driver, thus leading to a more detailed assessment of the risk drivers of a transaction, including their materiality.

24. This requires:

- first, the qualitative and exhaustive identification of all the risk drivers of the transaction;
- second, the assessment of the materiality of each risk driver of the transaction, leading to the identification of the material risk drivers of the transaction;
- finally, the identification of the most material among these material risk drivers.

25. In other words, after identifying all the risk drivers of the derivative transaction and assessing the material ones, institutions need to map the transaction to each risk category for which they have identified at least one material risk driver. The identification of the most material risk driver is essentially relevant for the sub-allocation to certain hedging sets (e.g. interest rate, FX, commodities), as the most material risk driver for each risk category will be considered the 'primary risk driver' for the purposes of the allocation of the derivative transaction to hedging sets under Article 277a of CRR2.

26. The quantitative methodology proposed hereafter is based on the computation of the sensitivities of each risk driver related to the specific transaction. Sensitivities are, then, compared with each other in a consistent fashion, i.e. considering aspects that could bias the assessment.

27. Besides sensitivities, the volatility of the underlying instruments, explicitly mentioned as a potential criterion in the BCBS standard, should also be accounted for in determining the materiality of multiple risk drivers.

28. The proposed methodology develops in Approach 2 a multistep approach considering all the aforementioned features, whereby first all the sensitivities of an instrument are computed, and then ranked by relevance, with only those that are deemed to be material being finally selected (i.e. most relevant to the total). In particular, the following steps are envisaged:

1) Compute[6] all the *n* sensitivities $(s_i)_{i=1}^{n}$, multiply them by the corresponding risk weights $(s_i * RW_i)_{i=1}^{n}$ and aggregate them in the corresponding risk category rc_k.

2) Rank the results obtained from the previous step $(rc_k)_{k=1}^{6}$, from the greatest to the smallest in absolute terms, to obtain a monotonic decreasing sequence of entries $(a_k)_{k=1}^{6}$, where $a_1 = \max(|rc_1|, \dots, |rc_6|)$ i.e. the greatest absolute term, a_2 is the second greatest term and so on[7].

3) Starting from a_1, i.e. from the greatest absolute value, for each a_i compute $\frac{\sum_{j=1}^{i} a_j}{\sum_{k=1}^{6} a_k}$ and check if

[6] Sensitivities, risk weights and aggregation functions should be the ones specified in Arts. 325s and 325u of CRR2, i.e. FRTB SA framework (exclusively delta risk sensitivities, as defined in Art. 325s).

[7] From a mathematical point of view, it can be defined as $a_1 = max(|rc_1|, \dots, |rc_6|)$ and

$$a_i = \begin{cases} \max\limits_{|rc_j| < a_{i-1}} (|rc_1|, \dots, |rc_6|) & \text{if } \#\{j: |rc_j| < a_{i-1}, j = 1, \dots, 6\} = 6 - i \\ a_{i-1} & \text{otherwise} \end{cases} \quad \text{for } i = 2, \dots, 6.$$

3i) $\frac{\sum_{j=1}^{i} a_j}{\sum_{k=1}^{6} a_k} < Y\%$.

If the condition is verified, then allocate the trade to the risk category of a_i, as risk drivers belonging to that category are assessed to be material, and repeat point 3) for the element a_{i+1}. Otherwise, the material risk drivers are the ones included in $a_1, \dots, a_{i+1}$ and no further analysis for elements $a_{i+2}, \dots, a_6$ is required.

However, it has been considered that, despite condition 3i), some risk categories for which a derivative transaction has relatively high sensitivities could be neglected. Consider the example of a transaction where there are two relevant risk categories, one accounting for 61% of the aggregate sensitivities, the other for the remaining 39%: under either *Y*% = 50% or *Y*% = 60%, for instance, the second category would be deemed not material. The application of an additional threshold could overcome problems arising in these types of situations. In particular, institutions could be required to consider material, on top of the abovementioned $a_1, \dots, a_{i+1}$ risk categories, each additional risk category that represents a significant share ($Z\%$) of the aggregate sensitivities, i.e. for each of the elements $a_{i+2}, \dots, a_6$ institutions should compute $\frac{a_i}{\sum_{k=1}^{6} a_k}$ and the following additional condition should be verified

3ii) $\frac{a_i}{\sum_{k=1}^{6} a_k} \geq Z\%$.

Institutions should also allocate the trade to the risk categories excluded in point 3i) but for which condition 3ii) is verified, as risk drivers belonging to those categories are assessed to be material too.

The EBA decided to consult in the CP on the most appropriate levels of the thresholds $Y\%$ and $Z\%$. Two pairs of values were chosen, considering that a less conservative condition in 3i) (i.e. $Y\% = 50\%$) could be counterbalanced by a more stringent condition in 3ii) ($Z\% = 25\%$) and vice versa (i.e. $Y\% = 60\%$ and $Z\% = 30\%$). In light of the feedback received during the consultation, the levels of the thresholds $Y\%$ and $Z\%$ were set to be 60% and 30%, respectively.

The most material risk driver for each risk category identified above is the one corresponding to the greatest absolute risk-weighted sensitivity, i.e. $\max(|s_1 * RW_1|, \dots, |s_{n_k} * RW_{n_k}|)$.

29. In addition to the consideration made in paragraph 26, another possible quantitative methodology that is potentially suitable for this purpose involves the use of SA-CCR add-ons for assessing the materiality of each risk category. In particular, institutions can compute SA-CCR add-ons for each risk category of the risk drivers affecting the transaction and compare them against their sum. The first step of the sequence would then read as follows:

1) Compute the SA-CCR add-ons for each risk category of the risk drivers affecting the transaction rc_k.

30. This alternative presents the advantage of being coherent with the SA-CCR framework and potentially more suitable for institutions that do not use FRTB but do apply SA-CCR, for which computing FRTB Standardised Approach (SA) sensitivities may entail a disproportionate burden.

31. The EBA requested feedback about leaving the possibility for institutions exempted from using FRTB SA to use SA-CCR add-ons computation in step 1). No particular concerns were raised by respondents related to the appropriateness of the SA-CCR add-ons methodology for small institutions. The EBA decided, then, to maintain a certain degree of proportionality in the second approach, leaving the possibility for smaller institutions to perform the computation of the quantitative assessment based on the SA-CCR add-ons.

Approach 3

32. As explained above, a fallback qualitative treatment would be needed for cases where Approach 2 cannot be applied (e.g. where sensitivities are not available). This approach being by definition simplistic, it is expected to yield more conservative outcomes than Approach 2. These goals can be met by simply assessing all identified risk drivers as material, thus triggering the mapping to the related risk categories.

33. The most material risk driver for each risk category is the one corresponding to the greatest resulting add-on component.

Supervisory delta formula for interest rate risk category

34. Once the derivative transaction is mapped to risk categories, then institutions make a supervisory delta adjustment to the trade-adjusted notional amount, in order to reflect the direction of the transaction and its non-linearity. The direction of the position in the primary risk factor (long/short) and the type of derivative transaction (whether the trade is linear, an option or a collateralised debt obligation tranche) determine the sign and magnitude of the supervisory delta. The supervisory delta formula is already provided in CRR2 for call and put options:

$$\delta = sign \cdot N\left(type \cdot \frac{\ln\left(\frac{P}{K}\right) + 0.5 \cdot \sigma^2 \cdot T}{\sigma \cdot \sqrt{T}}\right)$$

35. The present discussion focuses on adjustments that allow situations of negative interest rates to be reflected without fundamentally changing the formula above. This excludes, in particular, reverting to a normal distribution or using FRTB SA sensitivities, which represent the change in the market value of an instrument as a result of a regulatory pre-defined shift for the corresponding risk driver.

36. Considering industry experience as well, acquired as the market had to adjust to negative interest rates, the EBA proposes to add a λ shift in the regulatory formula, affecting both the price value and the strike value, so that the ratio $(P+\lambda)/(K+\lambda)$ is moved back into positive territory. In this context, λ represents the presumed lowest possible extent to which interest rates in the respective currency can become negative.

37. Therefore, the supervisory delta formula for call and put options would become as illustrated in Table 2, depending on whether they are bought or sold.

Table 2: Adjusted supervisory delta formula for bought/sold call/put options

Supervisory delta	Bought	Sold
Call options	$+N\cdot\left(+\frac{\ln\left(\frac{P_j+\lambda_i}{K_j+\lambda_i}\right)+0.5\cdot\sigma'^2_j\cdot T_j}{\sigma'_j\cdot\sqrt{T_j}}\right)$	$-N\cdot\left(+\frac{\ln\left(\frac{P_j+\lambda_i}{K_j+\lambda_i}\right)+0.5\cdot\sigma'^2_j\cdot T_j}{\sigma'_j\cdot\sqrt{T_j}}\right)$
Put options	$-N\cdot\left(-\frac{\ln\left(\frac{P_j+\lambda_i}{K_j+\lambda_i}\right)+0.5\cdot\sigma'^2_j\cdot T_j}{\sigma'_j\cdot\sqrt{T_j}}\right)$	$+N\cdot\left(-\frac{\ln\left(\frac{P_j+\lambda_i}{K_j+\lambda_i}\right)+0.5\cdot\sigma'^2_j\cdot T_j}{\sigma'_j\cdot\sqrt{T_j}}\right)$

38. The feedback received on the CP provided very little support for an adjustment to the supervisory volatility and favoured a simple pragmatic approach. For that reason, the EBA decided that no adjustment is needed on the supervisory volatility parameter.

39. By nature, λ is expected to change, reflecting movements in interest rates in a jurisdiction, and to progressively reach its lower bound, zero, while interest rates are moving back into positive territory. However, in order to promote consistency in the implementation across the EU, the EBA considers that the regulation should specify criteria for the application of the λ shift.

40. Example of maximum market values for the λ parameter (retrieved from data provider, as reported in section 5.1) are reported in Table 3 below. These possible values for the λ parameter take into consideration both the current level of interest rates in each jurisdiction and the volatility observed in the market for the same interest rates. These values are the ones that can presumably be used if institutions are allowed to reflect the market convention on the λ parameter.

Table 3: Example of maximum market values for the λ parameter (as provided on 31 May 2018 by ICAP/Bloomberg)

Currency	λ (%)
EUR	3
DKK	3
GBP	2
SEK	3
CHF	2
JPY	1

41. In the feedback received on the DP, an alternative solution was proposed: to set λ_i such that a certain threshold on the smallest (i.e. more negative) term between $P_j + \lambda_i$ and $K_j + \lambda_i$ is not crossed. In this sense, a possible formula for λ could be:

$$\lambda_i = \max\Big(threshold - \min\big(P_j, K_j\big), 0\Big)$$

42. The EBA decided to consult in the CP on the most appropriate levels of the threshold. Three alternatives were put on the table: 1 bp, 0.1% and 1%. In the light of the feedback received during the consultation, the EBA decided to set $threshold = 0.1\%$.

43. This methodology can be applied either at currency level or at transaction level. The feedback on the CP supported having a shift applied at transaction level. The EBA therefore retained only this alternative in the draft RTS.

44. Another option considered in the CP was based on the use of available market data for the λ parameter, i.e. the λ values that are quoted on the relevant markets.

45. However, the feedback on the consultation suggested that the benefits of using a λ based on market conditions are not sufficient to make the expected drawbacks acceptable. For that reason, the EBA decided to remove this alternative from the draft RTS.

Determination of long and short positions in a material risk driver

46. CRR2 provides a definition of long or short position in the primary risk driver. A methodology for the assessment of which definition applies (long or short) in specific cases should be provided.

47. The EBA believes that institutions should build on the same elements (i.e. cash flows and sensitivities) used for the materiality assessment of risk drivers, including in the determination of the direction of the position in that particular risk driver (long or short).

48. Feedback on the CP confirmed that the proposed approach is appropriate.

3. Draft regulatory technical standards on mapping of derivative transactions to risk categories, on supervisory delta formula for interest rate options and on determination of long or short positions in the Standardised Approach for Counterparty Credit Risk under Articles 277(5) and 279a(3)(a) and (b), respectively, of Regulation (EU) No 575/2013

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on supplementing Regulation (EU) No 575/2013 of the European Parliament and of the Council with regard to regulatory technical standards for identifying the risk drivers of derivative transactions for the purposes of Article 277(5), and for specifying the supervisory delta formula for interest rate options and for the determination of long or short positions for the purposes of Article 279a(3)(a) and (b) in the Standardised Approach for Counterparty Credit Risk

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supplementing Regulation (EU) No 575/2013 of the European Parliament and of the Council with regard to regulatory technical standards for identifying the risk drivers of derivative transactions for the purposes of Article 277(5), and for specifying the supervisory delta formula for interest rate options and for the determination of long or short positions for the purposes of Article 279a(3)(a) and (b) in the Standardised Approach for Counterparty Credit Risk

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EU) No 575/2013 of 26 June 2013 of the European Parliament and of the Council on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012 [8], and in particular the third subparagraph of Article 277(5) and the third subparagraph of Article 279a(3) thereof,

Whereas:

(1) The method for identifying derivative transactions with only one material risk driver, pursuant to Article 277(5)(a) of Regulation (EU) No 575/2013, for the purpose of mapping those derivative transactions to the relevant risk category, should be rendered simple for all cases where the primary and only material risk driver of the transaction is immediately discernible from the nature of the transaction. Thus, for example, in the case of interest rate swaps, interest rate futures or floating rate agreements, where the underlyings are in the same currency as the settlement currency, the cash flows of these instruments depend only on the interest rates relating to that currency. As a result, the primary risk driver for such type of transactions is clearly linked with the interest rate curve in the respective currency. Similarly for all other risk categories referred to in Article 277(1) of that Regulation, transactions should be mapped to them on the basis of whether the cash flows of that transaction depend exclusively on any one of these risk drivers. With regard to foreign exchange forwards, foreign exchange futures and foreign exchange swaps, given the nature of the transactions where the settlements relate

[8] OJ L 176, 27.6.2013, p. 1.

to more than one underlying currencies, the cash flow of such transactions depends primarly on foreign exchange risk drivers.

(2) Cross-currency interest rate swaps are used by institutions to hedge the foreign exchange risk arising from funding or investment in foreign currencies. Although such transactions primarly depend on foreign exchange risk drivers, they can depend also on other risk drivers, such as interest rate risk drivers. Nevertheless, as market experience shows that the effect of these other risk drivers is very often immaterial for these particular transaction types, if a transaction falls under this type, this should suffice for identifying such transactions as derivative transactions with only one material risk driver.

(3) The method for identifying derivative transactions with only one material risk driver applies on the basis of the cash flows of the transactions. This is because requiring the discount rate to be taken into account would be disproportionate and burdensome to the institutions, as market experience shows this is very often not material. As a result, the discount rate should not be considered as a material risk driver when other risk drivers are involved in a specific instrument (e.g. for a stock option, the discount rate can be disregarded whilst the stock price cannot).

(4) Where a transaction has more than one material risk driver and those material risk drivers refer to different risk categories, the method for identifying transactions with more than one material risk driver and for identifying the most material of those risk drivers pursuant to Article 277(5)(b) of Regulation (EU) No 575/2013 should take into account the sensitivities and the volatility of the underlying.

(5) With regard to those transactions which appear to have more than one material risk driver referring to different risk categories, where it is not possible, even after taking into account sensitivities and the volatility of the underlying of the transaction, to conclude which of the risk drivers are the material ones, institutions should allocate the derivative transaction to each of the risk categories corresponding to all the risk drivers of the transaction, as a simple, general and conservative fallback approach.

(6) The method for identifying derivative transactions with only one material risk driver should be performed at inception only, given that this material risk driver is such a basic characteristic of the transaction that is not expected to change. Where, at inception, a transaction has been identified as having more than one material risk drivers, then the method for identifying the most material of those risk drivers should be performed on a quarterly basis, to ensure that any changes in the transaction are appropriately reflected in the mapping of the transaction to the relevant risk drivers.

(7) For the purposes of Article 279a(3)(a) of Regulation (EU) No 575/2013, since the formula for the supervisory delta of call and put options mapped to the interest rate risk category and the supervisory volatility that is suitable for that formula need to be in line with international regulatory developments, it is appropriate to apply a treatment similar to that proposed by the Basel Committee on Banking Supervision (BCBS)[9], which provides that such an adjustment should be based on the use of a λ shift in the supervisory delta formula.

(8) In order for the λ shift to be adequate to move the interest rate into positive territory, the λ shift should be large enough to allow institutions to calculate the supervisory delta of the transaction in accordance with the formula provided in Article 279a (1). In addition,

[9] Frequently asked questions on the Basel III standardised approach for measuring counterparty credit risk exposures, 22 March 2018.

the λ shift should also be small enough not to introduce unnecessary bias in the outcome of the supervisory delta calculation.

(9) One of the parameters included in the formula provided in Article 279a (1) of Regulation (EU) No 575/2013, is the supervisory volatility. Distinct values should be provided for that parameter, based on the risk category of the transaction and the nature of the underlying instrument of the option, including for the interest rate risk category. As a result, the supervisory volatility for the adjustment to the formula should be suitable for the formula provided for the interest rate risk category.

(10) The definition of long or short position in a risk driver requires the specification of what objective information concerning a transaction institutions should use to determine whether the transaction is long or short in that risk driver, pursuant to Article 279a(3)(b). While there could be many approaches based on which this could be done, it would be less burdensome for institutions to apply the same methodology used for the identification of material risk drivers also for the determination of the direction of the position as either long or short.

(11) This Regulation is based on the draft regulatory technical standards submitted by the European Banking Authority to the Commission.

(12) EBA has conducted open public consultations on the draft regulatory technical standards on which this Regulation is based, analysed the potential related costs and benefits and requested the opinion of the Banking Stakeholder Group established in accordance with Article 37 of Regulation (EU) No 1093/2010[10],

HAS ADOPTED THIS REGULATION:

Section 1

Method for identifying transactions with only one material risk driver from transactions with more than one material risk drivers and for identifying the most material of those risk drivers for the purposes of mapping derivative transactions to risk category in accordance with Article 277(5)(a) of Regulation (EU) No 575/2013

Article 1

Method for identifying transactions with only one material risk driver

1. For the purpose of identifying those transactions with only one material risk driver, for the purposes of Article 277 of Regulation (EU) No 575/2013, institutions shall apply the following steps in sequence at the inception of a transaction:

   (a) they shall identify all the risk drivers of the transaction by determining the risk factor or risk factors on which the cash flows of the transaction depend. The assessment shall be made with respect to a sufficient number of risk factors, which shall include at least the risk factors referred to in Articles 325l to 325q of Regulation (EU) No 575/2013;

[10] Regulation (EU) No 1093/2010 of the European Parliament and of the Council of 24 November 2010 establishing a European Supervisory Authority (European Banking Authority), amending Decision No 716/2009/EC and repealing Commission Decision 2009/78/EC (OJ L 331, 15.12.2020, p. 12).

(b) where the cash flows of the transaction depend exclusively on one risk driver that belongs to one of the risk categories referred to in points (a), (c), (d), (e) and (f) of Article 277(1) of Regulation (EU) No 575/2013, and where the currency of the underlying of the transaction is the same as the settlement currency of the transaction, institutions shall identify that risk driver as the only material risk driver of the transaction;
(c) where the cash flows of the transaction depend exclusively on one risk driver belonging to the risk category referred to in point (b) of Article 277(1) of Regulation (EU) No 575/2013, institutions shall identify the foreign exchange risk driver as the only material risk driver of the transaction.

2. By way of derogation from paragraph 1, for derivative instruments listed in point 2(a) of Annex II of Regulation (EU) No 575/2013, institutions may identify the foreign exchange risk driver as the only material risk driver of the transaction.

Article 2

Method for identifying transactions with more than one material risk driver

For the purpose of Article 277 of Regulation (EU) No 575/2013 institutions shall identify as transactions with more than one material risk driver all transactions other than those referred to in points (b) and (c) of Article 1(1).

Article 3

Method for identifying the most material risk driver for those transactions with more than one material risk driver

1. For the purposes of Article 277 of Regulation (EU) No 575/2013, with regard to the transactions referred to in Article 2, institutions shall determine the most material risk driver by applying either of the following methods:

(a) they shall apply the following steps in sequence at the inception of a transaction:

(i) they shall consider all the risk drivers of the transaction identified in accordance with the procedure referred to in Article 1(a) to be material risk drivers;
(ii) for each risk category corresponding to the risk drivers referred to in point (i), they shall consider as the most material risk driver the risk driver corresponding to the highest risk category add-on from among those referred to in Articles 280a to 280f of Regulation (EU) No 575/2013.

(b) they shall apply the following steps in sequence at the inception of a transaction and then at least quarterly:

(i) with regard to all the risk drivers identified in accordance with the procedure referred to in Article 1(a), they shall compute the sensitivities of those risk drivers in accordance with Article 325r of Regulation (EU) No 575/2013;

(ii) they shall apply the provision of Article 325f(6) of Regulation (EU) No 575/2013 to the sensitivities computed in accordance with point (i);

(iii) they shall apply the provisions of Article 325f(7) and 325f(8) of Regulation (EU) No 575/2013 to the results of the multiplication referred to in point (ii) for each of the risk categories referred to in Article 277(1) of that Regulation;

(iv) they shall rank the aggregate results referred to in point (iii) from the greatest to the smallest in absolute terms, in order to obtain a monotonically decreasing sequence of entries, where the entry a_1 is the greatest absolute term, a_2 is the second greatest term and so on;

(v) for each of the entries referred to in point (iv) in the order resulting from the ranking in that point, they shall verify whether the following condition is met:

$$\frac{\sum_{j=1}^{i} a_j}{\sum_{k=1}^{6} a_k} < Y\%$$

where:

$Y\% = 60\%$

(vi) they shall consider material those risk drivers corresponding to the risk categories for which the condition of point (v) is met and the first risk category for which that condition is not met;

(vii) for each of the risk categories corresponding to risk drivers considered not material in accordance with point (vi), they shall verify whether the following condition is met:

$$\frac{a_i}{\sum_{k=1}^{6} a_k} \geq Z\%$$

where:

$Z\% = 30\%$

(viii) they shall consider material those risk drivers corresponding to the risk categories for which the condition of point (vii) is met;

(ix) for each of the risk categories referred to in points (vi) and (viii), they shall consider as the most material risk driver the risk driver corresponding to the highest absolute value of the result of the multiplication referred to in point (ii).

3. Where institutions meet either the conditions set out in Article 94(1) of Regulation (EU) No 575/2013 or the conditions set out in Article 325a(1) of that Regulation, they may determine, the most material risk driver by applying the following steps in sequence to all derivative instruments identified in accordance with Article 2:

(a) they shall compute the add-ons referred to in Articles 280a to 280f of Regulation (EU) No 575/2013, as applicable, for each risk category referred to in Article 277(1) of

Regulation (EU) No 575/2013 and associated with all the risk drivers identified in accordance with Article 1(a);

(b) they shall apply points (iv) to (viii) of paragraph 1(b);

(c) for each of the risk categories referred to in points (vi) and (viii), they shall consider as most material risk driver the risk driver corresponding to the highest risk category add-on from among those referred to in Articles 280a to 280f of Regulation (EU) No 575/2013.

Section 2

The formula to be used for the purposes of Article 279a(3)(a) of Regulation (EU) No 575/2013 and the supervisory volatility that is suitable for that formula and method for determining a short or long position in the primary risk driver or in the most material risk driver in a given risk category

Article 4

Supervisory delta for options mapped to the interest rate risk category

1. For the purpose of Article 279 of Regulation (EU) No 575/2013, the formula that institutions shall use to calculate the supervisory delta (δ) of call and put options mapped to the interest rate category shall be the following:

$$\delta = sign \cdot N\left(type \cdot \frac{\ln\left({}^{(P+\lambda)}/_{(K+\lambda)}\right) + 0.5 \cdot \sigma^2 \cdot T}{\sigma \cdot \sqrt{T}} \right)$$

where:

$$type = \begin{cases} -1 \text{ where the transaction is a put option} \\ +1 \text{ where the transaction is a call option} \end{cases}$$

$$sign = \begin{cases} -1 \text{ where the transaction is a sold call option or a bought put option} \\ +1 \text{ where the transaction is a sold put option or a bought call option} \end{cases}$$

$N(x)$ = the cumulative distribution function for a standard normal random variable which reflects the probability that a normal random variable with mean zero and variance of one is less than or equal to 'x';

P = the spot or forward price of the underlying instrument of the option;

K = the strike price of the option;

T = the expiry date of the option, which is the only future date at which the option may be exercised, expressed in years using the relevant business day convention;

λ = the shift adequate to move both P and K into positive territory, determined in accordance with paragraph 2;

σ = the supervisory volatility of the option determined in accordance with Article 5.

2. For the purposes of paragraph 1, institutions shall calculate the shift (λ) for any call and put options as follows:

$$\lambda_j = \max\left(threshold - \min\left(P_j, K_j\right), 0\right)$$

where:

P_j = the spot or forward price of the underlying instrument of the option j;
K_j = the strike price of the option j;
$threshold$ = 0.10%

Article 5

Supervisory volatility suitable for the corrected delta for options mapped to the interest rate risk category

For the purposes of paragraph 1 of Article 4, the supervisory volatility of the option shall be determined in accordance with Table 1 on the basis of the risk category of the transaction and the nature of the underlying instrument of the option.

Table 1

Risk category	Underlying instrument	Supervisory volatility
Interest rate	All	50%

Article 6

Method for determining whether a transaction is a long or short position in the primary risk driver or in the most material risk driver in a given risk category

For the purpose of determining whether a transaction is a long or short position in the primary risk driver or in the most material risk driver in a given risk category, institutions shall apply either of the following:

(a) they shall compute the sensitivities of those risk drivers in accordance with Article 325r of Regulation (EU) No 575/2013. The transaction shall be considered as a long position

in the material risk driver where the corresponding sensitivity is positive and as a short position in the material risk driver where the corresponding sensitivity is negative;

(b) they shall determine the transaction as either long or short by assessing the dependence of the structure of cash flows of the transaction on that risk driver or the hedging purpose of the transaction with respect to that risk driver.

Article 7

Entry into force

This Regulation shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels,

For the Commission
The President

[For the Commission
On behalf of the President

[Position]

4. Accompanying documents

4.1. Draft cost-benefit analysis/impact assessment

Article 277(5) of CRR2 requires the EBA to develop draft RTS to specify (a) the method for identifying transactions with one material risk driver and (b) the method for identifying transactions with more than one material risk driver and for identifying the most material of those risk drivers for the purposes of mapping a transaction to a risk category. In addition, Article 279a(3) of CRR2 requires the EBA to develop draft RTS to specify the formula that institutions shall use to calculate the supervisory delta of call and put options mapped to the interest rate risk category compatible with market conditions in which interest rates may be negative as well as the supervisory volatility that is suitable for that formula. In addition, the EBA is requested to provide a method for determining whether a transaction is a long or short position in the primary risk driver or in the most material risk driver in the given risk category for transactions with more than one material risk driver.

As per Article 10(1) of Regulation (EU) No 1093/2010 (EBA Regulation), any regulatory technical standards developed by the EBA shall be accompanied by an impact assessment (IA), which analyses 'the potential related costs and benefits'.

This section presents the cost-benefit analysis of the main policy options included in the RTS.

A. Background, problem identification and baseline scenario

In March 2014, the Basel Committee published its final standard on the standardised approach for measuring counterparty credit risk exposures. The new Standardised Approach for Counterparty Credit Risk (SA-CCR) replaces all non-internal model approaches (i.e. the current exposure method and the standardised method).

The SA-CCR consists of two components: the replacement cost (RC) and the potential future exposure (PFE). An alpha factor is applied to the sum of these components to calculate the exposure at default (EAD).

Mapping of derivative transactions to risk categories

The PFE is calculated differently for each asset class, requiring institutions to first allocate (map) derivative transactions to one or more asset classes. According to the Basel standards, the designation of a derivative transaction to an asset class is to be made on the basis of its primary risk driver. Most derivative transactions will have one primary risk driver, which is clearly identifiable, so as the transaction will fall into one asset class (also called risk categories). For most complex transactions that may have more than one risk driver, institutions must take the

sensitivities and volatility of the underlying into account for determining the primary risk driver and may allocate the trade to more than one asset class.

Other than these general principles, the Basel standards do not provide any specific methodology for identifying transactions with one primary risk driver or transactions with more than one risk driver, along with the primary risk driver among them. Consequently, CRR2 requests that the EBA specify this method. The lack of a common specification would result in an inconsistent application of SA-CCR across institutions and create an uneven playing field.

Supervisory delta formula

As part of the calculation of PFE, institutions need to apply a supervisory delta adjustment to the adjusted notional amount at trade level to reflect the direction of the transaction (i.e. short or long) and its non-linearity. For options, the supervisory delta adjustment is based on the classic Black-Scholes option pricing model and is defined as follows:

$$\delta = \pm\Phi\left(\frac{\ln\left(\frac{P}{K}\right)+0.5*\sigma^2*T}{\sigma\sqrt{T}}\right),$$

where *P* is the spot or forward price of the underlying instrument of the option, *K* is the strike price of the option, *T* is the expiry date of the option and σ is the supervisory volatility of the option.

The Black-Scholes model is widely used within the options markets, and the model's implied volatilities are a standard quoting convention for option prices[11]. However, the Black-Scholes model assumes that the underlying asset follows a lognormal distribution and can take only positive values. In particular, the supervisory delta formula contains the term $\ln(P/K)$, i.e. the natural logarithm of the ratio between the spot or forward price P of the underlying instrument of the option and the strike price K of the option. Given that the natural logarithm is defined only for values greater than zero, a negative *P* or *K* would make the supervisory delta adjustment inoperable.

In the aftermath of the recent financial crisis, many central banks introduced negative interest rate policies, leading to negative values of *P* or *K*[12]. As shown in Figure 1, the European Central Bank (ECB) lowered its deposit facility (- 0.1%)[13] to negative territory in June 2014, with other central banks following similar policies: the Danish National Bank set a negative rate in July 2012 (certificates of deposit: - 0.2%)[14], the Swiss National Bank in December 2014 (deposit rate:

[11] Other well-known models to price options are the Bachelier normal model, the constant elasticity of variance model and the SABR model.

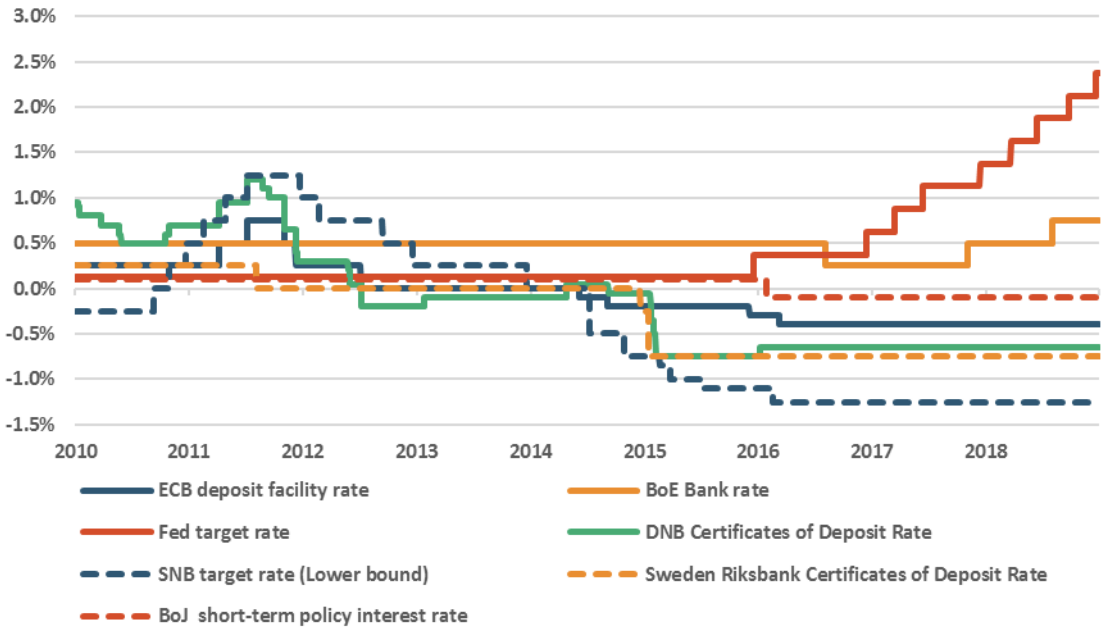
[12] The actual model used to price options for interest rate derivative is the Black (1976) pricing model, which is a variant of the Black-Scholes model.

[13] https://www.ecb.europa.eu/press/pr/date/2014/html/pr140605_3.en.html

[14] http://www.nationalbanken.dk/en/pressroom/Documents/2012/07/DNN201216563.pdf

- 0.25%)[15], the Swedish Riksbank in February 2015 (repo rate: -0.10%)[16] and the Bank of Japan in January 2016 (deposit rate: -0.1%)[17]. Meanwhile, the Federal Reserve (fed rate: 0.25%) and the Bank of England (bank rate: 0.5%) have kept interest rates close to zero.

Figure 1: Central banks' interest rates



Source: Bloomberg
Note: Daily data from 1 January 2010 to 31 December 2018.

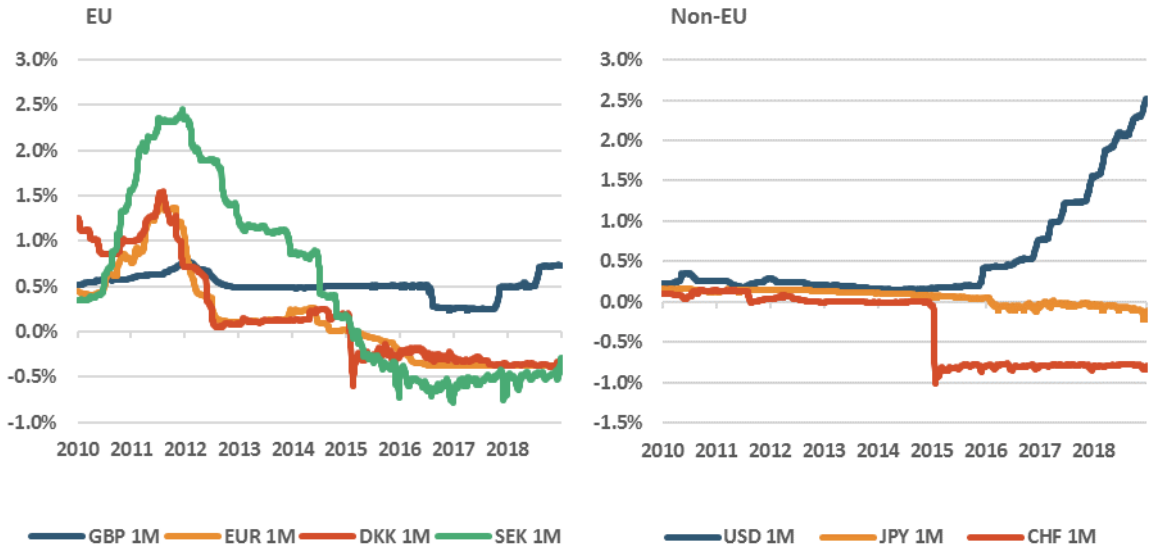
In turn, the negative monetary policy rates were transmitted to money markets, with short-term money market rates – which are often used in options for interest rate derivatives – moving to negative territory. As an example, the 1-month interbank offered rates for euro, Danish krone, Swedish krona, Swiss franc and Japanese yen have been (or still are) negative, while for the pound sterling and US dollar they have been positive but close to 0% (Figure 2).

[15] https://www.snb.ch/en/mmr/reference/pre_20141218/source/pre_20141218.en.pdf

[16] http://archive.riksbank.se/en/Web-archive/Published/Press-Releases/2015/Riksbank-cuts-repo-rate-to-010-per-cent-buys-government-bonds-for-SEK-10-billion/index.html

[17] https://www.boj.or.jp/en/announcements/release_2016/k160129a.pdf

Figure 2: 1-month interbank offered rate[1] for EUR, DKK, GBP, SEK, CHF, JPY and USD



Source: Bloomberg

Note: Daily data from 1 January 2010 to 31 December 2018.

Given that Black's model is not suitable in a negative interest rate environment, market practitioners have either switched to alternative models that allow for negative values of *P*, such as the Bachelier model, or have modified existing models to create the shifted (or displaced) versions of Black's model, the constant elasticity of variance model and the SABR model. The shifted Black model is essentially the same as Black's model, except that it models the shifted spot or forward rate $P + \lambda$ as the underlying asset, instead of the spot or forward rate P:

$$d(P_t + \lambda) = \sigma(P_t + \lambda)dW_t$$

$P_t + \lambda$ is drawn from a lognormal distribution (and P_t is said to follow a displaced or shifted lognormal distribution). In this case, the lowest possible value allowed for P_t is $-\lambda$ (rather than zero) and the corresponding shifted volatilities are published alongside it. In the option pricing equations P must be replaced by $P + \lambda$ and K with $K + \lambda$ everywhere[18]. The displacement λ must be sufficiently large that $P + \lambda$ is positive for the lowest forward rate implied by the current term structure and the logarithm $\ln\left(\frac{P+\lambda}{K+\lambda}\right)$ is well defined.

The Basel frequently asked questions (FAQ) on SA-CCR[19] take a shifted Black model perspective, suggesting that institutions must incorporate a shift in the price value and strike value by adding λ, where λ represents the presumed lowest possible extent to which interest rates in the currency in question can become negative. However, it does not specify the value of λ. It only sets high-level principles stating that (a) the same parameter must be used consistently for all interest rate options in the same currency; (b) for each jurisdiction, and for each affected currency *j*, the supervisor is

[18] J. Hull and A. White, 'Interest rate models and negative rates': http://www.fincad.com/blog/interest-rate-models-and-negative-rates

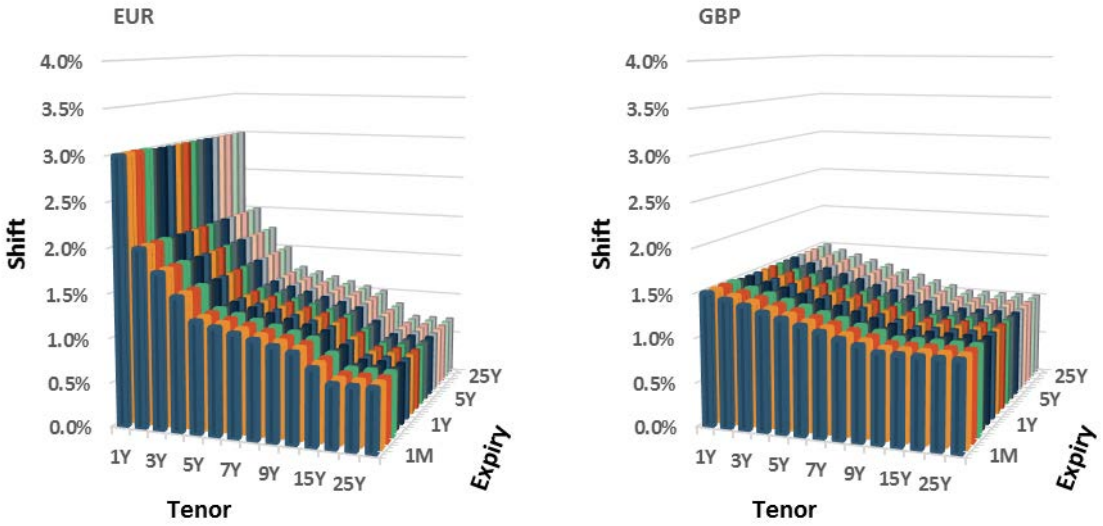
[19] https://www.bis.org/bcbs/publ/d438.pdf

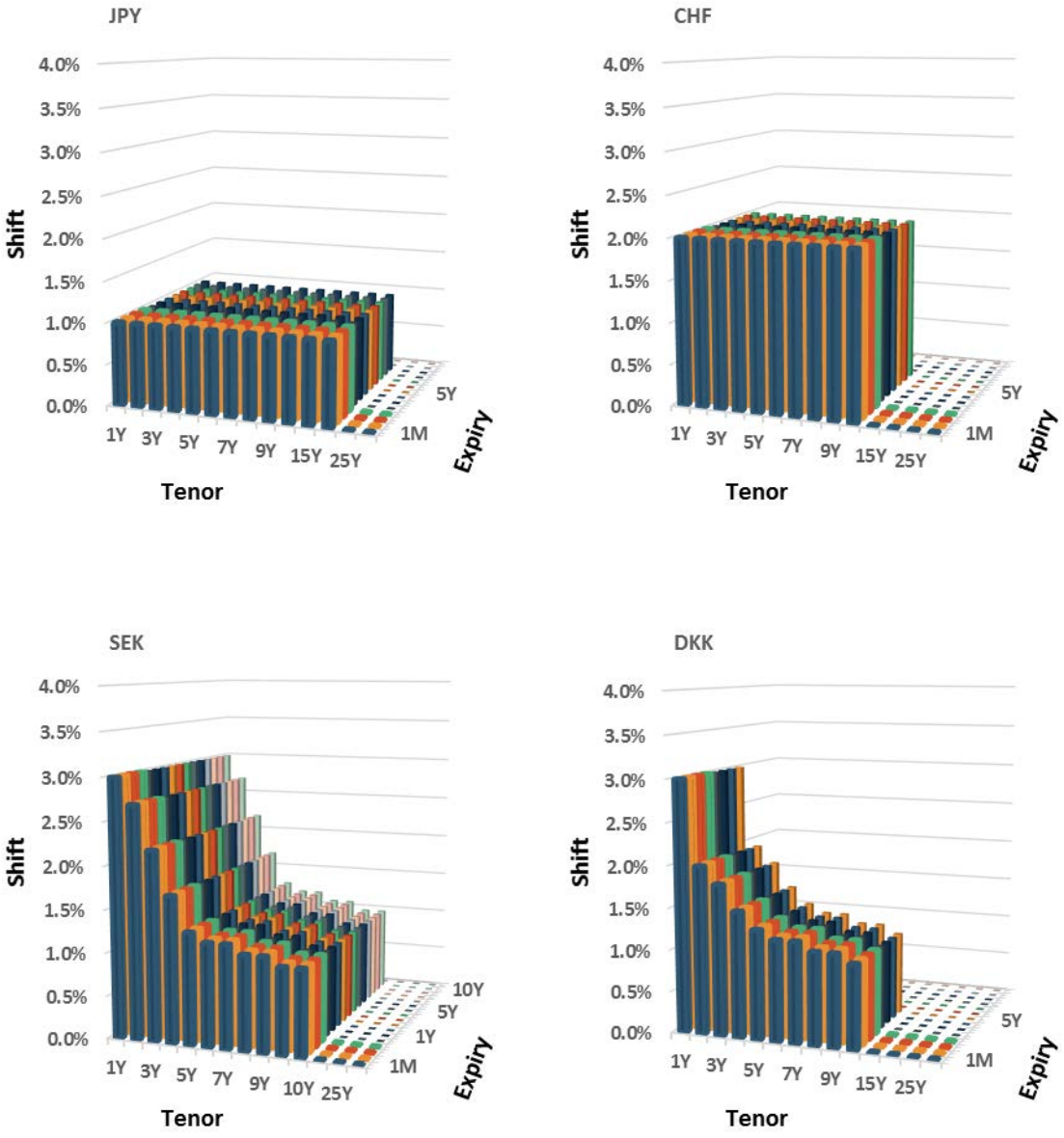
encouraged to make a recommendation to institutions for an appropriate value of λ_j, with the objective to set it as low as possible; (c) institutions are permitted to use lower values if it suits their portfolios.

The lack of such specification would give the option to institutions to use their own adjustments/shifts, creating an uneven playing field. Figure 3 shows the shifts applied by brokers to at-the-money swaptions for euro, Danish krone, pound sterling, Swedish krona, Swiss franc and Japanese yen. The maturity of the options ranges from 1 month to 30 years, while the maturity of the underlying swap ranges from 1 to 30 years.

For all currencies, the shifts varies with the maturity of the underlying swap, with larger shifts applied to shorter maturities. For euro, the shift ranges from 3% for short-term options (1 year) to 0.7% for longer term options (higher than 20 years). The Danish krone's and Swedish krona's shifts have similar values to those of the euro, ranging from 1% to 3%. For the pound sterling, the shift is lower and ranges from 1% to 1.5%. For the Swiss franc and Japanese yen, a flat shift is applied irrespective of the maturity, standing at 2% and 1%, respectively. The results suggest that there is no common shift and the value depends on the currency and maturity of the underlying swap. The data confirm the assumption that the value of the shift may not necessarily be coherent across institutions.

Figure 3: Shifts applied for shifted Black at-the-money swaptions





Source: ICAP/Bloomberg
Note: Data as of 18 February 2019. Expiry refers to the time period between the valuation date and the maturity of the option. Tenor refers to the length of the underlying swap.

B. Policy objectives

The specific objective of the RTS is to establish a harmonised methodology for:

- identifying the material risk drivers of derivative transactions under the SA-CCR within the EU;
- computing the supervisory delta adjustment applied to options under the SA-CCR when interest rates are negative, which, operationally, would provide institutions with a practical

solution for computing the supervisory delta adjustment in a negative interest rate environment.

Generally, the RTS aim to create a level playing field, promote convergence of institutions' practices and enhance comparability of own funds requirements across the EU. Overall, the RTS are expected to promote the effective and efficient functioning of the EU banking sector.

C. Options considered, cost-benefit analysis and preferred options

Mapping of derivative transactions to risk categories

a. Identification of the material risk drivers of the transaction (Approach 2)

The EBA DP put forward the following four proposals for the method to identify material risk drivers:

Option 1a: Comparing the relative relevance of each risk driver's sensitivity with that of the primary risk driver.

Option 1b: Comparing the relative contribution of each risk driver's sensitivity to the total.

Option 1c: Similar to Options 1a and 1b but based on risk-weighted sensitivities (i.e. taking into account volatility) instead of simple sensitivities.

Option 1d: Based on SA-CCR add-ons.

Table 7 lists the main pros and cons for each option.

Table 7: Proposals for identifying material risk drivers

Options	Pros	Cons
1a	Simple and easy to implement	Does not take into account volatility No mechanical cap to the number of material risk drivers
1b	Simple and easy to implement Allows for mechanical cap to the number of material risk drivers	Does not take into account volatility
1c	Takes into account volatility Allows for mechanical cap to the number of material risk drivers	More complex than Options 1a and 1b
1d	Coherent with SA-CCR framework and potentially more suitable for banks that do not use FRTB but do apply SA-CCR	More burdensome to implement, as it will require the bank to calculate the SA-CCR add-ons for all risk categories.

Options	Pros	Cons
	Allows for mechanical cap to the number of material risk drivers	

The feedback to the DP favoured Option 1c, i.e. assessing the materiality of risk drivers using an indicator that considers sensitivity and volatility jointly. The EBA CP consulted on both Options 1c (with FRTB SA sensitivities) and 1d.

The majority of respondents to the CP expressed some degree of concern about the approach based on FRTB sensitivities because they deemed it to be too complex and burdensome, considering that Approach 2 will be applied on only a small portion of the derivative portfolio (i.e. only for transactions with more than one risk driver). The EBA notes that a simple fallback is available in any case, should the use of FRTB sensitivities be considered too burdensome.

Several respondents state that all the institutions should be given the possibility of using, instead of FRTB sensitivities, internally generated sensitivities, at least for banking book instruments. In addition, some respondents to the CP expressed the view that institutions should be given the possibility to use the SA-CCR add-ons, at least for banking book instruments. Finally, some respondents were in favour of keeping the SA-CCR add-ons approach for smaller institutions.

The EBA deems it unclear how internal sensitivities could lighten the burden for institutions in relation to banking book positions (with respect to FRTB sensitivities). In addition, the use of different sensitivities/add-ons between the trading and banking book will create inconsistencies, given that identical positions could be treated differently depending on the allocation in the trading/banking book.

Option 1c is retained. To alleviate the burden of calculating risk-weighted sensitivities, smaller institutions are allowed to use Option 1d, which is based on SA-CCR add-ons. For smaller institutions that do not use FRTB but do apply SA-CCR, this will alleviate the burden of computing FRTB SA sensitivities.

b. Risk weights to be used to adjust sensitivities

The EBA has considered two alternative sets of risk weights to adjust sensitivities.

Option 2a: Use FRTB risk weights.

Option 2b: Use SA-CCR risk weights.

Option 2a offers greater risk-sensitivity, as the FRTB risk weights are more granular than the SA-CCR risk weights, while Option 2b promotes a more coherent application within the framework. On the one hand, using FRTB risk weights would be easy to implement for institutions using FRTB or SIMM. On the other hand, the use of FRTB risk weights may be potentially difficult for institutions that do not use FRTB or SIMM.

Option 2a is retained. As discussed under point a above, smaller institutions would be allowed to use the SA-CCR add-ons instead of FRTB SA sensitivities, which should alleviate the burden for those small institutions that do not use FRTB or SIMM.

c. Aggregation scheme for aggregating risk-weighted sensitivities

The EBA has considered two alternative aggregation schemes to aggregate risk-weighted sensitivities.

Option 3a: Aggregation in accordance with the aggregation schemes referred to in Section 6, Subsection 1 of CRR2.

Option 3b: Aggregation as a simple sum of absolute value of risk-weighted sensitivities.

Option 3a uses the FRTB aggregation scheme, which takes into account the correlation between risk factors. This scheme is the natural choice given that FRTB risk-weights are used to adjust sensitivities, as it would ensure full consistency with the FRTB framework. It also captures basis risk and diversification. Option 3b provides for a very simple aggregation scheme, but does not account for any offsetting positions or diversification benefits within risk categories.

Option 3a is retained.

d. Material risk driver assessment methodology

Option 4a: Material risk drivers are chosen based on the condition $\frac{a_i}{a_1} \geq Y\%$.

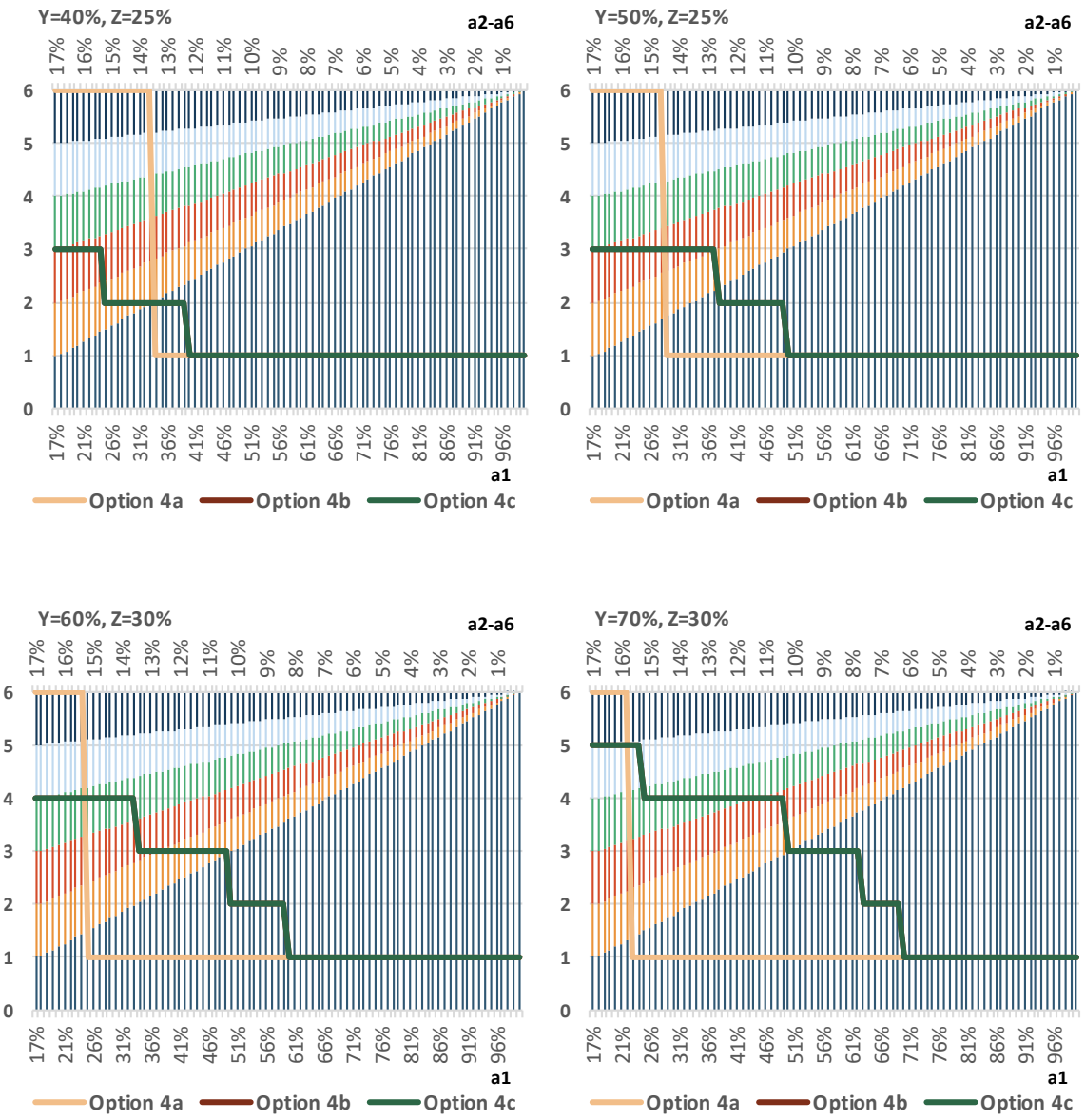
Option 4b: Material risk drivers are chosen based on the condition $\frac{\sum_{j=1}^{i} a_j}{\sum_{k=1}^{6} a_k} < Y\%$.

Option 4c: Material risk drivers are chosen based on the condition under Option 4b, $\frac{\sum_{j=1}^{i} a_j}{\sum_{k=1}^{6} a_k} < Y\%$, with a backstop that any risk driver that satisfies the condition $\frac{a_i}{\sum_{k=1}^{6} a_k} \geq Z\%$ is also material.

The EBA considered various levels for Y%, between 40% and 70%, and Z%, between 25% and 30%.

To illustrate the advantages and disadvantages of the alternative options, the following theoretical examples are considered. In the first example, a situation in which the risk drivers of a transaction belong to all six risk categories is considered (Figure 4). The second example considers a situation in which the risk drivers of a transaction belong to just two risk categories (Figure 5). Under both examples, the relative importance of the risk categories varies, from a situation where all the risk categories have the same importance to a situation where there is one predominant risk category and all the others are residuals.

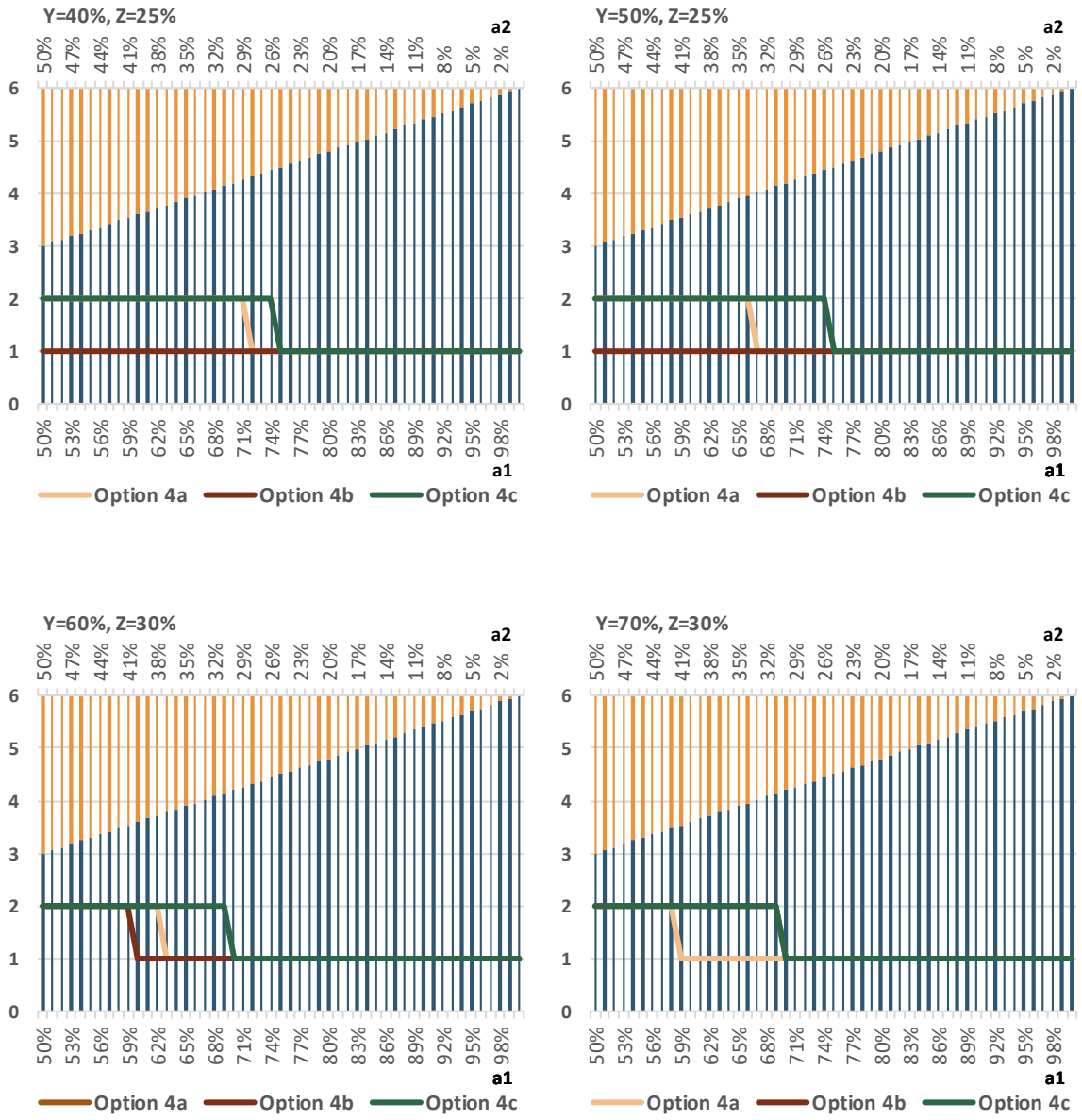
Figure 4: Example 1 – the risk drivers of a transaction belong to all six risk categories



Note: The bar chart shows the relative importance of each risk category to the total, from a situation where all risk categories have the same importance (17.6%) to a situation where there is one predominant risk category (100%). Option 4b and Option 4c coincide completely and this is the reason why Option 4b does not appear in the graph.

As shown in Figure 4, Options 4b and 4c provide a smoother mapping across categories, as the relative importance of the risk categories varies. In addition, they provide an implicit cap to the number of risk categories depending on the threshold (e.g. three risk categories for $Y = 50$ and four risk categories for $Y = 60$), while under Option 4a all the risk categories are selected, when their importance is very similar.

Figure 5: Example 2 – the risk drivers of a transaction belong to two risk categories



Note: The bar chart shows the relative importance of each risk category to the total, from a situation where all risk categories have the same importance (50%) to a situation where there is one predominant risk category (100%). In the lower right panel ($Y = 70$, $Z = 30$), Option 4b and Option 4c coincide completely and this is the reason why Option 4b does not appear in the graph.

As shown in Figure 5, Options 4a and 4c seems to work better in Example 2, as both risk categories are chosen when the importance of the two factors is high and very close to each other.

Based on the aforementioned analysis, Option 4c was retained, as it combines the benefits of both Options 4a and 4b. Given that the results for the threshold levels for *Y* of 40 and 50 are similar , and

so are those for 60 and 70, the EBA put forward for consultation two combinations: (a) $Y = 50$ and $Z = 25$; and (b) $Y = 60$ and $Z = 30$.

Although there was not clear-cut majority in the feedback received from the consultation, many respondents expressed a preference for Option 1b in the CP.

Option 1b is retained.

Corrections to supervisory delta

a. Value of λ shift

Option 5a: Based on market convention.

Option 5b: Based on the formula $\max\left(threshold - \min\left(P_j, K_j\right), 0\right)$.

Option 5a allows institutions to retrieve the value of the shift λ from market quotes for the relevant risk-free rate. A disadvantage of this option is that it entails the risk of setting different values of λ for the same transactions, simply because the institutions may use different market data providers. Moreover, some data providers may not quote shift λ for all different type of transactions.

Option 5b on the other hand, provides for a mechanistic way that ensures that the delta formula will be workable and that the shift is the same across institutions for the same transactions. It is also aligned with the guidance provided in the Basel FAQ on SA-CCR and with the proposal of the Federal Reserve Board, the Federal Deposit Insurance Corporation and the Office of the Comptroller of the Currency on the SA-CCR. This has the potential to reduce the compliance costs for internationally active institutions, which need to comply with different regulations worldwide, and to ensure a level playing field.

The EBA consulted upon both Options 5a and 5b. The majority of the respondents to the CP do not see benefits in using a shift based on market conditions.

Option 5b is retained.

b. Threshold amount

Option 6a: Threshold = 0.01%.

Option 6b: Threshold = 0.1%.

Option 6c: Threshold = 1%.

Introducing a shift (λ) to the formula for the supervisory delta may lead to different results, depending on the value of the shift, i.e. in general

$$sign \cdot N\left(type \cdot \frac{\ln\left(\frac{P}{K}\right) + 0.5 \cdot \sigma^2 \cdot T}{\sigma \cdot \sqrt{T}}\right) \neq sign \cdot N\left(type \cdot \frac{\ln\left(\frac{P+\lambda}{K+\lambda}\right) + 0.5 \cdot \sigma^2 \cdot T}{\sigma \cdot \sqrt{T}}\right)$$

whenever $\lambda > 0$. The only exception is in the case $P = K$, i.e. for at-the-money options.

In order to assess the possible materiality of the difference, Example 1 from Annex 4a of the BCBS document 'The standardised approach for measuring counterparty credit risk exposures' is considered. Table 5 summarises the main calculation steps to compute the EAD of the portfolio (composed of one long position in a swap denominated in US dollars and two short positions in a US dollar-denominated swap and a euro-denominated swaption). The example is slightly modified: in the BCBS's original example the assumed underlying price (the appropriate forward swap rate) is 6% and the strike price (the swaption's fixed rate) is 5%, whereas in the example proposed here the assumed underlying price and the strike price are 6 bp and 5 bp, respectively. As the supervisory delta is the same $-N\left(-\frac{\ln(6\%/5\%)+0.5\cdot(0.5)^2\cdot 1}{0.5\cdot\sqrt{1}}\right) = -N\left(-\frac{\ln(6\text{ bp}/5\text{ bp})+0.5\cdot(0.5)^2\cdot 1}{0.5\cdot\sqrt{1}}\right)$ even after the modification, the resulting EAD is the same.

Table 5: Example 1 from Annex 4a – the standardised approach for measuring counterparty credit risk exposures (underlying price and strike price modified: 5 bp and 6 bp)

Trade	Nature	Residual maturity	M	S	E	Currency	Notional	Pay leg	Receive leg	Market value	Option type	P	K
1	IRS	10	10	0	10	USD	10 000	fix	fl	30	0		
2	IRS	4	4	0	4	USD	10 000	fl	fix	-20	0		
3	Swaption	1 to 10	11	1	11	EUR	5 000	fl	fix	50	-1	6 bp	5 bp

EAD	Alpha	RC	PFE	Multiplier	AddOnAgg	DIRj	V	C	SD	d	δ	MF
569	1.4	60	347	1	347	78 694	30		8	78 694	1	1
	1.4	60	347	1	347	-36 254	- 20		4	36 254	-1	1
	1.4	60	347	1	347	-10 083	50		7	37 428	-0.27	1

Notice that the option is out of the money, being a put option with $P > K$. Consider then a downside movement of the underlying price, from 6 bp to 1 bp. The option is now in the money, as $P < K$ (the supervisory delta moves consequently from - 0.27 to almost - 1.00). Changed PFE and EAD are shown in Table 6.

Table 6: Example 1 from Annex 4a – underlying price and strike price 1 bp and 6 bp.

Trade	Nature	Residual maturity	M	S	E	Currency	Notional	Pay leg	Receive leg	Market value	Option type	P	K
1	IRS	10	10	0	10	USD	10 000	fix	fl	30	0		
2	IRS	4	4	0	4	USD	10 000	fl	fix	-20	0		
3	Swaption	1 to 10	11	1	11	EUR	5 000	fl	fix	50	-1	1 bp	5 bp

EAD	Alpha	RC	PFE	Multiplier	AddOnAgg	DIRj	V	C	SD	d	δ	MF
761	1.4	60	483	1	483	78 694	30	-	8	78 694	1	1
	1.4	60	483	1	483	-36 254	-20	-	4	36 254	-1	1
	1.4	60	483	1	483	37 428	50	-	7	37 428	-1	1

Consider then another downward movement of the underlying price, from 1 bp to - 1 bp. The supervisory delta in that case needs to be adjusted with a λ shift.

Table 7 compares the results for the three different threshold levels.

Table 7: Example 1 from Annex 4a – different levels of underlying price (6 bp, 1 bp and - 1 bp) and for different levels of thresholds (0.01%, 0.1% and 1%)

Threshold level (%)		*P* = 6 bp, *K* = 5 bp	*P* = 1 bp, *K* = 5 bp	*P* = - 1 bp, *K* = 5 bp
0.01	**Shift (%)**	0	0	0.02
	Swaption δ	-0.27	-1	-1
	PFE	347	483	483
	EAD	569	760	761
0.1	**Shift (%)**	0.05	0.09	0.11
	Swaption δ	-0.33	-0.66	-0.75
	PFE	358	421	438
	EAD	585	673	697

Threshold level (%)		*P* = 6 bp, *K* = 5 bp	*P* = 1 bp, *K* = 5 bp	*P* = - 1 bp, *K* = 5 bp
1	Shift (%)	0.95	0.99	1.01
	Swaption δ	-0.39	-0.43	-0.45
	PFE	370	377	380
	EAD	602	612	617

This illustrative example shows that setting a low threshold would make it possible to reduce the potential distortion introduced by the shift. In this way, the objective reported in the Basel FAQ[20] to set the λ as low as possible is also pursued. Nevertheless, setting a higher threshold would enable a smoother transition among the three different situations presented in Table 7.

Given that the actual effect depends on many features of the instruments composing the portfolio (e.g. strike price, underlying price, maturity), the EBA consulted on all three levels. The feedback from the CP did not provide clear preference on any option. The EBA expects that the intermediate solution would be the most appropriate in light of potential advantages and drawbacks of more extreme solutions.

Option 6b is retained.

c. Volatility adjustment

Option 7a: No adjustment to volatility.

Option 7b: Adjustment to volatility.

Option 7b could provide a technically more sound solution, as it would take into account that the shifted spot or forward rate $P + \lambda$ is modelled as the underlying asset, instead of the spot or forward rate P. However, there is no straightforward volatility adjustment. On the other hand, Option 7b could be a pragmatic solution, reducing the operational burden for institutions and avoiding additional complexity.

The EBA consulted on both Options 7a and 7b. The majority of the respondents to the CP do not support the need for any adjustment to the supervisory volatility.

Option 7a is retained.

[20] https://www.bis.org/bcbs/publ/d438.pdf

4.2 Feedback on the public consultation

The EBA publicly consulted on the draft proposal contained in this paper.

The consultation period lasted for 3 months and ended on 2 August 2019. Ten responses were received, of which seven were published on the EBA website.

This paper presents a summary of the key points and other comments arising from the consultation, the analysis and discussion triggered by these comments, and the actions taken to address them if deemed necessary.

In a number of cases several industry bodies made similar comments or the same body repeated its comments in response to different questions. In such cases, the comments and EBA analysis are included in the section of this paper where the EBA considers them most appropriate.

Changes to the draft RTS have been incorporated as a result of the responses received during the public consultation.

Summary of key issues and the EBA's response

As highlighted in section 2, the EBA has decided to make changes to the draft RTS to reflect some of the feedback brought by respondents. In the feedback table that follows, the EBA has summarised the comments received and explains which responses have and have not led to changes, and the reasons for this.

Several respondents mentioned that the scope of transactions subject to a quantitative approach should be further reduced. The EBA acknowledges that one adjustment in particular to the method proposed to identify non-complex transactions with only one material risk driver would lighten the overall burden of the method without compromising its effectiveness. Therefore, the EBA decided to explicitly consider cross-currency swaps under the scope of Article 1. In addition, the EBA provided clarification on the treatment of discounting for the purpose of the same article.

In addition, the EBA decided to maintain some proportionality within the quantitative part of the method, by allowing institutions exempted from FRTB computations to calculate SA-CCR add-ons (instead of FRTB sensitivities) for assessing the materiality of the risk drivers of a transaction.

With regard to the supervisory delta formula for interest rate options, the EBA, considering the feedback received, was able to fine-tune the methodology for determining the λ shift. In particular, the following elements were specified: the level of application of the methodology (at transaction level), the threshold value (set to 0.1%) and the volatility parameter σ (set to 50%). The alternative methodology for identifying the λ shift (i.e. use of market convention) has been discarded, given the scarce support provided by respondents.

Summary of responses to the consultation and the EBA's analysis

Comments	Summary of responses received	EBA analysis	Amendments to the proposals
General comments			
General comments related to the mapping of derivative transactions to risk categories	Several respondents state that the RTS should minimise the scope of transactions subject to a quantitative approach (Article 3). One respondent asks for clarification that, under Approach 1 for mapping (Article 1), discounting is disregarded as a potential risk driver. Some respondents state that cross-currency swaps should be clearly covered under the qualitative approach (i.e. under Article 1). The reason is that those products are not complex and the only material risk driver is FX.	The EBA notes that the envisaged purpose of the mapping methodology in the RTS is to minimise the operational burden by both extending the scope of the quantitative approach and always providing the possibility of choosing a simple fallback approach. The background section of the CP specified that the discounting rate is not a risk driver under the qualitative approach. This has now been also restated in a recital. All respondents that mentioned the cross-currency swaps issue are of the view that the product should be allocated only to the FX category. The feedback from the DP was more mixed on the issue.	Additional clarification on the treatment of specific instruments such as cross-currency swaps and on discounting has been provided.
General comments related to the supervisory delta formula for interest rate options	One respondent proposes allowing institutions to use internally generated delta using models that are used for pricing and risk generation in order to solve the negative interest rate issue. It would be also useful in cases where the Black-Scholes deltas do not work for some specific products (correlation products, American options, etc).	The proposal of an internally generated delta is not in line with Basel and with the EBA legal mandate included in CRR2.	No amendment needed.

Responses to questions in Consultation Paper EBA/CP/2019/03

Question 1. Which one of the options do you think is more appropriate (Option 1a, Y%=50% and Z%=25% or Option 1b: Y%=60% and Z%=30%)? Please provide the rationale for the chosen option.	Some respondents support Option 1b. In addition, a number of respondents propose allowing institutions to choose between the two options. Two respondents specify that institutions should apply a chosen option consistently across the whole portfolio and keep it constant over a certain period.	Although there is no clear-cut majority, many respondents express a preference for Option 1b.	Option 1b in the CP has been kept.
Question 2. What are your views about the general quantitative approach methodology, which hinges on FRTB SA sensitivities? Please provide examples of cases where computing FRTB SA sensitivities might raise some issues.	The majority of respondents express some degree of concern about the approach based on the FRTB sensitivities because they deem it to be too complex and burdensome, considering that it will be applied only on a small portion of the derivative portfolio (with more than one risk driver). Several respondents state that all the institutions should be given the possibility of using, instead of FRTB sensitivities, internally generated sensitivities and/or SA-CRR add-ons, at least for banking book instruments. Two respondents ask for the discretion to make the quantitative analysis at the portfolio level of similar transactions. One of them proposes an alternative approach. Two respondents propose that all transactions should be assigned to a single risk category, as the assignment of a transaction to more than one risk category would be too conservative. One respondent states that the alignment with the FRTB sensitivities in reasonable.	The EBA deems it unclear how internal sensitivities could lighten the burden for institutions in relation to banking book positions (with respect to FRTB sensitivities). The extension of the approach based on SA-CCR add-ons to banking book positions could create inconsistencies, given that identical positions would be treated differently depending on the allocation in the trading/banking book. Furthermore, it could be counterintuitive because netting sets are defined by counterparty. Therefore, there may be derivatives held in the banking book and derivatives held in the trading book belonging to the same netting set. The EBA expects that the large majority of derivatives held in the banking book are simple transactions. Therefore, they would be covered under the qualitative approach. The EBA considers that the mapping should be performed at transaction level and not at the portfolio level of similar transactions, because even for the same type of products the materiality of risk drivers can depend substantially on the specific features of the trade.	Additional clarification has been provided on the frequency of the assessment.

	Some respondents ask that the mapping be at a frequency that is operationally feasible. Some of them ask for the computation to be performed only at inception. One respondent suggests as an alternative performing the calculation at inception and also quarterly. Another suggests that institutions should be given the possibility of conducting the qualitative analysis on a subset of trades of similar transaction annually and then map all the following trades of that same type based on the previous outcome. One respondent asks for more examples of mapping, specifically for cross currency and basis swaps.	Many respondents ask for a frequency to be defines for the mapping that limits the operational burden. The EBA recognises that a frequency has not been set and that specifications in this regard could reduce the operational burden. Therefore, depending on the approach used to map transactions, a frequency was specified (mapping at inception date and/or quarterly).	
Question 3. Do you have any views on the appropriateness, for smaller institutions, of the alternative SA CCR add-ons approach (paragraph 2) in overcoming the issues (if any) raised by the general FRTB SA sensitivities approach?	Some respondents are in favour of the SA-CCR add-ons approach. Another, while welcoming the alternative approach (SA-CCR add-ons approach) also finds it burdensome (no alternative is suggested). Two respondents ask the EBA to clarify the level of application of the conditions set out in Article 3(2), which refers to Article 94(1) and Article 325a(1) of Regulation (EU) No 575/2013. In particular, they ask if the conditions can be applied to credit institutions that are subsidiaries of large banking groups.	Several respondents were in favour of the SA-CCR add-ons approach. Apart from one respondent, no particular concerns were raised related to the appropriateness of the SA-CCR add-ons methodology for small institutions. On the level of application of the conditions set in Article 3(2), the EBA is of the view that the relation with the level of application of Article 94(1) and Article 325a(1) of Regulation (EU) No 575/2013 is clear and no further clarification is needed.	Option 2 in the CP has been kept.
Question 4. Do you think the approach outlined here should be applied at currency level	Some respondents support Option 3b. One of them states that Option 3b is easier to implement and it limits distortion effect. On the contrary, Option 3a could lead to threshold effect. One asks the EBA to	A number of respondents support Option 3b (transaction level), which appears to be easier to implement and to have limited distortion effects. Limited support was provided to Option 3a, with the	Option 3b in the CP has been kept.

(Option 3a) or transaction level (Option 3b)?	clarify that transaction refers to 'deal' and not to 'type of instrument'. Two respondents support Option 3a. However, it was also mentioned that under Option 3a there could potentially be a threshold effect. Furthermore, both of the respondents suggest introducing a backstop at transaction level in case of deals with very negative strike. In particular, one suggests using a conservative delta equal to 1 in extreme cases. Another suggests decomposing λ in a global shift at currency level and a shift at transaction level that incorporates a backstop. $\lambda_{transaction} = \max(\lambda_{currency}; threshold - K_{transaction})$ $\lambda_{currency} = \max\left(threshold - \min_j(P_j); 0\right)$ One respondent suggests that both options should be maintained.	main argument in favour of this option being potential consistency between jurisdictions.	
Question 5. Which one of the three options (Option 4a: 1 bp, Option 4b: 0.1% or Option 4c: 1%) do you think is more appropriate as a threshold? Please provide the rationale for the chosen option.	Two respondents support Option 4a. Two respondents support Option 4c. One respondent supports Option 4b. Several respondents suggest keeping the discussion open until an assessment to fully understand the impact of the suggested threshold options has been implemented. One of them suggests keeping all options in the RTS, while stating that, to avoid cherry picking, the	There is no clear-cut majority on the preferred option. The views are split between Options 4a and 4c. Considering that no clear preference was expressed, the EBA decided to retain the intermediate solution in the light of potential advantages and drawbacks of more extreme solutions.	Option 4b in the CP has been kept.

	choice of the option within each institution should be constant.		
Question 6. Please provide examples of cases where the possibility to set the shift λ according to the prevalent market conditions (Option 5) might: - provide some benefits - raise some concerns	Some respondents either are against using λ according to market conditions or raise concerns about it. One respondent mentions operational concerns with the case of a quoted value of λ being below the strike of an entered trade. One respondent favours λ according to market conditions because it is deemed practical and simple.	The majority of the respondents do not see benefits in using the λ based on market convention.	The possibility of having λ based on market convention (Option 5 in the CP) has been removed.
Question 7. Do you consider necessary an adjustment to the supervisory volatility parameter σ as defined in Article 5? In the case an adjustment is considered necessary, how should it be carried out?	Several respondents think that an adjustment to the supervisory volatility parameter is unnecessary. One of them supports no adjustment, for simplicity, but mentions that it is important to retain a low threshold (1 bp) in Question 5 to limit the distortions. Two respondents propose a specific adjustment to the supervisory volatility: $\sigma' = (fwd+\lambda)/(fwd+\lambda') * \sigma$ where *fwd* is the forward rate and λ changes to λ'. One of the two suggests that institutions should be free to apply the fixed 50% supervisory volatility or to adjust the parameter as proposed.	The majority of the respondents do not support the need of any adjustment to the supervisory volatility.	No amendment needed.
Question 8. Do you think the specified method for determining whether a transaction is a long or short	Two respondents support the methodology in Article 6.	There is a general support for the proposed methodologies, especially for the qualitative approach.	In Article 6(b), the sentence 'where institutions apply the approach set out in

position in a material risk driver is adequate? If not, please provide an explanation.	Four respondents suggest allowing all institutions to use the qualitative approach. They suggest the removal of the following part of Article 6(b) of the draft delegated regulation: 'where institutions apply the approach set out in Article 3(1)(a)'. One respondent finds it useful to use sensitivities for determining the direction of a position only in cases where sensitivities are used for mapping.	Many respondents find that the condition for using the qualitative approach is too restrictive, since it is limited only to cases in which the institution uses the fallback approach for mapping.	Article 3(1)(a)' has been removed.