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Discussion Paper

Implementation in the European Union of the revised market risk and counterparty credit risk frameworks

Contents

Abbreviations

BB	Banking book, also referred to as non-Trading Book
BCBS	Basel Committee on Banking Supervision
BIS	Bank for International Settlements
CA	Competent Authority
CCR	Counterparty credit risk
CDS	Credit default swap
CEM	Current Exposure Method
CIU	Collective investment undertaking
COREP	Common Reporting standards (Commission Implementing Regulation (EU) No 680/2014 of 16 April 2014 laying down implementing technical standards with regard to supervisory reporting of institutions according to Regulation (EU) No 575/2013 of the European Parliament and of the Council (Text with EEA relevance)
CRD IV	Capital Requirements Directive (Directive 2013/36/EU)
CRM	Comprehensive risk measure
CRR	Capital Requirements Regulation (Regulation (EU) No 575/2013)
CRR2	European Commission legislative proposal 2016/0360 issued on 23 November 2016 to amend the Capital Requirements Regulation (CRR)
CTP	Correlation trading portfolio
DP	Discussion Paper
DRC	Default risk charge
EAD	Exposure at default
ES	Expected Shortfall
FRTB	Fundamental review of the trading book
FX	Foreign exchange

GLs	Guidelines
IMA	Internal model approach
IR	Interest rate
IRB	Internal ratings based approach
IRC	Incremental risk charge
LGD	Loss given default
LH	Liquidity horizon
NII	Net interest income
NMRF	Non-modellable risk factor
OTC	Over the counter
P&L	Profit and loss
PD	Probability of default
PFE	Potential future exposure
PLA	Profit and loss attribution
RC	Replacement cost
RRAO	Residual risk add-on
RTS	Regulatory Technical Standards
RWA	Risk-weighted asset(s)
SA	Standardised approach
SA-CCR	Standardised approach for counterparty credit risk
SBM	Sensitivities-based Method
SSRM	Stress scenario risk measure
SVaR	Stressed Value at Risk
TB	Trading book
VA	Valuation adjustment
VaR	Value at Risk

1. Responding to this Discussion Paper

The EBA invites comments on all proposals put forward in this paper and in particular on the specific questions stated in the boxes below (and in Annex 5 of this paper).

Comments are most helpful if they:

- respond to the question stated;
- indicate the specific point to which a comment relates;
- contain a clear rationale;
- provide evidence to support the view expressed;
- describe any alternatives the EBA should consider; and
- provide, where possible, data for a cost-benefit analysis.

Submission of responses

To submit your comments, click on the 'send your comments' button on the consultation page by 15 March 2018. Please note that comments submitted after this deadline, or submitted via other means, may not be processed.

Publication of responses

Please clearly indicate in the consultation form whether you wish your comments to be disclosed or to be treated as confidential. A confidential response may be requested from us in accordance with the EBA's rules on public access to documents. We may consult you if we receive such a request. Any decision we make not to disclose the response is reviewable by the EBA's Board of Appeal and the European Ombudsman.

Data protection

The protection of individuals with regard to the processing of personal data by the EBA is based on Regulation (EC) No 45/2001 of the European Parliament and of the Council of 18 December 2000 as implemented by the EBA in its implementing rules adopted by its Management Board. Further information on data protection can be found under the Legal notice section of the EBA website.

Disclaimer

The views expressed in this discussion paper are preliminary and will not bind the EBA in any way in the future development of the draft binding technical standards. They are aimed at eliciting discussion and gathering the stakeholders' opinions at an early stage of the process.

2. Executive Summary

Reasons for publication

1.The incorporation into EU law of the revised international standards for counterparty credit risk and market risk (SA-CCR and FRTB) included in the CRR2 legislative proposal[1] implements major post-crisis amendments to these aspects of the capital requirement framework for credit institutions.

2.Without pre-empting the outcome of ongoing legislative discussions with respect to the overall CRR2 package, the EBA sees significant merit in raising at an early stage issues stemming from the implementation of the revisions of the framework in order to highlight high-priority issues and thus inform the ongoing regulatory process.

3.In this Discussion Paper (DP), the EBA introduces some of the most important implementation issues in the area of counterparty credit risk and market risk. The DP intends to provide preliminary views on how those implementation issues could be addressed and, at the same time, give stakeholders the opportunity to provide early input. A full, formal consultation process on proposed RTS will be undertaken following conclusion of the CRR2 negotiations and confirmation of EBA mandates.

Content

4.This DP focuses on those implementation issues that are expected to have a significant impact on banks implementing the SA-CCR and/or the FRTB frameworks, due to the need to introduce changes to infrastructures, IT systems, data management, pricing models or approximating techniques. In addition, Section 4.9 requests stakeholders' views on additional implementation issues that they may have identified and have not been included in the scope of the DP.

5.For each of the eight implementation issues identified below, the DP provides some background and rationale, and presents the outcome of preliminary discussions within the EBA, which includes discussion of options or proposed ways forward, as well as questions for stakeholders.

SA-CCR – Mapping of derivative transactions to risk categories

6.One of the key steps for computing the counterparty credit risk own funds requirement under the SA-CCR is the mapping of each derivative transaction to one or more than one of the five

[1] On 23 November 2016 the Commission published a comprehensive package of legislative proposals to further strengthen the resilience of EU banks. The webpage containing information related to the proposals is available under here.

risk categories, as set out in Article 277[2] of the CRR2 proposal. This mapping is done on the basis of the primary risk driver of each derivative transaction.

7. The EBA is proposing a three-step approach for the designation of a derivative transaction to a risk category:

- **First step: a qualitative approach** would identify derivative transactions that have clearly one primary risk driver, thus easily being mapped to the corresponding risk category; this step would be based on a prescribed list of product types and is meant to provide proportionality in the assessment, i.e. the mapping of 'simple' derivative transactions should be straightforward and not require the computation (and comparison) of sensitivities.

- **Second step: a qualitative and quantitative approach** would require a more detailed assessment of those derivative transactions that are not immediately allocated through the first step. First, institutions would be required to qualitatively identify all the risk drivers of the derivative transaction. Then, institutions would be required to perform an assessment of materiality in order to identify material risk drivers. Quantitative inputs would be required to be used, typically sensitivities and potentially volatility. This assessment would lead to the allocation to one or more than one risk category, reflecting the material risk driver(s).

- **Third step: a fallback approach**, in case the assessment in the second step does not allow to determine which of the risk drivers are material, would simply allocate the derivative transaction to all the risk categories corresponding to all the risk drivers (material or not) of the transaction.

8. In addition, stakeholders' feedback is requested on the appropriateness of introducing a cap limiting the allocation of a single derivative transaction to a maximum of three or four risk categories.

SA-CCR – Corrections to supervisory delta

9. In the current context of negative rates, the incompatibility of negative rates with the supervisory delta formula established in the SA-CCR framework needs to be addressed, as proposed under Article 279a of the CRR2 proposal.

10. Considering that the supervisory delta formula is already provided for call and put options, the DP is focusing on adjustments that allow situations of negative interest rates to be reflected without fundamentally changing the formula.

[2] For each of the eight implementation issues discussed in the DP, the text of the draft mandates proposed in the CRR2 legislative proposal is included in Annex 1.

11. The EBA is proposing to allow the use of a λ shift in the context of the Black-Scholes formula to move the interest rate into positive territory. Stakeholders' feedback is particularly sought on how the λ parameter should be set.

FRTB – Trading book boundary

12. One of the main objectives of the implementation of the new minimum capital requirements for market risk is a revised boundary between the trading book and non-trading book. The establishment of a more objective boundary intends to reduce incentives for arbitrage between the regulatory non-trading and trading books.

13. The new boundary requirements still allow, in exceptional circumstances, the reclassification of instruments between the two books.

14. The DP provides a brief analysis of the implications that the changes introduced in the boundary definition might have and it also analyses the potential conflicts between the criteria established in the new boundary definition. The DP also considers the cases where a change in the features of the instrument justifies (or even requires) a change in classification, and discusses other external circumstances that may justify a change in the categorisation, as proposed under Article 104a of the CRR2 proposal.

FRTB – Treatment of non-TB positions subject to FX or commodity risk

15. To be fully operationalised, the treatment of banking book (BB) positions subject to FX and commodity risk would require that a number of technical issues currently not fully explored in the Basel standards be addressed. In particular, the mechanics of the P&L attribution might need adaptation/clarification in case those positions are not treated separately on specific desks, but dealt with on desks managing trading book positions as well. If institutions create 'notional trading desks', it is not clear whether or not all the requirements established for the 'trading desks' would also be applicable to these 'notional desks', which are not defined or specified in any way in the CRR2 proposal.

16. The DP aims to explore these issues, as proposed under Article 325 of the CRR2 proposal, and seeks industry feedback on which requirements should apply to those positions.

FRTB – Residual risk add-on

17. The residual risk add-on (RRAO) aims at capitalising risks stemming from 'exotic underlyings' or 'other residual risks' that are not covered in the Sensitivity-based Method (SBM) or default risk charge (DRC).

18. The DP proposes to clarify which instruments are subject to the RRAO, as proposed in Article 325v of the CRR2 proposal, based on a combination of general definitions of exotic underlying and other residual risks, a list of instruments that would be considered as bearing residual risks and, where needed, a list of exclusions from the RRAO.

FRTB – IMA liquidity horizons

19. The assignment of appropriate liquidity horizons is a decisive step under the internal model approach (IMA). In order to ensure harmonised application of the revised market risk standards, it is important to specify, as proposed under Article 325be of the CRR2 proposal, how liquidity horizons shall be determined under the IMA, including (i) a 'mapping' of TB positions to risk factors, (ii) categorisation of liquid currencies for the Interest Rate category, (iii) categorisation of liquid currency pairs for the FX category and (iv) definition of large and small capitalisation for equities.

20. Regarding the 'mapping' of risk factors, the DP is questioning the added value of an additional subcategorisation of the broad risk factors reflected in Table 2 of Article 325be(7) of the CRR2 proposal, but acknowledges that certain risk factors require further guidance for an appropriate mapping.

21. The most liquid currencies for the Interest Rate risk category were specified in the FRTB standards based on the 2013 triennial BIS survey on OTC interest rate derivatives. Specifically, those currencies for which net OTC interest rate derivative contracts with an average daily turnover of more than USD 30 billion were observed were classified as 'liquid' in the FRTB standards. Based on the same survey, the most liquid currency pairs were also defined.

22. The DP suggests using the same data from the triennial survey to select the most liquid currencies and currency pairs but questions the level of the threshold to be used in the context of EU markets and the frequency of this assessment, which is not indicated in the FRTB standards. The DP also discusses the possibility of allowing the 'triangulation' of liquid currency pairs to form additional liquid currency pairs.

23. Finally, as regards the distinction between large and small capitalisation for equities, the EBA has conducted some empirical analysis to assess whether or not the threshold of USD 2 billion set out in the FRTB standards is appropriate for EU markets. The DP suggests keeping an absolute threshold to distinguish between large and small capitalisation but potentially opens the door to also using relevant national indexes to make this distinction. Another option would be to leverage on the work conducted by ESMA in this area.

FRTB – Backtesting and P&L attribution requirements

24. Under the revised framework, backtesting will carry on relying on actual and hypothetical P&L, while the new P&L attribution (PLA) test, aimed at assessing the completeness of risk factor coverage and the accuracy of valuation functions used as part of risk models, will be based on the comparison of the hypothetical P&L and the risk-theoretical P&L.

25. Clarifying the definition of those three different P&Ls is a prerequisite for a smooth implementation of the new IMA under the revised market risk framework. Therefore, for each one of these three P&L calculations, the DP discusses, as proposed in Article 325bh of the CRR2 proposal, which elements should be included or excluded.

26. The EBA is aware that the new PLA requirements are one of the most pressing issues for the industry, and possibly the biggest hurdle to make the IMA workable for banks. However, due to still ongoing discussions on the detailed specification of the PLA test requirements, this DP does not discuss for the time being the exact nature of the test that could be performed, or the extraordinary circumstances under which an institution may be permitted to carry on using its internal models despite having issues with backtesting or PLA requirements.

FRTB – Non-modellable risk factor stress scenario risk measure

27. Under the IMA, when a risk factor has been identified as 'non-modellable' it has to be capitalised, outside the Expected Shortfall (ES) measure, under a stress scenario which the FRTB standards do not specify in detail except that it should be calibrated to be at least as prudent as the expected shortfall calibration used for modelled risks (i.e. a loss calibrated to a 97.5% confidence threshold over a period of extreme stress for the given risk factor). The CRR2 proposal is more prescriptive in this area and requires the EBA under Article 325bl to determine how to calculate 'extreme scenario of future shock' and apply it to the non-modellable risk factors (NMRFs) to form the stress scenario.

28. The DP discusses a prescribed methodology to calculate this extreme scenario of future shock, which should always be seen as a minimum requirement. Institutions may opt to calculate a more severe shock to their portfolio that requires holding additional capital, where they believe the prescribed methodology is not conservative enough.

29. The methodology provides a conservative proxy of a 97.5% ES calculation (it is calibrated so that, theoretically, in 90% of the cases it would not underestimate the true ES value). The approach would be more conservative in cases where less data points are observed, to compensate for a potentially higher estimation error.

30. In addition, it appears necessary to devise a fallback approach in case an institution cannot determine an extreme scenario of future shock, or if competent authorities are not satisfied with the extreme scenario of future shock determined by the institution.

31. The DP is exploring two possible options for the fallback approach:

    i. A 'maximum loss' approach, consistent with the fallback approach currently in the Basel FRTB rules text. This approach may be, in principle, conservative, but the concept of a maximum loss is not well defined for a variety of instruments.

    ii. The fallback approach prescribes a specific stress scenario, based on the risk weight of the SBA, that institutions should apply to their NMRFs to calculate the stress scenario risk measure (SSRM).

Next steps

32. The amendments to the CRR proposed in Commission proposal 2016/0360 (CRR2 proposal) published on 23 November 2016 constitute a European Commission proposal, which is currently being discussed by the Council of the European Union and the European Parliament as part of the normal legislative procedure. This entails that the analyses and proposed approaches presented in this DP represent preliminary elements of discussion of identified implementation issues, which will need to be adjusted to reflect the final revised regulation, once it is adopted and published.

33. The EBA will review industry responses, and pending adoption by Council and Parliament of a final revised CRR2 regulation, the EBA will prepare consultative papers on the various mandates included in the final CRR2 text.

34. Upon publication of the final CRR2 text, the EBA will:

- finalise and publish the draft RTS/GLs for consultation;
- consult with the industry (e.g. public hearings) and review industry responses to the various consultations;
- finalise and submit draft RTS to the European Commission for adoption.

35. Figure 1 below proposes a prioritisation of regulatory products, based on the draft mandates included in the CRR2 proposal. Once the CRR2 is adopted, priority will be given to the production of those RTS that are deemed essential for the implementation of the new frameworks: this includes SA-CRR mandates, as the SA-CRR will come into force shortly after publication of the CRR2, and key regulatory products on the new FRTB IMA, i.e. technical standards on backtesting and P&L attribution, as well as on NMRFs, which are essential for banks to start implementing the IMA.

36. Then, in phase 2, priority will be given to those mandates that are key for a harmonised implementation of the revised framework in the EU, without being essential for banks to finalise the implementation the revised framework. This includes, for example, the discussions on revisions to the RTS on assessment methodology.

37. Remaining implementation-linked, regulatory products of lower priority will be developed in phase 3, while regulatory products whose substance will be derived from the monitoring of the application of the revised frameworks will be developed in phase 4.

38. Finally, in line in line with recommendation No 4 of the EBA Response to the European Commission's Calls for Advice[3], the EBA stands ready to produce more regulatory products in

[3] EBA Recommendation 4 for a higher reliance on delegated legislation in the implementation of the SA-CCR and the FRTB frameworks – European Commission's Calls for Advice on standardised approach for counterparty credit risk and own funds requirements for market risk, published on 3 November 2016 and available under here.

phase 1, should the co-legislators decide that some parts of the revised frameworks are not stable enough to be included at this stage in the level 1 text directly and, instead, mandate the EBA to reflect them through RTS.

Figure 1: Prioritisation of regulatory products related to the revised frameworks (CRR2 proposal)

Prioritisation	Regulatory products
Phase 1: Main SA-CCR regulatory products and FRTB IMA regulatory products implementing essential parts of the revised regulation for the internal model approach	SA-CCR – mapping of derivative transactions to risk categories SA-CCR – corrections to supervisory delta FRTB – backtesting and P&L attribution requirements FRTB – NMRF stress scenario risk measure FRTB – IMA liquidity horizons FRTB – treatment of non-TB positions subject to FX or commodity risk
Phase 2: FRTB IMA regulatory products including assessment methodology, model changes and extraordinary circumstances, and main FRTB SA regulatory products	FRTB – extraordinary circumstances allowing disregarding of backtesting and P&L attribution FRTB – revisions to RTS on assessment methodology and model changes, including PDs and LGDs under default risk charge FRTB – residual risk add-on
Phase 3: Remaining implementation-linked regulatory products	FRTB – risk weights for positions in collective investment undertakings (CIUs) FRTB – emerging markets and advanced economies FRTB – gross jump to default amounts
Phase 4: Regulatory products whose substance will be derived from the monitoring of the application of the revised frameworks	FRTB – trading book boundary FRTB – report on appropriateness of the level of own funds requirements for market risks FRTB – report on certain aspects of own funds requirements for market risks

Question to stakeholders:

1. Do you have views on the proposed prioritisation of work?

3. Background and rationale

39. On 23 November 2016, the Commission published[4] a comprehensive package of legislative proposals to further strengthen the resilience of EU banks. The regulatory package includes the implementation of two new international frameworks proposed by the Basel Committee on Banking Supervision (BCBS): (i) an enhanced standardised framework for counterparty credit risk (CCR), i.e. the SA-CCR[5], and (ii) new minimum capital requirements for market risk based on the fundamental review of the trading book (FRTB)[6].

40. Both frameworks aim to address the regulatory flaws that were exposed by the global financial crisis, by, among other things, increasing the risk sensitivity of the risk frameworks; realigning the risk incentives in some key areas, such as market liquidity or the use of proxies under the FRTB; providing credible fallback alternatives to internal models or allowing a better recognition of risk mitigation techniques, such as margining under the SA-CCR.

41. The CRR2 proposal in these two areas follows the publication by the EBA of a Report in November 2016, which provided an assessment of the envisaged qualitative and quantitative impacts of these two frameworks, on both large and small firms. The legislative proposal also builds on some EBA recommendations included in the report. In particular, in light of the inevitable burden that the implementation of the new frameworks will entail, the EBA recommended the introduction of some key proportionality measures, such as increasing the threshold value for the derogation of small trading book business and introducing a similar threshold for small derivative businesses, below which institutions are allowed to use simpler approaches to compute CCR own funds requirements.

42. The EBA also recommended that banks outside the traditional scope of the Basel standards should be allowed to carry on applying the current approaches, subject to appropriate recalibration. Finally, the EBA recommended including more granularity in COREP to provide a better overview of institutions' CCR exposures and make available information needed to monitor the computation of the different proportionality thresholds included in legislation.

43. The incorporation into EU law of the revised standards represents – given the novelty and the technicality of the frameworks – a sizable collective challenge. In this respect, it is considered diligent to raise issues stemming from the implementation of the revisions at this stage in order to highlight high-priority issues and thus inform the further regulatory process. In particular, this is considered of particular relevance given the intention in the EU to implement the new regulatory frameworks on time, i.e. as soon as originally planned in Basel.

[4] Information on the Commission proposal to review the CRD IV is available under here, while the Commission proposal to review the CRR is available under here.

[5] The SA-CCR standards are available under here.

[6] The FRTB standards are available under here.

44. Therefore, the EBA proposes in this comprehensive discussion paper (DP) a preliminary discussion on some implementation issues that the EBA identified as the most significant. The DP intends to provide preliminary views on possible ways forward and, at the same time, give stakeholders the opportunity to provide their early input.

Standardised Approach for Counterparty Credit Risk (SA-CCR)

45. In March 2014, the Basel Committee published an updated Standardised Approach (SA) for measuring exposure value for counterparty credit risk.

46. The main objectives of the SA-CCR are to:

- introduce a single standardised approach replacing both the Current Exposure Method (CEM), the most widely used methodology developed in 1995, and the Standardised Method, introduced in 2005;
- recalibrate CCR supervisory add-ons in order to reflect the levels of volatilities observed in most recent stress periods;
- introduce a more risk-sensitive standardised approach, which is, in particular, appropriate for use in the computation of CCPs' hypothetical capital, differentiating between margined and un-margined trades and including better recognition of netting benefits;
- avoid undue complexity and limit the discretion left to banks and competent authorities by minimising the use of banks' internal estimates.

Fundamental Review of the Trading Book (FRTB)

47. Weaknesses in the capital framework for trading activities resulted in undercapitalised trading book exposures prior to the 2007-08 period of the financial crisis. To deal with the most pressing deficiencies, the Basel Committee introduced a set of revisions to the market risk framework. The so-called 'Basel 2.5' package of reforms was incorporated into EU law through CRD III and is currently included in the CRR.

48. While appropriate at the time, the package was considered only a 'quick fix' and a number of structural flaws in the market risk framework remained unaddressed, notably:

- The specification of instruments included in the trading book was not fully addressed. As a consequence, capital arbitrage between regulatory books remained possible.
- Several weaknesses with the VaR-based framework remained, such as (i) the incentives to take on tail risk, (ii) the inability to adequately capture credit risk inherent in trading exposures, (iii) too generous recognition of the risk-reducing effects of hedging and diversification, (iv) the inability to capture the risk of market illiquidity and (v) the lack of a credible alternative for any flawed internal model.

49. In response, the BCBS undertook the FRTB to improve the overall design and coherence of the capital standard for market risk. The main objectives of the FRTB are to:

- Enhance the trading book/banking book boundary: internal asset allocation and transfers between books need to meet stringent rules in order to limit regulatory arbitrage.

- Improve the management of trading book positions, as well as the granularity of IMA approval (by requiring approval at desk level instead of, as currently, only bank-wide level), via the requirement to establish trading desks, where a trading desk is a group of traders or trading accounts that implements a well-defined business strategy operating within a clear risk management structure.

- Introduce a more risk-sensitive standardised approach: an enhanced and globally consistent Sensitivity-Based Approach (SBA) based on price sensitivities, which is developed as a credible alternative to approved internal models for parts of the trading book (at the trading desk level).

- Increase the supervisory oversight and scrutiny over internal models: greater focus on tail risk introducing a single expected shortfall model and default risk charge, thus substituting/replacing a number of internal model components (VaR[7], SVaR, IRC, CRM). The expected shortfall in particular removes the reliance on the 99th percentile, on which the VaR model is based, and instead uses the average value of the tail from the 97.5th percentile, which is intended to introduce more stability in the requirements. IMA approval will also be subject to stringent backtesting and PLA test requirements at desk level;

- Additionally, market liquidity risk, as well as the excessive degree of diversification benefit, is addressed by introducing different liquidity horizons across risk factors and limited aggregation of exposures.

[7] The VaR will still be used for backtesting purposes.

4. Discussion

4.1 SA-CCR – Mapping of derivative transactions to risk categories

4.1.1 Background and rationale

50. The new Standardised Approach for Counterparty Credit Risk (SA-CCR) was adopted by the BCBS in March 2014 and is intended to replace all non-internal model approaches (i.e. the Current Exposure Method (CEM) and the Standardised Method) for measuring the exposure at default (EAD) for counterparty credit risk in the Basel framework.

51. 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 components: 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.

52. The Commission proposal consistently introduces in Article 277(6) of the CRR2 proposal the five risk categories proposed in the Basel standards: interest rate risk, foreign exchange risk, credit risk, equity risk and commodity risk. In addition, it proposes a sixth risk category for 'other risks'.

53. 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 five risk categories which are set out in proposed Article 277 of the CRR2 proposal. This mapping is done on the basis of the primary risk driver of each derivative transaction.

54. Although most derivatives have one obvious risk driver (e.g. interest rates for interest rates swaps (IRS), foreign exchange (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).

55. 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. Therefore, the CRR2 proposal suggests that the EBA should devise a methodology for the allocation of derivative transactions (trading book and non-trading book derivative

transactions) to one or more than one risk category, depending on either the primary risk driver or the material/most material risk driver(s).

4.1.2 Preliminary discussion and proposal

56. 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 Article 277(2) of the CRR2 proposal. In those cases, the single risk category could be identified directly through categorisation of the derivative transaction based on a list of plain vanilla products that are driven by a single risk driver or several risk drivers referring unambiguously to a single risk category.

57. In this context, it should be noted that 'complex product' does not necessarily mean complex allocation to risk categories. Some bespoke structured products might be sophisticated but still be related to a single asset class. Therefore, in addition to a list of simple derivatives, a list of criteria to be fulfilled for a derivative to be considered as having a clearly identifiable single risk driver could be developed. Such methodology would be similar to the 'presumption list' used in defining the trading book boundary, with a list providing ex ante allocation of specific instruments and an ex post generic method to be applied for all other transactions.

58. In the event that a primary risk driver cannot be clearly identified, an ex post identification methodology will be triggered to determine the material risk drivers of the transaction. This methodology can 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. Such a method would probably be based on sensitivities. However, it should be noted that sensitivities may not be available for all transactions.

59. In any case, a fallback approach should be available for cases where the identification of the most material risk drivers is not easy.

60. As a result, it is envisaged to specify an allocation process structured along the three following steps:

- First, where the allocation is simple, refer to a list of criteria and/or a list of instruments.
- Then, where allocation is not simple, assess the derivative transaction in more detail based on a quantitative approach (sensitivities), to determine which risk drivers are material, including the most material of these risk drivers.
- Finally, if the assessment in the second step does not make it possible to conclude which of the risk drivers are the material risk drivers, including the most material of these risk drivers, the fallback treatment would consist in the allocation of the derivative transaction

to each of the risk categories corresponding to all its risk drivers. In order to limit the risk categories to which a single derivative transaction can be allocated, a cap could be introduced.

Step 1

61. For those derivatives whose features allow the relevant risk category to be easily identified, it could be possible to envisage a quasi-automatic approach, based on a list that matches the risk category, the primary risk driver and the transaction type. This would allow each transaction to be mapped to the relevant risk category without triggering any methodology but simply by assessing the features of the transaction.

62. Such a qualitative approach would at the same time:

- provide (ex-ante) clarity for banks, given that every bank would know the treatment applicable to instruments in the list;
- limit the overall operational cost of the use of the SA-CCR.

63. The primary risk driver should 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 the CRR2 proposal.

64. In Figure 2 below is outlined a proposed list of simple derivatives for the simplicity assessment:

Figure 2: Proposed list for the mapping of instruments to the risk category

Risk category	Primary risk driver	Examples and relevant conditions
Interest rate	Interest rate curve in the respective currency	IR swap; IR future; floating rate agreement; IF underlyings are in the same currency as the settlement currency AND options on such instruments whose payoff depends only on interest rates or inflation
Foreign exchange	Foreign exchange rate of the respective currency pair	FX forward; FX future; FX swap; AND options on such instruments whose payoff depends only on FX rates
Equity	Equity prices and payouts	Equity future; equity index future; equity forward; equity swap; IF underlyings are in the same currency as the settlement currency AND options on such instruments whose payoff depends only on equity prices and dividends

Risk category	Primary risk driver	Examples and relevant conditions
Credit	Reference entity	CDS single name or index IF underlyings are in the same currency as the settlement currency AND options on such instruments whose payoff depends only on credit quality or spreads
Commodities	Commodity price with respect to the relevant commodity type (i.e. energy, metals, agricultural goods, climatic conditions and other commodities)	Commodity future; commodity forward; IF underlyings are in the same currency as the settlement currency AND options on such instruments whose payoff depends only on commodities

Questions to stakeholders:

2. Would the proposed allocation for the products in the list be appropriate in all cases? If not, please provide an explanation.

3. Would you include in the above list other derivative transactions for which there would be an unambiguous primary risk driver? In particular, do you consider that bond forwards on investment-grade bonds or cross-currency swaps should be included? Please provide some justification for your answer.

4. If a list of criteria is to be developed instead of (or combined with) a list of derivatives, what could such criteria be? Please use the table below in order to give examples of allocation based on simplicity-related criteria.

Table to be used for the purposes of answering question 3:

Trade	Instrument description	Risk class allocation	Rationale for the allocation
Example 1	Brief overview of the instrument and main contractual terms	Allocation proposed by the bank	Explanation for the proposed allocation
Example 2	…	…	…

Step 2

65. Transactions that have not been identified under step 1 would be 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.

66. This requires:

- first, the qualitative 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.

67. In other words, after identification of all the risk drivers of the derivative transaction and assessment of the material ones, institutions would 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 per 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 the CRR2 proposal.

68. A possible way to determine the material risk drivers quantitatively would be to compare all sensitivities across all risk categories, and to take the risk driver associated with the highest sensitivity in absolute terms. However, considering the fact that there might be a lot of sensitivities in each risk category, by looking at only the highest one we could miss the fact that there are many other sensitivities in another risk class that are just below in absolute terms.

69. Therefore, the identification of the material risk driver could equally well be done with the methodology that will be used to assess materiality of other risk drivers, which will only make the assessments consistent. Below are two proposals (Options 1 and 2) on possible methodologies that could be used to do so through the analysis of sensitivities.

70. Besides sensitivities, the volatility of underlying instruments, explicitly mentioned as a potential criterion in the BCBS Standard, could be accounted for in determining materiality of multiple risk drivers. In particular, it is not necessarily the risk category associated with the highest sensitivity that would lead to the highest exposure under the SA-CCR calculation. Options 3 and 4 below account for (expected) volatilities as well as sensitivities.

Option 1

71. Considering that the primary risk driver will always be determined considering the value of the instruments' sensitivity to it, it could be reasonable to determine the materiality of other risk

drivers by comparing the relative relevance of other sensitivities with that of the primary risk driver. One simple solution could be to determine a threshold above which 'any risk driver whose associated sensitivity is higher than X% of the sensitivity of the main risk driver is deemed material'. In that case, it should be noted that there is no mechanical limitation to the number of material risk drivers.

Option 2

72. Another possibility using only sensitivity values is to assess the relative contribution of each. The idea would be to develop a multistep approach whereby we first compute all the sensitivities of an instrument, then we rank them in terms of relative relevance and then we select only those that are deemed to be material (i.e. most relevant to the total). Formally, the following steps are envisaged:

1) Compute all the *n* sensitivities $(s_i)_{i=1}^{n}$ and sum their absolute value to obtain S_n.

2) Rank all *n* sensitivities s_i ($1 \le i \le n$), from the greatest to the smallest in absolute terms, to obtain a monotonic decreasing sequence of entries a_i ($1 \le i \le$ n), where $a_1 = max(|s_i|, \dots, |s_n|)$ i.e. the greatest absolute term, and where a_2, is the second greatest term and so on.

3) Compute the ratio between the sensitivity with the greatest absolute value, a_1, and S_n, i.e. $\frac{a_1}{S_n}$:

   3a. if the ratio $\frac{a_1}{S_n} \geq Y\%$, there is only one material risk driver associated with a_1;

   3b. if the ratio $\frac{a_1}{S_n} < Y\%$, proceed further to step 4.

4) Go down to the second highest absolute a_2 value and compute the ratio $\frac{(a_1+a_2)}{S_n}$.

   4a. If the ratio $\frac{(a_1+a_2)}{S_n} \geq Y\%$ and if a_1 and a_2 belong to the same risk category (for instance two tenors of an IR curve), then allocate the trade to this risk category.

   4b. If the ratio $\frac{(a_1+a_2)}{S_n} \geq Y\%$ and if a_1 and a_2 belong to two different risk categories, then allocate the trade to the two risk categories.

   4c. If the ratio $\frac{(a_1+a_2)}{S_n} < Y\%$, continue further down the list computed under 2) until reaching the *l*th sensitivity where *l* $(2 < l \le n)$ is the minimum integer such that $\frac{\sum_{k=1}^{l} a_k}{S} \geq Y\%$.

73. In that example again, there is no mechanical limitation to the number of material risk drivers, although a limitation could be introduced by setting a maximum number of steps, which stops

the multistep approach regardless of whether Y% is reached or not. The number of material risk drivers will depend on the calibration of Y; the higher Y is set, the higher the number of sensitivities that will be considered.

Option 3

74. A simple way to address the volatility issue is to use one of the methods set out in Options 1 and 2 on an indicator that includes both sensitivity and volatility. For instance, it could be argued that the FRTB SA risk weights are parameters supposed to capture the expected volatility of a kind of underlying. Therefore, we could use Option 1 or 2 based on *s**RW instead of *s* only.

75. Against this, one could argue that there are different backgrounds behind the FRTB and the SA-CCR, in particular the difference in liquidity horizons. That issue is, however, overcome by the fact that we need only a relative scale between risk categories, and not an absolute one. That is, we are interested not in the absolute value of *s*1*RW1 but in whether it is bigger or smaller than *s*2*RW2.

Option 4

76. A more advanced method could be to use the SA-CCR PFE. The idea would be to:

- calculate the PFE for all risk categories; and either
- assess the materiality of sensitivities to a risk class relatively, by comparing PFEs with the highest PFE (similarly to Option 1); or
- assess the materiality by considering the coverage of total PFE (similarly to Option 2).

77. If such a method were to be used to identify all material risk drivers, the determination of the most material one would need to be done by the same method for the sake of consistency.

Questions to stakeholders:

5. What are your views about the qualitative approach used as a starting point under step 2?

6. Which would be the most appropriate option for the quantitative approach? Would you recommend another option?

7. What values would be reasonable for the threshold(s) (X, Y, and their equivalents for Options 3 and 4) that determine the number of material risk drivers? Please provide rationales for proposed levels.

Step 3

78. As explained above, a fallback qualitative approach would be needed for cases where step 2 cannot be applied (for example where sensitivities are not available), is inappropriately applied (the institution's assessment of materiality is not considered adequate) or is considered too burdensome. This approach being by definition simplistic, it is expected to be more conservative than steps 1 and 2. That is, the presumption is that all identified risk drivers would be deemed material, thus triggering the mapping to the related risk categories.

Transactions allocated to more than two risk categories

79. The eventuality of two material risk drivers or more belonging to different risk categories raises the question of mapping a transaction to more than two risk categories. The industry has advocated for a possible slicing of products into different categories to avoid too punitive a treatment, but the SA-CCR, referring to the 'same position' being allocated to multiple risk categories (SA-CCR paragraph 152), is inconsistent with this proposal.

80. In order to limit the number of risk categories to which a single derivative transaction could be allocated, a cap could be introduced. Currently, a derivative transaction could in theory be allocated to up to six risk categories, which would lead to the computation of six separate PFE add-ons for the same transaction. It can be argued that both the CRR2 proposal and the Basel standards consider that, generally, a derivative transaction should be allocated to one risk category only, based on the primary risk driver (see Article 277(2) of the CRR2 proposal), and that the allocation to more than one risk category should happen only on an exceptional basis. This principle could be made explicit by the introduction of a cap, limiting the allocation of a derivative transaction to a maximum of three or four risk categories.

Questions to stakeholders:

8. Do you have any views on the appropriateness of devising a fallback approach? Can you identify any cases where reverting to the fallback approach is necessary?

9. Do you have any views on the appropriateness of a cap on the number of risk categories to which a single derivative transaction can be allocated? If yes, what value would you recommend for that cap (three or four)?

10. Do you have any further comment or consideration on the mandate under discussion?

4.2 SA-CCR – Corrections to supervisory delta

4.2.1 Background and rationale

81. In the SA-CCR, a supervisory delta adjustment is applied to the adjusted notional amounts in order to reflect the 'direction' of the transaction (i.e. long or short) and its non-linearity.

82. The definition of long or short position in the primary risk driver is relatively clear in Article 279a(2) of the CRR2 proposal and should be self-sufficient for a harmonised implementation of the regulation.

83. With regard to non-linearity, a formula of the supervisory delta is specified for call and put options in Article 279a of the CRR2 proposal:

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

84. One of the terms of the formula is the $\ln\frac{P}{K}$, i.e. the natural logarithm of the ratio between the spot or forward price of the underlying instrument of the option (*P*) and the strike price of the option (*K*). This formulation works where the ratio $\frac{P}{K}$ is strictly positive. However, there may be circumstances in which the ratio $\frac{P}{K}$ is zero or negative, typically a negative interest rates environment, so the term $\ln\frac{P}{K}$ cannot be computed. Under such circumstances, an adjustment to the supervisory delta formula is needed.

85. The purpose of this section is to get stakeholders' views on how the formula of the supervisory delta should be adjusted to reflect situations of negative interest rates.

4.2.1 Preliminary discussion and proposal

86. Considering that the supervisory delta formula is already provided for call and put options, the present discussion focuses on adjustments that allow situations of negative interest rates to be reflected without fundamentally changing the formula. This excludes, in particular, reverting to a normal distribution.

87. Considering also market practice, which had to adjust to this situation, it is proposed to add a λ shift in the regulatory formula, affecting both the price value and the strike value, so that the ratio $\frac{P+\lambda}{K+\lambda}$ 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.

88. Therefore, the supervisory delta formula for call and put options would become, depending on whether they are bought or sold:

Supervisory delta	Bought	Sold
Call options	$+\Phi\left(\frac{\ln\left(\left(P_i+\lambda_j\right)/\left(K_i+\lambda_j\right)\right)+0.5*{\sigma_i}^2*T_i}{\sigma_i*\sqrt{T_i}}\right)$	$-\Phi\left(\frac{\ln\left(\left(P_i+\lambda_j\right)/\left(K_i+\lambda_j\right)\right)+0.5*{\sigma_i}^2*T_i}{\sigma_i*\sqrt{T_i}}\right)$
Put options	$-\Phi\left(\frac{-\ln\left(\left(P_i+\lambda_j\right)/\left(K_i+\lambda_j\right)\right)-0.5*{\sigma_i}^2*T_i}{\sigma_i*\sqrt{T_i}}\right)$	$+\Phi\left(\frac{-\ln\left(\left(P_i+\lambda_j\right)/\left(K_i+\lambda_j\right)\right)-0.5*{\sigma_i}^2*T_i}{\sigma_i*\sqrt{T_i}}\right)$

89. The same λ parameter should be used consistently for all interest rate options in the same currency; it is intrinsically dependent on the level of interest rates in a jurisdiction, therefore it is jurisdiction specific. In addition, the λ parameter should be set as low as possible. Potentially, banks could be allowed, subject to supervisory review, to set a lower value than λ if it suits their specific portfolio.

90. 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 set a reference value for λ.

91. Two options could be considered:

- The λ parameters could be set in EBA RTS for each EU currency and regularly updated.
- Banks could be required via EBA RTS to reflect the market convention for the λ parameter, i.e. the λ values that are quoted on the relevant market; this would make the update of the RTS irrelevant, as the λ value would be automatically adjusted by the market for the relevant jurisdiction.

Questions to stakeholders:

11. Do you have any views on the most appropriate approach to compute supervisory delta in a negative interest rates environment? Please elaborate.

12. Which one of the two options do you think is more appropriate from an EU perspective (i.e. maximum harmonisation)? Are you aware of any issue these two options could raise?

13. Do you agree that the definition of a long position in the primary risk driver and a short position in the primary risk driver in Article 279a(2) of the CRR2 proposal is sufficiently clear for banks to determine whether they hold a long or a short position?

4.3 FRTB – Trading book boundary

4.3.1 Background and rationale

92. One of the main objectives of the implementation of the new minimum capital requirements for market risk is a revised boundary between the trading book and non-trading book. The establishment of a more objective boundary intends to reduce incentives to arbitrage between the regulatory trading and non-trading books. In exceptional circumstances the new boundary requirements still allow the reclassification of instruments between the two books, where this is documented and sufficiently provisioned for.

4.3.2 Preliminary discussion and proposal

93. Article 104 of the CRR2 proposal clarifies the criteria for assigning positions in the trading book, while Article 104a include some conditions for reclassifying a trading book position as a banking book position and vice versa. Article 104a(1) further specifies that institutions must have in place policies for identifying exceptional circumstances justifying reclassification. Furthermore, reclassification is subject to permission by CAs as per Article 104(2), with institutions having to provide written evidence.

94. Article 104 of the CRR2 proposal incorporates two 'presumptive lists' of instruments that, by default, should belong to the trading book (paragraph 2), as well as instruments that belong to the non-trading book (paragraph 3).

"2. Positions in the following instruments shall be assigned to the trading book:

(a) instruments that meet the criteria for the inclusion in the correlation trading portfolio ('CTP'), as referred to in paragraphs 6 to 9;

(b) financial instruments that are managed on a trading desk established in accordance with Article 104b;

(c) financial instruments giving rise to a net short credit or equity position;

(d) instruments resulting from underwriting commitments;

(e) financial assets or liabilities measured at fair value;

(f) instruments resulting from market-making activities;

(g) collective investment undertakings, provided that they meet the conditions specified in paragraph 10 of this Article;

(h) listed equities;

(i) trading-related SFTs;

(j) options including bifurcated embedded derivatives from instruments in the non-trading book that relate to credit or equity risk.

3. Positions in the following instruments shall not be assigned to the trading book:

(a) instruments designated for securitisation warehousing;

(b) real estate holdings;

(c) retail and SME credit;

(d) other collective investment undertakings than the ones specified in point (g) of paragraph 2 in which the institution cannot look through the fund on a daily basis or where the institution cannot obtain real prices for its equity investment in the fund on a daily basis;

(e) derivative contracts with underlying instruments referred to in point (a) to (d);

(f) instruments held for the purpose of hedging a particular risk of a position in an instrument referred to in point (a) to (e).”

95. In this section of the DP, the EBA provides a brief analysis of the implications that the changes introduced in the boundary definition might have. It also analyses the potential conflicts between the criteria established in the new boundary definition. The EBA has also considered the cases where a change in the features of the instrument justifies (or even requires) a change in classification and discusses other external circumstances that may justify a change in the categorisation.

Evolution in the boundary articulation

96. The current TB-BB boundary is articulated around a series of ‘necessary’ conditions (or preconditions) that instruments have to meet in order to be classified in the TB, such as absence of restrictions on tradability and ‘trading intent’. Importantly, these conditions are not ‘sufficient’, i.e. a bank could choose to keep liquid tradable instruments which are also reflected at fair value in the BB.

97. Accordingly, the ‘default’ categorisation for any instrument is BB (or non-TB according to the CRR wording). Banks have to indicate (and ‘justify’ if needed) which instruments are to be included in the TB. As is well known, ‘trading intent’ is the main criterion that banks need to apply to justify inclusion in the TB.

98. The FRTB tries to avoid the use of ‘intent’ as a criterion, since it is an intrinsically subjective one; however, the new framework uses ‘purpose’ instead, which seems to be largely equivalent to intent. In practice, the most relevant change is the introduction of two ‘presumptive’ lists of items that have to be either in the TB or in the BB.

99. Thus, the new boundary is theoretically based on 'sufficient' conditions (i.e. instruments held for certain 'purposes' must be in the TB, instruments in one of the lists must be in the TB and those listed in the other must be in the BB); however, it is clear that, despite the more 'assertive' language, the boundary is still prone to interpretation and subjectivity. At the same time, the articulation of the general 'purpose' criterion and the two presumptive lists is a potential source of conflict.

Potential conflicts in the articulation of the boundary criteria

100. The CRR2 text is very strict when it comes to the bank changing its mind (or intent or purpose) after inception and it is also strict about the presumptive lists, except for the specific cases set out under paragraphs 4 to 6 of Article 104. It is worth noting that the purpose is linked to a subjective decision by the bank, whereas the lists are based on objective features of the instruments.

101. In the event of conflict between a list in Article 104 and the institution's purpose, it is expected that the list prevails.

102. In addition, it is possible that the features of an instrument included in one of the lists change over time, for example:

- participation in a CIU could move from being in the 'BB' list (look-through is not possible and daily prices are not available) to the 'TB' (look through and/or daily prices available) or vice versa;
- a corporate might reduce its size so much that it becomes an SME;
- an unlisted equity gets listed for the first time or vice versa.

103. Importantly, the two lists do not seem to present the same degree of rigidity. While, according to paragraph 4 of Article 104, it is possible to justify that items in the trading book presumptive list are still included in the non-TB, the same cannot be said about the presumptive list in paragraph 3. According to the wording in Article 104 (as well as in the FRTB text in Basel), items in the non-TB list cannot be assigned to the trading book.

104. If there are changes in the instrument circumstances that would shift them from one list to the other, this should imply that a change from TB to BB or vice versa is possible, even necessary, particularly for items that move from the TB to the BB list. As mentioned previously, the rule allows more flexibility to exclude instruments from the TB list, so it may be possible to justify that instruments that should be included in the TB after inception may remain in the BB, since the institution did not have any 'trading intent' when it bought that instrument. However, according to Article 104, it does not seem possible to maintain instruments in the TB if they fall under the BB list after inception.

105. The EBA considers that changes in the circumstances of the instruments that may imply a shift from one presumptive list to another would be generally considered 'exceptional circumstances'. In this regard, it can be argued that these changes are implicitly required by the rule; however, it may still be necessary to communicate these changes to the competent authorities.

Questions to stakeholders:

14. Do you agree that changes in instruments' circumstances that imply a shift between the presumptive lists should be accepted as 'exceptional circumstances'? Please provide examples.

106. Apart from the cases mentioned previously, there are also potential conflicts between the two lists. For example, according to paragraph 2 of Article 104, options should be included in the TB, but the underlying may be one included in the BB list; also, a CIU that may have daily prices available (i.e. TB list) could invest partially in real estate and/or SME credit (BB list); and it is also possible that a BB guarantee over an SME credit position held in the BB might produce a short credit position in the event of early repayment.

107. In all these cases of potential conflict, the EBA considers that the BB criteria should prevail.

Changes in liquidity and other market / regulatory developments

108. The FRTB text does explicitly note that a change in the liquidity of the instrument or in the bank's intent is not a justification for reclassification. However, at the same time, liquidity is a precondition for those instruments to be included in the CTP[8]. In this regard, it is clear that CTP conditions can be lost after inception, particularly the condition that a two-way market exists.

109. In this regard, the FRTB incorporates a new framework to deal with illiquidity (for example, in relation to non-modellable risk factors and stressed ES) and, although the CRR2 proposal is not as specific on this as the Basel text, the lack of liquidity is not a reason to move instruments outside the TB. One potential solution would be to exclude any instrument that has turned illiquid from the CTP, but maintain it inside the TB, still subject to market requirements.

Questions to stakeholders:

15. Do you agree that CTP positions that become illiquid must remain in the TB?

[8] Paragraphs 7 and 9 specify that for all instruments in the CTP there must be a liquid two-way market.

110. Finally, apart from the elements described previously, an external condition that could not be foreseen upon allocation of a financial instrument in the TB may be considered an exceptional circumstance. This could potentially include structural changes, for example a dramatic shift in the liquidity conditions of a large portion of financial instruments for which liquidity was taken for granted previously, such as the case of securitisations prior to the financial crisis, or a modification in the accounting standards that implies the need to change the accounting valuation for certain instruments.

111. Of course it is very difficult to fully grasp ex-ante what all the exceptional circumstances might be (particularly if they are 'exceptional'). It is therefore the view of the EBA that it would be more relevant to include a notification to the EBA of cases where permission had been granted, including sending to EBA the written evidence provided by the firm. This would provide a good starting point for developing guidelines a later stage.

112. An overarching principle behind all these changes would be that the institution should not be aware at inception that there was going to be a change in any circumstances.

Questions to stakeholders:

16. Please provide examples of cases where exceptional circumstances might warrant the approval of reclassification.

4.4 FRTB – Treatment of non-TB positions subject to FX or commodity risk

4.4.1 Background and rationale

113. The FRTB retained the existing requirement of the market risk framework to capture FX risk and commodity risk arising from non-trading book positions using the market risk capital requirements. While the FRTB outlines that such positions should be treated as if they were held on a 'notional' trading desk within the trading book[9], no additional specifications are provided. In practice, the implementation of notional trading desks is not straightforward, and a number of questions remain unanswered. For instance, are there restrictions on the number of notional trading desks, or are the qualitative and quantitative requirements for trading desks applicable to notional trading desks.

114. Consistently with the FRTB, the proposed amendments to Article 325(1) of the CRR require institutions to capitalise the FX and commodity risks of non-trading book positions using the own funds requirements for market risks. Like the Basel standards, the proposed CRR amendments do not provide details on how such treatment should be implemented in practice. This could lead to a number of interpretational and operational issues if left without more specification, potentially undermining the harmonisation of the implementation of the proposed market risk rules within the EU.

4.4.2 Preliminary discussion and proposal

115. The following issues related to the calculation of FX and commodity risks of non-trading book positions are proposed for discussion:

i) the identification and valuation of non-trading book positions;

ii) the structure and composition of notional trading desks;

iii) the application of the quantitative IMA requirements to notional trading desks.

Identification and valuation of non-trading book positions with FX or commodity risk

116. Banks are currently supposed to identify non-trading book positions with FX and commodity risks because those risks are captured by the capital requirements for market risks under the CRR. However, it is not clear if banks currently experience any problems in identifying those positions. It is likely that positions with commodity risk should be straightforward to identify but it may be more difficult for those non-trading book positions with FX risk. The new

[9] '26. Any foreign exchange or commodity positions held in the banking book must be included in the market risk charges. For regulatory capital calculation purposes, these positions will be treated as if they were held on notional trading desks within the trading book.'

boundary defined under Article 104 of the CRR2 proposal would not necessarily make this identification simpler.

117. In addition, the capital requirement for market risk is based on estimating a potential loss in the market value of a position subject to market risk due to changes in risk factors. The current market value of trading book position based on fair value is the starting point for estimating this loss. For non-trading book positions, it may be more complicated to estimate this loss if the valuation is not based on fair value but on another accounting treatment[10]. This would require the institution to revalue those positions, and certain risks of those positions, for the sole purpose of calculating capital requirement for market risks.

Questions to stakeholders:

17. Do institutions have any particular issue in identifying non-trading book FX and commodity positions subject to market risk? What kinds of transactions do those positions correspond to and how material are they with respect to current RWAs for market risks?

18. What issues would institutions face to value those positions in order to calculate the own funds requirement for market risks using the FRTB standards? Currently, do you revalue all components for the purposes of computing the own funds requirement for market risks? If not, which ones? Currently, how frequently are those positions valued?

19. For the non-trading book positions subject to the market risk charge that are not accounted for at fair value (or in the case of FX, are non-monetary), do stakeholders have the capacity to mark these positions to market and how frequently can this be done? Do stakeholders have the capacity to "mark to market" the FX component of the non-monetary item subject to FX risk on a frequent basis (for example daily)?

20. Does IFRS 13, i.e. Fair Value Measurement, have an impact on the frequency of non-trading book revaluations? If yes, please explain how.

21. Are there other factors (for example impairments or write-downs) that can affect the valuation of non-trading book FX positions?

[10] For instance IFRS 13 requires a fair value at the 'measurement date'.

Structure and qualitative requirements for notional trading desks

118. CRR2 does not explicitly refer to the concept of notional trading desks introduced in the FRTB to capture the FX and commodity risks of non-trading book positions. A number of questions should be answered on the structure, composition and qualitative requirements before the concept of 'notional desk' can be defined under the RTS.

119. First, the FRTB standards do not specify how many notional trading desks are to be allowed. This number will vary depending on which of the trading desks requirements are applied to notional trading desks. Certain requirements will be difficult to meet if only one trading desk is to be allowed (e.g. the requirement of a clearly defined business model, potentially the quantitative P&L attribution and backtesting). Having said that, it may also be natural to allow at least one notional trading desk for FX risks and at least one notional trading desk for commodity risk since these two risks are of different natures.

120. Second, the FRTB standards are not clear about whether a notional trading desk shall incorporate positions from only the non-trading book or whether it could incorporate some trading book positions. The latter case may be more appropriate when trading book positions are used to hedge FX and commodity risks from non-trading book positions so that hedging benefits could be recognised. However, including trading book positions in notional trading desks could imply that all the quantitative and qualitative requirements of trading desks should apply to notional trading desks. Otherwise, institutions could take advantage of the situation by moving large chunks of trading positions to notional trading desks to avoid the requirements of trading desks.

121. This raises a more fundamental question of which qualitative requirements of trading desks should apply to notional trading desks. There may be a number of practical issues in applying those requirements to notional desks. The answer to this question could also depend on the answers to the two questions asked in the previous paragraphs. For example, it could be difficult in practice to require that one trader is be only allocated to a notional trading desk without having other trading book positions managed from this trading desk (if it only contained the FX risk of non-trading book positions, by definition no activities would be initiated from that notional trading desk and it is unlikely that a trader would be assigned for the sole purpose of managing this risk).

Questions to stakeholders:

22. Do stakeholders have a view on what minimum number of notional trading desks should be allowed? What would be the negative consequences of applying some restrictions to the number of notional trading desks allowed (for example only one notional desk for FX positions and only one for commodities)?

23. Do you consider that trading book positions should not be included in notional trading desks? Would you agree that, for trading desks that include trading and non-trading book instruments, all the trading desk requirements should apply? Do you consider that for notional trading desks all the trading desk requirements should apply? If this is not the case, which qualitative requirements of Article 104b(2) of the CRR2 proposal could not practically apply to notional trading desks?

Application of IMA requirements to notional trading desks

122. In addition to the qualitative requirements set out in Article 104b(2) of the CRR2 proposal, trading desks are also subject to two quantitative requirements under the IMA: P&L attribution and backtesting. The P&L attribution test compares daily hypothetical P&L and risk-theoretical P&L. Daily changes in hypothetical P&L (HPL) and actual P&L are also required for the purposes of backtesting. However, non-trading book positions may not be required to be revalued daily for accounting purposes. As a result, an institution would be required to re-evaluate its non-trading positions with FX risk and commodity risk for the purposes of P&L attribution and backtesting (but not for accounting purposes).

123. Another question is whether or not the calculation of backtesting at bank level should include the risks of those non-trading book positions.

Questions to stakeholders:

24. Do you see a reason why backtesting requirements should not apply to notional trading desks?

25. Do you see a reason why P&L attribution requirements should not apply to notional trading desks?

4.5 FRTB – Residual risk add-on

4.5.1 Background and rationale

124. Own funds requirements for residual risks are calculated in addition to other own funds requirements computed under either the sensitivities-based method (SBM) or the default risk charge (DRC), for instruments exposed to residual risks.

125. Instruments are considered exposed to residual risks where they are either instruments referencing an exotic underlying or instruments bearing other residual risks. The additional own funds requirements in that case, also referred to as residual risk add-on (RRAO), amounts to 1% or 0.1% of the gross notional amount of the instrument, depending on whether the instrument is an instrument referencing an exotic underlying or an instrument bearing other residual risks, respectively.

126. The scope of application of the RRAO framework is per se an issue, as it is essentially defined negatively and seeks to address risks not captured either:

- under the sensitivities based method, i.e. risk factors not captured or not contemplated in Section 3 of Chapter 5 of the CRR2 proposal (subsection 'Risk factor definitions', i.e. risk factors for interest rate, credit spread, equity, commodities, FX); or
- under the default risk charge (Article 325w, for instruments or underlying 'affected by the event of default of an obligor').

127. The FRTB standards provide high-level guidance on the meaning of exotic underlyings and other residual risks, as well as examples, which by their nature may be difficult to translate into EU regulation. In fact, it seems, considering the nature of the RRAO, to be more appropriate in practice to have a scope negatively defined, which could be directly specified either in the level 1 text or in EBA RTS. Any remaining boundary issues linked with the definition of the scope would have to be addressed via Q&As or EBA RTS.

128. It is therefore suggested that instruments that (i) reference an exotic underlying or (ii) bear other residual risks be identified on the basis of the following definitions (the references are to the current draft CRR2 proposal text):

(i) An instrument references an exotic underlying where its underlying exposure is sensitive to risk factors not captured under either subsection 1 of Section 3 or paragraph 1 of Article 325w;

(ii) Instruments bearing other residual risks shall include:

a. instruments subject to the vega and curvature risk own funds requirements set out in Section 2 whose payoffs cannot be perfectly replicated as a finite linear combination of plain vanilla options referencing a single underlying;

b. securitisation positions and *n*-th-to-default credit derivatives assigned to the CTP in accordance with Article 104(7), excluding positions assigned in accordance with Article 104(9).

129. Regardless of whether those definitions are directly included in the level 1 text or in the RTS, the EBA should keep the possibility to address via RTS unexpected cases, either unforeseen by the definitions above or where those definitions fail to ensure a sufficient level of harmonisation or clarity. Therefore, the EBA RTS mandate should be worded broadly enough to allow for the EBA to both include particular sets of instruments in the scope of the RRAO and exclude other sets from it.

130. In this regard, having the above definitions specified in the RTS (rather than in the level 1 text) would allow more flexibility, should the EBA have to fine-tune those definitions in the future on the basis of unforeseen implementation issues. Conversely, having the above definitions specified in level 1 text (rather than in the RTS) would enable the immediate identification of instruments that should be subject to the RRAO without the need to wait for the finalisation and adoption of EBA RTS.

131. Regardless of the outcome of the legislative procedure, the EBA considers it useful at this stage to discuss possible proposals for identifying instruments which should be in the scope of the residual risk add-on and should therefore be captured in the RTS.

4.5.2 Preliminary discussion and proposal

132. As noted above, the EBA considers that, as a starting point, instruments referencing exotic underlyings and instruments bearing other residual risks should be identified on the basis of the definitions provided above, reflecting points (d) and (e) respectively of paragraph 58 of the FRTB.

133. As a result, instruments referencing 'exotic underlyings' would readily be identified whenever they are outside the scope of the default risk charge or with underlyings that are outside the scope of the sensitivities-based method. The FRTB provides examples of underlyings that would be considered exotic: longevity risk, weather, natural disasters and future realised volatility. However, the above definition appears already to be broad enough to capture all possible exotic underlyings that should be in the scope of the RRAO, since it involves the complementary set of all possible risk factors not already considered within the SBM or DRC. Consequently, further specifications do not seem to be necessary.

134. Regarding instruments bearing 'other residual risks', these are instruments which are subject to vega and curvature risk (i.e. only options, since other instruments are not subject to these charges) whose payoffs cannot be written or perfectly replicated as a finite linear combination of vanilla options (with a single underlying equity price, commodity price, exchange rate, bond price, CDS price or interest rate swap), or instruments falling under the definition of the correlation trading portfolio (and not recognised as eligible hedges within the CTP).

135. In addition to these general criteria, the FRTB text also provides a non-exhaustive list of risks which would meet this definition (refer to point (g) of paragraph 58 of the FRTB), and a list of risks which by themselves will not cause the instrument to be subject to the residual risk add-on (point (h) of paragraph 58 of the FRTB). Paragraph 70 of the FRTB also indicates that 'multiunderlying options with delta sensitivities of different signs' may be in the scope of the RRAO if they fit the definitions set out in paragraph 58. It would seem that these options may be subject to the RRAO (paragraph 70) as bearing 'other residual risk', but would not be considered instruments with an 'exotic underlying', since they do not imply per se any exotic underlying.

136. Under the CRR2 proposal, instruments listed on a recognised exchange, instruments eligible for central clearing under EMIR or back-to-back transactions are exempt from the RRAO in accordance with Article 325v(4).

137. Unlike instruments that reference exotic underlyings, there seems to be more room for guidance in the case of instruments bearing other residual risks. For example, the EBA could develop in RTS a list of instruments (types of instruments) that would be considered to bear other residual risks (which should be non-exhaustive, as other instruments than those listed may be deemed to bear other residual risks), or a set of criteria which would help to identify instruments exposed to residual risks. A combination of both criteria and a list would also be a possible way to implement the mandate.

138. If a list is developed, the assessment would then be made by the institution in the first place to determine whether or not instruments belong to the list and, if they are outside the list, whether or not they would meet the definition, in which case they should be considered to carry other residual risks. In building the list of instruments, the examples of residual risks provided in the FRTB text would be used as guidance, although the list should be made up of instruments rather than risks.

139. In the second place, it should be decided whether or not and how to reflect in the legal text the FRTB language on risks which by themselves will not cause the instrument bearing these risks to be subject to the residual risk add-on. Since this is more a clarification, it is hard to see how to include this directly in a legal text.

140. In the third place, the inclusion of behavioural risk in the scope of the RRAO, in accordance with the FRTB, poses some difficulties. A reference is made only to 'callable bonds', which would be in the scope of the RRAO only if the holder is a retail client, but the overall scope is not clearly defined. Taking into account the FRTB text, but also references to prepayment/behavioural risk in the prudential legislation, a generally restrictive approach, defined below, could be proposed.

141. Based on all these considerations and on the assumption that the above definitions would be included in the RTS, a possible starting point for the RTS could be the following.

- First, provide the general definition of instruments referencing an exotic underlying and highlight if needed, for some instruments (boundary cases), whether or not they constitute instruments referencing an exotic underlying.

- Second, provide the general definition of instruments bearing other residual risks, specify a list of instruments which are deemed to constitute 'instruments bearing other residual risks' and specify, if needed, other instruments that are considered not to constitute instruments bearing other residual risks.

142. In particular, the following list of instruments could be considered as instruments bearing other residual risks:

(a) Path-dependent options, i.e. options where the payoff depends on the path followed by the price of the underlying asset, and not just on its final value.

(b) Forward start options, i.e. options that start at a predefined date in the future.

(c) Compound options, i.e. options whose underlying is another option.

(d) Chooser options, i.e. options with a feature that allows the holder to decide, after a specified period of time, whether the option is a call or a put.

(e) Binary options or options with discontinuous payoffs, including, for example, digital options, which give a fixed payout if the underlying is below or above a certain point, and do not give any payout in all other cases.

(f) Shout options, i.e. European options where the holder has the chance during the life of the option to mark the underlying's price at one specific point in time. At the end of the life of the option, the option holder receives either the usual payoff from a European option or the intrinsic value at the time of the shout, whichever is greater.

(g) Best-of options and worst-of options, i.e. options where the final payoff depends on the value of the best or the worst performing underlying among a number of predefined underlyings.

(h) Bermudan options, i.e. options that can be exercised on more than one predetermined date.

(i) Quanto options, i.e. options whose underlying is denominated in a foreign currency but whose payoff is received in the local currency.

(j) Multiunderlying or basket options with delta sensitivities of different signs.

(k) Options subject to behavioural risk, i.e. depending on the behaviour of agents, which may be affected by factors other than pure financial gain, such as elements related to

remaining maturity and size of the loan, demographical features and/or and other social factors. In that case, a residual risk charge will apply only:

- when the option lies with a retail client;
- where a significant amount of these instruments with prepayment risk is held in the trading book;
- when the behavioural risk for those instruments is considered material (the materiality of behavioural risk would be assessed based on the criteria embedded in the guidelines on corrections to modified duration for debt instruments under Article 340(3) of Regulation (EU) 575/2013).

Questions to stakeholders:

26. Do you agree with the proposed general definitions of instruments referencing an exotic underlying and instruments bearing other residual risks? Do you think that these definitions are clear? If not, how would you specify what is an 'exotic underlying' and what are 'instruments that reference exotic underlyings'? Please provide your views, including rationale and examples.

27. Do you agree with complementing, for the sake of clarity, those definitions with a non-exhaustive list of instruments bearing other residual risk? Similarly, do you agree with retaining the possibility of excluding some instruments from the RRAO?

28. More specifically, do you consider that there are particular instruments (or underlyings) which, while meeting the definitions above (in line with point (d) of paragraph 58 of the FRTB), should be excluded from the RRAO? Alternatively, on the contrary, do you consider that there are instruments (or underlyings) that are not captured by the definitions above and that should be subject to the RRAO? Please provide your views, including rationale and examples.

29. Although the proposed list of options does not aim at being exhaustive, since there is a general definition, do you find that any important option type meeting the criteria in point (i) of point (e) of paragraph 58 of the FRTB is missing? Conversely, do you think that any of the options in the list does not meet general criteria?

30. Do you think there are any instruments, not meeting the general definitions above, whose risk would however be poorly captured within the standardised approach and should therefore be included in the list of instruments subject to the RRAO?

31. What are your views on the proposed treatment for behavioural risks? Do you have any proposal for a more objective/prescriptive approach to identifying instruments with behavioural risks?

32. What are your views on the role that the list in point (h) of paragraph 58 of the FRTB should play?

33. Are there any cases in which instruments could meet the definitions of both 'instrument referencing an exotic underlying' and 'instrument bearing other residual risks'?

4.6 FRTB – IMA liquidity horizons

4.6.1 Background and rationale

143. In the FRTB, the risk of market illiquidity is catered for by incorporating varying liquidity horizons to mitigate the risk of sudden and severe impairment of market liquidity across asset markets. Accordingly, liquidity horizons work as scaling factors to take into account the fact that various risk factors have different underlying liquidities and should therefore attract different capital requirements. Liquidity horizons are relevant to large parts of the new market risk framework and can be decisive on the composition of banks' trading books, as well as impact their modelling decisions.

4.6.2 Preliminary discussion and proposal

Mapping of risk factors to broad risk factor categories and subcategories

144. The intention is to set up requirements for institutions using the internal model approach on how to map risk factors of positions attributed to trading desks to broad risk factor categories and subcategories in Table 2 of Article 325be. Mapping risk factors to risk factor categories and subcategories is a key step in the assignment of a liquidity horizon to each risk factor for the purpose of scaling the calculated capital requirements taking into account the risk of illiquidity of the given risk factor of a position.

145. Under the current CRR2 proposal, the EBA has already separate mandates to define liquid currencies for FX and IRR, small cap and large cap, and emerging and advanced economies. As Table 2 in Article 325be is already quite specific, there may be little added benefit from increasing the risk factor granularity by adding further subcategories to all existing subcategories, although this may be useful for some subcategories. In any case, it is not possible to come up with a mapping of all possible risk factors (i.e. the exhaustive list of possible risk factors) to the existing broad risk factor categories and subcategories.

146. Specifying the mapping of risk factors could be achieved by:

- increasing the granularity of some risk factor categories as well as some subcategories in the CRR2 table, specifying for these new elements the corresponding liquidity horizons/length of liquidity horizons;

- prescribing some specific rules for mapping risk factors to already established risk factors categories or giving further guidelines for some type of risk factors.

147. The approach would essentially specify the mapping for certain types of risk factors where further guidance is needed. The content of the RTS would partly rely on the existing FRTB FAQ on liquidity horizons published in January 2017. Referring to this FAQ, which focuses on equity dividends and equity repos, inflation, mono-currency and cross-currency basis risk, it is clear

that there is some uncertainty around how to categorise some risk factors and thus map them to the appropriate liquidity horizon.

148. Furthermore, additional clarifications to the ones already published in the FRTB FAQs could be given. It could be clarified what to do if a position has multiple underlying risk factors (e.g. a USD corporate bond has USD-IR risk, corporate spread risk and USD/EUR FX risk). A solution would be to map each risk factor to its relevant liquidity horizon. Where an institution models the whole instrument instead of the separate risk factors, the longest horizon embedded in the instrument could be applied to the whole instrument. If there is one material risk factor, accounting for a substantial part of the total sensitivity (based on some established threshold) of the instrument, a possibility would be to consider that the whole instrument can be mapped to the liquidity horizon relevant to that risk factor. If a risk factor, within a broad risk factor subcategory, could not be categorised, the institution would allocate that risk factor to the prudent category 'other' of the relevant broad risk factor categories established in Table 2 of Article 325be.

149. In addition, if correlations (or volatilities of volatilities) are risk factors, the liquidity horizon to be assigned to these correlations should be specified. Exotic underlyings could also be considered.

150. Finally, the RTS could elaborate on the qualitative requirements which are currently mentioned in the FRTB but not in the CRR2. Paragraph 181 of the FRTB sets out qualitative conditions requiring that banks must map each risk factor using consistent and clearly documented procedures, and that the mapping must be (i) set out in writing; (ii) validated by the bank's risk management; (iii) made available to supervisors; and (iv) subject to internal audit. This would ensure that the mapping methodology applied by institutions is fit for purpose and does not lead to risk factors being assigned wrong liquidity horizons. However, it is felt that these qualitative requirements regarding the mapping of risk factors may be better included in the revised RTS on assessment methodology.

Questions to stakeholders:

34. What is your view on the outlined approach? Please provide background and reasoning for your position.

35. Do you have in mind risk factors for which additional guidance is needed? If yes, which ones?

36. Do you have in mind any risk factor categories or subcategories to add to those listed in Table 2 of Article 325be of the CRR2 proposal?

37. Would you think that Q&As could be sufficient to provide additional guidance (instead of RTS)?

Most liquid currencies for interest rate broad risk factor category

151. The FRTB standards specify explicitly the currencies that constitute the most liquid currencies subcategory in the interest rate broad risk factor category, namely USD, EUR, GBP, AUD, JPY, CAD and SEK as well as the domestic currency of the bank.

152. This choice was motivated by the 2013 report of statistics compiled by the BCBS every 3 years on OTC interest rate derivatives[11]. Based on data from this report, the currencies that underlie net OTC interest rate derivative contracts with an average daily turnover of more than USD 30 billion have been classified as 'the most liquid currencies'.

153. Clearly, the underlying assumption is that currencies with a higher volume of underlying OTC interest rate derivative contracts are less prone to liquidity shocks. This in turn would justify a lower liquidity horizon to be applied to interest rate instruments denominated in those selected currencies.

Figure 3: Triennial Central Bank Survey OTC interest rate derivatives turnover (2013 and 2016)

Global OTC interest rate derivatives market turnover by currency[1]

Net-net basis,[2] daily averages in April, in billions of US dollars — Table 3

Currency	1998	2001	2004	2007	2010	2013
Total	265	489	1,025	1,686	2,054	2,343
EUR	...	232	461	656	834	1,146
USD	71	152	347	532	654	657
GBP	17	37	90	172	213	187
AUD	3	8	12	19	37	76
JPY	27	27	46	137	124	70
SEK	2	5	13	33	20	36
CAD	7	6	8	15	48	30
BRL[3]	...	0	1	2	3	16
ZAR[3]	1	0	2	3	5	16
CNY[4]	...	...	...	0	2	15
CHF	9	6	10	19	20	14
KRW[3]	...	0	0	5	16	12
MXN[3]	0	0	2	5	5	10
NOK[3]	2	3	8	8	15	9
PLN[3]	...	0	1	2	1	7
INR[3]	...	0	0	3	2	6
NZD[3]	0	0	2	7	4	5
DKK[3]	2	5	2	1	2	4
SGD[3]	0	0	3	4	4	4
THB[3]	...	0	0	0	1	3
HUF[3]	...	0	0	1	0	2
HKD[3]	1	1	4	9	3	2
MYR[3]	0	0	0	0	0	2
ILS[3]	...	...	...	0	0	2
CLP[3]	...	...	...	0	0	1
TWD[3]	0	0	0	1	1	1
CZK[3]	...	0	0	1	0	1
SAR[3]	0	0	0	0	0	0
COP[3]	...	...	...	0	0	0
RUB[3]	...	...	...	0	0	0
LTL[3]	...	...	...	0	0	0
TRY[4]	...	...	...	...	...	0
ARS[3]	...	...	...	...	...	0
PHP[3]	...	...	0	0	1	0
IDR[3]	...	0	0	0	0	0
RON[3]	...	...	...	...	0	0
PEN[3]	...	...	...	0	0	0
BHD[3]	...	...	...	0	...	0
LVL[3]	...	...	...	0	0	0
BGN[3]	...	...	...	...	...	0
OTH	124	4	12	50	36	7

[1] Single currency interest rate contracts only. [2] Adjusted for local and cross-border inter-dealer double-counting (ie "net-net" basis). [3] Turnover for years prior to 2013 may be underestimated owing to incomplete reporting in previous surveys. Methodological changes in the 2013 survey ensured more complete coverage of activity in emerging market and other currencies.

OTC interest rate derivatives turnover by currency[1]

Net-net basis,[2] daily averages in April, in billions of US dollars — Table 3

Currency	2001	2004	2007	2010	2013	2016
Total	489	1,025	1,686	2,054	2,311	2,677
USD	152	347	532	654	639	1,357
EUR	232	461	656	834	1,133	641
GBP	37	90	172	213	187	237
AUD	8	12	19	37	76	108
JPY	27	46	137	124	69	83
CAD	6	8	15	48	30	39
NZD[3]	0	2	7	4	5	26
MXN[3]	0	2	5	5	10	26
SEK	5	13	33	20	36	19
ZAR[3]	0	2	3	5	16	16
NOK[3]	3	8	8	15	9	15
CHF	6	10	19	20	14	14
KRW[3]	0	0	5	16	12	13
SGD[3]	0	3	4	4	4	12
CNY[4]	...	...	0	2	14	10
HUF[3]	0	0	1	0	2	8
BRL[3]	0	1	2	3	16	7
INR[3]	0	0	3	2	6	6
PLN[3]	0	1	2	1	7	6
HKD[3]	1	4	9	3	2	5
CLP[3]	...	...	0	0	1	4
MYR[3]	0	0	0	0	2	3
THB[3]	0	0	0	1	3	2
DKK[3]	5	2	1	2	4	2
TWD[3]	0	0	1	1	1	2
COP[3]	...	...	0	0	0	1
CZK[3]	0	0	1	0	1	1
ILS[3]	...	...	0	0	2	1
SAR[3]	0	0	0	0	0	1
IDR[3]	0	0	0	0	0	0
RON[3]	...	...	...	0	0	0
RUB[3]	...	...	0	0	0	0
ARS[3]	...	...	...	...	0	0
TRY[4]	...	...	...	...	0	0
PHP[3]	...	0	0	1	0	0
PEN[3]	...	...	0	0	0	0
BGN[3]	...	...	...	...	0	0
BHD[3]	...	...	0	...	0	0
LTL[3]	...	...	0	0	0	...
LVL[3]	...	...	0	0	0	...
OTH	4	12	50	36	7	14

[1] Single currency interest rate contracts only. [2] Adjusted for local and cross-border inter-dealer double-counting (ie "net-net" basis). [3] Turnover for years prior to 2013 may be underestimated owing to incomplete reporting in previous surveys. Methodological changes in the 2013 survey ensured more complete coverage of activity in emerging market and other currencies.

[11] http://www.bis.org/publ/otc_hy1311.pdf

154. While the threshold applied is based on an objective, quantified criterion, it should be highlighted that when referring to the more recent 2016 version of this report[12] – if the same criteria were to apply to select the most liquid currencies – SEK would no longer be retained. At the same time, NZD and MXN could be potential candidates, with turnovers of around USD 26 billion.

155. Therefore, while the methodology for selecting of the most liquid currencies for the FRTB standards, as performed by the BCBS, offers a natural option for fulfilling this mandate, the list of selected currencies would have to be updated periodically to reflect changes in the markets.

156. It should also be noted that applying the above criteria would mean that interest rate instruments denominated in the selected currencies would have a competitive advantage, since they would receive a less stringent capital treatment than instruments denominated in other currencies.

Questions to stakeholders:

38. What is your view on the definition and level of the threshold used for assigning currencies to the most liquid category?

39. If you agree with the threshold outlined, would you agree that the list of selected currencies should be updated on a triennial basis following the publication of the BIS OTC derivative statistics?

40. If you do not agree with the threshold outlined, please provide reasoning for establishing another selection criterion.

Most liquid currency pairs for FX broad risk factor category

157. As is the case for interest rate broad risk factor categorisation, the most liquid currency pairs in the FRTB are established based on the 2013 report of foreign exchange turnover of OTC products compiled by the BCBS on a triennial basis[13].

[12] http://www.bis.org/publ/otc_hy1611.pdf

[13] http://www.bis.org/publ/rpfxf13fxt.pdf

Figure 4: Triennial Central Bank Survey OTC foreign exchange turnover (2013 and 2016)

OTC foreign exchange turnover by currency pair

Net-net basis,[1] daily averages in April, in billions of US dollars and percentages — Table 3

Currency pair	2001		2004		2007		2010		2013		2016	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
USD / EUR	372	30.0	541	28.0	892	26.8	1,099	27.7	1,292	24.1	1,172	23.1
USD / JPY	250	20.2	328	17.0	438	13.2	567	14.3	980	18.3	901	17.8
USD / GBP	129	10.4	259	13.4	384	11.6	360	9.1	473	8.8	470	9.3
USD / AUD	51	4.1	107	5.5	185	5.6	248	6.3	364	6.8	262	5.2
USD / CAD	54	4.3	77	4.0	126	3.8	182	4.6	200	3.7	218	4.3
USD / CNY	...	...	...	...	...	...	31	0.8	113	2.1	192	3.8
USD / CHF	59	4.8	83	4.3	151	4.5	166	4.2	184	3.4	180	3.6
USD / MXN	...	...	...	...	...	...	...	...	128	2.4	90	1.8
USD / SGD	...	...	...	...	...	...	...	...	65	1.2	81	1.6
USD / KRW	...	...	...	...	...	...	58	1.5	60	1.1	78.0	1.5
USD / NZD	...	...	...	...	...	...	...	...	82	1.5	77.6	1.5
USD / HKD	...	...	...	...	...	...	85	2.1	69	1.3	77	1.5
USD / SEK	...	...	...	...	57	1.7	45	1.1	55	1.0	66	1.3
USD / TRY	...	...	...	...	...	...	...	...	63	1.2	64	1.3
USD / INR	...	...	...	...	...	...	36	0.9	50	0.9	56	1.1
USD / RUB	...	...	...	...	...	...	...	...	79	1.5	53	1.1
USD / NOK	...	...	...	...	...	...	...	...	49	0.9	48	0.9
USD / BRL	...	...	...	...	...	...	25	0.6	48	0.9	45	0.9
USD / ZAR	...	...	...	...	...	...	24	0.6	51	1.0	40	0.8
USD / TWD	...	...	...	...	...	...	...	...	22	0.4	31	0.6
USD / PLN	...	...	...	...	...	...	...	...	22	0.4	19	0.4
USD / OTH	199	16.0	307	15.9	612	18.4	446	11.2	214	4.0	215	4.2
EUR / GBP	27	2.1	47	2.4	69	2.1	109	2.7	102	1.9	100	2.0
EUR / JPY	36	2.9	61	3.2	86	2.6	111	2.8	148	2.8	79	1.6
EUR / CHF	13	1.1	30	1.6	62	1.9	71	1.8	71	1.3	44	0.9
EUR / SEK	...	...	...	...	24	0.7	35	0.9	28	0.5	36	0.7
EUR / NOK	...	...	...	...	...	...	...	...	20	0.4	28	0.6
EUR / AUD	1	0.1	4	0.2	9	0.3	12	0.3	21	0.4	16	0.3
EUR / CAD	1	0.1	2	0.1	7	0.2	14	0.3	15	0.3	14	0.3
EUR / PLN	...	...	...	...	...	...	...	...	14	0.3	13	0.3
EUR / DKK	...	...	...	...	...	...	...	...	13	0.2	13	0.2
EUR / HUF	...	...	...	...	...	...	...	...	10	0.2	5	0.1
EUR / TRY	...	...	...	...	...	...	...	...	6	0.1	4	0.1
EUR / CNY	...	...	...	...	...	...	...	...	1	0.0	2	0.0
EUR / OTH	20	1.6	38	1.9	83	2.5	102	2.6	51	0.9	65	1.3
JPY / AUD	...	...	...	...	...	...	24	0.6	46	0.9	31	0.6
JPY / CAD	...	...	...	...	...	...	...	...	6	0.1	7	0.1
JPY / NZD	...	...	...	...	...	...	4	0.1	5	0.1	5	0.1
JPY / TRY	...	...	...	...	...	...	...	...	1	0.0	3	0.1
JPY / ZAR	...	...	...	...	...	...	...	...	4	0.1	3	0.1
JPY / BRL	...	...	...	...	...	...	...	...	3	0.1	1	0.0
JPY / OTH	15	1.2	28	1.4	66	2.0	50	1.3	88	1.7	45	0.9
Other currency pairs	13	1.1	22	1.1	74	2.2	71	1.8	44	0.8	116	2.3
All currency pairs	1,239	100.0	1,934	100.0	3,324	100.0	3,973	100.0	5,357	100.0	5,067	100.0

[1] Adjusted for local and cross-border inter-dealer double-counting (ie "net-net" basis).

Global foreign exchange market turnover by currency pair

Net-net basis,[1] daily averages in April, in billions of US dollars and percentages — Table 3

Currency pair	2001		2004		2007		2010		2013	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
USD / EUR	372	30.0	541	28.0	892	26.8	1,098	27.7	1,289	24.1
USD / JPY	250	20.2	328	17.0	438	13.2	567	14.3	978	18.3
USD / GBP	129	10.4	259	13.4	384	11.6	360	9.1	472	8.8
USD / AUD	51	4.1	107	5.5	185	5.6	248	6.3	364	6.8
USD / CAD	54	4.3	77	4.0	126	3.8	182	4.6	200	3.7
USD / CHF	59	4.8	83	4.3	151	4.5	166	4.2	184	3.4
USD / MXN	...	...	...	...	...	...	...	...	128	2.4
USD / CNY	...	...	...	...	...	...	31	0.8	113	2.1
USD / NZD	...	...	...	...	...	...	...	...	82	1.5
USD / RUB	...	...	...	...	...	...	...	...	79	1.5
USD / HKD	...	...	...	...	...	...	85	2.1	69	1.3
USD / SGD	...	...	...	...	...	...	...	...	65	1.2
USD / TRY	...	...	...	...	...	...	...	...	63	1.2
USD / KRW	...	...	...	...	...	...	58	1.5	60	1.1
USD / SEK	...	...	...	...	57	1.7	45	1.1	55	1.0
USD / ZAR	...	...	...	...	...	...	24	0.6	51	1.0
USD / INR	...	...	...	...	...	...	36	0.9	50	0.9
USD / NOK	...	...	...	...	...	...	...	...	48	0.9
USD / BRL	...	...	...	...	...	...	25	0.6	48	0.9
USD / PLN	...	...	...	...	...	...	...	...	22	0.4
USD / TWD	...	...	...	...	...	...	...	...	22	0.4
USD / OTH	199	16.0	307	15.9	612	18.4	445	11.2	213	4.0
EUR / JPY	36	2.9	61	3.2	86	2.6	111	2.8	147	2.8
EUR / GBP	27	2.1	47	2.4	69	2.1	109	2.7	102	1.9
EUR / CHF	13	1.1	30	1.6	62	1.9	71	1.8	71	1.3
EUR / SEK	...	...	...	...	24	0.7	35	0.9	28	0.5
EUR / AUD	1	0.1	4	0.2	9	0.3	12	0.3	21	0.4
EUR / NOK	...	...	...	...	...	...	...	...	20	0.4
EUR / CAD	1	0.1	2	0.1	7	0.2	14	0.3	15	0.3
EUR / PLN	...	...	...	...	...	...	...	...	14	0.3
EUR / DKK	...	...	...	...	...	...	...	...	13	0.2
EUR / HUF	...	...	...	...	...	...	...	...	9	0.2
EUR / TRY	...	...	...	...	...	...	...	...	6	0.1
EUR / CNY	...	...	...	...	...	...	...	...	1	0.0
EUR / OTH	20	1.6	38	1.9	83	2.5	102	2.6	52	1.0
JPY / AUD	...	...	...	...	...	...	24	0.6	45	0.8
JPY / CAD	...	...	...	...	...	...	...	...	6	0.1
JPY / NZD	...	...	...	...	...	...	4	0.1	5	0.1
JPY / ZAR	...	...	...	...	...	...	...	...	4	0.1
JPY / BRL	...	...	...	...	...	...	...	...	3	0.1
JPY / TRY	...	...	...	...	...	...	...	...	1	0.0
JPY / OTH	5	0.4	14	0.7	49	1.5	49	1.2	42	0.8
Other currency pairs	23	1.8	36	1.9	90	2.7	72	1.8	89	1.7
All currency pairs	1,239	100.0	1,934	100.0	3,324	100.0	3,971	100.0	5,345	100.0

[1] Adjusted for local and cross-border inter-dealer double-counting (ie "net-net" basis).

158. The threshold established stipulates that currencies that underlie net OTC interest rate derivative contracts with an average daily turnover of more than USD 45 billion are classified as 'the most liquid currency pairs'. Accordingly, the following currency pairs have been selected: USD/EUR, USD/JPY, USD/GBP, USD/AUD, USD/CAD, USD/CHF, USD/MXN, USD/CNY, USD/NZD, USD/RUB, USD/HKD, USD/SGD, USD/TRY, USD/KRW, USD/SEK, USD/ZAR, USD/INR, USD/NOK, USD/BRL, EUR/JPY, EUR/GBP, EUR/CHF and JPY/AUD.

159. Similar to the interest rate broad risk factor categorisation, when referring to the most recent report[14], based on the same thresholds, EUR/CHF, JPY/AUD and USD/ZAR would not be retained. This again implies that the list will have to be updated periodically, to reflect changes in markets.

160. Taking into account that the FX market is the world's largest and most liquid financial market, and also considering that a harmonised treatment of market risk across national jurisdictions, where possible, should be encouraged, a common liquidity horizon could apply across all FX

[14] http://www.bis.org/publ/rpfx16fx.pdf

markets or at a minimum an additional bucket of currency pairs between 'most liquid currency pairs' and 'other currency pairs' could be added.

161. An alternative approach could be to expand the list of 'liquid currency pairs' to include low-volatility currency pairs as well. The list of liquid currency pairs could be expanded by applying a triangulation logic, whereby, for example, if USD/BRL is liquid and so is USD/EUR, then EUR/BRL is deemed liquid by way of triangulation.

Questions to stakeholders:

41. What is your view on the definition and level of the threshold used for currency pairs to be considered most liquid?

42. If you agree with the threshold outlined, would you agree that the list of selected currencies should be updated on a triennial basis following the publication of the BIS OTC derivative statistics?

43. If you do not agree with the threshold outlined, please provide reasoning for establishing other selection criteria.

44. Do you consider that triangulation of currency pairs should be allowed? Is triangulation used in practice to hedge less liquid FX positions?

Small and large capitalisations for equity broad risk factor category

162. For the purpose of defining what constitutes a large market capitalisation for equities, the FRTB establishes a threshold of USD 2 billion. Entities are then allocated into large/small cap according to whether their capitalisation is above/below the threshold.

163. The EBA has tested this capitalisation threshold for European equity markets. These tests showed that there are many differences across Member States in term of market capitalisation. For larger markets, the scope would include many equities from large cap indices (and some from mid cap indices). However, many smaller jurisdictions would have no or a very limited number of equities above this threshold.

164. A threshold of USD 2 billion does not appear to be sufficient in itself to capture the diversity of equity markets in the EU. Therefore, it could be considered whether this absolute threshold could be adjusted or whether an absolute threshold could be combined with some relative threshold. Besides, other criteria such as free-float of any given equity might also be relevant to consider.

165. The composition of the relevant national indices may be appropriate as a relative threshold mechanism. Following this approach, entities belonging to one of those indices could be automatically considered large caps.

166. Having said that, a potentially useful benchmark in considering a combination of an absolute and relative threshold is the implementing technical standards (ITS) submitted by ESMA, to specify main indices and recognised exchanges, to the European Commission pursuant to Article 15(1) of Regulation No (EU) 1095/2010 (the ESMA Regulation) and Article 197(8) of the CRR (updated in 2016 with the ESMA opinion on the 'main Indices and recognised exchanges' whose components can be used as collateral)[15]:

> *(1) Regulation (EU) No 575/2013 states that equities or convertible bonds included in a main index can be used by credit institutions and investment firms as eligible collateral. Therefore, the equity indices listed in this Regulation should be ones that mainly consist of securities that can reasonably be expected to be realisable when a credit institution or investment firm needs to liquidate its collateral. This should be the case* ***when at least 90% of the components of an index have a free float of at least EUR 500 000 000 or, in the absence of information about free float, a market capitalisation of at least EUR 1 000 000 000****.*
>
> *(2) Furthermore it should be possible for institutions to use as collateral instruments that are* ***liquid relative to the markets in which they are operating*** *and meet a minimum level of liquidity. Therefore equity indices listed in this Regulation should* ***also include an index if it includes no more than half of the total number of companies whose shares are traded on the market on which the indices are based, if the average daily turnover is at least EUR 100 000, and if it also meets two of the following three criteria: the total market capitalisation of the index should be at least 40% of the market capitalisation of all the companies whose shares are traded on that market; the total turnover of trading in the components of the index should be at least 40% of the total turnover of all equity trading on that market; and the index serves as an underlying for derivative products****.*

167. When drafting these ITS, ESMA faced the same kind of issues that the EBA would have to confront. The criteria proposed by ESMA are based on the liquidity of the components of the indices, considering two approaches: (i) one based on two common thresholds of liquidity (market capitalisation and free float) to the constituents of each index on a world-wide basis and (ii) a relative approach, applying a number of tests designed to identify the main index of more liquid instruments in each EEA economy, provided they meet an underpinning liquidity threshold.

15 https://www.esma.europa.eu/press-news/esma-news/esma-updates-crr-standard-main-indices-and-recognised-exchanges

168. Accordingly, one potential solution would be to rely on the list published and updated by ESMA. In practice it would mean that all equities in the indices provided by ESMA would be considered large cap. Following this approach would have the following advantages:

- This solution would be straightforward to implement.
- The list is readily available and institutions already consider it for collateral purposes; this should help to reduce the implementation burden.
- The list has the additional advantage of covering indices across the whole world, not just located in the EU, as originally envisaged by the EBA.
- According to ESMA's experience there is a need to update the list quite frequently, which would imply a considerable burden on the EBA.

169. Accordingly, the EBA suggests relying on the list of indices provided by ESMA.

Questions to stakeholders:

45. What is your view on the definition and level of the threshold for defining small and large capitalisations for equity price and volatility?

46. Do you see any problems in using the ITS published by ESMA to specify the equities that can be considered as large capitalisations?

4.7 FRTB – Backtesting and P&L attribution requirements

4.7.1 Background and rationale

170. A key requirement for a credit institution to obtain approval to use an IMA to calculate own funds requirements for market risks, is the reliability (conservatism and accuracy) of the IMA in predicting capital requirements relative to the realised P&L of the institution.

171. One way of assessing whether or not a model produces reliable capital requirements is the regulatory backtesting programme. Regulatory backtesting compares the model-generated risk metric at a given confidence level (97.5% and 99% value-at-risk) with the subsequent business day's realised trading actual and hypothetical P&Ls. In practice, many elements influence the realised P&L outcome of an institution (e.g. intra-day trading, pricing methods, market data movement, definition of P&L scope and components). This means in particular that there are several possible explanations for a backtesting failure. Some overshootings may be attributed to poor model quality (missing risk factors, inadequate model scope, inappropriate use of proxies, etc.) while others may not be related to model performance (i.e. P&L losses not attributable to market risk).

172. While the basic principles for the definition of actual and hypothetical P&L for regulatory backtesting purposes are set out in the level 1 text, a more specific definition of actual and hypothetical P&L is necessary to ensure that the technical implementation does not undermine the usefulness of the test, and to ensure consistent implementation of the regulatory backtesting programme across European institutions.

173. Another way of assessing whether or not a model produces reliable capital requirements is the P&L attribution test. The P&L attribution requirement ensures that the theoretical changes in a trading desk portfolio's value, based on the institution's risk-measurement model and risk factors in the risk-measurement model, are sufficiently close to the hypothetical changes in the trading desk portfolio's value, based on the institution's pricing model and including all the risk factors used by the front office (F/O).

174. Notwithstanding the above, a trading desk may fail the backtesting and P&L attribution test requirements, even if the model is generally appropriately capturing the trading desk's market risk. Thus, Article 325ba(4) of the CRR2 proposal allows competent authorities in extraordinary circumstances to permit an institution to continue using its internal models for the purpose of calculating own funds requirements for market risks of a trading desk that no longer meets the backtesting or P&L attribution requirements.

175. In the following, the definitions of actual and hypothetical P&L for the purpose of backtesting, as well as the definition of risk-theoretical P&L for the purpose of P&L attribution, are clarified. The definition of hypothetical P&L for the purpose of P&L attribution is considered to be identical to the definition of hypothetical P&L for backtesting purposes, consistently with the current Basel FRTB text (January 2016). Elements to be included in those

P&Ls are specified in some detail for discussion, since the choice of the components to be included has an impact on the results of the P&L attribution test (for both hypothetical and risk-theoretical P&L) and of the backtesting (for both actual and hypothetical P&L), and consequently on the own funds requirements.

176. Finally, because discussions on PLA test requirements are still ongoing, this DP does not discuss for the time being the technical criteria of the P&L attribution test, or the specifications of extraordinary circumstances, as it is felt that those can be defined only on the basis of detailed P&L attribution and backtesting requirements.

4.7.2 Preliminary discussion and proposal

Hypothetical P&L for backtesting

Background

177. The purpose of the hypothetical P&L used for regulatory backtesting is to provide a backtesting of the market risk model (VaR model) in order to assess whether or not that model appropriately captures market risk based on the assumption of a static portfolio over a 1-day time horizon.

178. As a result, the hypothetical P&L should be produced using changes in portfolio value that would occur on the basis of unchanged end-of-day positions. Therefore, P&L from intra-day trading is excluded from the hypothetical P&L. In addition, as they are out of the sphere of market risk, fees and commissions are excluded from the hypothetical P&L.

179. The hypothetical P&L, which has to be produced at the trading desk level, should be computed using the same pricing models (i.e. the same pricing functions, pricing configurations, model parametrisation, market data and systems) as the ones used to compute the daily P&L, including all the risk factors (market parameters) used by the F/O. As a consequence, FRTB NMRF should be included in the hypothetical P&L. In addition, the scope of the calculation is restricted to the trading desks included in the IMA.

180. Clarification is needed on which valuation adjustments to include in the hypothetical P&L or exclude from it. For the purpose of this paper, 'valuation adjustment' is a generic term which includes, for example, fair value adjustments, XVAs and reserves. With a view to harmonising banks' practices, but also allowing flexibility with regard to future improvements/changes carried out by institutions, it is proposed to specify criteria for the inclusion of valuation adjustments in the hypothetical P&L or their exclusion from it without giving any exhaustive list of valuation adjustments in/out. Where necessary, additional guidance on valuation adjustments that would be expected to be included in the hypothetical P&L (i.e. those updated on a daily basis) could be provided.

181. Neither the time effect nor net interest income (NII) is mentioned in this section, as they are treated in a specific section.

Criteria for systematic exclusion from hypothetical P&L

182. Valuation adjustments (VAs) for which a separate regulatory capital treatment has been specified as part of the rules (e.g. CVA) would be excluded from the hypothetical P&L. This flexible criterion would allow for other VAs (e.g. Funding VA, Margin VA), which could in the future be subject to a separate capital treatment, to be excluded from desk-level backtesting and PLA.

183. Valuation adjustments which are deducted from CET1 would also be excluded from the hypothetical P&L. It is, for example, the case for PVAs (Prudential VAs, referred to as additional valuation adjustments or AVAs in the CRR, and furthermore computed quarterly), as well as DVA.

184. Valuation adjustments that are updated at a less than daily frequency in the measure of P&L would be excluded from the hypothetical P&L for the purpose of backtesting (and P&L attribution test). One reason is that the inclusion of VAs updated less frequently than daily (for example monthly) in the hypothetical P&L would also have consequences for the PLA test, as it would lead to a (for example monthly) bump in hypothetical P&L versus risk-theoretical P&L and consequently to a potential increase in the number of desks failing the PLA test. Furthermore, these adjustments are usually not taken into account in the 1-day VaR.

185. Finally, valuation adjustments which cannot be calculated at desk level, because they are assessed in terms of the firm's overall positions/risks or because of other constraints around the assessment process), would be included in the hypothetical P&L backtesting not at desk level but only at the 'top of the house' level. In any case, the reason why an adjustment is not computed at desk level would have to be justified by the institution in order to avoid incentives for 'top of the house' computations only.

Criteria for inclusion in hypothetical P&L

186. Finally, only the valuation adjustments that are updated daily and are not in the above list of systematic exclusions would be included in the hypothetical P&L (at the 'top of the house' only or also at desk level, depending on the level at which these VAs are computed) unless specific agreement to exclude them has been obtained from the supervisory authority or the exclusion has been instructed by the supervisory authority. This should ultimately not be overly prescriptive, while providing the desired harmonisation, and should enable supervisors some degree of latitude to approve or not approve the hypothetical P&L computed by institutions, since supervisory authorities would have to check whether or not exclusions are well justified.

187. In addition, if a VA is taken into account in the daily VaR, it will have to be taken into account in the hypothetical P&L, as it is possible to compute and update it daily in this P&L. This would add consistency between the VaR and the hypothetical P&L and would possibly help to pass the current PLA test.

Guidance on valuation adjustments expected to be updated daily

188. In order to harmonise institutions' practices in terms of valuation adjustments to be included in the hypothetical P&L, additional guidance – in particular on valuation adjustments expected to be updated daily – could be provided at a further stage without specifying any exhaustive list of valuation adjustments.

189. A list of valuation adjustments to be formally considered is provided under CRR Article 105(10), which deals with requirements for prudent valuation, i.e. the calculation of additional valuation adjustments to be deducted from CET1 on a quarterly basis: unearned credit spreads, close-out costs, operational risks, market price uncertainty, early termination, investing and funding costs, future administrative costs and model risk. This list can be considered an exhaustive list of valuation adjustments to be considered for prudent valuation purposes. It is, however, not an exhaustive list of possible valuation adjustments.

190. Some of the valuation adjustments in this list are part of the fair value and, if related to market risk, could be potential candidates for inclusion in the hypothetical P&L subject to two conditions: not fulfilling the exclusion criteria and being updated daily.

191. Other ones are related to the prudent valuation framework only. In particular, unearned credit spreads are viewed as related to CVAs (i.e. AVA on CVA), so there is no rationale to include them in hypothetical P&L (or in the actual P&L).

192. The above list, which is not recent[16], could be supplemented by specifying for each broad category of valuation adjustments whether or not it is related to market risk, whether or not a daily frequency update in the P&L measure would generally be feasible, and at which level ('top of the house' only or also desk level) it could be computed. However, full harmonisation among institutions would be difficult to achieve, as these specifications would depend on their organisation, IT systems, etc.

Questions to stakeholders:

47. Do you agree with the list of criteria for systematic exclusions from hypothetical P&L?

48. Do you have numerous valuation adjustments not computed at desk levels? For those VAs, would it be possible to calculate them at desk level? If not, explain why.

49. Do you agree with the criteria defined for the inclusion of a valuation adjustment in the hypothetical P&L? If not, please give arguments. Do you agree with the proposal to provide only criteria for inclusion in or exclusion from the hypothetical P&L, in order to allow some flexibility, or do you think that we should have non-exhaustive lists supplemented by criteria?

[16] Basel II Prudent Valuation Guidance (November 2005), paragraph 699, mentions the same VA.

50. Do you agree with developing additional guidance on specific valuation adjustments: related to market risk versus not related to market list, possible daily frequency update in the P&L versus not daily, 'top of the house' versus desk-level computation?

51. Did you have overshootings that are mainly caused by valuation adjustments included in the hypothetical P&L? If yes, which valuation adjustments were mainly causing overshootings? Did you identify types of desks which were more frequently affected by such overshootings? Are these desks likely to breach the backtesting thresholds because of these overshootings (how frequently do the overshootings occur)?

Actual P&L for backtesting

Background

193. The purpose of the actual P&L is to capture the market risk arising from trading activities of the bank including the P&L stemming from intra-day trading (these being outside the scope of the risk model), including FX and commodities in the BB if they are in the IMA.

194. As all the elements that are outside the sphere of market risk, fees and commissions are excluded from the actual P&L, the scope of the calculation is restricted to the trading desks included in the IMA.

195. The actual P&L should be as close as possible to the daily P&L, so the same pricing models (i.e. the same pricing functions, pricing configurations, model parametrisation, market data and systems) should be used. The changes in value of all the F/O market parameters (even those that are not modelled in the VaR) should be taken into account in the actual P&L. As a consequence, NMRF should be included in the actual P&L.

196. In order to harmonise banks' practices, clarifications are proposed about the valuation adjustments to include in or exclude from the actual P&L.

197. The problematic of the time effect/net interest income is treated in a specific section below.

Criteria for systematic exclusion from the actual P&L

198. The proposed criteria for systematic exclusion of valuation adjustments are reduced compared with the case of hypothetical P&L, the only systematic exclusions being valuation adjustments for which a separate regulatory capital treatment exists (e.g. CVA) and valuation adjustments which are deducted from CET1.

199. The systematic exclusions from the actual P&L detailed above are mostly motivated by the fact that overshootings arising from risks other than market risks do not indicate a failure of the market risk model. Using them as criteria for performance of the market risk model would not make sense and would not improve model supervision. However, overshootings arising

from market risks that are not included in the scope of the market risk model but are part of market risk (e.g. intra-day trading) highlight the real economic risk of the institution.

200. Backtesting the VaR against the actual P&L captures the importance of effects that are not modelled in the risk engine but are part of market risk (e.g. intra-day trading) and is a useful test to ensure that desks with significant un-modelled intra-day trading P&L volatility are not modelled. It is also a way to check if the VaR is sufficient to cover the P&L stemming from intra-day trading and, more generally, P&L elements not included in the VaR.

Criteria for inclusion in the actual P&L

201. As opposed to the hypothetical P&L case, all valuation adjustments that are related to market risk, irrespective of their frequency's upgrade, should be included in the actual P&L unless specific agreement to exclude them has been obtained from the supervisory authority. As a consequence, there is no need for guidance on valuation adjustments in addition to that proposed in the hypothetical P&L section.

202. One exception to this rule, similar to the one described for the hypothetical P&L, concerns the adjustments not computed at desk level. Because they are assessed in terms of the firm's overall positions/risks or because of other constraints around the assessment process, those adjustments would be included in the actual P&L backtesting not at desk level, but only at the 'top of the house'. In any case, the reason why an adjustment is not computed at desk level would have to be justified by the institution.

203. On one hand, this inclusion of valuation adjustments irrespective of their calculation frequency could be an incentive for institutions to compute most of them daily to avoid the actual P&L being too far from the VaR if moves in market-risk-related adjustments are not taken into account in the VaR. On the other hand, the inclusion of non-daily adjustments can possibly lead to jumps in the actual P&L and thus overshootings. In any case, smoothing adjustments that are not calculated daily across the calculation period should not be allowed.

Questions to stakeholders:

52. Do you agree with the list of criteria for systematic exclusions from the actual P&L?

53. Do you agree with the criteria defined for the inclusion of a valuation adjustment in the actual P&L? If not, please provide arguments.

54. Did you have overshootings that are mainly caused by valuation adjustments included in the actual P&L? If yes, which valuation adjustments were mainly causing overshootings? Did you identify types of desks which were more frequently impacted by such overshootings? Are these desks likely to breach the backtesting thresholds because of these overshootings (how frequently do the overshootings occur)?

Specific issue of time/theta effect and net interest income

Background

204. Net interest income is a rather unclear notion with no precise definition. It is a concept not equivalent to, but closely related to, time/theta effect. A bond position funded through a derivative would see interest earned (NII) offset by theta on the derivative, whereas in the banking book the bond would be funded by a deposit meaning positive and negative interest income (hence net).

205. There are various interpretations of NII among banks. For example, in some cases NII is approximated by the time effect. In other cases, institutions consider that NII is specific to the banking book and null on the trading book, or align it with the accounting definition.

206. A proposed definition of NII is: 'Net interest income can be defined as the interest cash flow related component of the passage of time on the value of the portfolio (i.e. positions remain unchanged, market data remain unchanged and the date is moved from t to t+1). It measures the paid or received interest cash flows and the interest cash flow related effect on the fair value[17]. In the calculation of the net interest income, refinancing costs can be considered.'[18]

207. Similarly, the time effect is not defined in the same way in all institutions, as elements included in the time effect vary depending on institutions. Whereas some institutions name the time effect 'theta' (this is misleading, as theoretically speaking theta is the price sensitivity to time, i.e. the first-order derivative of the price relative to the time), other institutions include elements such as the carry in the time effect.

208. Based on these observations, it appears that there is a need to give a harmonised definition of the time effect as well as of net interest income, possibly including the link between NII and theta effect or more broadly time effect.

209. Once both NII and time effect definitions have been clarified, the question of inclusion in or exclusion from P&Ls for backtesting purposes has to be addressed.

210. Basel 2.5 specified that NII had to be excluded from P&Ls (actual and hypothetical) for backtesting purposes. However, in the FRTB rules, NII is mentioned nowhere. Moreover, the Basel 2.5 framework referred to instantaneous shocks for the VaR, which is usually understood as a computation of the VaR excluding time effects. Likewise, instantaneous shocks are no longer mentioned in the FRTB rules, or in the CRR.

[17] For example, if a bond coupon is received and the fair value of the bond drops by the coupon amount, the net interest income is zero.

[18] ECB draft TRIM guide (paragraph 65): https://www.bankingsupervision.europa.eu/banking/letterstobanks/shared/pdf/2017/trim_guide.en.pdf?6049006eb6eb6c14e07ab520acd68082

Proposal 1

211. One possibility would be to use a generic term for the 'P&L due to the passage of time', to include the passage of time in the actual P&L and to exclude the passage of time from the hypothetical P&L.

212. This proposal would not be too prescriptive on the definitions, thanks to the use of a more generic term: 'P&L due to the passage of time'. With such a terminology, NII would be 'formally' removed from the text, but implicitly included in the new generic term, and addressed consistently with other P&L components relating to the passage of time, the entire 'P&L due to passage of time' being included in the actual P&L and excluded from the hypothetical P&L. Intra-day trading is considered a sign of the passage of time, which is a realistic assertion.

213. Moreover, in the glossary of the current FRTB rules (i.e. not taking into account potential changes referring to valuation adjustments), the actual P&L is defined as 'the daily economic P&L based on the marking to market of the books and records of the bank excluding fees and commissions'. According to this definition, the actual P&L, being derived from the economic P&L, would include time effects. As a consequence, the actual P&L would include the 'P&L due to passage of time' as a whole (i.e. NII included), irrespective of whether or not it is modelled in VaR. The backtesting of the actual P&L is one of the tests to ensure that desks with significant un-modelled intra-day trading P&L volatility are not allowed. The passage of time in that case would also incorporate new trades.

214. In the glossary of the current FRTB rules (i.e. not taking into account potential changes referring to valuation adjustments), the hypothetical P&L is defined as the P&L produced by revaluing the positions held at the end of the previous day using the market data at the end of the current day. According to this definition, the hypothetical daily P&L between t and $t + 1$ is computed based on the assumption of static positions at t, i.e. without any change in the composition of the portfolio between t and $t + 1$. Therefore, it takes into account neither intra-day trading nor new/modified deals. It measures the changes of value of these static positions when moving the market data from their values at t to their values at $t + 1$. Moreover, since intra-day P&L is not included in the hypothetical P&L, hypothetical P&L should not take into account the time effect.

215. Proposal 1 has two main inconveniences. On the one hand, an actual P&L including time effect would not be in line with the VaR if time effect is not captured in the VaR. This is, however, not so important, since the actual P&L is used as a 'reality check' and this would reflect the actual trading experienced by the institution. On the other hand, the hypothetical P&L (excluding the passage of time) would not be consistent with the VaR (and the risk-theoretical P&L) if the time effect is captured in the VaR, but would be consistent with the risk-theoretical P&L if the VaR does not capture the time effect.

Proposal 2

216. Another possibility would be to use a generic term for the 'P&L due to passage of time', to include the passage of time in the actual P&L and to make the time effects consistent in hypothetical and risk-theoretical P&L, i.e. inclusion in or exclusion from both P&Ls, this last point being the main objective. It would provide some flexibility to take into account or not the time effects in the VaR.

217. The main advantages of Proposal 2 would be that it adds flexibility and there would be no need to define NII.

Proposals 3 and 3 bis

218. Another possibility would be to define NII and exclude it from both actual and hypothetical P&Ls. The rest of the time effect (i.e. time effect after removal of the NII) would be included in the actual P&L. For the hypothetical P&L, two variants could be considered, the inclusion of the time effect after removal of the NII in the hypothetical P&L (Proposal 3), or consistency between hypothetical and risk-theoretical P&L (Proposal 3bis), like in Proposal 2.

219. In these proposals, references to NII as a component of the time effect would be kept and NII would be clearly defined and isolated from the other elements of the time effect, the main issue being how to define the NII.

220. NII would be treated in the same way as fees and commissions, i.e. exclusion from both actual and hypothetical P&L. The rational for this clustering is that each of these elements is purely deterministic and independent from any market risk factor.

Questions to stakeholders:

55. According to you, is the net interest income part of the time effect?

56. Do you agree with the proposed definition for net interest income? If not, what would be your proposal?

57. Would you like further indications of the elements to take into account in the time effect? Which elements would you include in the time effect?

58. Regarding the different proposals, do you agree with EBA that Proposal 2 would achieve the best outcome? If not, what would be your suggestion?

Hypothetical P&L for P&L attribution purposes

221. In the current FRTB text, the hypothetical P&L for the purpose of backtesting is the hypothetical P&L used to pass the P&L attribution test.

Risk-theoretical P&L

222. The risk-theoretical P&L is the daily P&L calculated using the risk factors and valuation engines in the risk model. The risk-theoretical P&L takes into account all risk factors that enter into the risk management model (i.e. risk factor inputs which are inputs of the ES as well as NMRF).

223. In its current definition, the P&L attribution test should check if a sufficient number of pricing factors and pricing parameters that a bank incorporates in its daily P&L are incorporated as risk factors in the ES model or capitalised by a SSRM charge (i.e. the risk factor coverage). Where a proxy is used in the ES model, the test should assess the quality of that proxy. Besides that, the divergence in the bank's pricing models used for the daily P&L and the pricing models used for risk management purposes (i.e. for the ES calculation as well as the NMRF capital charge) should be tested in the P&L attribution test.

224. In its future design, the P&L attribution test will be based on comparisons between risk-theoretical and hypothetical P&Ls, with the difference between the risk-theoretical and hypothetical P&L ('unexplained P&L') being a key input to the P&L attribution test.

225. The elements taken into account for the computation of the risk-theoretical P&L will have a major impact on the results of the test.

226. The risk-theoretical P&L should be as far as possible in line with the hypothetical P&L. This means that the same valuation adjustments should be taken into account in both P&Ls. In other words, the criteria for systematic exclusion as well as the criteria for inclusion in the risk-theoretical P&L should be identical to those for the hypothetical P&L.

Questions to stakeholders:

59. Do you agree with the principle of including in or excluding from the risk-theoretical P&L the same valuation adjustments as for the hypothetical P&L?

4.8 FRTB – Non-modellable risk factor stress scenario risk measure

4.8.1 Background and rationale

227. The stress scenario risk measure in Article 325bl(2) of the CRR2 proposal is computed for each single NMRF relevant to positions whose market value depends on that non-modellable risk factor in the trading book and all relevant FX and commodity positions.

228. That means, netting is generally allowed across positions (potentially restricted by maturity impacts) with the same NMRF; however, no diversification with other risk factors is allowed unless the specific conditions for idiosyncratic credit spread risks in ICSS (the first part of the sum in Article 325bl) are met.

229. The NMRF framework is a significant innovation in the new market risk rules. Applying to banks using market risk IMA, the NMRF framework introduces a non-discretionary methodology for distinguishing between modellable risk factors and non-modellable risk factors.

230. There are two dimensions to the NMRF framework. First, the framework sets out criteria for assessing whether a risk factor is modellable or non-modellable, based on an objective assessment of the availability of real prices, i.e. verifiable prices in the CRR2 terminology. Where there are sufficient verifiable prices for a given risk factor, that risk factor is considered modellable and can be included in a bank's IMA expected shortfall model; modellable risk factors benefit from diversification and hedging benefits with other modellable risk factors. Where a risk factor is non-modellable, i.e. an NMRF, the second dimension of the NMRF framework applies: the NMRF is excluded from the expected shortfall model and capitalised separately, producing a capital charge referred to as 'stress scenario risk measure' (SS).

231. The BCBS revised market risk framework[19] states that, for NMRFs, 'each non-modellable risk factor is to be capitalised using a stress scenario that is calibrated to be at least as prudent as the expected shortfall calibration used for modelled risks (i.e. a loss calibrated to a 97.5% confidence threshold over a period of extreme stress for the given risk factor'. On its own, this statement leaves significant discretion to institutions in calculating SSRM capital charge. This potentially represents a significant source of RWA variability across institutions, which the EBA judges is particularly unwarranted, as NMRFs are characterised by the limited availability of good quality data with which to calculate the SSRM capital charge.

232. The intention of point (a) of this RTS mandate is thus to introduce a harmonised procedure for calculating capital charge for NMRFs, with the objective of providing a degree of consistency across institutions.

[19] BCBS Minimum capital requirements for market risk paragraph 190.

233. Point (b) of this RTS mandate considers a fallback solution where the methodology in point (a) is not feasible. The BCBS revised market risk framework essentially requires that a 'maximum possible loss' for the risk factor should be taken; as a 'maximum possible loss' is not well defined for certain instruments, an alternative fallback solution is proposed.

4.8.2 Preliminary discussion and proposal

a. Point (a) of the proposed SSRM RTS mandate: calculation method

Proposal to determine scenario of future shock applicable to non-modellable risk factors (point a of the proposed mandate)

234. This section proposes a general methodology to determine a scenario of future shock applicable to non-modellable risk factors that could be used to address the RTS mandate provided in point (a) of Article 325bl(4) of the CRR2 proposal. This methodology could be considered a minimum requirement for institutions, i.e. institutions may opt to choose a more severe shock to their portfolio if the methodology produces particularly low shocks for certain risk factors. Thus, institutions would be incentivised to be more conservative, resulting in calculating higher stress scenario risk measures, in particular in cases where they are asking supervisors to exempt them from counting certain backtesting exceptions[20].

235. The proposed methodology relies on first determining a range of extreme shock scenarios based on historical time series of data that are representative of the NMRF. Once this range has been determined, the stress scenario for the given NMRF will be determined as the maximum loss incurred in the portfolio of positions containing the NMRF when the NRMF spans the range of extreme shocks.

236. The proposed methodology, as set out in the following sections, is intended as an estimate for a stressed expected shortfall for a single NMRF. Heuristically, the methodology takes the following steps.

1. Over the time-period being considered, observations of the NMRF are converted into returns (i.e. changes in the value of the risk factor between observations). These returns are scaled to the prescribed liquidity horizon of the risk factor as per Table 2 in Article 325be, using the square root of time.

2. A standard deviation of LH-adjusted returns is calculated. A formula is prescribed for calculation of the standard deviation to allow an estimation with a specified confidence level when there are limited data available (to minimise the likelihood of the standard deviation being underestimated).

[20] In fact, Article 325bg(8) of the CRR2 proposal specifies that 'competent authorities may permit an institution not to count an overshooting where a one-day change in its portfolio's value exceeds the related value-at-risk number calculated by that institution's internal model is attributable to a non-modellable risk factor. To do so, the institution shall substantiate to the competent authorities that the stress scenario risk measure calculated in accordance with Article 325bl for this non-modellable risk factor is higher than the positive difference between the institution's portfolio's value and the related value-at-risk number.'

3. The standard deviation is transformed into an extreme shock to the risk factor, using a prescribed formula. The prescribed formula is essentially an estimate of the expected shortfall for the NMRF itself.

4. For their own portfolio, institutions calculate their maximum loss assuming that the risk factor moves by *at most* the extreme shock calculated in step 3. In most cases, this will be realised when the risk factor moves by exactly the extreme shock (either increasing or decreasing); where institutions have tail hedges in place for the risk factor, the maximum loss may be realised for some return to the risk factor that is less than the extreme shock.

5. Finally, this maximum loss is multiplied by a portfolio-specific factor, κ (kappa), to get the SSRM capital charge for the risk factor. Kappa is conceptually correcting for portfolios with non-linear instruments, where the expected shortfall of the portfolio may be greater than the expected loss given the expected shortfall of the risk factor.

237. The following section formally sets out this proposed methodology, while the theoretical justifications and technical aspects of the methodology are presented in Annex 4 of this discussion paper.

Methodology for calculating the stress scenario risk charge

238. The proposed methodology relies on first determining a range of extreme shock scenarios based on historical time series of data that are representative of the NMRF. Once this range has been determined, the stress scenario risk measure for the given NMRF will be determined as the maximum of the loss incurred in the portfolio of positions containing the NMRF when the NRMF spans the range of extreme shocks.

239. For an NMRF *j* with value $r_j(D_t)$ at date D_t, we assume that the institution has collected a set of representative data. The interval $D_t - D_{t-1}$ represents the time between the observation of data $r_j(D_t)$ and $r_j(D_{t-1})$.

240. The calculation of the all the returns between two observation dates will be scaled up to the liquidity horizon of the NMRF, $LH(j)$, using the square root of time rule as for the scaling for modellable risk factors.

241. The return calculation – absolute returns (e.g. for low interest rates) or log-returns (e.g. for equity prices) – should follow the modelling assumption in the IMA ES model. Other return definitions, if consistent with the modelling in the IMA, should be used, e.g. if the institution uses a return that crosses over from absolute to relative returns.

242. Absolute returns: in this case, the return $Ret(r_j, t)$ between observations at $r_j(D_{t-1})$ and $r_j(D_t)$ will be given by:

$$Ret(r_j, t) = Ret(abs, LH(j), r_j, D_t, D_{t-1}) \stackrel{\text{def}}{=} \left(r_j(D_t) - r_j(D_{t-1})\right) \times \sqrt{LH(j)/(D_t - D_{t-1})}$$

243. Log returns: in this case, the return $Ret(r_j, t)$ between observations at $r_j(D_{t-1})$ and $r_j(D_t)$ will be given by:

$$Ret(r_j, t) = Ret(ln, LH(j), r_j, D_t, D_{t-1}) \stackrel{\text{def}}{=} \ln\left[\frac{r_j(D_t)}{r_j(D_{t-1})}\right] \times \sqrt{LH(j)/(D_t - D_{t-1})}$$

244. Having determined the set of scaled returns, the standard deviation of these returns, $\hat{\sigma}_{Ret(j)}$, is estimated as:

$$\hat{\sigma}_{Ret(j)} = \sqrt{\frac{1}{N - 1.5} \times \sum_{t=1}^{N} \left(Ret(r_j, t) - \overline{Ret(r_j)}\right)^2}$$

where *N* is the number of returns and the variable $\overline{Ret(r_j)}$ denotes the mean of the sample of returns.

245. The range of extreme shock (the 'calibrated stress scenario risk factor range') to the NMRF around $r_j(D_t)$ is given by:

$$\boldsymbol{CSSRFR}\left(\boldsymbol{r_j(D_t)}\right) = \left[\boldsymbol{r_j(D_t)} \ominus \boldsymbol{CS(r_j)}, \boldsymbol{r_j(D_t)} \oplus \boldsymbol{CS(r_j)}\right]$$

where:

- $\ominus$ and $\oplus$ are the operators applying the shock $CS(r_j)$ downwards and upwards to $r_j(D_t)$, consistently with the method chosen to calculate the returns (e.g., for absolute returns, $|r_j(D_t) \ominus CS(r_j) = r_j(D_t) - CS(r_j)|$);
- the range should be capped and floored at the maximum and minimum possible theoretical values respectively;
- $CS(r_j)$ is the extreme shock ('calibrated shock') calculated so that it is an estimate of the expected shortfall of the NMRF distribution:

$$\boldsymbol{CS(r_j)} \stackrel{\text{def}}{=} \boldsymbol{C_{ES\,equiv}} \times \boldsymbol{\hat{\sigma}_{Ret(j)}} \times \left(\boldsymbol{1} + \frac{\boldsymbol{\Phi^{-1}(CL_{sigma})}}{\boldsymbol{\sqrt{2(N - 1.5)}}}\right)$$

where:

- CL_{sigma} is a confidence level of not underestimating the true (but unobserved) standard deviation of the risk factor returns;
- $C_{ES\,equiv}$ is the approximate ratio of the expected shortfall to the standard deviation.

246. They are discussed in more detail below, regarding their calibration, and in Annex 4, regarding their technical definition and meaning.

247. Finally, the stress scenario risk measure on date D_t is given by the scenario for the NMRF in the range of extreme shocks that would maximise the loss of the portfolio composed of all the positions containing this NMRF (all the other risk factors held constant) multiplied by a factor κ_j:

$$\boldsymbol{SS_t^j = \kappa_t^j \times \max_{r_j \in CSSRFR\left(r_j(D_t)\right)} \left[loss_t(r_j)\right] = \kappa_t^j \times loss\left(FS_t[r_j]\right)}$$

where:

- $PV\left(r_j, r_{i\neq j}\ fixed\right)$ is the value of the portfolio of all the positions susceptible to the NMRF r_j (all the other risks factors of this portolio $r_{i\neq j}$ remain fixed);
- $loss_t(r_j) \stackrel{\text{def}}{=} PV\left(r_j = r_j(D_t), r_{i\neq j}\ fixed\right) - PV\left(r_j, r_{i\neq j}\ fixed\right)$ is the loss of the positions susceptible to the risk factor r_j when shocking this risk factor from its value on D_t, $r_j(D_t)$, to a value $r_j \in CSSRFR\left(r_j(D_t)\right)$;
- the future shock scenario is the realisation of the NMRF r_j which leads to the highest loss in the calibrated stress scenario risk factor range: $FS_t[r_j] \stackrel{\text{def}}{=} \underset{r_j \in CSSRFR\left(r_j(D_t)\right)}{\text{argmax}} \left[loss_t(r_j)\right]$;
- κ_t^j is a multiplicative factor specific to the risk factor $r_j(D_t)$ to cater for non-linearity in the loss function.

Non-linearity adjustment κ_t^j

248. The stress scenario risk measure is an estimate of an expected shortfall for losses due to the NMRF $r_j(D_t)$ (to be consistent with the Basel standards) if we are making the assumption that $ES\left[loss\left(r_j(D_t)\right)\right]$ *is* approximately equal to $loss\left(ES\left[r_j(D_t)\right]\right) \approx loss\left(FS_t[r_j]\right)$.

249. When losses grow faster than linearly, the expected shortfall of losses for varying $r_j(D_t)$ is higher than the loss of the expected shortfall of $r_j(D_t)$, however.

250. In order to capture this deviation, we incorporate the non-linearity adjustment

$$\kappa_t^j \stackrel{\text{def}}{=} max\left[1, \frac{ES\left[loss\left(r_j\right)\right]}{loss\left(FS_t[r_j]\right)}\right]$$

251. There are some options on how to set κ_t^j; see Annex 3 for details.

Specifications of the general methodology

252. For the different elements of the methodology, a number of elements need to be specified in more detail. This section lists the elements and some proposed options on which feedback is sought.

1) Definition of the observation period

253. An observation period needs to be defined to collect the observations of representative data for each NMRF $r_j(D_t)$. According to the FRTB, the period needs to reflect stress conditions for the NMRF. Different options could be considered

a) Include the preceding 1-year period and additionally multiply the stress scenario risk measure by some scaling factor to reflect a 1-year stress period, similar to the approach taken in the calculation of the expected shortfall for the MRF.

b) Include the preceding 1-year period and extend it back in time to include the 1-year stress period for the regular ES risk measure.

c) Include the 1-year stress period for the modellable risk factors in the expected shortfall calculation.

d) Include the worst stress period (1 year but potentially longer) for each NMRF for all the positions containing this NMRF. This would be consistent with Basel FAQs MRG-072 and MRG-202.

2) Types of data acceptable for the observations

254. Different options could be considered.

a) FRTB standards (paragraph 183[21]) remain silent on the type of data which could be used in the calculation of both the expected shortfall for MRF and the stressed scenario risk measure for the NMRF. Since the data observed for the NMRF are crucial in the general methodology, it would be important to specify which data would be accepted for the observation. Different options could be considered. The data could correspond to the definition of real (or verifiable) price data used to determine whether a risk factor is modellable or not.

b) The data could correspond to the same data type as the data allowed in the computation of the expected shortfall calculation for the MRF.

c) If NMRF 'gauge' risk factor data (similar to proxy data) could be used (e.g. on a credit spread curve some maturities might not be modellable because they are rarely traded while other tenors are more liquid), the gauge data of the liquid and modellable maturities could, under specific conditions, be used to calculate the standard deviations of the maturities classified as non-modellable with some modifications of the data to ensure conservativeness. Gauge data for an NMRF needs to ensure that its usage does not lead to a risk underestimation compared with using the actual risk factor data.

[21] 'Once a risk factor is deemed modellable, the bank should choose the most appropriate data to calibrate its model – the data used for calibration does not need to be the same data used to prove that the risk factor is modellable.'

3) Additional conditions on the data observed for the NMRF

255. Some additional conditions could be introduced to ensure that the observation data set is relevant, for example the following.

- On each observation date D_t, only one observation is allowed. As an extension, a minimum time interval between two acceptable observations could be specified, e.g. 5 days or 10 days. This is needed in particular if many observations are available. If daily representative observation data were available for an NMRF, except for a period above 1 month triggering the classification as NMRF, the returns on the relevant liquidity horizon could be computed directly without scaling to the liquidity horizon outside the missing data period.

- Stale observations are not allowed. That means, if there is no new market activity, the observation must not be carried over from a previous observation date.

- In order to make the general methodology more robust, the RTS could require that a minimum number of acceptable observations should be found in the observation period. Otherwise the fallback solution defined in the next section would have to be used.

256. A hierarchy of relevant observable data could be defined: if none of the elements of the acceptable observation requirements is met, including some gauge (proxy) data, and insufficient data are available, then the fallback approach applies.

4) Definition of the liquidity horizon LH(j) for an NMRF

257. The FRTB specifies that the liquidity horizon of a NMRF should be the greater of (i) the maximum time between two consecutive data observations and (ii) the liquidity horizon assigned according to the liquidity horizons specified in Table 2 in Article 325be of the CRR2 proposal. However, Article 325be of the CRR2 proposal introduced the effective liquidity horizons concept to take into account the maturity of positions. This additional dimension could create some complexity if combined with the FRTB requirements.

258. Two options could be considered.

a) Find a formula to combine the effective liquidity horizons with the FRTB requirement.

b) For simplicity, go back to the FRTB definition and discard the introduction of the additional maturity dimension.

5) Calibration of parameter $\mathrm{CL}_{\mathrm{sigma}}$

259. This parameter captures the estimation uncertainty due to a low number of observations ('uncertainty compensation'). The confidence level CL_{sigma} is (approximately) the probability of not underestimating the true value of the estimated standard deviation.

260. From a prudential perspective, there should be a high level of confidence and it is probably appropriate to fix the value to a high confidence level, such as 90%. The effect of the parameter decreases quickly with an increasing number of observations.

6) Calibration of parameters $C_{ES\ equiv}$

261. This parameter describes the ratio of the expected shortfall at the desired confidence level of the NMRF to the standard deviation. It depends on the (unobserved) true distribution of the non-modellable risk factor and increases for fatter distribution tails and skewness. The technical note, Annex 4, illustrates values for $C_{ES\ equiv}$.

262. There are several options for the setting of the parameters for the quantitative method:

a) Set one conservative fixed value (3…5?). Because the value is fixed and needs to cover all risk factors, it needs to be conservative.

   PRO: reduces RWA variability; simple.

   CON: not risk sensitive; might underestimate $C_{ES\ equiv}$ for some risk factors and be over-conservative for others.

b) Set one conservative base value (3…5?) and let the institutions set the value for each non-modellable risk factor, subject to a floor of 3. The base value is a moderately conservative starting point that institutions have to use, unless they can then demonstrate that a lower value is more appropriate. The floor should be set to cover only some non-normality. The institutions need to document the methodology for setting the value used, which is part of the model approval. The values would be reported in COREP for ongoing monitoring and analysis.

   PRO: reduces RWA variability somewhat; sets incentives for institutions.

   CON: setting of base and floor still a challenge.

c) Let the institutions set the value for each non-modellable risk factor, subject to a floor of 3. The floor should be set to cover only some non-normality. The institutions need to document the methodology for setting the value used, which is part of the model approval. The values would be reported in COREP for ongoing monitoring and analysis.

   PRO: more risk sensitive; sets incentives for institutions.

   CON: increases RWA variability; setting of floor still a challenge.

7) Calibration of κ_j

263. κ_j depends on the *ratio* $\frac{ES[loss(r_j)]}{loss(FS_t[r_j])}$, which typically depends on the non-linear position price characteristics for strong risk factor movements. In addition, it could cater for other qualitative weaknesses of the implementation of the SSRM in an institution.

264. Different options could be considered.

- Option A: κ_t^j could be calculated according to a methodology proposed by the institution, to be approved by the competent authority as part of the model approval.

PRO: most risk sensitive.

CON: increases RWA variability; burdensome for institutions and CAs; potentially high computational effort.

- Option B: κ_t^j could be calculated based on prescribed tail distributions for the risk factors. These could be distributions per NMRF classes or globally. The characteristics of the instruments would enter in the loss calculation, and kappa could be calculated by numerical integration. Simplest option: Student's t to capture some non-normality.

PRO: risk sensitive, comparable across institutions.

CON: computational effort.

- Option C: κ_t^j could be set based on prescribed tail distributions for the risk factors and assuming that the non-linear component of losses is quadratic only and SBM curvature values.

PRO: somewhat risk sensitive, comparable across institutions.

CON: SBA curvature method might not be designed for that purpose; non-linear tail losses not necessarily quadratic.

- Option D: κ_t^j could be set to 1 for some or all NMRFs subject to conditions, e.g. for low materiality or coverage by some add-on.

PRO: simple.

CON: not risk sensitive.

- Option E: κ_t^j could be set to 1, i.e. correction for portfolio non-linearity should not be considered, as it may impose unwarranted complexity on the framework.

PRO: simple.

CON: not risk sensitive.

8) Calibration of κ_t^j, CL_{sigma} and $C_{ES\ equiv}$ to achieve the target calibration 'at least as high as an expected shortfall'

265. The results of the calibration of CL_{sigma}, $C_{ES\ equiv}$ and κ_t^j need to be viewed in combination in order not to deviate inappropriately far from the target calibration.

266. There also needs to be a balance between the various other components of the framework and the calibration. In particular, a longer period for observations provides potentially more data points, but at lower average volatility.

Questions to stakeholders:

60. What are your preferred options for points 1-8 above? How would you justify these preferences?

61. Do you have any observations or concerns about the overall methodology proposed for point (a) of the mandate?

62. Do you have an alternative proposal for the calculation of an extreme scenario of future shock or stress scenario risk measure?

Calculation method variants

267. The calculation method outlined above could be called a 'risk factor based approach' for the stress scenario risk measure, whereby the standard deviation of each NMRF risk factor is obtained, multiplied by $C_{ES\,equiv}$, to which the loss function is applied and then, for non-linear positions, kappa captures the non-linearity to get $ES\left[loss\left(r_j\right)\right]$.

268. Kappa calculation requires numerical tail integration of the positions' losses in the tail for each risk factor where it is applied.

269. An alternative would be to consider a 'direct loss based approach' for the stress scenario risk measure, where the standard deviation of the losses for each of the NMRF observation dates is calculated, which is then multiplied by a constant to obtain $ES\left[loss\left(r_j\right)\right]$ directly. Because the losses already capture the full pricing, no additional considerations for non-linearity are needed. However, the loss needs to be evaluated for all NMRFs and all observation dates.

270. It should be noted, however, that this approach could be considered to be inconsistent with the current CRR2 mandate.

271. An important aspect is the computational effort. Let $N_{allrf} = N_{MRF} + N_{NMRF}$ be the number of risk factors in the institution's ES model. This set comprises N_{MRF} modellable and N_{NMRF} non-modellable risk factors. The number of portfolio loss evaluations for single risk factors is:

a) NMRF SSRM 'risk factor based approach': $N_{NMRF} \times \left(1 + N_{evaluations\ for\ \kappa}\right)$

b) NMRF SSRM 'direct loss based approach': $\sum_{j \in NMRF}^{N_{NMRF}} N_j = N_{NMRF} \times \overline{N_j}$

Where $N_{evaluations\ for\ \kappa}$ is the average number of evaluations for obtaining the non-linearity adjustment and $\overline{N_j}$ is the average number of return observations and evaluations for NMRF j.

272. If the non-linearity adjustment needs to be calculated and $1+N_{evaluations\ for\ \kappa} > \overline{N_j}$, the risk factor based approach requires more evaluations; otherwise the risk factor based approach requires fewer portfolio loss evaluations.

273. The evaluations per NMRF are independent of each other and can be parallelised trivially on multiple CPUs systems.

274. The quantitative methodology is designed to allow a reasonable approximation of the expected shortfall for a low number of observations, fewer than $1/\alpha = 40$. If many observations for an NMRF are available, e.g. if a long observation period is allowed, and significantly more than $1/\alpha = 40$ observations are available, the expected shortfall for the NMRF returns can be calculated directly using a normal historical estimator.

Questions to stakeholders:

63. Do you have any comment on the 'risk factor based approach' versus the 'direct loss based approach'? Is computational effort a concern?

64. Is there a case for allowing institutions to calculate a standalone expected shortfall directly?

Outstanding issues

(a) How to define the frequency of review of the extreme scenarios of future shocks. In accordance with the monthly assessment of modellability of risk factors in Article 325bf(1)of the CRR2 proposal, a monthly review frequency could be considered a natural choice.

(b) Conditions in which supervisors may be dissatisfied with the calculation (leading to the application of the regulatory fallback).

(c) Documentation requirements.

(d) Reporting requirements. Banks could be required to report in updated COREP templates the nature of the NMRF, the liquidity horizon of the NMRF, the associated estimate for standard deviation and the extreme scenario of future shock, all or some ICSStm separately and all or the most material SStl. This would facilitate peer comparison, review by CAs and monitoring of practices.

(e) Some elements of these aspects could be inspired by the RTS on model assessment and GL on backtesting.

(f) Care must be taken that the method is sufficiently conservative in comparison with the IMA ES risk measure to avoid incentivising banks to include NMRF unduly.

(g) The approach assumes square root of time scaling. Its use for sparse observations might need some additional consideration.

Questions to stakeholders:

65. Do you have any views on points (a)-(g) above?

66. What are the most relevant NMRFs for your institution in broad terms?

67. What are the most relevant statistical distributions for NMRFs?

68. What are the most relevant non-linear tail loss profiles that need to be considered?

69. What is the materiality of non-linear tail losses in practice?

b. Fallback solution to determine scenario of future shock applicable to non-modellable risk factors (point b of the mandate)

275. If an institution cannot determine an extreme scenario of future shock in accordance with point (a) of the RTS mandate, or if competent authorities are not satisfied with the extreme scenario of future shock determined by the institution, institutions must apply a fallback approach.

276. Any fallback solution must be sufficiently conservative to avoid incentivising banks to prefer the fallback solution instead of the general methodology defined in the sub-section 4.8.2.a. In addition, it should allow banks to be more conservative and hold additional capital if required (to ensure they hold sufficient SSRM capital to explain backtesting exceptions due to the NMRF) based on a predefined, approved and documented methodology (as opposed to ad hoc increases only, where an overshooting is detected).

277.Two possible options would be possible for the fallback approach.

Option 1: Institutions must calculate the 'maximum loss' that could arise from an adverse movement in the non-modellable risk factor.

- This approach is consistent with the fallback approach set out in the Basel FRTB standards.
- The approach is strictly conservative.
- The approach would be relatively straightforward for institutions to determine for certain instruments (e.g. a cash equity position) but the concept of a maximum loss would not be well defined for a variety of instruments. Even simple linear derivatives such as FX forwards and interest rate swaps can have a theoretically unbounded maximum loss.

Option 2: The fallback approach prescribes a specific range of stress scenarios that institutions should apply to their NMRFs to determine the SSRM capital requirements.

- More specifically, the specific stress scenario could be a prescribed shock to the NMRF which is determined based on observed extreme movements in similar risk factors.
  - For example, the prescribed shock could be calibrated as the 1st and/or 99th percentile observation of movements of risk factors in the broad asset category in a period of stress.
  - The stress scenario should be conservatively calculated to ensure that the methodology in point (a) of the approach is generally preferred.
- This approach would be consistent with the general methodology set out in in the sub-section 4.8.2.a.
- This approach would be more aligned with the expectations set out in point (b) of the proposed CRR2 mandate.
  - A unique prescribed shock could be provided for each of the broad asset classes as considered in Table 2 of Article 325be of the CRR2 proposal, as envisioned in point (b) of the mandate.

    While for each risk factor in point (a) a period per risk factor is defined, a risk factor class approach is chosen for simplification.

278.The remainder of this section provides further considerations on Option 2 for the fallback approach.

Determining appropriate risk factor shocks for the stress scenarios

279.A basic principle of the NMRF framework is that capital requirements for an individual risk factor should be broadly similar to the capital requirements for a risk factor in the IMA expected shortfall model if calculated in a standalone model (but, unlike modellable risk factors, the capital requirements are aggregated conservatively without diversification or hedging recognition, and the stress scenario is unique to each risk factor). Thus the prescribed shocks for each stress scenario would ideally be calibrated as the ES(97.5%) risk factors, which

correspond for the Gaussian distribution to the 1st and/or 99th percentile observation of movements of risk factors in the broad asset category in a period of stress.

280. Notably, the risk weights in the new SA could be used as the basis for the prescribed shocks of the fallback approach; the delta and vega risk weights in the SBA are broadly similar to shocking risk factors in the sense that they specify risk factor movements.

281. Tables with proposed prescribed shocks are presented in Annex 2 of this document. The rationale used for determining the prescribed shocks is as follows.

- For underlying (delta) and volatility risk factors, the maximum SA risk weight is used for any risk factors in that broad asset class. The maximum is taken, given that the fallback approach should be designed to be more conservative than the methodology in point (a) of the mandate. Where delta and vega risk weights prescribe a relative shock of 100%, the downside shock is adjusted to be less severe.
- For 'other' risk factors, the maximum of delta and volatility stress scenarios for the corresponding broad risk factor category is proposed.

282. To safeguard against arbitrage, the values presented in the tables in Annex 2 shall be further calibrated against the quantitative results of the methodology under point (a), to ensure that the fallback solution is consistently more conservative.

Additional considerations for the fallback approach

283. An extreme shock to an NMRF may not necessarily lead to a severe loss for an institution's portfolio relative to a less extreme shock (e.g. if the institution holds a straddle option on an underlying NMRF). Thus, institutions should be required to consider the value of the risk factor that leads to the maximum loss within the range of prescribed shocks:

$$\underset{r_j \in [r_j \pm range_j]}{\arg\max} \left[loss(r_j, r_{i \neq j} \text{ fixed}) \right].$$

284. The market value calculation should take into account the full price movements, such that non-linear effects are fully included. As calculating the maximum loss over a continuous range of shocks for their portfolio may be computationally burdensome, institutions may be permitted by their relevant competent authorities to consider the maximum loss for a more limited number of possible shocks within the prescribed range of shocks to be considered.

285. Furthermore, the tables presented in Annex 2 specify risk factor movements appropriate for the liquidity horizons of each broad asset category. As the Basel market risk rules require NMRFs to use a liquidity horizon that is the greater of the horizons prescribed in Table 2 of Article 325be of the CRR2 proposal and the largest time interval between two consecutive price observations over the prior year, shocks should be scaled using the square root of time rule.

286. Similarly to the methodology presented in point (a) of the mandate, banks using the fallback approach may opt to consider a more extreme stress scenario where they believe the shock is inadequate. This ensures that the prescriptive methodology does not force institutions to hold capital requirements that are insufficient to explain backtesting exceptions which could lead to failures in desk-level or portfolio-level backtesting (which mean that either a desk cannot be modelled or the IMA multiplier should be increased).

Questions to stakeholders:

70. Do you deem Option 1 (the 'maximum possible loss') or Option 2 (the prescribed risk weights) more suitable as a fallback approach? What is the reason for your preference?

71. Do you deem the risk factor categories and respective shocks presented in the tables in Annex 2 appropriate for the (types of) NMRFs you expect? If not, what is your proposal to remedy the issues you see?

4.9 Other implementation issues

287. In addition to the questions on the previous items, general industry feedback is requested on the following issues, which despite their importance have not been included in the previous sections.

FRTB – Revisions to RTS on assessment methodology and model changes

288. The implementation in the EU of the revised IMA standards will require the revision of the RTS on assessment methodology published on 22 November 2016, as well as of the RTS on model extensions and changes published on 4 July 2014. This is a comprehensive and important task encapsulating large parts of the framework.

289. All types of internal model approaches should be covered by the revised RTS on assessment methodology, in particular the internal default risk model. In this context, there would be no need to issue Guidelines on the internal default risk model, as this would be directly addressed in the RTS on assessment methodology.

290. Ideally, discussions on revisions to the RTS on assessment methodology should start as soon as the rules are stable, so that the new models are approved according to updated, harmonised RTS. In contrast, revisions to the RTS on model extensions and changes could be dealt with once the RTS on assessment methodology have been revised.

FRTB – Default risk charge – PDs and LGDs

291. With regard to default risk modelling, the FRTB text is similar to the Guidelines on IRC published by the EBA on 16 May 2012 (Section 12). The EBA Guidelines gave banks the option of directly using their IRB PD and LGD estimates for IRC purposes. Where no IRB PD and LGD estimates were available for a given issuer, banks were advised to use a methodology that is consistent with the IRB methodology, even though the use of PDs and LGDs provided by external sources was always, as an alternative, considered appropriate. The flexibility of the Guidelines was framed by the requirement for institutions to establish a hierarchy ranking their preferred sources of PDs and LGDs, in order to avoid cherry-picking.

292. The FRTB decided to go a step further, as it makes it compulsory for institutions with permission to estimate default probabilities or loss given default under the IRB framework to use those for their relevant issuers in their trading book (unless the supervisor estimates that they are not ‘sufficiently robust’). In the absence of such estimates, a methodology consistent with the IRB methodology has to be used; estimates provided by external sources are also acceptable if ‘relevant for the bank’s portfolio’.

293. Despite the move in the FRTB, the RTS on assessment methodology published by the EBA on 22 November 2016 removed the Guidelines’ provisions making a link with IRB PD and LGD estimates (or ratings), to keep only the requirement for the risk control unit to have documented a ‘hierarchy of sources of ratings for determining the rating of an individual

position' and 'where an IRC model uses different sources of ratings' to map the 'ratings into a common Masterscale'. This decision was justified by the priority given to the inner consistency of IRC modelling (i.e. sources of ratings or PDs have to be consistent with the transition matrices used) over its consistency with IRB modelling.

294. The CRR2 proposal is aligned with the FRTB requirements and includes RTS mandate to specify the requirements to be fulfilled in case the IRB estimates cannot be used. This issue could also be directly covered under the RTS on assessment methodology, as is the case currently.

FRTB – Level of own funds requirements for market risks

295. The CRR2 proposal introduces, from the date of application of the new revised market risk standards, a phasing-in of own funds requirements for market risks, via the application of a 65% factor during 3 years. Simultaneously, the EBA is requested to produce, 2 years after the date of application, a report on the impact of the application of the new SA and IMA, as well as on the opportunity to change the calibration of these approaches. Following this, and dependent on the international regulatory development and the specificities of the financial and capital markets in the Union, the Commission can decide to prolong or amend the 65% factor.

FRTB – Simplified standardised approach

296. In its Response to the European Commission's calls for advice on standardised approach for counterparty credit risk and own funds requirements for market risk[22], published on 3 November 2016, the EBA recommended introducing further proportionality in the market risk framework, in the form of higher thresholds below which simplified versions may be used and keeping the current standardised approach for institutions that fall between the small trading book business threshold of EUR 50 million and a higher threshold to be defined. The EBA recommended, however, that this should be subject to an appropriate recalibration of the current SA.

297. Following the advice provided in the EBA report, the Commission introduced in its CRR2 proposal a new threshold of EUR 300 million below which the current SA may be used, however without recalibration being proposed at this stage[23].

298. On 29 June 2017, the Basel Committee consulted on a simplified alternative to the standardised approach to market risk capital requirements[24]. In this document, the Basel Committee proposes a new approach, the new reduced SBM, to be used as a simplified

[22] https://www.eba.europa.eu/documents/10180/1648752/Report+on+SA+CCR+and+FRTB+implementation+%28EBA-Op-2016-19%29.pdf

[23] This is, however, the object of one of the two market risk reports that the EBA is requested to produce.

[24] https://www.bis.org/bcbs/publ/d408.htm

alternative under a threshold to be defined, or a recalibrated version of the Basel II standardised approach to market risk.

299. In line with the report published In November 2016, the EBA reiterates its preference for a recalibrated version of the current standardised approach. This would minimise the burden of moving to a sensitivity-based approach for medium-sized or smaller banks that currently use the standardised approach. In particular, it is felt that, from an IT point of view, implementing the reduced SBM is almost equivalent to implementing the FRTB SA, as the approaches are very similar.

300. As for the recalibration itself, the EBA considers that the recalibration of the current standardised approach should be carried out based on the FRTB SA, by simply applying a scalar at the risk class level, with a view to keeping a reasonable capital incentive for banks – especially the ones close to the threshold – to move towards the FRTB SA.

Questions to stakeholders:

72. Do you agree that, to the extent possible, new FRTB models in the EU should be approved according to updated, harmonised RTS on assessment methodology? Do you agree that, in the absence of such revised standards, relevant parts of the published RTS on assessment methodology, provided they are in line with the new requirements, should apply?

73. Do you agree that a recalibrated version of the current standardised approach – for banks below the EUR 300 million threshold (as currently proposed in the CRR2 proposal) – is preferable in the EU to the implementation of the BCBS reduced SBM? Do you agree that the recalibration should be carried out simply at the risk class level by applying a scalar, such that the recalibrated approach is generally more conservative – but not systematically more conservative – than the FRTB SA?

74. Do you have any comment on the items mentioned in this section or wish to raise additional implementation issues?

Annex 1 – Proposed CRR2 mandates

SA-CCR – Mapping of derivative transactions to risk categories – Article 277(6) of the CRR2 proposal

6. EBA shall develop draft regulatory technical standards to specify in greater detail:

a) a method for identifying the only material risk driver of transactions other than those referred to in paragraph 3;

b) a method for identifying transactions with more than one material risk driver and for identifying the most material of these risk drivers for the purposes of paragraph 3;

EBA shall submit those draft regulatory technical standards to the Commission by [6 months after the entry into force of this Regulation].

Power is delegated to the Commission to adopt the regulatory technical standards referred to in the first subparagraph in accordance with Articles 10 to 14 of Regulation (EU) No 1093/2010.

SA-CCR – Corrections to supervisory delta – Article 279a(4) of the CRR2 proposal

4. EBA shall develop draft regulatory technical standards to specify:

(a) 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;

(b) what objective information concerning the structure and the intend of a transaction institutions shall use to determine whether a transaction that is not referred to in Article 277(2) is a long or short position in its primary risk driver;

EBA shall submit those draft regulatory technical standards to the Commission by [6 months after the entry into force of this Regulation].

Power is delegated to the Commission to adopt the regulatory technical standards referred to in the first subparagraph in accordance with Articles 10 to 14 of Regulation (EU) No 1093/2010.

FRTB – Trading book boundary – Article 104a(1) of the CRR2 proposal

1. Institutions shall have in place clearly defined policies for identifying which exceptional circumstances justify the re-classification of a trading book position as a non-trading book position or conversely a non-trading book position as a non-trading book for the purposes of determining their own funds requirements to the satisfaction of the competent authorities. The institutions shall review these policies at least annually.

EBA shall develop guidelines by [two years after the entry into force of this Regulation] on the meaning of exceptional circumstances for the purpose of this Article.

FRTB – Treatment of non-TB positions subject to FX or commodity risk – Article 325(8) of the CRR2 proposal

8. EBA shall develop regulatory technical standards to specify in more detail how institutions shall determine the own funds requirements for market risks for non-trading book positions subject to foreign exchange risk or commodity risk in accordance with the approaches set out in points (a) and (b) of paragraph 1.

FRTB – Residual risk add-on – Article 325v(5) of the CRR2 proposal

5. EBA shall develop regulatory technical standards to specify in more details what is an exotic underlying and which instruments are exposed to other residual risks for the purpose of paragraph 2.

When developing those draft regulatory technical standards, EBA shall take the following elements into account:

- *a) Exotic underlying shall include exposures that are not in the scope of the delta, vega or curvature risk treatments under the sensitivities-based method laid down in Section 2 or the default risk charge laid down in Section 5. EBA shall at least examine whether longevity risk, weather, natural disasters and future realised volatility should be considered as exotic underlying exposures.*

- *b) When defining which instruments are exposed to other residual risks, EBA shall at least examine instruments that meet any of the following criteria:*

  - *i) An instrument is subject to vega and curvature risk own funds requirements in the sensitivities based method laid down in Section 2 and generates pay-offs that cannot be replicated as a finite linear combination of plain-vanilla options;*

  - *ii) An instrument is a securitisation position that belongs to the CTP, as referred to in Article 104(7) to (9). Non-securitisation hedges that belong to the CTP shall not be considered.*

FRTB – IMA liquidity horizons – Article 325be(7) of the CRR2 proposal

7. EBA shall develop draft regulatory technical standards to specify in greater detail:

- *a) how institutions shall map trading book positions to broad risk factors categories and broad risk factor subcategories for the purpose of paragraph 1;*

- *b) the currencies that constitute the most liquid currencies subcategory in the interest rate broad risk factor category of Table 2;*

c) *the currency pairs that constitute the most liquid currency pairs subcategory in the foreign exchange broad risk factor category of Table 2;*

d) *the definition of a small and large capitalisation for the equity price and volatility subcategory in the equity broad risk factor category of Table 2;*

FRTB – Backtesting and P&L attribution requirements

- Backtesting – Article 325bg(9) of the CRR2 proposal

9. The EBA shall develop draft regulatory technical standards to further specify the technical elements that shall be included in the actual and hypothetical changes to portfolio's value of an institution for the purpose of this article.

- P&L attribution requirements – Article 325bh(4) of the CRR2 proposal

4. The EBA shall develop draft regulatory technical standards to further specify:

(a) in light of international regulatory developments, the technical criteria that shall ensure that the theoretical changes in a trading desk portfolio's value is sufficiently close to the hypothetical changes in the trading desk portfolio's value for the purposes of paragraph 2;

(b) the technical elements that shall be included in the theoretical and hypothetical changes in a trading desk portfolio's value for the purpose of this Article.

- Extraordinary circumstances – Article 325ba(9) of the CRR2 proposal

9. EBA shall develop draft regulatory technical standards to specify in greater detail the extraordinary circumstances under which competent authorities may permit an institution to continue using its internal models for the purpose of calculating the own fund requirements for market risks of a trading desk that no longer meets the conditions referred to in points (b) or (c) of paragraph 1.

FRTB – Non-modellable risk factor stress scenario risk measure – Article 325bl(4) of the CRR2 proposal

4. EBA shall develop draft regulatory technical standards to specify in greater details:

a) *how institutions shall determine the extreme scenario of future shock applicable to non-modellable risk factors and how they shall apply that extreme scenario of future shock to those risk factors;*

b) *a regulatory extreme scenario of future shock for each broad risk factor subcategory listed in Table 2 of Article 325be which institutions may use when they cannot determine an extreme scenario of future shock in accordance with point (a), or which competent*

authorities may require the institution to apply when those authorities are not satisfied with the extreme scenario of future shock determined by the institution.

In developing those draft regulatory technical standards, EBA shall take into consideration that the level of own funds requirements for market risk of a non-modellable risk factor as set out in this Article shall be as high as the level of own funds requirements for market risks that would be calculated under this Chapter were this risk factor modellable.

EBA shall submit those draft regulatory technical standards to the Commission by [six months after the entry into force of this Regulation].

Annex 2 – Risk weights tables from SBM

Absolute shocks (percentage points)				
Broad risk factor categories	Broad risk factor subcategories	Liquidity horizons	Length of liquidity horizons (days)	Possible shocks for the fallback solution
Interest rate	Most liquid currencies and domestic currency	1	10	1.7%
	Other currencies (excluding most liquid currencies)	2	20	2.4%
Credit spread	Central government, including central banks, of Member States of the Union	2	20	0.5%
	Covered bonds issued by credit institutions established in Member States of the Union (Investment Grade)	2	20	2.0%
	Sovereign (Investment Grade)	2	20	1.0%
	Sovereign (High Yield)	3	40	3.0%
	Corporate (Investment Grade)	3	40	5.0%
	Corporate (High Yield)	4	60	12.0%

Relative shocks (percent of current value of risk factor)				
Broad risk factor categories	Broad risk factor subcategories	Liquidity horizons	Length of liquidity horizons (days)	Possible shocks for the fallback solution
Interest rate	Volatility	4	60	[-80%,+100.0%]
	Other types	4	60	[-80%,+100.0%]
Credit spread	Volatility	5	120	[-80%,+100.0%]
	Other types	5	120	[-80%,+100.0%]

Equity	Equity price (Large capitalisation)	1	10	60.0%
	Equity price (Small capitalisation)	2	20	70.0%
	Volatility (Large capitalisation)	2	20	77.8%
	Volatility (Small capitalisation)	4	60	[-80%,+100.0%]
	Other types	4	60	[-80%,+100.0%]
Foreign exchange	Most liquid currency pairs	1	10	21.2%
	Other currency pairs (excluding most liquid currency pairs)	2	20	30.0%
	Volatility	3	40	[-80%,+100.0%]
	Other types	3	40	[-80%,+100.0%]
Commodity	Energy price and carbon emissions price	2	20	60.0%
	Precious metal price and non-ferrous metal price	2	20	40.0%
	Other commodity prices (excluding energy price, carbon emissions price, precious metal price and non-ferrous metal price)	4	60	80.0%
	Energy volatility and carbon emissions volatility	4	60	[-80%,+100.0%]
	Precious metal volatility and non-ferrous metal volatility	4	60	[-80%,+100.0%]
	Other commodity volatility (excluding energy volatility, carbon emissions volatility, precious metal volatility and non-ferrous metal volatility)	5	120	[-80%,+100.0%]
	Other types	5	120	[-80%,+100.0%]

Annex 3 – Non-linearity adjustment κ_t^j

301. The stress scenario risk measure is an estimate of the expected shortfall (ES), $\mathrm{ES}\left[\mathrm{loss}\left(\mathrm{r_j}(\mathrm{D_t})\right)\right]$, of losses due to the NMRF $\mathrm{r_j}(\mathrm{D_t})$. In order to obtain it from the ES of the risk factor, $\mathrm{ES}\left[\mathrm{r_j}(\mathrm{D_t})\right] \approx FS_t\left[r_j\right]$, one has to cater for the fact that in general, the loss function application cannot be interchanged with the ES calculation in mathematical terms, these operations do not 'commute'.

302. This can be seen for convex loss functions $loss\left(r_j\right)$ from Jensen's inequality[25] for expectation values, stating:

$$E\left[loss\left(r_j\right)\right] \geq loss\left(E\left[r_j\right]\right)$$

303. Intuitively, the reason is that a convex loss function leads to magnified losses compared with the risk factor distribution for tail values of r_j. Restricted to the tail expectation being the expected shortfall for continuous distributions, we have:

$$ES\left[loss\left(r_j\right)\right] \geq loss\left(ES\left[r_j\right]\right)$$

304. This effect is taken into account by the non-linearity adjustment:

$$\kappa_t^j \stackrel{\text{def}}{=} \max\left[1, \frac{ES\left[loss\left(r_j\right)\right]}{loss\left(FS_t\left[r_j\right]\right)}\right]$$

305. The purpose of the following is to illustrate the non-linearity adjustment in a stylised setup. To see the connection to the non-linearity, we split the convex loss function into a linear and a non-linear loss component, where the non-linear component is comonotonic with the linear component:

$$loss\left(r_j\right) \stackrel{\text{def}}{=} loss_{\text{linear}}\left(r_j\right) + loss_{\text{non-linear}}\left(r_j\right)$$

306. A simple example is a quadratic loss term on top of linear losses.

307. Due to comonotonicity assumed, $ES\left[loss\left(r_j\right)\right] = ES\left[loss_{\text{linear}}\left(r_j\right)\right] + ES\left[loss_{\text{non-linear}}\left(r_j\right)\right]$.

308. For the linear loss component $loss_{\text{linear}}\left(r_j\right) = a \times r_j + b$, and for symmetrical risk factor distributions, the expected shortfall is homogeneous (regardless of the sign of a) and translation invariant, $ES\left[a \times r_j + b\right] = a \times ES\left[r_j\right] + b$, which means $ES\left[loss_{\text{linear}}\left(r_j\right)\right] = loss_{\text{linear}}\left(ES\left[r_j\right]\right)$, and so:

[25] J. L. W. V. Jensen, 'Sur les fonctions convexes et les inégalités entre les valeurs moyennes', *Acta Mathematica* vol. 30, pp. 175-193, 1906 [Online]. Available: https://projecteuclid.org/euclid.acta/1485887155

$$ES\left[loss\left(r_j\right)\right] = loss_{\text{linear}}\left(ES\left[\left(r_j\right)\right]\right) + ES\left[loss_{\text{non-linear}}\left(r_j\right)\right]$$

309. Leaving aside the max[] function and inserting those results into the definition of κ_t^j:

$$\kappa_t^j = \frac{ES\left[loss\left(r_j\right)\right]}{loss\left(FS_t\left[r_j\right]\right)}$$

$$= \frac{ES\left[loss_{\text{linear}}\left(r_j\right)\right] + ES\left[loss_{\text{non-linear}}\left(r_j\right)\right]}{loss_{\text{linear}}\left(FS_t\left[r_j\right]\right) + loss_{\text{non-linear}}\left(FS_t\left[r_j\right]\right)} = \frac{loss_{\text{linear}}\left(ES\left[\left(r_j\right)\right]\right) + ES\left[loss_{\text{non-linear}}\left(r_j\right)\right]}{loss_{\text{linear}}\left(FS_t\left[r_j\right]\right) + loss_{\text{non-linear}}\left(FS_t\left[r_j\right]\right)}$$
$$= \frac{loss_{\text{linear}}\left(ES\left[\left(r_j\right)\right]\right) + loss_{\text{non-linear}}\left(FS_t\left[r_j\right]\right) + ES\left[loss_{\text{non-linear}}\left(r_j\right)\right] - loss_{\text{non-linear}}\left(FS_t\left[r_j\right]\right)}{loss_{\text{linear}}\left(FS_t\left[r_j\right]\right) + loss_{\text{non-linear}}\left(FS_t\left[r_j\right]\right)}$$
$$= 1 + \frac{ES\left[loss_{\text{non-linear}}\left(r_j\right)\right] - loss_{\text{non-linear}}\left(FS_t\left[r_j\right]\right)}{loss\left(FS_t\left[r_j\right]\right)}$$

shows that κ_t^j depends on the non-linear loss component only in this setup with the comonotonic, non-linear, convex loss component.

310. In general, the non-linearity adjustment cannot be decomposed as above.

311. For pure delta positions: $loss_{\text{non-linear}}\left(r_j\right) \equiv 0 \Longrightarrow \kappa_t^j = 1$.

312. Considering the estimation error of the calibrated shock and of $FS_t\left[r_j\right]$, κ_t^j is floored at 1 and:

$$\kappa_t^j \stackrel{\text{def}}{=} \max\left[1, \frac{ES\left[loss\left(r_j\right)\right]}{loss\left(FS_t\left[r_j\right]\right)}\right]$$

313. For the stress-scenario risk measure, the loss is evaluated at the scenario$FS_t\left[r_j\right]$, which will in most cases be at the endpoints of the calibrated stress scenario risk factor range; otherwise the non-linearity adjustment is not needed (i.e. $\kappa_t^j = 1$).

314. If $FS_t\left[r_j\right]$ is at the endpoints of the shock range, $FS_t\left[r_j\right] \approx ES\left[r_j\right]$ by construction of the calibrated shock, so that we see that the difference $ES\left[loss_{\text{non-linear}}\left(r_j\right)\right] - loss_{\text{non-linear}}\left(ES\left[r_j\right]\right)$ from the non-linear losses indeed drives kappa:

$$\kappa_t^j \approx 1 + \max\left[0, \frac{ES\left[loss_{\text{non-linear}}\left(r_j\right)\right] - loss_{\text{non-linear}}\left(ES\left[r_j\right]\right)}{loss\left(FS_t\left[r_j\right]\right)}\right]$$

315. The expected shortfall for a continuous loss function is the loss tail conditional expectation over the density $\phi(l)$ of the loss distribution in the tail, up to –VaR[97.5%] divided by the cumulative tail probability,

$$ES\left[loss\left(r_j\right)\right] = \frac{1}{1 - 97.5\%} \int_{-\infty}^{-VaR\left[loss\left(r_j\right)\right]} l \times \phi(l)\, \mathrm{d}l$$

316. Therefore, if the density $\phi(l)$ of the loss distribution is prespecified or follows from a prespecified distribution of risk factors in the tail, the ES can be evaluated efficiently by numerical integration.

Annex 4 – Technical note on the calibrated risk factor quantile calculation

1. Outline and basic idea

317.This technical annex on the calibrated risk factor shock calculation is concerned with a statistical approach for a shock estimation corresponding to an expected shortfall with a specified confidence level for a non-modellable risk factor that is robust for small samples.

318.According to the RTS mandate, the quantitative stress scenario calculation for NMRFs should take into account the calibration of the own funds calculation for modellable risk factors, which is based on the expected shortfall at 97.5% and a liquidity horizon using a square root of time scaling.

319.For achieving a stress scenario risk measure based on a risk factor (as opposed to a measure based on the market value of the positions), this means that a shock scenario approximately matching the ES(97.5%, risk factor j) needs to be calculated and later 'converted' into an ES(97.5%, market value) for the market value.

320.The relevant significance level α is 1 – 97.5% = 2.5%. In order to have at least one observation in the α-tail, at least $1/\alpha = 40$ observations are required, which might not be the case for NMRF because of their definition. A risk factor is non-modellable according to Article 325bf of the CRR2 proposal if less than 24 verifiable price observations in the past year are available, or the gap between two consecutive observations is a month or more. Depending on what are the precise requirements for the observations of representative data for each NMRF, by the definition of an NMRF, only a few data points might be available. Therefore, the methodology should also work in the case of few observations.

321.Constructing an α-tail risk measure such as expected shortfall from a number of observations smaller than $1/\alpha$ is unusual and challenging and to our knowledge no commonly used estimation procedure is available for this constellation. For a recent comprehensive review of estimation methods for expected shortfall see Nadarajah et al. [1].

322.A quantitative method for a shock calibrated to a tail measure for non-modellable risk factors is intrinsically difficult because the true distribution is not known, data are sparse and any estimate will have a large estimation error.

323.While the true distribution will most likely not be Gaussian, due to the central limit theorem Gaussian distributions are often used as reference points and literature results are available. That is why for the development of the methodology we use results for the Gaussian distribution as a starting point, while keeping in mind that the calibration needs to capture non-Gaussianity.

324.The outline of the methodology for this proxy calculation of an ES(97.5%) shock for a NMRF is done in the following steps:

2) Calculate risk factor returns scaled to the relevant liquidity horizon.

3) Estimate the standard deviation of the returns based on the idea that it is more robust to estimate the standard deviation than a tail measure directly.

4) From a few observations, a distribution, respectively its standard deviation, cannot be reliably estimated. Thus, one needs to take into account the number of observations in order to adjust the range with an 'uncertainty compensation' function to target a certain confidence level for the standard deviation.

5) From the standard deviation computed in the previous step, construct an estimate for a shock corresponding to an ES(97.5%), the 'calibrated shock'.

2. Methodology

325.The calculation is performed in the following steps.

Step 1 (relevant returns at the liquidity horizon)

326.In order to assess the risk factor movements, the returns are calculated for the individual risk factors. From N_{RFO} risk factor observations, $N = N_{RFO} - 1$ returns are obtained as explained below.

327.For each NMRF j, it needs to be checked if a minimum number of risk factor observations, N_{RFOmin}, in the permissible observation period is available.

328.If so, take the risk factor observations at dates D_t to create N relevant returns scaled to the liquidity horizon LH(j) for the risk factor j. The scaling with the square root of time rule is done analogously to the partial expected shortfall calculation in Article 325bd of the CRR2 proposal.

329.Absolute returns: in this case, the return $Ret(r_j, t)$ between observations at $r_j(D_{t-1})$ and $r_j(D_t)$ will be given by:

$$Ret(r_j, t) = Ret(abs, LH(j), r_j, D_t, D_{t-1}) \stackrel{\text{def}}{=} \left(r_j(D_t) - r_j(D_{t-1})\right) \times \sqrt{LH(j)/(D_t - D_{t-1})}$$

330.Log returns: in this case, the return $Ret(r_j, t)$ between observations at $r_j(D_{t-1})$ and $r_j(D_t)$ will be given by:

$$Ret(r_j, t) = Ret(ln, LH(j), r_j, D_t, D_{t-1}) \stackrel{\text{def}}{=} \ln\left[\frac{r_j(D_t)}{r_j(D_{t-1})}\right] \times \sqrt{LH(j)/(D_t - D_{t-1})}$$

Step 2 (estimation of the standard deviation)

331. Estimate the sample standard deviation of the relevant returns, $\hat{\sigma}_{Ret(j)}$, with an unbiased estimator for small sample sizes (Brugger, 1969; Gurland & Tripathi, A Simple Approximation for Unbiased Estimation of the Standard Deviation, 1971):

$$\hat{\sigma}_{Ret(j)} = \sqrt{\frac{1}{N-1.5} \times \sum_{t=1}^{N} \left(Ret(r_j,t) - \overline{Ret(r_j)}\right)^2} = \sqrt{\frac{N-1}{N-1.5}} \times S$$

with $S^2 = \frac{1}{N-1} \times \sum_{t=1}^{N} \left(Ret(r_j,t) - \overline{Ret(r_j)}\right)^2$ being the (unbiased) estimator of the sample variance, which is typically available in software.

332. The estimator $\hat{\sigma}_{Ret(j)}$ is obtained for independent and identically distributed (i.i.d.) normally distributed random variables with standard deviation σ and is only approximate in N (Gurland & Tripathi, A Simple Approximation for Unbiased Estimation of the Standard Deviation, 1971). The most important feature of this estimator is that it is approximately unbiased for small N and a distribution that is sufficiently close to the normal distribution.

333. $\overline{Ret(r_j)}$ is the mean return, which we will ignore in the remainder, because it is typically small compared with the volatility effect and could be easily added as a constant if needed.

334. Figure 5 shows the estimator result for a small number N = 11 of returns, resampled to get a smooth density function. The black line is the result of the estimator. It often underestimates the true value of the standard deviation, which is set to unity. In order to ensure that the true value is not underestimated, with a certain confidence level, the estimator needs to be shifted, such that the total probability of underestimation matches a prespecified value. Step 3 (confidence level for sigma estimate) explains how.

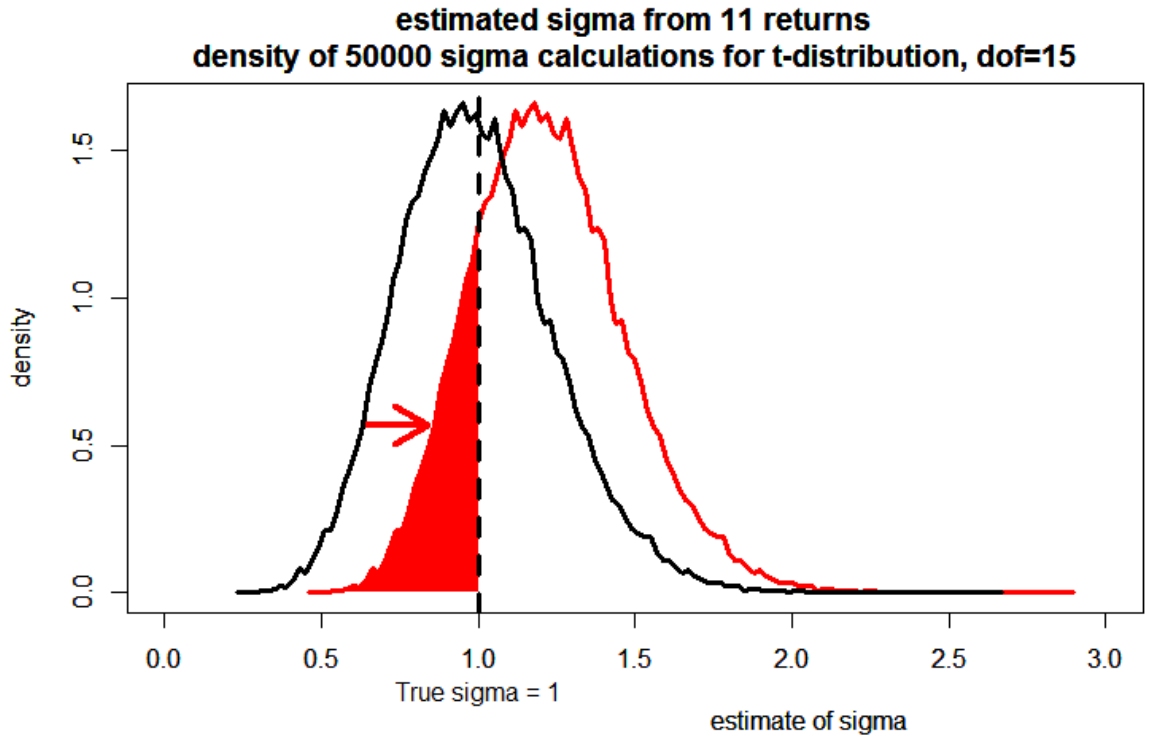

Figure 5

335. Given the low number of return data and the considerable estimation error, we think that incorporating higher moments, such as skewness and kurtosis, is problematic due to the additional estimation error for higher than second moments.

336. Neglecting skewness (and higher moments of uneven order) means that the derived stress risk factor range is symmetrical by construction, because information on asymmetrical behaviour of returns is not captured, although financial time series are often 'left sided' in the sense that high losses occur more frequently than high gains. Neglecting non-normality effects, such as excess kurtosis, leads to a systematic underestimation of the true value. However, instead of introducing more estimation error sources, the calibration of the shock based on the standard deviation needs to reflect this fact.

Step 3 (confidence level for sigma estimate)

337. As illustrated in Figure 5, the estimation of the returns' sample standard deviation is subject to a considerable estimation error. The goal is to achieve an estimate with a targeted confidence level, that is, to approximately calculate the shift needed in order to get the red curve in Figure 5, so that the red area under the curve corresponds to a probability of 1 – CL_{sigma}.

338. We start again from the normal distribution for which analytical results are known.

339. Assuming that all N returns of the risk factor j are i.i.d. normal with unobserved true population standard deviation σ and zero mean, by definition of the Chi distribution, the sum of the squared returns follows a Chi distribution with k = N – 1 degrees of freedom [4]:

$$\sqrt{N-1.5} \times \frac{\hat{\sigma}_{Ret(j)}}{\sigma} = \frac{1}{\sigma} \sqrt{\sum_{t=1}^{N} \left(Ret(r_j,t) - \overline{Ret(r_j)}\right)^2} \sim \mathrm{X}_k$$

with the probability density function of the Chi distribution, X_k:

$$PDF_{Chi}(\mathrm{X}_k) = \frac{2^{1-\frac{k}{2}}\, x^{k-1}\, e^{-\frac{x^2}{2}}}{\Gamma\left(\frac{k}{2}\right)}$$

340. The variance of the Chi distribution is [5]:

$$\sigma^2_{Chi}(\mathrm{X}_k) = k - \frac{2\,\Gamma\left(\frac{k+1}{2}\right)^2}{\Gamma\left(\frac{k}{2}\right)^2}$$

341. The Chi distribution X_k gets close to the normal distribution relatively quickly when increasing the degrees of freedom, so that a confidence level for $\frac{\hat{\sigma}_{Ret(j)}}{\sigma}$ can approximately be obtained using a standard normal quantile multiplied by the standard deviation of the Chi distribution.

342. This approximation rests on the assumptions of i.i.d. normality and N large enough so that $\mathrm{X}_{N-1} \sim \mathcal{N}\left(\mu_{Chi}(k), \sigma_{Chi}(k)\right)$, both of which are not truly fulfilled. Therefore, as compensation, the confidence level needs to be chosen higher.

343. The shift needed to achieve the target level of confidence CL_{sigma} (that is the red area under the curve) is approximately $-\Phi^{-1}\left(1-\mathrm{CL}_{\mathrm{sigma}}\right) \times \frac{\sigma_{Chi}(k)}{\sqrt{N-1.5}}$ and is depicted as the red arrow in Figure 5.

344. Due to the symmetry of the normal distribution, $-\Phi^{-1}\left(1-\mathrm{CL}_{\mathrm{sigma}}\right) = \Phi^{-1}\left(\mathrm{CL}_{\mathrm{sigma}}\right)$, and we can write:

$$P\left[\frac{\hat{\sigma}_{Ret(j)}}{\sigma} + \Phi^{-1}\left(\mathrm{CL}_{\mathrm{sigma}}\right)\frac{\sigma_{Chi}(k)}{\sqrt{N-1.5}} < 1\right] \approx 1 - \mathrm{CL}_{\mathrm{sigma}}$$

345. A confidence bound of the estimate of the standard deviation of the returns of risk factor j at a confidence level CL_{sigma} is thus approximately known if $\sigma_{Chi}(k)$ is known.

346. The large k expansion of $\sigma_{Chi}(k)$ is [6]:

$$\sigma_{Chi}(k) \approx \frac{1}{\sqrt{2}}\left(1 - \frac{1}{8k} - \mathcal{O}\left[\left(\frac{1}{k}\right)^2\right]\right)$$

347. Note that the relative error in $\frac{\hat{\sigma}_{Ret(j)}}{\sigma}$ converges for large N from below to the finite constant $1/\sqrt{2} \approx 0.7071$ as also found in [4].

348. Keeping only the leading term in the number of observations N, we arrive at the following bound for $\frac{\hat{\sigma}_{Ret(j)}}{\sigma}$, ensuring that the estimated standard deviation is higher than the true one with confidence level $\mathrm{CL}_{\mathrm{sigma}}$:

$$P\left[\frac{\hat{\sigma}_{Ret(j)}}{\sigma} + \frac{\Phi^{-1}\left(\mathrm{CL}_{\mathrm{sigma}}\right)}{\sqrt{2(N-1.5)}} > 1\right] \approx \mathrm{CL}_{\mathrm{sigma}}$$

349. The more data points are available, the more the estimation error decreases and, for very large ($N \to \infty$) samples, the error disappears.

Step 4 (converting standard deviation to ES)

350. The next step is to use the estimate of the standard deviation of the returns for the non-modellable risk factor j to obtain an estimate for the expected shortfall at 97.5% by multiplying it with a factor $\mathrm{C}_{\mathrm{ES\ equiv}}$, being the approximate ratio of the expected shortfall to the standard deviation.

351. Formally:

$$ES(j, 97.5\%) = \mathrm{C}_{\mathrm{ES\ equiv}}(j, 97.5\%) \times \hat{\sigma}_{Ret(j)}$$

352. $\mathrm{C}_{\mathrm{ES\ equiv}}(j, 97.5\%)$ depends on the distribution of the NMRF j and the confidence level.

353. In the Gaussian case, $\mathrm{C}_{\mathrm{ES\ equiv,\ Gauss}}(j, 97.5\%) = 2.3378$. The calibration is discussed below.

Step 5 (calibrated shock for the risk factor)

354. Multiplying in the argument for the probability at the end of Step 3 (confidence level for sigma estimate) both sides by the true sigma we have:

$$P\left[\hat{\sigma}_{Ret(j)} + \frac{\sigma \times \Phi^{-1}\left(\mathrm{CL}_{\mathrm{sigma}}\right)}{\sqrt{2(N-1.5)}} > \sigma\right] \approx \mathrm{CL}_{\mathrm{sigma}}$$

355. In order to have a calibrated shock corresponding to the expected shortfall which does not underestimate the expected shortfall with a confidence level $\mathrm{CL}_{\mathrm{sigma}}$, we combine the estimate for $\hat{\sigma}_{Ret(j)}$ including the shift, and multiply with $\mathrm{C}_{\mathrm{ES\ equiv}}(j)$.

356. Finally, we use the estimator for sigma for the true value of sigma, $\sigma \approx \hat{\sigma}_{Ret(j)}$, to obtain an approximate expected shortfall calibrated shock:

$$\boldsymbol{CS(r_j) \stackrel{\text{def}}{=} C_{\text{ES equiv}} \times \hat{\sigma}_{Ret(j)} \times \left(1 + \frac{\Phi^{-1}(CL_{\text{sigma}})}{\sqrt{2(N - 1.5)}}\right)}$$

3. Calibration of $C_{ES\ equiv}$ and CL_{sigma}

357. The calibrated shock is determined by the standard deviation from N observed returns and the following parameters:

- $\mathrm{CL}_{\text{sigma}}$, a confidence level of not underestimating the true (but unobserved) standard deviation; and
- $\mathrm{C}_{\text{ES equiv}}$, the approximate ratio of the expected shortfall to the standard deviation of the risk factor returns.

Value of CL_{sigma}

358. $\mathrm{CL}_{\text{sigma}}$ has a strong influence only for small N: the more observations are available, the more reliable the estimate is. $\mathrm{CL}_{\text{sigma}}$ should be set to a high confidence level of 80% to 90% in order not to underestimate the standard deviation for low N and taking into account that non-normality and higher order effects were ignored in the estimators of $\hat{\sigma}_{Ret(j)}$ and the use of the Chi-distribution.

Value of $C_{ES\ equiv}$

359. In the Gaussian case, the ratio of the expected shortfall at 97.5% and the standard deviation is $\mathrm{C}_{\text{ES equiv, Gauss}}(j, 97.5\%) = 2.3378$. For skewed or more fat-tailed distributions, the expected shortfall can be substantially higher as shown in Figure 6 for a series of Skewed Generalised *t*-distributions (SGT) [7] with standard deviation normalised to unity. The Hurlimann bound is a distribution-free upper bound of the ES; see Figure 6 below.

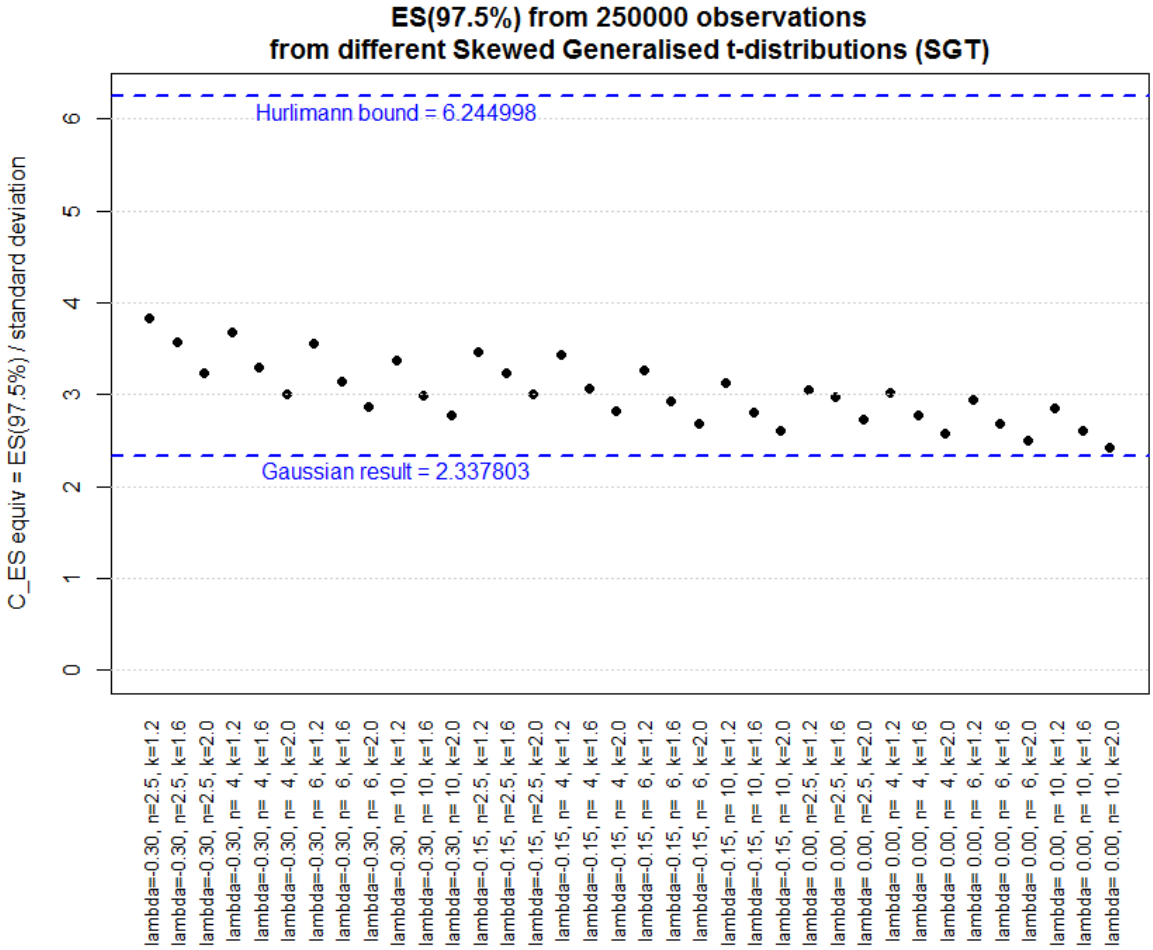

Figure 6

360. As can be seen, the expected shortfall increases with skewness (increasing with |lambda|) and 'fat-tailedness' (increasing with lower n). k is a parameter for the 'peakedness'. For lambda = 0 and k = 2, 2 * n the SGT is the Student's t-distribution degree of freedom. Lambda = 0, k = 2 and n = ∞ is the Gaussian distribution.

361. While the SGT are considered to capture financial time series well [7] [8], other distribution families might also be considered and investigated. The main point here is to show that $C_{ES\ equiv}(j)$ can vary substantially depending on the underlying distribution.

362. Potential deviations from the square root of time rule need to be captured in $C_{ES\ equiv}(j)$ as well. One could argue that the longer time horizons non-normality is becoming less pronounced (see, for example, [9]), while the deviations from the square root of time rule can increase with the time horizon depending on the NMRF and market period.

363. Therefore, $C_{ES\ equiv}(j)$ needs to be set sufficiently higher than for the normal distribution to cover a plausible range of underlying distributions, or needs to be specifically calibrated to the NMRF in question.

Illustration

364.The calibrated shock is based on the estimation of the standard deviation. We are setting:

$$\mathrm{CL}_{\mathrm{sigma}} = 90\%$$

365.That means that the probability of underestimating the standard deviation is $1 - \mathrm{CL}_{\mathrm{sigma}}$ = 10%.

366.The calculations are performed as follows: N return observations $\{Ret(r_j, t), t = 1, \ldots, N\}$ are drawn from SGT distribution with different parameter sets. From those returns, the standard deviation and the calibrated shock $CS(r_j)$ are calculated. Because the estimated standard deviation and the calibrated shock are based on the randomly drawn returns, they are random variables themselves.

367.In Figure 7 the probability that $\hat{\sigma}_{Ret(j)} \times \left(1 + \frac{\Phi^{-1}(\mathrm{CL}_{\mathrm{sigma}})}{\sqrt{2(N-1.5)}}\right)$ underestimates the true sigma is presented. The more pronouncedly the SGT deviates from a normal distribution (lambda not 0, n small, k small), the more the probability of underestimation increases, but it stays below 50% for all but the most non-Gaussian distribution parameter sets investigated. The reason for the deviations from the target level is that the estimator $\hat{\sigma}_{Ret(j)}$ ignores higher moments of the distribution and thus underestimates the true standard deviation. The effect is driven by the curvature of the probability distribution around the mean value. In addition, the derivation of the expression based on the Chi distribution, the i.i.d. normal assumption and the large N limit was used, which is not fulfilled. Thus, only for the normal distribution (lambda = 0, n = 999, k = 2) and a high number of estimations, i.e. in the lower right corner of the Figure, the target level of 10% is reached.

Probability of underestimating sigma

	Number of return observations							
SGT parameters	3	5	7	11	15	23	47	124
lambda=-0.075, n=2.5, k=1.2	51%	55%	56%	57%	58%	58%	60%	61%
lambda=-0.075, n= 4, k=1.2	37%	39%	40%	40%	40%	40%	40%	38%
lambda=-0.075, n= 6, k=1.2	34%	34%	34%	34%	33%	33%	31%	31%
lambda=-0.075, n= 10, k=1.2	31%	30%	30%	30%	29%	28%	27%	25%
lambda=-0.075, n=2.5, k=1.6	35%	36%	37%	37%	37%	38%	38%	39%
lambda=-0.075, n= 4, k=1.6	29%	30%	29%	29%	27%	27%	27%	25%
lambda=-0.075, n= 6, k=1.6	27%	26%	25%	25%	24%	23%	22%	20%
lambda=-0.075, n= 10, k=1.6	25%	24%	23%	22%	22%	21%	19%	18%
lambda= 0.00, n=2.5, k=2.0	27%	28%	28%	27%	27%	27%	26%	26%
lambda= 0.00, n= 4, k=2.0	25%	23%	23%	21%	21%	20%	19%	18%
lambda= 0.00, n= 6, k=2.0	24%	21%	20%	19%	18%	18%	16%	15%
lambda= 0.00, n= 10, k=2.0	23%	20%	19%	17%	17%	16%	15%	14%
lambda= 0.00, n=999, k=2.0	22%	19%	17%	16%	15%	14%	13%	11%

Figure 7

368.As an illustration for a concrete distribution, the following parameter choices are used:

$$C_{\text{ES equiv}}(j) = 3$$

369.We are using a SGT distribution with values lambda = –0.075, n = 4 and k = 1.6 in this illustration, in line with a recent work on equity returns spanning the financial crisis period [8].

370.The probability density of $CS(r_j)$ is shown in Figure 3, where the x-axis is scaled to the true expected shortfall of the chosen SGT distribution. One sees that, at a low number of observations N, the distribution is rather wide, and it narrows as N gets larger. As intended, the calibrated shock is mostly higher than the true expected shortfall. The methodology is robust if only a few observations are available.

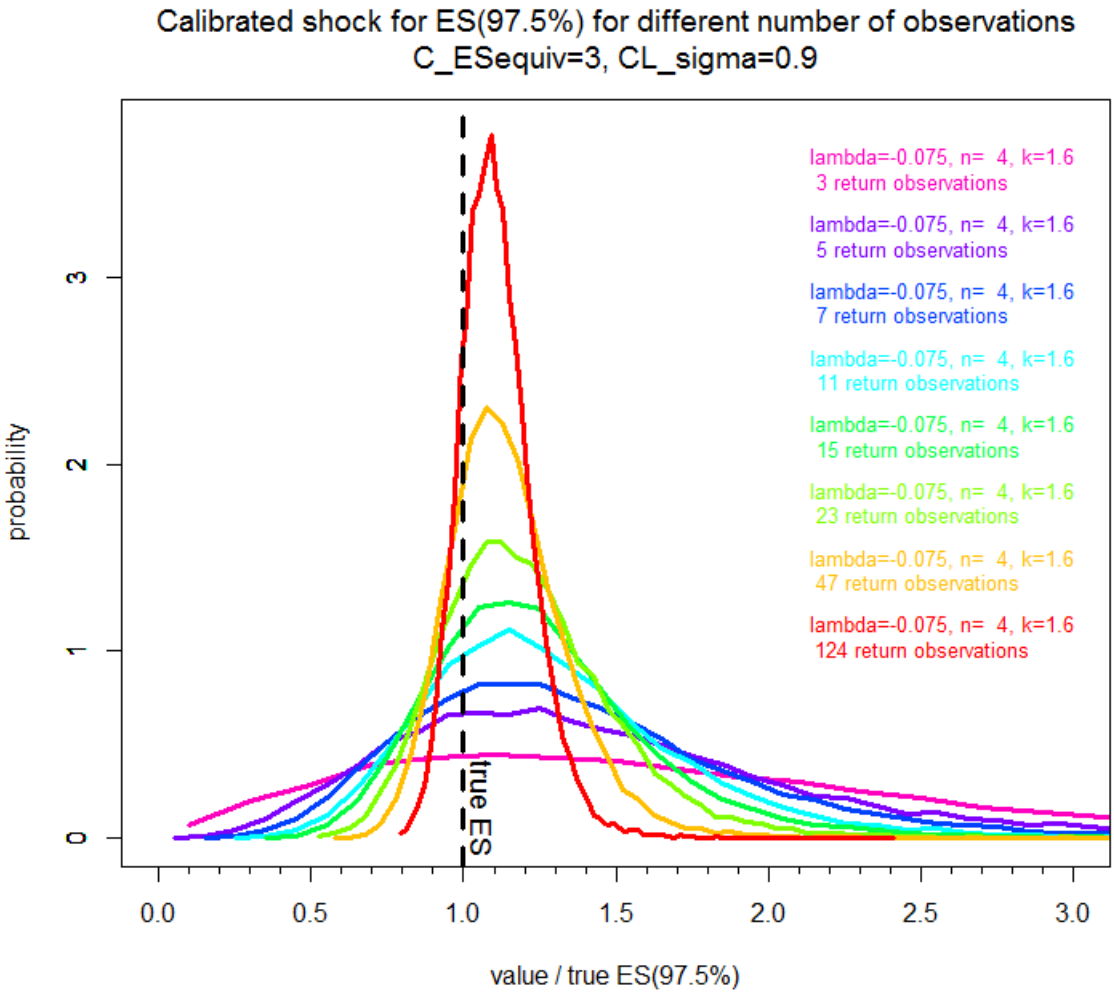

Figure 8

371. A distribution-free upper bound of the ES for mean 0 and standard deviation $\hat{\sigma}_{Ret(j)}$ is

$$ES_{HBound}(j, 97.5\%) = \sqrt{\frac{1-\alpha}{\alpha}} \times \hat{\sigma}_{Ret(j)} = 6.245\ \hat{\sigma}_{Ret(j)}$$

for a confidence level of $\alpha = 97.5\%$ and 0 mean (see section 2.4 in [1] on Hürlimann's inequalities and references therein). Any $CS(r_j)$ being above the Hürlimann bound $6.245\ \hat{\sigma}_{Ret(j)}$ is therefore mathematically over-conservative under the assumption that $\hat{\sigma}_{Ret(j)}$ is correct.

372. Another reference point is the Gaussian distribution, for which:

$$ES_{Gauss}(j, 97.5\%) = \mathrm{C}_{\text{ES equiv, Gauss}}(j, 97.5\%) \times \hat{\sigma}_{Ret(j)} \approx 2.338\ \hat{\sigma}_{Ret(j)}$$

373. Plotting the calibrated shock in units of the estimate for sigma, $CS(r_j)/\hat{\sigma}_{Ret(j)}$, for different numbers of observations in Figure 9 shows that the calibration leads to values that get closer to the theoretical Hürlimann bound for low numbers of observations, but otherwise approach the large-N result for the distribution parameter choice.

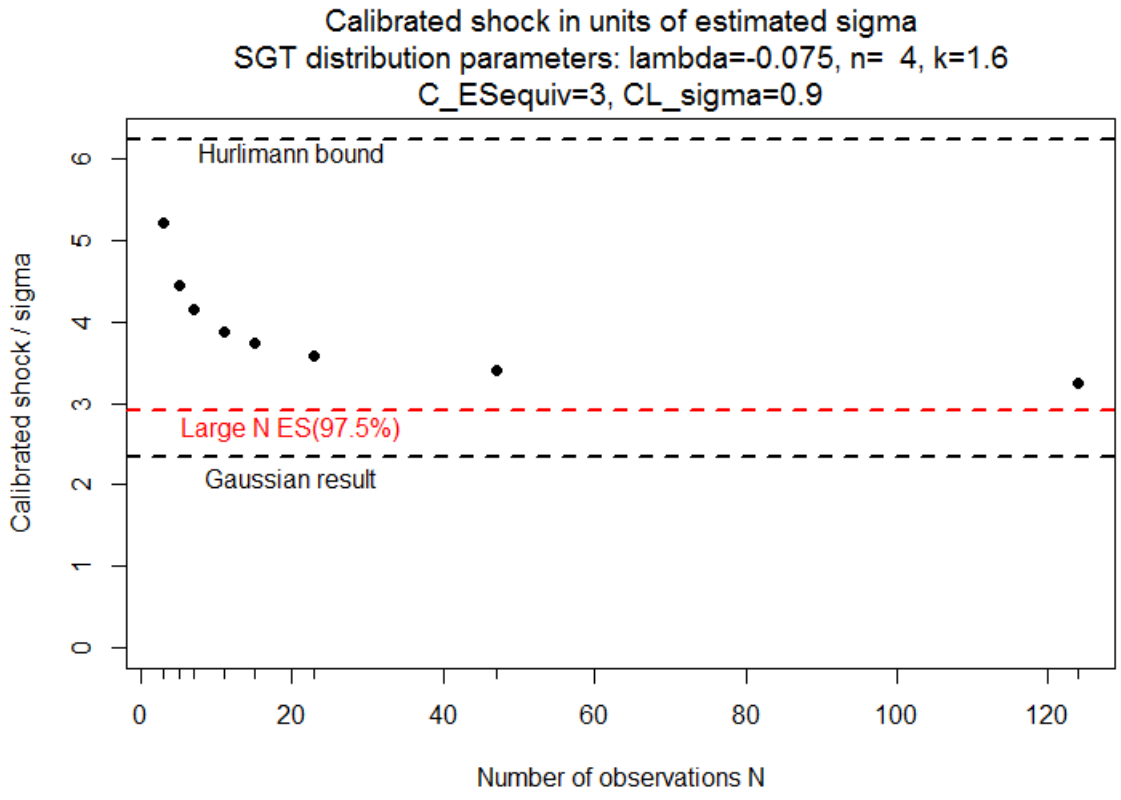

Figure 9

374. Overall, the calibrated shock method presented is simple to apply, yet performs satisfactorily over a wide range of relevant distributions and is robust for low numbers of return observations.

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Annex 5 – Summary of questions

Question 1. Do you have views on the proposed prioritisation of work?

SA-CCR – Mapping of derivative transactions to risk categories

Question 2. Would the proposed allocation for the products in the list be appropriate in all cases? If not, please provide an explanation.

Question 3. Would you include in the above list other derivative transactions for which there would be an unambiguous primary risk driver? In particular, do you consider that bond forwards on investment-grade bonds or cross-currency swaps should be included? Please provide some justification for your answer.

Question 4. If a list of criteria is to be developed instead of (or combined with) a list of derivatives, what could such criteria be? Please use the table below in order to give examples of allocation based on simplicity-related criteria.

Question 5. What are your views about the qualitative approach used as a starting point under step 2?

Question 6. Which would be the most appropriate option for the quantitative approach? Would you recommend another option?

Question 7. What values would be reasonable for the threshold(s) (X, Y, and their equivalents for Options 3 and 4) that determine the number of material risk drivers? Please provide rationales for proposed levels.

Question 8. Do you have any views on the appropriateness of devising a fallback approach? Can you identify any cases where reverting to the fallback approach is necessary?

Question 9. Do you have any views on the appropriateness of a cap on the number of risk categories to which a single derivative transaction can be allocated? If yes, what value would you recommend for that cap (three or four)?

Question 10. Do you have any further comment or consideration on the mandate under discussion?

SA-CCR – Corrections to supervisory delta

Question 11. Do you have any views on the most appropriate approach to compute supervisory delta in a negative interest rates environment? Please elaborate.

Question 12. Which one of the two options do you think is more appropriate from an EU perspective (i.e. maximum harmonisation)? Are you aware of any issue these two options could raise?

Question 13. Do you agree that the definition of a long position in the primary risk driver and a short position in the primary risk driver in Article 279a(2) of the CRR2 proposal is sufficiently clear for banks to determine whether they hold a long or a short position?

FRTB – Trading book boundary

Question 14. Do you agree that changes in instruments' circumstances that imply a shift between the presumptive lists should be accepted as 'exceptional circumstances'? Please provide examples.

Question 15. Do you agree that CTP positions that become illiquid must remain in the TB?

Question 16. Please provide examples of cases where exceptional circumstances might warrant the approval of reclassification.

FRTB – Treatment of non-TB positions subject to FX or commodity risk

Question 17. Do institutions have any particular issue in identifying non-trading book FX and commodity positions subject to market risk? What kinds of transactions do those positions correspond to and how material are they with respect to current RWAs for market risks?

Question 18. What issues would institutions face to value those positions in order to calculate the own funds requirement for market risks using the FRTB standards? Currently, do you revalue all components for the purposes of computing the own funds requirement for market risks? If not, which ones? Currently, how frequently are those positions valued?

Question 19. For the non-trading book positions subject to the market risk charge that are not accounted for at fair value (or in the case of FX, are non-monetary), do stakeholders have the capacity to mark these positions to market and how frequently can this be done? Do stakeholders have the capacity to "mark to market" the FX component of the non-monetary item subject to FX risk on a frequent basis (for example daily)?

Question 20. Does IFRS 13, i.e. Fair Value Measurement, have an impact on the frequency of non-trading book revaluations? If yes, please explain how.

Question 21. Are there other factors (for example impairments or write-downs) that can affect the valuation of non-trading book FX positions?

Question 22. Do stakeholders have a view on what minimum number of notional trading desks should be allowed? What would be the negative consequences of applying some restrictions to the number of notional trading desks allowed (for example only one notional desk for FX positions and only one for commodities)?

Question 23. Do you consider that trading book positions should not be included in notional trading desks? Would you agree that, for trading desks that include trading and non-trading book instruments, all the trading desk requirements should apply? Do you consider that for notional trading desks all the trading desk requirements should apply? If this is not the case, which qualitative requirements of Article 104b(2) of the CRR2 proposal could not practically apply to notional trading desks?

Question 24. Do you see a reason why backtesting requirements should not apply to notional trading desks?

Question 25. Do you see a reason why P&L attribution requirements should not apply to notional trading desks?

FRTB – Residual risk add-on

Question 26. Do you agree with the proposed general definitions of instruments referencing an exotic underlying and instruments bearing other residual risks? Do you think that these definitions are clear? If not, how would you specify what is an 'exotic underlying' and what are 'instruments that reference exotic underlyings'? Please provide your views, including rationale and examples.

Question 27. Do you agree with complementing, for the sake of clarity, those definitions with a non-exhaustive list of instruments bearing other residual risk? Similarly, do you agree with retaining the possibility of excluding some instruments from the RRAO?

Question 28. More specifically, do you consider that there are particular instruments (or underlyings) which, while meeting the definitions above (in line with point (d) of paragraph 58 of the FRTB), should be excluded from the RRAO? Alternatively, on the contrary, do you consider that there are instruments (or underlyings) that are not captured by the definitions above and that should be subject to the RRAO? Please provide your views, including rationale and examples.

Question 29. Although the proposed list of options does not aim at being exhaustive, since there is a general definition, do you find that any important option type meeting the criteria in point (i) of point (e) of paragraph 58 of the FRTB is missing? Conversely, do you think that any of the options in the list does not meet general criteria?

Question 30. Do you think there are any instruments, not meeting the general definitions above, whose risk would however be poorly captured within the standardised approach and should therefore be included in the list of instruments subject to the RRAO?

Question 31. What are your views on the proposed treatment for behavioural risks? Do you have any proposal for a more objective/prescriptive approach to identifying instruments with behavioural risks?

Question 32. What are your views on the role that the list in point (h) of paragraph 58 of the FRTB should play?

Question 33. Are there any cases in which instruments could meet the definitions of both 'instrument referencing an exotic underlying' and 'instrument bearing other residual risks'?

FRTB – IMA liquidity horizons

Question 34. What is your view on the outlined approach? Please provide background and reasoning for your position.

Question 35. Do you have in mind risk factors for which additional guidance is needed? If yes, which ones?

Question 36. Do you have in mind any risk factor categories or subcategories to add to those listed in Table 2 of Article 325be of the CRR2 proposal?

Question 37. Would you think that Q&As could be sufficient to provide additional guidance (instead of RTS)?

Question 38. What is your view on the definition and level of the threshold used for assigning currencies to the most liquid category?

Question 39. If you agree with the threshold outlined, would you agree that the list of selected currencies should be updated on a triennial basis following the publication of the BIS OTC derivative statistics?

Question 40. If you do not agree with the threshold outlined, please provide reasoning for establishing another selection criterion.

Question 41. What is your view on the definition and level of the threshold used for currency pairs to be considered most liquid?

Question 42. If you agree with the threshold outlined, would you agree that the list of selected currencies should be updated on a triennial basis following the publication of the BIS OTC derivative statistics?

Question 43. If you do not agree with the threshold outlined, please provide reasoning for establishing other selection criteria.

Question 44. Do you consider that triangulation of currency pairs should be allowed? Is triangulation used in practice to hedge less liquid FX positions?

Question 45. What is your view on the definition and level of the threshold for defining small and large capitalisations for equity price and volatility?

Question 46. Do you see any problems in using the ITS published by ESMA to specify the equities that can be considered as large capitalisations?

FRTB – Backtesting and P&L attribution requirements

Question 47. Do you agree with the list of criteria for systematic exclusions from hypothetical P&L?

Question 48. Do you have numerous valuation adjustments not computed at desk levels? For those VAs, would it be possible to calculate them at desk level? If not, explain why.

Question 49. Do you agree with the criteria defined for the inclusion of a valuation adjustment in the hypothetical P&L? If not, please give arguments. Do you agree with the proposal to provide only criteria for inclusion in or exclusion from the hypothetical P&L, in order to allow some flexibility, or do you think that we should have non-exhaustive lists supplemented by criteria?

Question 50. Do you agree with developing additional guidance on specific valuation adjustments: related to market risk versus not related to market list, possible daily frequency update in the P&L versus not daily, 'top of the house' versus desk-level computation?

Question 51. Did you have overshootings that are mainly caused by valuation adjustments included in the hypothetical P&L? If yes, which valuation adjustments were mainly causing overshootings? Did you identify types of desks which were more frequently affected by such overshootings? Are these desks likely to breach the backtesting thresholds because of these overshootings (how frequently do the overshootings occur)?

Question 52. Do you agree with the list of criteria for systematic exclusions from the actual P&L?

Question 53. Do you agree with the criteria defined for the inclusion of a valuation adjustment in the actual P&L? If not, please provide arguments.

Question 54. Did you have overshootings that are mainly caused by valuation adjustments included in the actual P&L? If yes, which valuation adjustments were mainly causing overshootings? Did you identify types of desks which were more frequently impacted by such overshootings? Are these desks likely to breach the backtesting thresholds because of these overshootings (how frequently do the overshootings occur)?

Question 55. According to you, is the net interest income part of the time effect?

Question 56. Do you agree with the proposed definition for net interest income? If not, what would be your proposal?

Question 57. Would you like further indications of the elements to take into account in the time effect? Which elements would you include in the time effect?

Question 58. Regarding the different proposals, do you agree with EBA that Proposal 2 would achieve the best outcome? If not, what would be your suggestion?

Question 59. Do you agree with the principle of including in or excluding from the risk-theoretical P&L the same valuation adjustments as for the hypothetical P&L?

FRTB – Non-modellable risk factor stress scenario risk measure

Question 60. What are your preferred options for points 1-8 above? How would you justify these preferences?

Question 61. Do you have any observations or concerns about the overall methodology proposed for point (a) of the mandate?

Question 62. Do you have an alternative proposal for the calculation of an extreme scenario of future shock or stress scenario risk measure?

Question 63. Do you have any comment on the 'risk factor based approach' versus the 'direct loss based approach'? Is computational effort a concern?

Question 64. Is there a case for allowing institutions to calculate a standalone expected shortfall directly?

Question 65. Do you have any views on points (a)-(g) above?

Question 66. What are the most relevant NMRFs for your institution in broad terms?

Question 67. What are the most relevant statistical distributions for NMRFs?

Question 68. What are the most relevant non-linear tail loss profiles that need to be considered?

Question 69. What is the materiality of non-linear tail losses in practice?

Question 70. Do you deem Option 1 (the 'maximum possible loss') or Option 2 (the prescribed risk weights) more suitable as a fallback approach? What is the reason for your preference?

Question 71. Do you deem the risk factor categories and respective shocks presented in the tables in Annex 2 appropriate for the (types of) NMRFs you expect? If not, what is your proposal to remedy the issues you see?

Other implementation issues

Question 72. Do you agree that, to the extent possible, new FRTB models in the EU should be approved according to updated, harmonised RTS on assessment methodology? Do you agree that, in the absence of such revised standards, relevant parts of the published RTS on assessment methodology, provided they are in line with the new requirements, should apply?

Question 73. Do you agree that a recalibrated version of the current standardised approach – for banks below the EUR 300 million threshold (as currently proposed in the CRR2 proposal) – is preferable in the EU to the implementation of the BCBS reduced SBM? Do you agree that the recalibration should be carried out simply at the risk class level by applying a scalar, such that the recalibrated approach is generally more conservative – but not systematically more conservative – than the FRTB SA?

Question 74. Do you have any comment on the items mentioned in this section or wish to raise additional implementation issues?