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QUESTIONNAIRE FOR IMA APPLICATIONS

This Questionnaire should be completed by firms seeking to use the Internal Model Approach (IMA) for market risk. For credit institutions and investment firms, the IMA framework is set out in Annex G Market Risk: Internal Model Approach (CRR) Part and SS13/13, and all firms' trading operations must demonstrate compliance with the requirements applicable to the general aspects covering the trading book set out in Annex N Amendments to the Trading book (CRR) Part.

This Questionnaire is designed to aid the PRA's understanding of the methods used to meet the internal models capital requirements, as well as the business, systems and control environment within which the methods are applied.

Applicant firms are asked to undertake a self-assessment against the rules set out in:

- Annex N Amendments to the Trading Book (CRR) Part;
- Annex G Market Risk: Internal Model Approach (CRR) Part; and
- the Supervisory Statement for market risk (SS13/13);

The self-assessment needs to be specific to the legal entities relevant to the IMA application. Firms should follow the structure of this Questionnaire when completing the application, in order to facilitate the efficiency of the PRA's review. The self-assessment per section should include a short introductory description of the business context and the main findings evidencing the attested compliance status, followed by a detailed analysis, addressing the specific points highlighted in this Questionnaire and including cross-references to the relevant sections of the supporting documentation. As part of the self-assessment per section, the firm should clearly flag areas of potential or actual non-compliance and, where there is scope for interpretation in the rules, the firm should explain how it has chosen to interpret the rules.

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In addition to the self-assessment, the supporting documentation and a summary of its salient points should clearly answer the individual requests for information in each section in this Questionnaire.

Where relevant and practical, any information provided should make use of internal documentation/management information (MI) in the form in which it was presented at the time through the firm's normal governance forums. We recognise that there may be circumstances where this requirement may need to be over-ridden in the interests of providing sufficiently detailed information in response to the requests of this Questionnaire. Please indicate where this is the case.

When providing policies, procedures or methodologies please explain the governance around these documents and provide committee meeting minutes if available. Please ensure that all policies and procedures provided govern the practices of the legal entities covered by the IMA application.

Where the self-assessment leads to identification of issues, the firm should outline the nature and materiality of the issue and provide details of any planned remediation. Also note that any finding reported shall evidence that a targeted review for the areas in scope of the application was carried out, whereas a general reference to global firm policies, which may indicate higher-level compliance, does not suffice.

This Questionnaire is not prescriptive or exhaustive. In order to meet the IMA qualitative criteria relating to documentation set out in the detailed requirements covered by this Questionnaire, firms are expected to have comprehensive coverage in respect to the range of topics covered by this Questionnaire, as stipulated in Article 325bi(1)(f). If firms are providing additional information to support their application, which has not been explicitly requested within this document, this should be made clear in the response.

Please include the following attestation issued and signed by an individual performing a relevant Senior Management Function (SMF):

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I confirm that for the [name of model] [firm name] has carried out a comprehensive assessment of its compliance with the "PRA requirements". Based on this assessment, there is no evidence that any aspect of the model is materially non-compliant with the PRA's requirements. For these purposes, "PRA requirements" mean the requirements in the PRA Rulebook in regard to the internal model approach for market risk, including any applicable PRA guidance relevant to the model type in question (such as the Supervisory Statement on Market Risk). I further confirm that this Application provides an accurate picture of the trading activities of [firm name].

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List of abbreviations/terms used

Article	Refers to the articles in the PRA Rulebook
APL	Actual Profit and Loss
ATM	At The Money
BAU	Business as usual
CRR	Capital Requirements Regulation (Corrigendum to Regulation (EU) No 575/2013)
DRC	Default Risk Charge
EBA	European Banking Authority
ES	Expected Shortfall
FO	Front Office
FRTB	Fundamental Review of the Trading Book
GIRR	General Interest Rate Risk
HPL	Hypothetical Profit and Loss
ICAAP	Internal Capital Adequacy Assessment Process
IFRS	International Financial Reporting Standards
IMA	Internal Models Approach
IPV	Independent Price Verification
IRB	Internal Ratings Based
LGD	Loss Given Default
MI	Management Information
MRF	Modellable Risk Factor
NMRF	Non-Modellable Risk Factor
OFR	Own Funds Requirements

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P&L	Profit and Loss
PD	Probability of Default
PES	Partial Expected Shortfall
PRA	Prudential Regulation Authority
RF	Risk Factor
RFET	Risk Factor Eligibility Test
RNIM	Risk Not In Model
ROE	Return On Equity
RPO	Real-Price Observation
RTPL	Risk Theoretical Profit and Loss
SABR	Stochastic Alpha Beta Rho model
SES	Stressed Expected Shortfall
SMF	Senior Management Function
SONIA	Sterling Overnight Index Average
SRS	Supervisory Risk Specialists
SS	Supervisory Statement
SSRM	Stress Scenario Risk Measure
UES	Unconstrained Expected Shortfall
VaR	Value at Risk
VoV	Volatility of Volatility
VP	Verifiable Price

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A Introduction to the IMA application

Please provide an introductory section that shall cover the aspects given below to a sufficient level of detail.

1. Please provide an overview of the rationale for the application, and a description of the business lines, trading desks and banking book positions that the application proposes to cover, along with the relationship to the legal entities relevant to the application (hereinafter 'entities'), noting that business lines may cut across legal entity boundaries.

2. Please provide a self-assessment against Articles 102 to 104b and include a brief description of the status of the activities and positions for which permission is sought versus the standards set out in these Articles. Please also include an up-to-date version of the firm's Trading Book Policy Statement and other documents referred to therein.

3. Please provide the projected impact on market risk regulatory capital requirements that the IMA permission is expected to produce by legal entity, clearly stating any assumptions being made. A granular breakdown of capital impact information is requested per internal model component (such as ES, SSRM, DRC and any additional additive factors) at the lowest level possible, such as desk. The capital impact should also be provided as a proportion of total UK solo/solo-consolidated and consolidated capital requirements.

4. Please also include the projected impact on Pillar 2A capital requirements, and if relevant, explain any impacts the permission sought is expected to have on the approaches used in the firm's ICAAP.

5. Please include any information on market risk hedges across capital regimes (e.g. CVA-hedging on the trading book).

6. For legal entities within a group, please describe the relationship between the use of the model within the legal entity compared with the use of the model within the wider group. Have any entities received IMA recognition, or been denied IMA recognition, from other regulators already? If so, name the other regulators involved. Where permission has already been granted, please

describe any differences between these recognitions and the application and differences in business activities/positions to the extent relevant to the application at hand.

7. Please provide a self-assessment against Article 106 and include a summary of the firm's approaches to internal hedges and transfers of market risk from the banking book to the trading book and vice versa. Please also describe the key controls that surround these activities and positions. Please include supporting documentation, in particular relevant extracts from the Trading Book Policy Statement.

8. Please provide the following information, providing insight into the business context:

    a. an organisation chart of the business lines, and the trading desks within each, impacted by the IMA application. Please refer to the answer to request A1 and provide the roles, responsibilities and reporting lines of staff. Please also give the geographical locations that members of staff are based in;

    b. a summary of the **business lines**, covering: their business strategies, risk appetite, P&L budgets, historical performance against budget, sales credits, revenue and risk drivers, fully loaded ROE before the application, instruments and products traded, trading and hedging strategies that are in scope of the application.

9. Please provide a summary view of trading activities conducted (as well as the business lines they fall under) within legal entities covered by the application, but for which IMA recognition is not being sought. This should include the reasoning for their exclusion and any plans for subsequent inclusion within the IMA framework. Please indicate the status and significance of positions in relation to Article 325az(6), and comment on the distinction from activities giving rise to banking book exposures and exposures in other legal entities.

10. Please give an overview of all material positions at the most recent month-end for the previous question and provide the risk-measurement metrics and the

risk-management strategies used by the front office with respect to these positions as well as the overall positions.

11. Please outline any major changes planned in the business or booking model impacting the answers in this Questionnaire and provide a timetable.

12. Please provide details of the due diligence process undertaken by the SMF prior to their signing the application.

13. Please provide a point of contact for the IMA application.

B Internal models for market risk measurement (ES, SSRM, DRC)

Please provide a line-by-line self-assessment against each item (Article, including sub-articles) listed in the following table:

Description	Articles
Own funds requirements when using internal models	Rulebook 325ba, 325bb, 325bc
Permission to use internal models and material changes and extensions to permission, including Risk Not in Model (RNIM) framework	Rulebook 325az, 325azx
Risk Factors --- Mapping and Liquidity Horizons	Rulebook 325bd, 325bdx
Assessment of the Modellability of Risk Factors (Risk Factor Eligibility Test, or RFET)	Rulebook 325be
Non-Modellable Risk Factors (NMRF) and Stress Scenario Risk Measure (SSRM)	Rulebook 325bk
Regulatory Back-Testing Requirements	Rulebook 325bf
Profit and Loss Attribution (PLAT) Requirements	Rulebook 325bg

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Requirements on risk measurement (Data Requirements and Principles)	Rulebook 325bh
DRC model requirements	Rulebook 325bl to 325bp
Model Risk Management for internal models	Rulebook 325bj SS1/23
Qualitative Requirements	Rulebook 325bi
Material deficiencies in risk capture by an institution's internal approach	SS13/13 Section 2
Expectations relating to internal models	SS13/13 Section 9

1. Please describe the scope of the model application, as relating to the components including ES, SSRM, and DRC, and indicate the precise nature of the permission sought in relation to Articles 325az and 325azx (including in terms of legal entities, trading locations, trading desks, detailing specific inclusions and/or exclusions).

2. Please describe, in sufficient detail, how the firm will ensure, in compliance with Article 325az(2), that trading desks continue to meet the requirements for the use of internal models, as well as the requirements for resumption of use after stopping. Please refer to (and provide) relevant policies and procedures, as well as details of the assurance work carried out to test their effectiveness (including internal audit review).

3. Please provide self-contained responses to questions in the following sections, including detailed references to the relevant submitted documentation, and also provide the requested documentation in each section and fill in the template (if any) required for the section. Please refer to these responses, as necessary, for the line-by-line self-assessment of the articles listed in the above table.

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C Own funds requirements

1. Please describe the calculation process for the aggregation of Own Funds Requirements (OFR) for market risk from individual components (partial ES, DRC, SSRM) to final capital charge (including the Capital Surcharge calculation).

2. Please state the proposed calculation frequency of the ratio of undiversified UES measures to diversified UES measures. If the proposed calculation frequency is weekly, please describe how the firm will comply with the conditions listed in Article 325bb(4).

3. Please provide details of the following processes/controls with regards to potential changes in trading desk eligibility:

   a. monitoring of the 60-day average of the ratio of the reduced set ES and full set ES for the current period (Article 325bc(2)(a));

   b. removal of desks from the IMA calculation should the condition specified in Article 325bc(2)(a) not be met; and

   c. resumption of desks for the IMA calculation upon regaining compliance with the condition specified in Article 325bc(2)(a).

4. Please describe how the reduced set of modellable risk factors will be selected.

5. For risk factors in the reduced set for which historical data is not fully available from 1 January 2007, and for which modelled or proxy methods are required (e.g. backfill), please describe how these risk factors will be modelled for the current period reduced set calculations (i.e. Article325bc(3)). In particular, please confirm that the modelling approaches for PES(RS) and PES(RC) are the same for such risk factors or provide rationale for why this is not the case.

6. For modellable risk factors not in the reduced set, please describe their treatment for the calculations set out in Article 325bc(2)-(3). In particular, please explain how exposures to these risk factors are mapped to risk factors in the reduced set for the purposes of calculating ES measures in the stressed period.

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7. Please explain the choice of the methodologies used to generate risk factor shocks for both the current and stressed period, both for the choice of return type and for the choice of scenario generation type (historical simulation, Monte Carlo simulation, or other).

8. Please describe the process/methodology to be used for identifying the stressed period and provide the justification for any assumptions or approximations used. This should include analysis to demonstrate that any simplifications do not have a material impact on the choice of stressed period. The description should cover each of the legal entities included in the proposed model scope.

9. Please provide details of the update frequency for the market data used in the ES calculation and describe whether there will be any lag in the data's inclusion in the calculations.

10. Please confirm that the firm has the capability to use a shorter window than the preceding 12-months for the expected shortfall calculation should there be a significant upsurge in price volatility of a material number of modellable risk factors and describe the process/method that will be followed to identify such circumstances.

Documentation request:

a) Methodology document for generation of risk factor shocks for current and stress periods;

b) Methodology document for identification of the stress period for Expected Shortfall;

Template requirement:

- Please provide data for all fields listed in the data collection template C1 (see appendix) for a given COB date for all legal entities in scope of the application.

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D Risks Not in Model (RNIM) framework

1. Please specify the scope of the firm's RNIM framework (including RNIMs related to missing risks, missing risk factors, model assumptions, limitations and uncertainties).

2. Please describe the firm's approach for ongoing identification, quantification, monitoring and capitalisation of deficiencies in risk capture.

3. Please describe the criteria used to short-list entries in the RNIM inventory for periodic testing.

4. Please explain the key differences between the proposed RNIM entries and the RNIVs currently captured under existing pre-FRTB rules.

5. Please describe what the firm considers to be the main potential deficiencies of its FRTB-IMA approach, with regards to adequate capitalisation.

6. Please describe the methodologies used to assess the materiality of RNIM that have been identified for periodic testing.

7. Please describe the thresholds used for RNIM monitoring outcomes, the monitoring frequencies, and the respective mitigation actions including any capital buffers being (or proposed to be) held.

8. Please describe any other approaches used to mitigate identified risks, including approaches not requiring capitalisation.

9. Please describe the RNIM capital calculation method choices (including with regards to liquidity horizon determination, confidence level, stressed period selection), with clear delineation by risk factor or asset class where these differ.

Documentation request:
a) RNIM monitoring policies and procedures for ongoing identification, quantification, monitoring, and capitalisation of deficiencies in risk capture;
b) RNIM testing methodology documentation, including determination of materiality thresholds;
c) RNIM capital add-on methodology documentation;

d) Independent validation and internal governance approval documents covering the above methodologies, and any key judgements (such as materiality threshold assessments);

e) Monitoring results report, including the quantitative assessment of the materiality of RNIMs, and any capital buffers being (or proposed to be) held for these;

f) List of open validation findings on RNIM associated approaches and the expected closure criteria/timeline.

Template requirement:
- Please fill in the fields for the RNIM inventory template D1 (see appendix).

E   Risk Factors --- mappings and liquidity horizons

1. Please set out, and provide the reasoning for, any risk factor sub-groups for which Article 325bd(3) applies and for which the standard liquidity horizon is replaced by a longer one for the purpose of calculating the partial expected shortfall measures.

2. Please provide supporting evidence for any risk factor mappings to categories and sub-categories which are not obvious (including all cases under Article 325bdx(2)-(3), e.g. no valid category, multiple valid categories).

3. Please provide details on the approach for assigning the liquidity horizon for any risk factors used to model a homogeneous index instrument (Article 325bdx(4)).

4. Please describe the approach for initial/ongoing validation of the appropriateness of the risk factor mappings and explain the choice of frequency of ongoing validation.

Documentation request:

a) Methodology document(s) for mapping risk factors to risk factor categories and sub-categories;

b) Methodology document(s) for assigning the liquidity horizon to risk factors taking into consideration the maturity of the positions;

c) Procedure document(s) describing the initial/ongoing validation of the appropriateness of the risk factor mappings;

d) Independent validation review documents associated with the above.

Template requirement:

- Please provide a list of all risk factors and the corresponding mapped broad risk factor category, broad risk factor subcategory and liquidity horizon, as well as all additional requested information, in the data collection template E1 (see appendix).

F Risk Factor Eligibility Test (RFET) i.e. assessment of the modellability of Risk Factors

1. **Verifiable Prices**

   a. Please describe which data sources the firm proposes to use to assess price verifiability, broken down by the following transaction types:

      i. actual in-house transactions between other arms-length parties (Article 325be(5)(a)(i));

      ii. actual transactions by third parties at arm's length (Article 325be(5)(a)(ii), Article 325be(6));

      iii. actual bona fide competitive quotations (Article 325be(5)(a)(iii), Article 325be(6));

      iv. any other.

   b. Please describe the approach to identify and select the verifiable price sources for each risk factor. In particular, please explain the procedure followed to address situations where prices from a VP source become illiquid or ill-determined.

c. Please show (by broad risk factor category) the percentage of risk factors that are deemed to be modellable by using each of these sources separately and together.

d. If 'competitive quotations' are used:

    i. please clarify how the firm meets the requirements of "non-negligible volume" and that "bid-offer spread cannot deviate substantially from bid-offer spreads reflective of current market conditions" (Article 325be(5)(b)-(c));

    ii. please confirm that bid and offer pairs are taken on the same day, and describe the process to match the bid and offer in each pair (to the extent required);

    iii. if bid and offer quotations in a pair are from different market makers, please clarify how the firm has assessed the respective prices from each market maker in order to verify that the bid-offer pair meets the relevant requirements.

e. If synthetic trades are used:

    i. if a synthetic trade is constructed from multiple trades (e.g. using put/call parity to construct a forward), please clarify the reasons why this approach is considered to be compliant;

    ii. please confirm that the firm does not decompose one VP into multiple VPs.

f. Please confirm that all verifiable prices correspond to RF values directly or to trade types with approved internal pricing models using which the firm is able to extract the RF value from the verifiable price.

2. **Bucketing Approach of the RFET**:

a. **Own bucketing** (Article 325be(9)(c)): Please provide:

    i. a summary description of own bucketing;

    ii. discussion of any compromise in PLAT performance due to the use of own bucketing.

b. **Regulatory bucketing** (Article 325be(9)(b)(iv)) with respect to Delta mapping:

   i. Please describe the proposed delta calculations to map options into buckets, and provide details of any differences in those calculations by asset types/classes (e.g. vanilla options, exotic options).

   ii. Please justify why the proposed delta is appropriate for the purpose.

   iii. Please confirm whether the proposed delta is also used for: (a) internal Front Office (FO) pricing/hedging; (b) converting strike to delta for the purpose of implied volatility modelling in FO; or (c) other purposes. If (c), please provide further details.

   iv. If the firm is combining both in-house and vendor VPs, please confirm that the in-house delta and vendor delta use the same approach (i.e. same model methodology and input specification).

   v. If the delta calculation is not needed for the purpose of mapping option prices to delta buckets, please provide the reasoning.

   vi. **_Case study:_** In the case that the FO marks implied volatility completely flat (across all strikes) for certain (possibly illiquid) product types, please describe how RFET will be done.

c. **Mixing between own bucketing and regulatory bucketing**: Please provide:

   i. a summary description of how own buckets will be combined with regulatory buckets;

   ii. the risk factors under this category and reason(s) for the choice;

   iii. discussion of any compromise in PLAT performance due to the use of own bucketing.

d. **Parametric approach for curves/surfaces/cubes** (e.g. SABR) (Article 325be(8)-(10))

   i. **Parameter calibration**:

(a) For each asset class (e.g. Rates, FX), please clarify which parametric model is chosen (e.g. SABR) and which buckets are needed to calibrate the corresponding parameters.

(b) In particular, and using SABR as an example, please clarify:

- if the SABR parameters (i.e. ρ, VoV) will be calibrated simultaneously; or

- if a hierarchical approach will be used for the SABR calibration, such as ATM (SABR α) $\rightarrow$ Skew (SABR ρ) $\rightarrow$ Curvature (SABR VoV).

(c) Please provide commentary on whether the calibration method applied for the purpose of the RFET is consistent with the FO calibration of these parameters, highlighting any differences and the corresponding justification.

ii. RFET approach:

(a) Please clarify how RFET is done for each distinct parametric approach, including details of whether RFET is done at the level of parameters or the buckets required to calibrate the parameters (Article 325be(10)).

(b) If RFET is done at the level of the parameters, please provide justification for the approach and clarify if/how bucketing is reflected in this approach.

iii. _Case study_: SABR (or similar) model is used to "interpolate" a complete volatility surface from a set of discrete market quotes, and options in all 5 regulatory buckets are used to calibrate its parameters. If only 3 regulatory delta buckets (i.e. the ATM bucket and the two buckets adjacent to this) pass RFET, how will SABR parameter modellability (and any associated NMRFs and their stress scenario stress measures) be determined?

e. **Ensuring consistency** (Article 325be(9)(b)(iv)): Please clarify how the firm intends to meet the requirement that "formulae which are consistent

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with their own documented and independently reviewed pricing models" should be used to convert the regulatory delta buckets to the market-standard convention where alternative definitions of moneyness are standard for options markets.

3. **Deriving representative risk factors (RF) from verifiable prices (VP):**
(Note: if the firm's methodology differs by asset class, please reflect this in the responses)

   a. Methodology to define 'close relationship':

   i. Please explain how the firm will demonstrate a 'close relationship' between the RF and VP (Article 325be(7)(a)), including any key differences in the approach by risk class and product type.

   ii. Please explain if one VP will have only one (or multiple) close relationships with RFs.

   iii. Please specify if the firm's approach for the criteria used to define 'close relationship' is quantitative or qualitative.

   iv. If quantitative thresholds are used, please specify how the quantitative thresholds are determined, and provide justification for why the thresholds are appropriate.

   v. Please specify the governance, both initial and ongoing, around the initial determination of close relationship and any subsequent changes.

   b. 'Sound methodology' to derive RFs from the VPs (Article 325be(7)):

   i. Please provide a summary description of the methodology.

   ii. Please provide further details for the case 'one VP – one RF' mapping:

   (a) where a hierarchical approach[1] is used to derive the representative RFs);

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[1] An example of a "hierarchical approach" is to: use SONIA futures/swap RPO to confirm SONIA term rates are MRF; use Uber stock RPO to confirm the Uber spot price is MRF; and then use

(b) where a waterfall approach is used to derive the representative RFs; and

(c) any other cases.

   iii.   Please provide further details for the case 'one VP – multiple RF' mapping:

(a) details on how this is done in practice;

(b) justification for how the firm's 'sound methodology' permits multiple RFs to be derived from one VP (Article 325be(7)); and

(c) materiality of the RFs under this approach.

   iv.   Please highlight any assumptions (e.g. a priori knowledge of other parameters, specific requirements on 'close relationship', etc.).

   v.   Please reconcile and explain any inconsistencies between:

(a) the framework of calibration methodologies used to derive risk factor values from instrument prices for use in the firm's independent price verification process; and

(b) the 'sound methodologies' considered available to extract risk factor values from verifiable prices.

   c. **Type of representative RF versus categories of trades**: Please provide:

      i.   RF types derived from linear trades (e.g. swaps);

     ii.   RF types derived from vanilla non-linear trades (e.g. vanilla options);

    iii.   RF types derived from non-vanilla, non-linear trades, including path-dependent products (e.g. barrier options, variance swaps); and

    iv.   RF types derived from complex options or hybrids, such as correlation-based products (e.g. basket options).

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vanilla Uber options (whose delta is sufficiently close to ATM) to confirm the Uber central volatility bucket is MRF.

Documentation request:

a) Methodology document for deriving risk factor values from verifiable prices;

b) Methodology document for own bucketing;

c) Methodology document for regulatory bucketing.

Template requirement:

Please provide the required information in the data collection template F1 (see appendix) to include (a) the list of risk factors with Bucketing category and reason(s) for the choice, (b) fair value levelling classification under IFRS13, and (c) internal observability classification under IPV process.

G Non-Modellable Risk Factors and Stress Scenario Risk Measure

1. **Determination of stress period** (Article 325bk(10)):

   a. Please describe the method for stress period selection for each broad risk factor category in order to: (1) maximise the sum of stress scenario risk measures for the NMRFs in that category; or (2) maximise the partial expected shortfall measure (PES) for that category.

      i.   If the former method is used, please highlight any simplifications or adjustments involved in the maximisation process.

      ii. If the latter method is used, please justify why the stress period identified represents a period of financial stress for the NMRFs in that risk category, especially in the context where the NMRFs primarily capture non-modellable basis risks.

2. **Extreme scenarios for individual risk factors** (Article 325bk(3)-(5)):

   a. Please clarify how the firm defines "similar NMRFs" in the context of applying "methodologies in a consistent manner".

b. Please describe how extreme scenarios are calibrated for individual risk factors (to the extent there are differences), and how the firm will ensure the methodology is consistently applied across similar NMRFs.

c. When multiple scenario calibration methodologies are used for NMRFs that are not categorised as "similar", please provide the mapping between NMRFs and scenario methodologies applied.

d. Please explain how the scenarios meet the requirements set out in Article 325bk(3)(a)-(e).

e. Please explain how methodology limitations (including, but not limited to, the capture of skewness, kurtosis, and material non-linearity) are identified, what those limitations are, and how they will be managed.

f. Please describe the approach taken to estimate the confidence level of the extreme scenarios, given the identified model limitations.

3. **Extreme scenarios at standardised bucket level** (Article 325bk(7)):

a. Please describe the methodology for developing extreme scenarios at a standardised (i.e. regulatory) bucket level, including any differences across risk factor types.

b. Please explain how the firm's design of extreme scenarios meets the requirements set out in Article 325bk(7)(a)–(e). In particular, for cases where exposures to different risk factors in the same bucket are of opposite sign (i.e. there are longs and shorts), please explain how the chosen extreme scenario achieves a confidence level of at least 97.5%.

c. Please clarify to what extent the choice of scenario, or its calculation, is dependent upon risk factors in different buckets, particularly in the context of maintaining arbitrage-free scenarios.

4. **Regulatory extreme scenarios of future shocks** (Article 325bk(11)-(12)):

a. Please explain why the extreme scenario approaches set out in Article 325bk(3) or Article 325bk(7) cannot be developed for the NMRFs for which regulatory extreme scenarios are proposed.

b. Please describe the "expert-based" approach (Article 325bk(12)(a)), and the qualitative and quantitative information used.

c. Please explain how the "level of certainty equal to 99.95%" (Article 325bk(12)(a)) is addressed on a 10 business day horizon.

d. Please explain how skewness and kurtosis are considered when developing regulatory extreme scenarios. Please set out any distributional or statistical assumptions and explain how they are justified when identifying the maximum loss.

e. Please describe the calculation of losses for Article 325bk(12)(b).

5. **Time series and data** (Article 325bk(6),(9)):

a. Please describe the time series used for calibration of NMRFs.

b. Please describe the minimum data requirements that must be met by time series to be used for extreme scenario calibration.

c. Where these minimum data requirements are not met, please describe any use of alternative methodologies, either to directly calculate extreme scenarios or to overcome insufficient data during the stressed period (e.g. use of proxies).

d. Please provide justification for how proxies used to compensate for NMRFs with incomplete time series meet the requirements in Article 325bk(3) with a high degree of confidence.

e. Please provide evidence to demonstrate how the use of any other alternative methodologies meets the requirements set out in Article 325bk(3).

6. **Valuation methods**:

a. Please provide a summary overview description of the re-pricing methods used for determining the stressed scenario risk measures (e.g. full revaluation, re-pricing ladders, sensitivity-based approach) with cross-referencing of which risk factor types will use which method (where more than one re-pricing approach is used).

    b. If full revaluation is not used, please explain how sufficient accuracy will be ensured for material non-linear positions.

    c. Please clarify how non-arbitrage-free scenarios are handled, and comment on the accuracy.

7. **Aggregation of stress scenario risk measures** (Article 325bk(13)-(15)):

    a. Please describe the idiosyncratic credit spread risks and idiosyncratic equity risks, and indicate which of these are represented by NMRFs listed in the data submission.

    b. Please provide details of the results of statistical tests run to verify the requirements for Article 325bk(14)-(15), and, in particular, to evidence negligible correlation among NMRFs.

    c. Please provide details, including the frequency, of the monitoring process that will be used to periodically re-assess these requirements.

    d. Please describe the planned approach for the aggregation of NMRF risks if negligible correlation cannot be evidenced (either initially or as a result of ongoing monitoring).

8. **Other associated issues**:

    a. Please provide details on how judgment-based or infrequently updated risk factors (e.g. beta of SABR, mean-reverting parameters) will be capitalised.

    b. Please confirm that no single scenario is used for more than 1 NMRF in a standard bucket (Article 325bk(12)).

    c. Please clarify if the liquidity horizon will be capped at the instrument maturity.

Documentation request:

a) Methodology document for the stressed period selection, including:

    i. frequency (e.g. weekly, monthly) of selection;

      ii.   the lookback period to be used for stressed period selection (e.g. 2007 onwards); and

      iii.   how relevant data quality issues for data over the lookback period are resolved;

b) Procedure document for stress period selection review, including review frequency and governance;

c) Validation document for stress period selection methodology, including the review of any assumptions and limitations;

d) Methodology document for developing extreme scenarios for ``similar NMRFs'', including their calibration and validation;

e) Methodology documents for the statistical tests run to verify the requirements of Article 325bk(14) and 325bk(15), in particular to justify negligible correlation;

f) Validation documents for the review of the extreme scenarios' development and application.

Template requirement:

- Please provide requested information on NMRFs in the data collection template G1 (see appendix).

H Regulatory back-testing

1. Back-testing history at application time:

    a. Please explain the drivers of the back-testing exceptions included in the templates H1 and H3 (see appendix) and provide a summary table of these exception drivers and the causes by category (e.g. outsized market move, risks deemed non-modellable or model deficiencies capitalised as NMRF or RNIM, other deficiencies, etc.).

    b. Please demonstrate that the requirements of Article 325bf(8)(b) are met for any exceptions that are requested to be excluded from the count for the overall bank portfolio.

2. Please provide a summary description of the technical elements to be included in, as well as those to be excluded from, the P&L measures used for back-testing. The summary should supplement the information provided in the template H2 (see appendix).

3. Please provide an indication of the rationale and materiality for any positions subject to the standardised approach that are planned to be included in the value of adjustments at the time of the FRTB IMA adoption.

4. Please provide an indication of the rationale and materiality for any daily updated adjustments that the firm is seeking permission to exclude from HPL, consistent with Article 325bf(11)(c). Please also provide the impact of such exclusion on PLAT performance.

Documentation request:

a) Back-testing procedure documentation to show the integration of back-testing in the organisation. This shall indicate responsibilities by function, systems used for the back-testing process, computations and analyses undertaken with timings (e.g. with respect to back-testing exceptions and follow-up actions) and controls;

b) Methodology documents for the implementation of the back-testing approach set out in Article 325bf(1)-(8);

c) Validation documents and other assurance information of the implementation of the back-testing approach set out in Article 325bf(1)-(8);

d) Any other documentation requirements as required by Article 325bf(15);

e) Back-testing reports showing results by trading desk.

Template/data requirement:

-   Please provide VaR, ES, APL, HPL, and RTPL data by trading desk for at least the most recent three months as outlined in template H1 (see appendix), and provide the back-testing exceptions in template H3 (see appendix). Please complete with charts for visualisation.

- Please provide the information showing NMRF per desk and its in- or exclusion into the VaR, subject to back-testing as permitted by Article 325bf (1)(b), in template H4 (see appendix)

I   Profit and Loss Attribution (PLAT) requirements

1. Please indicate the valuation techniques employed in the core end-of-day valuation process (for APL and HPL) or in the risk measurement model (for RTPL).

2. Please provide explanations of known causes of HPL and RTPL discrepancies, including justifications and impact information to evidence compliance with Article 325bg(2). Please refer to the template H2.

3. Please provide explanations of the interplay between the PLAT and back-testing performance and the firm's risk factor identification approaches and results to show the implementation of the processes referred to in Article 325bg(3).

4. Please provide explanations of the reasons for any snapshot time alignments (Article 325bg(4)), with position materiality information.

5. Please demonstrate that the methods to calculate the RTPL are materially aligned with the methods used in the risk measurement model, as required by Article 325bg(9)(b). Please justify the reasoning, and explain any differences and show their impact.

6. Please justify that the calculation referred to in Article 325bg(12)(b) is sufficiently granular to identify the drivers of the impact of the data alignment.

7. Please provide explanations or further analysis and remediation plans for any trading desks that are performing unsatisfactorily in the submitted PLAT results.

8. Please provide an explanation of how the daily P&L attribution and analysis, performed for the purpose of verifying reported P&L, interacts with the PLAT and back-testing processes. This should cover the following, along with any other relevant considerations:

a. the methodologies used in P&L attribution to decompose daily APL / HPL by risk driver, including: use of revaluation-based and risk-based predict; calculation of first, second order and cross effects for different risk inputs; granularity of the decomposition by curve / surface points and between MRF, NMRF, RNIM;

b. mapping between this risk decomposition and that available for RTPL. Please outline any known differences between the decompositions that might act as an obstacle to understanding sources of HPL to RTPL discrepancies;

c. analysis tools or systems used to identify and investigate HPL vs. RTPL differences;

d. projects in place to improve P&L attribution systems and P&L analysis tools;

e. statistics on manual corrections or enrichments applied to the system-generated daily P&L attribution, with root cause analysis and plans to address these.

Documentation request:

a) PLAT procedure documentation to show the integration of PLAT in the organisation, and that shall indicate responsibilities by function, computations and analyses undertaken with timings (e.g. with respect to poor PLAT performance and follow-up actions) and controls;

b) Methodology documents for the implementation of the statistical tests set out in Article 325bg(5)-(8);

c) Validation documents and other assurance information of the implementation of the statistical tests set out in Article 325bg(5)-(8);

d) Any other policies and procedures as required by Article 325bg(12);

e) PLAT performance reports showing results of statistical tests by trading desk;

f) Policies and procedures in relation to independent P&L attribution and analysis.

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Template requirement:

- Please provide the information showing RNIM per desk and its in- or exclusion into the RTPL, as permitted by SS13/13, clause 2.13, in template I1 (see appendix).

- Please provide the results, if available, of PLAT statistical tests by trading desk in template I2 (see appendix). If full PLAT results based on 250 business days of HPL and RTPL data for the trading desks are not available, please provide the date when the information would be submitted.

J Data requirements and principles

1. **General approach on data principles**:

   a. Please provide summary details on how each of the following principles will be followed:

      i. Article 325bh(4) (Principle One): Data inputs derived from combination of MRF;

      ii. Article 325bh(5) (Principle Two): Systematic and idiosyncratic market risk;

      iii. Article 325bh(6) (Principle Three): Reflection of volatility and correlation;

      iv. Article 325bh(7)-(9) (Principle Four): Consistency of data inputs with verifiable prices and with front-office and independent price verification prices;

      v. Article 325bh(10) (Principle Five): Frequency of updating data inputs;

      vi. Article 325bh(11)-(12) (Principle Six): Data inputs for stress period; and

      vii. Article 325bh(13)-(14) (Principle Seven): Use of proxies.

   b. Please confirm that each of the data principles have been assessed in full, with any reasoning and assumptions fully documented and validated.

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c. Please confirm that the scope of the data for the assessment includes all the data for ES calculations, including all risk factors used in ES(FC) and ES(RS).

d. Please provide details on any types of risk factor for which RFET can be passed, but which are nevertheless classified as NMRF due to a failure to meet the data principles.

2. **Specific questions on data principles**:

a. Principle 1:

   i. Please describe and explain the firm's extrapolation approach in Principle 1, and show how this approach meets the requirement of "reasonable distance".

   ii. Please provide the number of MRFs used in extrapolation.

   iii. If "flat-extrapolation" is used, please explain the treatment of the extrapolation basis (e.g. for capitalisation, computation of RTPL in PLAT, etc.).

b. Principle 4:

   i. Please provide details of the statistical tests used in accordance with 325bh(8)(c) and the outcome of the quarterly analysis in 325bh(7) as presented internally.

   ii. Please explain how VPs are used in the IPV process and how they fit within the waterfall of IPV data sources. For example, are they used directly as IPV sources or as a check, given they may not be end-of-day prices? If VPs were significantly away from the prices referenced in Article 325bh(7)(a),(b), and (d), how would they be identified under the IPV process?

   iii. Please clarify how ES data has been compared with VPs.

   iv. Please clarify the frequencies of the IPV data points (e.g. daily, weekly) used for the comparison with ES data, broken down by risk factor type and other relevant dimensions (e.g. currency) as appropriate, and explain why the frequencies are appropriate.

c. Principle 5, Article 325bh(10):

 i. If the data inputs used for the firm's risk management model are updated less frequently than weekly but not less frequently than monthly, please explain why the frequency is considered appropriate (Article 325bh(10)(a)).

 ii. If the re-estimation of model parameters in the firm's risk measurement model is less frequently than fortnightly, please explain why the frequency is considered appropriate (Article 325bh(10)(b)).

d. Principle 6, Article 325bh(11)-(12):

 i. Please clarify how regime shifts, following which risk factors can be expected to behave significantly differently to previous historical periods, have been taken into consideration.

 ii. Please confirm whether idiosyncratic basis is captured for single-name (SN) data which is not available in the stress period.

 iii. Please confirm whether mapping is used for exposures to risk factors not in the reduced set for the purposes of calculating ES(RS) and ES(RC). If it is not used, please clarify the modelling approach.

 iv. Please clarify the methodology used to define the reduced set of risk factors, and provide an indication of whether there are any circumstances where the reduced set is expected to be the same as the full set of risk factors.

 v. Please confirm the firm has the capability to have a distinct reduced set of risk factors, for which 1 or more modellable risk factors are not included.

e. Principle 7 (proxies):

 i. Please set out the definition of proxy used.

 ii. Please provide summary details of the proxy methodologies used.

iii.   Please confirm if all proxies are based on data corresponding to MRFs, with clear justification where this is not the case.

iv.   Please confirm if residual basis risk is captured for proxies, highlighting any cases where this is not the case.

v.   If the residual basis risk is not captured in ES, SSRM or RNIM, please provide the reasoning, including why this risk is not considered material, or potentially material, in the context of a stress period tail event calculation.

vi.   Please clarify the proxy approach for risk factors that are not name-specific, respectively when the basis component is and is not capitalised.

3. **RFET & data principle results**: Please provide the RFET and data principle passing rate (i.e. percentage of risk factors classified as MRF) per risk class/risk factor type. Please discuss how these passing rates vary across currencies (or currency-pairs).

4. **Other data requirements**:

  a. Completeness of risk capture:

      i.   Please list, and provide justification of, any instances where a risk factor is included in the pricing model but not in the risk measurement model, and in particular demonstrate its immateriality (Article 325bh(1)(a)).

      ii.   Judgement-based parameters:

        (a) Please clarify the capitalisation of judgement-based parameters for: (1) proxy methods; and (2) other models (e.g. β of the SABR model, mean reversion of Hull-White model).

        (b) Please explain why the proposed approach is appropriate.

  b. Non-linear risks (Article 325bh(1)(b)):

      i.   Please provide a summary overview description of the re-pricing methods used for determining ES (e.g. full revaluation, re-pricing ladders, sensitivity-based approach).

      ii.   If full revaluation is not used, including when fallback models are used (e.g. in the case of full revaluation failure), please comment on how sufficient accuracy will be ensured for material non-linear positions.

      iii.   Please clarify how non-arbitrage-free scenarios are handled, and comment on the accuracy.

c. Please describe if/how correlation and basis risks are captured in ES (Article 325bh(1)(b), Article 325bh(1)(d)(v)).

d. Minimum data requirements:

      i.   Please describe the firm's minimum data standards for ES (e.g. maximum gap, percentage of stale data points, etc.).

      ii.   Please provide justification for why these minimum data standards are considered appropriate/adequate.

e. CIU approach (Article 325bh(1)(k)):

      i.   Please describe the proposed modelling approach for CIU positions.

      ii.   Please provide evidence demonstrating that the approach leads to own funds requirements that are at least as conservative as a look-through approach.

f. Please confirm that any coefficients of a multi-factor model are included as NMRF except in cases where they are determined empirically based on historical data corresponding to modellable risk factors (Article 325bh(3)(c)).

5. **Other associated issues**:

a. Data construction methods:

      i.   Please define all relevant data construction (e.g. back-filling) terminologies. These may include (but are not limited to):

decomposing, regression, mapping, proxy, interpolation, extrapolation, calculated, surrogate, substitute, backfilling, gap-filling, cohort filling, fallback filling, etc.

ii. Please categorise each of the terminologies into: proxy; mapping[2]; modelling choice (i.e. not a proxy); or other. If needed, please make the categories more granular.

iii. Please describe each of the approaches, at a minimum including: (a) the use cases; (b) the methods; (c) if it is classified as a proxy as per Principle 7; (d) which of the reduced set/full set and stress period/current period ES calculations or SES NMRF calculations it is used for.

iv. Please justify why each of the data construction methods is considered to meet the requirements for the data to have a good track record for the actual position(s) held or be appropriately conservative.

b. Please provide confirmation that:

i. the level of granularity at which RFET is undertaken will be the same as the granularity of risk factors defined in the firm's model. For example, if bonds are modelled at individual issue level, then RFET is also expected to be performed at this level (and not e.g. at issuer level);

ii. NMRF are not included in ES;

iii. entity VaR for the purpose of back-testing includes MRF only.

c. Please provide details of any extremely illiquid risk factors which are proposed to be declared as permanent NMRF, in order to avoid repeatedly performing the RFET exercises to confirm their non-modellable status.

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[2] As described in Principle 6

6. **Audit**: Please provide details of all open audit findings relating to the controls surrounding data to be included in the internal model, including their severity, planned next steps, and closure due dates.

Template requirement:

- Please extend the table in template F1 as appropriate to provide the breakdown of data sources (e.g. verified prices, FO prices, vendor prices, etc.) for the various types of RF in the ES model.

- For the example of a single-name stock position, there are broadly 8 possible cases for the data choices for risk factors. Please complete the table in template J1 (see appendix) with the firm's modelling choices.

K Default Risk Charge

1. **Systematic factors (Article 325bp):** Please provide analysis demonstrating the relevance of the selected systematic drivers for the firm's portfolio (i.e. significance of risk factors, appropriateness of systematic factors, and the mapping of risk positions to systematic risk factors).

2. **Economic cycle:** Please provide the following information:

   a. details on how the economic cycle is reflected in the model;

   b. analysis with respect to calibration of the economic cycle parameters;

   c. comparison of simulated recovery rates vs. empirical recovery rates.

3. **PD matrices (Article 325bp):** Please provide the following information:

   a. whether an approved IRB approach has been used for those estimates, as well as details on the methodology used to compute the PDs if such estimates do not exist;

   b. if PDs are implied from market prices, the approach and actions taken to correct to obtain the objective probability of default;

   c. if PDs are provided by external sources, analysis to show how they are relevant to the firm's portfolio;

d. an overview of which parts of the portfolio, with associated materiality (jump to default), are covered by internal (IRB) PDs, external PDs or fallback PDs;

e. final PD matrices by category (i.e. corporate, sovereign, etc.) and rating.

4. **LGD estimates (Article 325bp):** Please provide the following information:

a. whether an approved IRB approach has been used for those estimates, as well as details on the methodology used to compute the LGDs if such estimates do not exist;

b. an overview of which parts of the portfolio, with associated materiality (jump to default), are covered by internal (IRB) LGDs, external LGDs or fallback LGDs;

c. details on how different levels of seniority for the same obligor are taken into account in DRC.

5. **Correlations (Articles 325bn and 325bc):** Please provide the following information relating to the modelling of default correlations within DRC:

a. details of how concentrations that can arise within and across product classes under stressed conditions are captured by the assumed correlation model;

b. the type of data used to calibrate correlations;

c. the length of the horizon used (e.g. monthly, quarterly, annual) when calculating equity price or credit spread returns;

d. details on the identification of a relevant stress period within the calibration window;

e. the calibration window (i.e. start date and end date of the historical data), and confirmation on how this is expected to be updated at subsequent model recalibrations;

f. the type of shocks used (e.g. overlapping/non-overlapping);

g. the final correlation matrix.

6. **Hedges (Article 325bo):** Please provide:

    a. details on how hedges are modelled;

    b. details on how netting is applied.

7. **Equities (Article 325bn):** Please provide the following information:

    a. the liquidity horizon used for equity sub-portfolios;

    b. the equivalent correlation matrix which will be used;

    c. how positions with multiple underlyings are modelled within DRC, in particular in relation to the calculation of exposure at default;

    d. details on any assumptions and simplifications that will be applied for positions with non-linear behaviour, and how these have been validated, and any mitigating actions taken (or planned).

8. Please provide the following additional analysis:

    a. convergence analysis regarding the number of simulations chosen;

    b. details of stress tests, including sensitivity analyses and scenario analyses, performed to assess the qualitative and quantitative reasonableness of the internal default risk model, in particular with regard to the treatment of concentrations.

Documentation request:

a) Methodology documentation relating to the DRC model and its implementation;

b) Procedure documentation for the calculation of the DRC (outlining the involved systems, steps, frequency, controls), and including:

- information on the number of simulations used for DRC estimation, and on how the 99.9% confidence interval estimate is derived from the simulated loss distribution;

- information on the calculation day for the DRC in case of a weekly calculation (and analysis demonstrating the choice of day of the week does not materially impact results);

- information on the implementation, and testing, of the DRC calculation in the production systems;

c) Details of the stress tests, sensitivity analysis and/or scenario analysis performed in order to assess the qualitative and quantitative reasonableness of the model;

d) Independent validation documentation associated with the above, as well as any governance materials relating to the internal challenge and review process.

Template requirement:

- Please complete the worksheet template K1-K4 (listed in appendix) to capture the PD, LGD, systematic risk factors, and correlations which serve as input to the internal DRC model.

L Model Risk Management for internal models

1. **Model risk management organisation**: Please provide organisational charts and an overview of the composition, reporting lines, and roles and responsibilities of the organisational units / committees / decision-making bodies involved in the end-to-end model risk management process for market risk models, with a particular focus on Trading, Market Risk Management, Model Development (including for pricing functions used by Trading), Model Validation, and Internal Audit.

2. **Model validation organisation, detail**: Please provide details of the Model Validation team size, levels of experience (including relevant industry and academic experience), and geographical location, with comparison against the corresponding Model Development team (for market risk models). Please provide organisation charts and details of the functions which are responsible for the different elements of the back-testing process (e.g. for P&L production and the computation of actual and hypothetical P&L, carrying out back-testing analysis, reporting/escalating back-testing exceptions, etc.), to the extent these are different. Please also provide a summary of the extent to which

testing and validation of internal models is carried out by outsourced or offshored staff.

3. **Assessment versus SS1/23**: Please provide an assessment of how the firm meets the standards set out in SS1/23 in principle 3 (model development, implementation, and use), principle 4 (independent model validation), and principle 5 (model risk mitigants), in relation to the models in scope of this application, with details of planned actions (and target dates) to close any gaps identified.

4. **Systems**:

   a. Please provide a description of systems and processes used to manage the end-to-end model risk management workflow, including validation, for market risk models.

   b. Please describe how the implementation process for internal models is independently verified.

Documentation request:

a) **Model validation process**: Please provide documentation of the validation process, both at inception and on an ongoing basis (including the frequency of re-validation for the different component models, the reporting/follow-up of the validation results, and the escalation process). Please include all relevant policy documents.

b) **Split of validation responsibilities**: Please provide documentation explaining the allocation of responsibilities and tasks between the model development and validation functions (also, at local and group-wide level, if applicable).

c) **Governance process**: Please provide documentation of the decision-making process of the firm for market risk models, i.e. the process by which new models / material model changes are approved and existing models are re-approved. The governance process documentation should cover development, implementation, and approval of internal models and model changes for capital requirements calculation purposes.

d) **Model change process**: Please provide the model change policy as it relates to IMA models and any feeder models. Please include details of how the qualitative criteria set out in the PRA Rulebook (on Material Changes and Extensions to Internal Models) with be applied in practise.

e) **New products process**: Please provide documentation of the new product approval process, including details of how consideration is given to potential impacts on the IMA models.

f) **Risk measurement model methodology**: Please provide the methodology documentation for all the risk measurement models, that should all be listed in the risk measurement model inventory.

g) **Model validation methodology**: Please provide documentation of the validation methodology for each IMA model component, describing which assumptions and limitations (including approximations used in the model) are tested in the validation and how. Please also provide documentation on any relevant internal modelling benchmarks.

h) **Model validation results**: Please provide the model validation reports (including recommendations and findings and the associated severity) for:

    i. the ES and SSRM methodology and all chosen model assumptions (including calibration, proxies, risk factor scenarios, number of simulations, and revaluation methods where different (and potentially simplified or approximated) from front office valuations, etc.).

    ii. the stressed period selection methodology for NMRFs, including the review of any assumptions and limitations associated with NMRFs.

    iii. the DRC methodology and all chosen model assumptions (including calibration of correlations, factor model and mapping to systematic factors, PDs, LGDs, etc.).

    iv. the risks not covered in ES/SSRM/DRC (i.e. RNIM).

    v. the methodologies for deriving risk factor values from verifiable prices.

In cases where this information has already been provided in response to earlier sections of the questionnaire, please annotate accordingly. Where additional validation activities not covered by the above list have been carried out, please include the corresponding reports.

i) **Governance results**: Please provide the outcomes from the firm's internal governance process for the IMA models, including minutes from decision-making committees, and any agreed issues/follow-ups (with closure plans and progress).

Template requirement:

- Please provide the inventories for (a) models (b) assumptions and limitations, and (c) findings in the templates L1-L3 (see appendix).

M Internal model production

The following information is requested to provide insight about internal model implementation and use of model outputs (results) for internal risk management. Some items may already be included in the detailed materials supporting the firm's self-assessments provided in the preceding Sections, in which case a short cross-reference in either Section will suffice.

1. Please provide organisation charts and details of the team(s) responsible for producing and maintaining the internal risk measures for individual model components. Please also indicate the geographical location that members of staff are based in.

2. Please provide a description of all feeds, and associated systems, to the risk-measurement model components, setting out source/pre-processing systems, cut-off times for inclusion of positions, and the expected time that the feed should be available.

3. Please provide a description of reconciliations undertaken as part of the risk-measurement model production process, or as part of other daily processes (e.g. by Product Control or Operations) that inform or ensure the completeness and accuracy of the internal model feeds and outputs

4. Please provide a description of the role played by business-generating units (if any) in respect of risk or internal model results sign-off.

5. Please provide a description of the main causes of differences between flash and final results. For instance, please expand on the circumstances under which internal model results would be re-stated in case of problems materialising, such as late, failed or corrupt feeds or late trade capture or amendments, and any thresholds applicable.

Documentation request:

a) Please supply copies of market risk reports provided to senior management and trading desks that incorporate the internal models outputs.

b) Please provide internal documentation explaining the internal models production process, including the main steps relating to the production of risk-measurement model results, including target times (results in flash and final form, if relevant).

c) For global firms, please provide details of flash and final regional cuts of internal model results.

N Independent market risk management

Please provide details of the firm's assessment against Article 325bi covering the qualitative requirements on model use within the organisational context, noting the level of detail required by SS13/13 Clause 9.3 and noting that the results of internal model validation procedures to assess the ES model will be taken into account, as suggested in SS13/13 Clause 9.12.

1. With respect to governance arrangements and the organisation of the market risk management function, please provide:

   a. an organisation chart for the independent market risk management function, details of key individuals with delegated responsibilities for the market risk management processes, along with their roles, responsibilities

and reporting lines. Please also indicate the geographical location that members of staff are based in;

b. an overview of the governance processes relevant to market risk management, including how senior management assures itself of the effectiveness of the market risk management function;

c. an overview of the ways in which independent market risk management interacts with other units/teams (including front office, middle office, back office, internal audit) within the organisation, along with examples of the resulting deliverables, including effective challenge of the front office;

d. an overview of independent market risk management involvement with market risk related decisions (including new product approval processes, active risk management, methodological changes, stress testing) and how risk identification is achieved through these processes and how confidence in the effectiveness of these processes is gained;

e. an overview of independent market risk management involvement with other control processes (including valuation control, product control, independent price verification, internal audit).

2. With respect to any organisational arrangements impacting on risk management and how changes to organisational arrangements are made and governed, please provide:

a. an overview of the extent to which staff based outside legal entities are responsible for independent market risk management within the entities within scope of the application;

b. a description of established intra-group booking practices and use of internal hedges, noting the drivers of the arrangements;

c. a description of notable booking structures (e.g. back-to-backing of trades) that might impede effective risk management on a going concern basis;

d. an overview of the booking model employed by the entities within scope of the application. (e.g. back-to-backing of trades).

3. With respect to market risk management resources, please provide:

    a. a summary of how the firm satisfies itself on the adequacy and technical skills of market risk management resources, taking into account the requirements in Article 325bi(1)(d)-(e);

    b. a summary of the numbers of staff who carry out risk management functions (broken down by seniority) and their location. Details of risk management resources should include: number, budget, turnover, composition (senior vs. junior, temporary vs. permanent, full-time vs. contractor, etc.);

    c. details of key risk controllers and their corresponding key risk takers;

    d. an overview of how remuneration (i.e. salary and bonuses) is determined for independent market risk managers, and who within the organisation has influence over discretionary remuneration decisions;

    e. an overview of the extent to which independent market risk management is offshored or outsourced (including information regarding which parts of the function is outsourced and how you satisfy yourself that the outsourced parts of the function are effective);

    f. an overview of the systems used by the independent risk management function;

    g. any material dependencies of risk management staff on other functional areas;

    h. an overview of the dependencies that independent risk management has on other areas within the organisation and on other independent risk managers outside the legal entity;

    i. an overview of the extent to which the production of internal models' risk metrics is reliant on offshored or outsourced staff.

4. With respect to market risk management, please provide:

    a. an overview of the firm's market risk appetite and limit framework as it applies to the legal entities within the scope of the application. In addition,

if applicable, please provide an overview of how market risk limits for legal entities differ from group-wide risk limits;

b. an overview of the calibration and monitoring of metrics used in the market risk limit framework (risk limits, limit monitoring and reporting, limit exception reporting, limit change reporting). Please provide details of any types of positions that are either partially or wholly exempt from the market risk limit framework;

c. an overview of how intra-day market risk is managed, including reports on intraday limits and utilisation and breaches.

5. Please provide an overview of how the governance of internal risk measures differs from those that are proposed to be used to calculate regulatory capital requirements.

Documentation request:

a) Please provide documentation relating to governance arrangements and the organisation of the market risk management function.

b) Please provide minutes and presentations over the past 6 months associated with committees and forums relevant to market risk management.

c) Please provide internal documentation for the booking model employed by the entities within scope of the application.

d) Please provide independent market risk management procedures used in identifying, measuring, reporting and controlling of market risks

e) With respect to market risk management, please provide:

   i.   internal reports showing the utilisation of market risk limits over the past 12 months, along with evidence of the processes used to adjust limits (on a temporary or permanent basis), and evidence of the actions taken to redress limit breaches, during that period;

   ii. examples of internal documentation relating to periodic (e.g. daily, weekly, monthly, etc.) market risk management reporting;

   iii. a list of all internal credit and equity hedges between the non-trading book and trading book, together with transaction-by-transaction

confirmation of offsetting identical transactions with third parties if the internal hedge is to be recognised (Article 106(2)-(8));

iv. a list of all internal general interest rate risk (GIRR) hedges between the non-trading book and trading book, together with confirmation that the hedge is booked in a dedicated GIRR internal hedge portfolio for non-trading book exposures. (Article 106(9)-(10))

O Stress testing

Please provide details of the firm's assessment against Article 325bi(1)(h). The following information is requested to provide insight about the firm's stress testing (including reverse stress testing). Some items may already be included in the detailed materials supporting the firm's self-assessments provided in the preceding Sections, in which case a cross reference in either Section will suffice:

1. An overview of the governance process relevant to the production of stress testing, including the process used to determine the nature of scenarios implemented:

    a. Information on governance at a relevant legal entity level for the IMA application and global level, relevant committees, listing members and attendees of these committees;

    b. An overview of the roles and responsibilities of the teams/units involved when designing stress testing scenarios;

    c. A description of the quality assurance process in place in order to ensure the integrity of the firm's stress test results;

    d. An explanation of how stressed measures are used to inform the process for setting limits, as required in Article 325bi(1)(h);

2. An overview of the scenario design process, including: what triggers design and implementation of a new stress scenario / decommissioning a stress test scenario; whether the stress scenario consists of an instantaneous shock or has time dimension in which market developments and the firm's risk management are expected to play out; how the severity of the stress scenario

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/ risk factor shocks are calibrated; how real-world events inform the design of stress scenarios; how the firm's trading positions influence the design of stress scenarios; which functions are included in the stress scenario design process and how they are included;

3. An overview of the firm's ability to carry out ad hoc stress test, providing examples of ad hoc analyses carried out;

4. An overview of the various periodic stress testing analyses performed, highlighting the length of time between close-of-business date of positions and dissemination of the resulting report;

5. Any validation carried out in relation to the firm's stress testing framework.

Documentation request:

 a) Please provide internal stress testing methodology documentation. This should cover all scenarios, including reverse stress testing, setting out both the revaluation methods applied for all respective in-scope-products and the methods applied to determine stress scenarios (including. information explaining the exact risk factor inclusion/exclusion choices and the firm's underlying considerations, stress severity assumed and the methods used to incorporate liquidity constraints in a crisis, detail on a possible implementation of specific stresses for sectoral or idiosyncratic risk concentrations, detail on risk factor granularity and hedge efficiency considerations) and further analysis performed.

 b) Please provide stress testing policies concerned with all methodological aspects (additional details of the various stresses, scenarios and correlation assumptions currently used within the stress testing framework, risk factors and stress horizons).

 c) Please provide examples of internal stress testing reports and analysis.

 d) Please provide examples of actions taken where the stress results show excessive losses.

 e) Please provide a list of those products that are not currently subject to stress testing, their materiality and the reasons why these products are excluded from stress testing.

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P Trading desk

Please provide details of the firm's assessment against Article 104, covering the requirements for the trading book and non-trading book boundary and the structure of a trading desk.

Please provide the following documentation:

1. Trading Book Boundary:

   a. Policies and procedures for determining which positions to include in the trading book for the purposes of calculating capital requirements, documentation of compliance with these policies and procedures, and a copy of the annual internal audit;

   b. List of instruments assigned to the trading book and a separate list of instruments assigned to the non-trading book;

   c. Details and rationale for any re-assignments between the trading book and non-trading book in the last 12 months;

2. Trading Desk Requirements:

   a. Rationale for the trading desk structure;

   b. Organisation charts for each trading desk, highlighting reporting lines within desk and to senior management, and responsibilities;

   c. Examples of trader mandates;

   d. Business strategy, annual budget and regular MI for revenue, costs and RWAs for each trading desk;

   e. Risk scope and permitted risk factors for each trading desk;

   f. Compensation policy for each trading desk.

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Q Internal Audit

Please provide the following information in relation to the Internal Audit (IA) function and its coverage of the relevant requirements for the businesses and controls within scope of the IMA application:

1. Organisation charts and background information on the IA function and personnel responsible for carrying out independent audits of the internal model, and of the market risk measurement and management systems and processes more generally;

2. A description of IA's approach and methodology for meeting the qualitative requirements set out in Article 325bi(1)(i) and (2). If IA work to meet these requirements, or elements of it, is outsourced, please provide details of the outsourcing arrangements;

3. Please describe the methodology, scope and depth of these reviews, including the nature and extent of sampling and the extent to which IA has reviewed the businesses for which permission is being sought.

Documentation request:

a) A copy of the most recent IA report (or reports) which have been completed in compliance with Article 325bi(1)(i) and (2), or which are otherwise deemed relevant to the IMA application;

b) Copies of the most recent IA and other independent reports undertaken on each of: operations and middle office, product control, risk management and measurement systems and activities, the lines of business and any other functions relevant to the IMA application;

c) A list of all open audit issues relevant to the IMA application (e.g. business units, IT, market risk management and thematic audits) including any past due issues and their completion target dates.

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R Appendix: Worksheet templates

Please fill in the following accompanying templates:

	Template Description
C1	Worksheet template for data collection for Articles 325ba-bc: Please provide the components of own funds requirements under IMA, and separately for the dedicated general interest rate internal hedge portfolio as according to Article 106(9)(b)(ii) and for all other trading book positions.
D1	**Worksheet template for data collection for Risks Not In Model**: Please provide, as relating to Article 325az(4), the Risk-not-in-model ('RNIM') inventory (which may include missing risks or risk factors, model assumptions, limitations and uncertainties). This should be consistent with what is (or will be) used internally and shared with senior management. Please provide all of the requested information in the template as a minimum, and add other fields as necessary
E1	**Worksheet template for data collection for risk factors:** Please provide the category, liquidity horizon mapping, and materiality for all the risk factors in the ES model. In addition, please also provide, by extending the template as appropriate, the breakdown of data sources (e.g. verified prices, FO prices, vendor prices, etc.) for each risk factor.
F1	**Worksheet template for RFET:** Please provide P&Ls *for at least three months* by trading desk by filling in the template. Please extend the template as necessary to provide back-testing outcomes and PLAT results (including the statistical test results) by trading desk.
G1	**Worksheet template for NMRF:** Please provide information on all individual NMRFs (and their risk factor types, such as bond price, equity price, credit spread, etc.) along with the scenario approach to be used, including whether the stress scenario is at the individual NMRF level or at a standardised bucket level, and other requested information including time series used for calibration and the re-pricing methods for SSRM.

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H1	**Worksheet template for data collection for P&L, back-testing and PLAT results:** Please provide P&Ls *for at least three months* by trading desk by filling in the template. Please extend the template as necessary to provide back-testing outcomes and PLAT results (including the statistical test results) by trading desk.
H2	**Worksheet template for data collection for the technical elements of APL, HPL and RTPL:** Please provide information on the inclusion or exclusion for technical elements (the seven specified as a minimum) into APL, HPL and RTPL for trading desks and into APL and HPL for the bank portfolio, as well as the calculation frequency.
H3	**Worksheet template for back-testing:** Please provide back-testing exceptions, if available. If the full back-testing results based on 250 business days of APL, HPL and VaR data for the bank portfolio are not available, provide the date when the information would be submitted.
H4	**Worksheet template for NMRF in VaR:** Please provide the information on the inclusion/exclusion of NMRF, as permitted by Article 325bf(1)(b) in the trading desks' VaR subject to back-testing.
I1	**Worksheet template for RNIM in RTPL:** Please provide the information showing RNIM per desk and its in- or exclusion into the RTPL, as permitted by SS13/13, clause 2.13.
I2	**Worksheet template for PLAT:** Please provide PLAT statistical test results, if available. If the full PLAT results based on 250 business days of HPL and RTPL data for the trading desks are not available, provide the date when the information would be submitted.
J1	**Worksheet template for *case study* for data choices for risk factors**: For the example of a single-name stock position, there are broadly 8 possible cases (listed in the template). Please complete the template with the firm's modelling choices.
K1	**Worksheet template for DRC data collection for PDs:** Please provide the probabilities of default (PD) which serve as input to the internal DRC model. Please adapt the set of obligor categories and

	the rating scale in the template as appropriate to reflect the setup of the DRC model.
K2	**Worksheet template for DRC data collection for LGDs:** Please provide the loss given default (LGD) parameters used in the DRC model.
K3	**Worksheet template for DRC data collection for Systematic Risk Factors:** Please provide the two types of systematic risk factors used in the DRC model, as according to Article 325bp(1), and also provide all dimensions of the systematic risk factor types.
K4	**Worksheet template for DRC data collection for correlations:** Please provide the full list of market data time series used to calibrate correlations in the DRC model, and also provide the qualitative information as well as the basic statistics requested for each time series.
L1	**Worksheet template for data collection for Model Inventory:** Please provide a list of the IMA risk measurement models including any feeder models as captured in the firm-wide model inventory. Please include all relevant fields captured in the inventory (e.g. model tier), as well as the model documentation name.
L2	**Worksheet template for data collection for Assumptions and Limitations Inventory:** Please provide a list of model assumptions and limitations of the IMA models, including materiality assessment, mitigation, and ongoing monitoring frequency.
L3	**Worksheet template for data collection for Findings Inventory:** Please provide a list of findings arising from the IMA model validation reviews, including (but not limited to): a summary of each finding, severity, mitigants in place, closure plans, and a status update.

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