

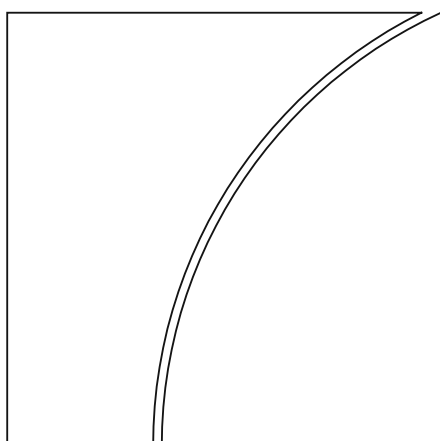
Basel Committee on Banking Supervision

Consultative Document

Revisions to the minimum capital requirements for market risk

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Revisions to the minimum capital requirements for market risk

Introduction

In January 2016, the Basel Committee on Banking Supervision published the standard *Minimum capital requirements for market risk*¹ (hereafter “January 2016 standard”). This new market risk standard was developed to address a number of structural shortcomings in the Basel II market risk framework (and its subsequent revisions), and served as a key component of the Basel Committee’s reform of global regulatory standards in response to the global financial crisis.

In the time since its publication, the Basel Committee has monitored the pace of implementation of the market risk standard as well as its impact on banks’ market risk capital requirements. In acknowledgment of ongoing challenges related to implementation of the standard, the Basel Committee’s oversight body, the Group of Governors and Heads of Supervision (GHOS), has endorsed an extension of the implementation date to 1 January 2022 (which will constitute both the implementation and regulatory reporting date for the standard). This deferred implementation date is intended to allow banks additional time to develop the systems infrastructure needed to apply the standard and for the Committee to address certain specific outstanding issues.

In order to address the issues with the standard that the Committee has identified, this consultative document proposes a number of revisions to the standard. It also sets out the Committee’s proposals for a simplified alternative to the revised standardised approach to market risk, which take into account responses to the consultative document the Committee issued in June 2017.²

1. Standardised approach

A major structural shortcoming of the Basel II market risk framework is that it does not feature a risk-sensitive standardised approach that can serve as a credible fallback for, as well as a floor to, the internal models approach. The January 2016 standard intended to address this by introducing a revised standardised approach.

The main element of the revised standardised approach – the Sensitivities-based Method – relies on the use of “sensitivities”. “Sensitivities” are banks’ estimates of how much the values of their financial instruments change when the values of a prescribed list of underlying risk factors change. For example, banks are required to calculate the change in value of their financial instruments if there was a 1 basis point move in interest rates. The standardised approach specifies:

- the risk weights that should be applied to the sensitivities for each of the prescribed list of risk factors. Banks multiply their sensitivities to risk factors by these risk weights to estimate the change, on a risk factor by risk factor basis, in the value of their trading book portfolio; and
- the approach that banks should use to aggregate the risk factor-level valuation changes into an aggregate amount that is the basis of the capital requirement – a set of formulae is prescribed that uses defined correlation assumptions to provide diversification benefit across risk factors.

¹ Basel Committee on Banking Supervision, *Minimum capital requirement for market risk*, January 2016, www.bis.org/bcbs/publ/d352.pdf.

² Basel Committee on Banking Supervision, *Consultative Document – Simplified alternative to the standardised approach to market risk capital requirements*, June 2017, www.bis.org/bcbs/publ/d408.pdf.

The use of sensitivities and the incorporation of diversification benefits in calculating the aggregate capital requirement better align the outcomes of the revised standardised approach with that of the internal models approach by enabling a degree of risk sensitivity in the standardised approach.

The Committee's ongoing monitoring of the impact of the revised standardised approach, and feedback received from banks as they have begun to implement it, have highlighted areas where the approach to measure risk factor-level losses, and their aggregation, are not commensurate with the actual risk. Without revision, these issues could make the standardised approach a less credible fallback for the internal models approach. The Committee therefore proposes revisions to the following elements:

- the approach to determine FX pairs that are liquid and therefore subject to lower risk weights;³
- the correlation scenarios applied in the standardised approach calculation; and
- the treatment of non-linear financial instruments such as options.

In order to ensure that the overall level of capital requirements resulting from the revised standardised approach is more consistent with the Committee's initial expectation, the Committee is also proposing reductions in the risk weights applied for certain asset classes. Further details on the proposed revisions are provided below, with revisions to the associated standard text provided in Annex A.

1.1 Revisions to the treatment of liquid FX pairs

Under both the standardised approach and the internal models approach, certain specified currency pairs are designated to be sufficiently liquid to warrant lower associated capital requirements. Neither approach recognises that it is possible to combine two liquid currency pairs to create a new, triangulated pair that, by virtue of being the result of combining two liquid instruments, would also be liquid.

For example, although USD/BRL and USD/EUR are included in the January 2016 standard's list of liquid currency pairs, EUR/BRL is not included in the list. However, by combining two liquid instruments that reference USD/BRL and USD/EUR, a bank could create a liquid instrument that references the currency pair EUR/BRL.

Because the January 2016 standard does not permit the consideration of such combinations, some liquid FX currency pairs may be subject to capital requirements that are not commensurate with their risk. The Committee proposes to allow banks to combine two currency pairs in the current list of liquid pairs and treat the resulting new FX pair as liquid.

1.2 Revisions to correlation scenarios

In the January 2016 standard, improved risk sensitivity in the revised standardised approach relative to the Basel II standardised approach is largely due to better recognition of diversification benefits across banks' trading portfolios. These diversification benefits come from the use of prescribed correlations in the aggregation of risk factor-level losses to calculate banks' capital requirements.

To account for a range of possible market conditions, the January 2016 standard requires banks to calculate capital requirements for each risk class⁴ three times: (i) with correlation assumptions as prescribed in the standard (the "medium correlations" scenario); (ii) with all correlations scaled upwards by 25% (the "high correlations" scenario); and (iii) with all correlations scaled downwards by 25% (the "low

³ The proposed revision to the treatment of FX liquidity would also apply to the internal models approach.

⁴ The standardised approach categorises market risks into seven "risk classes" and calculates capital requirements separately for each. The defined classes are: (i) general interest rate risk; (ii) equity risk; (iii) credit spread risk: non-securitisation; (iv) credit spread risk: securitisations (non-correlation trading portfolio); (v) credit spread risk: securitisations (correlation trading portfolio); (vi) commodity risk; and (vii) foreign exchange risk.

correlations" scenario). The capital requirement for each risk class is calculated in each scenario, with the ultimate capital requirement determined by the highest result, aggregated across the entire trading book portfolio, from the three scenarios.

For risk factors that are observed empirically to be consistently highly correlated in all market conditions, the Committee has observed that the "low correlations" scenario can produce correlations that are more conservative than empirical data would support. This can make the outcome of the standardised approach overly conservative. The Committee proposes to revise the "low correlations" scenario to address this issue by limiting the reduction in correlations in these cases.

1.3 Revisions to capital requirements for non-linear instruments

The January 2016 standard specifies additional capital requirements – curvature risk capital requirements – for certain financial instruments, such as options, for which values do not change linearly with respect to their underlying risk factors. Because of this non-linearity, these types of instruments can lose more value than would be estimated by applying shocks to risk factor sensitivities. The curvature risk capital requirements are computed by calculating the maximum loss of two scenarios of shocks – an upward shock and a downward shock. Banks revalue their non-linear instruments based on those shocks, and calculate the incremental value change beyond what would be estimated using sensitivities. This incremental amount is the additional capital requirement for curvature risk.

The Committee has identified three aspects of the curvature risk measurement where minor changes could improve the January 2016 standard:

- *The approach to apply shock scenarios:* when calculating the curvature risk capital requirement, the upward and downward shocks are applied separately to each risk factor. The worst loss for each risk factor is used to calculate the capital requirement. This approach can lead to two financial instruments that are very closely related having capital requirements based on different shocks. The Committee proposes to revise this approach so that consistent scenarios are applied to risk factors that are defined to be in the same standardised approach "bucket"⁵ for the credit spread risk, equity and commodity risk classes. The Committee is also exploring an alternative approach of defining "sectors" as a subset of each bucket and applying consistent scenarios at that level and would welcome feedback on the potential merits and drawbacks of this alternative approach.
- *Cliff effects caused by the approach used to calculate aggregate capital requirements:* the Committee has observed that the formulae used to calculate the aggregate curvature risk capital requirement can cause cliff effects for certain types of trading book portfolios. Cliff effects arise from the use of an alternative specification that banks must use when curvature risk positions are negative (ie when banks would only see profits in the curvature shock scenarios). The alternative specification can lead to an abrupt increase in capital requirements. To address this, the Committee proposes a simple fix that applies a floor to the part of the formula causing the cliff effect.
- *Potential double-counting of FX curvature risk:* the revised standardised approach requires banks to define FX exposures relative to their reporting currency. This reflects the reality that a bank's FX risk stems from movements in other currencies relative to that which it uses for reporting purposes. However, the Committee has observed that, in the specific situation of banks holding FX options where neither of the underlying currencies is the bank's reporting currency, the

⁵ Within the January 2016 standard standardised approach, buckets are defined groups of risk factors with similar characteristics.

approach to calculate curvature risk capital requirements may lead to double-counting.⁶ The Committee has not received sufficient data through its monitoring to determine whether this double-counting of FX curvature risk is a material issue in practice. The Committee therefore seeks feedback via this consultation on whether this is a material issue. If this is a material issue, a potential revision to the standard to address it is set out in Box 1. The Committee welcomes views on whether the approach set out below would address the issue in an appropriate manner. In providing feedback on this matter, commenters should provide concrete evidence and data in support of any recommendations for the appropriate level of any scaling factor.

Box 1

131. For FX and equity curvature risk factors, the curvature risk weights are relative shifts (“shocks”) equal to the delta risk weights. For FX curvature, where none of the underlying currencies of a particular FX instrument is the reporting currency, any resulting curvature sensitivities may be divided by a scalar [X]. If a bank opts to apply this discretion, it must do so consistently for all FX instruments where none of the underlying currencies is the reporting currency.

1.4 Revisions to risk weights

The Committee’s monitoring of the impact of the January 2016 standard indicates that the currently reported capital impact of the revised standardised approach is not consistent with its initial expectations. The Committee has identified that, after taking into account the expected impact of the above-proposed revisions, reductions in risk weights in the January 2016 standard standardised approach are necessary to bring market risk capital requirements closer to that originally intended level. Based on impact data received to date, the Committee proposes to reduce the risk weights for the general interest rate risk class by 20–40%, and equity and FX risk classes by 25–50%. No specific revision is proposed to the risk weights applied for the credit spread and commodity risk classes. The final recalibration for all risk classes will be determined based on further analysis of impact data provided by banks, and feedback provided to this consultative document. Upon finalisation of any recalibrated risk weights, the Committee may also consider making corresponding changes to risk weights used in the standardised approach to credit valuation adjustment risk (SA-CVA) given that SA-CVA risk weights were based upon the risk weights included in the January 2016 market risk standard.

1.5 Other clarifications

The Committee has received feedback that the treatment of multi-underlying options and index instruments in the revised standardised approach is unclear. The Committee proposes, in Annex A, revisions to clarify the treatment.

⁶ For example, if a GBP-reporting bank writes an option on the EUR/USD exchange rate, the bank is considered to have two separate FX risk exposures – a GBP/EUR exposure and a GBP/USD exposure. The bank calculates curvature risk capital requirements based on two shocks: one where EUR is shocked relative to GBP, and one where USD is shocked relative to GBP. This is unlike the case of an EUR-reporting bank, which will have one FX risk exposure and calculates curvature risk capital requirements based on one shock: where USD is shocked relative to EUR.

2. Internal models approach

The internal models approach (IMA) set out in the January 2016 standard featured a number of enhancements relative to the Basel II framework, including: (i) enhanced requirements for approval to use models, including the introduction of a profit and loss (P&L) attribution (PLA) test that trading desks must pass on an ongoing basis in order to be eligible for the IMA; and (ii) more coherent and comprehensive methods to measure risk, including the introduction of distinct capital requirements for non-modellable risk factors (NMRFs).

To address a number of issues identified in the course of ongoing monitoring of the implementation of these aspects of the IMA and to facilitate its effective implementation, the Committee proposes the following revisions.

2.1 P&L attribution test

The Committee introduced the PLA test to serve as an objective, quantitative assessment of whether models that a bank uses to calculate market risk capital requirements appropriately measure all material risks relevant to each individual trading desk to which they are applied. The test is intended to be a benchmark by which supervisors can assess the appropriateness of a bank's use of a model, with a trading desk being required to use the standardised approach for market risk in the event that it fails to meet the PLA test's requirements.

The PLA test specified in the January 2016 standard compares historical time series of two measures of daily P&L for each trading desk for which a bank intends to use internal models:

- "Hypothetical P&L" (HPL): The P&L, as calculated by the bank's systems that produce the reported daily P&L but removing commissions, fees, the impact of intraday trading and certain valuation adjustments.
- "Risk-theoretical P&L" (RTPL): The P&L that is produced when only the risk factors in the bank's internal risk management model, and the valuation techniques used in that model, are included.

The HPL is the benchmark against which the PLA test assesses a trading desk's risk management model. If the risk management model includes all risk factors and uses the same valuation techniques as used by the models used for the reported daily P&L, then the RTPL will match the HPL. The two P&Ls might differ, however, in the event that the bank's risk management model ignores some risks, and/or values products in a simpler way, in order to allow the model to run more efficiently. Therefore, material inconsistencies between the two measures of P&L are indicative of "missing risks" that are not included in the risk management model. The PLA test aims to measure and set a limit on how inconsistent the two P&Ls can be before a trading desk is no longer permitted to use the IMA.

The Committee continues to believe that the PLA test is an important innovation of the market risk framework, but is aware of issues with the approach specified in the January 2016 standard that may lead to it not meeting the Committee's intended objectives. These issues relate to the inputs to the test, the test metrics themselves, and the automatic consequences of failing the test. To address these issues, the Committee proposes a number of revisions that are described below. Associated revisions to the standard text are in Annex B.

2.1.1 PLA test input data

The Committee has received requests for additional clarity on the January 2016 standard's definitions of HPL and RTPL, in addition to requests for clarification as to whether banks may be permitted to make any adjustments to data used to produce both parameters.

As explained above, the objective of the PLA test is to assess the materiality of risks that may be missing from the risk management model due to risk factors that are not included in the model or simplifications in the model's approaches to valuation. Beyond these sources of discrepancy between the HPL and the RTPL of a given trading desk, additional differences between the two measures of P&L may arise as the result of acknowledged differences or misalignments in the data that the bank uses as inputs to calculate each measure. For example, such differences could be the result of:

- differences in the times at which market data are collected to calculate the HPL and the RTPL, respectively; and/or
- a bank using different data providers to source the inputs for its calculations of the HPL and the RTPL.

To avoid issues resultant from such differences in input data, the Committee proposes revisions to the definitions of the HPL and the RTPL and clarification that banks may align input data. The proposed revisions specify conditions that a bank must meet in making such alignments to ensure that the process does not inappropriately conceal the impact of any "missing risks" that the PLA test is intended to assess.

2.1.2 PLA test metric design

The PLA test as specified in the January 2016 standard includes two test metrics to measure the size of the difference between the HPL and the RTPL for each trading desk,⁷ with each test metric to be calculated on a monthly basis using data over the previous one-month period. Banks must then count the number of breaches of the test over the previous 12 one-month periods.

The Committee has monitored the performance of the PLA test metrics as originally specified, and has identified concerns over the metrics' combined abilities to appropriately identify models that demonstrate deficiencies for the purposes of determining capital requirements. In addition, the one-month sample of data used may be insufficiently representative of a model's performance.

To address these concerns, the Committee proposes revisions to: (i) the frequency at which the test is to be conducted and the length of the time series to be used; and (ii) the design of the test metrics themselves. The Committee proposes that the PLA test be calculated on a quarterly basis using a time series of data collected over the preceding 12 months. The Committee also proposes two new metrics to replace those specified in the January 2016 standard.

The first of the two new proposed test metrics would measure the correlation between the values of the HPL and the RTPL, comparing the "Spearman correlation" with predefined thresholds. The second of the proposed test metrics would measure the similarity of the distributions of the HPL and the RTPL. For use as this second test metric, the Committee seeks feedback on two alternatives. The first alternative would use the "Kolmogorov-Smirnov" (KS) test, whereas the second alternative would use a "Chi-squared" test. The details of these tests are summarised in Box 2. The Committee seeks comments on the relative merits of the KS and the Chi-squared test alternatives, particularly with regard to considerations over their ease of implementation and ability to discriminate between appropriate and inappropriate models for a given trading desk.

⁷ The first test metric measures the mean of unexplained daily P&L (ie daily RTPL minus daily HPL) over the standard deviation of HPL, and the second metric measures the variance of unexplained P&L over the variance of HPL.

Overview of the proposed PLA test metrics

The proposals to revise the PLA test metrics are intended to provide reliable measures of whether the P&L generated by a risk management model (represented by the RTPL) is sufficiently “related to” and “similar to” the P&L generated by the bank’s front office (represented by the HPL). To measure the relationship between the two measures, the Committee proposes that the revised test assess whether the correlation between the HPL and the RTPL is sufficiently high using the Spearman correlation metric. To measure how similar the measures are, the Committee proposes two alternatives for the revised test to assess whether the time series of values of the HPL and the RTPL have sufficiently similar statistical distributions.

Assessing the relationship between the HPL and the RTPL: Spearman correlation

The Spearman correlation coefficient is a measure of the correlation between the two time series of P&Ls to assess the level of dependence between the HPL and the RTPL. The metric separately ranks (from lowest value to highest) the historical 12-month time series of daily HPL and RTPL values. The correlation between the assigned ranks of the two series is calculated. A strong correlation will only be observed if the rank ordering of values is closely related between the two time series. A well modelled trading desk would be expected to exhibit a strong correlation.

Assessing the similarity of the distributions of the HPL and the RTPL

The measurement of “similarity” of the distributions of the measures of P&L is intended to assess whether the risk management model used for the trading desk sufficiently captures the P&Ls of the desk across the range of market conditions during the previous 12 months. The Committee is considering two alternatives for this metric:

- Alternative 1 – Kolmogorov-Smirnov (KS) test metric

The KS test metric assesses how “similar” the distributions of the HPL and the RTPL are over time by calculating the maximum absolute difference between the probability distributions of the HPL and the RTPL over the time series. Well modelled trading desks would be expected to feature smaller differences between the distributions.

- Alternative 2 – Chi-squared test metric

The Chi-squared test assesses “similarity” of distributions by dividing the time series of the HPL and the RTPL, respectively, into five bins (with each bin representing a non-overlapping range of values for the P&L measure as calculated over the time series) and counting the number of instances of the HPL and the RTPL that fall into each bin. If the HPL and the RTPL have a similar number of occurrences in each bin, they have a more similar distribution and are indicative of a well modelled trading desk.

2.1.3 PLA test failure consequences

The January 2016 standard specified that trading desks that fail the PLA test would become ineligible to use the IMA and thereby be subject to capital requirements based on the standardised approach. Although this automatic consequence was intended by the Committee, the Committee acknowledges that an immediate fallback to the standardised approach from the IMA can contribute to significant volatility in the capital requirements for a given trading desk. To address concerns over volatility in capital requirements, the Committee proposes a modified, “traffic light” approach to smooth a trading desk’s transition to the standardised approach.

The proposed traffic light approach features three “zones” by which trading desks are categorised based on their PLA test performance. Trading desks in the “green zone” are those that pass the PLA test,

whereas those in the “red zone” are those that have failed the PLA test and must fall back to use of the standardised approach. Trading desks in the “amber zone” are those that have not met the full requirements of the PLA test, but that have not performed so poorly as to necessitate immediate fallback to the standardised approach.

Under the Committee’s proposal, the capital requirements for a trading desk in the amber zone would be subject to an additional simple, formula-based capital requirement to be added to the trading desk’s IMA-based capital requirements. This additional requirement is determined by the difference between IMA and standardised approach capital requirements as determined on an aggregated level for all trading desks in the green zone and the amber zone. This difference is adjusted by (i) a weighting factor that is determined by the materiality of the amber zone trading desks in relation to the combined set of green zone and amber zone trading desks; and (ii) a multiplier that sets the severity of the capital surcharge determined as a fixed multiplier of 50%. The Committee is of the view that this additional capital requirement for trading desks in the amber zone will provide a prudent consequence for trading desks that do not meet the full requirements of the PLA test, but that perform sufficiently well so as to not necessitate exclusive use of the standardised approach.

The proposed thresholds below which a trading desk would fall into the amber zone or the red zone are set out in the Annex B. Upon finalisation of the traffic light approach into the market risk standard, the Committee will continue to monitor the effectiveness of the finalised calibration of the thresholds to ensure their appropriateness.

2.1.4 Trading desk requirements

As described above, the PLA test is applied to each individual trading desk. In order to promote consistency in how banks define their trading desks for this purpose, the January 2016 standard set out a number of requirements for the organisation of trading desks to which a bank intends to apply the IMA. These requirements were intended to allow flexibility so as to avoid conflict with the way banks typically organise their trading activities. The Committee has noted that some elements of the January 2016 standard’s requirements for trading desks – the requirement for a single head trader per desk and the restriction that a trader may only be assigned to a single trading desk – could conflict with the way banks organise their trading desks. To allow more flexibility in the way trading desks are established, the Committee proposes revisions to amend these requirements as set out in Annex C.

2.2 Non-modellable risk factors

The IMA model requirements of the January 2016 standard permit a bank to include a risk factor in an internal model if there are at least 24 “real price observations” of the value of the risk factor over the previous 12 months, with no more than a one-month gap between any two observations. The Committee intended this requirement, referred to as the risk factor eligibility test (RFET), to provide assurance that the risk factors that a bank models are sufficiently liquid and observable to be amenable to modelling. In the event that a given risk factor does not satisfy the RFET, it is classified as a non-modellable risk factor (NMRF), is to be excluded from the bank’s expected shortfall (ES) model, and is subject to capital requirements determined by means of a stress scenario.

Since the publication of the January 2016 standard, the Committee has received feedback from market participants that the standard is not sufficiently clear regarding (i) the meaning of real price observations and (ii) the requirements for banks’ use of data to calibrate internal models (eg whether the same data observations used for the RFET must be used for the calibration of banks’ internal models). The Committee is also aware of nascent efforts to establish data-pooling schemes that could improve the availability of real price observations for the RFET, but that may face confidentiality-driven challenges that prohibit the sharing of actual prices to subscribers of such a service. To address these issues, the Committee proposes clarifications to the RFET and a number of principles to inform assessments of the

quality of data that banks use to calibrate their internal models. Further details are set out below, and associated revisions to the related standard text are in Annex D.

A number of market participants and stakeholders have also expressed concerns that the approach defined for NMRFs may be subject to design flaws that result in disproportionately high capital requirements for some risk factors relative to the risk they pose to a bank (eg due to an arguably liquid risk factor not meeting requirements of the RFET or due to an overly conservative treatment of certain types of NMRFs). As described below, the Committee has not received compelling evidence for these issues, and seeks further feedback in response to this consultative document that could support a final decision on them. In the absence of compelling evidence, the Committee does not propose revisions to these aspects of the treatment of NMRFs.

2.2.1 Process for satisfying modellability requirements and expectations for internal model calibration

The January 2016 standard required real price observations to be “representative” of the risk factors which are subject to the RFET. This is because risk factors for a financial instrument often do not correspond directly to observable transactions in the market. For example, a bank might model the implied volatility of an equity when modelling the risk of an equity option. Although the implied volatility of the equity is not directly observable, the bank may make a case that it can be derived from observable market transactions in other options on that equity and wish to count those as real price observations. For risk factors that can be directly observed from a market transaction, a bank may wish to model the performance of the risk factor based on available observations of a similar, but not identical, instrument and treat those as real price observations (eg to model a five-year credit default swap (CDS) spread, a bank may seek to use a CDS with a maturity close to five years as the observation for a five-year risk factor).

The January 2016 standard did not elaborate the process to assess whether the observed transactions are sufficiently “representative” to be counted as real price observations, which has led to concerns regarding consistency in banks’ approaches. To facilitate consistent application of the standard, the Committee proposes to clarify the meaning of “representative” real price observations. It also proposes:

- to clarify that a bank that uses observable transactions to derive the value of underlying risk factors must establish, to the satisfaction of its national supervisor, policies and procedures to clearly set out its approach to map real price observations to the relevant risk factors; and
- two potential alternatives to determine how similar a risk factor of an observable transaction must be to the risk factor for a financial instrument in order to count as an observation for the RFET. The first alternative would permit a bank to establish its own ranges (“buckets”) for its risk factors within which an observable transaction may qualify as an observation for a risk factor. The ranges would be subject to certain limitations, including that a bucket can only correspond to one risk factor, and supervisory approval. The second alternative would specify buckets that banks must use. The Committee seeks feedback on the relative merits of each alternative, particularly with regard to ensuring consistency of outcomes while offering sufficient flexibility to appropriately cover the variety of instruments traded by internationally active banks. Commenters that prefer the second alternative should provide proposals for the minimum requirements for setting the buckets which are at least as granular as the buckets used in the standardised approach – an example of such a structure is included in Annex D.

In addition, the Committee proposes to clarify conditions whereby (i) committed quotes may be used as real price observations and (ii) data-pooling schemes could be employed to help banks satisfy the RFET.

For risk factors that meet the RFET, the Committee intends to provide banks reasonable flexibility in the choice of data to be used to calibrate internal models. However, it is the responsibility of the bank to use appropriate data to ensure its model provides a representative measurement of risk. To ensure that

the data used for model calibration are consistently robust across banks, the Committee proposes a number of principles to which banks will be expected to adhere when selecting data to calibrate their models.

2.2.2 Impact of the NMRF framework on seasonal markets

The Committee has received feedback from market participants that the RFET requirement for there to be a gap of no longer than one month between any two price observations may result in some risk factors being inappropriately deemed as non-modellable despite other evidence of market liquidity. In particular, challenges in identifying observable prices during certain periods of the year have been cited due to seasonality of markets and low volumes of trading during holiday periods.

Although the Committee does not propose any changes to the requirements of the January 2016 standard in this regard at this time, the Committee welcomes data and comments to confirm the validity and materiality of these concerns. Respondents should provide concrete evidence and data based on specific examples of risk factors that are considered to have demonstrated adequate liquidity and observability in stress periods but are unable to meet the requirements of the RFET due to the above concerns. The Committee also welcomes alternative proposals for the RFET requirement based on the identified examples. In the absence of compelling evidence, the Committee will not make changes to the treatment of NMRFs in this regard.

2.2.3 Impact of NMRF idiosyncratic equity risk

Per the January 2016 standard, capital requirements for NMRFs are calculated using a stress scenario for each type of NMRF, with the resulting stress losses to be aggregated without recognition of diversification benefits. As an exception, for NMRFs associated with idiosyncratic credit spread risk, banks are permitted to use a single stress scenario and may recognise diversification. The Committee specified this exception for credit risk due to a view that failure to do so would result in disproportionately high capital requirements for these idiosyncratic credit risk factors.

The Committee has received feedback that, for some banks, the lack of a corresponding exceptional treatment for idiosyncratic equity risk is also resulting in exceedingly high capital requirements for equity risk NMRFs. Due to insufficient evidence on the potential materiality of this issue, the Committee does not propose to change the treatment of idiosyncratic equity risk at this time. However, the Committee welcomes comments on the materiality of this issue (and associated supporting concrete evidence and data) to support its consideration. The Committee also welcomes feedback on whether a revision per the amended text of paragraph 190 as included in Box 3 below could address the issue. In the absence of compelling evidence, the Committee will not make changes to the treatment of NMRFs in this regard.

190. 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 (ie a loss calibrated to a 97.5% confidence threshold over a period of extreme stress for the given risk factor). For each non-modellable risk factor, the liquidity horizon of the stress scenario must be the greater of the longest time interval between two consecutive price observations over the prior year and the liquidity horizon assigned to the risk factor in paragraph 181. For non-modellable risk factors arising from idiosyncratic credit spread risk or idiosyncratic equity risk arising from spot, futures and forward prices, equity repo rates, dividends and volatilities, banks may apply the same stress scenario. Additionally, a zero correlation assumption may be made when aggregating gains and losses provided the bank conducts analysis to demonstrate to its supervisor that this is appropriate – for example, analysis on the residuals and showing that residual distributions from factor models are homogeneous within each residual distribution and heterogeneous against others, and do not exhibit serial correlation in the time series.^{Footnote} No correlation or diversification effect between other non-modellable risk factors is permitted. In the event that a bank cannot provide a stress scenario which is acceptable for the supervisor, the bank will have to use the maximum possible loss as the stress scenario.

The aggregate regulatory capital measure for I non-modellable idiosyncratic credit spread risk factors that have been demonstrated to be appropriate to aggregate with zero correlation, J non-modellable idiosyncratic equity spread risk factors that have been demonstrated to be appropriate to aggregate with zero correlation and K risk factors in model-eligible desks that are non-modellable (SES) is:

$$SES = \sqrt{\sum_{i=1}^I ISES_{NM,i}^2} + \sqrt{\sum_{j=1}^J ISES_{NM,j}^2} + \sum_{k=1}^K SES_{NM,k}$$

where $ISES_{NM,i}$ is the stress scenario capital charge for idiosyncratic credit spread non-modellable risk i from the I risk factors aggregated with zero correlation; $ISES_{NM,j}$ is the stress scenario capital charge for idiosyncratic equity non-modellable risk j from the J risk factors aggregated with zero correlation; and $SES_{NM,k}$ is the stress scenario capital charge for non-modellable risk k from K risk factors.

^{Footnote}The tests are generally done on the residuals of panel regressions where the dependent variable is the change in issuer spread while the independent variables can be either a change in a market factor or a dummy variable for sector and/or region. The assumption is that the data on the names used to estimate the model suitably proxy the names in the portfolio and the idiosyncratic residual component captures the multi-factor name basis. If the model is missing systematic explanatory factors or the data suffer from measurement error, then the residuals would exhibit heteroscedasticity (which can be tested via White, Breuche Pagan tests, etc) and/or serial correlation (which can be tested with Durbin Watson, LM tests, etc) and/or cross-sectional correlation (clustering).

3. Scope of market risk capital requirements

The January 2016 standard set out a revised definition of the scope of the market risk capital requirements. This included a new definition of the boundary between a bank's trading book and its banking book, with the former to be subject to capital requirements under the market risk standard, and revisions to the standards for "structural FX positions" (ie FX positions that hedge a bank's capital ratio and may therefore be exempted from FX capital requirements).

The January 2016 standard's boundary definition was intended to address shortcomings identified with the Basel II boundary definition by reducing the ability of banks to arbitrage the different capital requirements between the trading book and the banking book, and facilitating consistent implementation of the boundary across banks. The January 2016 standard's treatment of structural FX positions was intended to remove redundant text used in the Basel II market risk framework and therefore simplify this part of the framework, but not to materially alter the current practices applied by banks under Basel II framework.

Based on its monitoring since the publication of the standard, the Committee has identified areas of both of the above elements that it believes require clarification in order to ensure they continue to have their intended impact and can be implemented consistently across banks. Further details on the proposed revisions are described below, and associated revisions to the related accord text are in Annex E.

3.1 Treatment of structural FX positions

Instruments with FX risk are subject to market risk capital requirements regardless of whether they are held in the trading book or the banking book. However, supervisors may permit banks to exclude certain FX risk positions from the calculation of "net open currency positions" if the position is entered into to completely or partially hedge against adverse effects on the bank's capital ratio due to changes in exchange rates.

In the January 2016 standard, this exclusion was limited to the maximum of the amount of investments in consolidated subsidiaries or non-consolidated affiliates. The Committee proposes revisions to allow the amount of structural FX positions that may be exempted from market risk capital requirements to be measured based on the FX risk stemming from an investment, rather than the amount of investment itself. The limit on the amount of such exempted positions would be the amount of the risk position that neutralises the sensitivity of the bank's capital ratio to movements in exchange rates.

In addition, the Committee proposes revisions to clarify that structural FX positions in foreign branches of a bank can be included in the scope of the structural FX exemption.

The Committee believes these proposed revisions would enhance consistency of the treatment of structural FX positions across jurisdictions while more closely aligning the proposed standard with the treatment currently applied, as was originally intended in the January 2016 standard.

3.2 Boundary between the trading book and the banking book

The January 2016 standard definition of the boundary between the trading book and the banking book specified types of financial instruments that must be in the banking book and similar instruments that must be in the trading book. It also specified financial instruments that are expected to be in a particular book but could be designated to a different book with supervisory approval. This additional detail, not present in the Basel II market risk framework boundary definition, was intended to promote consistent implementation of the boundary, and limit the ability of banks to arbitrage capital requirements by choosing, without restriction, to which book they designate instruments.

The Committee has identified that in some cases financial instruments can be both in the list of instruments that must be in a particular book, and in the list that are expected to be in the other book. In these cases, it may not be clear which requirement takes precedence. The Committee therefore proposes amendments to this part of the standard to clarify the approach in these situations. The proposed revisions also clarify under what conditions equity investments in funds (eg exchange-traded funds) can be included in the trading book. Under the proposals, banks may assign to the trading book funds: (i) for which daily price quotes are available; (ii) which track a non-leveraged benchmark; and (iii) which demonstrate a tracking difference, ignoring fees and commissions, for which the absolute value is less than 1%.

4. Simplified alternative to the standardised approach

In June 2017, the Committee published a consultative document to propose a simplified alternative to the standardised approach to market risk capital requirements.⁸ The proposal to include such a simplified alternative was intended to facilitate adoption of the market risk standard for banks other than those that are internationally active.

The consultative document proposed that the simplified alternative could take the form of one of the following: (i) a reduced form of the January 2016 standard's sensitivities-based method; or (ii) a recalibrated version of the Basel II standardised approach. In response to comments received, the Committee is of the view that a recalibrated Basel II standardised approach would be better suited to facilitate the adoption of the standard by the banks for which a simplified alternative is intended.

Annex F sets out the proposed recalibration of the Basel II standardised approach. To recalibrate the approach, the Committee proposes to apply a multiplier to the capital requirements in each risk class of the Basel II standardised approach. No other amendment to the approach is proposed. The multipliers proposed are set out in Table 1. The final calibration of these multipliers will be determined based on further analysis of impact data provided by banks, and feedback provided to this consultative document.

Proposed risk class multipliers for the simplified SA

Table 1

	Multiplier to be applied to Basel II standardised approach
General and specific interest rate risk	1.50-2.00
General and specific equity risk	3.00-3.50
Commodity	1.50-2.50
FX	1.25-1.50

The recalibration proposed is intended to make the Basel II standardised approach's calibration comparable with, but slightly more conservative than, the revised "full" standardised approach. Given its relatively more conservative proposed calibration, the Committee does not propose to specify eligibility requirements for banks that may use this approach. Nevertheless, the Committee notes that the simplicity of the approach means that it may not be appropriate for banks that (i) are globally systemically important banks (G-SIBs); (ii) use internal models for determining the market risk capital requirements for part of their trading book; or (iii) maintain correlation trading portfolios.

Next steps

The Committee welcomes comments on all aspects of these proposals. The Committee's scope of material potential revisions to the revised market risk framework are limited to those included in this consultative document. Respondents are requested to limit their feedback to views on the proposals contained herein. Comments should be uploaded at www.bis.org/commentupload.htm by 20 June 2018. All comments will be published on the website of the Bank for International Settlements unless a respondent requests confidential treatment.

⁸ Basel Committee on Banking Supervision, *Simplified alternative to the standardised approach to market risk capital requirements – Consultative Document*, June 2017, www.bis.org/bcbs/publ/d408.pdf.

The Committee will assess the impact of these proposals by means of data collected in the end-December 2017 Basel III monitoring exercise. The Committee strongly encourages participating banks to provide complete and robust trading book data submissions for that exercise to facilitate the sufficiency of analyses to inform finalisation of the standard.

As noted above and announced in the December 2017 press release on the GHOS's finalisation of Basel III reforms,⁹ the GHOS has endorsed the Committee's proposal to extend the implementation date of the market risk standard to 1 January 2022 (with that date to constitute both the implementation and regulatory reporting date for the revised standard). The Committee intends to finalise any revisions to the market risk standard resultant from this consultative document as soon as practicable in order to allow sufficient time for national implementation and to allow banks the time necessary to develop the systems infrastructure needed to apply the standard. Further, the Committee hereby amends the implementation date for Pillar 3 market risk disclosure requirements to 1 January 2022, to align the date for Pillar 3 requirements with the implementation date for Pillar 1 requirements for market risk.

⁹ Basel Committee on Banking Supervision, *Press release – Governors and Heads of Supervision finalise Basel III reforms*, 7 December 2017, www.bis.org/press/p171207.htm.

Annex A – Revisions to the standardised approach

A.1 Revisions to correlation scenarios

The proposed modifications to paragraph 54 are as follows:

54. In order to address the risk that correlations increase or decrease in periods of financial stress, three risk charge figures are to be calculated for each risk class, corresponding to three different scenarios on the specified values for the correlation parameter ρ_{kl} (correlation between risk factors within a bucket) and γ_{bc} (correlation across buckets within a risk class).
- (a) In the first scenario, "high correlations", the correlation parameters ρ_{kl} and γ_{bc} that are specified in Sections 4 to 6 are uniformly multiplied by 1.25, with ρ_{kl} and γ_{bc} subject to a cap at 100%.
- (b) In the second scenario, "medium correlations", the correlation parameters ρ_{kl} and γ_{bc} remain unchanged from those specified in Sections 4 to 6.
- (c) In the third scenario, "low correlations", the correlation parameters ρ_{kl} and γ_{bc} that are specified in Sections 4 to 6 are replaced by $\rho_{kl}^{low} = \max(2 \times \rho_{kl} - 100\%; 75\% \times \rho_{kl})$ and $\gamma_{bc}^{low} = \max(2 \times \gamma_{bc} - 100\%; 75\% \times \gamma_{bc})$, respectively.

A.2 Revisions to the curvature risk capital requirement

The proposed modifications to paragraph 53 are as follows:

53. The following step-by-step approach to capture curvature risk must be separately applied to each risk class (apart from default risk):
- (a) Find a net curvature risk charge CVR_k across instruments to each curvature risk factor k . For instance, all vertices of all the curves within a given currency (eg Euribor three months, Euribor six months, Euribor one year etc for EUR) must be shifted upwards. The potential loss, after deduction of the delta risk positions, is the outcome of the first scenario. The same approach must be followed in a downward scenario. The worst loss (expressed as a positive quantity), after deduction of the delta risk position, is the curvature risk position for the considered risk factor. If the price of an option depends on several risk factors, the curvature risk is determined separately for each risk factor.
- (b) The curvature risk charges for curvature risk factor k can be formally written as follows:

$$CVR_k^+ = - \left(\sum_i V_i(x_k^{RW(Curvature)^+}) - V_i(x_k) - RW_k^{Curvature} * S_{ik} \right)$$

$$CVR_k^- = - \left(\sum_i V_i(x_k^{RW(Curvature)^-}) - V_i(x_k) + RW_k^{Curvature} * S_{ik} \right)$$

where:

- i is an instrument subject to curvature risks associated with risk factor k ;
- x_k is the current level of risk factor k ;
- $V_i(x_k)$ is the price of instrument i depending on the current level of risk factor k ;
- $V_i(x_k^{RW(Curvature)^+})$ and $V_i(x_k^{RW(Curvature)^-})$ both denote the price of instrument i after x_k is shifted (ie "shocked") upwards and downwards;
- in the FX and equity risk classes:

- $RW_k^{(curvature)}$ is the risk weight for curvature risk factor k for instrument i determined in accordance with paragraph 131
 - s_{ik} is the delta sensitivity of instrument i with respect to the delta risk factor that corresponds to curvature risk factor k
- in the GIRR, CSR and commodity risk classes:
- $RW_k^{(curvature)}$ is the risk weight for curvature risk factor k for instrument i determined in accordance with paragraph 132
 - s_{ik} is the sum of delta sensitivities to all tenors of the relevant curve of instrument i with respect to curvature risk factor k

(c) The aggregation formula for curvature risk distinguishes between positive curvature and negative curvature risk exposures. The negative curvature risk exposures are ignored unless they hedge a positive curvature risk exposure. If there is a negative net curvature risk exposure from an option exposure, the curvature risk charge is zero.

(d) The curvature risk exposure must be aggregated within each bucket using the corresponding prescribed correlation ρ_{kl} as set out in the following formula for CSR, equity and commodity risk classes:

$$K_b = \max(K_b^+, K_b^-), \text{ where}$$

$$\begin{cases} K_b^+ = \sqrt{\max(0, \sum_k \max(CVR_k^+, 0)^2 + \sum_{l \neq k} \sum_k \rho_{kl} CVR_k^+ CVR_l^+ \psi(CVR_k^+, CVR_l^+))} \\ K_b^- = \sqrt{\max(0, \sum_k \max(CVR_k^-, 0)^2 + \sum_{l \neq k} \sum_k \rho_{kl} CVR_k^- CVR_l^- \psi(CVR_k^-, CVR_l^-))} \end{cases}$$

where $\psi(CVR_k, CVR_l)$ is a function that takes the value 0 if CVR_k and CVR_l both have negative signs. In all other cases, $\psi(CVR_k, CVR_l)$ takes the value of 1.

Where $K_b = K_b^+$, this shall be termed the "upward scenario". Where $K_b = K_b^-$, this shall be termed the "downward scenario". In the specific case where $K_b^+ = K_b^- = 0$, if $\sum_k CVR_k^+ > \sum_k CVR_k^-$, the upward scenario is selected; otherwise, the downward scenario is selected.

(e) Curvature risk positions must then be aggregated across buckets within each risk class, using the corresponding prescribed correlations γ_{bc} .

$$\text{Curvature risk} = \sqrt{\max\left(0, \sum_b K_b^2 + \sum_b \sum_{c \neq b} \gamma_{bc} S_b S_c \psi(S_b, S_c)\right)}$$

where:

- K_b is defined above;
- $S_b = \sum_k CVR_k^+$ for all risk factors in bucket b when, in (d), the upward scenario has been selected for bucket b , $S_b = \sum_k CVR_k^-$ otherwise; and
- ψ is defined as in (d).

A.3 Revisions to FX risk factors and curvature risk capital requirement

The proposed modifications to paragraphs 66, 67 (g) and 121 are as follows:

66. Foreign exchange risk factors

- (a) **Delta FX:** For the purpose of delta risk, the FX risk factors are all the exchange rates between (i) the reporting currency and both (ii.a) the currency in which an instrument is denominated and (ii.b) any other currencies referenced by the instrument.^{FN}

^{FN} For example, for an FX forward referencing USD/JPY, the relevant risk factors for a CAD-reporting bank to consider are the exchange rates USD/CAD and JPY/CAD.

- (b) **Vega FX:** For the purpose of vega risk, the foreign exchange risk factors are the implied volatilities of options that reference exchange rates between currency pairs; further defined along one dimension:

- (i) **Maturity of the option:** The implied volatility of the option as mapped to one or several of the following maturity vertices: 0.5 years, 1 year, 3 years, 5 years, 10 years.

- (c) **Curvature FX:** For the purpose of curvature risk, the FX risk factors are all the exchange rates between (i) the reporting currency and both (ii.a) the currency in which an instrument is denominated and (ii.b) any other currencies referenced by the instrument.

- (d) No distinction is required between onshore and offshore variants of a currency for all FX delta, vega and curvature risk factors.

67 (g) **Delta FX:** The sensitivity is calculated by taking the value of a 1 percentage point change in the exchange rate, divided by 0.01 (ie 1%):

$$s_k = \frac{V_i(1.01 FX_k) - V_i(FX_k)}{0.01}$$

where:

- k is a given currency;
- FX_k is the exchange rate between currency k and the reporting currency, expressed using the convention: units of "other currency" per unit of "reporting currency"; and
- $V_i(.)$ is the market value of instrument i as a function of the exchange rate k .

121. A uniform correlation parameter γ_{bc} equal to 60% applies to FX sensitivity or risk exposure pairs. For FX delta and curvature risk factors, the uniform correlation parameter applies between sensitivities determined when all exchange rates are expressed in the convention: units of "other currency" per unit of "reporting currency".

A.4 Treatment of multi-underlying options and index instruments

The proposed modifications to paragraph 58 (h) (iii) are as follows:

58. [...]

- (h) When an instrument is subject to one or more of the following risk types, this by itself will not cause the instrument to be subject to the residual risk add-on:

[...]

- (iii) Correlation risk arising from multi-underlying European or American plain vanilla options, and from any options that can be written as a linear combination of such options. This exemption applies in particular to the relevant index options.

The proposed modifications to paragraphs 69 and 70 are as follows:

69. In the delta and curvature risk context:

- (a) A look-through approach must be used for index instruments and multi-underlying options in the delta risk context. The sensitivities to constituent risk factors from index instruments and multi-underlying options are allowed to net with sensitivities to single-name instruments without restrictions, although this does not apply to the correlation trading portfolio. However, in the curvature risk context, for index/multi-underlying options, a bank may alternatively elect to compute curvature risk charges without performing a look-through. If the no look-through approach is adopted, the risk weight to be applied to the index/multi-underlying option for the computation of the curvature risk charge should be the highest prescribed delta risk weight for each of the delta risk factors in the curvature risk requirement.

70. In the vega risk context:

- (a) Multi-underlying options (including index options) are usually priced based on the implied volatility of the option, rather than the implied volatility of its underlying constituents.^{FN}

^{FN} As specified in the vega risk factor definitions in Section 3, the implied volatility of an option must be mapped to one or more maturity vertices.

Proposed addition of new paragraph 70a is as follows:

70a. In the residual risk add-on context: Index instruments and multi-underlying options are subject to residual risk add-on if they fall within the definitions set out in paragraph 58.

A.5 Revisions to the treatment of liquid FX pairs

The proposed modifications to paragraph 120 (a) are as follows:

120. [...]

- (a) For the currency pairs specified by the Basel Committee,^{FN1} and for currency pairs forming first-order crosses across these specified currency pairs,^{FN2} the above risk weight may at the discretion of the bank be divided by the square root of 2.

^{FN1} Selected currency pairs specified by the Basel Committee are: 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.

^{FN2} For example, EUR/AUD is not among the selected currency pairs specified by the Basel Committee, but is a first-order cross of USD/EUR and USD/AUD.

The proposed modifications to the footnote for "FX rate: specified currency pairs" in paragraph 181 (k) are as follows:

^{FN1} 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, and currency pairs forming first-order crosses across these specified currency pairs.

A.6 Revisions to standardised approach risk weights for GIRR, equity and FX risk classes

75. The risk weights are set as follows:

Vertex	0.25-year	0.5-year	1-year	2-year	3-year
Risk weight (percentage points)	[1.5–1.9%]	[1.5–1.9%]	[1.4–1.8%]	[1.1–1.5%]	[1.0–1.4%]
Vertex	5-year	10-year	15-year	20-year	30-year
Risk weight (percentage points)	[0.9–1.2%]	[0.9–1.2%]	[0.9–1.2%]	[0.9–1.2%]	[0.9–1.2%]

(a) A risk weight of [1.4–1.8%] is set for the inflation risk factor and the cross currency basis risk factors, respectively.

107. The risk weights for the sensitivities to equity spot price and equity repo rate for buckets 1–11 are set out in the following table:

Bucket number	Risk weight for equity spot price (percentage points)	Risk weight for equity repo rate (percentage points)
1	[27.5–41.25%]	[0.275–0.4125%]
2	[30–45%]	[0.30–0.45%]
3	[22.5–33.75%]	[0.225–0.3375%]
4	[27.5–41.25%]	[0.275–0.4125%]
5	[15–22.5%]	[0.15–0.225%]
6	[17.5–26.25%]	[0.175–0.2625%]
7	[20–30%]	[0.20–0.30%]
8	[25–37.5%]	[0.25–0.375%]
9	[35–52.5%]	[0.35–0.525%]
10	[25–37.5%]	[0.25–0.375%]
11	[35–52.5%]	[0.35–0.525%]

120. A unique relative risk weight equal to [15–22.5%] applies to all the FX sensitivities or risk exposures. [...]

Annex B – Revisions to the internal models approach

B.1 Revisions to PLA test metric design

Proposed revisions to paragraphs 182 and 183 of the January 2016 standard are as follows:

182. [...] (b) Further to the regulatory backtesting programmes, testing for model validation must use hypothetical P&L as defined in Appendix B.

183 [...] (b) [...] Backtesting requirements are based on comparing each desk's one-day static value-at-risk measure (calibrated to the most recent 12 months' data, equally weighted) at both the 97.5th percentile and the 99th percentile, using at least one year of current observations, with the desk's one-day actual P&L and the one-day hypothetical P&L (HPL) defined in Appendix B. If any given desk experiences either more than 12 exceptions at the 99th percentile or 30 exceptions at the 97.5th percentile in the most recent 12-month period, all of its positions must be capitalised using the standardised approach.^{FN} Positions must continue to be capitalised using the standardised approach until the desk no longer exceeds the above thresholds over the prior 12 months.

^{FN} Desks with exposure to issue default risk must pass a two-stage approval process. First, the trading desk must pass backtesting and P&L attribution. Conditional on approval of the trading desk, the desk may then apply for approval to model default risk as described in paragraph 186. Desks that fail either test must be capitalised under the standardised approach.

PLA requirements are based on two metrics described in Appendix B that assess the degree of correlation and distributional similarity between risk-theoretical P&L (RTPL) and HPL. The tests are intended to measure the materiality of simplifications in banks' internal models driven by missing risk factors and differences in the way positions are valued. Banks are allowed to align the RTPL's input data for its risk factors with those used in the HPL subject to the requirements stated in Appendix B. These metrics are calculated quarterly based on the most recent annual observation period.

Based on the outcome of the metrics, a trading desk is allocated to a "red zone", an "amber zone" or a "green zone".

A trading desk is in the green zone if both (i) the correlation metric is above 0.825; and (ii) the [Alternative 1: Kolmogorov-Smirnov (KS) / Alternative 2: Chi-squared] distributional test metric is below [0.083 (p-value = 0.35) / 14].

A trading desk is in the red zone if the correlation metric is less than 0.75 or if the [Alternative 1: Kolmogorov-Smirnov (KS) / Alternative 2: Chi-squared] distributional test metric is [above 0.095 (p-value = 0.20) / above 18].

A trading desk is in the amber zone if it is allocated neither to the green zone nor to the red zone.

		Table [X]
Zone	Threshold	Threshold
	Spearman correlation	[KS test / Chi-squared]
Amber zone thresholds	0.825	[0.083 (p-value = 0.35) / 14]
Red zone thresholds	0.75	[0.095 (p-value = 0.20) / 18]

If a trading desk is in the PLA red zone, it is ineligible to be capitalised using the internal models approach and must be capitalised using the standardised approach. Risk exposures held by these

ineligible trading desks must be included with the out-of-scope desks and capitalised according to the standardised approach on a portfolio basis. These ineligible trading desks must remain out-of-scope until (i) the trading desk is in the green zone for PLA test requirements; and (ii) the trading desk satisfies the backtesting exceptions requirements over the past 12 months.

If a trading desk is in the PLA amber zone, it is not considered an out-of-scope desk for internal models approach capitalisation purposes.

If a trading desk is in the PLA amber zone, it must remain in the amber zone until it both (i) is in the green zone for PLA test requirements; and (ii) it has satisfied its backtesting exceptions requirements over the prior 12 months.

There may on very rare occasions be a valid reason why a series of accurate desk-level models across different banks will produce many backtesting exceptions or inadequately track PLA to the front office pricing model (for instance, during periods of significant cross-border financial market stress affecting several banks or when financial markets are subjected to a major regime shift). One possible supervisory response in this instance would be to permit the relevant desks within each affected bank to remain capitalised under the internal models approach but require each desk's model to take account of the regime shift or significant market stress as quickly as practicable while maintaining the integrity of its procedures for updating the model. It should be emphasised, however, that the Committee believes that this supervisory discretion should be allowed only under the most extraordinary circumstances.

For an institution to remain eligible for capitalisation under the internal models approach, a minimum of 10% of the bank's aggregated market risk charges must be based on positions held in desks that qualify for inclusion in the bank's internal model for regulatory capital.

B.2 Revisions to risk factor modellability

183 [...]

(c) Step three is a risk factor analysis. Following the identification of eligible trading desks, this step will determine which risk factors within the identified trading desks are eligible to be included in the bank's expected shortfall model for regulatory capital. For a risk factor to be classified as modellable by a bank, a necessary condition is that it pass the risk factor eligibility test. This requires a sufficient number of "real" prices which are representative of the risk factor. A price will be considered to be "real" if it meets at least one of the following criteria:

- it is a price at which the institution has conducted a transaction;
- it is a verifiable price for an actual transaction between other arm's length parties;
- it is a price obtained from a committed quote made by (i) the bank itself or (ii) another party. The committed quote must be collected and verified through a third-party vendor, a trading platform or an exchange; or
- it is a price obtained from a third-party vendor, where: (i) the transaction or committed quote has been processed through the vendor; (ii) the vendor agrees to provide evidence of the transaction or committed quote to supervisors upon request; and (iii) the price meets the three criteria listed immediately above.

To pass the risk factor eligibility test, a risk factor must have at least 24 observable "real" prices per year (measured over the period used to calibrate the current expected shortfall model) with a maximum period of one month between two consecutive observations.^{FN} No more than one real price observation per day can be taken into account for the risk factor eligibility test. The above criteria must be assessed on a monthly basis. Any "real" price that is observed for a

transaction should be counted as an observation for all of the risk factors for which it is representative.

^{FN} In particular, a bank may add modellable risk factors, and replace non-modellable risk factors with a basis between these additional modellable risk factors and these non-modellable risk factors. This basis will then be considered as a non-modellable risk factor. A combination of modellable and non-modellable risk factors will be a non-modellable risk factor.

In order for a risk factor to pass the risk factor eligibility test, a bank can also count real price observations based on information collected from third-party vendors provided (i) the vendor(s) communicate to the bank the number of corresponding "real" prices observed and the dates at which they have been observed; (ii) the vendor(s) provide, individually, a minimum necessary set of "identifier" information to enable banks to map real prices observed to risk factors; and (iii) each vendor be subject to an audit regarding the validity of its pricing information. The results and reports of this audit must be made available on request to the relevant supervisors and to banks as a precondition for the bank to be allowed to use "real" price observations collected by the third-party vendor. If the audit of a third-party vendor is not satisfactory to a supervisor, the supervisor may decide to prevent the bank from using data from this vendor.^{FN1}

A "real" price is representative for a risk factor of a bank where the bank is able to extract the value of the risk factor from the value of the real price. Any "real" price that is observed for a transaction should be counted as an observation for all of the risk factors for which it is representative. Banks must have policies and procedures that describe their mapping of "real" price observations to risk factors. Banks must provide sufficient information to supervisors in order to determine if the methodologies used are appropriate.

Where a risk factor is a point of a curve or a surface, a bucketing approach may be used to count "real" price observations for the risk factor eligibility test.

Alternative 1

To apply the bucketing approach, banks must define the buckets they will use and meet the following requirements:

- (i) exactly one risk factor per bucket must be defined, and the risk factors must correspond to the risk factors that are part of the RTPL of the bank for the purpose of the PLA test in paragraph 183 (b);^{FN2} and
- (ii) the buckets must be non-overlapping.

^{FN1} In this case, the bank may be permitted to use "real" price observations from this vendor for other risk factors.

^{FN2} The requirement to use the same buckets or segmentation of risk factors for the PLA test and the RFET recognises that there is a trade-off in determining buckets for an expected shortfall (ES) model. The use of more granular buckets may facilitate a trading desk's success in meeting the requirements of the PLA test, but additional granularity may challenge a bank's ability to source a sufficient number of "real" observed prices per bucket to satisfy the RFET. Banks should consider this trade-off when designing their ES models.

Alternative 2

To apply the bucketing approach, banks must use, at a minimum, the following set of standard buckets for risk factors:

- Eleven buckets for the maturity dimension of interest rate, foreign exchange and commodity risk factors, excluding implied volatilities (for a given underlying): 0 year up to 0.25 years; longer than 0.25 years up to 0.5 years; longer than 0.5 years up to 1 year; longer than 1 year up to 2 years; longer than 2 years up to 3 years; longer than 3 years up to 5 years; longer than 5 years up to 10 years; longer than 10 years up to 15 years; longer than 15 years up to 20 years; longer than 20 years up to 30 years; longer than 30 years.
- Six buckets for the maturity dimension of credit spread and equity risk factors, excluding implied volatilities (for a given underlying): 0 year up to 0.5 years; longer than 0.5 years up to 1 year; longer than 1 year up to 3 years; longer than 3 years up to 5 years; longer than 5 years up to 10 years; longer than 10 years.
- 6 x 9 buckets for expiry and strike dimensions of interest rate, foreign exchange, commodity, equity and credit spread implied volatility risk factors (for a given underlying):
 - (i) Expiry buckets: 0 year up to 0.5 years; longer than 0.5 years up to 1 year; longer than 1 year up to 3 years; longer 3 years up to 5 years; longer than 5 years up to 10 years; longer than 10 years.
 - (ii) Strike buckets set as multiplies applied to the "at-the-money"(ATM) value: less than 50%×ATM; equal to or greater than 50%×ATM and less than 75%×ATM; equal to or greater than 75%×ATM and less than 90%×ATM; equal to or greater than 90%×ATM and less than 100%×ATM; greater than 100%×ATM up to 110%×ATM; greater than 110%×ATM up to 125%×ATM; greater than 125%×ATM up to 150%×ATM; greater than 150%×ATM.

For risk factors with more than one dimension (eg a correlation between two interest rates), the buckets that banks use must be the product of the same individual buckets referenced above for one dimension.]

Banks may count all real price observations allocated to a bucket to assess whether it passes the risk factor eligibility test for any risk factors that belong to the bucket. A real price observation must be allocated to a bucket where it is representative for any risk factors that belong to the bucket.

Risk factors derived solely from a combination of modellable risk factors are modellable. For example, risk factors derived through multi-factor beta models for which inputs and calibrations are based solely on modellable risk factors, can be classified as modellable and can be included within the ES model.

Once a risk factor has passed the risk factor eligibility test, the bank should choose the most appropriate data to calibrate its model – the data used for calibration do not need to be the same data used to pass the risk factor eligibility test.

Banks must demonstrate that the data used ("real" price observations and/or other sources of data) in the ES model are appropriate based on the principles contained in [Annex D]. Where a bank has not met these principles to the satisfaction of the supervisor for particular risk factors, the supervisor may choose to deem the data unsuitable for calibration and, in such case, those risk factors should be excluded from the ES model and capitalised as non-modellable risk factors with a stress scenario capital charge.

There may on very rare occasions be a valid reason why a significant number of modellable risk factors across different banks may become non-modellable due to a widespread reduction in trading activities (for instance, during periods of significant cross-border financial market stress affecting several banks or when financial markets are subjected to a major regime shift). One possible supervisory response in this instance would be to consider as modellable a risk factor that no longer passes the eligibility test. This retention of a status quo treatment between modellability and non-modellability assessments should not facilitate a decrease in regulatory capital or a switch towards modellable risk factors. It should be emphasised, however, that the Committee believes that this supervisory discretion should be allowed only under the most extraordinary circumstances.

B.3 Revisions to the IMA capital requirement and PLA test failure consequences

189. The aggregate capital charge for modellable risk factors (*IMCC*) is based on the weighted average of the constrained and unconstrained expected shortfall charges.

$$IMCC = \rho(IMCC(C)) + (1 - \rho) \left(\sum_{i=1}^B IMCC(C_i) \right)$$

$$\text{where } IMCC(C) = ES_{R,S} \times \frac{ES_{F,C}}{ES_{R,C}} \text{ and } IMCC(C_i) = ES_{R,S,i} \times \frac{ES_{F,C,i}}{ES_{R,C,i}}$$

The stress period used in the risk class level $ES_{R,S,i}$ should be the same as that used to calculate the portfolio-wide $ES_{R,S}$.

ρ is the relative weight assigned to the bank's internal model. The value of ρ is 0.5.

B are the risk classes (general interest rate risk, equity risk, foreign exchange risk, commodity risk and credit spread risk).

191. The additional regulatory capital charge for modellable risk positions in approved and eligible desks subject to default risk is *DRC* as described in paragraph 186 above.

192. The aggregate (non-DRC) capital charge for those desks approved and eligible for the internal models approach (ie desks passing the backtesting requirements and assigned to the PLA test "green zone" or "amber zone" according to paragraph 183 (b)) (C_A) is equal to the maximum of the most recent observation and a weighted average of the previous 60 days scaled by a multiplier (m_c):

$$C_A = \max\{IMCC_{t-1} + SES_{t-1}; m_c \cdot IMCC_{avg} + SES_{avg}\}$$

where *SES* is the aggregate regulatory capital measure for K risk factors in model-eligible desks that are non-modellable.

The multiplication factor m_c will be 1.5 or set by individual supervisory authorities (by adding a qualitative multiplier) on the basis of their assessment of the quality of the bank's risk management system, subject to an absolute minimum of 1.5. Banks must add to this factor a plus factor directly related to the ex post performance of the model, thereby introducing a built-in positive incentive to maintain the predictive quality of the model. The plus factor will range from 0 to 0.5 based on the outcome of the backtesting of the bank's *daily VaR at the 99th percentile* based on current observations on the full set of risk factors (VaR_{FC}). If the backtesting results are satisfactory and the bank meets all of the qualitative standards set out in paragraph 180, the plus factor could be zero. Appendix B presents in detail the approach to be applied for backtesting and the plus factor. The multiplication factor will be based on the maximum of the

exceptions generated by the backtesting results against actual and hypothetical P&L as described in Appendix B.

193. The regulatory capital charge associated with risks from unapproved or currently ineligible trading desks (C_U) is to be calculated by aggregating all such risks and applying the standardised charge.

194. The aggregate capital charge for market risk (ACC) is equal to the aggregate capital requirement for approved and eligible trading desks ($C_A + DRC$) plus the standardised capital charge for risks from unapproved or currently ineligible trading desks (C_U). If at least one eligible trading desk is in the PLA test "amber zone" in accordance paragraph 183 (b), a capital surcharge is added.

$$ACC = C_A + DRC + \text{Capital surcharge} + C_U$$

194a. The capital surcharge is calculated as the difference between the aggregated standardised capital charges ($SA_{G,A}$) and the aggregated internal models-based capital charges ($IMA_{G,A} = C_A + DRC$) multiplied by a factor k . To determine the aggregated capital charges, positions in all of the desks in the PLA "green zone" or "amber zone" are taken into account. The capital surcharge is floored at zero.

$$\text{Capital surcharge} = k \cdot \max\{0, SA_{G,A} - IMA_{G,A}\}$$

where:

- $k = 0.5 \times \frac{\sum_{i \in A} SA_i}{\sum_{i \in G,A} SA_i}$;
- SA_i denotes the standardised capital charge for all the positions of desk "i";
- $i \in A$ denotes the indices of all the approved desks in the "amber zone";
- $i \in G, A$ denotes the indices of all the approved desks in the "green zone" or "amber zone";

B.4 Revisions to Appendix B: PLA test metric design

I. Introduction

[...]

The remainder of this appendix describes the P&L attribution (PLA) and backtesting framework that accompanies the internal models capital requirement. The next section deals with relevant definitions and the nature of the tests themselves, while the section that follows concerns the supervisory interpretation of the results and sets out the agreed standards of the Committee in this regard.

II. Description of the PLA and backtesting frameworks at the trading desk level

For the purposes of the PLA and backtesting frameworks, the following requirements apply.

The hypothetical P&L (HPL) must be calculated by revaluing the positions held at the end of the previous day using the market data of the present day (ie using static positions). As it measures changes in portfolio value that would occur when end-of-day positions remain unchanged, it must not take into account intraday trading nor new or modified deals, in contrast to the actual P&L. Both actual and hypothetical P&Ls include FX and commodities in the banking book if their regulatory capital is calculated using an internal model.

Fees and commissions must be excluded from both actual and hypothetical P&Ls as well as valuation adjustments for which separate regulatory capital approaches have been otherwise specified as part of the rules (eg CVA and its associated eligible hedges) and valuation adjustments which are deducted

from Common Equity Tier 1 (CET1) (eg the impact on the DVA component of the fair value of financial instruments must be excluded from these P&Ls).

Any other market risk-related valuation adjustments, irrespective of their updating frequency, must be included in the actual P&L while only valuation adjustments updated daily must be included in the HPL, unless specific agreement to exclude them has been obtained from the bank's supervisor. Smoothing of valuation adjustments that are not calculated daily is not allowed. P&L due to the passage of time should be included in the actual P&L and should be treated consistently in both HPL and RTPL.^{FN}

^{FN} Time effects can include various elements such as: the sensitivity to time, or theta effect (ie using mathematical terminology, the first-order derivative of the price relative to the time), and carry or costs of funding.

Valuation adjustments which the bank is unable to calculate at the trading desk level (eg because they are assessed in terms of the bank's overall positions/risks or because of other constraints around the assessment process) are not required to be included in the HPL and actual P&L for backtesting at the trading desk level, but should be included for firm-wide backtesting. Banks must provide support, to the satisfaction of the supervisor, for valuation adjustments that are not computed at a trading desk level.

Both actual P&L and HPL must be computed based on the same pricing models (eg same pricing functions, pricing configurations, model parametrisation, market data, systems) as the ones used to produce the reported daily P&L.

P&L attribution

The PLA assessment is designed to measure the materiality of simplifications in banks' risk management models driven by missing risk factors and differences in the way positions are valued compared with their front office systems. It is intended to prevent banks using their risk management models for the purposes of capital requirements when such simplifications are considered material. For the assessment, all of the instruments held within a particular trading desk should be identified and considered as a distinct portfolio. The risk factors for that portfolio that are included in the trading desk's risk management model must be used to calculate the risk-theoretical P&L (RTPL) – the daily desk-level P&L that is predicted by the valuation engine of the risk management model using all the risk factors used in the risk management model (ie both modellable risk factors which are included in the bank's ES model and the non-modellable risk factors which are subject to a stress scenario capital charge). The RTPL must not take into account any risk factors that the bank does not include in its desk's risk management model.

Movements in all risk factors contained in the trading desk's risk management model should be included, even if the forecasting component of the internal model uses data that incorporate additional residual risk. For example, a bank using a multi-factor beta-based index model to capture event risk might include alternative data in the calibration of the residual component to reflect potential events not observed in the name-specific historical time series. The fact that the name is a risk factor in the model, albeit modelled in a multi-factor model environment, means that, for the purposes of the PLA, the bank would include the actual return of the name in the RTPL (and the HPL) and get recognition for the risk factor coverage of the model.

The PLA assessment compares the RTPL with the HPL – the HPL used should be identical to the HPL used for backtesting purposes. The comparison is performed to determine whether the risk factors included and the valuation engines used in the desk's risk management model capture the material drivers of the bank's P&L by determining if there is a significant degree of association between the two P&L measures observed over a suitable time period. The Committee accepts that the RTPL can differ from the HPL for a number of reasons. However, the rationale for this assessment is that a desk's risk management model should provide a reasonably accurate assessment of the risks of a trading desk to be deemed eligible for the internal models approach.

For the sole purpose of the PLA assessment, banks are allowed to align the RTPL's input data for its risk factors with the data used in the HPL if these alignments are documented, justified to supervisors, and the requirements set out are fulfilled:

- Banks must demonstrate that HPL input data can be appropriately used for RTPL purposes, and that no risk factor differences or valuation engine differences are missed when transforming HPL input data into a format which can be applied to the risk factors used in RTPL calculation.
- Any adjustment of RTPL input data must be properly documented, validated and justified to the supervisor.
- Banks must have procedures in place to identify changes with regard to the adjustments of RTPL input data. Banks must notify the supervisor about these changes.
- Banks must provide assessments on the effect these input data alignments would have on the RTPL and the PLA test. To do so, banks need to compare RTPL based on HPL-aligned market data with the RTPL based on market data without alignment. This comparison must be performed when designing or changing the input data alignment process and upon the request of the supervisors.

Adjustments to RTPL input data will be allowed when the input data for a given risk factor that is included in both the RTPL and the HPL differs due to: different providers of market data sources or time fixing of market data sources; or transformations of market data into input data suitable for the risk factors of the underlying pricing models. These adjustments can be done either:

- by direct replacement of the RTPL input data (eg par rate tenor x, provider a) with the HPL input data (eg par rate tenor x, provider b); or
- by using the HPL input data (eg par rate tenor x, provider b) as a basis to calculate the risk factor data needed in the RTPL/ES model (eg zero rate tenor x).

If the HPL uses market data in a different manner to the RTPL to calculate risk parameters which are essential to the valuation engine, then these differences need to be reflected in the PLA test and as a result in the calculation of the HPL and RTPL. In this regard, the HPL and RTPL are allowed to use the same market data only as a basis, but need to use their respective methods (which can differ) to calculate the respective valuation engine parameters. This would be the case, for example, where market data are transformed as part of the valuation process used to calculate the RTPL. In that instance, banks can align market data between the RTPL and HPL pre-transformation but not post-transformation.

Banks are not permitted to align the HPL's input data for the risk factors with ones used in the RTPL. Adjustments to the RTPL or HPL to address residual operational noise are not permitted.^{FN}

^{FN} Residual operational noise arises from computing the HPL and RTPL in two different systems at two different points in time. It may originate from transitioning large portions of data across systems, and potential data aggregations may result in minor reconciliation gaps below tolerance levels for intervention; or from small differences in static/reference data and configuration.

The P&L attribution requirements are based on two test metrics:

- the Spearman correlation metric of the ranks between the RTPL and the HPL; and
- the [Alternative 1: Kolmogorov-Smirnov, Alternative 2: Chi-Squared] test metric of the likeness between the RTPL and the HPL.

To calculate each test metric for a desk, the bank must use the time series of the most recent 250 business days of observations of the RTPL and HPL.

Process for determining the Spearman correlation metric

1. For a time series of the HPL, banks must produce a corresponding time series of ranks based on the size of the P&L (R_{HPL}), ie the lowest value in the HPL time series receives a rank of 1, the next lowest value receives a rank of 2, etc.
2. Similarly, for a time series of the RTPL, banks must produce a corresponding time series of ranks based on size (R_{RTPL}).
3. Banks must calculate the Spearman correlation coefficient of the two time series of ranks based on size using the following formula:

$$r_s = \frac{cov(R_{HPL}, R_{RTPL})}{\sigma_{R_{HPL}} \times \sigma_{R_{RTPL}}}$$

where R_{HPL} is the time series of HPL rank values; R_{RTPL} is the time series of RTPL rank values; and $\sigma_{R_{HPL}}$ and $\sigma_{R_{RTPL}}$ are the standard deviations of R_{RTPL} and R_{HPL} .

Alternative 1

Process for determining Kolmogorov-Smirnov (KS) test metrics

1. The bank must calculate the empirical cumulative distribution function of the RTPL. For any value of RTPL, the empirical cumulative distribution is the number of RTPL observations that are less than or equal to the specified RTPL divided by 250.
2. The bank must calculate the empirical cumulative distribution function of HPL. For any value of HPL, the empirical cumulative distribution is the number of HPL observations that are less than or equal to the specified HPL divided by 250.
3. The bank must calculate the largest absolute difference between these two empirical cumulative distribution functions at any P&L value.

Alternative 2

Process for determining Chi-squared test metrics

1. The bank must use the HPL observations to create five bins (of potentially unequal length), each of which contains 50 values of HPL.
 - The first bin contains all HPL values less than or equal to the 50th observation.
 - The second bin contains all HPL values greater than the 50th lowest valued observations and less than or equal to the 100th lowest valued observation.
 - The third bin contains all HPL values greater than the 100th lowest valued observations and less than or equal to the 150th lowest valued observation.
 - The fourth bin contains all HPL values greater than the 150th lowest valued observation and less than or equal to the 200th observation.
 - The fifth bin contains all HPL values greater than the 200th HPL observation.
2. The bank must count the number of RTPL observations in each bin (denoted $c_1...c_5$).
3. The bank must calculate the Chi-squared test metric as:

$$\chi^2 = \sum_{i=1}^5 \frac{(c_i - 50)^2}{50}$$

]

Banks are required to estimate and report these metrics for each trading desk at a quarterly frequency based on annual observation periods.

B.5 Revisions to Appendix B and Glossary: PLA definitions

[...]

III. Supervisory framework for the interpretation of backtesting results for the firm-wide risk model

(a) Definition of a backtesting exception/outlier

Backtesting the firm-wide risk model will be based on a VaR measure calibrated at a 99th percentile confidence level. An exception or an outlier occurs when either the actual or the hypothetical loss of a trading desk or of the firm-wide trading book registered in a day of the backtesting period is higher than the corresponding daily risk measure given by the model. In the case where either the P&L or the risk measure is not available or impossible to compute, it will count as an outlier.

[...]

Glossary

Hypothetical P&L (HPL): The daily 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. Commissions, fees, intraday trading and new/modified deals, valuation adjustments for which separate regulatory capital approaches have been otherwise specified as part of the rules and valuation adjustments which are deducted from CET1 are excluded from the HPL. Valuation adjustments updated daily should usually be included in the HPL. Time effects should be treated in a consistent manner in the HPL and risk-theoretical P&L.

Actual P&L: The actual P&L is derived from the daily P&L process. It includes intraday trading as well as time effects and new and modified deals but excludes fees and commissions as well as valuation adjustments for which separate regulatory capital approaches have been otherwise specified as part of the rules or which are deducted from CET1. Any other valuation adjustments that are market risk-related must be included in the actual P&L. As is the case for the HPL, the actual P&L should include FX and commodity positions held in the banking book.

Risk-theoretical P&L (RTPL): The daily desk-level P&L that is predicted by the valuation engines in the risk management model using all risk factors used in the risk management model.

Desk's risk management model: "[T]he desk's risk management model (pertaining to in-scope desks) includes all risk factors that are included in the bank's ES model with supervisory parameters and any risk factors deemed not modellable by the supervisor in Step 3, and which are therefore not included in the ES model for calculating the respective regulatory capital charge, but are included in NMRFs".

Profit and loss (P&L) attribution (PLA): A method for assessing the robustness of banks' risk management models by comparing the RTPL predicted by risk management models with the HPL.

Annex C – Revisions to trading desk structure

The proposed revision to paragraph 24 of the January 2016 standard is as follows:

24. The key attributes of a trading desk are as follows:
- (a) A trading desk for the purposes of the regulatory capital charge is an unambiguously defined group of traders or trading accounts. Each individual trader or trading account should only be assigned to a single trading desk. A bank may assign an individual trader to work across two trading desks provided it can justify the business necessity to the supervisor. A bank could allocate traders across desks for sound business and resource allocation reasons but must not do so with the intent to optimise the likelihood of success in the P&L attribution tests.

The proposed revision to key element #1 of Annex A of the January 2016 standard is as follows:

Key element #1: a “trading desk” for the purposes of the regulatory capital framework is an unambiguously defined group of traders or trading accounts.

- An individual trader or trading account is an indisputable and unambiguous unit of observation in accounting for trading activity.
- The desk must have no more than two head traders provided their roles, responsibilities and authorities are either clearly separated or one has ultimate oversight over the other.
 - The head trader must have direct oversight of the group of traders or trading accounts.
 - Each trader or each trading account in the desk must have a clearly defined specialty (specialities).
- Each trader or each trading account should only be assigned to a single trading desk. Subject to supervisory approval, a bank may assign individual traders to up to two trading desks. The head trader’s role may cut across several businesses. Nonetheless, a given trader should be the head trader at only one desk and not multiple desks unless it can be justified as a necessity to the supervisor.

The desk must have a clear reporting line to bank senior management, and should have a clear and formal compensation policy clearly linked to the pre-established objectives of the desk.

Annex D – Guidance for evaluating the sufficiency and accuracy of risk factors for IMA trading desk models

The proposed additional appendix to January 2016 standard is as follows:

1. Principles for supervisory assessment of data used for expected shortfall models

Banks use many different types of models to determine the risks resulting from trading positions. The data requirements for each model may be different. For any given model, banks may use different sources or types of data for the model's risk factors. Banks must not rely solely on the number of observations to determine whether a risk factor is modellable. The accuracy of the source of the risk factor price must also be considered. In addition to the requirements specified in paragraph 183 (c), the following principles for data used in the model must be applied to determine whether a risk factor that passed the risk factor eligibility test can be modelled using the expected shortfall model or should be subject to a non-modellable risk factor (NMRF) charge.

Principle 1. *The data used may include combinations of modellable risk factors.* Banks often price instruments as a combination of risk factors that have been deemed modellable. This practice allows for sound pricing interpolations/extrapolations, as well as other transformations of historical observations. As a general principle, interpolation based on combinations of modellable risk factors should be consistent with mappings used for P&L attribution (to determine the RTPL) and should not be based on alternative, and potentially broader, bucketing approaches. Likewise, banks may compress risk factors into a smaller dimension of orthogonal risk factors (eg principal components) and/or derive parameters from observations of modellable risk factors, such as in models of stochastic implied volatility, without the parameters being directly observable in the market.

Subject to the approval of the supervisor, banks may extrapolate up to a reasonable distance from the closest modellable risk factor. The extrapolation should not rely solely on the closest modellable risk factor but on more than one modellable risk factor. In the event that a bank uses extrapolation, the extrapolation must be considered in the determination of the RTPL.

Principle 2. *The data used must allow the model to pick up both idiosyncratic and general market risk.* General market risk is the tendency of an instrument's value to change with the change in the value of the broader market, as represented by an appropriate index or indices. Idiosyncratic risk is the risk associated with a particular issuance, including default provisions, maturity and seniority. The data must allow both components of market risk to be captured in any market risk model used to determine capital requirements. If the data used in the model do not reflect either idiosyncratic or general market risk, the bank must apply an NMRF charge for those aspects that are not adequately captured in its model.

Principle 3. *The data used must allow the model to reflect volatility and correlation of the risk positions.* Banks must ensure that they do not understate the volatility of an asset (eg by using inappropriate averaging of data or proxies). Further, banks must ensure that they accurately reflect the correlation of asset prices, rates across yield curves and/or volatilities within volatility surfaces. Different data sources can provide dramatically different volatility and correlation estimates for asset prices. The bank should choose data sources so as to ensure that (i) the data are representative of real price observations (RPOs); (ii) price volatility is not understated by the choice of data; and (iii) correlations are reasonable approximations of correlations among RPOs. Furthermore, any transformations must not understate the volatility arising from risk factors and must accurately reflect the correlations arising from risk factors used in the bank's ES model.

Principle 4. *The data used must be reflective of prices observed and/or quoted in the market.* Where data used are not derived from RPOs, the bank must demonstrate that the data used are reasonably representative of RPOs. To that end, the bank must periodically reconcile price data used in a risk model with front office and back office prices. Just as the back office serves to check the validity of the front office price, risk model prices should be included in the comparison. The comparison of front or back office prices with risk prices should consist of comparisons of risk prices with RPOs, but front office and back office prices can be used where RPOs are not widely available. Banks must document their approaches to deriving risk factors from market prices.

Principle 5. *The data used must be updated at a sufficient frequency.* A market risk model may require large amounts of data, and it can be challenging to update such large data sets frequently. Banks should strive to update their model data as often as possible to account for frequent turnover of positions in the trading portfolio and changing market conditions. Banks should update data at a minimum on a monthly basis, but preferably daily. Lags in updating can lead to erroneous outcomes and a poor reflection of current risks. Additionally, banks should have a workflow process for updating the sources of data. Furthermore, where the bank uses regressions to estimate risk factor parameters, these must be re-estimated on a regular basis, generally no less frequently than every two weeks. Calibration of pricing models to current market prices must also be sufficiently frequent, ideally no less frequent than the calibration of front office pricing models. Where appropriate, banks should have clear policies for backfilling and/or gap-filling missing data.

Principle 6. *The data used to determine stressed expected shortfall (ES) must be reflective of market prices observed and/or quoted in the period of stress.* The data for the stressed ES model should be sourced directly from the historical period whenever possible. There are cases where the characteristics of current instruments in the market differ from those in the stress period. Nevertheless, banks must empirically justify any instances where the market prices used for the stress period are different from the market prices actually observed during that period. Further, in cases where instruments that are currently traded did not exist during a period of significant financial stress, banks must demonstrate that the prices used match changes in prices or spreads of similar instruments during the stress period.

In cases where banks do not sufficiently justify the use of current market data for products whose characteristics have changed since the stress period, the bank must omit the risk factor for the stressed period and meet the requirement of paragraph 181 (d) that the reduced set of risk factors explain 75% of the fully specified ES model. Moreover, if name-specific risk factors are used to calculate the ES in the actual period and these names were not available in the stressed period (eg an initial public offering occurred two years ago, while the stress period is five years ago), there is a presumption that these risk factors are not in the reduced set of risk factors. Exposures for risk factors which are included in the current set but not in the reduced set need to be mapped to the most suitable risk factor of the reduced set for the purposes of calculating ES measures in the stressed period.

Principle 7. *The use of proxies must be limited, and proxies must have sufficiently similar characteristics to the transactions they represent.* Supervisors will assess whether methods for combining risk factors are conceptually and empirically sound. Combinations of modellable risk factors are to be considered as proxies and, in constructing modellable risk factors, proxy use must be limited and proxies themselves must be sufficiently similar to characteristics of the transactions they represent. Proxies must be appropriate for the region, quality and type of instrument they are intended to represent. For example, the use of indices in a multi-factor model must capture the correlated risk of the assets represented by the indices, and the remaining idiosyncratic risk must be demonstrably uncorrelated across different issuers. A multi-factor model needs to have significant explanatory power for the price movements of assets and must provide an assessment of the uncertainty in the final outcome due to the use of a proxy. The coefficients (betas) of a multi-factor model need to be empirically based and not determined based on judgment. Instances where coefficients need to be set by judgment generally should be considered as NMRFs. If risk factors are represented by proxy data in the ES model, the proxy data representation of the risk factor – not the risk factor itself – must be used in the RTPL unless the bank has identified the basis

between the proxy and the actual risk factor and properly capitalised the basis as an NMRF. If the basis is properly capitalised as an NMRF then the bank can choose to include in the RTPL either (i) the proxy risk factor and the basis or (ii) the actual risk factor itself.

2. Evidence to support model data quality

Banks are required to demonstrate to their supervisors that the principles outlined above are being followed. Although supervisors may use discretion regarding the types of evidence required of banks, the following are examples of the types of evidence that banks may be required to provide.

Example 1. Regression diagnostics for multi-factor beta models. In addition to showing that indices or other regressors are appropriate for the region, asset class and credit quality (if applicable) of an instrument, banks must be prepared to demonstrate that the coefficients used in multi-factor models are adequate to capture both general market risk and idiosyncratic risk. If the bank assumes that the residuals from the multi-factor model are uncorrelated with each other, the bank should be prepared to demonstrate that the modellable residuals are uncorrelated. Further, the factors in the multi-factor model must be appropriate for the region and asset class of the instrument and must explain the general market risk of the instrument. This must be demonstrated through goodness-of-fit statistics (eg an adjusted-R² coefficient) and other diagnostics on the coefficients. Most importantly, where the estimated coefficients are not used (ie the parameters are judgment-based), the bank must describe how the coefficients are chosen and why they cannot be estimated, and demonstrate that the choice does not underestimate risk. In general, risk factors are not considered modellable in cases where parameters are set by judgment.

Example 2. Recovery of price from risk factors. The bank must periodically demonstrate and document that the risk factors used in its risk model can be fed into front office pricing models and recover the actual prices of the assets. If the recovered prices substantially deviate from the actual prices, this can indicate a problem with prices used to derive the risk factors and call into question the validity of data inputs for risk purposes. In such cases, supervisors may determine that the risk factor is non-modellable.

Example 3. Risk pricing is periodically reconciled with front office and back office prices. While banks are free to use price data from external sources, these external prices should periodically be reconciled with internal prices (from both front office and back office) to ensure they do not deviate substantially, and that they are not consistently biased in any fashion. Results of these reconciliations should be made available to supervisors, including statistics on the differences of the risk price from front office and back office prices. It is standard practice for banks to conduct reconciliation of front office and back office prices; the risk prices must be included as part of the reconciliation of the front office and whenever there is a potential for discrepancy. If the discrepancy is large, supervisors may determine that the risk factor is non-modellable.

Example 4. Risk factor backtesting. Banks must periodically demonstrate the appropriateness of their modelling methodology by comparing the risk factor returns forecast produced by the risk management model with actual returns produced by front office prices. Alternatively, a bank could backtest hypothetical portfolios that are substantively dependent on key risk factors (or combinations thereof). This risk factor backtesting is intended to confirm that risk factors accurately reflect the volatility and correlations of the instruments in the risk model. Hypothetical backtesting can be effective in identifying whether risk factors in question adequately reflect volatility and correlations when the portfolio of instruments is chosen to highlight specific products.

Example 5. Risk factors generated from parameterised models. For options, implied volatility surfaces are often built using a parameterised model based on single-name underlyings and/or option index RPOs and/or market quotes. Liquid options at moneyness, tenor and option expiry points may be used to calibrate level, volatility, drift and correlation parameters for a single-name or benchmark volatility surface. Once these parameters are set, they are derived risk factors in their own right that must be updated and recalibrated periodically as new data arrive and trades occur. In the event that these risk factors are used

to proxy for other single-name option surface points, there must be an additional-basis NMRF overlay for any potential deviations.

Annex E – Revisions to the scope of market risk capital requirements

E.1 Revisions to the treatment of structural FX positions

The proposed modifications to paragraph 4 are as follows:

4. A matched currency risk position will protect a bank against loss from movements in exchange rates, but will not necessarily protect its capital adequacy ratio. If a bank has its capital denominated in its domestic currency and has a portfolio of foreign currency assets and liabilities that is completely matched, its capital/asset ratio will fall if the domestic currency depreciates. By running a short risk position in the domestic currency, the bank can protect its capital adequacy ratio, although the risk position would lead to a loss if the domestic currency were to appreciate. Supervisory authorities are free to allow banks to protect their capital adequacy ratio in this way and exclude certain currency risk positions from the calculation of net open currency risk positions, subject to meeting each of the following conditions:

- (a) The risk position is taken or maintained for the purpose of hedging partially or totally against the potential that changes in exchange rates could have an adverse effect on its capital ratio.
- (b) The risk position is of a “structural”, ie of a non-dealing, nature such as positions stemming from:
 - investments in affiliated but not consolidated entities denominated in foreign currencies; or
 - investments in consolidated subsidiaries or branches denominated in foreign currencies.
- (c) The exclusion is limited to the amount of the risk position that neutralises the sensitivity of the capital ratio to movements in exchange rates.
- (d) The exclusion from the calculation is made for at least six months.
- (e) The establishment of a structural FX position and any changes in its position must be pre-approved by the national supervisor.
- (f) Any exclusion of the risk position needs to be applied consistently, with the exclusionary treatment of the hedge remaining in place for the life of the assets or other items.
- (g) The bank is subject to a requirement by the national supervisor to document and have available for supervisory review the positions and amounts to be excluded from market risk capital requirements.

4a. No FX capital charge need apply to positions related to items that are deducted from a bank’s capital when calculating its capital base.

[...]

E.2 Revisions to the boundary between the trading book and banking book

The proposed modifications to paragraphs 12, 13, 14, 15, 15a, 16, 27, 28, 29 and 69 are as follows:

12. Any instrument a bank holds for one or more of the following purposes must, when it is first recognised on its books, be designated as a trading book instrument, unless specifically otherwise provided for in paragraph 10 or paragraph 15:

- (a) short-term resale;

- (b) profiting from short-term price movements;
- (c) locking in arbitrage profits;
- (d) hedging risks that arise from instruments meeting criteria (a), (b) or (c) above.

13. Any of the following instruments is seen as being held for at least one of the purposes listed in paragraph 12 and therefore must be included in the trading book, unless specifically otherwise provided for in paragraph 10 or paragraph 15:

- (a) instrument in the correlation trading portfolio;
- (b) instrument that would give rise to a net short credit or equity position in the banking book;^{FN}

^{FN} A bank will have a net short risk position for equity risk or credit risk in the banking book if the present value of the banking book increases when an equity price decreases or when a credit spread on an issuer or group of issuers of debt increases.

- (c) instruments resulting from securities underwriting commitments.

14. Any instrument which is not held for any of the purposes listed in paragraph 12 at inception, nor seen as being held for these purposes according to paragraph 13, must be assigned to the banking book.

15. The following instruments must always be assigned to the banking book:

- (a) unlisted equities;
- (b) instrument designated for securitisation warehousing;
- (c) real estate holdings;
- (d) retail and SME credit;
- (e) derivative instruments that have the above instrument types or funds that need to be assigned to the banking book according to paragraph 15a as underlying assets; or
- (f) instruments held for the purpose of hedging a particular risk of (i) a position in the types of instruments above or (ii) funds that need to be assigned to the banking book according to paragraph 15a.

15a. Equity investments in a fund, including but not limited to hedge funds, for which no daily real prices are available must be assigned to the banking book. The same generally applies if there is no look-through possibility for such funds. A trading book assignment is, however, possible for equity investments in funds that (i) have daily price quotes; (ii) track a non-leveraged benchmark (allowing full look-through); and (iii) have an absolute value of a tracking difference, ignoring fees and commissions, of less than 1%. The tracking difference must be checked at regular intervals of no more than one year and is defined as the annualised return difference between the fund and its tracked benchmark over the last 12 months of available data (or a shorter period in the absence of a full 12 months of data). For the sensitivities-based method and the default risk charge of the standardised approach, such equity investments in funds are considered as a direct exposure to the tracked benchmark. For the residual risk add-on treatment, see paragraph [58 (d')].

The proposed new paragraph (to be added between 58 (d) and 58 (e)) is as follows:

58. [...]

(d') For equity investments in funds that are assigned to the trading book according to paragraph 15a, if the tracked benchmark includes components that individually would be subject to curvature or vega risk, the fund as a whole is, in the event of a standardised approach treatment, subject to a residual risk add-on of (i) 1% for benchmarks including exotic exposures or (ii) 0.1% for benchmarks not including any exotic exposures.

The proposed revisions to paragraphs 16, 27, 28, 29 and 69 are as follows:

16. There is a general presumption that any of the following instruments are being held for at least one of the purposes listed in paragraph 12 and are therefore trading book instruments, unless specifically otherwise provided for in paragraph 10 or paragraph 15.

(a) instruments held as accounting trading assets or liabilities;^{FN}

^{FN} Under IFRS (IAS 39) and US GAAP, these instruments would be designated as "held for trading". Under IFRS 9, these instruments would be held within a trading business model. These instruments would be fair-valued through the profit and loss (P&L) account.

(b) instruments resulting from market-making activities;

(c) equity investments in a fund, excluding those assigned to the banking book according to paragraph 15a;

(d) listed equities (other than equity investments in funds);^{FN}

^{FN} Subject to supervisory review, certain listed equities may be excluded from the market risk framework. Examples of equities that may be excluded include, but are not limited to, equity positions arising from deferred compensation plans, convertible debt securities, loan products with interest paid in the form of "equity kickers", equities taken as a debt previously contracted, bank-owned life insurance products, and legislated programmes. The set of listed equities that the bank wishes to exclude from the market risk framework should be made available to, and discussed with, the national supervisor and should be managed by a desk that is separate from desks for proprietary or short-term buy/sell instruments.

(e) trading-related repo-style transaction;^{FN} or

^{FN} Repo-style transactions that are (i) entered for liquidity management and (ii) valued at accrual for accounting purposes are not part of the presumptive list of paragraph 16.

(f) options including bifurcated embedded derivatives^{FN} from instruments that the institution issued out of its own banking book and that relate to credit or equity risk.

^{FN} The bifurcated derivative associated with the issued instrument should be recognised on the bank's balance sheet for accounting purposes.

Banks can be allowed to deviate from the presumption according to the process described in paragraph 17:^{FN}

^{FN} The presumptions for designation of an instrument to the trading book or banking book set out in this text will be used where a designation of an instrument to the trading book or banking book is not otherwise specified in this text.

[...]

27. Apart from the moves required by paragraphs 12 to 17, there is a strict limit on the ability of banks to move instruments between the trading book and the banking book at their own discretion after initial designation, which is subject to the process described in paragraphs 28 and 29. Switching instruments for regulatory arbitrage is strictly prohibited. In practice, switching should be rare and will be allowed by supervisors only in extraordinary circumstances. Examples are a major publicly announced event, such as a bank restructuring that results in permanent closure of trading desks, requiring termination of the business activity applicable to the instrument or portfolio or a change in accounting standards that allows an item to be fair-valued through the P&L. Market events, changes in the liquidity of a financial instrument, or a change of trading intent alone are not valid reasons for reassigning an instrument to a different book. When switching positions, banks must ensure that the standards described in paragraphs 12 to 17 are always strictly observed.

28. Without exception, a capital benefit as a result of switching will not be allowed in any case or circumstance. This means that the bank must determine its total capital charge (across banking book and trading book) before and immediately after the switch. If this capital charge is reduced as a result of this switch, the difference as measured at the time of the switch will be imposed on the bank as a disclosed Pillar 1 capital surcharge. This surcharge will be allowed to run off as the positions mature or expire, in a manner agreed with the supervisor. To maintain operational simplicity, it is not envisaged that this additional charge would be recalculated on an ongoing basis although the positions would continue to also be subject to the ongoing capital requirements of the book to which they have been switched.

29. Any reassignment between books must be approved by senior management; thoroughly documented; determined by internal review to be in compliance with the bank's policies; subject to prior approval by the supervisor based on supporting documentation provided by the bank; and publicly disclosed. Unless required by changes in the characteristics of a position, any such reassignment is irrevocable. If an instrument is reclassified to be an accounting trading asset or liability, there is a presumption that this instrument is in the trading book, as described in paragraph 16 (a). Accordingly, in this case an automatic switch without approval of the supervisor is acceptable.

69. [deleted]

Annex F – Simplified alternative to the standardised approach to market risk capital requirements

The proposals to introduce the simplified alternative to the standardised approach are as follows:

General provisions

1. The simplified alternative to the standardised approach (hereafter “the simplified alternative”) is intended for use by banks that maintain smaller or simpler trading books. To determine the appropriateness of the simplified alternative for use by a bank for the purpose of its market risk capital requirements, supervisors may wish to consider the following indicative criteria:

- The bank should not be a G-SIB.
- The bank should not use the internal models approach for any of its trading desks.
- The bank should not hold any correlation trading positions.

2. The use of the simplified alternative is subject to supervisory approval and oversight. Supervisors can mandate that banks with fairly complex or sizeable risks in particular risk classes apply the full standardised approach instead of the simplified alternative, even if those banks meet the indicative eligibility criteria referred to above.

Capital requirement of simplified alternative

3. The capital requirement arising from the simplified alternative is the simple sum of the recalibrated capital requirements arising from each of the four Basel II risk classes, namely interest rate risk, equity risk, foreign exchange risk and commodity risk as detailed in the formula below:

$$\text{Capital requirement} = CR_{IRR} * SF_{IRR} + CR_{EQ} * SF_{EQ} + CR_{FX} * SF_{FX} + CR_{COMM} * SF_{Comm}$$

where:

- CR_{IRR} = capital requirement under Basel II, Section VI (C), subsection 1, “Interest rate risk”, plus additional requirements for option risks from debt instruments (non-delta risks) under Basel II, Section VI (C), subsection 5, “Treatment of options”;
- CR_{EQ} = capital requirement under Basel II, Section VI (C), subsection 2, “Equity risk”, plus additional requirements for option risks from equity instruments (non-delta risks) under Basel II, Section VI (C), subsection 5, “Treatment of options”;
- CR_{FX} = capital requirement under Basel II, Section VI (C), subsection 3, “Foreign exchange risk”, plus additional requirements for option risks from foreign exchange instruments (non-delta risks) under Basel II, Section VI (C), subsection 5, “Treatment of options”;
- CR_{COMM} = capital requirement under Basel II, Section VI (C), subsection 4, “Commodities risk”, plus additional requirements for option risks from commodities instruments (non-delta risks) under Basel II, Section VI (C), subsection 5, “Treatment of options”;
- SF_{IRR} = Scaling factor of [1.50-2.00];
- SF_{EQ} = Scaling factor of [3.00-3.50];
- SF_{COMM} = Scaling factor of [1.50-2.50];
- SF_{FX} = Scaling factor of [1.25-1.50].