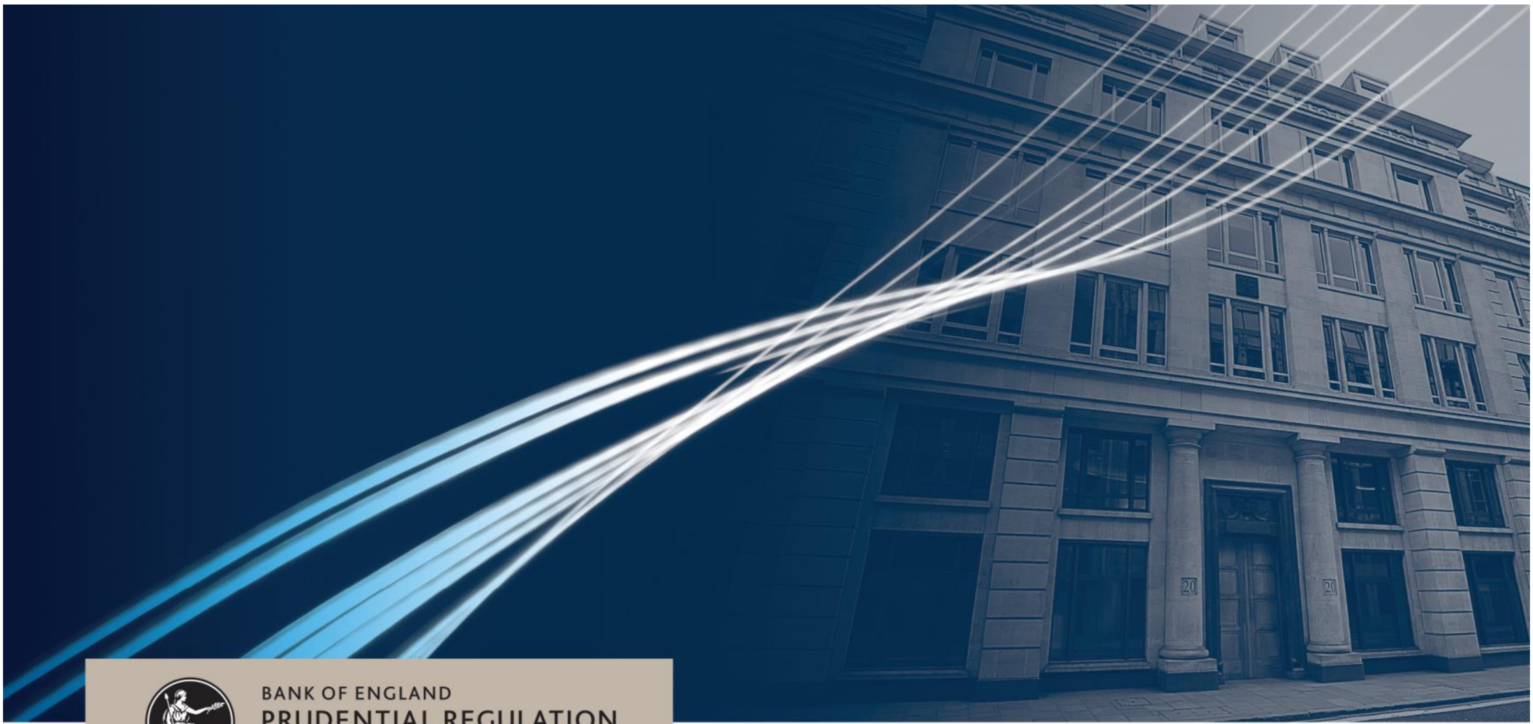

BANK OF ENGLAND
PRUDENTIAL REGULATION AUTHORITY

Consultation Paper | CP17/19

Counterparty credit risk: Treatment of model limitations in banks' internal models

July 2019

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Responses are requested by Friday 25 October 2019.

Please address any comments or enquiries to:
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1 Overview

1.1 This consultation paper (CP) sets out the Prudential Regulation Authority's (PRA's) proposed changes to Supervisory Statement (SS) 12/13 'Counterparty Credit Risk' to clarify expectations regarding the treatment of model limitations and assumptions under Part Three, Title II, Chapter 6, Section 6 (the internal model method for counterparty credit risk) of the Capital Requirements Regulation (575/2013) (CRR).

1.2 The CP is relevant to all firms to which CRD IV[1] applies.

1.3 Draft amendments to the SS, which add a new chapter (4A) are set out in the Appendix.

Background

1.4 CRR Article 286(4) requires that firms using the internal model method (IMM) to calculate the exposure value for derivatives or other transactions should have in place a formal process through which they can ensure senior management is aware of the limitations and assumptions of the model, and the impact those limitations and assumptions can have on the reliability of the model output. CRD Article 101(1) requires the competent authorities to ensure that where material deficiencies are identified in risk capture by a firm's internal model then these deficiencies are either rectified, or mitigated through imposing capital add-ons or other appropriate and effective measures.

1.5 The PRA has identified variability in how firms comply with the Article 286(4) requirement. Specifically there is variability in relation to the process used to track limitations and assumptions, the type of limitations and assumptions considered, the rigour with which the potential materiality of the impact of limitations and assumptions on the model outputs is considered, and the application of capital add-ons as mitigants to model limitations and assumptions. The PRA considers that it would improve comparability and help ensure a level playing field between firms to clarify its expectations with regards to how Article 286(4) should be interpreted.

1.6 The PRA notes that the materiality of model limitations and assumptions will typically increase with increasing levels of collateralisation. The PRA considers it important that the process for tracking model limitations and assumptions should take this into account when estimating the potential impact of model assumptions and limitations on the model output.

1.7 The PRA is especially concerned about the model risk that may arise from recognising excess collateral (ie collateral beyond the level required to offset the current exposure) in the exposure calculation. This is particularly relevant if the amount of excess collateral available is determined using models which are themselves similar to those used to estimate the gross exposure. This may occur when initial margin exchanged against non-cleared derivatives exposures is recognised in the IMM. One way to address this increased model risk is through an exposure floor, calibrated as a percentage of the exposure without recognising the initial margin. The PRA proposes such a floor in this CP, which it would expect firms to apply as a mitigant against the possibility that the level of collateralisation leads to an unacceptable increase in the relative materiality of limitations and assumptions on the net exposure output from the model.

1 Capital Requirements Directive (2013/36/EU) (CRD) and Capital Requirements Regulation (575/2013) (CRR) – jointly 'CRD IV'.

Implementation

1.8 The PRA proposes that the draft changes to SS12/13 would take effect from the publication of the final policy.

Responses and next steps

1.9 This consultation closes on Friday 25 October 2019. The PRA invites feedback on the proposals set out in this consultation. Please address any comments or enquiries to CP17_19@bankofengland.co.uk.

1.10 The proposals set out in this CP have been designed in the context of the current UK and EU regulatory framework. The PRA has assessed that the proposals will not be affected in the event that the UK leaves the EU with no implementation period in place.

2 Proposals

2.1 This chapter sets out the PRA’s proposed expectations relating to:

- monitoring of model limitations and assumptions; and
- setting a minimum level for certain exposures in the presence of excess collateral.

Monitoring of model limitations and assumptions

2.2 All models inevitably involve assumptions and limitations. If the impact of these assumptions and limitations on the output of the model becomes too large, then the model may become unfit for purpose. When using models to estimate capital requirements it is important to mitigate this risk by monitoring the potential impact of known limitations and assumptions on the model output on an ongoing basis. These requirements, applied in relation to firms using the IMM, are set out in CRR Article 286(4).

2.3 An IMM framework generally consists of many different individual models, each responsible for simulating the evolution of a particular group of risk factors or pricing a certain category of transactions. Typically each of these models is developed, documented and reviewed somewhat independently of the others, and this process usually includes an assessment of limitations and assumptions in the individual model. However the PRA has observed variation in how effectively firms aggregate these limitations and assumptions into a single coherent framework for the monitoring, and where necessary capitalisation, of model limitations and assumptions relevant to the overall IMM output.

2.4 The PRA proposes that all model limitations and assumptions which may affect the output of the IMM should be included in a single, central inventory with an assessment of their potential impact on the key model outputs of exposure and capital requirements. An example of a (non-exhaustive) list of the types of limitations and assumptions which the PRA would expect to be monitored is included in the Appendix. The PRA proposes that firms should estimate the potential impact of limitations and assumptions on model outputs on a periodic basis, and that firms should hold capital against them where the potential impact is material.

2.5 The PRA does not propose to set any explicit expectations relating to the methodologies used to quantify potential impact, the frequency of reassessment, or the level at which a model deficiency is deemed sufficiently material to warrant application of a capital add-on. The PRA understands that an

IMM framework embeds a large number of assumptions and would expect estimates to vary in frequency and methodological rigour based on their likely materiality.

A minimum exposure level in the presence of excess collateral

2.6 The PRA is particularly concerned about model limitations and assumptions in the presence of excess collateral beyond the level required to offset the current exposure, such as exposures covered by initial margin (IM). While it is reasonable that an increasing level of collateralisation should lead to a reduction in exposure, it is also likely to lead to an increase in the relative materiality of the potential impact of model deficiencies.

2.7 It is challenging to assess quantitatively the performance of an IMM model in the presence of significant levels of excess collateral. By design, the collateral reduces the exposure close to zero, which makes meaningful statistical analysis difficult. However, without any further mitigation there is a risk that high levels of excess collateral may lead to models generating outputs which are substantially affected by model deficiencies. The PRA proposes that firms should consider the model limitations that arise as a result of transactions covered by excess collateral and that, if appropriate, they should hold more capital in respect of these transactions.

2.8 The PRA notes that the standardised approach for measuring counterparty credit risk exposures (SA-CCR) in CRR II recognises the model risk from 'fat tails' in the exposure distribution for out-of-the-money netting sets through a conservative 'multiplier' function, which controls the extent to which excess collateral reduces the estimated exposure.[2] Under SA-CCR the exposure value of a portfolio of derivatives with zero net replacement cost (eg whose current market value is fully offset through the exchange of variation margin) and further excess collateral *IM* is given by:

$$(1)\ Exposure = Exposure_0\left(0.05 + 0.95e^{-IM/(1.9*AddOn)}\right)$$

where $Exposure_0$ is the exposure without recognising the IM and the *AddOn* factor represents the potential future exposure of the portfolio estimated using SA-CCR. Under this formula IM may never reduce the exposure value by more than a maximum of 95%.

2.9 Having considered various methods to address the issue of increased model risk, the PRA proposes that the modelled exposure in the presence of excess collateral should not be lower than the level of a floor. For reasons of simplicity and consistency with the standardised approach, the PRA proposes a floor functionally similar to the SA-CCR multiplier but recalibrated for use in IMM. The proposed floor, set out in paragraph 4A.5 of the Appendix, is based on applying a multiplier to the exposure value. This multiplier is similar to the SA-CCR multiplier but replaces the *AddOn* factor with a more risk-sensitive estimate of portfolio volatility derived from the IMM model. If firms apply this expectation, this would ensure a minimum level of capital is still held against the possibility that limitations and assumptions lead to a material understatement of exposure in the presence of significant excess collateral, while still retaining the essential risk-sensitivity of the IMM framework, with additional collateral always leading to a reduction in exposure.

2.10 The increased relative materiality of the impact of model deficiencies may be an issue in the presence of any form of excess collateral. However the PRA considers that this may be compounded if the amount of excess collateral is determined using similar models to the IMM models themselves,

2 Capital Requirement Regulation (EU) 2019/876 amending Regulation (EU) 575/2013.

as risks not captured in the IMM models are likely to overlap strongly with those risks which are not adequately covered by collateral. The PRA proposes that the scope of the proposed floor should be transactions where the amount of excess collateral is determined using an initial margin model as set out in Chapter I, Section 4 of Commission Delegated Regulation (EU) 2016/2251 or equivalent third country requirements, as the PRA considers the IMM output in this case to be exposed to significant model risk which cannot easily be quantified.

3 The PRA's statutory obligations

3.1 The PRA is required by the Financial Services and Markets Act 2000 (FSMA) to consult when setting its general policies and practices.[3] In doing so, it is required to comply with several statutory and public law obligations. The PRA meets these obligations by providing the following in its consultations:

- a cost benefit analysis;
- an explanation of the PRA's reasons for believing that making the proposed rules is compatible with the PRA's duty to act in a way that advances its general objective,[4] insurance objective[5] (if applicable), and secondary competition objective;[6]
- an explanation of the PRA's reasons for believing that making the proposed rules are compatible with its duty to have regard to the regulatory principles;[7] and
- a statement as to whether the impact of the proposed rules will be significantly different for mutuals than for other persons.

3.2 The Prudential Regulation Committee (PRC) should have regard to aspects of the Government's economic policy as recommended by HM Treasury.[8]

3.3 The PRA is also required by the Equality Act 2010[9] to have due regard to the need to eliminate discrimination and to promote equality of opportunity in carrying out its policies, services and functions.

Cost benefit analysis

Monitoring of model limitations and assumptions

3.4 This proposal provides clarity to ensure that firms have in place consistent practices for the monitoring, and capitalisation where necessary, of material model limitations and assumptions. The PRA considers that the benefits of the proposal include:

- enhanced safety and soundness of any affected firm as firms would have in place sound processes to ensure they are aware of the materiality of model limitations and assumptions;

3 Section 2L of FSMA.
4 Section 2B of FSMA.
5 Section 2C of FSMA.
6 Section 2H(1) of FSMA.
7 Sections 2H(2) and 3B of FSMA.
8 Section 30B of the Bank of England Act 1998.
9 Section 149.

- increased consistency and transparency with the PRA's supervisory approach as clarifying requirements will improve transparency of the IMM framework, improve consistency among firms in how they mitigate model deficiencies, and ensure that capital requirements are more in line with risk.

3.5 The PRA recognises that developing and maintaining a framework for the monitoring of model limitations and assumptions in line with the expectations set out in this paper will represent a cost for some firms. However, the PRA estimates that the overall cost should be of limited significance as the principle of monitoring model limitations and assumptions is already a regulatory requirement for all firms approved to use the IMM.

Minimum exposure level in the presence of excess collateral

3.6 The proposed floor for exposures recognising collateral needed to meet the initial margin requirement set out in Chapter I, Section 4 of Commission Delegated Regulation (EU) 2016/2251 would mitigate the risk of internal models becoming exposed to an unacceptable level of model risk in the presence of excess collateral. The PRA considers that the benefits of the proposal include:

- the minimisation of the adverse effects of a failure of a PRA-regulated firm on the UK financial system, as failed firms would hold more capital against derivatives exposures covered by initial margin;

- increased consistency and transparency with the PRA's supervisory approach through setting out clear expectations for prudent IMM modelling in the presence of excess collateral.

3.7 The PRA estimates that the proposed exposure floor would have no material impact on firms' own funds requirements. The recognition of excess collateral within the IMM is not currently commonplace for exposures within scope of the proposed floor, meaning there is unlikely to be any immediate effect. The operational cost of implementing the floor is expected to be minimal.

Compatibility with the PRA's objectives

3.8 The PRA considers that the proposals in this CP advance its general objective to promote the safety and soundness of the firms it regulates by clarifying the PRA's expectations on the monitoring and capitalisation of model limitations and assumption as set out in CRR Part Three, Title II, Chapter 6 and CRD. The proposals aim to ensure that the level of capital firms are expected to maintain is adequate in relation to the risks to which they are, or may be, exposed.

3.9 When discharging its general functions in a way that advances its objectives, the PRA has, as a secondary objective, a duty, as far as reasonably possible, to act in a way that facilitates effective competition in markets for services provided by PRA-regulated firms carrying on regulated activities. The PRA's proposals would facilitate a more consistent interpretation of the requirements set out in CRR Article 286(4). The PRA considers a more consistent interpretation of the requirements will help to level the playing field among firms and ensure that firms take a more unified approach to holding capital against model limitations and assumptions.

Regulatory principles

3.10 In developing the proposals in this CP, the PRA has had regard to the regulatory principles. Three principles are of particular relevance.

(i) The principle that a burden should be proportionate to the benefits which are expected to result from the imposition of that burden. The PRA considers that the increased costs to firms that would result from the proposals is small in comparison to the regulatory outcome of promoting the safety and soundness of PRA regulated firms.

(ii) The principle that the PRA should use its resources in the most efficient and economical way. Clarifying the PRA's supervisory expectations in respect of the monitoring of model limitations and assumptions would result in better and more efficient engagement between the PRA and users of the IMM framework.

(iii) The principle that the PRA should exercise its functions as transparently as possible. The PRA is aware of inconsistent interpretation of CRR Article 286(4) in relation to the scope and methodological rigour of the processes used by firms. The PRA considers that setting out expectations in a supervisory statement is the most suitable way to provide greater clarity.

Impact on mutuals

3.11 The proposals in this CP would only apply to firms subject to the CRR. Some mutual societies are subject to the CRR, and for those firms, the impact of the proposals would be no different than for other authorised firms.

HM Treasury recommendation letter

3.12 HM Treasury has made recommendations to the PRC about aspects of the Government's economic policy to which the PRC should have regard when considering how to advance the PRA's objectives and apply the regulatory principles. The PRA has considered these in relation to the proposals. Of particular relevance are the aspects of:

- Competitiveness, by making the UK and London an attractive domicile for internationally active financial institutions through the promotion of robust institutions (considered in paragraph 3.8); and

- Competition, by ensuring a level playing field between firms (considered in paragraph 3.9).

Equality and diversity

3.13 The PRA considers that the proposals do not give rise to equality and diversity implications.

Appendix: Draft amendments to Supervisory Statement 12/13 'Counterparty credit risk'

This appendix proposes changes to Supervisory Statement 12/13 'Counterparty credit risk'. All text is new and has not been underlined.

...

4A Monitoring of model limitations

4A.1 Article 286(4) of the CRR states that firms using the IMM must have in place a formal process through which senior management shall be aware of the limitations and assumptions of the model and the impact those limitations and assumptions can have on the reliability of the model output.

4A.2 In complying with these requirements the PRA expects that all firms should be able to make readily available a single, comprehensive inventory of limitations and assumptions that may affect the output of the IMM to senior management, the PRA and other stakeholders. This should include all limitations and assumptions identified during the validation of the individual models which make up the IMM framework, as well as overarching limitations and assumptions which affect the calculation of Effective Expected Positive Exposure (EEPE) under both the current and stress period calibration. The inventory should include, but is not limited to, assumptions and limitations associated with the following:

- Risk factors used by the business in the pricing of transactions included in the scope of the IMM, whose variability is not captured in the forecasting distribution used to calculate the exposure.
- The number of paths used, and the granularity of the time grid on which those paths are realised, should the firm use Monte Carlo simulation to estimate the exposure.
- Any fixed parameters or constants determined by expert judgement which are used in the models to generate the forecast distribution under either the current or stressed calibration.
- Collateralised exposure including the duration of the margin period of risk, and whether firms may continue to make (but not receive) trade-related cashflow payments during all or part of that period.
- Calibration of models including the selection of calibration instruments, the length of historical time periods, or the use of proxy data.
- Identification of a stress period which coincides with a period of increased credit default swap or other credit spreads for a representative selection of counterparties as per CRR Article 292(3).
- The value assumed for any assets consistent with a jump to default of the underlying obligation as per CRR Article 291(5)(e).

4A.3 The PRA expects that firms should have in place a process for estimating the potential impact that limitations and assumptions may have on the key model outputs of exposure and capital requirements. The impact of a model assumption should be assessed relative to plausible alternative assumptions. The sophistication of the methodology used and the frequency of estimation, should be commensurate with the materiality of the limitation or assumption. Where quantitative models are used then these should be reviewed by a team independent from the model developer. Where the potential impact of an assumption or limitation on the total CCR capital requirement calculated using the IMM is material, firms should apply a prudent capital add-on in order to compensate for the risk. Capital add-ons for model limitations may be offset against other model risk-related capital add-ons, for example any capital buffer derived through backtesting, only to the extent that they can be clearly shown to derive from the same underlying limitation.

4A.4 The PRA expects that firms should take into account the effect of collateral when assessing the potential impact of model limitations and assumptions. Collateral reduces the absolute level of exposure to a counterparty but at the same time increases the relative materiality of any understatement of risk. This is particularly true for exposures covered by excess collateral beyond the amount needed to offset the current exposure, for example where a firm recognises the effect of initial margin posted by the counterparty. The PRA expects firms to ensure that the recognition of collateral in IMM does not reduce exposure to a level at which the output of the model is subject to excessive model risk.

4A.5 In meeting this expectation, for exposures covered by excess collateral required to meet a regulatory obligation calculated in accordance with Chapter I, Section 4 of Commission Delegated Regulation (EU) 2016/2251,[10] the PRA will expect firms to floor the EEPE as per equation [1] below:

$$[1]\ EEPE = \max\left[EEPE_{modelled}\ ,\ EEPE_0\left(0.05 + 0.95e^{-IM/1.9EEPE_0}\right)\right]$$

Where $EEPE_{modelled}$ is the EEPE estimated by the model recognising all collateral; $EEPE_0$ is the EEPE recognising only collateral sufficient to offset the current market value; and *IM* is the volatility-adjusted value of excess collateral available over and above the amount required to offset the current market value. This floor should be applied at the level of each individual netting set.

4A.6 As well as monitoring the potential impact on the total CCR capital requirement calculated using the IMM, firms are expected to routinely identify individual counterparties and specific product types for which the impact of model limitations and assumptions may be particularly acute. Firms should have in place a process to ensure that credit officers and other stakeholders are made aware when there is a risk that exposure to a counterparty is materially understated as a result of deficiencies in the model. Senior management should be aware of any product types included in the IMM despite the presence of a model limitation which makes the model inherently unsuitable for estimating exposure for that particular product.

10 Or third country requirements deemed to be equivalent under Article 13 of Regulation (EU) 648/2012.