

Policy Statement | PS7/18

Model risk management principles for stress testing

April 2018



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PRUDENTIAL REGULATION
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1 Overview

1.1 This Prudential Regulation Authority (PRA) Policy Statement (PS) provides feedback to responses to Consultation Paper (CP) 26/17 'Model risk management principles for stress testing'.¹ It contains the final Supervisory Statement (SS) 3/18 'Model risk management principles for stress testing' (see Appendix).

1.2 This PS is relevant to PRA-authorised banks, building societies and PRA-designated investment firms ('firms'). The PS is not relevant to credit unions and there is currently no proposal to extend the policy to insurance and reinsurance firms.²

Background

1.3 In CP26/17, the PRA proposed a set of principles to support effective practices in model risk management for stress testing, namely:

- Principle 1 – Banks have an established definition of a model and maintain a model inventory.
- Principle 2 – Banks have implemented an effective governance framework, policies, procedures and controls to manage their model risk.
- Principle 3 – Banks have implemented a robust model development and implementation process, and ensure appropriate use of models.
- Principle 4 – Banks undertake appropriate model validation and independent review activities to ensure sound model performance and greater understanding of model uncertainties.

1.4 The PRA proposed that firms participating in the Bank of England's (the Bank) annual concurrent stress test should adopt the principles in full, and firms not participating in the Bank's annual concurrent stress test should seek to apply the principles on a proportionate basis, taking into account their size, complexity, risk profile, and the relevance to them of using stress test models.

Summary of responses

1.5 The PRA received three responses to the proposals in CP26/17. Respondents were supportive of the model risk management principles for stress testing, but also asked for further clarification, guidance and alternative wording in some areas. The PRA's feedback to responses, and decisions, are set out in Chapter 2.

Changes to the draft policy

1.6 Where the final rules differ from the draft in the CP in a way which is, in the opinion of the PRA, significant, the Financial Services and Markets Act 2000 (FSMA)³ requires the PRA to

1 December 2016: www.bankofengland.co.uk/prudential-regulation/publication/2017/model-risk-management-principles-for-stress-testing.

2 Insurance and reinsurance firms are currently not in scope. Requirements on model management for firms subject to Solvency II are set out in Commission Delegated Regulation (EU) 2015/35 Title I, Chapter VI, and PRA expectations are set out in SS17/16 'Solvency II: internal models – assessment, model change and the role of non-executive directors', November 2016: www.bankofengland.co.uk/prudential-regulation/publication/2016/solvency2-internal-models-assessment-model-change-and-the-role-of-non-executive-directors-ss.

3 Sections 138J(5) and 138K(4).

publish: details of the difference together with a cost benefit analysis; and a statement setting out in the PRA's opinion whether or not the impact of the final rule on mutuals is significantly different to the impact that the draft rule would have had on mutuals, or the impact that the final rule will have on other PRA-authorised firms.

1.7 Following consideration of respondents' comments, the PRA has made a number of changes to the draft SS to make the statements in some principles clearer, and provide greater clarity on the PRA's expectations in specific areas.

1.8 The PRA considers that the changes are not significant, and will not increase the burden on firms (including mutuals) or have a differential impact on mutuals compared to other firms. Therefore, the PRA has not updated the cost benefit analysis from the CP, or provided an assessment of the impact on mutuals.

Implementation

1.9 The expectations in SS3/18 will take effect from Friday 1 June 2018.

1.10 All firms applying the principles are expected to undertake a self-assessment of their stress test model risk management practices against the principles as part of the Internal Capital Adequacy Assessment Process (ICAAP) and report the findings in the ICAAP documents from Tuesday 1 January 2019 onwards, depending on the frequency of the Supervisory Review and Evaluation Process (SREP).

2 Feedback to responses

2.1 Respondents suggested alternative wording in selected areas to make the statements in the principles clearer. The PRA has reviewed the statements and agrees that some of them could be clearer. As a result, the PRA has made changes to the principles in P3.1, P3.7 and P4.2.

2.2 Respondents also sought greater clarity on the PRA's expectations in a number of specific areas. The remainder of this chapter sets out the details of these responses, the PRA's clarifications, and highlights the areas where changes have been made to the SS and the principles.

Rationale and scope of the principles

2.3 Two respondents commented that the model risk management principles set out in CP26/17 for stress testing purposes are applicable, and should be followed, for all models as best practice. They asked the PRA to elaborate on the rationale for proposing the principles only for stress testing models, as opposed to all models, and any future plans to issue or consult on model risk management standards covering other, or a wider set, of models.

2.4 The PRA considers stress testing an important tool, which informs supervisory strategy and policy development as well as the supervisory response to individual firms. Firms' stress test results should be based on sound judgements that adequately account for stress test model risk. While supervisory expectations on model validation for regulatory capital models have been published previously, eg SS11/13 'Internal Ratings Based (IRB) Approaches',¹ SS13/13

¹ October 2017: www.bankofengland.co.uk/prudential-regulation/publication/2013/internal-ratings-based-approaches-ss.

'Market Risk',¹ SS12/13 'Counterparty Credit Risk',² no expectations have so far been set for stress testing models.

2.5 A key objective of the Bank's stress-testing framework is to contribute to an improvement in firms' risk and capital management practices.³ The PRA considers the principles support this objective and will assist all firms in raising standards of management and governance of stress test model risk. They will provide a framework against which the Bank and the PRA can assess the effectiveness of firms' model risk management frameworks. For firms participating in the annual stress test, the assessment will form part of the stress test itself and for other firms as part of the SREP.

2.6 The principles are intended to be relevant to all model types, not only those used in a stress-testing context. In future, the PRA will consider whether it should further extend the principles to be applied to other types of models. The PRA will work closely with the industry to assess whether to widen the scope of the principles and, if it plans to do so, will consult on it separately.

Proportionality and model materiality

2.7 Respondents asked the PRA, in general, to be clearer on its expectations on the application of proportionality and materiality. They felt this would be of particular interest to smaller firms which will have fewer resources with the relevant knowledge to, for example, conduct independent review and challenge.

2.8 The PRA expects firms to adopt a risk-based approach to determine the materiality of models focusing on two factors: coverage (eg size of a portfolio), and impact (eg financial, capital or risk), with due consideration given to the model risks associated with the models, ie criteria such as complexity, purpose or strategic importance.

2.9 Materiality is specifically articulated for certain principles. In all other cases, the PRA expects firms to focus their validation and independent review activities in a manner commensurate with the overall use, complexity and materiality of models across the model life cycle to ensure those models that pose most significant risks – financial, capital or other - are adequately managed. The PRA has included a section in the SS that sets out these expectations.

Model definition

2.10 One respondent sought confirmation from the PRA that the principles do not apply to regulatory formulas used for capital reporting purposes. They also suggested removing the expectation that risks associated with the use of calculation mechanisms not classified as models should be controlled and managed through an established management control process.

2.11 The nature and extent of control management, validation and independent review activities employed for calculations or formulas (including regulatory formulas) will depend on the circumstances and purpose of use. The PRA considers it important for firms to assess the

1 March 2018: www.bankofengland.co.uk/prudential-regulation/publication/2013/market-risk-ss.

2 July 2016: www.bankofengland.co.uk/prudential-regulation/publication/2013/counterparty-credit-risk-ss.

3 Stress Testing the UK banking system: 2017 guidance for participating banks and building societies (March 2017): www.bankofengland.co.uk/stress-testing.

risks associated with the use and implementation of calculations or formulas. Firms should consider whether validation and independent review are needed for cases where calculations or formulas are used.

2.12 Therefore, the PRA considers that the principles apply to regulatory formulas depending on the purpose and use, and will retain the expectation on calculation mechanisms not classified as models in the model definition.

Model inventory

2.13 Two respondents requested that the PRA offer firms flexibility in recording model dependencies in their model inventory. In line with the approach to materiality set out above the PRA has amended P1.2 to provide this flexibility.

Role and responsibility of the board

2.14 One respondent requested that the PRA set out in more detail the expectations on the role and responsibility of the board and expressed concern as to the level of detail in relation to board oversight set out in P2.1. The respondent suggested that the PRA amend the principles to reflect that the board should be responsible for the model risk management framework and focus its attention on the aggregate model output rather than on specifics of individual models.

2.15 It is not the PRA's intention that boards should understand the statistical and mathematical underpinnings of models. However, both senior management and the board should ensure that they possess a general understanding of the most material models, the uncertainty around judgements, where the model is expected to work well and in what circumstances it is likely to break down. This is in line with the PRA's expectations set out in 'The Prudential Regulation Authority's approach to banking supervision'¹. The PRA has amended P2.1 to make clear that boards should focus their attention on the most material models and the aggregate outputs.

Definitions and roles of key functions

2.16 Respondents asked for further clarification of the definition of 'control and compliance functions' referenced in P2.1 and P2.3, and 'internal party' responsible for maintaining the bank-wide inventory referenced in P1.2.

2.17 In the context of a model risk management framework, the PRA considers control and compliance functions in P2.1 and P2.3 to refer to the independent model review function and model risk governance, or any other related governance function involved in the model risk management framework, and includes people performing these functions. In P1.2, 'internal party' should be interpreted as internal bank staff responsible for maintaining the model inventory system, regardless of whether an external inventory system is used. The responsibility to record and maintain model inventory records is that of model owners as set out in P2.3. For clarity, the definitions of 'control and compliance functions' and 'internal party' have now been added as footnotes to the relevant principles.

1 March 2016: www.bankofengland.co.uk/prudential-regulation/publication/2016/pru-approach-documents-2016.

2.18 One respondent asked the PRA to clarify its expectations on the roles of ‘model developers’ and ‘model users’. The PRA considers that model developers should be responsible for the development, evaluation and documentation of models and may be involved in model monitoring and a reassessment of already implemented models. Model users should ensure that models are used consistently with the model’s intended purpose, and that any model limitations are understood and taken into consideration when using the output of the model. The PRA has included these expectations in P2.3.

Independent review

2.19 Two respondents asked the PRA to clarify whether the same level of independent review or challenge applied to statistical or mathematical models are required for: (i) expert judgement based forecasting; (ii) adjustments made to model outputs; and (iii) all model components (including vendor models).

2.20 On points (i) and (ii), the PRA considers that the concept of independent review of judgement based models and adjustments may differ from that expected for other statistical or mathematical models. For example, the review and challenge of judgement-based approaches and adjustments may rely more heavily on reviews by subject matter experts that are independent of the development process.

2.21 On point (iii), and in line with the approach to materiality set out above, the PRA expects firms to conduct validation and independent review activities in line with the use, complexity and materiality of model components and vendor models.

2.22 The PRA has amended P4.1 to make clear that the nature and extent of firms’ validation and independent review activities should be appropriate with the overall use, complexity, and materiality of the models, model components, and adjustments to model results or changes to a model.

Model uncertainty

2.23 In P3.8, the PRA proposed that banks demonstrate that model uncertainties are adequately understood, managed, monitored, reported, and accounted for in the model results. Two respondents asked for further clarification on the definition and scope of ‘model uncertainty’, and for the PRA to provide further guidance on what is expected from firms in the assessment of model uncertainty.

2.24 The PRA considers model uncertainty as the inherent uncertainty in the parameter estimates and results of statistical models, and the uncertainty in the results due to model choices or model misuse. The management of model uncertainty should be supported by a robust model risk appetite framework.

2.25 On an individual model level, examples of assessing model uncertainty include the setting of triggers based on confidence intervals for statistical model performance, or conducting sensitivity analyses on key model assumptions.

2.26 On an aggregate level, the robustness of a model risk management framework can be assessed based on a range of criteria, for example the number of models (or balance sheet / risk weighted assets coverage) that have been independently reviewed. While such validation statistics are not measures of overall model uncertainty, they can be useful as indicators of the embeddedness of the framework.

2.27 The assessment of model uncertainty will depend on the type of models used and the nature, size, complexity and type of business. Firms should implement a model risk appetite framework and consider model uncertainty from both an individual model and aggregate level.

2.28 The PRA has included the definition, scope and expectations for model uncertainty in P3.8.

Model monitoring

2.29 In P3.9, the PRA proposed that the frequency of periodic monitoring of model performance should be commensurate with the nature and materiality of the models and risks, with due consideration given to model complexity. One respondent asked for further clarification as to the meaning of 'periodic monitoring of model performance' for stress testing models.

2.30 The PRA considers that the purpose of model monitoring is to ensure parameter estimates and model constructs remain fit for purpose and use when sufficient new observations are available and to ensure model assumptions remain valid under different stress conditions and scenarios. The frequency of monitoring activities will be determined by the frequency of available data and use of models for different scenarios. The PRA has clarified this in P3.9.

Appendix

Supervisory Statement 3/18 ‘Model risk management principles for stress testing’ available at: www.bankofengland.co.uk/prudential-regulation/publication/2018/model-risk-management-principles-for-stress-testing-ss